
EXPLORING FACTORS THAT
INFLUENCE THE SUPPLY AND
USE OF ANTIBIOTICS FROM
COMMUNITY PHARMACIES IN
THAILAND

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Summary

In Thailand, antibiotics are available lawfully from community pharmacies without a prescription. Inappropriate supply of antibiotics from Thai community pharmacies to the public for common, self-limiting diseases has been reported, and is associated with increased antimicrobial resistance. This study aims to explore factors influencing the use and supply of antibiotics from community pharmacies in Thailand.

Semi-structured interviews with Thai community pharmacists (n=23) and citizens (n=21) were conducted to explore the practice and reasons for antibiotic supply from pharmacies. Findings from the interviews and a literature review were used to develop a questionnaire for a stratified sample of community pharmacists, including nine vignettes for pharmacists to identify how they would respond in practice. Approval was obtained from Thailand and Wales ethics committees.

Three-hundred-and-twenty community pharmacists in all four Thai regions responded. In response to vignettes, 46% (147/320) of pharmacists would supply antibiotics without an appropriate indication for a URI, 50% (321/638) of pharmacists would suggest inappropriate antibiotics and/or regimens for patients with possible/probable group A streptococcal pharyngitis. In addition, 13% (74/640) and 11% (71/638) of pharmacists would supply antibiotics for acute diarrhea and simple wounds, respectively, where antibiotics were not recommended. Inappropriate antibiotic choices and/or incorrect dosage regimens were also reported.

A higher proportion of younger pharmacists and/or those with less experience, Pharm D. graduated pharmacists, employee pharmacists and those pharmacists who worked in a chain pharmacy were more likely to indicate appropriate antibiotic supply in response to the vignettes ($p<0.05$). Additionally, pharmacists who perceived an advantage of antibiotics is being cured quickly, were more likely to indicate less appropriate supply of antibiotics ($p<0.05$).

The findings suggest that improved public education, more pharmacist education on antibiotic use and AMR, better enforcement of existing regulations and stricter regulation on the supply of some antibiotics may lead to improved rational antibiotic use in Thailand.

List of Abbreviations

AMR	Antimicrobial resistance
ASU	Antibiotics Smart Use
CSMBS	Civil Servants Medical Benefits Scheme
GAS	Group A streptococcal
GPP	Good pharmacy practice
HCs	Health centres
MoPH	Ministry of Public Health
NCDs	Noncommunicable diseases
NHSO	National Health Security Office
PCT	Pharmacy Council of Thailand
PharmD	Doctor of Pharmacy
PHCs	Public health centres
RADT	Rapid Antigen Detection Testing
PPHO	Provincial Public Health Offices
SCM	Simulated client method
SSS	Social Health Insurance Scheme
Thai-FDA	Thai Food and Drug Administration
THPHs	Tambon health-promoting hospitals
UCS	Universal Coverage Scheme
URIs	Upper respiratory infections
UTIs	Urinary tract infections
VHVs	Village health volunteers
WHO	World Health Organization

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Chapter One

Introduction

1 Introduction

This chapter begins by providing a general context to the research, including background information on Thailand, its country profile, health system, related law and registration, and pharmacy. Background to the problem of antimicrobial resistance is also presented. Further, the structure of the thesis is also presented.

1.1 Thailand country profile

The Kingdom of Thailand is shown in Figure 1-1 Map of Thailand (Thanatheerawong 2019) and is situated in the continental Southeast Asia, just north of the equator, and is part of the Indochina Peninsula.



Figure 1-1 Map of Thailand

Thailand covers an area of about 514,000 square kilometres. It is the third largest country among the Southeast Asian nations, after Indonesia and Myanmar.

Thailand is divided into 77 provinces and has a population of 67 million; almost all residents (98.1%) are Thais and the rest are of other nationalities such as Chinese, Myanmar and Lao. For communication purposes, the Thai language is officially and commonly used for speaking and writing, while English tends to be used to some extent particularly in the business sector. Most Thai people are Buddhists (93.6%), followed by Muslims (5.4%), Christians (0.9%) and others (National Statistical Office 2015; Thanatheerawong 2019).

In 2017, the major causes of death were noncommunicable diseases (NCDs). The top three causes of death were cancer and tumours, traffic injuries, and heart disease. The proportions of disability-adjusted life-years (DALYs) lost due to NCDs were 68.0% and 72.0% in 2010 and 2016, respectively, while communicable diseases contributed 18.0% and 15.0% in the same years. The major NCD problems are hypertension, diabetes and cancer (Sitthiwong et al. 2019). The burden from a few preventable causes, such as traffic injuries, ischaemic heart disease, Type 2 diabetes and alcohol dependence or harmful use, is still high and challenging (Woratanarat et al. 2017).

1.1.1 Thailand health system

Thailand is a developing country with a particular healthcare system. This part presents a description of the public health insurance, health services and facilities in Thailand.

1.1.1.1 Public health insurance

Presently, almost all the Thai population (99%) is eligible for health services financially covered by three main schemes: the Universal Coverage Scheme (UCS), the Civil Servants Medical Benefits Scheme (CSMBS), and the Social Health Insurance Scheme (SSS) (Chaiyakunapruk et al. 2016; Woratanarat et al. 2017). CSMBS is operated by the Comptroller General's Department of the Ministry of Finance which covers approximately 5.2 million people (in 2010) specifically civil servants, public employees, and their dependents (parents, spouses and children) as well as pensioners. Funding for the CSMBS comes from general taxes. Similarly, the SSS is operated

by the Social Security Office at the Ministry of Labor and covers approximately 13.9 million (in 2016) private employees and temporary public employees. Its funding source is from employees, employers, and the government. UCS is operated by the National Health Security Office (NHSO). This scheme covers the rest of the population who are not covered under the CSMBS and the SSS, that is, approximately 49 million Thai nationals in 2016 (Woratanarat et al. 2017).

1.1.1.2 Health Services

Thailand has a multi-level health care system, aiming to improve geographical access to health services and to optimize system efficiency through rational use of services (Woratanarat et al. 2017). Health care services in Thailand are delivered by both public and private providers (Sakunphanit 2015; Pinprateep et al. 2019). The public sector is the majority of the health care service system, largely under the Ministry of Public Health (MoPH) (Chaiyakunapruk et al. 2016). Health facilities provide public health services at all health system levels, including primary, secondary and tertiary care.

Primary health services in Thailand are generally provided through networks of health centres (HCs), mostly at subdistrict (tambon) level, called “tambon health-promoting hospitals” (THPHs), primary care units (PCUs) and run by the MoPH; and public health centres (PHCs) run by the Bangkok Metropolitan Administration. The PHCs, which are available only in Bangkok, are staffed by between one and three physicians plus allied health personnel, and provide curative, preventive, and promotive (but rarely rehabilitative) services. The HCs are usually located in the rural areas of provinces and are mainly staffed by non-physician staff such as nurses or public health officers. Promotive and preventive services are the main functions of these HCs and THPHs. However, they also offer some basic curative and rehabilitative care to people living in their catchment areas. There is at least one THPH in each subdistrict, covering approximately 5,000 people. There are 9777 THPHs and 362 PCUs across the country (Pinprateep et al. 2019).

To further expand the primary health care workforce in rural areas, village health volunteers (VHVs) were introduced to engage closely with people in the community. These volunteers have responsibilities to promote primary health care across the country, assisting to control communicable diseases, and providing basic care services to the local areas. The VHVs also provide follow up care via home visits. There is a link between clinical care and community resources. At those home visits, VHVs might provide family counseling and informal conversations to support the emotional and mental health of the family. They also might provide information on healthy lifestyles. All VHVs are from the local community, which ensures that they fully understand the cultural context of their community's health care needs and can provide appropriate physical and emotional support to individuals and families. Up to now, there are approximately 700,000 trained volunteers throughout the country (Woratanarat et al. 2017).

Secondary care delivers health services at the district level. There are 780 district hospitals providing health services. This is the first-level referral hospital (Pinprateep et al. 2019). There is at least one district hospital with 30 – 120 beds covering a population of around 50,000 people (Pinprateep et al. 2019). These hospitals provided curative and rehabilitative care at the individual level and serve as referral hospitals for primary care facilities. Doctors, pharmacists, and healthcare teams are responsible for providing care.

For tertiary care, there are 110 general hospitals at the provincial level, each covering a population of approximately 600,000 people. There are 33 regional hospitals which have been upgraded from general hospitals for referrals. At the top level of the system, there are 11 medical school hospitals (Pinprateep et al. 2019). The services are mainly provided in curative care, particularly in medical specialty services.

Moreover, private health facilities also play a significant role in providing health services in Thailand, especially in urban areas. There are 380 private hospitals, 26,066 private clinics (Ministry of Public Health 2019), mostly single practice operated by registered doctors, and 18,900 private pharmacies in 2017 (Bureau of Drug Control 2018).

1.1.2 Community pharmacy in Thailand

All pharmacies in Thailand are in the private sector. These pharmacies provide health services to much of the population and are front line, often conveniently accessible and affordable for many for self-care (Woratanarat et al. 2017).

In Thailand, there are three types of modern pharmacies: Type I, Type II, and Type III pharmacies. A Type I pharmacy is the majority type of pharmacy in Thailand. This type of pharmacy is required to have a registered pharmacist present to provide pharmacy services during working hours. The pharmacists provide medicines with or without a prescription depending on the drug classification. There were 18,900 Type I pharmacies registered in 2018 (Bureau of Drug Control 2018). In this study, the researcher used the term community pharmacy referring to a Type I pharmacy. A Type II pharmacy is licensed to sell only ready-packed modern medicines that are not classed as “dangerous drugs” or specially controlled drugs These pharmacies do not require the presence of a registered pharmacist. A Type III pharmacy is licensed to sell ready-packed modern medicines for animals.

1.1.3 Regulation relating to pharmaceutical products in Thailand

1.1.3.1 The Drug Act B.E. 2510 (1967)

The Thai Food and Drug Administration (Thai-FDA) of MoPH is the national regulatory agency for pharmaceutical products. All medicinal products for human and animal use in Thailand, including modern and traditional medicines and biological preparations, are regulated by The Drug Act B.E. 2510 (1967) and its amendments (The Constituent Assembly in the capacity of the National Assembly 1967).

Activities relating to this legislation are undertaken by the Thai-FDA, the central regulatory agency under the supervision of the Drug Committee appointed by the MoPH. The Thai-FDA collaborates with other MoPH agencies, such as the Department of Medical Science and the Provincial Public Health Offices (PPHO), in respective provinces throughout the country as well as non-MoPH agencies to

ensure effective regulatory systems on medicines for both human and animal uses (Chaiyakunapruk et al. 2016).

According to the Drug Act B.E. 2510 (1967), medicines in Thailand are classified into two major groups, modern and traditional medicines (The Constituent Assembly in the capacity of the National Assembly 1967; Chaiyakunapruk et al. 2016). In terms of the control of supply, modern medicines are divided into four major classes as described below (The Constituent Assembly in the capacity of the National Assembly 1967; Saramunee et al. 2011).

1.1.3.1.1 Household remedies

These medicines are common medicines for self-care and minor ailments. These products can be distributed through any premises, e.g. convenience stores and pharmacies without any requirement on the qualifications of the sellers. This type of medicine is approximately equivalent to UK General Sales List medicines. Examples of household remedy medicines are paracetamol 500 mg, not more than 10 tablets per strip or sodium alginate 250 mg, not more than 20 tablets per package.

1.1.3.1.2 Ready-packed medicines

These are modern medicines that are not classified as dangerous drugs. These can be sold without a prescription, by pharmacists, nurses and other medical professionals, for example, paracetamol 500 mg, 100 tablets per container.

1.1.3.1.3 Dangerous medicines:

These medicines are available can only be supplied/dispensed by pharmacists or medical doctors. Most of the medicines in Thailand are classified in this category, including most antibiotics. Examples of antibiotics are classified as dangerous drugs are amoxicillin, co-amoxiclav, cephalexin and levofloxacin,

1.1.3.1.4 Specially controlled medicines:

Special controlled medicines are also only available in Type I pharmacies, clinics, and hospitals, for example, corticosteroid tablets. These medicines could be

dispensed by medical doctors or supplied by community pharmacists from a Type I pharmacy with a valid prescription.

1.1.3.2 Regulations relating to psychotropic substances and narcotics

Regulation of psychotropic substances and narcotics with therapeutic uses are also the responsibility of the Thai-FDA. Benzodiazepines are categorized as psychotropic substances under the Psychotropic Substance Act B.E. 2559 (2016). Some benzodiazepines, such as diazepam, lorazepam and clonazepam are permitted to be dispensed in authorized Type I pharmacy with a valid prescription.

For narcotics, these medicines are under the control of the Narcotics Act B.E. 2552 (2009). It is not possible to dispense opiates from pharmacies.

1.1.3.3 Advertisement and price regulation

Advertisement of modern medicines of all categories is regulated by the Thai-FDA. All advertising materials for medicines including, related scripts and audio tracks, requires approval from the Thai-FDA. Only household remedies and traditional medicines can be advertised to the general public. The price regulation of medicines is not well established in Thailand. There has been no mechanism in place to control the prices and profit margins of medicines. There is only the Reference Pricing Scheme which regulates medicines purchased by government hospitals.

1.1.4 Professional and regulatory pharmacy organizations

Professional and regulatory pharmacy organizations play a number of roles with regards to pharmacy education, practice, accreditation, reimbursement, health policy planning and future planning for practitioners and graduating pharmacy students. Examples of professional pharmacy organizations are presented in Table 1-1 (Chaiyakunapruk et al. 2016).

Table 1-1 Pharmacy professional organizations in Thailand.

Name	Description	Website
Pharmacy Council of Thailand (PCT)	Governs, implements, and issues pharmacist licensures and accredits pharmacy curricula for all pharmacy schools in Thailand.	http://www.pharmacycouncil.org
The Association of Hospital Pharmacy (Thailand)	Provides standards of hospital pharmacy practice, which is re-enforced in conjunction with Hospital Accreditation Institute (HAI). Provides continuing education opportunities to Thai hospital pharmacists.	http://thaihp.org
Community Pharmacy Association (Thailand)	Supports and promotes professional activities and continuing education for community pharmacists.	http://pharcpa.com
The College of Pharmacotherapy of Thailand (CPhT)	Under the supervision of PCT. Supervises, implements, and accredits pharmacy residency programmes in Thailand.	http://thaibcp.pharmacycouncil.org

1.1.5 Pharmacy education in Thailand

The Pharmacy Council of Thailand (PCT) is the governing body that issues pharmacy licences and accredits pharmacy curricula in Thailand. Since 2010, all initial pharmacy education in Thailand transitioned from a 5-year BPharm (Bachelor of Pharmacy) to an entry-level-6-year PharmD (Doctor of Pharmacy) programme (Chaiyakunapruk et al. 2016).

The recently qualified pharmacists with a Pharm D degree are expected to have more clinical skills and capable to provide clinically services in their practice. The programmes initially emphasized institutional clinical pharmacy practice, with the last year devoted to experiential professional clerkships. The programmes have been built on the principles of pharmaceutical care towards clinical pharmacy practice. In addition, a number of clinical residency programmes in pharmacotherapy have recently been established and approved by the PCT (The

Royal Thai Government Gazette 2008; Sumpradit et al. 2014; Chaiyakunapruk et al. 2016).

At present, there are 19 faculties of pharmacy which are accredited by the PCT to offer the PharmD degree. These are based in 14 public and 5 private universities (Chaiyakunapruk et al. 2016; Pharmacy Council of Thailand 2019). There are many postgraduate programmes offered in Thailand, including Masters and PhD degrees, and diplomas. Masters and PhD degrees are provided by numerous faculties of pharmacy, while diplomas are provided by the college of Pharmacotherapy of Thailand (for Board Certification Pharmacotherapy) and The College of Pharmaceutical and Health Consumer Protection of Thailand (for Board Certified in Pharmaceutical and Health Consumer Protection) (The College of Pharmaceutical and Health Consumer Protection of Thailand 2017; The College of Pharmacotherapy of Thailand 2017).

1.1.6 Community pharmacy practice in Thailand

Community pharmacies in Thailand are one of the major health facilities where people can access medicines and health related products. The main role of community pharmacists is to provide pharmacy services for people in the community. One of the most common services is to supply medicines (without need of a prescription) to patients. Community pharmacists perform triage and supply medicines to treat minor illness for their patients as well as providing necessary advice. Community pharmacists also provide a dispensing service for prescription medicines. However, the prescription service is a small fraction of the services provided from community pharmacies due to the fact that drug prescribing and dispensing services are not formally separated in Thailand. Every hospital in Thailand has a pharmacy department to dispense medicines to their outpatients. In private clinics, doctors can prescribe and dispense medicines for their patients. The customers have to pay for medication cost regardless of whether or not there is a prescription. (Chaiyakunapruk et al. 2016).

The role of community pharmacists in Thailand has been changing over the past two decades. They provide other pharmacy services not just medicines supply.

Recently, many extended pharmacy services have been initiated as pilots. Four community pharmacy services have been provided in community pharmacies, 1) prescription refilling services for chronic diseases (hypertension, diabetes, asthma, and psychiatric disorders), 2) screening services for chronic diseases, 3) smoking cessation services, and 4) medication therapy management. These activities have been integrated into the healthcare delivery system and are now reimbursable from a number of funding bodies such as the Thai Health Promotion foundation, NHSO (Chaiyakunapruk et al. 2016).

To ensure the high quality of pharmaceutical care in community pharmacies in Thailand, the Community Pharmacy Accreditation Project was introduced in 2002 as a collaboration between the Pharmacy Council of Thailand and the Thai-FDA. However, community pharmacy accreditation is voluntary not compulsory. The number of accredited community pharmacies was more than one thousand in 2017 (The office of Pharmacy Accreditation (Thailand) 2017). Accredited community pharmacies have been approved by the Pharmacy Council for meeting standards concerning: 1) premises, equipment, and supporting facilities; 2) quality management; 3) good pharmacy practice; 4) regulation compliance and ethics; and 5) services and participation in the community (Panyawuttikrai 2013). Accredited pharmacies are expected to provide good pharmacy services, including the following: 1) promoting the rational use of medicines; 2) identifying patients for pharmaceutical services; 3) reviewing prescriptions and consulting prescribers if needed; 4) dispensing medication with suitable information; 5) recording patient drug profiles; 6) monitoring therapeutic outcomes; 7) referring patients for appropriate treatment; 8) conducting sequential counselling sessions (e.g. smoking cessation counselling) for those who need it; 9) reporting adverse outcomes of drugs and health-related products; and 10) collaborating with physicians and other healthcare professionals (Thailand Ministry of Public Health 2013).

The Thai-FDA realized the benefit of good pharmacy practice (GPP)¹ and tried to implement this concept in the regulations for every community pharmacy in Thailand. For this reason, the new Ministerial Regulation on the Application and Issuance of License to Pharmacies was announced in 2013 and became effective on 26th June 2014. As a result, new community pharmacies which apply for a licence after the start of this regulation must adhere to the regulation. However, the Thai-FDA gave a period of eight years for pharmacies that were licensed before the start of the regulation to modify their pharmacy to comply with the new regulations before renewing their pharmacy licence (Wimonkittipong and Pantong 2014). Therefore, all community pharmacies should comply with GPP by 2022.

1.2 The problem of antimicrobial resistance

1.2.1 The burden of antimicrobial resistance

In recent years, the problem of antimicrobial resistance (AMR) has increased significantly, and has become a serious health care issue worldwide (Llor and Bjerrum 2014; World Health Organization 2016a). Growing resistance to antibiotics is a particularly serious global challenge. AMR infections are estimated to contribute to approximately 700,000 deaths per year, globally. Failing to tackle AMR could cause 10 million deaths a year and cost up to 100 trillion USD by 2050 (O'Neill 2016). This problem is exacerbated by the increased use of antimicrobials worldwide, and the lack of development of new antimicrobial agents (World Health Organization 2016b).

Unfortunately, there are no recent official numbers on the impact of AMR on healthcare and public health in Thailand. Most recently, a preliminary study in 2010 found that about 88,000 infections were attributed to AMR. This was responsible for at least 3.2 million additional hospitalization days and about 38,000 deaths in Thailand. The direct costs to treat AMR infection amounted to

¹ GPP is the practice of pharmacy that responds to the needs of the people who use the pharmacists' services to provide optimal, evidence-based care. To support this practice, it is essential that there be an established national framework of quality standards and guidelines (International Pharmaceutical Federation and World Health organization 2011).

2400-5800m Baht (approximately £60 - £145m). The indirect costs of morbidity and premature deaths related to AMR were at least 37,000m Baht (approximately £940m) (Phumart et al. 2012).

Reports from national antimicrobial surveillance as well as a previous study (Ministry of Public Health and Ministry of Agriculture and Cooperatives 2016; Pharm et al. 2016; Phodha et al. 2019) revealed that antimicrobial resistance in Thailand has been increasing over the past decade. One important group of infections related to AMR are nosocomial infections. Common and important resistant pathogens include extended-spectrum beta-lactamase producing Enterobacteriaceae, carbapenem-resistant Enterobacteriaceae, carbapenem-resistant *Acinetobacter baumannii*, colistin-resistant Enterobacteriaceae, methicillin-resistant *Staphylococcus aureus*, and vancomycin-resistant Enterococci. In the community setting, important resistant pathogens are *Escherichia coli*, *Campylobacter* spp., and *Salmonella* spp. *Klebsiella* spp. and *Neisseria gonorrhoeae*

Even though AMR is a natural process which develops when microorganisms adapt and grow in the presence of antimicrobials, inappropriate prescribing and utilization of antimicrobials accelerates AMR. In particular, the misuse and overuse of antimicrobials (e.g. taking suboptimal dose, too short duration, or treatment of self-limiting infections) provides an avoidable additional pressure leading to more antibiotic resistance (Goossens 2009; World Health Organization 2015b, 2016b).

An exposure of susceptible bacteria to suboptimal doses of antibiotics can result in resistance. There is a significant association between antimicrobial resistance and inappropriate antibiotic use at both the individual and population levels (Goossens et al. 2005; Goossens 2009; World Health Organization 2016a). The inappropriate, overuse or misuse of antibiotics results not only in the increase in resistant bacteria but also increases ineffective therapy, adverse drug reactions, wasted resources, the higher cost of therapy and ultimately a greater economic burden on national and global health systems (Shehadeh et al. 2012; Sumpradit et al. 2012; World Health Organization 2016b).

In most countries, antibiotics are usually only lawfully supplied from community pharmacies with a prescription from a prescriber. However, purchasing antibiotics without a prescription from various drug outlets and community pharmacies have been reported in a range of countries around the world (Chuc et al. 2001; Awad et al. 2005; Grigoryan et al. 2008; Mainous et al. 2008; Sihavong et al. 2009; Sakeena et al. 2018b). This issue was also found in some developed countries, such as, the United Kingdom, France, Italy and Belgium (Väänänen et al. 2006; European Commission 2018). Likewise, self-medication with antibiotics left over from previous treatments, and sharing antibiotics with friends and family members has also been reported, both in developing and developed countries (Morgan et al. 2011; Ocan et al. 2015; Sakeena et al. 2018b). The inappropriate use of antibiotics, such as for non-bacterial infectious conditions, when patients are non-adherent to antibiotic treatment or when patients self-medicate with antibiotics, have also been reported in many countries (Kardas et al. 2005; Pechère et al. 2007; Auta et al. 2018; European Commission 2018; Sakeena et al. 2018b). More information on this issue is presented in Chapter 2: a review of the literature.

1.2.2 Action plan to combat AMR

Participation at the international level and the national level is needed to combat AMR. Therefore, the Global Action Plan on AMR was endorsed by the World Health Organization (WHO) in 2015. The goal of the action plan was to try to ensure the continuity of effective treatment and infectious disease prevention with the use of medicines in a judicious way, and all who need medicines to be able to access them. The five strategic objectives provided in this action plan were: 1) improve awareness and understanding of AMR through effective communication, education and training, 2) strengthen the knowledge and evidence base through surveillance and research, 3) reduce the incidence of infection through effective sanitation, hygiene and infection prevention measures, 4) optimize the use of antimicrobial medicines in human and animal health, and 5) develop the economic case for sustainable investment that takes account of the needs of all countries, and increase investment in new medicines, diagnostic tools, vaccines, and other

interventions. Although this proposal to combat AMR was initiated a few years ago, progression has been slow. This is because of inadequate monitoring and reporting at national, regional, and global level, and inadequate recognition of the need for action by all stakeholders (World Health Organization 2015a). Therefore, to succeed, every stakeholder, including government, healthcare organizations, healthcare providers, and public need to be involved in the action plan.

1.2.2.1 At national level

National policies could reduce the inappropriate use of antimicrobial agents and AMR. Achievement of improved appropriate antibiotic use will be difficult without a favourable policy framework (Holloway 2011; Uchil et al. 2014). The governments should consider AMR as a major public health issue. In addition, A one-health approach policy is essential for collaboration of all stakeholders (Uchil et al. 2014; World Health Organization 2015a). For example, the success of AMR strategies in South Africa was due to a collaboration of all key stakeholders: the government, the Minister and Director General of Health, and the South African Antibiotic Stewardship Programme. The programme spans both public and private sectors, human and animal sectors. The national strategy framework and implementation policy was endorsed by all participants (Goff et al. 2017).

1.2.2.2 Healthcare provider level

Healthcare providers including community pharmacists are one of the key factors to improve the rational use of antibiotics. Several activities related to healthcare professionals have proved useful to promote the rational use of medicines.

Up-to-date knowledge regarding antibiotic treatments and resistant microbes are important for appropriate antibiotic use. Therefore, education and training to improve awareness and understanding of AMR among healthcare professionals is needed. Continuing professional education is an effective method for improving appropriate treatment (Laing et al. 2001). Making AMR a core component of continuing professional education would help to ensure proper understanding and awareness among professionals (World Health Organization 2015a).

In many countries, educational support to healthcare providers was implemented in antimicrobial stewardship (AMS) programmes. For example, the International Centre for Medical Research and Training, USA, has linked AMS programmes to their patient safety strategy and promoted healthcare provider awareness campaigns. Treatment guidelines for specific infections, free online stewardship toolkits and continuing professional education have been provided in the USA. In the UK, an open-ended online course in AMS, relevant to global health economies has been developed (Goff et al. 2017).

A systematic review by Roque et al. (2014) which reviewed educational interventions, reported that educational programmes for healthcare professionals such as physicians, pharmacists, or nurses could improve adherence to practice guidelines and reduce antibiotic prescribing. The educational interventions reported in this review included: 1) disseminating educational materials such as protocols and guidelines, self-instruction materials, drug bulletins; 2) group education including group-session rounds, lectures, seminars, conferences; 3) feedback of physician prescribing or feedback of patient-specific lists of prescribed medication; 4) individual outreach visits; 5) reminders at the time of prescribing; 6) computer-assisted decision-making systems; 7) formulary control/restrictive formulary process; 8) workshops on rapid tests/introduction of Rapid Antigen Detection Testing (RADT) in consulting offices; and 9) prescription feedback, with recommendations to modify prescriptions made by pharmacists. This review included 78 studies that aimed to improve antibiotic prescribing and dispensing practice in either primary care or hospital settings. Therefore, the review covered a wide range of studies with different designs, targeted samples, targeted conditions/diseases, outcome measures and outcome periods. However, the results showed that educational programmes to improve rational antibiotic use are important, multifaceted interventions were likely to be more effective.

In addition, establishing, updating and increased provision of national treatment guidelines was suggested to improve antibiotic use by healthcare professionals (Abasaeed et al. 2009; Al Rasheed et al. 2016).

Furthermore, another key strategy to combat AMR is raising awareness of AMR and promoting behavioural change among public. This strategy needs to be actioned immediately according to the Global Action Plan. This should target all antibiotic usage in human health, animal health and agriculture (World Health Organization 2015a).

1.2.2.3 Public level

Public education is an important strategy to change the norm of antibiotic utilization. Many countries have initiated campaigns to educate and raise awareness of the public. Interventions reported to communicate with the public included pamphlets, posters, print media, billboards, radio, television, websites, letters, radio, television education events (Allison et al. 2017) and training. The target of the campaigns mostly were to the general public; however, some campaigns had more specific targets, such as, parents of young children or schoolchildren (Allison et al. 2017), the elderly population, and those in lower socioeconomic classes. Most campaigns tried to convey the message that antibiotic resistance is a significant problem and misuse of antibiotics contributes to this resistance. Informing the public about the unnecessary use of antibiotics for upper respiratory infections (URIs) which is mostly caused by viruses was also communicated. Other messages that were conveyed to the public included: encouraging people to follow the instructions and to complete the course of antibiotic treatment as prescribed; inviting them to consult healthcare professionals instead of specifically asking for antibiotics; and undertaking measures for infection prevention such as hand hygiene (Huttner et al. 2010; International Pharmaceutical Federation 2015; Cross et al. 2017). Pharmacists were targeted to provide and display information materials in numerous campaigns (Huttner et al. 2010). In addition, the WHO suggested the incorporation of the topics of antibiotic use and resistance in school curricula (World Health Organization 2015a).

A narrative review by (Cross et al. 2017) reported on the effectiveness of public education to improve antibiotic use. Some studies within this 2017 review reported that public-targeted interventions at national level, community level and

site-based/household level could reduce in antibiotic prescribing in developed countries, in at least the short-term; nonetheless, the long-term effect of the interventions have not been reported. Most of the studies within the review used mass media to communicate with the public. Interventions using mass media resulted in positive findings on antibiotic prescribing in a number of studies within the review. However, multi-modal approach such as distribution of written materials, educational events and meetings, providing educational materials in high schools, mailed written materials to households, or educational materials for patients was also used to communicate with the public alongside with the mass media. Therefore, the reduction of antibiotic prescribing reported in some studies may not be due to the mass media intervention alone, or even perhaps in part. Furthermore, some studies found no evidence in reducing antibiotic prescribing.

1.2.3 Roles/Potential roles of community pharmacists in combating AMR

Community pharmacists are uniquely positioned in being easily accessible to the public. In addition, most antibiotic consumption occurs in the community and antibiotics are obtained from community pharmacies, without or with a prescription. Many studies reported that community pharmacists believed that they can play a prominent role in AMS to promote rational antibiotic use and reduce AMR (Erku 2016; Khan et al. 2016; Rehman et al. 2018; Rizvi et al. 2018; Saha et al. 2019). Some developed countries have achieved success with the implementation of AMS programs that include community pharmacists (Huttner et al. 2014), while in many developing countries such programmes have not been implemented yet (Sakeena et al. 2018a). Possibly, because most community pharmacies are in the private sector, which may not have been considered by policy makers. Private practitioners are perceived by some to be of interest only in terms of profit rather than in the quality of professional practice, which is an oversimplification (Laing et al. 2001).

With capacity, opportunity and motivation, community pharmacists could play an important role in AMS to reduce inappropriate antibiotic use and resistance (International Pharmaceutical Federation 2015; Essack et al. 2018). Where antibiotics are classified as prescription only medicines, pharmacists could

evaluate and confirm the use of antibiotics in consultation with the prescriber. As the supplier without a prescription, community pharmacists could supply treatment for certain bacterial infections using standard treatment protocols, counsel patients on the appropriate use of antibiotics, and prevent unnecessary use of antibiotics for non-bacterial infections through appropriate treatment of symptoms and counselling of patients to ensure they have a good understanding of their illness. Community pharmacists should also advise and educate patients on the appropriate use of antibiotics when supplied in accordance with a prescription from a prescriber. These interventions could promote adherence to treatment guidelines and treatment regimens. Moreover, community pharmacists could provide other interventions to reduce AMR, such as, advising good hygienic practices to prevent infection, delivering/administering vaccines, and referring patients to appropriate healthcare professionals (International Pharmaceutical Federation 2015; Essack et al. 2018). High quality and expanded pharmacy education should be delivered to qualified community pharmacists to ensure they are well prepared for the activities above so that the quality of pharmaceutical care relating to antibiotics and infections is improved (Sakeena et al. 2018a).

1.2.4 Programmes to tackle antimicrobial resistance in Thailand

Thailand has started to address AMR as a health problem. Some approaches have been implemented to tackle the issue. For example, the Thailand National AMR surveillance Centre was established in 1998 and has been a WHO collaborating Centre for AMR surveillance for South East Asia since 2005.

In 2007, the Antibiotics Smart Use (ASU) Program was the first programme which started to tackle AMR. This programme aimed to reduce unnecessary prescriptions of antibiotics for common self-limiting conditions, including URIs, acute diarrhoea, and simple wounds. Multiple interventions were conducted, for example, educating and training prescribers on treatment guidelines and providing materials facilitating behaviour change. However, the action research programme recruited only hospitals and primary health centres and in some, not all, provinces in Thailand. In phase one of the initiative (2007 – 2008), one hospital and 87 primary health centres were recruited. In phase two (2008 – 2009), 44

hospitals and 621 primary health centres hospitals in three provinces participated. Public hospitals in 15 provinces participated in phase three (2010-2011). The pay-for-performance system provided a financial reward mechanism to hospitals based on the degree to which they have followed the ASU guideline. This was an important achievement that prompted the expansion of the ASU nationwide. Nonetheless, this was temporary. The programme was successful in the implementation of the ASU in participating hospitals and primary health centres. However, the extent to which antibiotic prescriptions for URIs, diarrhoea, and simple wounds was reduced in each health care setting varied. Moreover, antibiotic prescription rates in some centres increased (Sumpradit et al. 2012; Sumpradit 2013).

Public education regarding the rational antibiotic use in URIs, diarrhoea, and simple wounds was also a part of ASU programme. Educational tools were provided to participating hospitals and primary health centres for educating their patients and the public. The three key messages used to communicate with the public were: 1) antibiotics are not anti-inflammatory drugs; 2) antibiotics are classified as potentially dangerous drugs; and 3) URIs, acute diarrhoea, and simple wounds can be cured without antibiotics (Sumpradit et al. 2012).

As a later development, the Community Pharmacy Association (Thailand) initiated a campaign called “Mirror, mirror on the wall, do I need antibiotics at all” in 2012, as a part of the ASU policy. This campaign aimed to reduce patient demand for antibiotics. A mirror with side-by-side pictures of a typical bacterial and viral throat infection (figure 1-2) was provided to participating community pharmacies. This tool was used to help consumers check their throats in the mirror to see if it resembled the throat in the picture and decide whether or not they thought antibiotics were needed. When consumers asked for antibiotics, pharmacists would ask them for their self-evaluation (Community Pharmacy Association (Thailand) and Huachiew Chalermprakiet University 2012).

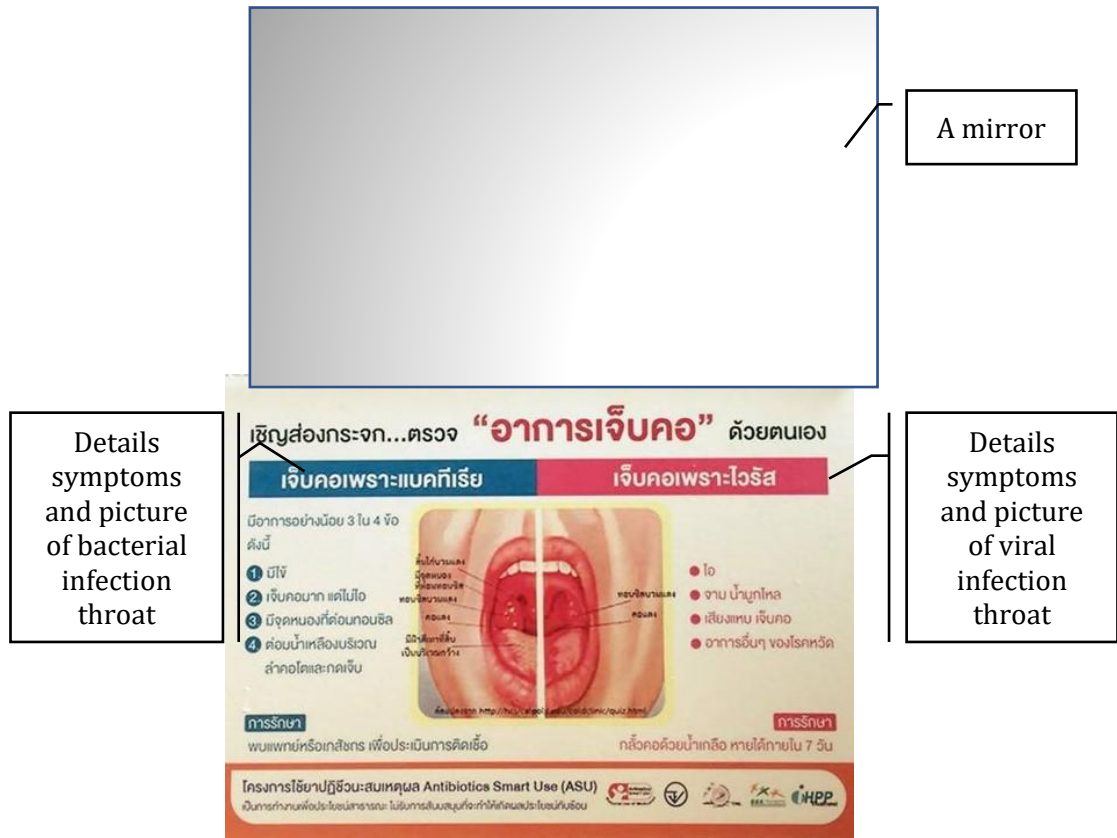


Figure 1-2 A tool using in the campaign to improve rational antibiotic use in community pharmacy, in Thailand

In 2017, the Thailand national strategic plan on antimicrobial resistance (2017 – 2021) was established to promote multisectoral collaboration in order to reduce antimicrobial consumption in both humans and livestock, to reduce AMR morbidity, and to raise public awareness. The plan consisted of five strategies, namely, 1) to increase AMR surveillance under the concept of a “One Health” approach which emphasizes collaboration across disciplines related to human health, animal health and livestock, agriculture and environment sectors in order to consolidate and synergize efforts and actions and to enhance the health of all living things; 2) to improve regulation of antimicrobial distribution by re-classifying certain antimicrobials and ensuring effective law enforcement; 3) to prevent and control hospital acquired infections, and promote antimicrobial stewardship; 4) to improve AMR containment, and decrease antimicrobial use in agriculture and livestock, and 5) to raise public awareness on AMR and the

appropriate use of antimicrobials (Ministry of Public Health and Ministry of Agriculture and Cooperatives 2016).

Studies relating to improving antibiotic use in community pharmacies in Thailand are very limited. A study was conducted in community pharmacies with community pharmacists had attended the ASU training session. This study aimed to compare patient satisfaction and treatment outcomes between the antibiotic-supplied group and the non-supplied group. Community pharmacists from 54 pharmacies were asked to make a telephone follow-up with their patients, who presented with URIs, acute diarrhoea, or simple wounds, 3 – 7 days after the pharmacy visit. Of the 998 patients interviewed, the results showed that about three quarters of patients were not supplied antibiotics, with no statistical difference in patients' treatment outcomes or satisfaction between the two groups (Tongrod et al. 2013).

There is a clear need for further research on the role of community pharmacists in to improve rational use of antibiotics and AMR. Relevant evidence of antibiotic supply from community pharmacies and the factors influencing the practice of community pharmacists, as well as antibiotic use among the public will be presented in the next chapter.

1.3 Structure of thesis

This thesis is divided into seven chapters, as follows:

This chapter (Chapter 1) briefly described the context and the background to, and the need for, the overall research and its design, together with the overarching aims and the structure of this thesis.

Chapter 2 provides a review of the literature of the three main subjects that inform the research, namely: i) supplying antibiotics from community pharmacies, ii) antibiotic utilization in the community and iii) strategies to combat AMR.

Chapter 3 outlines the methodology and methods adopted for this study.

Chapter 4 presents the methods and findings from interviews with community pharmacists regarding their views and experiences regarding antibiotic supply and antibiotic resistance.

Chapter 5 presents the methods and findings from interviews with members of the public in Thailand on their views and experiences regarding antibiotic use and antibiotic resistance.

Chapter 6 presents the methods and findings from a cross-sectional survey of community pharmacists' views and experiences regarding antibiotic supply and antibiotic resistance in Thailand.

Chapter 7 discusses and integrates the key findings from the three empirical chapters and outlines suggestions for future research.

Chapter Two

Literature review

2 Literature Review

There is an association between AMR and the irrational use of antibiotics at both the individual and population level (Goossens 2009). Inappropriate use of antibiotics includes using antibiotics when they are not indicated, using improper doses, or taking them for an inadequate duration. In a number of developing countries, many antibiotics can be readily purchased without a prescription from pharmacies. The purpose of this chapter is to review the literature relevant to the supply of antibiotics from community pharmacies and the use of antibiotics in communities. This chapter aims to present relevant evidence of antibiotic supply from community pharmacy without a prescription and the extent of antibiotic use in the community, factors influencing the practice of community pharmacists in relation to antimicrobial use and resistance, as well as the knowledge and views of the public regarding antibiotics and how antibiotics are used. Finally, the need for future studies is also described.

2.1 Refining the search

Reviewing the published literature provides background that helps researchers to become familiar with what is already known about a specific area, indicating potential pitfalls and best practices, and identifying the needs or unknowns in the particular area of study. A literature search is conducted to identify potentially valuable information (Poirier and Behnen 2014). The purpose of this chapter is to review the literature relevant to the supply of antibiotics from community pharmacies and the use of antibiotics among the general population.

Although this is not a systematic review, the researcher applied the systematic search criteria to identify the relevant published studies. The databases which provide health and medical literature were used to find the relevant articles. The search engines used were Medline, EMBASE, Web of Science, and Google Scholar. In addition, Thai Journals Online database, Thai Citation Index Center, and Health Systems Research Institute database also were searched for Thai articles, in both Thai and English languages. The details of searched databases are provided in Table 2-1.

Table 2-1 Database and search terms used to identify the literature

International database	
search terms	<ol style="list-style-type: none"> 1. Medical Subject Headings (MESH): Pharmacy, Anti-bacterial agents 2. Main free text, keywords and index terms searching for studies related to supplying antibiotics from community pharmacy: <ol style="list-style-type: none"> 2.1 community pharmac* or pharmac* or drugstore* or drug store* 2.2 antibiotic* or antimicrobial* 3. Additional free text, keywords and index terms searching for studies related to supplying antibiotics from community pharmacy: <ol style="list-style-type: none"> 3.1 community pharmac* or pharmac* or drugstore* or drug store* 3.2 antibiotic* or antimicrobial* 3.3 perspective* or attitude* or knowledge or view* or opinion* or reason* or belie* or factor* or misuse or irrational use or judicious use 3.4 antimicrobial stewardship or antibiotic stewardship 4. Additional free text, keywords and index terms searching for studies related to public antibiotic use <ol style="list-style-type: none"> 4.1 antibiotic* or antimicrobial* 4.2 community pharmac* or pharmac* or drugstore* or drug store* over-the-counter (OTC)” or non-prescription or self-medication
Databases searched	<ol style="list-style-type: none"> 1. Medline: a health and medical database which indexed more than 5,000 journals biomedical literature journals 2. EMBASE: includes all of Medline plus 2,000 additional journals and abstracts from conferences related to biomedical research with strengths in pharmacology, drug research & toxicology 3. Web of Science: a multi-disciplinary database, including links to regional citation indexes, patent data, specialized subject indexes, and an index of research data sets, all in all totaling over 33,000 journals. 4. Google Scholar: a search engine that covers scholarly literature, including peer-reviewed papers, theses, books, abstracts and technical reports from broad areas of research.
Thai journal databases	
Search terms	<ol style="list-style-type: none"> 1. Free text, keywords and index terms searching: <ol style="list-style-type: none"> 1.1 community pharmac* or drugstore* or drug store* or “ร้านยา” 1.2 antibiotic* or antimicrobial* or “ยาปฏิชีวนะ”
Databases	<ol style="list-style-type: none"> 1. Thai Journals Online (ThaiJO): the central electronic database system of Thailand includes journals published in Thailand in all disciplines, 345 science/technology journals, and 513 humanities and social sciences journals. 2. Thai Citation Index Center: include health sciences, life sciences, social sciences, physical sciences, and other journals published in Thailand. 3. Health Systems Research Institute database: consisted of articles and publications relating to health system in Thailand.

Several strategies were adopted to filter the many results not relevant to the aims of the study. Firstly, Medical Subject Heading (MESH) and main keywords provided in Table 2-1 were combined using Boolean operators e.g. [AND]. Secondly, in order to filter the irrelevant results, more additional keywords (Table 2-1) were combined to the first search results using Boolean operators [AND].

Only full English articles were included. In addition, the researcher aimed to find the articles which were published within 10 years prior to the start of the research degree (January 2017). This means studies published from January 2007 to March 2017 were included. However, the researcher continued searching for new studies published after March 2017 for the most update relevant knowledge up to March 2020. *

Following review of the title and abstract, potentially relevant studies were identified, obtained and reviewed. Furthermore, the reference lists of these papers were manually searched to identify additional publications of interest.

The articles relevant to 1) the supply of antibiotics from community pharmacies and the factors influencing antibiotic supply from community pharmacies, and 2) antibiotic use among the general population and their knowledge and views, were included.

As a result, 82 articles related to the supply of antibiotics from pharmacies and 102 were related to the public's use of antibiotics. Of these studies, there were seven studies relevant to the supply of antibiotics from community pharmacy in Thailand, two articles were published in the Thai language. Three studies reported on the practice of antibiotic supply from pharmacists. Four studies reported the factors influencing the antibiotic supply from community pharmacists in Thailand. In addition, two studies were found relating to antibiotic use among Thai residents, one of them was published in the Thai language (see section 2.4).

***Supplementary searching of the literature**

Additional literature searching was undertaken of the articles published, and included in databases, in the time period April 2020 to the end of August 2020. One relevant Thai paper and nine from other countries were retrieved.

The one Thai study was a prospective study in Chiang Mai University pharmacy with 380 patients who had URIs. The study aimed to evaluate the outcomes of pharmacists' counseling in patients with viral associated URI in the community pharmacy (Singhan and Permsuwan 2020). Three studies relevant to AMS in community pharmacy had been conducted in Scotland, (Tonna et al. 2020), England (Ashiru-Oredope et al. 2020) and Pakistan (Atif et al. 2020). Five studies reported on antibiotic supply from community pharmacies in China (Shi et al. 2020; Wang et al. 2020), Yemen (Halboup et al. 2020), Congo (Ntizala et al. 2020), Nigeria (Abubakar and Tangiisuran 2020), and Saudi Arabia (Al-Tannir et al. 2020). The other study (Li et al. 2020) was conducted in China to investigate the knowledge, attitudes and practices of consumers visiting community pharmacies on the subject of antibiotics and antibiotic resistance. These studies were not included as part of the literature review in this chapter but are considered further in the relevant discussion sections, as appropriate.

The following section (2.2) will present a review of the research regarding antibiotic supply from community pharmacies.

2.2 The supply of antibiotics from community pharmacy

Antibiotics used in the community are either prescribed by a healthcare professional or purchased directly by consumers without a valid prescription (from many sources including community pharmacies). This section describes the literature relating to the supply of antibiotics and the contributing factors to the supply of antibiotics from community pharmacy.

2.2.1 The supply of antibiotics without a prescription

In many countries, the prescribing and dispensing of medicines are separate, whereby primary care physicians hold the prescribing role and community pharmacists have the primarily or exclusively the right to dispense. The supply of antibiotics without a prescription is often illegal in such countries. Nevertheless, obtaining antibiotics without a prescription is not uncommon in some countries as outlined below.

Community pharmacies are a source of non-prescribed antibiotics. This might be because of the ease of access, availability of medicines, shorter waiting times, and longer working hours (Nguyen et al. 2019). Furthermore, many patients are unable to afford the fees to consult a physician for their medical needs (Abuirmeileh et al. 2014; Farah et al. 2015; Roque et al. 2015; Hadi et al. 2016; Salim and Elgizoli 2017; Abujheisha 2018).

Therefore, for various reasons, despite the laws restricting the supply of antibiotics without a prescription, recent evidence has indicated that supplying antibiotics without a prescription occurs in many countries, particularly, developing countries, for example, Vietnam (Nga et al. 2014; Nguyen et al. 2019), Sri Lanka (Zawahir et al. 2019c, b), China (Chang et al. 2019), Egypt (Zakaa El-din et al. 2018), Ethiopia (Erku and Aberra 2018), Saudi Arabia (Hadi et al. 2016; Abujheisha 2018), India (Barker et al. 2017b), Pakistan (Saleem et al. 2019), Syria (Mansour and Al-Kayali 2017), Portugal (Roque et al. 2015), Lebanon (Farah et al. 2015; Yaacoub et al. 2019), Jordan (Haddadin et al. 2019) and Hungary (Gajdács et al. 2020). Moreover, supplying antibiotics without a prescription can also be found in some developed countries, for example, the UK, Ireland (European Commission 2018) and New Zealand (Dameh et al. 2012).

Requesting antibiotics specifically and consultations (in relation to symptoms of an infection) that occur in community pharmacies can result in the supply of antibiotics without prescription. The majority of these antibiotics are for URIs (e.g. sore throat, common cold, cough, runny nose), gastroenteritis (e.g. acute diarrhoea), and urinary tract infections (UTIs), even though sometimes antibiotics are not required (Abuirmeileh et al. 2014; Dooling et al. 2014; Sabry et al. 2014; Farah et al. 2015; Roque et al. 2015; Erku et al. 2016; Hadi et al. 2016; Chang et al. 2017; Mansour and Al-Kayali 2017; Abujheisha 2018; Auta et al. 2018; Ayele et al. 2018; Erku and Aberra 2018; Horumpende et al. 2018; Mahmoud et al. 2018; Mohamed Ibrahim et al. 2018; Chang et al. 2019; Haddadin et al. 2019; Saleem et al. 2019; Zawahir et al. 2019c).

Non-prescription antibiotics have also been found to be supplied for other conditions including fever (Kotwani et al. 2012; Horumpende et al. 2018), dental

problems (Sabry et al. 2014; Roque et al. 2015; Hadi et al. 2016; Abujheisha 2018), skin wounds (Sabry et al. 2014; Amirthalingam et al. 2016), acne and abdominal pain (Sabry et al. 2014).

Many of the antibiotics commonly supplied without a prescription are broad-spectrum antibiotics including amoxicillin, co-amoxiclav, cephalosporin (e.g. cephalexin, cefuroxime, cefixime), macrolides (e.g. azithromycin, erythromycin) and several fluoroquinolones (e.g. ciprofloxacin, levofloxacin, ofloxacin) (Al-Faham et al. 2011; Sumpradit et al. 2013; Abuirmeileh et al. 2014; Dooling et al. 2014; Sabry et al. 2014; Shet et al. 2015; Amirthalingam et al. 2016; Erku et al. 2016; Hadi et al. 2016; Jaisue et al. 2017; Okuyan et al. 2017; Abujheisha 2018; Ayele et al. 2018; Erku and Aberra 2018; Horumpende et al. 2018; Kotb and ElBagoury 2018; Haddadin et al. 2019; Nguyen et al. 2019; Yaacoub et al. 2019; Zawahir et al. 2019a). Most of these antibiotics usually are the second-line treatment choice as recommended by clinical practice guidelines. Furthermore, these commonly supplied antibiotics are classified as critically important antibiotics by the World Health Organization. This means these antibiotics are the sole, or one of a limited range of available therapies, to treat serious bacterial infections in people. They could also be used to treat infections caused by bacteria possibly transmitted from non-human sources, or for organisms with resistant genes from non-human sources (World Health Organization 2019).

Other antibiotics reported as being supplied without a prescription are; ampicillin (Nga et al. 2014; Shet et al. 2015), dicloxacillin (Shet et al. 2015), tetracycline (Sabry et al. 2014), clindamycin (Sabry et al. 2014), metronidazole (Kotwani et al. 2012; Sabry et al. 2014; Shet et al. 2015; Erku and Aberra 2018), co-trimoxazole (Kotwani et al. 2012; Okuyan et al. 2017; Horumpende et al. 2018), and norfloxacin (Kotwani et al. 2012; Shet et al. 2015).

As outlined above, non-prescription use of antibiotics is often reported to be associated with the risk of inappropriate antibiotic use, such as, incomplete/shorter treatment courses and inappropriate choices of drug and doses (Chuc et al. 2002; Awad et al. 2005; Kianmehr and Koneri 2019; Saleem et al. 2019; Zawahir et al. 2019a). These inappropriate practices could contribute to

the development of microbial resistance (World Health Organization 2009, 2016a).

However, in certain contexts, community pharmacists are trained and have enough knowledge to manage minor infections. Therefore, many countries allow community pharmacists to supply some antibiotics for specific infections. For example, community pharmacists in Spain can examine patients about their symptoms and counsel them on their appropriate use and appropriately supply antibiotics for UTIs (Llor and Cots 2009). In the UK pharmacists can legally supply azithromycin to patients with positive chlamydia test results (Anderson and Thornley 2011; International Pharmaceutical Federation 2015). In New Zealand, pharmacists can prescribe trimethoprim for the short-term treatment of uncomplicated UTIs (International Pharmaceutical Federation 2015; Gauld et al. 2017).

2.2.2 Supplying antibiotics by non-qualified pharmacists²

The unavailability of qualified pharmacists to provide pharmaceutical services has been reported in studies in many developing countries, for example, Thailand (Jaisue et al. 2017), India (Barker et al. 2017b), Vietnam (Nguyen et al. 2019), Sri Lanka (Zawahir et al. 2019a), China (Chang et al. 2019), Egypt (Zakaa El-din et al. 2018), Ethiopia (Erku et al. 2016; Gebrekirstos et al. 2017; Horumpende et al. 2018), Pakistan (Waseem et al. 2019), Cameroon (Ekambi et al. 2019).

According to existing legislation in the majority of these countries, during community pharmacy opening hours, a licensed pharmacist should present at a pharmacy to provide pharmacy services, including the dispensing of medicines. However, the absence of a qualified pharmacist to provide pharmaceutical services in these countries was identified as an important factor leading to the inappropriate supply of medicines, including antibiotics, from community pharmacies (Sakeena et al. 2018a; Chang et al. 2019; Zawahir et al. 2019c, a).

² A person who is involved in the supplying of medicines, but who has not received a formal qualification such as BPharm or Pharm D degrees.

2.2.3 Factors influencing the inappropriate supplying of antibiotics

There are many contributing factors influencing the inappropriate supply of antibiotics. Table 2-2 presents examples of studies reporting reasons for, or factors associated with the supply of antibiotics without a valid prescription. These are outlined below.

2.2.3.1 Commercial pressure

Due to community pharmacy being a commercial business, the profitability of the business is a necessity. There may be a conflict with compliance with professional ethics. Commercial pressure is an important factor influencing the supply of antibiotics without a prescription by pharmacy staff. This commercial pressure drives some pharmacy staff to supply non-prescription antibiotics, whether it is necessary or not (Dameh et al. 2012; Black et al. 2014; Nga et al. 2014; Bahnassi 2015; Dillip et al. 2015; Salim and Elgizoli 2017; Vazquez-Lago et al. 2017; Erku and Aberra 2018; Nguyen et al. 2019; Saleem et al. 2019). Pharmacy staff have been reportedly involved in recommending specific antimicrobials that maybe more profitable than others (Nga et al. 2014; Nguyen et al. 2019). In addition, pharmacy owners' desire to maximize revenue has also been reported as a reason by community pharmacists to supply non-prescription antibiotics. (Sahoo et al. 2010; Nga et al. 2014; Bahnassi 2015; Dillip et al. 2015; Roque et al. 2015; Gebretekle and Serbessa 2016; Barker et al. 2017b; Salim and Elgizoli 2017; Erku and Aberra 2018; Mahmoud et al. 2018; Zaka El-din et al. 2018). Nonetheless, maintaining the good reputation of pharmacies was also reported as an influence in the supply of non-prescription antibiotics; refusing to supply non-prescription antibiotics might make the customer think that the pharmacy is not as good as others (Al-Mohamadi et al. 2013).

Table 2-2 Example of studies reporting reasons or factors influencing the non-prescription supply of antibiotics from community pharmacies.

Authors, Titles	Aims, Methods, samples	Reasons or correlating factors with supply of antibiotics without a prescription	Strengths	Limitations	Notes
<p>Kotwani et al. (2012)</p> <p>Irrational use of antibiotics and role of the pharmacist: an insight from a qualitative study in New Delhi, India</p>	<p>Aims: To understand the dispensing practices and behaviour of community pharmacists to develop policy interventions that would improve the use of antibiotics at the community level</p> <p>Methods: Focus group discussion</p> <p>Setting: India</p> <p>Samples: 40 community pharmacists (3 focus groups)</p>	<ul style="list-style-type: none"> - Commercial interests - Influencing of pharmaceutical companies (promotion programmes) - Lack of time to advise or educate patients on the use of antibiotics 	<ul style="list-style-type: none"> - Both public and private sector pharmacists were included in the study 	<ul style="list-style-type: none"> - Conducted before 2012 which the context in the area of study may have changed over time - Did not present how to recruit the participants - Small sample size from a specific area (but qualitative) - Did not mention the details of participants 	<ul style="list-style-type: none"> - The supply of antibiotics without a prescription in India is unlawful, but there it is common practice
<p>Roque et al. (2013)</p> <p>Attitudes of community pharmacists to antibiotic dispensing and microbial resistance: a qualitative study in Portugal</p>	<p>Aims: To explore pharmacists' knowledge, attitude, perceptions and dispensing habits insofar as to antibiotics as to antibiotics and microbial resistance</p> <p>Methods: Focus group discussion</p> <p>Setting: Portugal</p> <p>Samples: 32 community pharmacists (6 focus groups)</p>	<ul style="list-style-type: none"> - Patient demand due to belief of effectiveness of antibiotics - Patient request for specific antibiotics - Difficulty to access to health care - Patients cannot miss work - Patients cannot afford the medical consultations - Antibiotic for travelling - Prescription over the telephone - Known patient/clinical history 	<ul style="list-style-type: none"> - The authors said this is the first qualitative study in Portugal with the aim of exploring pharmacists' knowledge of and perceptions about antibiotic use and AMR 	<ul style="list-style-type: none"> - Conducted in late 2010-early 2011 which the context in the area of study may have changed overtime - Small sample size from a specific area (but qualitative) - Do not know how participants were recruit - Did not mention the details of participants 	<ul style="list-style-type: none"> - The supply of antibiotics without a prescription in Portugal is unlawful

Authors, Titles	Aims, Methods, samples	Reasons or correlating factors with supply of antibiotics without a prescription	Strengths	Limitations	Notes
Black et al. (2014) A qualitative study of pharmacists' perceptions of, and recommendations for improvement of antibiotic use in Qatar	Aims: To assess pharmacists' opinions relating to antibiotic utilization in the community setting Methods: Focus group discussion Setting: Qatar Samples: 22 community pharmacists and primary care pharmacists	<ul style="list-style-type: none"> - Patient demand - Pharmacists lack of knowledge about current antibiotic therapy - Poor perception about appropriate role of community pharmacists - Commercial interest/pharmacy owner pressure - Lack of up-to-date resources about antibiotic treatments - Lack of clear laws and regulations guiding prescribing and dispensing of medicines 	<ul style="list-style-type: none"> - The authors said this is the first qualitative study in Qatar to evaluate community pharmacists' perceptions of antibiotic use - Participants included both from community pharmacy and primary care pharmacy 	<ul style="list-style-type: none"> - Small sample size from a specific area (but qualitative) - Provided limited details of participants 	<ul style="list-style-type: none"> - The supply of antibiotics without a prescription in Qatar is unlawful
Dillip et al. (2015) What motivates antibiotic dispensing in accredited drug dispensing outlets (ADDO) in Tanzania? A qualitative study	Aims: To explore the attitudes of ADDO owners and dispensers toward antibiotic dispensing and to learn how accreditation has influenced their dispensing behaviour Methods: Semi-structured interview Setting: Tanzania Samples: 84 community pharmacists	<ul style="list-style-type: none"> - Patient demand - Commercial interest/owner pressure - Perceived that supply antibiotic without a prescription is common practice 	<ul style="list-style-type: none"> - Participants included owner-pharmacist, owner-not-pharmacist, and not-owner-pharmacist - The participants were from both urban and rural areas - Author said "all participants were willing to speak freely about potentially sensitive issues" 	<ul style="list-style-type: none"> - Small sample size from a specific area (but qualitative) - May have been social desirability bias - Non-ADDO participants were not included - Did not mention the details of participants 	<ul style="list-style-type: none"> - The supply of antibiotics without a prescription in Tanzania is unlawful

Authors, Titles	Aims, Methods, samples	Reasons or correlating factors with supply of antibiotics without a prescription	Strengths	Limitations	Notes
<p>Salim and Elgizoli (2017)</p> <p>Exploring the reasons why pharmacists dispense antibiotics without prescriptions in Khartoum state, Sudan</p>	<p>Aims: to explore the perspectives of community pharmacists in Khartoum State, Sudan about why they dispense antibiotics without prescriptions, and to understand their opinions about why they think patients self-medicate.</p> <p>Methods: Semi-structured interview</p> <p>Setting: Sudan</p> <p>Samples: 30 community pharmacists</p>	<ul style="list-style-type: none"> - Patients unable to afford consultation fees - Commercial interest - Lack of monitoring of dispensing practices at community pharmacies by health authorities - Pharmacists perceived that they have role to diagnose and supply antibiotics - Lack of pharmacists' awareness about the importance of patient counselling in promoting rational drug use 	<ul style="list-style-type: none"> - The authors said this is the first qualitative study to explore why community pharmacists supply antibiotics without prescriptions in Sudan - Participants including various ages, a range of experiences, and with bachelor or master degree 	<ul style="list-style-type: none"> - Small sample size from a specific area (but qualitative) 	<ul style="list-style-type: none"> - The supply of antibiotics without a prescription in Sudan is common practice
<p>Vazquez-Lago et al. (2017)</p> <p>Knowledge, attitudes, perceptions and habits towards antibiotics dispensed without medical prescription: a qualitative study of Spanish pharmacists</p>	<p>Aims: to investigate community pharmacists' knowledge, attitudes, perceptions and habits with regard to antibiotic dispensing without medical prescription in Spain</p> <p>Methods: Focus group discussion</p> <p>Setting: Spain</p> <p>Samples: 30 community pharmacists</p>	<ul style="list-style-type: none"> - Patient demand - To prevent regular customers consulting another pharmacy - Lack of communication with patients' physicians - Lack of follow up the patients - Selling antibiotics is priority of community pharmacists - Lack of continuing education - Physicians prescribed antibiotics without indication - High antibiotic prescription rates from private insurances 	<ul style="list-style-type: none"> - The authors said the study able to obtain participants' ideas about antibiotics and resistances which similar to previous studies in other settings - Participants including various ages, owner and non-owner pharmacist 	<ul style="list-style-type: none"> - Small sample size from a specific area (but qualitative) - Did not mention the details of participants 	<ul style="list-style-type: none"> - The supply of antibiotics without a prescription in Spain is unlawful

Authors, Titles	Aims, Methods, samples	Reasons or correlating factors with supply of antibiotics without a prescription	Strengths	Limitations	Notes
<p>Nga et al. (2014)</p> <p>Antibiotic sales in rural and urban pharmacies in northern Vietnam: an observational study</p>	<p>Aims: To understand the economic and behavioural incentives that support inappropriate dispensing of antibiotics at Vietnamese private pharmacies</p> <p>Methods: Mixed methods (in-pharmacy observation, post-observation questionnaire and in-depth interviews)</p> <p>Setting: Vietnam</p> <p>Samples: 30 pharmacies</p> <p>43 pharmacists/drug sellers for questionnaire study,</p> <p>1 focus group and 6 interviews</p>	<ul style="list-style-type: none"> - Fear of losing a customer - Patient pressure - Insufficient knowledge of drug sellers to supply antibiotics - Inappropriate prescribing of physicians - High profitability of antibiotics - Lack of quality of diagnosis - Difficulty to access to health services 	<ul style="list-style-type: none"> - Observational approach could reveal the magnitude of inappropriate antibiotic supply - Participants including owner and non-owner pharmacist or drug sellers - The participants were from both urban and rural areas 	<ul style="list-style-type: none"> - Small sample size from a specific area (but qualitative) - Awareness of being observed by participants might have influenced antibiotic dispensing practices - The data from interview study did not reach saturation 	<ul style="list-style-type: none"> - The supply of antibiotics without a prescription in Vietnam is unlawful, but there is common practice
<p>Zapata-Cachafeiro et al. (2014)</p> <p>Determinants of antibiotic dispensing without a medical prescription: a cross-sectional study in the north of Spain</p>	<p>Aims: To ascertain which attitudes of community pharmacists were related to inappropriate antibiotic dispensing</p> <p>Methods: Self-administered questionnaire</p> <p>Setting: Spain</p> <p>Samples: 286 community pharmacists</p>	<ul style="list-style-type: none"> - None of personal and professional traits of pharmacists showed any relationship with supply antibiotic without prescription - Pharmacists' attitudes were found significantly related to the supply of antibiotic without prescription included: <ul style="list-style-type: none"> o Perceived that AMR is important o Patient difficulty to access to a physician o Lack of time to explain that antibiotic is not needed o Developing of new antibiotics to solve AMR issue 	<ul style="list-style-type: none"> - The questionnaires were sent to all community pharmacists in the selected area - High response rate (72.8%) - Including a range of demographic characteristics of participants. 	<ul style="list-style-type: none"> - Conducted only in one region in Spain - Non-response bias but high response rate - There is the possibility that participants may have over-reported desirable practices or views, or under-reported undesirable practices or views (due to self-administered) 	<ul style="list-style-type: none"> - The supply of antibiotics without a prescription in Spain is unlawful

Authors, Titles	Aims, Methods, samples	Reasons or correlating factors with supply of antibiotics without a prescription	Strengths	Limitations	Notes
<p>Roque et al. (2015)</p> <p>Influence of community pharmacists' attitudes on antibiotic dispensing behavior: A Cross-sectional study in Portugal</p>	<p>Aims: To estimate the percentage of pharmacists who have a propensity to dispense antibiotics without a medical prescription; and to assess what attitudes and knowledge affect such behaviour</p> <p>Methods: Self-administered questionnaire</p> <p>Setting: Portugal</p> <p>Samples: 763 community pharmacists</p>	<ul style="list-style-type: none"> ○ Patient will easily obtain antibiotic from another pharmacy - None of personal and professional traits of pharmacists showed any relationship with supply antibiotic without prescription - Pharmacists' attitudes were found significantly related to the propensity to supply of antibiotic without prescription included: <ul style="list-style-type: none"> ○ Patient is known to have difficulty in obtaining a medical consultation ○ Patient self-medication and antibiotics mis use are the main cause of antibiotic resistance ○ Patient would easily obtain the prescription and could accuse a pharmacist of having delay treatment if antibiotics are not supplied ○ Patient is known to have neither time nor money to see physician ○ Patient will easily obtain antibiotic from another pharmacy ○ Antibiotics prescribing should be more closely controlled ○ Dispensing antibiotics without a prescription should be more closely controlled 	<ul style="list-style-type: none"> - The questionnaires were sent to all pharmacies in the selected area - High response rate (64.8%) - Including a range of demographic characteristics of participants. 	<ul style="list-style-type: none"> - Conducted only in one region in Portugal - Non-response bias but high response rate - There is the possibility that participants may have over-reported desirable practices or views, or under-reported undesirable practices or views (due to self-administered) 	<ul style="list-style-type: none"> - The supply of antibiotics without a prescription in Portugal is unlawful

Authors, Titles	Aims, Methods, samples	Reasons or correlating factors with supply of antibiotics without a prescription	Strengths	Limitations	Notes
Hadi et al. (2016) Community pharmacists' knowledge, attitude, and practices towards dispensing antibiotics without prescription (DAwP): a cross-sectional survey in Makkah Province, Saudi Arabia	Aims: To evaluate knowledge, attitude, and practices of community pharmacists towards dispensing antibiotics without prescription Methods: Self-administered questionnaire Setting: Saudi Arabia Samples: 189 community pharmacists	<ul style="list-style-type: none"> - Lack of patient willingness to consult a physician for a non-serious infection (69.9%) - Inability to afford a consultation with a physician (65.3%) - Pharmacists' good knowledge about antibiotic use (45.8%) - Lack of awareness about rules and regulations (28.4%) - Increased sales and profit pressure from the owner (26.8%) - Fear of losing a client/patient (17.4%) 	<ul style="list-style-type: none"> - High response rate (94.5%) - Using four-step systematic approach to recruit community pharmacists - Including a range of demographic characteristics of pharmacists 	<ul style="list-style-type: none"> - The study conducted only in one province in Saudi Arabia - There is the possibility that participants may have over-reported desirable practices or views, or under-reported undesirable practices or views (due to self-administered) 	<ul style="list-style-type: none"> - The supply of antibiotics without a prescription in Saudi Arabia is unlawful, but there is common practice

Note: Excluded four Thai studies that are discussed in section 2.4

2.2.3.2 Consumer demand

Most of the reviewed studies showed that pharmacy staff tend to satisfy consumers' expectations to obtain antibiotics regardless of whether it is appropriate or not, to keep the customers loyal to their pharmacy. Therefore, customer demand is a key factor reported to influence the supply of antibiotics by community pharmacists (Reynolds and McKee 2009; Saengcharoen and Lerkiatbundit 2010; Kotwani et al. 2012; Al-Mohamadi et al. 2013; Chandy et al. 2013; Roque et al. 2013; Black et al. 2014; Dooling et al. 2014; Zapata-Cachafeiro et al. 2014; Bahnassi 2015; Dillip et al. 2015; Farah et al. 2015; Roque et al. 2015; Gebretekle and Serbessa 2016; Barker et al. 2017b; Vazquez-Lago et al. 2017; Erku and Aberra 2018; Mahmoud et al. 2018; Gajdács et al. 2020). Many studies have indicated that a significant percentage of pharmacy personnel have agreed to supply antibiotics without a prescription after receiving a request from a simulated client (Al-Faham et al. 2011; Puspitasari et al. 2011; Al-Mohamadi et al. 2013; Sabry et al. 2014; Shet et al. 2015; Erku et al. 2016; Okuyan et al. 2017; Erku and Aberra 2018; Horumpende et al. 2018; Mohamed Ibrahim et al. 2018; Zapata-Cachafeiro et al. 2019)

Consumer satisfaction is an important determinant of a consumer's return to a pharmacy. Most pharmacy staff believe that fulfilling consumers' demands will ensure their return to their pharmacy. Community pharmacists stated that a customer would be able to obtain antibiotics easily from another pharmacy if they refused to supply the antibiotics; for this reason, community pharmacists might as well supply antibiotics for their customers (Al-Mohamadi et al. 2013; Chandy et al. 2013; Abuirmeileh et al. 2014; Roque et al. 2015; Mansour and Al-Kayali 2017; Erku and Aberra 2018; Hoxha et al. 2018; Zaka El-din et al. 2018).

2.2.3.3 Factors related to consumers

The economic status of patients was reported as a factor influencing the supply of antibiotics. The inability of the public to afford a physician consultation fee was a reason that led some community pharmacists to supply antibiotics without a prescription in many countries, such as Sudan, Saudi Arabia and Malaysia (Roque

et al. 2013; Abuirmeileh et al. 2014; Amirthalingam et al. 2016; Hadi et al. 2016; Mansour and Al-Kayali 2017; Salim and Elgizoli 2017). The economic status of consumers was also a reason to supply sub-optimal doses of antibiotics by community pharmacists. Pharmacists admitted supplying incomplete courses of antibiotics because the consumers could not afford a complete antibiotic course at that time (Saengcharoen and Lerkiatbundit 2010; Farah et al. 2015; Roque et al. 2015; Barker et al. 2017b).

Difficulties accessing health facilities was another factor influencing the decision by community pharmacists to supply antibiotics (Abuirmeileh et al. 2014; Zapata-Cachafeiro et al. 2014; Roque et al. 2015; Barker et al. 2017b; Mahmoud et al. 2018). Inconvenient access to health facilities and long waiting times for consultations were reasons some community pharmacist supplied antibiotics to their clients (Roque et al. 2013; Gebretekle and Serbessa 2016; Salim and Elgizoli 2017; Nguyen et al. 2019). Also, some studies reported that community pharmacists were more likely to supply antibiotics to their relatives and friends (Dameh et al. 2012; Bahnassi 2015).

2.2.3.4 Knowledge, attitudes and perceptions of pharmacists about antibiotics and antibiotic resistance

Knowledge, attitudes and perceptions of pharmacists are important influences on antibiotic supply. Insufficient knowledge, negative attitudes and misconceptions about antibiotics may lead to the inappropriate use of antibiotics in community pharmacies (Reynolds and McKee 2009; Zapata-Cachafeiro et al. 2014; Khan et al. 2016). A qualitative study in Thailand (Saengcharoen and Lerkiatbundit 2010) and one in Tanzania (Dillip et al. 2015) reported that some pharmacists perceived that supplying antibiotics without a prescription is common practice, resulting in their decision to supply antibiotics without a prescription. A survey in Saudi Arabia (Hadi et al. 2016) reported that community pharmacists supplied antibiotics without a prescription because they believed that they were competent and had enough knowledge to supply these medicines.

Perceptions that antibiotics are beneficial to patients, with no real potential to harm also influenced the supply of antibiotics by community pharmacists to their

patients (Bahnassi 2015). Some studies reported that community pharmacists believed in the benefits of antibiotics, such as, an antibiotic is needed for the illness and an antibiotic led to the recovery of the illness in the past, were reasons antibiotics were supplied (Saengcharoen and Lerkiatbundit 2010; Chandy et al. 2013; Foroughinia and Zarei 2016). However, some clinical trials showed that antibiotics had no benefit for non-bacterial URI. A review which included nine clinical studies (published between 1974 – 1984) involving patients aged between 2 months and 79 years, reported that antibiotics did not show any benefit over placebo for the common cold in terms of lack of cure or persistence of symptoms, but showed a higher rate of adverse effects (Arroll and Kenealy 2002). Similarly, a systematic review and meta-analysis of eight studies, involving patients aged between 6 months to 49 years, revealed that antibiotics had no benefit in terms of overall improvement compared to placebo for patients with acute upper respiratory tract infections. Moreover, antibiotics were found to significantly increase adverse effects compared to placebo (Arroll et al. 2008). However, the studies included in the review were published in 1950 – 1996 where the majority of patients were suffering from viral upper respiratory tract infections. Studies with more than 7% of patients with streptococci were excluded.

On the other hand, a review which included 27 studies (published in 1951 – 2003) involving sore throat (of either viral or bacterial aetiology) found that antibiotics shortened the duration of pain symptoms by an average of about one day and may reduce the chance of rheumatic fever. A subgroup analysis found that the effectiveness of antibiotics was increased in patients who had a positive Streptococcal throat swab (Spinks et al. 2013). This finding aligns with the Thai guidelines (RDU Pharmacy Eagle 2017; Thavornwattanayong et al. 2017) which only recommend antibiotics for URI patients who are more likely to have a Group A streptococcal (GAS) infection.

2.2.3.5 Inappropriate prescribing practices

Community pharmacists in many studies stated that the high rate of prescribing of antibiotics by physicians for minor ailments and symptoms of viral disease was a factor driving pharmacy staff to supply antibiotics inappropriately (Kotwani et

al. 2012; Nga et al. 2014; Dillip et al. 2015; Vazquez-Lago et al. 2017). Moreover, previously prescribed antibiotics by a physician affected consumers to demand antimicrobial agents from pharmacists for similar symptoms (Reynolds and McKee 2009; Zapata-Cachafeiro et al. 2014). A study conducted among parents in Pakistan reported that the most common reason to supply non-prescription antibiotics to their children for URI was that the same antibiotics had been prescribed by their physicians previously (Siddiqui et al. 2014).

2.2.3.6 Poor enforcement of law and regulations regarding antibiotic supplying

Although antibiotics are classified as prescription only drugs, in many countries the sale and dispensing of antibiotics without a prescription is common. It was noted that adherence of pharmacy staff to the existing prescription-only regulations was found to be low in many developing countries, leading to a high proportion of those pharmacies supplying antibiotics without a prescription (see section 2.2.1). Enforcement of the regulations regarding the sale and dispensing of antibiotics may not be effective (Reynolds and McKee 2009; Akinyandenu and Akinyandenu 2014; Black et al. 2014; Nga et al. 2014; Dillip et al. 2015; Gebretekle and Serbessa 2016; Hadi et al. 2016; Zaka El-din et al. 2018). Most of the reviewed studies stated that weak regulation of antibiotics was a common reason for non-prescription supply of antibiotics. Consideration of the consequences or penalties for violating the law was considered important to reduce the illegal supply of antibiotics (Nyazema et al. 2007; Dameh et al. 2012; Abdelaziz et al. 2019).

2.2.3.7 Other influencing factors

Other factors that have been reported to influence the supply of antibiotics by community pharmacists include: inadequate existing guidance on antibiotic use (Reynolds and McKee 2009); positive past experience of the effectiveness of antibiotic supply in terms of condition (Reynolds and McKee 2009; Amirthalingam et al. 2016; Salim and Elgizoli 2017); blurred professional boundaries between pharmacists and doctors in the minds of patients (Salim and Elgizoli 2017);

professional conflicts of interest (Gebretekle and Serbessa 2016); pharmacists not educating patients about the impact of self-medication (Salim and Elgizoli 2017); lack of time to explain about the appropriate treatment to patients (Black et al. 2014; Zapata-Cachafeiro et al. 2014); that pharmacists know the patient (regular customers, friends or relatives) (Dameh et al. 2012; Roque et al. 2013); and promotion and rewards by pharmaceutical companies (Reynolds and McKee 2009; Kotwani et al. 2012; Chandy et al. 2013; Mahmoud et al. 2018; Saleem et al. 2019).

In conclusion, inappropriate supply of antibiotics from community pharmacies was found in many countries. Factors influencing such a practice were related to commercial pressure, patient demand, and knowledge and beliefs of community pharmacists. In the next sections, antibiotic use amongst the general population will be reviewed.

2.3 Use of antibiotics in community

Antibiotic use is widespread worldwide. The prevalence of antibiotic usage varies between different countries. A survey in twelve countries in six regions by the World Health Organization (2016a) reported that 77% (48 – 88%) of participants had antibiotics in the last year, while more than a third had antibiotics within the past month. Higher antibiotic usage was found in the lower income countries. In Europe, 32% (20 – 47%) of Europeans had taken oral antibiotics at least once in the last twelve months. About 30% of British people reported having taken antibiotics in the last twelve months (European Commission 2018).

This section will review the behaviours by the public regarding the use of antibiotics, including self-medication with antibiotics and non-adherence to antibiotic treatment.

2.3.1 Self-medication with antibiotics

Self-medication refers to the use of medicines to treat self-diagnosed conditions or symptoms, without medical supervision (World Health Organization 2000). This practice can easily lead to the inappropriate use of antibiotics, such as, the indiscriminate use of medicines, improper medicine choice, incorrect dosages and

non-completion of a course of antibiotics, all of which are associated with an increased risk of resistance (Grigoryan et al. 2007; Shehadeh et al. 2012; Li 2014; Alhomoud et al. 2017).

Antibiotics are commonly used to self-medicate in many parts of the world. It has been estimated that over fifty percent of antibiotics are obtained and used without a medical prescription in many countries (Cars and Nordberg 2005; Morgan et al. 2011; Ocan et al. 2015; Xu et al. 2020). The prevalence of self-medication with antibiotics varies between different regions of the world. This could be due to differences in the effectiveness of regulations and/or their enforcement in differently resourced countries. A systematic review (Ocan et al. 2015) which included 34 studies from 20 developing countries reported that the prevalence of antimicrobial self-medication varied widely with some studies reporting as low as 4% in Yemen (Abdo-Rabbo 2003) to as high as 91.4% in Nigeria (Osemene and Lamikanra 2012). The overall estimate of self-medication with antibiotics in low- and middle-income countries was 38.8% (95% CI: 29.5-48.1%). Similarly, a systematic review by (Alhomoud et al. 2017) found that the prevalence of self-medication with antibiotics in Middle Eastern countries ranged from 19 – 82%. The prevalence of antibiotic self-medication was usually higher in low to medium income countries, usually prevalence being greater than one third. About 7% of Europeans reported having obtained antibiotics without a prescription. The highest proportion of the public obtaining antibiotics from a non-healthcare professional was found in Austria at 15%. In the UK, 4% of British people obtained antibiotics without a prescription. (European Commission 2018).

Commonly reported factors associated with self-medication with antibiotics included age, low level of education, and a low to middle income level. Regarding gender, some studies found that men were more likely to self-medicate (Pavydé et al. 2015; El Zowalaty et al. 2016; Kianmehr and Koneri 2019; Mate et al. 2019), while, the prevalence of self-treatment was higher among women in some studies (Chowdhury et al. 2009; Osemene and Lamikanra 2012). On the other hand, some studies found no association between gender and self-medication (Cheaito et al. 2014).

A number of studies reported different age groups tended to self-medicate. Some studies were reported that older age groups were more likely to self-medicate with antibiotics (Osemene and Lamikanra 2012; Pan et al. 2016; Kianmehr and Koneri 2019) while other studies reported it was more common in those of a younger age, that is, 18-39 (Al-Azzam et al. 2007).

Many studies revealed that the prevalence of self-medication was higher in individuals with a low educational level (Al-Azzam et al. 2007; Ilhan et al. 2009; Barah and Gonclaves 2010; Sapkota et al. 2010; Belkina et al. 2014; Widayati et al. 2015; Kianmehr and Koneri 2019) and people on low to medium incomes (Al-Azzam et al. 2007; Afolabi 2008; Ilhan et al. 2009; Sawair et al. 2009; Barah and Gonclaves 2010).

The patients' perceptions of antibiotics were also found to be associated with greater use of antibiotics (Grigoryan et al. 2007; Togoobaatar et al. 2010; Pan et al. 2012), such as poor knowledge of antibiotics being associated with the use of non-prescribed antibiotics (Mate et al. 2019).

Various reasons for self-medication with antibiotics were reported across studies. Previous successful experience or being prescribed an antibiotic previously for a similar illness were reasons for self-medication. Past experience of having an antibiotic prescribed reinforced any misunderstandings and increased expectations for having antibiotics (Mainous et al. 2008; Essack and Pignatari 2013; Widayati et al. 2015; Nawafleh et al. 2016; Nazir and Azim 2017; Abduelkarem et al. 2019; Kianmehr and Koneri 2019; Mate et al. 2019; Saha et al. 2019; Tuyishimire et al. 2019).

Economic conditions were also a driving factor for self-medication with antibiotics in developing countries, such as Pakistan (Nazir and Azim 2017), India (Barker et al. 2017a), China (Pan et al. 2012) and Jordan (Sawair et al. 2009). The high demand for antimicrobials from community pharmacies was mainly from customers who could not afford to consult a physician. Bypassing physicians was believed to be a cheaper option as there are no costs involved in getting an antibiotic from a pharmacy other than the cost of the medicine itself. The high cost

of health care and/or a lack of health insurance was likely to lead to avoiding a physician consultation to save costs (Mainous et al. 2008; Abasaeed et al. 2009; Ilhan et al. 2009; Sawair et al. 2009; Khan et al. 2011; Shehadeh et al. 2012; Al-Ramahi 2013; Al Akhali et al. 2013; Roque et al. 2013; Cheaito et al. 2014; Darwish et al. 2014; Widayati et al. 2015; Al Rasheed et al. 2016; Nawafleh et al. 2016; Pan et al. 2016; Erku et al. 2017; Nazir and Azim 2017; Abduelkarem et al. 2019; Kianmehr and Koneri 2019; Tuyishimire et al. 2019).

Inconvenience or difficulty accessing healthcare (Nawafleh et al. 2016; Nazir and Azim 2017; Abduelkarem et al. 2019; Ekambi et al. 2019), limited opening times and long waiting times at primary care centres or hospitals were reported in many studies. Therefore, people chose to self-medicate to save their time (Nounou et al. 2009; Agbor and Azodo 2011; Ngasha et al. 2011; Mossa et al. 2012; Osemene and Lamikanra 2012; Saengcharoen et al. 2012; Onohwosafe and Olaseha 2013; Roque et al. 2013; Cheaito et al. 2014; Widayati et al. 2015; Nawafleh et al. 2016; Erku et al. 2017; Abduelkarem et al. 2019; Mate et al. 2019). Accessibility to a health facility is also of importance. Difficulties accessing health care leads patients to demand antibiotics without a prescription (Roque et al. 2013; Barker et al. 2017a; Nazir and Azim 2017; Nguyen et al. 2019).

Misconceptions and confusion about the role of antibiotics and the cause of disease -whether it is viral or bacterial or non-infection are also factors that may lead to the injudicious use of antibiotics (Abasaeed et al. 2009; Al Akhali et al. 2013; Jose et al. 2013; Cheaito et al. 2014; Awad and Aboud 2015). Misunderstandings about conditions needing antibiotic treatment was a notable contributor to misuse of antibiotics. Many studies revealed that many people thought that antibiotics could cure viral infections as well as bacterial infections (Alili-Idrizi et al. 2014; Black et al. 2014; Fredericks et al. 2015; Maheshwari et al. 2015; Pavydé et al. 2015; European Commission 2018; Waaseth et al. 2019). Many people believed that antibiotics are effective for common cold and flu (McNulty et al. 2007; Del Fiol et al. 2015).

People's beliefs about antibiotics, particularly that antibiotics could speed up recovery from an illness (Agbor and Azodo 2011; Saengcharoen et al. 2012; Roque

et al. 2013; Alili-Idrizi et al. 2014; Emeka et al. 2014; Fredericks et al. 2015; Maheshwari et al. 2015; Pan et al. 2016; Alhomoud et al. 2017) or that by not taking antibiotics for cold, cough or flu symptoms the duration of illness would lengthen (Moienzadeh et al. 2017). These misunderstandings led to the overuse of antibiotics (Pan et al. 2016). Understanding which conditions can be benefit from antibiotic treatment is important, as antibiotic utilization for conditions where antibiotics are not required contributes to the development of resistance (World Health Organization 2016a).

Other factors that have been reported to influence patients' use of antibiotics included: poor enforcement of regulation about antibiotic supply (Buke et al. 2005; Abasaeed et al. 2009; Shehadeh et al. 2012); the use of antibiotics for travelling (Roque et al. 2013); no trust in medical doctors (Al-Ramahi 2013); advice from family and friends (Al-Ramahi 2013); media advice (Reynolds and McKee 2009; Al-Ramahi 2013); having a mild illness (Khan et al. 2011; Mate et al. 2019); emergency usage (Khan et al. 2011); and the availability of medicines more generally (Khan et al. 2011).

Past experiences, beliefs and expectations of the general population may lead them to inappropriately self-medicate with antibiotics. Various antibiotics were used by patients for self-medication with various conditions. Antibiotics commonly used in self-medication reported by the general population were similar to those reported by community pharmacists in section 2.2.1. Penicillins were commonly reported as being used in many countries, (Sawair et al. 2009; Al Akhali et al. 2013; Cheaito et al. 2014; Emeka et al. 2014; Al Rasheed et al. 2016; Alhomoud et al. 2017). Additional commonly-used antibiotics were macrolides, cephalosporins, fluoroquinolone and tetracycline (Maheshwari et al. 2015; Ocan et al. 2015; Alhomoud et al. 2017).

Amoxicillin and co-amoxiclav were the most commonly used, (Widayati et al. 2011; Cheaito et al. 2014; Emeka et al. 2014; Ocan et al. 2014; Ramay et al. 2015; El Zowalaty et al. 2016; Erku et al. 2017; Nazir and Azim 2017; Omulo et al. 2017; Kianmehr and Koneri 2019; Tuyishimire et al. 2019) mostly for URI conditions. Further antibiotics reportedly used for self-medication included doxycycline

(Erku et al. 2017; Nazir and Azim 2017; Omulo et al. 2017), tetracycline (Tuyishimire et al. 2019), erythromycin (Omulo et al. 2017; Kianmehr and Koneri 2019), azithromycin (Emeka et al. 2014; Nazir and Azim 2017; Kianmehr and Koneri 2019), clarithromycin (Emeka et al. 2014), metronidazole (Omulo et al. 2017; Kianmehr and Koneri 2019), ciprofloxacin (Nazir and Azim 2017; Kianmehr and Koneri 2019; Tuyishimire et al. 2019) and ceftriaxone (Kianmehr and Koneri 2019)

Self-medication with antibiotics was reported for use for many conditions, whether or not the cause was a bacterial infection. Inappropriate indications where antibiotics were used included prophylaxis against infection, as an analgesic or for treating viral infections (Shehadeh et al. 2012; Emeka et al. 2014). Respiratory related problems, such as, cold, flu, bronchitis, tonsillitis, cough and sore throat, were the most commonly reported conditions for self-medication with antibiotics (Abasaeed et al. 2009; Ilhan et al. 2009; Sarahroodi and Arzi 2009; Sawair et al. 2009; Askarian and Maharlouie 2012; Lim and Teh 2012; Shehadeh et al. 2012; Suaifan et al. 2012; Al Akhali et al. 2013; Belkina et al. 2014; Cheaito et al. 2014; Darwish et al. 2014; Emeka et al. 2014; Awad and Aboud 2015; Harakeh et al. 2015; Pavydè et al. 2015; Al Rasheed et al. 2016; El Zowalaty et al. 2016; Nawafleh et al. 2016; Pan et al. 2016; World Health Organization 2016a; Erku et al. 2017; Nazir and Azim 2017; Omulo et al. 2017; European Commission 2018; Kianmehr and Koneri 2019; Saha et al. 2019; Tuyishimire et al. 2019).

Other common conditions that the general population tended to self-medicate with antibiotics in some countries were: gastrointestinal conditions, particularly acute diarrhoea (Abasaeed et al. 2009; Belkina et al. 2014; Al Rasheed et al. 2016; El Zowalaty et al. 2016; Nawafleh et al. 2016; Erku et al. 2017; Nazir and Azim 2017; Omulo et al. 2017; European Commission 2018) and abdominal pain (Al Akhali et al. 2013; Kianmehr and Koneri 2019; Tuyishimire et al. 2019); simple wound or skin disease (Lim and Teh 2012; Suaifan et al. 2012; Al Akhali et al. 2013; Awad and Aboud 2015; Al Rasheed et al. 2016; El Zowalaty et al. 2016; Erku et al. 2017; Tuyishimire et al. 2019); and urinary tract infections (Abasaeed et al. 2009; Ilhan et al. 2009; Lim and Teh 2012; Shehadeh et al. 2012; Suaifan et al. 2012; Al

Akhali et al. 2013; Belkina et al. 2014; Awad and Aboud 2015; Al Rasheed et al. 2016; El Zowalaty et al. 2016; Nawafleh et al. 2016; European Commission 2018; Saha et al. 2019).

Additional indications leading to self-medication with antibiotics were also reported for dental problems (Abasaeed et al. 2009; Ilhan et al. 2009; Sawair et al. 2009; Suaifan et al. 2012; Nawafleh et al. 2016; Nazir and Azim 2017; Kianmehr and Koneri 2019; Saha et al. 2019), gynaecological conditions (Belkina et al. 2014; El Zowalaty et al. 2016), urogenital conditions (Cheaito et al. 2014), ear problems (Abasaeed et al. 2009; Shehadeh et al. 2012; Suaifan et al. 2012; Belkina et al. 2014; El Zowalaty et al. 2016; Nawafleh et al. 2016; Kianmehr and Koneri 2019), acne (Emeka et al. 2014; Kianmehr and Koneri 2019), chest tightness (Nawafleh et al. 2016; Nazir and Azim 2017), inflammation (Pavydè et al. 2015), eye conditions (Tuyishimire et al. 2019), headache or pain (Lim and Teh 2012; Shehadeh et al. 2012; Pavydè et al. 2015; Omulo et al. 2017; European Commission 2018; Tuyishimire et al. 2019), and fever (Lim and Teh 2012; Cheaito et al. 2014; Emeka et al. 2014; Omulo et al. 2017; European Commission 2018; Saha et al. 2019)

2.3.2 Sources of information on antibiotics and where antibiotics are obtained

Antibiotics used for self-medication were obtained from various sources. The three main sources of antibiotics obtained without a prescription were obtained from pharmacies, by using leftover antibiotics and from family members or friends.

Community pharmacies are a health facility which are often more accessible to the public. In addition, a number of medicines, including antibiotics, are available in pharmacies. Community pharmacies were reported as the most common source of antibiotics without a prescription in many countries, for example, United Arab Emirate (Abasaeed et al. 2009), Jordan (Darwish et al. 2014), Lebanon (Cheaito et al. 2014), Kuwait (Awad and Aboud 2015), Pakistan (Nazir and Azim 2017), India

(Barker et al. 2017a), Ethiopia (Erku et al. 2017), China (Ding et al. 2015), Europe (European Commission 2018), and Thailand (Chanvatik et al. 2019)

Leftover antibiotics were also a source of self-medicated antibiotics. Many people thought storing antibiotics, including keeping leftover antibiotics, for themselves or their children in case they might need them in the future, was appropriate (Alili-Idrizi et al. 2014). Over twenty percent of people in some countries reported keeping leftover antibiotics from uncompleted courses of previous treatments and then at a later date self-administering these antibiotics for self-diagnosed condition, either or both for themselves or family members, including their children. For example this has been identified by 20.3% of people in Jordan (Nawafleh et al. 2016), 31.6% in China (Ding et al. 2015), 44.7% in Saudi Arabia (El Zowalaty et al. 2016), and 55.4% in Qatar (Moienzadeh et al. 2017).

Sharing antibiotics between family members or friends has also been reported (Sawair et al. 2009; Mongkonchaipak et al. 2012; Suaifan et al. 2012; Alili-Idrizi et al. 2014; Black et al. 2014; Cheaito et al. 2014; Darwish et al. 2014; Emeka et al. 2014; Fatokun 2014; Awad and Aboud 2015; Ding et al. 2015; Pavydè et al. 2015; Nawafleh et al. 2016; Pan et al. 2016; World Health Organization 2016a; Erku et al. 2017; Moienzadeh et al. 2017; Tuyishimire et al. 2019). Further reported sources to obtain antibiotics were from abroad or via the internet (Abasaeed et al. 2009; Awad and Aboud 2015).

Information on antibiotics used in self-medication was obtained from a variety of sources including both reliable and non-reliable sources. Many studies revealed that the main source of information was from pharmacists or drug sellers (Belkina et al. 2014; Emeka et al. 2014; Harakeh et al. 2015; Ocan et al. 2015; Pavydè et al. 2015; Omulo et al. 2017; Abduelkarem et al. 2019) but others reported from relatives or friends (Khan et al. 2011; Askarian and Maharlouie 2012; Belkina et al. 2014; Cheaito et al. 2014; Emeka et al. 2014; Ocan et al. 2015; Pavydè et al. 2015; Widayati et al. 2015; Abduelkarem et al. 2019). Other reported sources include: own experience (Khan et al. 2011; Belkina et al. 2014; Cheaito et al. 2014; Emeka et al. 2014; Omulo et al. 2017), physicians (Cheaito et al. 2014; Pavydè et al. 2015), leaflets (Harakeh et al. 2015; Ocan et al. 2015), advertisements (Emeka

et al. 2014), the internet (Khan et al. 2011; Ding et al. 2015; Harakeh et al. 2015; Pavydė et al. 2015; El Zowalaty et al. 2016), newspapers/magazines (Khan et al. 2011; Ding et al. 2015; Harakeh et al. 2015) and television (Ding et al. 2015).

2.3.3 Adherence to antibiotic regimens

The WHO has advised that patients should always complete the course of antibiotics, even if they feel better (World Health Organization 2016a). However, many people, including parents and caregivers, think that they should stop taking/giving antibiotics when the symptoms subsided (Alili-Idrizi et al. 2014). Some thought that taking fewer antibiotics than prescribed is healthier than taking a full course (Alili-Idrizi et al. 2014). Some consumers worried about the risk of taking too many antibiotics (Widayati et al. 2015).

Patients have reported they did not adhere to antibiotic therapy as directed by healthcare professionals. A global survey of compliance with antibiotic therapy for acute infections in the community conducted in eleven countries from different regions (N= 4088) found that the overall non-compliance rate was 22.3%. However, the non-compliance rate varied widely between countries which ranged from 9.9% in the Netherlands to 44.0% in China. The factors relating to non-compliance with antibiotic therapy were country, daily dosage regimen, age of patients, patients' attitude to doctors and attitudes to antibiotics. (Pechère et al. 2007). A systematic review and meta-analysis by Kardas et al. (2005), which included 46 studies from many countries, reported an overall mean compliance to antibiotic therapies of 62.2% (95% CI, 56.4-68.0). Compliance was also found to vary within and between geographic regions; 39.2-69.5% in Latin America countries and 63.6-81.1% in Middle East countries.

Discontinuing antibiotic therapy once the symptoms improved or disappeared was commonly reported (Sarahroodi and Arzi 2009; Belkina et al. 2014; Darwish et al. 2014; Emeka et al. 2014; Fatokun 2014; Fernandes et al. 2014; Awad and Aboud 2015; Nawafleh et al. 2016; Erku et al. 2017; European Commission 2018; Abduelkarem et al. 2019; West and Cordina 2019). Some people thought that they were fully recovered when the symptoms had subsided so they could stop taking

antibiotics (Moienzadeh et al. 2017; Irawati et al. 2019). Other reported reasons for not finishing a course of antibiotics included forgetting to take antibiotics (Fernandes et al. 2014; Awad and Aboud 2015; West and Cordina 2019), they experienced side effects that made them feel unwell (Awad and Aboud 2015; Nawafleh et al. 2016; West and Cordina 2019) or study and work reasons (Fernandes et al. 2014; Nawafleh et al. 2016). These leftover antibiotics were kept for future use (see section 2.3.2.)

A number of studies reported that people usually take antibiotics for a short duration. Many consumers admitted to taking antibiotics for less than five days (Saengcharoen et al. 2012; Pavydè et al. 2015; Nawafleh et al. 2016; Pan et al. 2016; Abduelkarem et al. 2019); while some consumers might take antibiotics for up to seven days (Sihavong et al. 2009; Widayati et al. 2011; Pavydè et al. 2015; Nawafleh et al. 2016; Abduelkarem et al. 2019). There were few reports of patients taking antibiotics for a longer duration (Emeka et al. 2014). A study by Nawafleh et al. (2016) found that some people continued with the antibiotic if/when symptoms remained present, although they had already completed their recommended antibiotic course.

Changing the antibiotic if the symptoms had not improved immediately (Belkina et al. 2014), use of antibiotics other than in accordance with instructions, (Suaifan et al. 2012; Belkina et al. 2014), self-reducing the dose of antibiotics (Suaifan et al. 2012) or taking an inadequate dose (Al Akhali et al. 2013) were also reported by patients.

Non-adherence to antibiotic treatment is one important potential cause of AMR (Goossens 2009; World Health Organization 2016a). Non-adherence to antibiotic regimens and inappropriate antibiotic use are found to be associated with a lack of public awareness and knowledge of antibiotics and AMR (McNulty et al. 2007).

2.3.4 Knowledge and views of the public towards antibiotic resistance

Findings from many studies found that the general public lack awareness of AMR (McCullough et al. 2016; World Health Organization 2016a; Irawati et al. 2019). More than half of the population was familiar with the terms: antibiotic resistance,

drug resistance, antibiotic-resistant bacteria, and superbugs (Napolitano et al. 2013; World Health Organization 2016a; Irawati et al. 2019). Less than half of the study sample populations were aware that antimicrobial resistance was due to antibiotic use (Cheaito et al. 2014; Fatokun 2014).

Most population samples believed that antibiotic resistance is when antibiotics become ineffective to cure the infection (Fredericks et al. 2015; McCullough et al. 2016; Mason et al. 2018; Irawati et al. 2019). However, in some studies, the participants thought that antibiotic resistance is the human body becoming resistant to antibiotics (World Health Organization 2016a; Yusef et al. 2018). The level of misunderstanding about AMR was highest in the countries with a higher prevalence of antibiotic use (World Health Organization 2016a).

Many study populations thought that AMR was caused by overuse and/or other misuse of antibiotics including not completing the antibiotic course (Saengcharoen et al. 2012; McCullough et al. 2016; Pan et al. 2016; Mason et al. 2018; Irawati et al. 2019). A systematic review by McCullough et al. (2016) found that people believed that antibiotic resistance posed a minor risk to themselves. Most people thought the consequences of AMR included; infections being more difficult to treat and a higher cost of treatment (Irawati et al. 2019), treatment failure and the need for more treatment (McCullough et al. 2016), increased hospitalization and death (McCullough et al. 2016).

Moreover, many people were not aware of the risks of antibiotics, such as, adverse drug events, antibiotic allergies, and the development of resistance (Black et al. 2014; Widayati et al. 2015; Barker et al. 2017a; Irawati et al. 2019). Many people did not know antibiotics had side effects (Kotwani et al. 2016; Pan et al. 2016; Barker et al. 2017a). Some were aware that antibiotics could affect the hepatic and renal system (Cheaito et al. 2014; Kotwani et al. 2016). People who were aware of the adverse effects of the frequent use of antibiotics were less likely to self-medicate with antibiotics (Widayati et al. 2015).

As reviewed above, non-prescription use of antibiotics was widely reported globally, particularly in developing countries. The major source of non-

prescription antibiotics was from pharmacies. Non-prescription antibiotic use was found to be related to inappropriate antibiotic choice, as well as, suboptimal doses and duration of treatments. This irrational use of antibiotics is an important cause of AMR. In order to develop appropriate strategies to improve rational antibiotic use, understanding the reasons behind the practices, as well as, recognising of barriers to comply with the rational use of antibiotics are important.

2.4 The need for research

Supplying antibiotics without a prescription is influenced by several factors, for example, lack of professionalism and/or knowledge of pharmacists and pharmacy staff, demand from customers, financial incentives and a business orientation by pharmacies, lack of regulation or enforcement of existing regulations, and failing health systems (Roque et al. 2013; Llor and Bjerrum 2014; Dillip et al. 2015; Roque et al. 2015; Gebretekle and Serbessa 2016; Salim and Elgizoli 2017). The influence of the pharmaceutical industry, pharmacists' familiarity with treatment options and their belief that doctors would prescribe the same medication were also reported (Radyowijati and Haak 2003; Chalker et al. 2005). Unfortunately, most studies exploring the factors that influence the supply of antibiotics by community pharmacies were conducted in countries where supplying antibiotics without a prescription is illegal but none-the-less does occur (e.g. Malaysia, Singapore, Indonesia, Qatar, Saudi Arabia, Palestine, Nigeria, Portugal etc.) (see section 2.2).

In Thailand, over 5,200 antimicrobial products are registered with the Thai-FDA. Two thirds of these antimicrobials are for humans; the remainder are for animals (Jitraraknatee 2011). About one fifth of human drug costs are accounted for by antimicrobials. Half of antimicrobial consumption is antibiotics. In 2009, the total value of the manufacture and importation of antibiotics into Thailand was approximately £220m, which is higher than on medicines for cardiovascular diseases (£170m) and cancer (£145m). The top three antibiotic groups in terms of volume are penicillins, cephalosporins and carbapenems (Jitraraknatee 2011; Sumpradit et al. 2017).

Several studies have revealed that antibiotic supply without a prescription in community pharmacies leads to the inappropriate use of antibiotics (Ocan et al. 2015). In Thailand, antibiotics are widely available lawfully from community pharmacists without the need for a prescription. Some studies have shown that the inappropriate supply of antibiotics from community pharmacies also occurs in Thailand (Apisarnthanarak et al. 2008; Saengcharoen et al. 2008a). Approximately 50-60% of patients who visited community pharmacies in Thailand with upper respiratory infection (URI), sore throat or acute diarrhoea due to food poisoning were supplied with antibiotics (Sumpradit et al. 2013). A SMC study in 91 community pharmacies in Thailand reported that about seventy percent of pharmacists inappropriately supplied antibiotics for acute non-infectious diarrhoea in children (Jaisue et al. 2017). The supply of antibiotics from community pharmacies to the public for common, self-limiting diseases such as URI, acute diarrhoea and simple wounds is common (Saengcharoen et al. 2008a; Saengcharoen and Lerkiatbundit 2010; Tongrod et al. 2013). This supply could be due to a specific request from a patient for an antibiotic or a pharmacist recommending an antibiotic in response to presenting symptoms.

Understanding why and how community pharmacists supply antibiotics, as well as factors associated with antibiotic (mis)use by patients is important to plan strategies to improve rational use of antibiotics in community. Globally, studies have explored the factors influencing the supply of antibiotics without a prescription, and assessed the knowledge, attitudes, and practice of antibiotic supply and antibiotic resistance. Besides, studies have explored the public's use and prevalence of self-medication with antibiotics (see section 2.3). However, little work on this subject has been conducted in Thailand.

To date, studies relating to antibiotic supply from community pharmacies and the use of antibiotics in community settings in Thailand are limited (both in Thai and English language). Four studies relating to factors influencing the supply of antibiotics from community pharmacies in Thailand were identified during literature searching. However, these studies were conducted in only one region in Thailand; additionally, three studies were conducted over a decade ago. Two

studies which reported the knowledge, attitude, and behaviours of Thai residents towards antibiotic use were also identified.

In a study investigating the supply of antibiotics from pharmacies, a simulated client method³ (SCM) followed by a self-administered questionnaire was conducted in 115 pharmacies in south of Thailand. The four stimulated clients visited the selected pharmacies and requested medicines for a girl with diarrhea. They found that only 5.2% of pharmacies supplied appropriate treatment for a child with viral diarrhoea, while 52.2% of pharmacies inappropriately supplied antibiotics for such illnesses. The study also reported that the supply of antibiotics by pharmacy staff was influenced by beliefs in the benefits of antibiotics in promoting a quick recovery and in the high profit of antibiotics (Saengcharoen and Lerkiatbundit 2010). Another SCM study by Saengcharoen et al. (2008a) was conducted in 2005 in 32 pharmacies in Thailand. Each simulated client visited eight community pharmacies twice, one month apart, with a different appearance suggesting a different socioeconomic status (SES). The results showed that antibiotics were supplied in 112/128 instances (87.5%). Gender and appearance of SES did not affect the supply of antibiotics by community pharmacists.

A survey (N = 656) (Saengcharoen et al. 2008b) was conducted to investigate predictors of intention to supply antibiotics for URIs among community pharmacists in Southern Thailand. The findings demonstrated that beliefs of community pharmacists in the benefits of antibiotics was the strongest influence on intention to supply antibiotics. Perceptions about adverse drug reactions and antibiotic resistance, patient demand and profit had a low influence on the supply of antibiotics. Another survey with 703 respondents (Saengcharoen et al. 2016), also conducted in community pharmacies in the south of Thailand, revealed that the supply of antibiotics for streptococcal pharyngitis was positively associated with length of experience in community pharmacy (more than 5 years), a belief that antibiotics could shorten the duration of pharyngitis and prevent its

³ The simulated client method (SCM) is a way to study client-health provider interactions. Simulated client (SC) with a third person scenario patient visit pharmacies and request for some medicines/or antibiotics for the patient.

complications, and a belief that a supply of antibiotics would result in higher patient satisfaction. Moreover, pharmacists who were knowledgeable on the scoring tool⁴, Centor criteria (National Institute for Health and Care Excellence (NICE) 2018), that is used to identify sore throat patients likely to benefit from antibiotics, were less likely to supply inappropriate antibiotics in such cases.

Consumers' behaviours and views regarding antibiotic use have also been studied in Thailand. A survey study with 384 pharmacies' clients was (Mongkonchaipak et al. 2012) conducted in Pathum Thani Province, Thailand. These authors reported that most pharmacies' clients had incorrectly believed that antibiotics could be used for fever and pain, and more expensive antibiotics were better than cheaper antibiotics. Moreover, many participants reported that they did not always complete a course of antibiotics, sometimes shared antibiotics with relatives/friends and/or always took antibiotics for colds, and fresh wounds. Many factors were significantly found to have an effect on the knowledge and behaviour of antibiotic usage, including, gender, marital status, religion, education level, occupation, household income, conditions for using antibiotics, and having previously obtaining antibiotics from healthcare providers. A questionnaire (Saengcharoen et al. 2012) was conducted using Thai students (N = 712) where it was found that more than 75% of respondents had misconceptions on the benefits of antibiotics. Taking an incomplete course of antibiotics which was recommended by health providers was found in more than 45% of respondents, mostly for less than 5 days. Factors significantly influencing antibiotic use for URIs amongst Thai students were knowledge and attitudes about antibiotics, attitudes towards antibiotic prescribing for treating colds by physicians and pharmacy staff, belief in the common use of antibiotics for colds, and an expectation to receive antibiotics from physicians.

⁴ Scoring tools were developed to identify patients with sore throat who are more likely to be infected with group A streptococcal (GAS) and likely to benefit from an antibiotic treatment. Examples of scoring tools are FeverPAIN, and the Centor criteria. Each tool consists of group of criteria (mostly sign and symptoms), and each criterion scores 1 point. A total score determines a likelihood of isolating streptococcus and is in line with treatment recommendations (National Institute for Health and Care Excellence (NICE) 2018).

As outlined above, studies focusing on antibiotic supply from community pharmacies and the public's use of antibiotics in Thailand are limited. Most studies were published about a decade ago. In addition, those studies were conducted in a specific province, or region. Since then there have been many changes related to antibiotic supply in Thailand, particularly, a higher number of qualified pharmacists and a change in pharmacy education with the introduction of a Pharm D in 2010. Furthermore, there have also been limited published studies exploring the reasons Thai people use antibiotics obtained from community pharmacies, that is, appropriately or otherwise.

In addition, generalizations from findings conducted in other countries are unsuitable due to the geographical variation which has regional differences in the economy, culture, legal provisions, health systems, human behavior and health literacy. Therefore, the context within which practising pharmacists and the context within which self-medication by patients occurs in other countries may be different to pharmacists and patients in Thailand, where the supply of antibiotics from community pharmacies without a prescription is legal.

To develop appropriate interventions to improve antibiotic use in community pharmacies in Thailand, it is first necessary to understand more about the practice of the supply of antibiotics from pharmacies and their use by the public.

2.5 Aims of the studies in this thesis

This study aims to

- 1) explore the factors which influence the appropriate supply of antibiotics by community pharmacists
- 2) to explore why and how Thai citizens use antibiotics supplied from community pharmacies.

The specific objectives for each of the empirical studies are presented in chapter 4, chapter 5, and chapter 6.

Chapter Three

Methodology

3 Methodology

This chapter presents the general methodological approach and sets out the general methods used to explore the supply and use of antibiotics from community pharmacies in Thailand. This chapter introduces the general mixed methods approach used for this thesis. The specific methods for the community pharmacist and citizen interviews and the community pharmacist survey are described in chapters 4, 5 and 6, respectively.

3.1 Philosophical worldviews and epistemological consideration

The research approach involves three components, philosophical assumptions, research design, and research methods. All researchers should be aware of the assumptions they make about gaining knowledge during a study. Importantly, the researcher should identify the philosophical assumptions that they bring to research. Beliefs about philosophical worldviews or research approaches result in different practices (Johnson and Onwuegbuzie 2004). Moreover, having an awareness and recognition for the researcher's ontology and epistemological views is also crucial (Caelli et al. 2003).

Ontology is concerned with the nature of reality and what there is to know about life, the world or a topic. A relativist ontology is one which concludes that no reality exists that is independent of our beliefs and understanding. Furthermore, the world is influenced by context, and individuals will have a different understanding of what social reality is to them. Individuals have different constructions as to what reality is to them. This contrasts with realism as an ontological standpoint, where there is one reality and that reality exists independently of the minds of individuals within society (Ritchie and Spencer 2002; Levers 2013). For the interviews in this study, a relativist ontological position is adopted, so that the subjective experiences and contexts of individuals are considered

A philosophical worldview or paradigm is commonly classified as postpositivist, constructivist, transformative or pragmatist (Creswell 2014). These paradigms

are different from the concepts of ontology (the nature of reality), epistemology (how we gain knowledge of what we know), methodology (the principle that drives the selection of research methods), and methods (the tools or processes that are used in research).

Postpositivism is typically associated with quantitative approaches in which postpositivists tend to view reality as singular; researchers reject or fail to reject hypothesis. In contrary, constructivism is often associated with qualitative approaches where the constructivist constructs meaning from views and/or experiences of others and their own reflections. A transformative worldview involves politics and a political change agenda to confront social oppression. Lastly, a pragmatist worldview is focused on the empirical research problem and uses any approaches available to understand the problem of interest, rather than focusing on the specific research methods (Creswell 2014).

Regarding pragmatism, knowledge is considered as being both constructed and based on the reality of the world. Pragmatists are typically associated with the mixed methods approach. Research approaches can be mixed to clarify important research questions (Johnson and Onwuegbuzie 2004). Both qualitative and quantitative approaches have many strengths and weaknesses. In some circumstances, a qualitative approach may be more applicable; while, in other circumstances, a quantitative approach may be more appropriate. In some situations, mixing insights and methods from both qualitative and quantitative approaches can provide a more workable solution (Johnson and Onwuegbuzie 2004).

The researcher defines herself as a pragmatist. The pragmatist looks for the truth that is practically useful although considering appropriate approaches. This means that, as a pragmatist, the researcher focus is much more on the outcomes of research and the use of the most appropriate method to achieve these, thus prompting the application of mixed methods which could fulfil the aims of this thesis, namely determining and exploring the supply and use of antibiotics from community pharmacies in Thailand.

3.2 Mixed method research

Mixed methods research is an approach in which the researcher collects, analyses and mixes both quantitative and qualitative data in a single study or a multiphase study. This method of research can include the use of multiple approaches to address the aims of the study (Tashakkori and Teddlie 2016). A researcher can apply the strengths of an additional method to minimize the weakness in another method by using both in a research study for the best opportunities for the best answering research questions (Johnson and Onwuegbuzie 2004). This approach is helpful because researchers may be required to solve problems, combining inductive and deductive thinking (Creswell and Clark 2011). However, mixed methods research can be time-consuming as it involves several stages relating to planning, data collection, analysis and reflection. There are some challenges in using a mixed method design, such as the effort and knowledge required to conduct both quantitative and qualitative research (Johnson and Onwuegbuzie 2004).

The researcher is likely to base knowledge claims gathered from mixed methods research on their pragmatic problem-centred worldview, which frees the researcher to combine both quantitative and qualitative approaches to better understand the research problem (Johnson and Onwuegbuzie 2004; Creswell 2014). A pragmatic worldview is focused on the research problem and uses appropriate approaches available to understand the problem of interest, rather than focusing on the specific research methods. Pragmatists look for the truth that is practically useful (Creswell 2014).

3.2.1 Justification for using mixed method design

The literature review in chapter 2 highlighted a lack of data, therefore suggesting the need to conduct further research to gather basic information concerning antibiotic supply and use from community pharmacy in Thailand. Areas of interest where there were concerns include the views of Thai community pharmacists regarding the supplying of antibiotics and AMR, as well as the views of the general population regarding antibiotic use and AMR. In response to the need to develop

an understanding about the factors which influence the supply of antibiotics by community pharmacists and the factors which influence the public's use of antibiotics, a mixed methods approach is well suited to deal with the research questions in this study. The mixed methods approach enables the researcher to apply different methods and use different types of data for an appropriate approach the research questions (Creswell and Clark 2011; Tashakkori and Teddlie 2016)

As there were limited studies relating to the influencing factors for the supply of antibiotics by community pharmacists, an in-depth understanding of the issues, with examples, is needed. Therefore, this study chose to use an exploratory sequential mixed-methods design where qualitative data were collected and analysed first, followed by the collection and analysis of quantitative data. The findings from the qualitative phases were used for the development of the tool used in the quantitative phase (Johnson and Onwuegbuzie 2004).

3.3 Methods used

The study was conducted in a sequential manner – semi structured interviews followed by a cross-sectional survey (Figure 3-1). This allowed the data to be collected iteratively, and findings from the qualitative interviews were used to develop the quantitative questionnaire (Creswell et al. 2011). The two-step approach commenced with a set of qualitative, face-to-face, semi-structured interviews in Thailand with a sample of community pharmacists and a sample of the general population to explore 'how' and 'why' antibiotics are used and supplied from community pharmacies. This was then followed by a self-completion questionnaire that was administered to a larger sample of community pharmacists in Thailand.



Figure 3-1 Study design overview for exploratory sequential mixed-method approach.

3.3.1 Qualitative research methods

Qualitative research is based on how the social world is understood, interpreted, and experienced. The data collected and analysed in qualitative research is *words*. Qualitative research tends to be exploratory, inductive in nature and oriented to show “how” and “why” things happen (Gray 2009; Braun and Clarke 2013b). These methods are appropriate for understanding the phenomenon and for gaining insight into peoples’ attitudes, beliefs and behaviours (Mack et al. 2011). The use of qualitative research allows more in depth exploration and description of a participant’s experiences or beliefs compared to quantitative methods (Babbie 2016c)

There was limited information relating to the reasons for the supply of antibiotics from community pharmacies in Thailand and the use of antibiotics by the public. Therefore, a qualitative study is well suited to the study of this issue because it allows the capture of experiences and perceptions of community pharmacists and patients about antibiotic utilization and AMR.

There are numerous forms of data collection methods in qualitative studies, for example, interviews, focus groups, research-directed diaries, and observation. The selected methods depend on the research questions. In addition, the time and resources available, and accessibility and feasibility for data collection from potential participants should be also considered (Johnson and Onwuegbuzie 2004; Braun and Clarke 2013c). Regarding the aims of the study, research-directed diaries, and observation were not well suited to the study. Although such methods are suitable to learn about a phenomenon of interest they cannot explore cognitive processes, such as reasons (Given 2008; Alaszewsk 2019). Observation within a pharmacy setting would require significant time (travelling and in the pharmacy) and the study would take longer. Furthermore, the presence of a researcher, especially in a small pharmacy would be noticeable by all. There are additional ethical considerations with observation studies. Regarding research diaries, although they can be useful, they require a significant amount of time for the research subjects to complete them. It was decided that the time commitment would be too much for this study. Interviews are well suited for this study that aimed to explore people's experience and practice, identifying the factors that influence their practice, and also clarifying and elaborating their own views. An interview with individuals could provide a comfortable environment for the interviewees and would be most likely to provide the desired depth of information and emphasis, compared with group interviews (Braun and Clarke 2013b; Wilson 2014). Therefore, the one-to-one interview was selected for this study because the participants were asked about their own experience and their views towards antibiotic supply, and some of the topic discussions might be sensitive (Stokes and Bergin 2006; Wilson 2014).

An individual interview should help to make the interviewees feel comfortable and provide rich and detailed data about individual practices and views. Besides, the other advantage of one-to-one interviews over focus groups for this study was that it would be easier to arrange an interview (Braun and Clarke 2013b; Lewis and Nicholls 2013). Focus group discussions would be more difficult arrange for community pharmacists in Thailand because community pharmacists had various

working hours, as well as, the fact that most pharmacies were open every day and closed late (Stokes and Bergin 2006).

3.3.1.1 Type of interviews

The interview is the most common qualitative method of data collection within social and health sciences research. The goal of interviewing is to provide a participant with an opportunity to talk about their experiences and perspectives, and to capture their language and concepts, in relation to specific topics. Interviews are often divided into three types: structured, semi-structured, and unstructured (Braun and Clarke 2013b).

Structured interviews involve asking respondents a series of pre-established questions with response categories that are predetermined by the researcher with little flexibility. The interviewers strictly read the questions from a list in the organized order to obtain answers from all interviewees (Qu and Dumay 2011). In contrast, in an unstructured interview, the researcher has a list of themes or topics to discuss with the participants. In this type of interview, the interviewer does not control the interviewees' responses (Braun and Clarke 2013b; McIntosh and Morse 2015). The unstructured interview proceeds from the assumption that the interviewers do not know in advance all the necessary questions, and/or the topics of interest (Qu and Dumay 2011).

For semi-structured interviews, the researcher has a list of general questions and topics to discuss with participants but also provides the participants with the opportunity to raise issues that the researcher has not anticipated, through, for example, prompts and probes and requests for examples (Braun and Clarke 2013b). The wording and order of questions are contextual and responsive to the participant's response, this provides the flexibility for interviewees to express their related experiences and views. Furthermore, the researcher can prompt and probe deeper into the given situation (Qu and Dumay 2011; Braun and Clarke 2013b; Lewis and Nicholls 2013; Wilson 2014).

From the options above, a semi-structured interview was considered most suitable to explore the reasons to use and supply antibiotics from community pharmacists and Thai citizens. This type of interview provides more space for interviewees to answer but still retains some structure for comparison across interviewees. In addition, the interviewer can keep the respondent pointed in the direction towards the research topics (Braun and Clarke 2013b; Edwards and Holland 2013).

3.3.2 Quantitative research methods

Quantitative research is an approach in which investigators often use statistical or numerical data to investigate social phenomena (Watson 2015; Bryman 2016). This approach is typically highly structured so that the researchers are able to examine the precise issues that are focused on in the study. Quantitative researchers often, but not always, want their findings to be generalisable to the relevant population. Additionally, researchers are often involved in large-scale investigations to analyze the social trends and relationships between variables (Roberts and Priest 2010; Bryman 2016). Therefore, a quantitative approach is useful to test if the findings from qualitative study are consistent in a larger population. Moreover, the approach is suitable to identify the relationships between the study variables and, in this case, the supply of antibiotics from community pharmacists.

Quantitative research is divided into two broad categories, namely experiments and surveys. An experimental design is used to study the effect of an independent variable on a dependent variable. The researcher can manipulate the independent variable and measure the change on the dependent variable (Watson 2015). The researcher aims to study community pharmacists in Thailand; therefore, a large number of pharmacies would be needed which would lead to high expense and take a significant amount of time. Thus, this type of quantitative approach was not used. In contrast, a survey study cannot easily determine cause and effect. Survey designs are suitable for research questions where the researcher wants a broad overview of a certain phenomenon or situation, for instance, the prevalence of the

problem, associated factors, knowledge, views, and the behaviour of those in a sample (Hallberg 2008). Therefore, survey research is more suitable to achieve the aims of this study.

Survey studies may be cross-sectional or longitudinal. Longitudinal approaches are suited for studying the change in the phenomenon over time, for instance, developmental processes, effects of interventions, and social trends. This approach involves repeated observations or examinations of a group of samples at multiple time points (Plano Clark et al. 2015). On the other hand, cross-sectional studies are conducted at one time point over a shorter period. The purpose of a cross-sectional study is descriptive, and it often uses a survey approach. The study aims to describe a population or a subgroup within the population, or a sample. Cross-sectional studies are also used to investigate associations between factors and the specific topics of interest. The cross-sectional survey has advantages in that it is useful for understanding a broad base of knowledge and interests; is inexpensive to employ and takes a shorter time to conduct. Therefore, considering the research questions, this method was appropriate for understanding an overview of the views of community pharmacists and the factors that influence their supply of antibiotics from community pharmacies in Thailand. It also has the advantage for this doctoral research which has limited resources available (Levin 2006).

A cross-sectional survey using a self-administered questionnaire was chosen to collect the data regarding the antibiotic supply from community pharmacists. This approach is appropriate for understanding the outcomes, which are the practices and views of community pharmacists, as well as, the pharmacists' and pharmacies' characteristics associated with the outcome at a given point in time.

Mail surveys have been used to gather systematic information about the views, and self-reported behaviours in social science. This research method had been perhaps the most common of all social science research methods (Babbie 2016b). However, the internet and smart phone technology have changed the way people in the world communicate nowadays. Postal mail has been almost replaced by

electronic communications in the form of emails, text messages, and messages sent through social networks (Dillman et al. 2014a). Maintaining high response rates to mail surveys is thus crucial. The response rate to mail surveys declined annually between 1971 – 2017 (Stedman et al. 2019). However, there has been no clear evidence showing higher response rates to online surveys over mail surveys. Moreover, Hardigan et al. (2016) assessed whether survey response rates and average response time varied by delivery method, postal mail, e-mail, and postcard including a web link. The study found that postal mail surveys accounted for the highest response rates for completing surveys, but e-mails exhibited the quickest return.

In addition, a number of recent studies with community pharmacies in Thailand have shown that postal mail surveys can achieve reasonable response rates (Dillman et al. 2014a). For example, Sookaneknun et al. (2017) surveyed community pharmacies that provided experiential education to pharmacy students. The survey was conducted in 2014 to evaluate the readiness and decisions of community pharmacists to co-service with the National Health Security Office (NHSO). The survey offered the clinical practice guideline in community pharmacy book as an incentive and yielded a 47.5% (188/396) response rate. Parinyarux and Suwannaprom (2014) used a postal survey to explore the attitudes of community pharmacists towards participation in the community pharmacy development and accreditation scheme and 40.6% (50/123) responded. Sumpradit et al. (2013) surveyed community pharmacies in Thailand about patterns of antibiotic supply. This study achieved a 55% (N=218) response rate. Finally, in 2005, Saengcharoen et al. (2008b) surveyed community pharmacists in Southern Thailand about antibiotic supply for upper respiratory infections, and 78.8% responded to the mail survey. In conclusion, previous postal surveys in community pharmacies in Thailand have resulted in a response rate between 40% and 80%, with most recent surveys likely to yield slightly lower response rates.

An advantage of a paper questionnaire is that participants can easily peruse the entire the questionnaire to get a sense of its length and the topics covered.

Respondents also could answer questions out of the intended order (Dillman et al. 2014a).

The Bureau of Drug Control (Thailand) website is the only source of registered community pharmacies in Thailand. This website only provides postal addresses of community pharmacies, with no electronic means of contact. For these reasons, a mail questionnaire was the most suitable to collect the data from community pharmacies in Thailand. Although, additional responses were encouraged using social media platforms.

3.4 Ethical considerations

Ethical approval was sought from the School/University ethical committees. Since the study was conducted in Thailand in the Thai language, the researcher also sought ethical approval from an ethics committee in Thailand. Moreover, an application for approval from an ethical committee in Thailand might provide additional reassurance for participants that there has been an independent review from within Thailand. As the Thai researcher (SD) was a lecturer at Ubon Ratchathani University, Thailand, the study was submitted for ethics approval to Ubon Ratchathani University Ethical Committee. The studies (in English) also had ethical approval from Cardiff School of Pharmacy and Pharmaceutical Science (CSPPS) Ethics Committee, as the studies were undertaken as part of the researcher's doctoral studies at Cardiff University.

3.5 Reflexivity

Reflexivity, an important consideration in qualitative research, is the process of being self-aware and reflecting critically of the role of oneself as a researcher (Braun and Clarke 2013c). This process has been accepted as a method where researcher can validate their research practices (Lambert et al. 2010). Therefore, the researcher conducting a qualitative study should report their background and role, including potential researcher bias that may affect data collection, data analysis and/or interpretation (Creswell 2017).

The researcher is a female Thai academic staff member at a university-based faculty of pharmacy in Thailand; a position I have held for over a decade. I also practised as a community pharmacist for the community pharmacy of the university. I graduated with a BPharm and MPharm (Clinical Pharmacy) from Thailand. While I worked as a lecturer, I had the opportunity to work with the Thai-FDA to promote the pharmacy accreditation project. I also have collaborated with CPA (Thailand) to promote ASU programmes in community pharmacy. However, I was an inexperienced researcher especially in terms of qualitative and mixed-methods research.

Before conducting the qualitative study, I prepared myself by attending qualitative research training courses that covered such topics as qualitative methods, individual and group interviews and analysing qualitative data. This preparation aimed to develop my various research skills in qualitative research. In addition, before the main study started, I conducted a pilot study to test the interview process and the interview schedule. The training and experiences that I had been through allowed me to have enough confidence to conduct the interviews. In addition, I also had regular discussions with the academic supervisors.

My professional background as an academic staff member and pharmacist might have shaped my data collection, analysis, and interpretation of the phenomenon in this study. Regarding the interview, I choose my 'insider-outside' position in different situations. For interviewing community pharmacists, I introduced myself as a pharmacist and a lecturer from a faculty of pharmacy who is a PhD student to establish better rapport with pharmacy practitioners. As an insider, the researcher may be more acceptable by community pharmacists; therefore, participants may be more willing to share their experiences and in-depth information (Dwyer and Buckle 2009). On the other hand, as I am a lecturer, the participants may be aware of providing some certain aspects of their experience, particularly where they may not have been engaging in the best practice. Thus, during those interviews, I had to consider my thoughts, feelings and responses, and any potential bearing these may have on the resulting data. I was careful to not make any assumptions and remain as neutral as possible in how I phrased

questions, responses and my use of body language. With the general population, I introduced myself as a lecturer from a faculty of pharmacy who is studying for a PhD. I did not mention that I had worked in a community pharmacy.

Regarding data analysis, the researcher has to make sure that the data can speak for themselves, not to project my own biases on the data and the analysis (Dwyer and Buckle 2009). I reminded myself to be careful not to selectively identify themes which fitted with my own preconceptions. Additionally, I also had regular discussions with the academic supervisors about all generated codes and themes.

This chapter has outlined the approach to the empirical research in the thesis. The detailed methods and results, together with a discussion, for the pharmacist interviews, citizen interviews and pharmacist survey are outlined in Chapters 4, 5 and 6, respectively.

Chapter Four

Community pharmacists' views regarding antibiotic supply and antibiotic resistance: Qualitative study

4 Community pharmacists' views regarding antibiotic supply and antibiotic resistance: Qualitative study

4.1 Introduction

This chapter presents the finding from interviews with 23 community pharmacists in Thailand about their views regarding antibiotic use and antibiotic resistance in Thailand. This study was needed because the literature review pointed to the fact that community pharmacists are important as a one of the key stakeholders to combat AMR (see chapter 1). Understanding why and how Thai community pharmacists supply antibiotics is important to plan strategies to improve the rational use of antibiotics in the community in Thailand. However, the number of studies related to antibiotic supply from community pharmacies in Thailand is limited (see chapter 2).

4.2 Aims and objectives

This study aims to explore the factors which influence appropriate antibiotic supply by community pharmacists in Thailand. The findings from this qualitative study will inform the design of a questionnaire for community pharmacists (see chapter 6). This study has two specific objectives:

1. To explore the factors that influence the supply of antibiotics from community pharmacies in Thailand
2. To explore how rational antibiotic supply from community pharmacies in Thailand can be improved

4.3 Methods

The qualitative (one-to-one, face-to-face) semi-structured interview was used in this study (described in chapter 3).

4.3.1 Ethical approval

Ethical approval was obtained from Cardiff University School of Pharmacy and Pharmaceutical Sciences Ethics Committee (in English) and Research Ethics

Committee of Ubon Ratchathani University, Thailand (in Thai). The Ethical Approval Letters are presented in Appendix 1.

4.3.2 Topic guide design

The interview guide (Appendix 2) was developed by the research team. A list of questions used to explore the practice and experiences of community pharmacists and their views regarding antibiotic use and AMR were developed by the researcher (SD) based on both the aims of the study and a literature review. This was discussed with the academic supervisors until agreement was reached.

The interview schedule consisted of three sections, 1) an introduction, 2) questions relating to the supply of antibiotics from community pharmacy, and 3) questions relating to improving the appropriate use of antibiotics in community pharmacies.

For the first section, demographic data of the participants was requested that is, age, educational level, previous or other experience related to pharmacy, length of experience in community pharmacy, and to confirm the accreditation status of the pharmacy.

In the second section, questions about participants' experiences relating to antibiotic supply from community pharmacy and their views regarding antibiotic resistance were asked. The questions were focused on antibiotic supply for three conditions, namely URIs, acute diarrhoea and simple wounds which were the areas of focus to reduce the unnecessary use of antibiotics in patients in ASU campaign (Sumpradit et al. 2012). This section aimed to explore the experience of participants regarding antibiotic supply in community pharmacies and their views towards the appropriateness of the supply, as well as, their views about factors influencing their practice.

The third section of the interview schedule aimed to explore the participants' views regarding the AMR problem and the ways to combat this problem including interventions for community pharmacists they thought may reduce the problem.

4.3.3 Sampling and recruitment

For the study, the plan was to have representation from a minimum of one participating community pharmacist in each of the different demographic characteristics, male/female, BPharm/Pharm D degree, owner/employer, working in independent/chain pharmacy and accredited/non-accredited pharmacy⁵, from various provinces. Therefore, purposive sampling was used to select the sample. Purposive sampling, one of the most common sampling strategies using in qualitative research (Patton 2002), selects participants according to preselected criteria relevant to a particular research question (Mack et al. 2011). This is to ensure that rich information will be provided (Patton 2002). However, since the budget, time and access to the samples were limited, convenience sampling was also used in combination with purposive sampling. Convenience sampling has the advantages of saving time and cost. However, it may be biased and unrepresentative of the population and data might not be transferable to the population (Bergin 2018a).

Firstly, the settings to collect the data were selected based on convenience sampling. Three provinces in north-east Thailand (Nakhon Phanom, Ubon Ratchathani and Sisaket) and three in central Thailand (Bangkok, Nonthaburi, Pathum Thani) were selected based on transportation, and proximity to the researcher's accommodation. These selected provinces include both small and big cities.

Secondly, purposive sampling was conducted to select the sample pharmacies for the study. Accredited pharmacies from each selected province, both independent and chain store, were chosen. Invitation emails (Appendix 3) including the participant information sheet (Appendix 4) and consent form (Appendix 5) were sent to accredited pharmacies in the selected provinces where email addresses are available. Telephone invitations were used where the email address was unavailable. During the phone call, the researcher would introduce oneself and the

⁵ Community pharmacy accreditation in Thailand is voluntary. Thailand initiated a community pharmacy accreditation project in the year 2002. It used accreditation criteria comprised of five domains: premise and facility, personnel, drug inventory and stocking, dispensing and patient care, and patient satisfaction and health promotion.

study, then ask for the pharmacists' willingness to participate in the study or email address to send more information (information sheet and consent form). All materials were in the Thai language.

Lastly, non-accredited pharmacies in close proximity to those selected accredited pharmacies or within 60 miles from researcher's home were identified. Email or telephone invitations were used the same way as those used to recruit accredited pharmacies.

After providing information about the study, the researcher (SD) gave participants a week to decide whether or not they wished to participate. A reminder was sent within a week after providing the participant information sheet and consent form.

This sampling approach was used to select a diverse range of participants and included most of the purposive criteria listed above. However, this sampling method could not ensure that both male and female, BPharm and Pharm D pharmacists would be included in the study. The reason was the list of community pharmacies provided online did not include information on the demographics of the community pharmacists.

Since there are not rules for sample size calculations for qualitative studies. The sample size is affected by the objectives of the research (Patton 2002). Braun and Clarke (2013c) stated that moderate to large sample sizes (approximately ten to over twenty) are suitable for an interview study which aims to explore the factors influencing individuals' behaviours. Therefore, this study tried to recruit as many participants as possible in an attempt to achieve data saturation within a predetermined time period of 8 weeks. Recruitment was stopped a week prior to the end of the data collection period, as no new perspectives or data had been identified in the last 6 interviews. Twenty-three community pharmacists were recruited.

4.3.4 Data collection

The study was conducted in three provinces in north-east Thailand and three in central Thailand to gain access to participants who were located in different regions. Interviews were carried out over a period of 8 weeks, between October

and December 2017. Interviews were conducted face-to face and took place at a mutually convenient location and time. Almost all interviews took place at a participant's pharmacy. Only two interviews were conducted at a café near the pharmacies. The language of participants, Thai, was used in all interviews. The interviews were audio-recorded with consent.

Prior to beginning the interviews, the purpose of the interview was explained to the participants. Moreover, the interviewer reminded the participants that they could withdraw consent at any point in the process with no resulting consequences to them, and that they could refuse any questions. Permission to audio-record the interviews was also asked. The participants were assured that confidentiality and anonymity would be maintained. Then, the participants were asked to complete two enclosed copies of the consent form confirming the participant had read and understood the information sheet and that participation was voluntary. The researcher also signed both copies. One copy of the form was for the participant to keep. The other copy was retained by the research team. The interview structure including the key interview topics was also described to the participants to aid their understanding and to make them feel more comfortable with the interview process.

During the interview where participants gave incomplete or unclear explanations where further elaboration was needed, the interviewer used prompts and probes so that the researcher could clarify what they meant (Babbie 2016b).

4.3.5 Data management

4.3.5.1 Transcription

Transcription refers to the process of reproducing spoken words, as from an audio-recorded interview, into written text. The interview recordings were transcribed verbatim, with word-for-word transcription of verbal data (MacLean et al. 2004; Braun and Clarke 2013a). Therefore, all transcriptions were in the Thai language. However, the utterance/non-lexical conversation sounds, such as “ums” and “ahs”, and repetition were not included in the transcripts (Bailey 2008). The audio-recorded words were exactly transcribed into written words, in order to

enhance the quality of transcription and ensure coding was accurate and representative of the answers provided by the participant (MacLean et al. 2004; Braun and Clarke 2013a).

The researcher (SD) transcribed the interviews herself and anonymized the transcripts to maintain the confidentiality of persons and institutions mentioned in the interviews. This also helped with the initial familiarization of the researcher with the data. Moreover, transcription is a first step and important in data analysis because this process is attentive to the data through repeated listening of the audio-interviews (Bailey 2008). Another advantage of the researcher transcribing the interviews was a financial saving. Thirty minutes of interview recording took approximately 3 - 4 hours of transcription.

To enhance reliability of transcriptions, all anonymized Thai transcripts were checked twice for accuracy by listening to the recording while reading through the transcript (McLellan et al. 2003; Babbie 2016a).

4.3.5.2 Translation

Data translation in this research was important because Thai was the language used by the researcher and the participants. The supervisors did not speak or read Thai at all. It was necessary to translate key elements of the interviews, and all codes and themes from Thai into English.

For the translation of the transcripts, four Thai transcripts of interviews were translated into English by the Thai researcher (SD) using a meaning-based approach to provide the data in English for the supervisors (Lopez et al. 2008; Santos et al. 2015). Confirmation of the translation to check the correctness of the translation was done by TS⁶. The aim of meaning-based translation is to transfer from source language (in this study the Thai language) to a target language (in this study English) by communicating the same message of the source language but

⁶ TS: Associate Professor at Ubon Ratchathani University, who obtained her PhD degree in pharmacy from the United Kingdom. She is a fluent Thai-English bilingual speaker

using the vocabulary and grammatical choice of the target language (Squires 2009). These four English transcripts were shared with the supervisors.

In this study, the data were analyzed in Thai by the PhD student (SD), all Thai codes and themes were conceptually equivalence translated (from Thai to English) by SD. For the effectiveness of translation in cross-language research which is critical to the interpretation of the data and integrity of the results, steps need to be taken to attempt to ensure the conceptual equivalence of the translations (Squires 2009; Al-Amer et al. 2015). The translations were confirmed by the second Thai-English bilingual translator, TS, for meaning and comprehension to achieve a high quality of translation while being aware of possible errors in translation (Esposito 2001; Lopez et al. 2008). Any discrepancies were resolved through discussion between the two Thai speaking individuals (Irvine et al. 2007). To maximize the quality of translation, and overcome the epistemological and cultural issues (Chen and Boore 2010), the necessary characteristics of the translators were as follows (Esposito 2001; Squires 2009): bilinguals (Thai-English), Thai native speaker, familiar with community pharmacy in Thailand.

4.3.5.3 Data storage

Confidentiality was ensured at all stages of the research process. The audio files of the interviews were kept on a password protected computer laptop before transcription. The files on the recording devices were deleted after they were copied onto the laptop. The transcripts were anonymised. Consent forms, transcripts and recordings were kept in a locked drawer in the School of Pharmacy & Pharmaceutical Sciences, Cardiff University. Any information retained on password protected computer laptops was anonymised (containing a reference number in place of personal data).

Any personal details that were collected during the study were only seen by the researcher and were kept a year before being destroyed.

4.3.6 Data analysis

Data analysis in the source language is suitable as it corresponds more closely to the original data and better describes meaningful segments of text with long and accurate codes (Tarozzi 2013). Moreover, this also saves time and budget (Twinn 1997) for translating all transcripts; therefore, the data were analyzed in Thai language, then the codes and themes were translated into English.

Thematic analysis was used to analyze the interview transcripts in this study. It is a process that a researcher uses to identify themes and patterns of meaning within the dataset. A theme is a category identified by the researcher through the data, which relates to the research questions. This approach is commonly used across many qualitative methods within psychology and social sciences. Thematic analysis is flexible enough to be used to answer most types of research questions related to influencing factors, representation, and construction. Furthermore, this can be used to analyze most types of qualitative data, including interview data. Moreover, this approach is accessible to researchers with little qualitative experience which is suitable for the researcher (SD)(Braun and Clarke 2013b). For these reasons, thematic analysis was selected as an appropriate analysis method for this study.

Both a deductive and an inductive thematic analysis approach were applied to analyze the interview data. Deductive analysis was guided by the aims of the study, interview schedules and the literature. This approach was used to seek the reasons that influence the use and supply of antibiotics. Additionally, an inductive approach was used to identify anything else of interest to the researcher (SD) within the dataset in relation to the research questions (Braun and Clarke 2013a).

Braun and Clarke (2006) provided a six-step guide for conducting thematic analysis. The data analysis was undertaken with the following steps:

- 1) Becoming familiar with the data

This process is important and the basis of qualitative data analysis. The researcher needs to be immersed in the collected data through transcribing and re-reading the data several times (Braun and Clarke 2006, 2013b).

The principal researcher (SD) familiarized herself with the interview data through transcribing the interview recordings, checking the transcripts against the audio-files twice for accuracy and reliability, reading and re-reading the transcripts and taking note of potential interest, and noting down initial ideas. This facilitated the principal researcher to immerse herself further with the context of all transcripts to ensure thorough understanding of the content.

2) Generating initial codes

Coding is used to analyze the content of the entire dataset or to identify certain features of the data. Codes are used to identify relevant and interesting data (Braun and Clarke 2006, 2013b). The coding was initially carried out by the researcher (SD) on the Thai transcripts. The initial codes were produced in a deductive manner. The data were identified based on specific research questions and objectives, such as, the factors influencing antibiotic supply and ways to improve antibiotic use. In addition, inductive analysis, which was driven by the data, was also used to determine any other codes within the interview transcripts.

The codes were discussed among the PhD student (SD) and academic supervisors. The coding structure was revised and further developed. This involved several steps between the generated codes and themes. Reflection and the amendment of codes and themes was done by SD by looking at the transcripts and codes, sometimes it stayed the same and sometimes changed. Codes and themes aligned with quotes were also discussed as three of the researchers (SD, DNJ, MW), reflection and amendments were made several times until agreement was reached. The issues discussed related to the form of English used for the codes and themes.

NVivo 11 software was used in the coding process for all Thai transcripts. Codes were created for as many potential themes/categories as possible. Codes and themes aligned with quotes were also translated into English and discussed between the researcher and supervisors.

3) Searching for themes

During this phase of the analysis researchers identify emergent themes (Braun and Clarke 2006, 2013b). The principal researcher reviewed the generated codes from the previous steps. The codes where there were similarities and overlap were collated. Then the researcher looked for concepts or topics which several codes were related to, and which could be used as a theme.

Themes, subthemes, and codes with illustrative quotes in Thai were translated (conceptual equivalence) into English for discussion with the academic supervisors. Discussions between the researcher and academics enabled the more credible identification of key concepts and themes.

4) Reviewing themes

This stage focuses on reviewing and refining the themes at two levels: the level of the coded extracts and at the level of the entire dataset. This phase ends with the generation of a thematic overview (Braun and Clarke 2006, 2013b). The researchers met frequently, all themes were reviewed and revised by checking all the coded and collated data to confirm that each theme was fitted and covered most of the coded data and answered the research questions. A thematic table was developed to explore the relationships between codes and themes, and themes and subthemes.

5) Defining and naming themes

Defining and further refining of the themes occurs taking into consideration the themes, its scope and how they relate to each other (Braun and Clarke 2006, 2013b). The researchers discussed the themes and subthemes until consensus was reached on the key overarching themes and the subthemes under them.

6) Producing the report

This is the writing up phase of the thematic analysis, showcasing the data in an analytical narrative with evidence from the data to highlight specific themes (Braun and Clarke 2006, 2013b). The principal researcher (SD) then wrote the report based on the validated themes with illustrative quotes.

4.4 Results

A total of 23 community pharmacists participated the interviews. The repetition of data occurred, and no new data were found in later interviews, which means the data may well have been saturated. However, this cannot be said with certainty. The depth of the data was enough to demonstrate participants' views regarding antibiotic use and ways to improve it as well as to identify relevant factors influencing the supply of antibiotics by community pharmacists. The demographic characteristics of the participants including gender, age, their experience related to pharmacy, ownership, type and location of pharmacy are presented in Table 4-1. The duration of interviews lasted between 19 and 47 minutes with a mean of 30 minutes.

Table 4-1 Characteristics of interviewed pharmacists

Participant	Gender	Age (years)	Educational degree	Experience (years)	Ownership/ type of pharmacy	Previous/other experiences	Accreditation status	Location of pharmacy	Duration of interview (minutes)
1	Female	42	BPharm	8	Owner/ Independent pharmacy	-	Yes	Bangkok	40:37
2	Male	49	BPharm	>15	Owner/ Independent pharmacy	-	No	Bangkok	29:42
3	Female	53	BPharm	18	Owner/ Independent pharmacy	Pharmaceutical sale representative	No	Nonthaburi	45:42
4	Female	27	BPharm. MSc in Pharmacology	2	Owner/ Independent pharmacy	Part time community pharmacist	No	Nonthaburi	19:39
5	Female	27	BPharm	2-3	Owner/ Independent pharmacy	Employee community pharmacist	No	Pathum Thani	18:58
6	Male	58	BPharm	7	Owner/ Independent pharmacy	Pharmaceutical Manufacturing Manager	Yes	Nonthaburi	46:43
7	Female	35	BPharm,	1-2	Owner/ Independent pharmacy	Pharmaceutical sale representative	No	Ubon Ratchathani	40:58
8	Female	25	PharmD	2	Employee/ Chain pharmacy	-	No	Ubon Ratchathani	19:28
9	Female	41	BPharm	5	Owner/ Independent pharmacy	Pharmaceutical sale representative	Yes	Ubon Ratchathani	27:20
10	Female	36	BPharm	5	Owner/ Independent pharmacy	Currently government' employee at Provincial Public Health Office	No	Ubon Ratchathani	26:08
11	Female	36	BPharm	8	Owner/ Independent pharmacy	Currently government' employee at Provincial Public Health Office	No	Ubon Ratchathani	22:47

Participant	Gender	Age (years)	Educational degree	Experience (years)	Ownership/ type of pharmacy	Previous/other experiences	Accreditation status	Location of pharmacy	Duration of interview (minutes)
12	Female	35	BPharm	11	Owner/ Independent pharmacy	-	Yes	Sisaket	33:24
13	Female	62	BPharm	30	Owner/ Independent pharmacy	-	Yes	Sisaket	35:29
14	Male	37	BPharm	10	Owner/ Independent pharmacy	Currently hospital pharmacist	No	Sisaket	25:11
15	Female	28	BPharm	5	Employee/ Chain pharmacy	-	No	Ubon Ratchathani	26:34
16	Female	42	BPharm	9	Owner/ Independent	Hospital pharmacist	Yes	Ubon Ratchathani	41:51
17	Female	34	BPharm	1	Employee/ Chain pharmacy	Hospital pharmacist	No	Ubon Ratchathani	33:04
18	Female	30	BPharm	6	Employee/ Independent pharmacy	-	No	Ubon Ratchathani	20:24
19	Female	36	BPharm	>10	Employee/ Independent pharmacy	-	Yes	Ubon Ratchathani	20:39
20	Female	38	BPharm	5	Owner/ Independent pharmacy	Hospital pharmacist	Yes	Nakhon Phanom	39:57
21	Male	36	BPharm	10	Owner/ Independent	Currently hospital pharmacist	No	Nakhon Phanom	34:09
22	Female	37	BPharm	10	Owner/ Independent	Currently hospital pharmacist	No	Nakhon Phanom	39:45
23	Male	49	BPharm	20	Owner/ Independent	Hospital pharmacy	Yes	C/NBI	29:30

The findings revealed four major themes regarding antibiotic use in, and supply from, community pharmacies in Thailand. Themes and subthemes are presented in Table 4-2.

4.4.1 Theme 1: The practice of pharmacists regarding antibiotic supply

At the beginning of the interview, community pharmacists were asked about the last time they supplied antibiotics for each of the following conditions: URIs, diarrhoea, and simple wounds. Community pharmacists outlined where they would supply antibiotics whether in response to patients presenting at the pharmacy via history taking or by patients describing their symptoms, including direct requests by patients. The participants also explored the symptoms or conditions related to patients that they would supply antibiotics.

4.4.1.1 History taking

All participants said that they usually asked patients about their symptoms before making clinical decisions, even when patients specifically request an antibiotic.

Usually, when patients come to my pharmacy, I will take their history. Many times, patients came to me and had self-diagnosed.

But after I took their history, it was a different ailment.

[Pharmacist 2]

Mostly, this group of patients [with sore throat] will ask for antibiotics. But I will do the history taking. [Pharmacist 4]

4.4.1.2 Symptoms indicating bacterial infections

A patient's symptoms obtained from history taking were used to make a decision to supply or not supply antibiotics. Community pharmacists also considered patient factors such as co-morbidities, current medication use, allergy history and age, when making treatment decisions for patients.

Table 4-2 Identified themes and subthemes for community pharmacist study.

Subthemes	Categories
<i>Theme 1: The practice of pharmacists regarding antibiotic supply</i>	
History taking	History taking
Symptoms indicating bacterial infections	Symptoms related to bacterial URIs
	Symptoms related to infection diarrhoea
	Symptoms related to infection wound
Worth trying antibiotic	For cases that do not indicate a clear diagnosis of bacterial infection (Just in case)
	To prevent bacterial infections
	For those patients at greater risk
	Reduce cost and duration of treatment
Patterns of antibiotics supplying	Supplying incomplete course of antibiotics
	Choices of antibiotics
Pharmacy counselling	Explanation about appropriate use of antibiotics
	Emphasizing patient to have full course antibiotics
<i>Theme 2: Reasons community pharmacists find it difficult to comply with the rational use of antibiotics</i>	
Patient demand	Perceived the benefit of antibiotic from previous experience
	Advice from those other than healthcare professionals
	Influenced by directed advertisement from the pharmaceutical companies to the public
Commercial influencing	Conflict of interest between profession and business
	Customer's satisfying
	Lack of time to educate a patient at busy times
Lack of understanding of the significant of AMR	Lack of understanding of the significant of AMR
<i>Theme 3: Limitation to persuading community pharmacies to participate AMS campaign</i>	
Lack of benefits and penalties	Could not force a pharmacy to comply with the campaigns.
Lack of campaign publicizing	Lack of awareness of campaigns
<i>Theme 4: Pharmacists' suggestions to improve rational use of antibiotics</i>	
Raising public awareness and knowledge of the appropriate/inappropriate use of antibiotics	Patient education during pharmacy consultations
	Public education
	Appropriate way to communicate with the public
Increasing patient and community pharmacist relationship	Building or strengthening relationships between public and community pharmacists
Increasing awareness within pharmacy	Raising awareness amongst pharmacists of pharmacists' professional duty to ensure appropriate antibiotic use
	Raising awareness of rational antibiotic use and AMR among pharmacy students
Education strategies for pharmacists	Continuing professional development
Government strategies	Development and enforcement of laws and regulations regarding antibiotics prescribing and supplying

Subthemes		Categories
Government (continue)	strategies	Controlling the promotion of ABs selling
		Motivating pharmacies in the rational antibiotic use project by use of incentives
		Consistent messages throughout the health system to all healthcare professionals

For URIs, combinations of symptoms such as severe sore throat, fever, pus on the tonsils, and/or a coloured discharge were reported as conditions when antibiotics were supplied by some participants.

The last case was the patient with sore throat. I took the history and found that the symptoms were fever, with quite high temperature, maybe 38-39 degree Celsius, saw few pus on tonsil, coloured discharge. The patients had been sick for few days. So, I supplied antibiotic. [Pharmacist 15]

[To supply antibiotics] patients must have severe sore throat and fever, with no symptoms of allergic rhinitis. I usually ask more about cough and check for tender lymph node at neck. Sometimes, when patients had severe sore throat and could not speak, I would supply antibiotics. [Pharmacist 7]

The duration that patients had the symptoms was also a factor influencing the decision to supply antibiotics. Some participants would supply antibiotics if patients had been ill for four days or over, and/or the symptoms were not relieved with other medicines.

When patients had the symptoms [of URIs] for 4 days or more, I would supply antibiotics for them. I also supplied antibiotics for the patients that had coloured phlegm and fever, and already taken antipyretics or antihistamine but the symptoms were not subside. [Pharmacist 11]

I usually ask patient about duration of illness, previously medications. If patients have sore throat, phlegm, coloured discharge, the symptoms last for 4-5 days, already taken other medicines but they do not feel better, I will supply antibiotics.

[Pharmacist 21]

In the case of diarrhoea, the appearance of stools and fever were key factors for community pharmacists in their decision whether or not to supply antibiotics. Some participants reported that they would supply antibiotics for patients who had diarrhoea with fever. Diarrhoea with foul-smelling stools was also a condition where some community pharmacists would decide to supply antibiotics.

I will supply antibiotic if patients have diarrhoea with fever. If patients don't have fever, I will supply activated charcoal and ORS

[Oral Rehydration Salts]. [Pharmacist 12]

When patients came with diarrhoea, I usually asked about the appearance of stools, smell of stools, and fever. If patients had diarrhoea with fever, or had foul-smell, I would supply antibiotics.

[Pharmacist 6]

Some participants would recommend antibiotics when patients had diarrhoea with mucus and/or blood visible in stools, together with abdominal pain.

For diarrhoea, cases that need to have antibiotics are patients with fever and chill, or mucous in stools, or foul-smell.

[Pharmacist 1]

For diarrhoea, I also follow the guidelines. If patient don't have dysenteric pain or no mucous or blood visible in the stools, I will not supply antibiotics. [Pharmacist 10]

The number of times a day that the patient had diarrhoea was also considered. A few participants said they would supply antibiotics for patients who had diarrhoea more than six times in the last 24 hours.

I will supply antibiotics if patients have diarrhoea more than six times within 24 hours, with or without fever. [Pharmacist 16]

Last case, the patient had water diarrhoea ten times. So, I supply antibiotics, activated charcoal, and ORS. [Pharmacist 20]

For wounds, purulence was the important sign that all community pharmacists indicated that patients should have antibiotic treatment, this being a sign of a bacterial infection.

For wound, I usually supply antibiotics for abscess, infection wound, such as, patients had wound with pus. [Pharmacist 6]

[For wound] If the wound has been recently, I will supply antibiotic as short course prophylaxis for 2-3 days, such as cloxacillin, dicloxacillin. But if it is wound with pus, I will supply antibiotics at least for five days. [Pharmacist 14]

Diabetes mellitus patients were a group for which some community pharmacists supplied antibiotics when they had a wound.

I will supply antibiotics if it is infected wound, or patients have diabetes mellitus with large open wound that has high risk to be infected. [Pharmacist 19]

4.4.1.3 Worth trying antibiotic

Although pharmacists said they supplied antibiotics for patient with clear signs of a bacterial infection, in some cases they claimed that the evidence base did not align well with real life situations. Therefore, sometimes, they were willing to supply antibiotics when they thought the patients may be likely to benefit from antibiotics. Some pharmacists reported that it was worth trying antibiotics just in case where it was not clear that there was a bacterial infection.

It was a case; patient had water diarrhoea four times. She came to me around 6pm. I was not sure, but her symptoms might be worst. So, I supplied antibiotics for just in case. [Pharmacist 16]

If I am certain that it is not bacterial infection, I will not supply antibiotics. But when I am not sure, for example, patients had diarrhoea for days and the frequency of diarrhoea still the same, or in cases that patients had diabetes or other conditions, I will supply antibiotics. [Pharmacist 19]

In some cases, participants would supply antibiotics for non-bacterial infections, but they considered that the patients were at high risk of getting infected; therefore, the participants suggested patients should have antibiotics to prevent the infection.

Many patients had a wound at a leg. I advised them to keep the wound clean and dry, but sometimes they could not do that because of their job. So, I supplied antibiotics to them for prevention [of bacterial infection]. [Pharmacist 20]

Some pharmacists pointed out that some patients' symptoms improved rapidly after antibiotic treatment, especially in the case of diarrhoea and upper respiratory tract infections. On occasion, when they did not supply antibiotics to a patient, the patient's condition worsened quickly. Therefore, some participants would supply antibiotics for patients who had a previous history of severe illness, even when antibiotics had not been taken.

Some children, if they don't take antibiotics as soon as possible, their symptoms will worsen rapidly. I have to supply antibiotics for them even it is the first day that they got sick. Or people with DM [diabetes mellitus], immune disease, RA [rheumatoid arthritis], SLE [systemic lupus erythematosus] etc. that have low immunity, I will supply antibiotic to them early.

[Pharmacist 16]

Moreover, participants said from their experience, using antibiotics overall reduced cost and time of treatment, so, patients could go back to a normal life more quickly and are relieved from suffering from the symptoms more rapidly. Accordingly, in some cases, pharmacists supplied antibiotics to them even though it was not clear, at the time of the consultation, that bacterial infection was present.

For a patient who is a student or working. he/she doesn't want to put up with the symptoms or he/she complain about pain. I will supply [antibiotics] to them. I want them to be cured faster. It should be cured faster. [Pharmacist 9]

4.4.1.4 Patterns of antibiotic dispensing

Most pharmacists reported supplying antibiotics for 3 – 5 days. Some pharmacists even mentioned giving enough just for 1 day. Primarily, the economic status of patients was the main reason to supply an incomplete course of antibiotics. After all, participants claimed that they advised patients to come back for the remaining antibiotics, but some patients did not come back. The cost/affordability to the patient was an important issue in antibiotic supply in the opinion of a number of pharmacists. Pharmacists stated that suspected non-compliance with antibiotic treatment in some cases, for example, where patients came to the pharmacy requesting antibiotics to continue a course of treatment initiated with leftovers from a previous illness episode.

I couldn't supply [antibiotics] for ten days; Five days is OK for me, and a patient accepted that. [Pharmacist 6]

I usually supply at least 2 blisters, for 5 days. Patients accepted that. But some patients had low income, so they prefer to have only 1 blister. I tried to advise them but because they didn't have enough money, so I supply what they can afford. [Pharmacist 10]

For URIs, amoxicillin was the most common antibiotic recommended by community pharmacists. A participant explained that she usually supplied roxithromycin for patients with a sore throat to avoid overuse of amoxicillin.

I usually supply macrolides, roxithromycin [for sore throat with bacterial infection]. People in this area overuse of amoxicillin. So, I supply roxithromycin instead. [Pharmacist 4]

For diarrhoea cases, the majority of participants stated that oral rehydration therapy and/or adsorbents were the first choice for treating acute diarrhoea. In cases where antibiotics were needed, norfloxacin was the antibiotic of choice reported by most pharmacists.

Mostly I supplied norfloxacin [for acute diarrhoea] and ORS. But when it was watery diarrhoea, I supplied only ORS. [Pharmacist 9]

I will supply antibiotics when there is diarrhoea with fever. If there is no fever, I will supply activated charcoal, ORS, or antispasmodic agents. [pharmacist 12]

Most wound cases presenting in community pharmacies were not infected and so many participants stated that they usually advised patients to keep the wound clean and sometimes supplied antiseptics such as povidone iodine or hydrogen peroxide.

For wound, I usually supplied antiseptic, such as, povidone iodine. I think, antiseptic is safe. I also advised the patients to keep the wound clean. I rarely supplied antibiotics for wound cases. [Pharmacists 6]

Usually, I advised the patients about cleaning wound and supplied povidone iodine, normal saline, or hydrogen peroxide. [Pharmacist 23]

In cases of infected wounds, topical antibiotics were recommended by some pharmacists for shallow and/or small wounds. The most common oral antibiotics recommended by participants were cloxacillin or dicloxacillin.

I usually supplied topical antibiotics for wound cases. It depended on the appearance of wound. I think, elderly and children should not have oral antibiotics. [Pharmacist 6]

Mostly, I supplied topical antibiotic for shallow wound. If oral antibiotic is needed, I will supply dicloxacillin [Pharmacist 17]

4.4.1.5 Pharmacy counselling

During the interviews many participants stated that when patients requested inappropriate antibiotics, pharmacists would counsel the patient about appropriate antibiotic use, for example, the indication for using antibiotics, directions on how to take antibiotics, disadvantages of antibiotics, and the consequences of the inappropriate use of antibiotics.

I will explain to them the reason. What are the advantages? What are the disadvantages? This is our [pharmacist] role. If they don't believe us, it's their decision. [Pharmacist 1]

In addition, some interviewees also advised about appropriate treatment, as an alternative to antibiotics and/or offered advice on non-pharmacological self-care options.

In Thailand, patients misunderstand between "Ya-Kha-Cheu" [means antibiotic] and "Ya-Kae-Ag-Seb"⁷ [means antiinflammation drug]. There was an elderly patient came to me and asked for green-blue-colour Ya-Kha-Ag-Seb [patient was meant amoxicillin] for knee pain. I had to explain to her that what she wanted was antibiotic which was not for her symptoms. I

⁷ The word "Ya-Kae-Ag-Seb" means antiinflammation drugs. However, for general population, the same word "Ya-Kae-Ag-Seb" is used for antiinflammation drugs or antibiotics.

supply antiinflammation drug that looks like the drug she wanted. [Pharmacist 6]

If a patient [who requested antibiotics] have a sore throat, I will advise he/she to take traditional medicines, e.g. Kariyat (Andrographis paniculate). [Pharmacist 13]

However, some patients insisted on being supplied antibiotics, even when inappropriate, and pharmacists supplied antibiotics although they reported doing so reluctantly.

The main problem is patients don't think that our advice or explain not to take antibiotics is needed. ... Last week, a patient came to ask for norfloxacin for diarrhoea. I said that it was not a bacterial infection, norfloxacin doesn't help. She said, "I had taken [it] before". [Pharmacist 15]

They insisted on having antibiotics. We found many cases like this in pharmacies. Some of them will listen to us when I advised them, about 40%. Some of them searched for information on the internet, some of them believed their friends, some of them wanted to have the same medicine as they had before.

[Pharmacist 8]

Non-compliance with healthcare professional instructions on how to take antibiotics was another important cause of AMR reported by many participants. The reported rationale for patient non-compliance included discontinuation of antibiotics prematurely due to resolution of symptoms, and that some patients were afraid of the side effects of the medicines, for example, to the liver and/or kidneys, if they took a lot of medicines. While, some patients could not afford the full course of antibiotics. Many participants reported that they usually emphasized to the patient to have a full course of antibiotics and gave the reasons to complete the antibiotic course.

For antibiotics, before I supply, I will tell them that should not take less than this. I will explain to them that if you take less than this, the bacteria will recognise the medicine and resist to this medicine, and you won't be cured. [Pharmacist 3]

We [pharmacist] must pay attention to advise patient to know about the important of completing the course of antibiotics. We must advise them to have full course of antibiotics, and the consequences of not finishing antibiotic course. [Pharmacist 19]

4.4.2 Theme 2: Reasons community pharmacists find it difficult to comply with the rational use of antibiotics

The participants mentioned several barriers that made it difficult for them to comply with the rational use of antibiotics, including patient demand, commercial interest, and pharmacists' lack of understanding of the significance of AMR.

4.4.2.1 Patient demand

One of the most important obstacles to comply with the rational use of antibiotics, as perceived by community pharmacists, was patient demand for antibiotics. Almost all community pharmacists said that they sometimes were under pressure to supply antibiotics. The main reasons identified by pharmacists for patients demanding antibiotics and pressuring pharmacists into supplying them linked to patients' views about antibiotics.

The views of the patients regarding antibiotics were influenced by many factors. Previous successful experience of antibiotic use, including obtaining antibiotics from physicians, other healthcare providers or pharmacies was one significant factor. Some pharmacists stated that many patients requested antibiotics because they had a previously successful experience with such treatment.

There were patients that had been received antibiotics from doctors. When they had symptoms that they think it was the same as the last time they will ask for antibiotics. I had to explain that it's not always the same as previous illness. [Pharmacist 6]

They had taken these medication [antibiotics] and they were cured, so, they think if they are sick, they must take it immediately. [Pharmacist 18]

Advice from family members and friends was also a driving factor for patients to ask for antibiotics. Searching on the internet was another source of information for self-medication.

Many patients came to my pharmacy and insisted on having antibiotics even though I told them that it wasn't needed. The patients didn't listen to the pharmacist. Some patients had information from internet, some had advice from their friend, some had taken antibiotics before and wanted the same antibiotics. [Pharmacist 8]

Some patients had been advised by their friend or perceive the benefit of antibiotics from their experience. These patients were difficult to give education. If we advise them, they won't listen. [Pharmacist 15]

Some participants also reported that illegal direct advertisements from pharmaceutical companies to the public was an important influence on the public.

There is a big influence of [direct] advertisement of the antibiotics, even though it is against the law. When they [patients] got ill, they came to ask for the antibiotics that they heard form advertisement. [Pharmacist 6]

There is direct advertising through the local radio, a lot. Antibiotics such as tetracycline have a lot of advertisements, offer the deals, say that this drug can treat these conditions and those conditions. This is a problem. [Pharmacist 13]

As mentioned above, pharmacists described that patients perceived that an antibiotic was needed for their illness, therefore, they requested antibiotics from a community pharmacist. Some pharmacists said that some patients believed that antibiotics were a cure for everything. As a result, such patients would seek antibiotics until they obtained them. Sometimes, patients came to a pharmacy with the names or empty strips of used antibiotics and asked for the same antibiotic for similar symptoms.

They had taken this medication [antibiotics] and they were cured, so, they think if they are sick, they have to take it immediately. [Pharmacist 18]

Some [patients] request by name, mostly amoxicillin, Amoxiclav, that they had taken before, and it was effective. Some parents they took their child to the private clinic, but the doctor didn't dispense antibiotics for their children. So, they will come to ask [for antibiotics] at pharmacies. [Pharmacist 20]

Some pharmacists also reported that some patients requested antibiotics for travelling or storing at home for future use, so they would be in the home 'just in case' they would be needed.

There were patients who like to buy [antibiotics] to store [at home]. Even though I am a community pharmacist, but I do business too. For these cases, if I don't give them, they will seek until they get it. So, I have to give them. If they insist on having it, I will sell it and inform them. [Pharmacist 2]

4.4.2.2 Commercial influences

Community pharmacies in Thailand are within the private sector, therefore, business was also one of influencing factors for pharmacists, particularly for the owners of a pharmacy.

The conflict of interest between the pharmacy profession and the business was a significant barrier to complying with the rational use of antibiotics. Most participants pointed out that making a financial profit was a basic expectation of running the business and admitted they sometimes did not comply with the practice guidelines.

When I ran my pharmacy for the first time, I felt like I wanted to solve the problem [inappropriate use of antibiotics]. But when I faced the real situation the pressure from patients, economic, I had to surrender in some cases. [Pharmacist 4]

It's a business. Every expense is my responsibility. When I was an employee, I could say no to a customer and I received my salary at the end of the month. But when I ran my business, I had to balance between professional and business. [Pharmacist 5]

Pharmacists were keen to keep their regular customers satisfied to keep their business. Many participants admitted that they sometimes supplied inappropriate antibiotics because of the fear of losing customers. Participants said that if they did not satisfy customers then the nearest rival pharmacy (or on occasion a non-pharmacy) would supply. This viewpoint meant pharmacists would probably supply the antibiotic in order to foster customer loyalty or to avoid losing the sale affecting the business.

For those that don't listen to me and insist on having it [antibiotics], I will supply it because if I don't supply them, they will go to another pharmacy. I need to keep them at my pharmacy. [Pharmacist 14]

It is a common practice that I have to supply antibiotics. If I don't supply them, patients will feel like "Is it going to be effective?". So, I have to supply it. If not, they will think my pharmacy isn't good, they won't be cured. And they will not come back to my pharmacy again. [Pharmacist 20]

Most participants stated that they did try to advise patients to have appropriate treatments. However, they also reported that sometimes, they did not have enough time to instruct or educate the patients on the appropriate use of antibiotics; especially, when there were multiple clients in the pharmacy at once or when the patients were in a hurry. This resulted in pharmacists supplying antibiotics as requested, even sometimes, when it was inappropriate.

We should tell the right information to patients when you have a chance because you can't talk to them for a long time. My pharmacy has a lot of customers per day, I can't talk to a patient for 10 minutes. It's impossible. So, if you have a chance, you should educate them [patients]. [Pharmacist 2].

It takes times to educate each patient, takes a long time. In the morning I have multiple clients at once, I don't have time to educate each of them, so I have to supply what they want. If I take longer than five, ten minutes, the patients will rush me. [Pharmacist 13]

4.4.2.3 Lack of understanding of the significance of AMR

Some pharmacists reported that they did not have enough knowledge and information about the current antibiotic resistance situation in Thailand, even though many participants stated that they thought antibiotic resistance in Thailand was a serious problem. However, some of them mentioned that they felt this problem was distant from community pharmacy. Moreover, some participants considered AMR to be a problem in the hospital setting. Some thought

antibiotic resistance in Thailand was a small problem and inapplicable to community pharmacists and their patients.

I think antibiotic resistance is not a big problem. They [other people] think the inappropriate use of antibiotics from community pharmacies is one of the causes of serious bacterial resistance infections that found in the hospitals. It's totally different. [Pharmacist 23]

Many pharmacists also pointed out that AMR was the responsibility of others, that is, other healthcare providers and patients, not community pharmacists.

I think it's misleading to assume that antibiotic use in community pharmacy results in drug resistance. Are pharmacies able to make this [antibiotic resistance] happen? Bacterial resistance is a natural process. Antimicrobial resistance is not related to the pharmacies. It's related to patients' behaviour that brought the old package of antibiotic and asked for them. AMR is a small problem. Pharmaceutical companies have been already preparing for new antibiotics. [Pharmacist 3]

I think, supplying antibiotics from pharmacies is mostly appropriate. We [community pharmacists] supply only basic antibiotics for minor ailments. Inappropriate use of antibiotic mostly from doctor clinics. [Pharmacist 7]

In addition, a few participants stated that they did not need to worry about antibiotic resistance because pharmaceutical companies have been developing new antibiotics to treat those resistant bacteria. However, some pharmacists believed that the pharmaceutical industry did not invest in research and development of new antibiotics because of a lack of incentives.

I believe that it will be new innovations, new antibiotics to solve this problem [AMR]. I heard that super bug was a serious problem a few years ago. I believe that new antibiotics will be developed. Pharmaceutical companies and PhD students see this situation as an opportunity. [Pharmacist 2]

I think it is normal. Antibiotics that have been using for a long time will become resistant. It's normal but they [pharmaceutical companies] have been developing new antibiotics to fight with the resistant bacteria. [Pharmacist 9]

4.4.3 Theme 3: Limitations of campaigns to promote rational use of antibiotics to community pharmacists

In Thailand, a campaign to promote the rational use of antibiotics was introduced in 2007, and was called “Antibiotics Smart Use (ASU)” (Sumpradit et al. 2012). A few years ago, this programme became a part of a broader national campaign called “Rational Drug Use (RDU)” (Thavornwattayanong et al. 2017). However, the campaign had some limitations in promoting the rational use of antibiotics in community pharmacies from the viewpoint of community pharmacists. They indicated that there were no incentives to participate, nor were there any penalties for not participating in the campaign. In addition, the campaign was not publicised appropriately, in their view, so there was a lack of awareness.

4.4.3.1 Lack of benefits and penalties

Community pharmacy is in the private sector, not a government facility. The recent campaign to promote the rational use of antibiotics in Thailand did not provide any incentive to participation and no penalty if the community pharmacies did not participate. Consequently, many pharmacists stated that they heard about the campaign, but they did not join the campaign.

There is no direct impact on the pharmacies [towards the appropriate or inappropriate supply of antibiotics]. For the public health facilities, there are KPIs [Key Performance Indicators]

which are related to funding from the government.

[Pharmacist 21]

Community pharmacies are not a part of the government health facilities. How the government improve appropriate use of antibiotics in community pharmacy while it doesn't have authority to order it. [Pharmacist 23]

4.4.3.2 Lack of campaign publicizing

Some community pharmacists reported that they had never heard about such a campaign. This issue might be because of insufficient publicity. A few pharmacists stated that the campaign was promoted to a small group of community pharmacists, particularly accredited pharmacies, and to the public health facilities.

I never heard about the current campaign. I heard about the promoting to use antibiotics appropriately only when I was studying [in the university]. [Pharmacist 4]

We campaigned in a small group, only in the group of accredited pharmacies. Should campaign to other [non-accredited] pharmacies. [Pharmacist 6]

4.4.4 Theme 4: Pharmacists' suggestions to improve rational use of antibiotics

The community pharmacists recommended a number of strategies to improve the rational use of antibiotic in community pharmacies, including, raising public awareness and knowledge of the appropriate/inappropriate use of antibiotics, increasing patient and community pharmacists relationship, increasing awareness within pharmacy, promoting education strategies for pharmacists, and government strategies. In the view of the interviewees, these strategies should enable community pharmacists to comply with the rational use of antibiotics.

4.4.4.1 Raising public awareness and knowledge of the appropriate/inappropriate use of antibiotics

The most commonly recommended way of improving antibiotic use in the community suggested by the participants was raising public awareness and knowledge of the appropriate/inappropriate use of antibiotics. If patients were aware and had the correct information towards antibiotic use, this would have a significant effect on improving the use of antibiotics.

Public education is important. This will show more impact than educating the healthcare providers. Healthcare professionals had enough knowledge, but it is a pressure from patient to supply inappropriate antibiotics. [Pharmacist 14].

Public education. The general population should have enough knowledge. Should education the public to let them know that when the antibiotic is necessary. [Pharmacist 22]

A possible initiative, proposed by participants to increase patients' knowledge and awareness of antibiotic use, was routine patient education during regular patient counselling at the time of consulting at the pharmacy. Moreover, community pharmacies could also help to provide the education tools to the patients.

We should tell the right information to a patient when you have a chance because you can't talk for a long time. My pharmacy has a lot of customers per day, I can't talk to a patient for 10 minutes. It's impossible. So, if you have a chance, you should educate them [patients]. [Pharmacist 2].

I think, if we have time to talk to them [patients], they'll listen to us. But it depends on a number of customers at that time. In my pharmacy, I have a small number of customers, so I have time to talk to them. The more time was spent, the more knowledge was gain. Sometimes, when patients came to ask for antibiotics and I

just asked about their symptoms, reasons to use antibiotics. This gave me an opportunity to educate them. [Pharmacist 4]

Should educate the public. Nowadays, they are some education provide through internet, brochure. The community should be provided the brochures to provide to patients. [Pharmacist 6]

Other than patient education at the pharmacy, public education was also suggested by many participants. Various ways to educate the public were recommended. The most commonly suggested ways were via mass media, such as, television, radio, and social media.

Should educate via various medias. There are a lot of social medias. The contents are post on social medias should be concise, attractive; when people see them, they should understand that antibiotics do not need for every episode of illness and when antibiotics are really needed. [Pharmacist 8]

The messages to communicate with the public should be provide repetitively again and again through TV. Do the same with product advertisements. [Pharmacist 9]

Public education through TV, radio. Promote [the rational use of antibiotics] on radio every day, like the advertisements of some antibiotics that patients come to ask for them every day. Promote on TV, Facebook. [Pharmacist 20]

Education through local community health workers, such as village health volunteers (in rural areas), health care providers as well as educating young people, was also suggested by some pharmacists.

Should use various ways to educate the public. Educate the young students, educate the general populations through VHV [Village Health Volunteer], village leaders, radio, or provide the brochures. [Pharmacist 11]

People who are the closest to the community are VHV [Village Health Volunteer] and village leaders. VHV is an important person to educate the villagers. [Pharmacist 22]

The messages that are used to communicate were also a key factor in the effectiveness of public education. The pharmacists suggested that the messages communicated to the general population should be concise and hence be more attractive to the public. The messages could be infographics or use short clips.

I think, the short, concise, and easy to understand the message is important [to communicate with the public] because today is an online society, everything should be short, so it would [then] be interesting. [Pharmacist 5]

Another suggestion was that there should be more education to the public on the risks of antibiotics.

We should tell the public the consequence of overuse of antibiotics. In general, people aren't much interested when we publicise the positive impact. They're more interest if we publicise the negative impact, for example, a serious adverse drug reaction may occur if you take medication on your own decision. This may make them scared and aware of using medications.

[Pharmacist 14]

Another issue is the reduction of misuse [of antibiotics]. We should explain the disadvantages [of antibiotics]. If a patient doesn't want it, we can't force them the take it. [Pharmacist 21]

4.4.4.2 Building or strengthening relationships between public and community pharmacists

Participants reported a poor perception of the role of pharmacists by the public. They said that trust between community pharmacists and patients was important to enable patients to listen to the advice of the pharmacists. Accordingly, raising

awareness amongst the public to build the trust between community pharmacists and the public should be done. Pharmacists stressed the importance of the public accepting a pharmacist as a healthcare provider and should be willing to seek advice on a health issue rather than self-medicating without any pharmacist input. A number of pharmacists believed that acting professionally such as routinely taking a patient history and routinely providing patient counselling while dealing with patients should help to reinforce the role of the pharmacist as a trusted health advisor.

Whenever the patient trusts us, we will work as professional more easily. The problem happened in early on [after opening the pharmacy] when people came to a pharmacy and asked for anything they wanted, but when the time goes by, I can act as professional more easily. For long-term, we should make the pharmacy reliable for people in the community. [Pharmacist 6]

It may be the counselling the appropriate/correct use of antibiotics [by community pharmacists], not just follow the advice of a friend. Community pharmacy is a health facility that is located close to the community. Before using antibiotics, patients should not go to ask their friend what medication they should take but should go to the pharmacy. [Pharmacy 14]

4.4.4.3 Increasing awareness within pharmacy

The majority of participants stated that the attitude of pharmacists to their professional practice, of achieving high ethical and professional values, is important to promote the judicious supply of antibiotics. Pharmacists were healthcare professionals. They should always be bound by ethics, the discharge of moral and professional obligations. Thus, raising the awareness amongst pharmacists of pharmacists' professional duty to ensure appropriate antibiotic use should be a priority.

This is not a legal requirement that you are prohibited to supply antibiotics [to patients] or otherwise you will be guilty of legal offences. This is about the ethics of pharmacists. Pharmacists should balance between the professional and business.

[Pharmacist 11]

Should change the attitude of pharmacists to comply with the profession, and also balancing between profession and business interests. [Pharmacist 22]

Moreover, as reported in section 4.4.2.3 some pharmacists lacked awareness of AMR. Therefore, raising awareness regarding the importance of the AMR problem in Thailand among community pharmacists was suggested.

If we could make the community pharmacists aware of antimicrobial resistance, it will be good in the long term. It should help the patients and the economy. Inappropriate use of antibiotics will be reduced. [Pharmacist 11]

In addition, raising awareness of rational antibiotic use and AMR among pharmacy students was also considered necessary.

Faculty of Pharmacy should encourage them [pharmacy students] about the rational use of antibiotics. [Pharmacist 1]

If we educate them [pharmacy students] about the rational use of antibiotics when they are studying, when they graduate and become pharmacists, they will work as professionals more effectively. [Pharmacist 12]

4.4.4.4 Education strategies for pharmacists

Many pharmacists reported that knowledge about antibiotic use from university education was enough for pharmacists to dispense/supply appropriate antibiotics and that licensed pharmacists also had enough knowledge to provide pharmacy services. However, they also added that antibiotic knowledge had been changing

and that some community pharmacists were not aware of the latest antibiotic recommendations. Therefore, continuous professional development to keep up to date with current practice guidelines and recommendations for antibiotics was required to supply antibiotics appropriately. That is, pharmacists need to be lifelong learners.

We should keep up to date. Microbial is adapting, diseases are changing. So, we must keep up to the new knowledge. Knowledge is very important for appropriate use of medicine. [Pharmacist 1]

Community pharmacists should continuously update knowledge. Knowledge is important for the appropriate use of medicine. [Pharmacist 17]

For updating the current practice of pharmacists, appropriate means were suggested including, providing booklets or other hard copies of simple current clinical practice guidelines to community pharmacies. There were also online materials, for example, through the website of Thailand Center for Continuing Pharmacy Education (CCPE) and/or professional social networks, and face to face training. It was proposed that these educational methods should be supported by pharmacy organisations such as the Pharmacy Council, the Community Pharmacy Association, the Provincial Public Health Office, the Faculty of pharmacy and pharmaceutical companies.

For example, if the government provide the guidelines of training, pharmacists may understand more about the treatment [with antibiotics] and their attitude may be changed. [Pharmacist 10]

The Provincial Public Health Office had to convene the meeting for community pharmacist every year. This should include the training the topic related to antibiotic use in this meeting.

[Pharmacist 6]

Moreover, a few participants pointed out that almost all training courses and online articles available were more tailored to supporting hospital pharmacists.

There were few such courses/articles relating to community pharmacy practice. Therefore, they asked for more seminars, education courses, or online material related to antibiotic use in community pharmacy to help them update their knowledge.

CPE [Continuing Pharmacy Education] is one method [to promote appropriate use of antibiotics]. We [Pharmacists] can read the article online and do the test. But there were only a few topics related to antibiotic use in community pharmacy. For face to face training, I attended the training provided by Community Pharmacy Association. There were only a few topics of rational use of antibiotics too. [Pharmacist 6]

4.4.4.5 Government strategies

The development and enforcement of laws and regulations regarding antibiotic prescribing and supply, including dispensing against a prescription, were necessary for promoting the rational use of antibiotics. Pharmacists outlined a need to review and update the relevant laws.

In Thailand, antibiotics are classified as “dangerous drugs” and are freely available without a prescription by community pharmacists. Thus, some of the community pharmacists suggested reforming the regulations regarding antibiotic prescribing and dispensing. Suggestions from pharmacists were that this reform could be done through a reclassification of antibiotics, whereby supplying antibiotics in community pharmacy would be restricted. The reclassification could be to categorise all antibiotics as requiring special-control or as prescription only medicines or withdrawing the availability of some antibiotics from community pharmacies and reserving them for hospital use only.

Some antibiotics should not be easily access from community pharmacies. For example, some fluoroquinolone like moxifloxacin, forth generation cephalosporins. These antibiotics need to be re-classification [Pharmacist 1]

Antibiotics should be dispensed with a prescription only.

[Pharmacist 8]

The law should reclassify antibiotics. Antibiotics should withdraw from the pharmacies. [Pharmacist 21]

Most pharmacists described the regulatory mechanism to enforce the supply of antibiotics by licensed pharmacists from qualified pharmacies only to be weak. This inadequate regulation and enforcement of drug distribution and sales resulted in easy access and boosted the inappropriate use of antibiotics by the public.

We should control the pharmacies that service by non-qualified pharmacists. I had work at a pharmacy as a part-time pharmacist. There was a “guide list” to supply medicines. I was shocked when I read it. It said to supply cefuroxime for all URIs cases. [Pharmacist 5]

The government should enforce the law to control the pharmacies where there is no pharmacist to provide the pharmacy service. [Pharmacist 16]

In addition, the promotion by pharmaceutical companies of purchases from community pharmacies was reported by some pharmacists. Any economic incentives offered by pharmaceutical companies to raise their market share may contribute to excessive provision of antibiotics. That is, there is a larger discount for higher volumes of antibiotics purchased for community pharmacies. Consequently, some pharmacists would try to sell antibiotics from their stock, and this may result in an over-supply of antibiotics. This was a view proposed by some respondents. Some pharmacists suggested that controlling advertisements regarding the promotion of antibiotic sales should be implemented.

The pharmaceutical companies are also involved. There shouldn't be the promotion of selling antibiotics to the pharmacies. [Pharmacist 2]

The promotions of a pharmaceutical company are very important. For example, the reward such as a package tour for the pharmacies if purchase at a specified cost. Amoxicillin was only 8 Baht per blister [the more you buy, the lower the cost].

[Pharmacist 12]

Furthermore, only a small number of community pharmacies participated in promoting appropriate antibiotic use programme at present. Few participants stated that they had engaged with the campaign. Many participants were not interested in participating or complying with its messages. Therefore, the government should motivate pharmacies to involve them in the campaign to promote the rational use of antibiotics. Some participants suggested the government should provide incentives for pharmacists to be involved in the campaigns. Pharmacists should hopefully perceive the benefit of the project and might be willing to promote the rational use of antibiotics in the long term, and without any incentives.

It should be something that convinces the community pharmacists to participate in the campaign not just in their mind. The mind is for people who don't worry about the money or with ideology. It should give something to support the pharmacies e.g. some benefit for pharmacies that join the campaign. [Pharmacist 7]

Pharmacists may not be very interested. But if there is a compensation [monetary incentive], this will help to induce pharmacists to join [the project] [Pharmacist 18]

Lastly, many pharmacists suggested promoting the rational use of antibiotics throughout the health system including public and private hospitals, clinics, and pharmacies, to all healthcare professionals including doctors, pharmacists, and nurses. They noted that AMR was not the responsibility of only one health care professional, or of patients.

We should look at the whole system. Now, people think that inappropriate use of antibiotics in communities is because of community pharmacies. But really there are many parts that are related. It should be improved in every part. For example, the private clinic prescribed and dispensed a lot of antibiotics.

[Pharmacist 7]

There are many parts related to inappropriate use of antibiotics, general population, healthcare providers, patients, using antibiotics in animals. They all are causes of antimicrobial resistance. [Pharmacist 10]

All sectors should be improved at the same time, include, hospitals, clinics, pharmacies. For example, if they [patients] can't get antibiotics from a pharmacy, they'll go to a clinic. If they [patients] can't get antibiotics from a clinic, they'll go to a hospital. [Pharmacist 14]

4.5 Strengths and limitations

To this researcher's knowledge, this is the first qualitative study to be conducted in Thailand that explores the views of community pharmacists towards antibiotic supplying and AMR. Semi-structured interviews allowed depth of exploration and the issues of greatest importance to the participants to be captured. Key barriers to comply with the rational use of antibiotics were identified as well as the potential strategies to overcome these obstacles.

Interviewing in community pharmacies posed challenges to the researcher, due to interruptions to interview proceedings which were inevitable. This happened on a number of occasions where the customers needed to consult with the pharmacist. However, when the interviews were interrupted, the interviewer noted the point being discussed and briefed the interviewee about the point before continuing the interview.

It is unclear whether there are differences in the experience and perceptions of those who participated and those who did not. It would have been good to recruit more community pharmacists who worked in chain pharmacies. Reasonable efforts were made to recruit a wide and varied sample of participants, but unfortunately a lack of uptake and time restrictions meant that the study had to end after 23 participants were recruited and interviewed. The purpose of this study is very much exploratory and not to make generalisations. The sample size was therefore deemed sufficient to make some initial explorations.

In addition, the study incorporated a higher percentage of participants based in the North-eastern region, particularly Ubon Ratchathani province, due to the geographical location of the researcher. This has been reported in the study results, as such the findings cannot be generalised. However, the findings will be used to design a questionnaire to find out the views of community pharmacists across Thailand (see chapter 6).

The researcher's interviewing and analysis skills were developed over the period of the study with increased practice. The questioning techniques of the researcher became more concise and leading questions decreased, as well as, decreased time to transcribe and code. In addition, frequent contact and discussions with the supervisory team (see section 4.3.6) ensured validity of data interpretation.

4.6 Discussion

The results of this qualitative study revealed the practice relating to the supply of antibiotics by a small sample of community pharmacists in Thailand as well as the factors influencing their practice. In addition, the data also demonstrated the participants' views regarding antibiotic use and suggested ways to improve it. These findings were useful for developing the questionnaire for the survey of community pharmacist in Thailand (chapter 6).

4.6.1 The practice of community pharmacists

In Thailand, one of the most common community pharmacy services is to perform triage and supply medicines to treat mild illness for patients together with the

necessary advice. In this study, community pharmacists reported their professional practice relating to infections, such as, taking a patient history to triage ailments, supply treatment and to provide important advice.

The most common conditions bringing patients to visit a pharmacy were acute sore throat, acute diarrhoea, and simple wounds. For acute sore throat, symptoms mentioned by participants as key criteria to supply antibiotics were severe sore throat, fever, discoloured nasal discharge or sputum, or that the symptoms lasted longer than three or four days and/or did not improve with other medicines. However, only a few of these symptoms were included in the scoring systems⁸ for identifying patients who would be more likely to benefit from an antibiotic according to the guidelines (RDU Pharmacy Eagle 2017; Thavornwattanayong et al. 2017; National Institute for Health and Care Excellence (NICE) 2018). The criteria included in these scoring systems were tonsillar exudates, tender anterior cervical lymphadenopathy or lymphadenitis, severely inflamed tonsils, a history of fever, an absence of cough and an onset of the illness within 3 days.

For acute diarrhoea, antimicrobials should be only given for cases of bloody diarrhoea (dysentery), and suspected cases of cholera with severe dehydration. Although, fever can be presented in some acute diarrhoeal infections, antimicrobials are not always recommended for acute diarrhoea with fever (World Health Organization 2005; RDU Pharmacy Eagle 2017; Thavornwattanayong et al. 2017). Nonetheless, in the present study, fever and bloody diarrhoea were those symptoms pharmacists reported as indicating a supply of antibiotics. This revealed that community pharmacists might not have enough knowledge to assess diarrhoea patients.

For simple wound cases, according to Thai guidelines, antibiotics are indicated for wounds when the wound is been contaminated with dirt, pus or other bodily fluid, larger than 5 centimetres, has a jagged edges, exposed muscle, is a pressure wound with deep tissue injury, or patients who are immunocompromised (RDU

⁸ Scoring system, such as FeverPAIN, Centor criteria, McIsacc score, is developed to identify patients who are more likely to benefit from an antibiotic (Appendix 6).

Pharmacy Eagle 2017; Thavornwattanayong et al. 2017). Most community pharmacists reported supplying antibiotics when pus had formed in or around the wound. In addition, some community pharmacists would supply antibiotics when patients had diabetes mellitus. This showed that this sample of community pharmacists appropriately identified patients who required antibiotics for treating wounds.

In summary, community pharmacists might not have enough knowledge to assess patients, particularly patients who have diarrhoea and URIs. Moreover, the findings from the interviews were not enough to assess the appropriateness of antibiotic treatments supplied by community pharmacists. In addition, some participants reported supplying alternative antibiotics rather than first line antibiotics recommended by the guidelines. Hence knowledge regarding management, including patients' assessments and antibiotic treatments, of infections is very important to provide appropriate treatment for the patient. Therefore, knowing whether community pharmacists have enough knowledge to assess the patient and know about appropriate antibiotic treatment will be useful in order to improve antibiotic supply. Based on these findings case scenarios could be developed and included in the questionnaire to explore the appropriateness of the patient assessment and intended supply of antibiotics for URIs, diarrhoea, and simple wounds by community pharmacists in Thailand.

In the present study, community pharmacists reported giving written instructions for patients, such as how to take the medicines and/or a suggestion to complete the course of antibiotics. Aside from telling how to take the antibiotics, most pharmacists also reported that they usually emphasized the patients to complete the course of antibiotics to reduce the resistance to antibiotics. The community pharmacists thought that non-compliance to antibiotic treatment among patients was an important contributory cause of AMR. A study in Portugal (Roque et al. 2013) using the focus group discussion (FGD) method with 32 community pharmacists found that all pharmacists said that they urged the patients to adhere to the antibiotic regimens when supplying antibiotics. A survey study of 531 community pharmacists in Cairo, Egypt (Zakaa El-din et al. 2018) reported that

85% of pharmacists responded that compliance of patients to antibiotic treatment affected AMR. In Makkah, Saudi Arabia, about ninety percent of 189 pharmacists surveyed claimed that they always educated patients about the importance of adherence to and completion of the antibiotic course (Hadi et al. 2016). Similarly, in a study with 286 pharmacists in northern of Spain, respondents claimed that they warned the patient about the importance of correct therapeutic compliance (Zapata-Cachafeiro et al. 2014).

4.6.2 Barriers to comply with rational antibiotic use and the ways to overcome them

Many obstacles to the supply antibiotics appropriately were communicated by community pharmacists in Thailand. These barriers were also outlined by community pharmacists internationally, such as, patient demand, commercial interests, knowledge of healthcare professionals, and weak enforcement of laws and legislation (Coleman 2003; Kotwani et al. 2012; Roque et al. 2013; Black et al. 2014; Bahnassi 2016; Nguyen et al. 2019).

4.6.2.1 Patient demand and commercial interest

As community pharmacies in Thailand are within the private sector, business survival were important as well as professional practice. Therefore, patient demand and commercial pressure were influencing the supply of medicines by some community pharmacists. The business model of community pharmacy practice was also identified as a barrier to comply with the rational use of antibiotics in Qatar (Black et al. 2014). Similarly, community pharmacists in Pakistan stated that the business nature of pharmacy was one of the main reasons for irrational antibiotic supply (Saleem et al. 2019).

To maintain the business, community pharmacists were keen to please their customers to keep them loyal to their pharmacy. The fear of losing patients to other pharmacies influenced pharmacists to supply antibiotics at a patient's request. The community pharmacists admitted they sometimes had to supply antibiotics inappropriately because patients strongly insisted on having them,

even on occasion when the pharmacist had concluded they were not necessary. Pressure from patients to supply antibiotics was reported by community pharmacists in many countries, for example, Vietnam (Nguyen et al. 2019), India (Kotwani et al. 2012), Qatar (Black et al. 2014), Portugal (Roque et al. 2013), Spain (Vazquez-Lago et al. 2017); even though, there was no medical indication. Interviews of 147 community pharmacists in Syria found that keeping up the business was a driving factor to supply medicines. Beliefs that patients can easily obtain antibiotics at another pharmacy increased the supply of antibiotics in order to foster customer loyalty or to avoid losing the sale (Bahnassi 2015). Another qualitative study in Saudi Arabia using face-to-face interviews with 20 community pharmacists reported pharmacists were under pressure from customers to supply antibiotics. The community pharmacists sometimes had to fulfil patients' requests because of the worry of losing customers, which may affect their business (Alhomoud et al. 2018). Similarly, in-depth interviews with 25 community pharmacists in Egypt reported that customer demand was an important reason for the sustained trend of antibiotic supply. In addition, refusing to supply antibiotics would eventually affect the business because of losing their customers they reported (Kotb and ElBagoury 2018). Therefore, reducing the demand of patients for antibiotics may have a great effect to decrease the inappropriate supply of antibiotics from community pharmacies.

In addition, economic status was also a reason for inappropriate supply of antibiotics reported by community pharmacists during interview. A suboptimal number of doses of antibiotics were supplied because of the inability of patients to afford to pay for the appropriate duration of treatment at the time of the consultation. The pharmacists would give a smaller amount of antibiotics that patients were able to afford at the time then advised patients to come back for the rest of the antibiotics. Interviewees reported that often patients did not return for the remaining balance. Similarly, semi-structured interviews with 12 community pharmacists in Pakistan reported that most of the time the patient asked for a lesser amount of antibiotics than the full treatment course because they could not afford the full course (Saleem et al. 2019). In India, a semi structured interview

study with 24 pharmacy staff reported that they supplied antibiotics inappropriately with short courses for patients because the patient could not afford a complete course of antibiotics (Barker et al. 2017b).

Public knowledge, attitudes, and perceptions about antibiotics are notable determinants of irrational use of antibiotics among general population (World Health Organization 2016a; Irawati et al. 2019; Machowska and Stålsby Lundborg 2019). Lack of knowledge and awareness regarding antibiotic use by the general population contributed to the demand for antibiotics from patients and the misuse of antibiotics (Lim and Teh 2012; Shehadeh et al. 2012; Gebretekle and Serbessa 2016). Many participants in the present study said that patients' lack of knowledge and misunderstanding about antibiotics led them to request antibiotics from community pharmacies. Therefore, there is a need to improve the knowledge and raise awareness about antibiotic use and AMR among the Thai public, something suggested by all community pharmacists in this study. Similarly, In India, a qualitative study using FGD method with 40 community pharmacists (Kotwani et al. 2012) found that pharmacists believed that raising awareness of the appropriate use of antibiotics would improve rational antibiotic use. Likewise, an interview study with 20 community pharmacists in Saudi Arabia (Alhomoud et al. 2018) revealed that pharmacists felt that educating the public about the consequences of antibiotic misuse and resistance was more important than enforcing the law.

Promotion by pharmaceutical companies was reported as influencing the supply of antibiotics in this study. Pharmaceutical promotions aim to increase purchases from community pharmacies. Rewards such as discounts for a large number of orders or travel trips were provided for pharmacies when the targeted number of orders were reached. Therefore, community pharmacies may order a higher number of antibiotics to increase the discount or get the rewards, which may lead to increasing the supply of antibiotics from community pharmacies as they have a high level of stock available. A survey with 34 pharmacies in Nepal revealed the positive association between a number of promotion activities by pharmaceutical companies and the number of antibiotics were sold (Koju et al. 2020). Adequate

and effective systems to monitor Pharmaceutical promotions to community pharmacies should be monitor (Machowska and Stålsby Lundborg 2019).

4.6.2.2 Lack of knowledge regarding antibiotic use and AMR among community pharmacists

The level of knowledge of community pharmacists was a common factor influencing rational antibiotic use; therefore, education for community pharmacists was needed in order to improve the rational use of antibiotics (Black et al. 2014; Nguyen et al. 2019; Zawahir et al. 2019c). The views of community pharmacists in the present study also reported that raising awareness and updating knowledge about antibiotic treatment and AMR was important and would help to improve the rational supply of antibiotics.

Continuing professional education is a suggested method for improving appropriate treatment (Laing et al. 2001; World Health Organization 2015a; Gebretekle and Serbessa 2016; Sakeena et al. 2018a; Saleem et al. 2019). In Thailand Continuing Pharmacy Education (CPE) for licence renewal for pharmacists is compulsory. This was implemented in 2015. Thai pharmacists can collect CPE points by attending seminars/training/workshops or reading the articles and pass a test associated with each article. It seems to be that the number of topics relating to antibiotic use in community pharmacy is small. Moreover, CPE topics regarding infectious disease management in community pharmacy are very limited, as reported by these interviewed Thai community pharmacists. Therefore, increasing the number of appropriate seminars/trainings/workshops/articles relating to infectious disease management in community pharmacy would be beneficial.

In addition, standard treatment guidelines are useful tools for appropriate antibiotic use. The procedures to develop, disseminate, utilize and revise the standard guideline should be implemented. Healthcare professionals as the end-users should participate in the process to ensure the practicality of guidelines (Laing et al. 2001).

Last but not least, the pharmacy curriculum should pay increased attention in education on infectious diseases and their management, as well as AMR. (Sakeena et al. 2018a; Gajdács et al. 2020). The situation of the inappropriate supply of antibiotics from community pharmacist will decrease if the new generation of pharmacists are more aware to the issue.

4.6.2.3 Ease of access to antibiotics

Inadequate laws and regulations on antimicrobial utilization and the ineffectiveness of the enforcement of regulations on antibiotic access is an important cause leading to overuse and inappropriate use of antibiotics (Akinyandenu and Akinyandenu 2014; Black et al. 2014; Nga et al. 2014; Dillip et al. 2015; International Pharmaceutical Federation 2015; Gebretekle and Serbessa 2016; Hadi et al. 2016; Zaka El-din et al. 2018). Therefore, policies and regulations should be put in place to enforce appropriate access to the medicines. A number of studies similarly stated that enforcing regulatory measures restricting access of antibiotics was important to reduce inappropriate use (Shehadeh et al. 2012; Al Akhali et al. 2013; Jose et al. 2013; Abuirmeileh et al. 2014; Belkina et al. 2014; Cheaito et al. 2014; Gebretekle and Serbessa 2016; Saleem et al. 2019). Some community pharmacists in this study suggested restricting some or all antibiotics for hospital use only. The restrictions on over-the-counter antibiotic supply has been found to reduce inappropriate antibiotic supply from community pharmacies in Chile (Bavestrello et al. 2002), Brazil and Mexico (Santa-Ana-Tellez et al. 2013).

Community pharmacist participants reported the sale of antibiotics by non-licensed pharmacists from both Type I and Type II pharmacies, as well as from grocery stores. This results from a lack of effective monitoring procedures to control the supply of antibiotics in the community in Thailand. Similarly, in Vietnam, a qualitative study with 16 pharmacy staff reported that pharmacy staff commonly supplied antibiotics without having experienced inspection or fines; the suppliers believed that the regulations to supply antibiotics only with a prescription were impractical (Nguyen et al. 2019). Interestingly, a semi

structured interview study with 35 community pharmacists in New Zealand found that the pharmacists did not supply antibiotics without a prescription because they considered the enforcement of laws and were concerned about the consequences or penalties for violation (Dameh et al. 2012). In addition, visits by pharmacy inspectors to enforce regulations related to dispensed medicines were found to improve the quality of care in community pharmacies in Vietnam (Chalker et al. 2005; Wiysonge et al. 2016).

4.6.2.4 Involving community pharmacists in the AMS programmes

A multifaceted strategy involving all key stakeholder groups including physicians, pharmacists, patients, and policymakers, is a suggested method that needs to be implemented (Uchil et al. 2014; World Health Organization 2015a). Community pharmacies are an important point of contact with healthcare providers and are important in advising patients on self-care without antibiotics, recommending appropriate antibiotic use, or referring them to medical professionals for further examination. Therefore, community pharmacists are well-positioned to contribute to tackling AMR (World Health Organization 2014; International Pharmaceutical Federation 2015). However, in Thailand, most community pharmacies have not been involved in AMS programmes. The majority of pharmacists interviewed did not know about any AMS campaign. This is possibly because community pharmacies are in the private sector, which unfortunately has been neglected by policy makers (Laing et al. 2001). The pharmacies were not penalized, or received any incentives, whether or not they participated in AMS programmes. Therefore, policy makers should include community pharmacies in the national AMS programmes. Rewards should be considered to motivate the pharmacies to participate in such projects.

As reported above, views of community pharmacists towards antibiotic supply from community pharmacies, antibiotic use, and AMR seem to be influencing factors to supply antibiotics by community pharmacists. Therefore, statements relating to these views would be built into the questionnaire (chapter 6). Moreover, ways to improve the rational supply of antibiotics suggested by the

participants in this study may affect the pharmacy practice of community pharmacists and/or the pharmacy business. Therefore, such strategies should also be included in the survey to explore if such views are shared by larger sample of community pharmacists in Thailand.

4.7 Conclusion

In this qualitative study community pharmacists reported to professionally provide pharmacy services by taking a patient history and giving advice to the patient when supplying antibiotics. However, a lack of knowledge regarding the appropriate assessment of patients was identified. Barriers to comply with the rational use of antibiotics by community pharmacists were patient demand, commercial interests and a lack of knowledge and awareness about antibiotic use and AMR among community pharmacists.

To improve the rational use of antibiotics in community pharmacies in Thailand, public education was the most important strategy suggested. In addition, several interventions to improve antibiotic use in community pharmacies were also suggested, including improving knowledge and raising awareness of rational antibiotic use and AMR among community pharmacists, restricting access to antibiotics, the implementation of effective monitoring procedures to control the supply of antibiotics, and involving all key stakeholder groups including physicians, pharmacists, patients and policymakers in national AMS programmes.

Chapter Five

Thai citizens' views regarding antibiotic use and antibiotic resistance: Qualitative study

5 Thai citizens' views regarding antibiotic use and antibiotic resistance: Qualitative study

5.1 Introduction

This chapter explores the views of Thai citizens towards antibiotic use and antibiotic resistance. The findings from interviews with 21 Thai citizens in Thailand are presented. This chapter was needed because the literature review showed that antibiotic 'misuse' by general populations e.g. self-medication, non-adherence and sharing antibiotics have been occurred in many countries including Thailand (see chapter 1 section 1.3, and chapter 2 section 2.3). Understanding how the public in Thailand use antibiotics, how they think about antibiotic use and antibiotic resistance is important to plan strategies to improve the appropriate use of antibiotics among the general populations. However, a number of studies related to the use of antibiotics in communities in Thailand is very limited.

5.2 Objectives

This study aimed to explore how and why Thai people use antibiotics as well as to explore their views regarding improving rational use of antibiotics in communities in Thailand. The findings from this study along with findings from the study in chapter 4 were used to design the questionnaire for the community pharmacist survey in chapter 6. This study has two specific objectives:

- 1) To explore how Thai citizens use antibiotics supplied from community pharmacies in Thailand.
- 2) To explore factors that influence Thai citizens to use antibiotics supplied from community pharmacies in Thailand.
- 3) To explore Thai citizens' views on how to improve appropriate use of antibiotics by the public and patients.

5.3 Methods

Semi-structured interviews (described in chapter 3) were employed for this part of the study.

5.3.1 Ethical approval

Ethical approval was obtained from Cardiff University School of Pharmacy and Pharmaceutical Sciences Ethics Committee (in English) and Research Ethics Committee of Ubon Ratchathani University, Thailand (in Thai). The Ethical Approval Letters are presented in Appendix 7.

5.3.2 Topic guide design

The interview topic guide (Appendix 8) was developed based on both the aims of the study and a literature review (Braun and Clarke 2013b). A list of questions used to explore the use and experiences of Thai citizens and their views regarding antibiotic use and AMR were listed by the researcher (SD) and discussed with the academic supervisors.

The interview schedule consisted of three sections, 1) introduction, 2) questions relating to use of antibiotics supplied from community pharmacies, and 3) questions relating to improving appropriate use of antibiotics by patients.

In the introductory section, the purpose of the study was explained, and participants were given the opportunity to ask questions. The participants were asked to complete consent forms confirming the participant had read and understood the information sheet and that participation was voluntary. Demographic data of the participants was asked at this stage, including age, educational level, and occupation.

In the second section, questions about participants' experience relating to antibiotics were asked. This section aimed to explore the experiences of participants regarding the use of antibiotics supplied from community pharmacies and other sources as well as their views towards factors influencing their use of antibiotics.

The last section of the interview schedule aimed to explore the participants' views regarding ways in which appropriate antibiotic use may be improved in communities.

5.3.3 Sample and recruitment

The study targeted participants who are Thai residents 18 years old and over and had obtained antibiotics from a community pharmacy at least once in the past 6-8 months. Individuals who were illiterate or worked as a healthcare professional were excluded.

The study was conducted on the campus at Ubon Ratchathani University, Ubon Ratchathani, Thailand. The campus was chosen due to the likelihood of recruiting samples of various ages, educational levels (finished primary school, finished secondary school, bachelor degree, master degree or higher qualification), and occupations (for example, students, academic staff, administrative and staff, and others e.g. drivers, catering and security staff). Additionally, the campus was a safe environment for a lone female researcher. Participants were selected by a combination of purposive and convenience sampling.

Recruitment was conducted via campus libraries, cafeterias (which are separate buildings and open access for everyone), or other public places within the university. The participants were approached by personal contact. The researcher handed out the brief study information flyers (in Thai, Appendix 9) to individuals. Individuals who were interested contacted the researcher using the details on the flyer and were then provided with the participant information sheet (Appendix 10) and consent form (Appendix 11), both in Thai.

5.3.4 Data collection

The study was conducted in Ubon Ratchathani, Thailand. Interviews were carried out over a period of 8 weeks, between October and December 2017. The language of participants, Thai, was used in all interviews. Interviews were audio-recorded after written, informed consent. The face-to-face interviews were arranged and conducted at the buildings of Ubon Ratchathani University where there was a

private area available where confidential discussions could not be overheard, and were also comfortable for the participants.

The process of interviewing is described in Chapter 4.3.4.

5.3.5 Data management

The researcher (SD) transcribed the interview herself to protect the confidentiality of the persons and institutions mentioned in the interviews and to gain an understanding of the meanings from interviews by immersing herself in the data. All Thai transcripts were checked twice for accuracy by listening to the recording while reading through the transcript to ensure reliability of transcription.

In this study, the data were analyzed in Thai by the main researcher (SD), all Thai codes and themes were conceptually equivalence translated (from Thai to English) by SD. The translations were confirmed by the second Thai-English bilingual translator, TS, for meaning and comprehension to achieve high quality translated versions. TS was also aware of possible errors in translation (Esposito 2001; Lopez et al. 2008). Any discrepancies were resolved through discussion between the two Thai speaking individuals (Irvine et al. 2007). Furthermore, the quotes used in the thesis in English aligned with codes/themes that were discussed with the supervisors to confirm intended meaning.

5.3.6 Data analysis

The data were analyzed in the source language (Thai) using qualitative content analysis. Looking at the interview transcripts, most of participants answered the interview questions with a few words or very short sentences. Therefore, the data were simple and provided most manifest content. Furthermore, with qualitative content analysis it is not inappropriate to count and report the number of times a 'code' is mentioned. Therefore, the researcher chose qualitative content analysis to analyze the data.

Both qualitative content and thematic analysis provide a framework. Content analysis can be used to analyze various types of data including textual data (e.g.

interview transcripts), symbols, messages, information, and media content (Elo and Kyngäs 2008; Vaismoradi et al. 2013). On the other hand, thematic analysis is more appropriate for the community pharmacist responses to questions which were often longer (Braun and Clarke 2013a) . Thematic analysis considers both manifest and latent content of the data as one, while in content analysis, manifest and latent content are analysed separately (Vaismoradi et al. 2013). Manifest content refers to the visible and obvious components of the text. In contrast, latent content refers to relationship aspects and interpretation of the underlying meaning of the text (Graneheim and Lundman 2004). The contents of citizen transcripts were principally manifest in nature.

The interview transcripts were analyzed iteratively and independently by SD. Firstly, the researcher immersed herself in the data by transcribing the interview recordings. In addition, the researcher read all interview transcripts to familiarize herself with the data in order to obtain the sense of the whole data set. Secondly, the researcher read each interview transcript carefully, highlighting keywords or phrases. Codes were derived from the keywords and phrases. Categories were then generated from the codes. Similar codes were grouped into sub-categories. Sub-categories were subsequently sorted and merged into categories. Finally, the tentative categories and all responses were translated into English by the Thai researcher (SD) and discussed with supervisors to generate themes. Findings were discussed among the three researchers until a consensus was reached. The findings are presented in the following section.

5.4 Results

A total of twenty-one Thai citizens were recruited. Twelve were female. The participants were aged 18 to 52 years old, from a range of educational backgrounds and occupations. The details of the key characteristics of the participants are presented in Table 5-1.

Table 5-1 Characteristics of participants

No.	Age	Sex	Employment type	Education	Marital/Children	Duration of interview (minutes)
1	38	F	Office staff	High vocational certificate	Single/None	15.28
2	34	F	Office staff	Associate degree	Married/Yes	13.09
3	37	F	Office staff	Bachelor	Married/Yes	12.46
4	49	M	Office staff	Bachelor	Married/None	17.06
5	44	F	Chef	Bachelor	Married/None	21.40
6	48	M	Office staff	Bachelor	Married/Yes	28.51
7	41	F	Office staff	High vocational certificate	Married/Yes	15.50
8	41	F	Maid	Primary school	Married/Yes	9.39
9	52	F	Office staff	Associate degree	Married/Yes	18.09
10	19	F	Student	High school	Single/None	14.16
11	50	M	Office staff	Bachelor	Married/Yes	14.08
12	18	M	Student	High school	Single/None	10.28
13	22	M	Student	High school	Single/None	12.20
14	29	M	Lecturer	Master	Married/None	10.55
15	25	F	Office staff	Bachelor	Single/None	18.09
16	25	F	Office staff	Bachelor	Single/None	16.09
17	45	F	Office staff	Bachelor	Single/None	15.00
18	36	M	Lecturer	PhD	Single/None	12.44
19	41	F	Lecturer	Master	Married/None	11.09
20	50	M	Security guard	Primary school	Married/Yes	16.31
21	18	F	Student	High school	Single/None	16.21

Four major themes regarding antibiotic use were identified, namely: (1) access to antibiotics, (2) how individuals used antibiotics, (3) views regarding antibiotics and antibiotic resistance, and (4) ways to improve appropriate use of antibiotics by the public (Table 5-2). Each theme and their relevant subthemes will be described in the next sections.

Table 5-2 Identified themes and subthemes for Thai citizen study.

Subthemes	Categories
Theme 1: Access to antibiotics	
Sources of antibiotics	Prescribing by physicians at hospitals or private clinics
	Supplying from community pharmacies
	Buying from grocery stores
Conditions requiring antibiotics	Sore throat alone or with other symptoms
	Diarrhoea
	Wound
Reasons for selecting pharmacy	Convenience
	Availability of antibiotics
	Mild illness
Theme 2: How individuals used antibiotics	
Self-medication with antibiotics	Request specifically for an antibiotic
	Storing antibiotics at home
	Sharing antibiotics with family/friends
	Reasons for self-medication with antibiotics
Adherence to the instructions	Not completing the treatment course
	Taking a lower dose than recommended
	Influenced by advice of healthcare professionals
	Consideration of benefits and risks
	Duration of course of antibiotics
Theme 3: Views regarding antibiotics and antibiotic resistance	
Advantages and disadvantages of antibiotics	Antibiotics are effective and help to cure faster
	Antibiotics may accumulate in the body
	Antibiotics may affect liver or kidney
Consequence of antibiotic resistance	Do not know the consequence of antibiotic resistance
	Need longer duration of treatment
	Need higher dose of antibiotics
	Need higher potency antibiotics
Theme 4: Ways to improve antibiotic use suggested by public	
Public education on appropriate antibiotic use and AMR	Public education during healthcare interactions
	Public education within local community
	Using mass media
	Public education content of messages
Raising pharmacist awareness of pharmacy professional	Encourage community pharmacists to act professionally
Controlling the supply of antibiotics by pharmacist only	Enforcement of laws and regulations regarding the supply of antibiotics from community pharmacies

5.4.1 Theme 1: Access to antibiotics

5.4.1.1 Sources of antibiotics

Regarding sources of antibiotics, all participants had obtained antibiotics from a pharmacy in this study. The participants also outlined other sources where they had obtained antibiotics, including hospitals or private doctor clinics, or grocery stores.

Last month I had sore throat, cough, throat irritation, so I went to a pharmacy and was supplied two blisters of amoxicillin. When I finished all of antibiotics, I felt like I was cured. Then 1 or 2 days later I had sore throat again. This time I went to a hospital. The doctor said this might be because of antibiotic resistance, so he prescribed another antibiotic for me which were more potent.

[Participant 4]

I had gone to a hospital and obtained antibiotics. The hospital was quite far from my home. So, I brought a sample of leftover antibiotics to the grocery store and asked for the same antibiotic.

[Participant 21]

5.4.1.2 Conditions requiring antibiotics

Regarding the last time they obtained an antibiotic from a community pharmacy, eighteen respondents reported the conditions that brought them to a pharmacy. These conditions were sore throat with other symptoms, for example, cold, cough and/or fever.

I had a sore throat. I had a cold and sore throat. Usually, I had antibiotic when I had symptoms like common cold. The last time was about 4-5 months ago. [Participant 1]

Last month, I went to a pharmacy and told pharmacist that I had sore throat and phlegm. The pharmacist supplied me antibiotics, pink and white capsules. [Participant 12]

In addition, two participants said diarrhoea was their presenting symptom.

Last Friday, I had food poisoning. I had had it before, so I knew it is food poisoning. I had very bad abdominal pain, so I told my friend to go to pharmacy and buy medicines for me. [Participant 15]

About two weeks ago, I had diarrhoea from around midnight till 6am. I also got sick and felt like I had a fever. I went to a pharmacy. Pharmacists took my history and supplied me antibiotics for diarrhoea and medicines for my abdominal pain. [Participant 16]

Lastly, one patient reported that he visited a pharmacy for a wound.

I bought antibiotic, black-red capsule. I took it for wound with pus. [Participant 20]

However, after asking what they had used antibiotics for personally, they were asked to identify what other conditions antibiotics could be used for. No patient identified any condition other than sore throat, cold, diarrhoea or a wound.

5.4.1.3 Reasons for selecting pharmacy

The most common reported reason to visit a pharmacy was convenience, which included time saving, long opening hours of pharmacies, or being located near to the home or workplace. Participants pointed out that visiting a hospital pharmacy was a waste of time.

I went to pharmacy because it was convenient, saves time. Pharmacist can supply medicines and give me the advice. I don't need to waste my time. I need to make a living. [Participant 5]

Going to a hospital is wasting time. It free, but I have to spend at least few hours at a hospital. So, I go to a pharmacy, consult a pharmacist. [Participant 6]

Many participants also reported that a pharmacy was located near their house or workplace, so they could stop by after work. Some participants considered it difficult to arrange a time to visit a doctor at hospital with the restricted opening time [usually 8.00 am – 4.00 pm] which was the same time as their working or studying hours. Pharmacies usually have longer opening hours, so, visiting a pharmacy was convenient with no need to take time off from work.

It wasn't convenient to go to a hospital because I had to go at my working hours. It was more convenient to visit pharmacy after work. [Participant 2]

It is easily to access to a pharmacy even at night [Participant 13]

Two participants pointed out that they visited a pharmacy because they knew that antibiotics were available at pharmacies and they could request antibiotics from a pharmacist.

Going to a pharmacy is convenient. I just requested what I wanted, what medication I wanted. Mostly, pharmacist would take some history, but a pharmacist usually pleases their customers. They supplied antibiotics as the customer requested. [Participant 4]

I knew that I could buy antibiotics from a pharmacy. I had been ill, and I went to a hospital and I obtained amoxicillin from a hospital. I knew that I could buy amoxicillin from a pharmacy. Why did I go to a hospital? There were too many patients at a hospital. [Participant 17]

A reason for choosing a pharmacy reported by three participants was the severity of illness. They said their symptoms were mild and/or they had been treated from a pharmacy on a previous occasion.

I went to a pharmacy because it was mild illness. I had had symptoms like this before and I had obtained medicines from a pharmacy, then I was cured. [Participant 1]

When I have mild illness, I still can take care of myself. I choose to go to a pharmacy. [Participant 14]

5.4.2 Theme 2: How and why individuals used antibiotics

5.4.2.1 Self-medication with antibiotics

The participants reported some behaviours which related to self-diagnosis and self-medication with antibiotics. Firstly, many participants stated directly requesting antibiotics from a pharmacist without recommendation by a pharmacist in the first place.

I told pharmacist that I would like to buy Ya-Kha-Cheu [amoxicillin]. [Participant 12]

I went to buy antibiotic from a pharmacy. I got a cold, so, I had amoxicillin. ... I requested amoxicillin because I knew that it is antibiotic. [Participant 17]

Some participants also stated that they first presented their symptoms to a pharmacist. If the pharmacists did not supply them antibiotics, they would ask for them.

I told pharmacist my symptoms [sore throat and cough]. At first, pharmacist didn't supply me antibiotics. So, I asked him for antibiotic, then they supplied amoxicillin for me. [Participant 4]

Moreover, one third of participants reported keeping leftover antibiotics that would be used later, for similar symptoms. Some patients who reported using leftover antibiotics also reported sharing antibiotics with their family or friends.

I kept the leftover antibiotics from a previous episode. I took it when I have the same symptoms with previous illness. ... I gave my antibiotics to my family when they have sore throat, running nose.

[Participant 7]

When my friend had sore throat and phlegm, I gave him a pack of antibiotics and told him to finish them all. [Participant 12]

Regarding reasons for self-medication with antibiotics, past experience was a common reason. Using antibiotics successfully in the past led some patients to self-medicate with antibiotics without consulting pharmacists/doctors.

I know that if I have fever, sore throat, especially when swallowing, I know that I need antibiotics. I know. [I] don't need to be educated. I learnt from my past experiences [Patient 6]

When I went to consult a doctor, a doctor prescribed antibiotic for me. So, I think if I have a sore throat, I can go to buy antibiotics for myself. [Patient 12]

Regarding conditions for self-medication with antibiotics, seven participants said they would take antibiotics when they had sore throat and/or cold symptoms with other symptoms, for example, fever.

I would have amoxicillin when I have very sore throat with fever, sore throat while swollen. If I have all of those symptoms, I am definitely sure that I need antibiotics. I don't need education, I learnt it from my experience. [Participant 6]

I just know that if I have a cold for days, I have to take antibiotics. I won't be cured if I don't take antibiotics. [Participant 17]

Some participants self-medicated with antibiotics for wounds or for diarrhoea.

When I had diarrhoea, I bought and took Disento®⁹ by myself because it kills bacteria and stops diarrhoea. [Participant 5]

I often used penicillin for wounds. My mother crushed penicillin tablet into a powder then put it on the wound. But I take it by mouth. [Patient 10]

5.4.2.2 Adherence to the instructions

After obtaining antibiotics, most patients claimed they followed the directions of a pharmacist. However, about half of them admitted they did not complete the course of antibiotics even though they were told by a pharmacist to complete the course. They took antibiotics for a short duration of treatment, mostly 1 – 3 days. Most of them stopped antibiotics after getting symptomatic relief. One participant reported that she also stopped giving antibiotics to her child when her child became asymptomatic.

I stopped taking antibiotics when I felt better. I did the same for my child. It was difficult to give medicine to my child so when my child's symptoms were gone, I stopped giving antibiotics to him. [Participant 2]

I didn't finish the course of antibiotics. I stopped taking it when I felt better wherever where I obtain antibiotics from, pharmacies, hospitals. If I was better in 1 or 2 days, I would stop taking antibiotics. [Participant 7]

In addition, one participant stated taking a lower dose of antibiotics than was recommended by a pharmacist.

Actually, pharmacist told me to have 1 capsule twice a day, but I took only 1 capsule a day. I don't like to have too many medicines. [Participant 9]

⁹ Disento® contains diiodohydroxyquinoline 250 mg, furazolidone 50 mg, neomycin sulfate 50 mg, phthalylsulfathiazole 250 mg., and light kaolin 250 mg

Regarding factors influencing the behaviour of participants to follow the instructions for how to use antibiotics, advice by healthcare providers and concerns regarding the benefits and risks of antibiotic treatment were the most common reasons. Approximately one third of participants decided to complete the course of antibiotics because they had been advised by pharmacists or other healthcare professionals.

Pharmacist said if I don't finish all antibiotics, it [microorganisms] will become resistance to antibiotics. So, I took all of antibiotics. [Participant 1]

I usually finish the course of antibiotics. Like, when I go to a hospital, they would tell me to finish the course of antibiotics. So, I follow the direction. [Participant 19]

However, the advice of the pharmacist had no influence on finishing the course of antibiotics for some participants. Some participants did not complete the course of antibiotics even where they recalled pharmacists advising them to finish the antibiotics.

Doctors and pharmacists told me to finish all of antibiotics. I usually stopped taking antibiotic when I felt better. It was my habit to stop taking antibiotic when I felt better. I didn't want to take antibiotic when I felt better. [Participant 16]

However, a few patients stated that they finished the course of antibiotics because they considered that completing the course of antibiotics would provide the highest efficacy of antibiotics and make them totally cured.

Pharmacists told me that if I do not complete the course of antibiotics, it [microorganisms] will become resistant, and the antibiotics will not work anymore. So, I completed the course of antibiotics. But I'm not afraid of resistance. I'm afraid I won't be cured. [Participants 4]

Nowadays, I finished a course of antibiotics. In the past, I didn't finish the course of antibiotic and sometimes it [disease] was recurrent. So, at present, I finish the course of antibiotics.

[Participant 6]

In contrast, several patients said that they did not complete the course of antibiotics because they considered the risks of taking antibiotics, for example, the side effects of antibiotics on the liver or of becoming tolerant to antibiotics.

Pharmacist told me to finish all antibiotics. But I do not want to be dependent on the medicine. I did another thing to make me better, resting, drinking warm water. I try to not always take medicine when I am ill. I avoid taking a lot of medicine, taking it for a long time. [Participant 7]

Usually, pharmacists told me to take antibiotics for a week. But I stopped taking when I felt better. I was afraid that antibiotics might affect my liver. [Participant 18]

One patient admitted that she usually did not complete a course of antibiotics, but she would finish the course when they thought that the causative organism was difficult to eradicate.

When I took antibiotics for my sinusitis, I finished all of antibiotics. The doctors said this germ was hard to be killed. It was, uhm, a virus that I need to complete the doses of antibiotics to kill all of them. [Participant 21]

Lastly, the number of antibiotic capsules/tablets supplied at a particular time also, in some cases, influenced whether or not a course of antibiotics was completed. One participant stated that he finished all antibiotics that were obtained from a pharmacy because he obtained a short course of antibiotics. Most participants stated that they were supplied antibiotics from a pharmacy for about 3 days or less at the last visit.

Usually [community] pharmacists supplied antibiotics for a few days, so, sometimes when there were few capsules left, I took all of them. For the hospitals, doctors prescribed antibiotics for weeks.

So, I stopped taking them when I felt better. [Participant 13]

Pharmacist supplied me one blister [10 capsules/tablet] of antibiotic. They told me to finish all antibiotics and If I don't feel better, I should go to a doctor. [Participant 12]

5.4.3 Theme 3: Views toward antibiotics and antibiotic resistance

From the interviews, the participants called antibiotics with a few different terms. Some participants called antibiotics as “Ya-Kae-Ug-Seb¹⁰” which actually means anti-inflammation medicines. Some called them “Ya-Ka-Cheu¹¹” which means antimicrobial agents.

I called antibiotic Ya-Kae-Ag-Seb. I had requested Ya-Kae-Ag-Seb from a pharmacy. I had diarrhoea and stomach-ache. Pharmacist supplied Ya-Kae-Ag-Seb-Ka-Cheu for me. I don't remember the name, but I knew it was an antibiotic. [Patient 7]

Interviewees were asked to express their perceptions regarding advantages and disadvantages of antibiotics, as well as, antibiotic resistance. The interviews showed that participants had minimal knowledge of advantages and disadvantages of antibiotics, and antibiotic resistance.

5.4.3.1 Advantages and disadvantages of antibiotics

The perceptions of most participants regarding the advantages of antibiotics depended on their own experience or that of their family. One participant was not sure about the advantages of antibiotics. Other participants stated that antibiotics were effective and helped them to be cured quickly.

¹⁰ *Ya-Kae-Ag- Seb* actually means anti- inflammatory drug, however, some patient referred this word to antibiotics.

¹¹ *Ya-Ka-Cheu* means antimicrobial drug, however, in practical, this word referred to antibiotics.

I was cured faster with antibiotics. The same as my child. For example, when my child had watery diarrhoea, he had to take antibiotics. If he didn't have antibiotics, he would be cured slower.

[Participant 2]

I would be cured quickly when I had antibiotics. Taking antibiotics is better than taking another medicine.

[Participant 10]

For the disadvantages of antibiotics, most interviewees were not sure about them. Almost all participants reported that they have never experienced any negative effects, including adverse reactions, of antibiotics. Many patients stated that they thought antibiotics had disadvantages, but they did not actually know what the disadvantages were. Only one patient said that antibiotics had no disadvantages.

Someone said there are the disadvantages [of antibiotic]. But I really don't know what they are. I just know that they [antibiotic] have side effects. Every medicine has side effects to liver and kidney. So, I try to take it at little as possible. [Participant 17]

One third of participants thought antibiotics might affect the liver and kidney. Three patients thought antibiotics may accumulate in the body.

It [antibiotics] may have disadvantages. I think it affects the internal organs, liver, kidney, something like that. Antibiotics may be cumulated in the body. I'm afraid a bit, but I do not frequently take it. So, I took it. [Participant 4]

Several patients were aware of disadvantages, but only two stated explicitly that they were concerned.

I do not know [disadvantages of antibiotics]. Someone told me that it might affect the liver. When I checked up, everything is fine. My liver is good. It may happen in the future. I do not know. But in

that situation when I was sick, I had to take antibiotics.

[Participant 6]

I've never experienced the disadvantages of antibiotics, but I am concerned about what doctors or pharmacists told me. Antibiotics may have disadvantages. Like, we could not donate blood if we took antibiotics within the last 7 days. So, I think antibiotic may have negative effects on our body, to our blood. [Participant 14]

5.4.3.2 Consequences of antibiotic resistance

The interviewees were also asked to provide their thoughts about antibiotic resistance. Most participants were not confident about what antibiotic resistance is, nor its causes or consequences. Over half of the participants described that antibiotic resistance meant that an antibiotic was not effective and could not cure the infection. Few patients stated that antibiotic resistance was bacterial resistance to an antibiotic.

I think, antibiotics are not effective anymore. The infection will not be cured. That's it. May have to change to another antibiotic to treat the infection. [Participant 19]

Like, it [germ] can tolerate antibiotics because we didn't complete the course of antibiotics, germs become stronger. [Participant 15]

Regarding a cause of antibiotic resistance, one patient admitted that she did not know anything about antimicrobial resistance. While many patients assumed that antimicrobial resistance was due to patients not completing courses of antibiotics.

Pharmacists and doctors told me that if I do not complete the course of antibiotics, it [microorganisms] will become resistant. But I never know what antibiotic resistance is. I don't know what the impacts of antibiotic resistance are. Why bacteria become resistance to antibiotics. I don't know what the causes of antibiotic resistance are. [Participant 17]

Other causes of antimicrobial resistance stated by interviewees included taking many antibiotics, taking antibiotics for a long time, or climate change.

Antibiotic resistance may result from taking a lot of the same antibiotics and taking it frequently. [Participant 12]

If we take antibiotics for a long time, it will make us resistant to antibiotics. [Participant 9]

Maybe the climate change. It is much hotter now. [Participant 6]

When asked about the impact of antimicrobial resistance, no serious impact was mentioned by any of the participants. Many participants stated that the consequences or impact of antimicrobial resistance was that a change to a new antibiotic would be needed.

The bacteria become resistant, a change of the antibiotic to cure the infection is required. Because the antibiotic is not effective anymore, so a doctor has to prescribe another antibiotic. This is my thought. We have to believe a doctor. If we don't need to worry about it [antimicrobial resistance]. [Participant 5]

The impacts of antibiotic resistance are needing to use another antibiotic that may more expensive, needing more complicated treatment, and may be dangerous. [Participant 12]

A few patients stated that needing to increase a dose of antibiotic, and/or a longer duration of treatment were consequences of antimicrobial resistance.

Maybe need longer time to be cured. Maybe increasing the dose of antibiotics or using stronger antibiotics. [Participant 2]

*I think, if germ becomes resistant to antibiotics, we have to use another antibiotic that may be more expensive, or have to take a lot more antibiotics, or need long time for being cured.
[Participant 3]*

Most participants were not concerned about antimicrobial resistance. Only two patients said that they were worried about antimicrobial resistance.

I'm a bit afraid of antibiotic resistance. But I usually forget to take antibiotic when my symptoms have gone, and I was not sure what should I do, continue taking it for how long. So, I just stopped taking it. [Participant 13]

Some participants stated that they did not worry about antimicrobial resistance because they thought the impact of antimicrobial resistance was not serious. Another reason reported by some participants not to worry about resistance is that they seldom used antibiotics.

If the bacteria become resistant, it has to change the antibiotic to cure the infection. Because the antibiotic is not effective anymore, so a doctor has to prescribe another antibiotic. This is my thought. We have to believe a doctor. We don't need to worry about it [antimicrobial resistance]. [Participant 5]

I don't take antibiotics frequently, so I don't worry [disadvantages of antibiotic and antimicrobial resistance]. Community pharmacists didn't tell much about side effects, resistance. They just told me to finish all the antibiotics. [Participant 15]

Three participants reported experiences that related to antimicrobial resistance. However, they did not show much concern about the situation.

Last month I had sore throat, cough, throat irritation, so I went to a pharmacy and was supplied two blisters of amoxicillin. When I finished all of the antibiotics, I felt like I was cured. Then 1 or 2 days later I had sore throat again. This time I went to a hospital. The doctor said this might because of antibiotic resistance, so he prescribed another antibiotic for me which were more potency. [Participant 4]

I took almost all of amoxicillin, but I didn't feel better. I went back to a pharmacy. The pharmacist told me that the bacteria were resistant to amoxicillin. Amoxicillin wasn't effective for me. The pharmacist looked at my throat and said it was red and swollen. they supplied higher potency antibiotics for five or seven days. I'm not sure. I took this antibiotic three times a day. I felt better on the fourth day. [Participant 6]

5.4.4 Theme 4: Ways to improve antibiotic use suggested by public

The participants suggested the ways to improve appropriate public use of antibiotics including public education, raising awareness of community pharmacists regarding pharmacy professional practice, and controlling the supply of antibiotics from community pharmacies through the supply by a pharmacist only.

5.4.4.1 Public education on appropriate antibiotic use and AMR

Public education through various methods was the most common suggestion by the participants. Many participants thought it was important to educate the public about antibiotic use. Most participants stated that Thai people lacked knowledge regarding antibiotics and overuse of antibiotics, particularly the villagers in rural areas or poorly educated people.

We [Thai people] have little knowledge about antibiotics. This may be because we are not interested to learn about them [antibiotics]. [Participant 2]

People in rural areas have low health literacy. They barely know about antibiotics. In rural areas, people use a lot of Ya-Kae-Ag-Saeb [antibiotic]. Ya-Kae-Ag-Saeb for them [villagers] look like a magic pill. They took it, and then the symptoms were gone.

So, they took it [antibiotic] when they got sick. They can buy it from grocery stores in the villages. [Participant 7]

Various ways to educate the public were offered by participants. Some participants suggested to educate the patients during healthcare services by healthcare providers, for example in community pharmacies or hospitals.

Public education is important. Healthcare professionals should educate their patients. Community pharmacist should provide enough information about antibiotic to their patients. Some community pharmacists did not give patients any information regarding antibiotic use. [Participant 13]

Educating about antibiotic use at hospitals may be good. There are many patients and their care givers. May post posters in public places. May post the information regarding antibiotic on Facebook. [Participant 21]

In addition, over half of participants suggested educating villagers in the village either by healthcare providers or Village Health Volunteers (VHVs).

If it is possible, the healthcare providers team should go to educate the villagers in the community. Targeting on educating the people that use a lot of antibiotics. [Patient4]

Every village has a pavilion as a community centre. Should provide some educating material at the pavilion for the villagers. Healthcare providers should go to educate villager in the village. People in urban areas have enough knowledge, and we are close to healthcare facilities. In rural areas, it was difficult to go to a doctor. For convenience and for saving cost, they [villagers] bought antibiotics from grocery in the village. They took it [antibiotic] and it worked. [Participant 6]

Furthermore, public education through the media such as television and social media was suggested by many participants.

Should educate public about antibiotics through media again and again. Should publish serious effects of antibiotics. Educate what will happen if use antibiotics inappropriately. This should be published through various media, such as, TV, social media.

[Participant 12]

At present, social media should be used to communicate with the public. However, the content should be short, easy to understand, may use infographics or short clips. The content should make the public feel that what's going to happen if [they] complete or not complete the course of antibiotics. [Participant 14]

With regard to the messages to communicate with the public, the headlines of the messages should be attractive to draw attention of the public to information about antibiotics.

I'm usually not looking for the topic of antibiotics. But if there is an attractive headline on the internet or TV, it may interest me and may read it. [Participant 2]

Public education should be something more interesting. I don't know what to do. It should not be boring [Participant 10]

The participants suggested that the following would be useful information to provide to the public: conditions where antibiotics are appropriate, disadvantages of antibiotics, including AMR and its impact, especially the serious impact of AMR.

We should know what an antibiotic is, what antibiotic resistance is, and when we should have antibiotics. Nobody knows what an antibiotic is, what makes antibiotic resistance, so what? It's not only me that did not finish the course of antibiotics, but my friends also do it. If it becomes [antibiotic] resistant, let it be. In addition,

we've never seen the consequence of antibiotic resistance.

[Participant 15]

I think, general populations should know what antibiotic resistance is. This may make people finish the course of antibiotic treatment. If the public really know what the serious consequences of not completing the course of antibiotics, they might take all of antibiotics. Now, they don't finish the course of antibiotics, but nothing happens. [Participant 17]

Additionally, encouraging the public to consult a doctor/pharmacist when ill rather than self-medicating with antibiotics or requesting antibiotics from a pharmacy was also suggested by several participants.

It [public education] may encourage the public to go to meet a doctor and not self-medicate. [Participant 11]

People usually like to request medicine from a pharmacy. They go to a pharmacy because it is convenient. More appropriately, they should consult healthcare professionals before using antibiotics, should not self-medicate with antibiotics. [Participant 16]

5.4.4.2 Raising pharmacist awareness of pharmacy professional practice

Awareness of community pharmacists toward professional practice was important to improve rational use of antibiotics. Community pharmacists should be encouraged to act professionally not just sell medicines, as suggested by one participant.

It should be controlled to supply antibiotic according to the indication. Not just sell antibiotic without taking history.

[Participant 12]

Some participants stated that when they had been to a pharmacy and had requested antibiotics from the pharmacist, some pharmacists asked questions

about their symptoms but two said the pharmacist just supplied antibiotics without asking any questions.

I had requested antibiotics at a pharmacy. At some pharmacies, when I said I would like to have amoxicillin. He just asked how many I want. I told I wanted 2 blisters. I know that I have to take 2 blisters. [Participant 4]

When I requested for antibiotic by name, they [pharmacists] wouldn't ask me any question. They just gave me what I asked for. [Participant 5]

Moreover, six participants confirmed that pharmacists did not refuse them when they requested antibiotics, even though sometimes that pharmacist said antibiotics were not indicated for their presenting conditions.

Sometimes, pharmacists told me that I didn't need antibiotics for my symptoms. But, if I said I wanted it, pharmacists just supplied it. [Participant 7]

There should be controls on the supply of antibiotics according to the indication. Not just sell antibiotics without asking any question. [Participant 12]

5.4.4.3 Controlling the supply of antibiotics by pharmacist only

Another suggested way to improve the rational use of antibiotics was to enforce the laws and regulations regarding the supply of antibiotics from community pharmacies. They stated that pharmacies must comply with the law associated with antibiotic supply.

Patients go to a pharmacy because they think it is the same as going to meet a doctor at a clinic. But sometimes, there is no pharmacist to serve patients. I do not know that those non-pharmacists advised me appropriately. A pharmacy must have a pharmacist to provide services. [Participant 1]

The law should be enforced to have a pharmacist present to serve at a pharmacy. Sometimes, pharmacist was not at a pharmacy but the other [non-pharmacists] still supplied medicines to patients. This wasn't right, as well as, selling medicine from a non-pharmacy shop. There should be stricter enforcement to make it not too easy to have access to medicines. [Participant 7]

In summary, interviews with citizens identified that some members of the public recognized that increasing public awareness of antibiotics and antimicrobial resistance is needed. Furthermore, the findings suggested that the inappropriate use of antibiotics does take place, as evidenced via self-reports by interviewees. The following section will present the strengths and limitations of the study.

5.5 Strengths and limitations

To the researcher's knowledge, this is the first qualitative study to be conducted in Thailand that explores the views of Thai citizens towards antibiotic use and AMR. The study explored important findings regarding Thai citizens' knowledge, attitude and behaviour in relation to antibiotic use and AMR. This study also identified some key areas that need to be addressed in public education to increase the knowledge, attitude and behaviour among the public. The views were helpful for the next stage of the thesis.

Interviewing the public posed challenges to the researcher, due to the participants having limited knowledge regarding antibiotic use and AMR. However, the interviews only focused on the experiences and views of the participants. In addition, as some questions asked about adherence to antibiotics in the recent past, recall bias might be an issue with those taking an antibiotic further back in time. This is recognised as a limitation.

Furthermore, due to the time restrictions, only 21 participants in only one province were recruited and interviewed. Nonetheless, this study was very much exploratory, and we did not set out to make generalizations. Additionally, reasonable efforts were made to recruit a wide and varied sample of participants, albeit in one small location. In terms of safety of the lone researcher, a university

campus was identified as appropriate for the exploratory nature of the research. The sample size and breadth of the backgrounds of participants were therefore deemed sufficient to meet the aims of this section of the thesis.

5.6 Discussion

5.6.1 Knowledges, attitudes and use of antibiotics

AMR is a serious health problem worldwide. The prevalence of resistance is made worse where antibiotics can be easily accessed (World Health Organization 2016b). As reported in this interview study of a small sample of Thai residents, antibiotics were easily obtained from community pharmacies. In Thailand, public health facilities provide all essential treatment, including medicines, covered in the universal health coverage for Thai citizens (Tangcharoensathien et al. 2018). In addition, there are 10,139 public primary care units across the country (Pinprateep et al. 2019). However, community pharmacies are also one of the main sources to obtain medications (including antibiotics) in Thailand (Chanvatik et al. 2019) even though patients have to pay out of pocket. Ease to access, convenience and the reasonable cost of medicines were the reasons for choosing community pharmacies by these interviewees. Moreover, the general population knew that antibiotics were legally available from community pharmacies without the need for a prescription. Misuse of antibiotics, including non-adherence to antibiotic treatments (e.g. not completing antibiotic course, taking suboptimal numbers of doses of antibiotic therapy) and self-medicating with antibiotics (e.g. using left over antibiotics, obtaining from non-pharmacies) has been previously reported in a number of countries including in Thailand (Widayati et al. 2011; Saengcharoen et al. 2012; Li 2014; Widayati et al. 2015; Alhomoud et al. 2017).

Lack of appropriate knowledge regarding antibiotic use promotes inappropriate antibiotic use in non-bacterial infections and non-adherence to antibiotic treatment (McCullough et al. 2016; Pan et al. 2016; Alhomoud et al. 2017; Fletcher-Miles et al. 2019). Other studies in Thailand also reported that Thai people have low levels of knowledge about antibiotics and AMR (Mongkonchaipak et al. 2012; Saengcharoen et al. 2012; Chanvatik et al. 2019). Likewise, the findings in the

present study showed that participants had minimal knowledge about antibiotics and their indications, as well as, a low awareness about the side effects of antibiotics and antibiotic resistance.

Many participants in the study called antibiotic as “Ya-Kae-Ag-Seb” which means anti-inflammatory drug. It is common to call antibiotics “Ya-Kae-Ag-Seb” in Thailand. A recently household survey in Thailand (N = 27,762) (Chanvatik et al. 2019) found that 57% of Thai adults did not know that antibiotics were not anti-inflammatory drugs. This may lead to the public to taking antibiotics for inflammation symptoms which are not bacterial infections.

The three common conditions among Thai people discussed at interview were sore throat, diarrhoea and simple wounds. However, these conditions do not mostly require antibiotic treatment (World Health Organization 2005; Thavornwattanayong et al. 2017; National Institute for Health and Care Excellence (NICE) 2018). Thus, understanding which conditions should be treated with antibiotics, particularly URIs, diarrhoea and wounds is important to try to reduce the inappropriate use of antibiotics and decrease resistance.

Perceived benefits over the risks of antibiotics were important factors contributing to the inappropriate use of antibiotics by the interviewees. Patients perceived that antibiotics help them to be cured quickly; therefore, they believed that they needed antibiotics for quick relief (Saengcharoen et al. 2012; Essack and Pignatari 2013; Pan et al. 2016; Alhomoud et al. 2017; Irawati et al. 2019). Previous experience with a successful antibiotic and/or having an antibiotic prescribed/supplied by a healthcare professional reinforced misunderstandings and incorrect expectations of the patients (Widayati et al. 2015; Nawafleh et al. 2016; Alhomoud et al. 2017; Irawati et al. 2019). Misconceptions regarding the benefit of antibiotics can lead to self-medication with antibiotics or pressure on healthcare professionals, including community pharmacists, to prescribe/supply an antibiotic. Furthermore, general populations were unaware about the adverse effects of antibiotics (Irawati et al. 2019). Most participants in this study had never experienced adverse effects while taking antibiotics. They thought that

antibiotics may be accumulated in the body or affect the kidneys and/or the liver. However, the immediate perceived individual benefit of antibiotics (being cured quickly) negated the long-term risks of antibiotic use such as antibiotic resistance and its consequences (Chandy et al. 2013). Therefore, the public may prefer to have antibiotics for quick relief from an illness rather than worry about the disadvantages of antibiotics that may or may not occur. In addition, patients in the present study were not aware about the serious consequences of AMR. They thought that AMR can be solved easily by changing or increasing the dose of antibiotics. Therefore, communicating the consequences of antibiotic misuse and AMR among general populations is also important. A study in Beirut (Cheaito et al. 2014) using structured interviews with 319 pharmacy customers reported that knowing the risks of the frequent use of antibiotics was associated with lower antibiotic self-medication. Therefore, the risks of the inappropriate use of antibiotics including AMR should be included in information communicated to the public.

Non-adherence to antibiotic treatments was another reported example of the misuse of antibiotics revealed in this study as well as in some previous studies. Patients frequently stopped taking antibiotics when symptoms disappeared (Fatokun 2014; Irawati et al. 2019; Nguyen et al. 2019). Never experiencing any risks when stopping antibiotics before completing the treatment course probably leads patients to be unaware of the importance of completing the course of antibiotics. Leftover antibiotics were reported as being kept for the next episode of a similar illness for oneself or family members was reported in previous studies (Alili-Idrizi et al. 2014; Ding et al. 2015; Nguyen et al. 2019). This may increase the risk of therapeutic failure, re-infection, and resistance (Pechère et al. 2007).

Concerns about the risk of taking too many antibiotics seemed to influence patients' adherence to antibiotic treatments, as reported in the present study. Similarly, interview studies in India (Irawati et al. 2019) and Vietnam (Nguyen et al. 2019) also revealed that some patients were aware of the side effects of taking too many antibiotics. Misunderstandings that taking antibiotics for long periods (to complete the antibiotic treatment course) may cause side effects probably

leads patients to not complete the course of antibiotics. In this study, shorter durations of antibiotic treatment were reported to influence patients' willingness to complete the course of antibiotics. A global survey by Pechère et al. (2007) also reported that shorter durations of antibiotic courses were associated with increasing adherence.

5.6.2 Public education

Regarding the above discussion, raising public awareness about the rational use of antibiotics is urgently needed. Public education was commonly reported as being important to improve the rational use of antibiotics (Awad and Aboud 2015; World Health Organization 2015a; Alhomoud et al. 2017). Several studies demonstrated that people who had received appropriate information about antibiotics and AMR had a higher level of knowledge than those who had not received the information (Jaja 2017; European Commission 2018; Chanvatik et al. 2019). A Eurobarometer report (European Commission 2018) presented that when some Europeans received information about the misuse of antibiotics, it changed the views on antibiotics and; led them to be more willing to consult a physician rather than self-medicate with antibiotics.

In the present study, all participants said that they had received information about not taking antibiotics unnecessarily and AMR only from healthcare professionals, such as, physicians and pharmacists. While a few participants also said that they may have seen some information relating to antibiotics on social media, that if they did, they did not pay attention. Similar results were reported in the national household survey in Thailand where only 18% of Thais had received information about the appropriate use of antibiotics in the past twelve months. Three common sources of information about the appropriate use of antibiotics were physicians (36%), healthcare workers (25%) and pharmacists (18%) while, television and social media played a minor role contributing 8% and 4%, respectively (Chanvatik et al. 2019). A cross-sectional population-based house to house survey study with 1200 caregivers in Peru demonstrated that participants were five time more likely to respect medical decisions when a physician explained the reasons for not

prescribing antibiotics (Ecker et al. 2013). Similarly, a survey study in Hong Kong with 1527 citizens (Ho et al. 2014) reported that the use of healthcare providers to provide education about AMR had the largest impact on the public cognition and behaviour change. However, this study revealed that community pharmacists and other healthcare professionals provided limited information about antibiotics and AMR issues. Therefore, healthcare providers should be a part of interventions to deliver appropriate messages on the use of antibiotics during all health services in order to strengthen the rational use of antibiotics and AMR with the public. Community pharmacists and other healthcare professionals should provide more information and address misconceptions and tailor their counselling appropriately (Zucco et al. 2018; Fletcher-Miles et al. 2019).

Furthermore, several studies recommended the use of mass media campaigns to effectively target public education programme to improve knowledge, attitudes and behaviour of the public regarding antibiotic use and AMR (Awad and Aboud 2015; Alhomoud et al. 2017). Mass media campaigns are widely used to expose high proportions of large populations to messages through routine uses of existing media, for example television, radio, and newspapers. A study in Libya (El-Nimr et al. 2019) found that the knowledge and attitudes of the public regarding antibiotic use were significantly improved after three months of mass media campaigns (a radio program (one episode/week for eight weeks), a television episode and written articles in Misurata University magazine about the appropriate use of antibiotics). In Thailand, a small number of people had received information from mass media, such as television and social media (Chanvatik et al. 2019). Education about appropriate antibiotic use and AMR through television may have an advantage as it can access the majority of the public. In addition, regarding the rapid expansion of the internet and social media, this method also has the potential to provide messages about the appropriate use of antibiotics and raise awareness towards AMR among the public. Social networks were reported as being a useful way to get information about antibiotics by some (Zucco et al. 2018; Andersen et al. 2019). However, to change the beliefs and behaviour of the public,

long term continuous public campaigns regarding the rational use of antibiotics and AMR would be essential.

5.7 Conclusion

The findings of this study revealed that patients could easily obtain antibiotics from community pharmacies. In addition, the inappropriate use of antibiotics such as taking antibiotics without an indication, self-medication with antibiotics and non-adherence to antibiotic treatment, were reported to be common by the interviewees. Previous experience was a common important influencing factor reported by the participants for using antibiotics. Moreover, lack of knowledge and misunderstandings about antibiotics and AMR also led to the inappropriate use of antibiotics. The Thai citizens interviewed were likely to believe that antibiotics can decrease the duration of illness and were unaware of the risks of antibiotics and AMR.

Multifaceted public education programmes towards the appropriate use of antibiotics was reported as the most important strategy to improve the rational use of antibiotics among those Thai citizens interviewed. Educational interventions should be provided by healthcare providers in clinical settings including in community pharmacies, as well as in the community. Additionally, mass media such as television, radio and social media should be used to post advertisements to promote the appropriate use of antibiotics. The contents of health education messaging should include the medical conditions requiring antibiotics, the risks of unnecessary antibiotics, resistance to antibiotics and its consequences, and encouraging the public to consult healthcare professionals rather than relying on self-medication.

Chapter Six

Community pharmacists'

views regarding

antibiotic supplying and

antibiotic resistance:

Cross-sectional survey

study

6 Community pharmacists' views regarding antibiotic supplying and antibiotic resistance: Cross-sectional survey study

6.1 Introduction

The previous qualitative studies explored (a) the views of community pharmacists regarding factors influencing antibiotic supply by community pharmacists and ways to improve rational use of antibiotics in Thailand, and (b) citizens' views regarding antibiotic use and antibiotic resistance. The study in this chapter was designed to obtain the views of larger numbers of community pharmacists in Thailand about the issues raised in the interviews. There has been no previous national survey into community pharmacists' views regarding antibiotic supply from community pharmacy in Thailand.

6.2 Aims and objectives

This study aims to explore the factors influencing the appropriate supply of antibiotics by community pharmacists in Thailand. It was hoped that our findings could be useful to help developing strategies to improve the rational use of antibiotics in the community pharmacy setting in Thailand. This research has five specific objectives:

1. To evaluate the appropriateness of the intended supply of antibiotics for URIs, diarrhoea, and simple wound by community pharmacists in Thailand.
2. To explore the relationship between factors relating to the supply of antibiotics by community pharmacists and demographic data of pharmacies in which they practice, including type of a pharmacy (independent or chain pharmacy), pharmacy accreditation status, participation in antimicrobial stewardship programmes, and location of the pharmacy.
3. To explore the relationship between factors relating to the supply of antibiotics by community pharmacists and the demographic data of

pharmacists, including age, gender, length of experience, role at a pharmacy, and highest education level.

4. To explore the views of pharmacists regarding antibiotics and antimicrobial resistance.
5. To explore the relationship between the factors relating to the supply of antibiotics by community pharmacists and pharmacists' views regarding antibiotics and antimicrobial resistance.
6. To explore the views of pharmacists regarding the ways to potentially improve the rational use of antibiotics from community pharmacies.

6.3 Methods

6.3.1 Study design

A cross-sectional survey using a self-completed questionnaire with Thai community pharmacists was used in this study as described in chapter 3.

The survey was made available using two different approaches: 1) a main (postal) survey, and 2) an open online survey. Firstly, the main survey was distributed to selected community pharmacies by post (see Sampling below). Then, after the main survey had been closed, the second open online survey was opened, and announcements were made via social network groups/pages related to community pharmacist in Thailand. The open online survey was used to deliberately boost response rate when the main survey received a lower response than anticipated.

6.3.2 Ethical approval

Ethical approval was obtained from Cardiff University School of Pharmacy and Pharmaceutical Sciences Ethics Committee (in English) and the Research Ethics Committee of Ubon Ratchathani University, Thailand (in Thai). The Ethical Approval Letters are included in Appendix 12.

6.3.3 Questionnaire development

6.3.3.1 Questionnaire design

The questionnaire was developed in English by drawing on the Thai interview data (see chapter 4 and chapter 5) and a review of the literature. The 23 participants in the community pharmacist interview study worked in one of two regions, Central or North-Eastern Thailand, (from a total of six provinces). The findings revealed four major themes regarding antibiotic use in, and the supply from, community pharmacies in Thailand, namely, 1) the practice of pharmacists regarding antibiotic supply, 2) reasons community pharmacists find it difficult to comply with the rational use of antibiotics, 3) limitations of campaigns to promote the rational use of antibiotics to community pharmacists, and 4) pharmacists' suggestions for improving the rational use of antibiotics. For the patient study, interviews were conducted with 21 individuals in Ubon Ratchathani province. Five themes were identified namely, 1) access to antibiotics, 2) pharmacist-patient interaction at the community pharmacy, 3) how patients use antibiotics, 4) advantages and disadvantages of antibiotics, and 5) raising public awareness of antibiotics and antimicrobial resistance. Although limited by the small number of participants from a few areas in Thailand, these findings were used for developing the questionnaire to determine the views of a larger sample of community across Thailand. Moreover, the symptoms and conditions of patients mentioned during the interview would be used to design the case vignettes.

Three researchers (DNJ, MCW, and SD) had meetings and discussed the questionnaire, the questions and the order of questions/sections several times until agreement was reached. Then, the final draft of the English version of questionnaire at this stage was translated into Thai by the Thai researcher (SD) using a meaning-based approach. The aim of meaning-based translation is to transfer from the source language (in this study: the English language) to a target language (in this study: the Thai language) by communicating the same message of the source language but using the vocabulary and grammatical choice of the target language (Squires 2009).

Confirmation of the translation for accuracy was undertaken by two Thai-English bilingual translators (TS¹², CP¹³) who were pharmacy graduates in Thailand, working as academic staff, for meaning and comprehension (Esposito 2001; Lopez et al. 2008). Both the English and the Thai questionnaires were sent to the translators. They reported a few minor suggestions to make the statements and questions clearer for participants. Agreement on the translation was reached by all translators using three criteria, clarity and ease of understanding of the translation and conceptual equivalence. The English version was reviewed for conceptual equivalence with the Thai version by Thai researcher (SD) to confirm Thai and English language consistency. The first draft of Thai questionnaire was tested for content and face validity by five experts and ten Thai community pharmacists. A pilot study was later conducted to test the reliability and feasibility of questionnaire.

6.3.3.2 Content validity

The first draft of the Thai questionnaire was tested for content validity by five Thai experienced individuals: two from pharmacy practice and three from the Faculty of Pharmaceutical Sciences in Thailand. The Item-Objective Congruence (IOC) index score was used to determine content validity with a value for each item higher than 0.5 accepted to confirm the content validity of the questionnaire (Kamket 2006). The comments of the individuals were used to improve the quality of the questionnaire.

¹² TS is Dr. Teeraporn Supapaan; TS is an Associate professor at the Faculty of Pharmaceutical Sciences, Ubon Ratchathani University, Thailand, who obtained her PhD degree from the University of Nottingham, United Kingdom in 2016.

¹³ CP is Dr. Chonladda Pitchayajittipong; CP is an Assistant professor at the Faculty of Pharmaceutical Sciences, Ubon Ratchathani University, Thailand, who obtained her PhD degree from the University of Bath, United Kingdom in 2009.

The questionnaire was revised based on comments of the experts, then, the draft was used for a preliminary investigation to determine the clarity and understanding of the statements and questions. Ten Thai community pharmacists were sampled using convenience sampling. They were contacted via email or social media and were asked to identify any difficult or confusing items. The questionnaire was amended slightly as a result of comments from the community pharmacists. The questionnaire was then again revised based on the comments of Thai community pharmacists. This adapted version of the questionnaire (Appendix 13) was used for the pilot study.

6.3.3.3 Pilot study

The pilot study was undertaken in order to assess the feasibility of the survey, method of distribution and whether the questionnaire was realistic and workable. Moreover, the pilot study also aimed to check the wording, comprehension, and ordering of the questionnaire, to identify logistical problems that might have occurred, to estimate the time needed for the study, and to assess the proposed data analysis techniques to uncover potential problems (Oppenheim 2000; Van Teijlingen and Hundley 2010).

The questionnaire used for the pilot study (Appendix 13) included both closed-ended questions using tick boxes and statements using a Likert scale, and open-ended questions. The questionnaire consisted of three parts:

- 1) Part one included case vignettes, and data pertaining to assess pharmacists' views toward antibiotic use, antibiotic resistance, and ways to improve the rational use of antibiotics. This part was informed by the findings of the community pharmacist and patient interviews, the Thai practice guideline for community pharmacy (RDU Pharmacy Eagle 2017; Thavornwattanayong et al. 2017) and the literature.
- 2) Part two comprised demographic questions about the respondent's community pharmacy, such as, type of pharmacy, location, and participation in antimicrobial stewardship. This part was informed by the objectives of the study as well as factors related to pharmacies that were

reported in literature that may influence the supply of antibiotics from community pharmacies.

- 3) Part three included questions about the pharmacist's background, such as, gender, age, education, role at the pharmacy, and length of experience in community pharmacy. This part was informed by the objectives of the study as well as factors related to pharmacists that were reported in the literature that may influence the supply of antibiotics by community pharmacists.

The questionnaire used for the pilot study was initially tested with fifty community pharmacists in three provinces in Thailand (Ubon Ratchathani, Loei, and Lamphun), prior to wider distribution, and following ethics approval. For selecting provinces, one province from each of the three different categories of population sizes¹⁴ was selected by the researcher using convenience sampling. None of these provinces were included in the main study. Then, sixteen to seventeen community pharmacies in each province were selected using systematic random method (Bergin 2018b).

The pharmacy addresses were obtained from the website of the Bureau of Drug Control, Thailand (Bureau of Drug Control 2018). This pretesting of the questionnaire was undertaken between 1st August 2019 and 16th September 2019.

An envelope containing a questionnaire, a cover letter (Appendix 14) which explained the purpose of the study and the confidentiality of the responses and a stamped return envelope were posted to the fifty selected pharmacies. The questionnaire included a link for completing the questionnaire online as an option for participants, or they could return the questionnaire by post to Ubon Ratchathani University, Thailand. The online questionnaire was created to be as similar as possible to the paper questionnaire using Bristol Online Survey (BOS) platform (<https://www.onlinesurveys.ac.uk/>). The returned envelopes were coded to identify the pharmacy in order to know who has responded so no follow-

¹⁴ Provinces were divided into three groups based on the population sizes, including, 1) more than 1,000,000 populations, 2) 500,000 – 1,000,000 populations, and 3) less than 500,000 populations.

up questionnaire was sent. The questionnaires and envelopes were divided upon receipt, with the envelopes discarded. The questionnaire did not contain any code or data that could identify the respondents. It was not possible to identify the pharmacist or pharmacy from the questionnaire.

Two reminders were sent to the community pharmacies in order to increase the response rate (Nakash et al. 2006; Dillman et al. 2014a). The first reminder, including another copy of the questionnaire, reminder letter, and a return envelope, was sent via post after two weeks (Glidewell et al. 2012; Dillman et al. 2014a; Hardigan et al. 2016). The second reminder using a postcard (Appendix 15), including the link to the survey, was sent after another two weeks (Glidewell et al. 2012; Hardigan et al. 2016; Bray et al. 2017). All materials were in the Thai language.

The packs of questionnaires and reminders were sent by a third person who was hired to distribute, then collect and scan the returned questionnaires on behalf of the researcher. The scanned files of returned questionnaires were sent to the researcher via email.

Fourteen completed questionnaires were received. Five completed questionnaires (4 completed online and 1 returned by post) were returned after the first mailing. After the first reminder, a further three completed questionnaires were returned by post, and one completed online. An additional four responses completed online, and one completed paper-questionnaire were received after the second reminder (Figure 6-1).

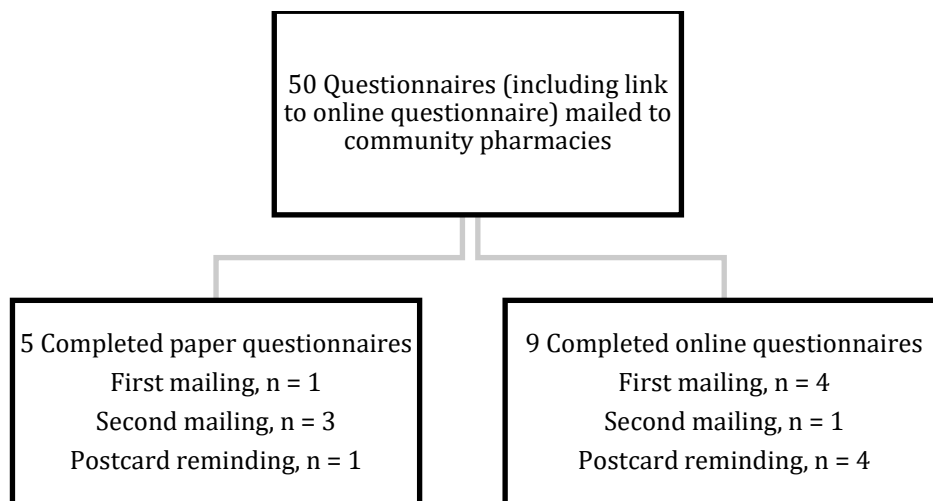


Figure 6-1 Flow chart of pilot survey.

Data completed online were directly exported from the BOS platform to IBM SPSS Statistics 25 as coded responses. The data were also exported to an Excel format with responses in text (un-coded). Cross checking the exported data between SPSS and the Excel file was done by the researcher (SD) to ensure accuracy of data entry. Data from the questionnaires returned by post were manually inputted into SPSS for statistical analysis. All the entered data were checked by comparing values against the data from the original paper questionnaire to validate data input in the database.

Each response was assigned a numerical code and entered into IBM SPSS. For information that was already in number format (e.g. age in years, length of experience in year) this was not changed. The variables such as gender, highest education, role in community pharmacy, type of community pharmacy etc. were converted to numbers (e.g. 1 = male, 2 = female). The first listed responses would be code as 1, the second as 2 and so on across the page. If no response was made to a particular question, then a separate “missing” code “99” was used to indicate this (Pallant 2016b). The scores of each negative statement provided in question 2. (Appendix 13) were reversed.

The final database, including data from both the paper and online questionnaires, was checked again for any error. The researcher (SD) was looking for any values that fell outside the range of possible values for each variable. For the categorical

variables (e.g. gender, highest education, type of pharmacy) the lowest and highest values were checked to ensure that the values entered in the dataset were within the range of possible values.

For continuous variables, the value range and extreme values were checked for each variable, as well as the mean value and standard deviation for unexpected values (Pallant 2016b). Ordinal and interval variables were also checked for unexpected values.

Descriptive statistics were calculated in IBM SPSS statistics 25 for all study variables: pharmacists' views regarding antibiotic use and antibiotic resistance, and the demographic data associated with respondents. Nominal and ordinal variables were explored for frequencies and percentages. Means and standard deviations or medians and interquartile ranges (IQR) were calculated for ordinal and interval variables (Pallant 2016a).

A bivariate analysis was done to assess factors associated with a practice score (see practice score calculation at section 6.3.6.2). Practice score was used as the dependent variable and has an interval level of measurement, which was not normally distributed. Therefore, the Mann Whitney U test or Spearman's correlation coefficient was used to assess the relationship between practice score and another variable. Mann Whitney U Test was used when the independent variable was nominal while a Spearman's correlation coefficient was used when the independent variable was ordinal (Sapsford 2007; Pallant 2016d).

As a result of the pilot study, a number of minor refinements (Table 6-1), were made to the questionnaire including the ordering of question sequences and instruction wording in the case-based questions part (part 2: Views regarding antibiotic supply and antimicrobial resistance). Demographic data in the respondent section were moved to the first part of the questionnaire as the researcher found that one respondent did not complete the questions which were used to confirm that the respondent was a pharmacist. Moving demographic data to the top also helped to highlight to respondents that the participant must be a pharmacist. Therefore, for the final version of the questionnaire (Appendix 16).

Table 6-1 Changes to the questionnaire after the pilot study.

Previous statement/ordering	Developed statement/ordering
Based on your experiences, would you recommend antibiotics treatment for the following cases?	<u>Based on your experiences</u> , would you recommend antibiotics treatment for the following cases? <i>(This is not a test. We are interested in your views and experiences.)</i>
Part 1: Views regarding antibiotic supply and antimicrobial resistance. Part 2: Demographic data of the pharmacy. Part 3: Demographic data of the respondent	Part 1: Demographic data of the respondent Part 2: Views regarding antibiotic supply and antimicrobial resistance. Part 3: Demographic data of the pharmacy.

Cronbach's alpha was used to measure internal consistency and is a reliability test to confirm that the questions measure what they intend to measure. The acceptable alpha value is more than 0.7 and low values of alpha indicate that the questionnaire should be revised (Pallant 2016a). The Cronbach's alpha of the statements regarding antibiotic supply and antimicrobial resistance (see Appendix 16, question 7) was 0.837 which is acceptable.

6.3.3.4 Creating the online questionnaire

The online questionnaire was created to be as similar as possible to the paper questionnaire using the BOS (Bristol Online Survey) platform. The first page also provided the information to not complete the online survey if they have completed the paper questionnaire already. The links for the main (postal) survey and open online surveys were different so that it would be clear how the participant was informed of, and recruited into, the study. All materials were in the Thai language.

6.3.4 Population and sample

6.3.4.1 Sample size calculation

1) Sample size calculation for the main postal survey study

Sample size was calculated to determine appropriate sample size for the main (postal) survey. The 'population' of pharmacies in Thailand had been previously described in a report which identified the number of pharmacists in each sector (Prapunwattana 2012) However, updated information from the Pharmacy Council of Thailand was not available for the researcher to use to send out the

questionnaires. The most recent information is available from the Bureau of Drug Control, Thailand (Bureau of Drug Control 2018). These data were used to calculate the sample size.

In order to recruit sufficient participants, a sample size calculation was done by using a formula for proportions proposed by Yamane (1967) as shown below:

$$n = N / (1 + Ne^2)$$

where: n is the sample size; N is the population size; e is margin of error.

A 95% confidence level and margin error 0.05 were assumed for the equation to reflect previous similar surveys conducted with community pharmacies in Thailand (Kulpanapinun and Wongruttanachai 2013; Sookaneknun et al. 2017). The number of Type-I community pharmacies¹⁵ was reported in 2018 (last available complete figures) to be 18,900 (Bureau of Drug Control 2018):

This calculation led to an ideal sample size of 392. However, a 40 - 55% response rate has been reported by several mail surveys conducted with community pharmacists in Thailand (Kulpanapinun and Wongruttanachai 2013; Sumpradit et al. 2013; Parinyarux and Suwannaprom 2014; Sookaneknun et al. 2017; Jarernsiripornkul et al. 2018). For this reason, the anticipated response rate for this research was 40% so the number of community pharmacists invited to participate needed to increase, giving a final sample size of 980 which was rounded up to 1000.

2) Sample size calculation for open online survey study

This was an online survey focusing on community pharmacists in Thailand. The questionnaire in this study was posted on social networks relevant to community pharmacy in Thailand to reach community pharmacists, therefore, a sample size calculation was not used for this method.

¹⁵ There are three types of pharmacy in Thailand: type I, type II, and traditional pharmacy. Type I community pharmacies are the only type of pharmacy which require community pharmacists to supply/dispense medicines.

6.3.4.2 Sampling method

1) Sampling method for main postal survey study

In order to recruit community pharmacies from all regions with their different cultures, socio-economic and socio-demographic characteristics, stratified sampling was used for the postal survey. Culture, socio-economic and socio-demographic characteristics are varied across each region and also related to population size; therefore, this study divided the population into strata by region and by province based on population size.

To classify strata, firstly, community pharmacies were grouped based on their location into the four regions, which are central Thailand, Northern Thailand, North-eastern Thailand, and Southern Thailand. Secondly, community pharmacies in each regional area were divided into three groups based on the population size of the province in which the pharmacy was located (Table 6-2) Three provinces in each of the three group size categories were randomly selected using a random number generator website, <https://stattrek.com/statistics/random-number-generator.aspx>. This gave thirty-six provinces across four regional areas, covering three population levels.

As at May 2019, there were a small number of accredited pharmacies¹⁶ (The office of Pharmacy Accreditation (Thailand) 2019) in Thailand, 1,054 out of 18,900 Type I community pharmacies (5.6%). Therefore, accredited community pharmacies in each province were selected by quota sampling in order to recruit a reasonable number of accredited pharmacies to the study (as one research question relates to comparing views of pharmacists working in accredited pharmacies versus those who did not). A ratio of approximately 1 to 2 accredited pharmacies to non-accredited pharmacies was used resulting in approximately 350 accredited pharmacies and 650 non-accredited pharmacies in the final sample.

¹⁶ Community pharmacy accreditation in Thailand is voluntary. Thailand initiated a community pharmacy accreditation project in the year 2002. It used accreditation criteria comprised of five domains: premise and facility, personnel, drug inventory and stocking, dispensing and patient care, and patient satisfaction and health promotion.

As there is a wide range in the number of community pharmacies in each province, 35% of accredited pharmacies in each of the selected provinces were invited to participate in the study. Many provinces had few accredited pharmacies so in cases where there were less than 10 accredited pharmacies in a selected province, all accredited pharmacies were invited. To recruit about the 650 non-accredited pharmacies, approximately 4% of non-accredited pharmacies were randomly selected, with at least 10 non-accredited pharmacies invited from each province. The list of provinces and the number of pharmacies eligible to participate in the study is shown in Table 6-3. From the resulting list of community pharmacies by province in each of the four regional areas, community pharmacies were randomly selected using a random number generator website, <https://stattrek.com/statistics/random-number-generator.aspx>.

Table 6-2 Classification of the strata

Regions	Population sizes	Provinces	
Central Thailand	> 1,000,000	1. Bangkok 2. Chonburi 3. Samut Prakan	4. NonThaburi 5. Pathum Thani
	500,000 – 1,000,000	1. Nakhon Pathom 2. Kanchanaburi 3. Ratchaburi 4. Suphanburi 5. Ayuthaya 6. Lop Buri 7. Rayong	8. Chachoengsao 9. Sara Buri 10. Samut Sakhon 11. Sa Kaeo (74/2) 12. Prachuap Khiri Khan 13. Chanthaburi
	< 500,000	1. Prachin Buri 2. Phetchaburi 3. Chainat 4. Ang Thong	5. Nakhon Nayok 6. Trat 7. Sing Buri 8. Samut Songkram
Northern Thailand	> 1,000,000	1. Chiang Mai 2. Chiang Rai	3. Nakhon Sawan
	500,000 – 1,000,000	1. Phetchabun 2. Phitsanulok 3. Lampang 4. Kamphaeng Phet	5. Tak 6. Sukhothai 7. Phichit
	< 500,000	1. Nan 2. Payao 3. Uttaradit 4. Phrae	5. Lamphun 6. Uthai Thani 7. Mae Hong Son
Northeastern Thailand	> 1,000,000	1. Nakhon Ratchasima 2. Ubon Ratchathani 3. Khon Kaen 4. Buriram 5. Udon Thani	6. Si Sa Ket 7. Surin (138/5) 8. Roi Et 9. Sakhon Nakhon 10. Chaiyaphum
	500,000 – 1,000,000	1. Kalasin 2. Maha Sarakham 3. Nakhon Phanom 4. Loei	5. Yasothon 6. Nong Khai 7. Nong Bua Lamphu
	< 500,000	1. Bungkan 2. Amnat	3. Mukdahan
Southern Thailand	> 1,000,000	1. Nakhon Sithammarat 2. Songkhla	3. Surat Thani
	500,000 – 1,000,000	1. Narathiwat 2. Pattani 3. Trang	4. Yala 5. Patthalung 6. Chumphon
	< 500,000	1. Krabi 2. Phuket 3. Satun	4. Phangnga 5. Ranong

Table 6-3 Selected provinces and number of selected pharmacies in each province.

Regions	Population sizes	Provinces	Number of non-accredited pharmacies	Number of selected non-accredited pharmacies	Number of accredited pharmacies	Number of selected accredited pharmacies
Central Thailand	> 1,000,000	Bangkok	4,870	205	363	128
		Samut Prakan	524	22	40	15
		NonThaburi	631	27	51	19
	500,000 – 1,000,000	Nakhon Pathom	311	13	19	10
		Chachoengsao	164	10	8	8
		Samut Sakhon	273	11	8	8
	< 500,000	Phetchaburi	13	10	6	6
		Nakhon Nayok	50	10	2	2
		Trat	84	10	0	0
Northern Thailand	> 1,000,000	Chiang Mai	600	25	49	13
		Chiang Rai	201	10	8	8
		Nakhon Sawan	138	10	10	10
	500,000 – 1,000,000	Kamphaeng Phet	79	10	4	4
		Sukhothai	76	10	1	1
		Phichit	61	10	7	7
	< 500,000	Nan	62	10	2	2
		Uttaradit	50	10	3	3
		Uthai Thani	32	10	2	2

Regions	Population sizes	Provinces	Number of non-accredited pharmacies	Number of selected non-accredited pharmacies	Number of accredited pharmacies	Number of selected accredited pharmacies
Northeastern Thailand	> 1,000,000	Nakhon Ratchasima	323	14	20	10
		Udon Thani	290	12	8	8
		Surin	133	10	5	5
	500,000 – 1,000,000	Kalasin	134	10	2	2
		Maha Sarakham	157	10	8	8
		Yasothon	72	10	2	2
	< 500,000	Bungkan	48	10	0	0
		Amnat Charoen	36	10	1	1
		Mukdahan	49	10	2	2
Southern Thailand	> 1,000,000	Nakhon Sithammarat	262	10	7	7
		Songkhla	376	15	43	16
		Surat Thani	651	26	27	10
	500,000 – 1,000,000	Narathiwat	72	10	6	6
		Yala	59	10	6	6
		Chumphon	86	10	2	2
	< 500,000	Phuket	705	30	35	12
		Satun	59	10	4	4
		Ranong	38	10	1	1
Total			11,769	652	761	348

2) Sampling method for the open online survey study

Convenience sampling was used to recruit participants. The link to the online questionnaire was posted on social network groups/pages which were relevant to community pharmacy in Thailand. The Thai researcher (SD) searched for relevant social network groups/pages on the internet (see section 6.3.5.2).

6.3.5 Data collection

6.3.5.1 Main (postal) survey

A pack containing the questionnaire, a cover letter and a return envelope, was posted to selected pharmacies. A QR code to link to the online questionnaire was provided on the first page of questionnaire as an option for the participant to complete the questionnaire online or to return the paper-based version, depending on the preference of the respondent (Dillman et al. 2014a; Hardigan et al. 2016). The first page also provided information to not complete the survey if they had completed either the paper or online version already.

A stamped envelope with the Thai researcher's name (SD) and university address in Thailand was posted with the questionnaire to make the return of the questionnaire more convenient and for the respondent not to have to purchase a stamp. This also encouraged respondents to complete the survey (Dillman et al. 2014a). The returned envelopes were coded to identify the pharmacy in order to know who has responded so no follow-up questionnaires were sent. The questionnaires and envelopes were divided upon receipt with the envelopes discarded. The questionnaires did not contain any code or data that could identify the respondents. To achieve a higher response rate, up to two reminders were sent to the selected pharmacies. For the first reminder, a pack of the reminder letter, the questionnaire and a stamped envelope with the Thai researcher's name and address was sent four weeks after sending the first questionnaire. Four weeks later, the second reminder was sent using a postcard. One month after sending the last reminder, the online survey link was closed. However, the date for receipt of any paper questionnaires was left open for another month. Figure 6-2 presents the timeline of the data collection.

The questionnaires returned by post to Ubon Ratchathani University were collected by the same person in the pilot study. The returned questionnaires were then scanned and sent to the researcher via email.

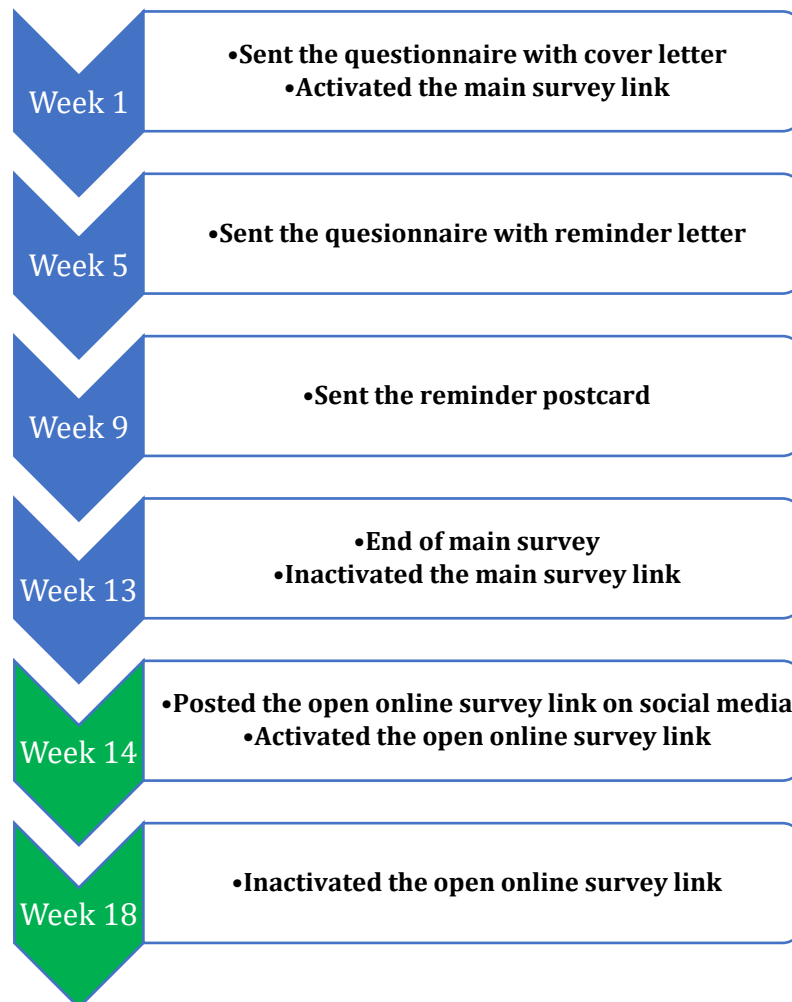


Figure 6-2 Data collection flowchart.

6.3.5.2 Open online survey

In order to reach participants, social networks relevant to community pharmacy in Thailand were identified. The Thai researcher (SD) contacted these channels via a social network contact and/or email to request their help to share the link of questionnaire on their social media or group of social networks that they were a member. The Thai researcher (SD) joined different social network groups relevant to community pharmacists such as Facebook and Line, either by requesting permission from the group's moderator (if the group was closed) or by adding the

group to their Facebook page (if the groups were 'open'). The researcher posted the brief survey information and the link to the questionnaire on these pages, requesting all those who were working as a community pharmacist either part time or full time and interested in participating to complete the questionnaire.

Although survey research conducted online cannot be viewed as representative of population at large, the method of recruitment aimed to make the research accessible to as broad a range of different sectors of the community present online as possible.

The link was posted after closing the main survey and was active for community pharmacists to complete for one month. The link was posted on social media again two weeks after the first post as the reminder.

6.3.6 Data analysis

6.3.6.1 Data entering and checking

Data completed online was directly exported from the BOS platform to IBM SPSS Statistics 25 as code responses. The data were also exported to Excel with un-coding. Ten percent of the exported data were cross-checked between SPSS and the Excel file to ensure accuracy of exported coded data. Data from the questionnaires returned by post was manually coded and entered into IBM SPSS for statistical analysis. Each response was assigned a numerical code to be entered into IBM SPSS the same way as was used to enter the data in the pilot study. The value range and extreme values were checked for each variable (Pallant 2016b). Then, ten percent of respondents' data were double-checked to make sure that the data were entered accurately and completely.

6.3.6.2 Quantitative data analysis

1) Descriptive statistical analysis

Descriptive statistics were calculated for all variables. These included counts and percentages for categorical variables, and medians and interquartile ranges for continuous variables. These were used to describe the pharmacies' and participants' demographic data and their views.

2) Willingness to supply inappropriate antibiotics assessment

Question 6 in the questionnaire (Appendix 16), presented case-scenarios related to three broad categories of conditions, namely, upper respiratory infection (URI), diarrhoea, and wounds. For each of the three conditions, three scenarios were developed, with only one of the three (one for each condition) definitely requiring an antibiotic to be supplied in accordance with Thai guidelines (RDU Pharmacy Eagle 2017; Thavornwattanayong et al. 2017). Responses to these case scenarios were used to assess the willingness to supply antibiotics by community pharmacists, in order to identify the factors influencing community pharmacists' willingness to supply antibiotics.

The willingness to supply inappropriate antibiotics, the dependent variable, was determined by using the two case scenarios that an antibiotic was less likely to be of benefit for each condition: scenario "a" and "b" for URI conditions, scenario "d" and "f" for diarrhoea conditions, and scenario "g" and "h" for wound conditions (Table 6-4). The participants were divided into two groups, less likely and more likely to supply inappropriate antibiotics, based on their responses for each case.

To determine the willingness to supply antibiotics, the respondents who did not recommend antibiotics for both scenarios for each condition (where antibiotic supply was not indicated) would be put in the "less likely to supply inappropriate antibiotics" group. On the other hand, the respondents who recommended antibiotics for at least one scenario of each condition would be put in the "more likely to supply inappropriate antibiotics" group. This variable will hereafter be called the SUPPLY variable.

Table 6-4 Case-based assessing pharmacists' practice score on antibiotic supply.

Scenarios	Antibiotics	Points
a. 6-year-old boy, weight 20 kg, presenting with a sore throat for 2 days accompanied by mild fever, productive cough with thick and coloured discharge. There are no other symptoms.	No	1
	Yes	0
b. 14-year-old girl presenting with sore throat for 2 days, accompanied by high grade fever, no cough, no runny nose or any other symptoms. She is not pregnant or breast-feeding and has are no other symptoms ^a	No	1
	Amoxicillin 500 mg twice daily for 10 days	1
c. 43-year-old man with a severe sore throat for 2 days accompanied by high grade fever, tender lymph nodes, pus on tonsils but no cough. There are no other symptoms	No	0
	Amoxicillin 500 mg twice daily for 10 days	1
d. 70 year-old-woman with watery stool 3 times within the last 12 hours, no fever and no other symptoms. There are no signs of dehydration.	No	1
	Yes	0
e. 30 year-old-woman with diarrhoea with blood visible in stools since yesterday evening, accompanied with high grade fever, and abdominal cramps. She is not pregnant or breast-feeding and has are no other symptoms.	No	0
	Norfloxacin 400 mg twice daily for 3 - 5 days, or Ciprofloxacin 500 mg twice daily for 3 days.	1
f. 3 year-old-boy, weight 15 kg, with watery stool 4 times within the last 10 hours accompanied by mild fever, nausea and mild abdominal pain. There is no sign of dehydration and there are no other symptoms.	No	1
	Yes	0
g. 35 year-old-man who had a motorcycle accident (about 15 minutes earlier) with many minor, superficial scratches on the left arm and left leg.	No	1
	Yes	0
h. 7-year-old-girl who has a fresh, thin, shallow cut wound on left index finger about 1 cm long, which happened about 30 minutes earlier.	No	1
	Yes	0
i. 50-year-old man who has a shallow wound on the right calf, about 1 cm in diameter. He had a cut wound by barbed wire about 4 days ago. The skin surrounding the wound has become red, swollen and sore, and with pus. The patient confirmed that he had a recent tetanus vaccination booster.	No	0
	Cloxacillin 250 - 500 mg 4 times daily, or Dicloxacillin 250 - 500 mg 4 times daily	1

^aSupplying antibiotics for this case is based on clinical judgement. See text for further explanation.

3) Practice score

The practice scores were calculated according to the appropriateness of recommended antibiotic treatments as supplied by community pharmacists. The scores were used as a dependent variable to identify factors influencing the appropriateness of antibiotics supply. The correct answers were identified according to the Rational Drug Use in community pharmacy, Thailand guideline (Thavornwattanyong et al. 2017). Correct answers, according to the guideline, were given a numerical value of "1". On the other hand, "0" was given for incorrect answers (Zahreddine et al. 2018) as shown in Table 6-4.

For cases where antibiotics were not recommended by the practice guidelines, scenarios "a", "d", "f", "g" and "h", the "No" response was given 1 point. At the same time, value of "1" was allocated to a correct antibiotic regimen response for scenarios "c", "e", and "i". as show in Table 6-4. Any incomplete recommended antibiotic regimens which were partially correct (e.g. missing duration of treatment) were classified as missing values. Scenario "b" was developed around a case of group A streptococcal (GAS) infection, 28 – 35 % chance, which antibiotics were not likely to be benefit. According to clinical practice guidelines, throat cultures or rapid antigen detection testing are required in order to diagnose for this case. Without a confirmation test, the practice guideline states that the decision whether or not to supply antibiotics is based on clinical judgement. Therefore, a value of "1" was allocated given to either a response of "No" or "Yes" as the correct antibiotic regimen. The practice score for each condition ranged between 0 and 3; and the total practice score ranged between 0 (reflecting poor practice) and 9 (reflecting good practice). The practice score will be used as a dependent variable in further analyses and will hereafter be called the PRACTICE variable.

- 4) Association analysis between demographic data (independent variables) and willingness to supply inappropriate antibiotics using the SUPPLY variable (dependent variable)

To examine the relationship between demographic data of community pharmacists and the willingness to supply inappropriate antibiotics using the SUPPLY variable, several statistics were used (Table 6-5). Firstly, bivariate analyses were performed to identify the factors that correlated with the willingness to supply inappropriate antibiotics using a Pearson's Chi-Square test or Fisher's exact test, when applicable, for categorical variables, and the Mann-Whitney U test for continuous variables (Pallant 2016c). Then, logistic regression was used to assess predictors of community pharmacists' practice scores (Pallant 2016d). The test will be carried out using variables that show significant *p*-values of less than 0.25 in the bivariate analysis in order to eliminate the potential confounders and to protect against residual confounding (Bursac et al. 2008; Roque et al. 2015; Zahreddine et al. 2018).

- 5) Association analysis between demographic data (independent variable) and community pharmacists' practice score using the PRACTICE variable (dependent variable)

Bivariate analyses were conducted to identify the factors that correlated with pharmacists' practice score (PRACTICE variable) using Pearson's correlation (for continuous variables) or Spearman's rank test (for categorical variables) (Pallant 2016d). Then, multiple linear regression was used to assess predictors of community pharmacists' practice score. Statistical significance was considered at a *p* value level less than 0.05 (Table 6-5).

Table 6-5 Statistical test using to identify the factors influencing the supply of antibiotics by community pharmacists.

Objectives	Dependent variable	Independent variable	Statistical test
To identify the demographic characteristics that correlated with the willingness to supply inappropriate antibiotics	SUPPLY variable	Gender, highest education, role of pharmacist, type of pharmacy, accreditation status of pharmacy, participating in antimicrobial stewardship programme (AMS), location of pharmacy, near competitive pharmacy, and near competitive non-pharmacy	Pearson's Chi-Square test
	SUPPLY variable	Age, length of experience	Mann-Whitney U
	SUPPLY variable	Variables that show significant <i>p</i> -values of less than 0.25 in the bivariate analysis.	Logistic regression
To identify the demographic characteristics that correlated with pharmacists' practice score	PRACTICE variable	Age, length of experience	Pearson's correlation test
	PRACTICE variable	Gender, highest education, role of pharmacist, type of pharmacy, accreditation status of pharmacy, participating in AMS, location of pharmacy, near competitive pharmacy, and near competitive non-pharmacy	Spearman's rank correlation
	PRACTICE variable	Variables that show significant <i>p</i> -values of less than 0.25 in the bivariate analysis.	Multiple linear regression
To examine the relationship between views of community pharmacists and willingness to supply inappropriate antibiotics	SUPPLY variable	The variables created as a result of factor analysis ^a	Logistic regression
To examine the relationship between views of community pharmacists and pharmacists' practice score	PRACTICE variable	The variables created as a result of factor analysis ^a	Multiple linear regression

^aFactor analysis was performed to reduce the eighteen statements of views to form a smaller number of constructs or factors which reflected underlying views. See text for further explanation.

6) Analysis of associations between community pharmacists' views (independent variable), and the willingness to supply antibiotics, using the SUPPLY variable, and the practice scores of community pharmacists using the PRACTICE variable.

Within the questionnaire, eighteen statements about antibiotic supply and AMR were included to obtain community pharmacists' views (Appendix 16, question 7). Factor analysis was performed to reduce the eighteen statements to form a smaller number of constructs or factors which reflected underlying views. All view statements were grouped into number of factors according the results of factor analysis, prior to using these new factors in regression analysis to identify factors influencing willingness to supply antibiotic and practice scores of community pharmacists (Pallant 2016d).

The score of each statement in each group of views as a result of factor analysis was summed. To ensure coherence under each factor, the scores of each negative statement was reversed.

Logistic regression is a technique to test models to predict categorical outcomes with two or more categories. In this study, logistic regression was used to test the effect of the groups of views on willingness to supply antibiotics of community pharmacists using the SUPPLY variable. Moreover, linear regression, a technique using to explore the relationship between a continuous dependent variable and a number of independent variables, was conducted to explore the group of views influencing the practice score of antibiotic supply by community pharmacists using the PRACTICE variable (Table 6-5) (Pallant 2016d).

6.3.6.3 Qualitative data analysis

Qualitative content analysis was used to analyze the open-ended written answers (Graneheim and Lundman 2004; Hsieh and Shannon 2005). Respondents' free text comments in Thai were analyzed iteratively and independently by SD. The researcher immersed themselves in the data by reading all the responses therefore familiarizing themselves with the data in order to obtain the sense of the whole data set. Then, the researcher read each participants' comments carefully,

highlighting text that appeared to discuss antibiotic use and AMR, and writing down keywords or phrases. Codes were derived from the keywords/phrases and similar codes grouped into sub-categories. Sub-categories were subsequently sorted and merged into categories. The tentative categories and all responses were translated into English by the Thai researcher (SD) and discussed between the supervisors (DNJ and MCW) to generate themes. Findings were discussed among the three researchers until a consensus was reached.

6.4 Results

Two-hundred-eleven community pharmacists out of the thousand pharmacists in the sample responded to the main survey, yielding a response rate of 21.1%. Ninety questionnaires were returned by post; two questionnaires were excluded because of the return of a blank questionnaire. One-hundred-twenty-one respondents in the sample completed the questionnaire online; one questionnaire was excluded as it had been completed by a non-pharmacist. For the open online survey, 112 surveys were completed. One questionnaire was excluded as it had been completed by a non-pharmacist. Therefore, the total number of valid responses was 320 (88 + 120 + 112) (Figure 6-3).

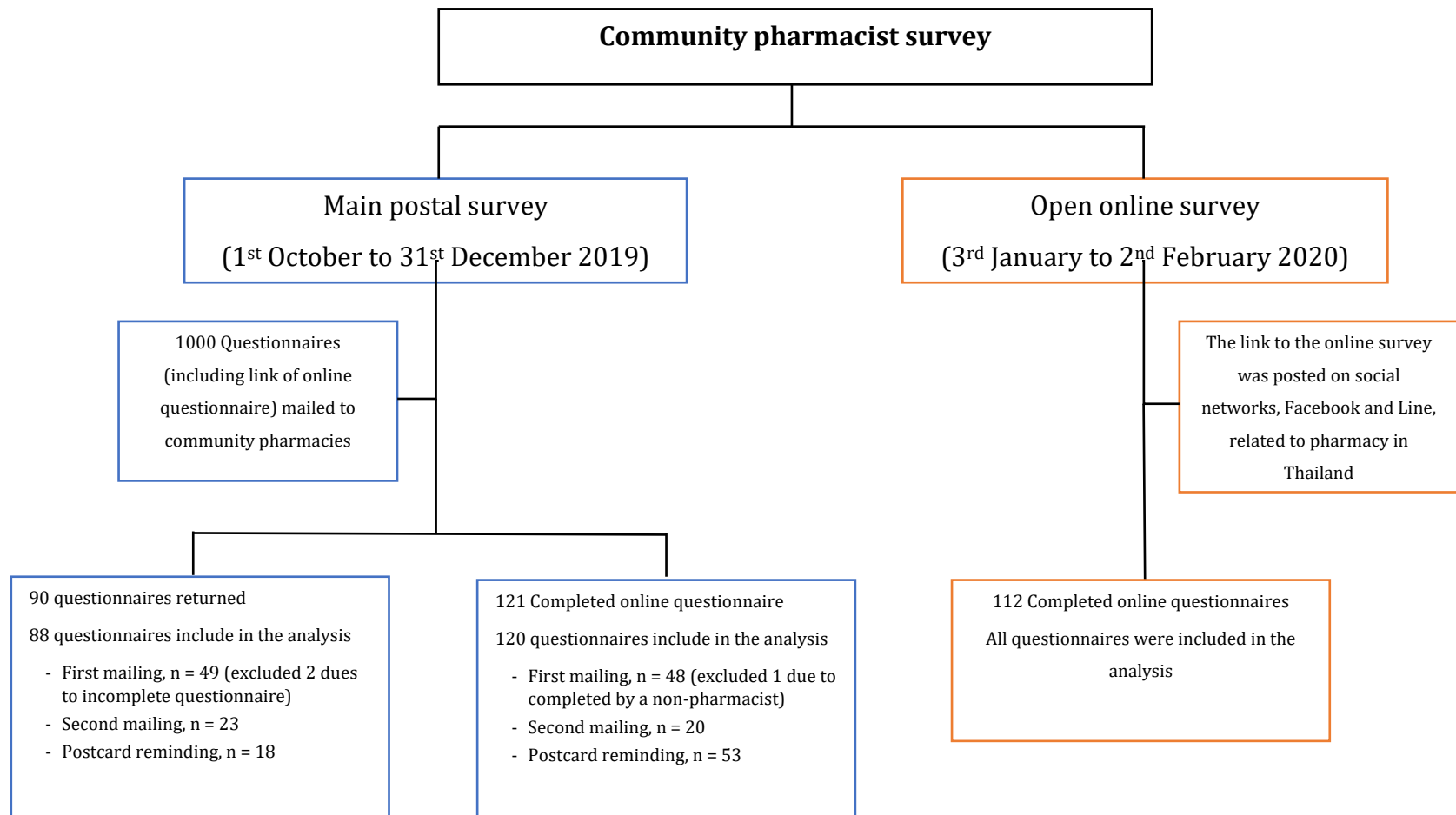


Figure 6-3 Flowchart of community pharmacist survey.

6.4.1 Justification to combine the survey data sets.

As the study consisted of two different methods of response using the same questionnaire, there were two data sets based on the survey (the main survey and the open online survey). The dependent variables, willingness to supply inappropriate antibiotics (SUPPLY) and practice score (PRACTICE), were not normally distributed. The data from both surveys were compared using nonparametric tests.

Since the response rate of main survey was low (21.1%), the homogeneity of variance and the difference between the demographic data of the two datasets were tested to see if the survey data from the two methods could be combined. Firstly, homogeneity of variance using the Kruskal-Wallis H test was used to determine if there were statistically significant differences between the two methods of responding to the survey with regards to the variance of community pharmacists' practice score of antibiotic supply (PRACTICE as the dependent variable). The findings showed no significant differences between URI practice score ($p=0.60$), diarrhoea practice score ($p=0.75$), wound practice score ($p=0.07$) and total practice score ($p=0.40$) (Table 6-6).

Table 6-6 Median and interquartile range of the practice score (PRACTICE) in the main and open online survey.

Practice scores	Median (IQR)		p value
	Main survey	Open online survey	
URI practice score	1.0 (1.0-2.0)	1.5 (1.0-2.0)	0.60
Diarrhoea practice score	3.0 (2.0-3.0)	2.5 (2.0-3.0)	0.75
Wound practice score	3.0 (2.0-3.0)	3.0 (2.0-3.0)	0.07
Total practice score	7.0 (5.0-7.8)	7.0 (6.0-8.0)	0.40

Secondly, a chi-square test was used to examine any differences in willingness to supply inappropriate antibiotics (SUPPLY as the dependent variable) between respondents from the main survey and the open online survey. The findings showed there was no significant difference between the two data sets regarding willingness to supply inappropriate antibiotics for URI, diarrhoea or wound cases (Table 6-7).

Table 6-7 Comparing the willingness to supply inappropriate antibiotics (using the SUPPLY variable) by community pharmacists.

	Number or participants (%)		χ^2 p-value
	Postal survey	Online survey	
URI cases			0.12
Less likely to supply inappropriate antibiotics	66 (31.7)	38 (33.9)	0.80
Likely to supply inappropriate antibiotics	140 (67.3)	74 (66.1)	
Diarrhoea cases			0.01
Less likely to supply inappropriate antibiotics	159 (76.4)	85 (75.9)	1.00
Likely to supply inappropriate antibiotics	49 (23.6)	23 (24.1)	
Wound cases			3.32
Less likely to supply inappropriate antibiotics	162 (77.9)	97 (86.6)	0.07
Likely to supply inappropriate antibiotics	45 (21.6)	15 (13.4)	

Finally, a chi-square test (for categorical variables) or a Mann-Whiney U test (for continuous variables) was used to test the difference between the two groups by looking at the demographic data. Some demographic data for the respondents showed a significant difference between the main survey and the open online survey, namely, type of pharmacy ($\chi^2= 5.31, p=0.02$), accreditation status of pharmacy ($\chi^2= 27.93, p<0.01$), location of pharmacy ($\chi^2= 56.05, p<0.01$) and location in terms of proximity to a non-pharmacy competitor ($\chi^2= 7.57, p<0.01$). However, these factors were found not to be significantly associated with ($p > 0.05$) or to have a weak correlation ($\rho < 0.2$) with community pharmacists' practice score to supply antibiotics (**Appendix 17**). Therefore, it was decided to combine the two data sets, main and open online survey, and to analyze the findings as one data set.

6.4.2 Demographic data of respondents

The respondents that participated in this study were from all four regions of Thailand, most of them were from Central Thailand. For a map of Thailand showing its regions please see Figure 1-1 in Chapter 1. The results are shown in Table 6-8.

About two thirds of the respondents were female (69.1%, N = 221/320). The majority of community pharmacists had a bachelor's degree in pharmacy as their

highest educational achievement (52.5%, N = 168/320), were an owner (55.3%, N = 115) and the majority worked in an independent pharmacy (68.4%, N = 219/319). In total, 150 responses (46.9%) were from pharmacists working in an accredited pharmacy. The age of the respondents ranged between 24 – 81 years old, and the number of years of experience in community pharmacy ranged from less than a year to 44 years. Most respondents (84.4%, N = 270/318) reported that there was a competitor pharmacy within 1000 meters distance of their pharmacy. One third of pharmacists (32.8%, N = 105/318) reported that there were non-pharmacies which supplied antibiotics within 1000 meters of their pharmacy.

Over 60% of pharmacies (64.4%, N = 206/317) had not participated in an antimicrobial stewardship campaign in Thailand. The reasons for not participating are presented in Table 6-9. Just over 40% of these pharmacists (N = 83/206) stated that they did not have enough time to participate in such campaigns. Never hearing about such campaigns was reported as a reason by 61 pharmacists (29.6%).

Table 6-8 Demographic data of the respondents.

Categories	Main survey, N (%) (N=208)	Open online survey, N (%) (N=112)	Combined survey, N (%) (N=320)
Age (years)			
Median (IQR)	33 (29.0-41.8)	34.5 (28.0-40.0)	34.0 (29.0-40.0)
Minimum	24	24.0	24
Maximum	81	63.0	81
Experience as community pharmacist (years)	(N=207)		(N=319)
Median (IQR)	6.0 (3.0-11.0)	5.0 (2.6-10.0)	6.0 (3.0-10.0)
Minimum	0.3	0.3	0.3
Maximum	44.0	34.0	44.0
Missing	1	-	1
Gender			
Male	64 (30.8)	35 (31.3%)	99 (30.9)
Female	144 (69.2)	77 (68.8%)	221 (69.1)
Highest education			
Bachelor's degree in Pharmacy	119 (57.2)	49 (43.8%)	168 (52.5)
Doctor of pharmacy (Pharm D.)	67 (32.2)	44 (39.3)	111 (34.7)
Post-graduation degree	22 (10.6)	19 (17.0%)	41 (12.8)
Role in a pharmacy			
Owner	115 (55.3)	63 (56.3%)	115 (55.3)
Employee	93 (44.7)	49 (43.7%)	93 (44.7)
Type of pharmacy			
Independent pharmacy	133 (63.9)	86 (76.8%)	219 (68.4)
Chain pharmacy	74 (35.6)	26 (23.2%)	100 (31.3)
Missing	1 (0.5)	-	1 (0.3)
Accreditation status			
No	88 (42.3)	82 (73.2%)	170 (53.1))
Yes	120 (57.7)	30 (26.8%)	150 (46.9)
Participation in an AMS campaign			
Yes	77 (37.0)	34 (30.4%)	111 (34.7)
No	128 (61.5)	78 (69.6%)	206 (64.4)
Missing	3 (1.4)	-	3 (0.9)
Location of Pharmacy			
Central	92 (44.2)	31 (27.7%)	123 (38.4)
Northern	39 (18.8)	7 (6.3%)	46 (14.4)
Northeastern	30 (14.4)	61 (54.5%)	91 (28.4)
Southern	40 (19.2)	13 (11.6%)	53 (16.6)
Missing	7 (3.4)	-	7 (2.2)
Near a competitor pharmacy			
Yes	178 (85.6)	92 (82.1%)	270 (84.4)
No	28 (13.5)	20 (17.9%)	48 (15.0)
Missing	2 (1.0)	-	2 (0.6)
Near a non-pharmacy competitor			
Yes	57 (27.4)	48 (42.9%)	105 (32.8)
No	149 (71.6)	64 (57.1%)	213 (66.6)
Missing	2 (1.0)	-	2 (0.6)

Table 6-9 Reasons to for not participating in an antimicrobial stewardship campaign.

Reasons	Number
I have never heard about such campaigns	61
I do not have enough time to participate	83
I was not interested in participating in the campaign	14
No incentive	8
Do not know how to take part with the campaign	13
It depends on the policy of the company/owner	18
Do not take part but follow the guideline of the campaign	5
Interested but have not participated	1
New pharmacy	2
Others: <ul style="list-style-type: none"> - Do not know that a pharmacy can take part - Pharmacy opening time less than 8hr - Many pharmacists working at a pharmacy - Never been invited to participate. 	5

6.4.3 Recommending antibiotics based on vignette questions.

Nine case-scenarios, comprising the three URI cases, the three diarrhoea cases, and the three wound cases were presented in the survey and participants were asked to indicate for each case if they would recommend antibiotics. About fifty percent (48.9% , 468 out of 918 instances) of treatment recommendations for the URI cases were inappropriate according to the guideline (RDU Pharmacy Eagle 2017; Thavornwattanayong et al. 2017). On the other hand, 11.4% and 12.3% of antibiotic recommendations for the diarrhoea and wound cases, respectively, were inappropriate (Table 6-10).

Even though the pharmacists were correct (according to the guideline) to recommend antibiotics for the required antibiotics cases, some of them suggested inappropriate antibiotic regimens. For case “a”, a child who was unlikely to have a GAS infection, antibiotics were not recommended by the practice guideline. However, 45.9% (N = 147) of community pharmacists incorrectly recommended antibiotics for this case. The most commonly suggested antibiotic was amoxicillin (N = 136/147). Others suggested antibiotics were azithromycin (N = 4/147), roxithromycin (N = 3/147), co-amoxiclav (N = 2/147), clarithromycin (N = 1/147), and erythromycin (N = 1/147).

Table 6-10 Recommendation to supply antibiotics based on case scenarios.

Case- scenarios	No N (%)	Yes N (%)	Missing
a. 6-year-old boy, weight 20 kg, presenting with a sore throat for 2 days accompanied by mild fever, productive cough with, thick and coloured discharge. There are no other symptoms ^a .	173 (54.1)	147 (45.9)	-
b. 14-year-old girl presenting with sore throat for 2 days, accompanied by high grade fever, no cough, no runny nose or any other symptoms. She is not pregnant or breast-feeding and has are no other symptoms ^b .	198 (61.9)	120 (37.5)	2 (0.6)
c. 43-year-old man with a severe sore throat for 2 days accompanied by high grade fever, tender lymph nodes, pus on tonsils but no cough. There are no other symptoms ^a .	2 (0.6)	318 (99.4)	-
d. 70 year-old-woman with watery stool 3 times within the last 12 hours, no fever and no other symptoms. There are no signs of dehydration ^a .	309 (96.6)	11 (3.4)	-
e. 30 year-old-woman with diarrhoea with blood visible in stools since yesterday evening, accompanied with high grade fever, and abdominal cramps. She is not pregnant or breast-feeding and has are no other symptoms.	32 (10.0)	288 (90.0)	-
f. 3 year-old-boy, weight 15 kg, with watery stool 4 times within the last 10 hours accompanied by mild fever, nausea and mild abdominal pain. There is no sign of dehydration and there are no other symptoms ^a .	247 (77.2)	73 (22.8)	-
g. 35 year-old-man who had a motorcycle accident (about 15 minutes earlier) with many minor, superficial scratches on the left arm and left leg ^a .	286 (89.4)	33 (10.3)	1 (0.3)
h. 7-year-old-girl who has a fresh, thin, shallow cut wound on left index finger about 1 cm long, which happened about 30 minutes earlier ^a .	281 (87.8)	38 (11.9)	1 (0.3)
i. 50-year-old man who has a shallow wound on the right calf, about 1 cm in diameter. He had a cut wound by barbed wire about 4 days ago. The skin surrounding the wound has become red, swollen and sore, and with pus. The patient confirmed that he had a recent tetanus vaccination booster.	10 (3.1)	310 (96.9)	-

^aAntibiotics were not recommended according to the guideline. ^bAntibiotics were recommended based on the judgement of a clinician.

In addition, 37.5 % (N = 120/318) of respondents suggested a young girl, case “b”, to have antibiotics, while antibiotics might likely be of benefit. Of 120 responses, 38 participants (31.67%) recommended correct antibiotic treatment as recommended by the practice guidelines, amoxicillin 500 mg twice daily for ten days. Other suggested antibiotics not along with guidelines, that are, roxithromycin (N = 8/120), azithromycin (N = 1/120), co-amoxiclav (N = 1/120), and co-trimoxazole (N = 1/120).

In the third URI case (case “c”), antibiotic treatment is likely to be benefit for a patient. In this case, 99.4% (N = 318) of pharmacists recommended antibiotics for the patient. Although, only 25.5% of community pharmacists suggested appropriate antibiotic treatment as recommended by the practice guidelines. Amoxicillin was the most common antibiotic suggestion by respondents. However, 140 pharmacists (44.0%) stated they would supply too high a dose of amoxicillin, 1500 - 2000 mg per day. About one third of participants (31.1%, N =99/318) recommended a sub-optimal duration of amoxicillin treatment, mostly five to seven days instead of the recommended 10 days. The most common inappropriate choice of antibiotic recommended was co-amoxiclav (19.2%, N =61/318). Inappropriately recommended antibiotic treatments suggested by community pharmacists for case “c” are presented in Table 6-11.

Of the diarrhoea cases, antibiotics were not required for case “d”. In total, 96.6% of respondents (N = 309) did not recommended antibiotics for this patient. Antibiotics recommended inappropriately were norfloxacin (N = 9/11), ciprofloxacin (N = 1/11), and tetracycline (N = 1/11).

The boy in case “f” was likely to have had a viral infection resulting in diarrhoea for which antibiotics were not required. In total, 22.8% of pharmacists (N = 73) recommended antibiotics for this patient, which were co-trimoxazole (N = 22/69), nifuroxazide (N = 18/69), Norfloxacin (N = 11/69), azithromycin (N = 6/69), furazolidone (N = 4/69), amoxicillin (N = 3/69), cefixime (N = 3/69), and cefdinir (N = 2/69). Three pharmacists recommended a referral of this patient to a doctor. For case “e”, the patient was likely to have shigellosis. Ninety percent of pharmacists (N = 288) recommended antibiotic treatment for this patient. Most of them (72.6%, N = 209) recommended an appropriate antibiotic treatment for shigellosis, ciprofloxacin 500 mg BID 3 days (2.4%, N = 7) or norfloxacin 400 mg BID 3-5 days (70.1 %, N = 202). In terms of inappropriate recommendations, supplying antibiotics for longer than the recommended duration of treatment was the most common recommendation (13.3%, N = 38). Six respondents would refer the patient to consult a doctor (2.1%). Inappropriate recommended antibiotic treatments for the case are presented in Table 6-11.

Table 6-11 Appropriateness of antibiotic treatment recommended by community pharmacists.

Inappropriateness of supplying antibiotics	Recommended antibiotic treatment	Number (%)
Group A streptococcal (GAS) infections case, case "c" (N = 318)		
Inappropriate drug choice	Co-amoxiclav	61 (19.2)
	Penicillin	1 (0.3)
	Dicloxacillin	2 (0.6)
	Cephalexin	1 (0.3)
	Roxithromycin,	7 (2.2)
	Azithromycin	7 (2.2)
	Clarithromycin	1 (0.3)
	Co-trimoxazole	1 (0.3)
Too low dose	Amoxicillin less than 1000 mg per day	2 (0.6)
Too high dose	Amoxicillin more than 1000 mg per day	140 (44.0)
Improper dosing interval	Amoxicillin three of four time daily	97 (30.5)
Improper duration of treatment	Treatment time less than 10 days	99 (31.1)
Shigellosis case, case "e" (N = 288)		
Inappropriate drug choice	Metronidazole	18 (6.3)
	Ofloxacin	5 (1.7)
	Cefixime	2 (0.7)
	Cefdinir	1 (0.3)
	Cotrimoxazole	1 (0.3)
	Metronidazole plus norfloxacin	1 (0.3)
Too low dose	Ciprofloxacin 250 mg twice daily	1 (0.3)
Too high dose	Norfloxacin 800 mg twice daily	1 (0.3)
Improper duration of treatment	Ciprofloxacin for 5-10 days	20 (7.0)
	Norfloxacin for 7-10 days	18 (6.3)
Improper duration of treatment	Norfloxacin less than 3 days	1 (0.3)
Superficial skin infection wound, case "i" (N = 310)		
Inappropriate drug choice	Amoxicillin	2 (0.6)
	Ampicillin	1 (0.3)
	Co-amoxiclav	18 (5.8)
	Cephalexin	5 (1.6)
	Clindamycin	5 (1.6)
	Metronidazole	1 (0.3)
Improper dosing interval	Cloxacillin two or three time daily,	4 (1.3)
	Dicloxacillin three time daily	13 (4.2)

Thirty-three respondents (10.3%, N = 33) recommended antibiotic treatment for case “g” where antibiotics were not required. Antibiotics suggested for this case included dicloxacillin (N = 22/33), cloxacillin (N = 2/33), amoxicillin (N = 2/33), topical fusidic acid (N = 2/33), topical gentamicin (N = 2/33), topical mupirocin (N = 1/33), and povidone iodine (N = 1/33).

For case “h”, 87.8% of participants (N = 281/319) did not recommend antibiotic treatment for a girl, which was the appropriate response. Antibiotics suggested for this case were dicloxacillin (N = 16/38), cloxacillin (N = 7/38), amoxicillin (N = 1/38), co-amoxiclav (N = 2/38), cephalexin (N = 2/38), topical gentamicin (N = 2/38), topical fusidic acid (N = 1/38), and povidone iodine (N = 2/38).

Almost all pharmacists (96.9%, N = 310) recommended antibiotics for the infected wound patient scenario, case “i”. Most pharmacists (84.2%, N = 261) suggested the correct antibiotic treatment as cloxacillin 500 mg four times daily (2.6%, N = 8/310), or dicloxacillin 250 – 500 mg four times daily (81.6%, N = 253/310). Inappropriate antibiotic treatments are shown in Table 6-11.

6.4.4 Willingness to supply inappropriate antibiotics.

Respondents were more likely to supply inappropriate antibiotics to patients in cases with URI (66.9%, N = 214) compared to those with diarrhoea (23.8%, N = 76) and also with those with wounds (18.8%, N = 60). The results are shown in Table 6-12.

Table 6-12 Willingness to supplying antibiotics by community pharmacists.

	Number of participants (%)		
	URI cases	Diarrhoea cases	Wound cases
Less likely to supply inappropriate antibiotics	104 (32.5)	244 (76.3)	259 (80.9)
More likely to supply inappropriate antibiotics	214 (66.9)	76 (23.8)	60 (18.8)
Missing	2 (0.6)	-	1 (0.3)

6.4.5 Practice score on antibiotic supply.

The practice score for URI-cases (PRACTICE variable) was low compared to the practice score for antibiotic supply for diarrhea and for wound cases (Table 6-13).

Forty percent (40.3%, N = 129) scored 1/3 points on the practice score of URI cases. Most pharmacists recommended appropriate antibiotic treatment for diarrhoea cases and for wound cases. About half of participants (51.2%, N = 164) scored 3/3 points on the practice score for diarrhoea cases. Similarly, 67.55% (N = 216) of participants scored 3/3 points on the practice score for wound cases.

Table 6-13 Practice score on antibiotic supplying of community pharmacists.

	Practice score
Total practice score for URI cases	N=318
Median (IQR)	1.0 (1.0-2.0)
Minimum	0.0
Maximum	3.0
Total practice score for diarrhoea cases	N=319
Median (IQR)	3.0 (2.0-3.0)
Minimum	0.0
Maximum	3.0
Total practice score for wound cases	N=318
Median (IQR)	3.0 (2.0-3.0)
Minimum	0.0
Maximum	3.0
Total practice score	N=316
Median (IQR)	7.0 (6.0-8.0)
Minimum	1.0
Maximum	9.0

6.4.6 Association between demographic data and the willingness to supply inappropriate antibiotics.

A Mann-Whitney U test was performed to test the relationship between age or length of experience in community pharmacies and willingness to supply inappropriate antibiotics (SUPPLY). No significant correlation was found between either of these two variables for all three conditions (Table 6-14).

Table 6-14 Mann-Whitney U analysis for determining the demographic data correlated to the willingness to supply antibiotics.

	URI cases		Diarrhoea cases		Wound cases	
	Man-Whitney U	<i>p</i> value	Man-Whitney U	<i>p</i> value	Man-Whitney U	<i>p</i> value
Age	10581.0	0.35	8016.5	0.07	7148.5	0.33
Length of experience	10402.5	0.48	8362.0	0.21	7270.5	0.48

In addition, a Chi square test was conducted to identify differences between other demographic data and willingness to supply inappropriate antibiotics (Table 6-15). None of the demographic factors were found to be significantly related to a respondents' willingness to supply inappropriate antibiotics for URI cases ($p > 0.05$).

For the diarrhoea cases, the role of the community pharmacist and the type of pharmacy were found to be significantly differently in terms of willingness to supply. Community pharmacists who were an owner of a pharmacy were more likely to supply antibiotics for the diarrhoea cases than employees ($p = 0.04$), as were community pharmacists who worked in independent pharmacies (when compared with those working for a chain) ($p = 0.03$, Table 6-15).

Only gender was found to be significant ($p < 0.01$, Table 6-15) between those less likely and more likely to supply inappropriate antibiotics for wound cases, with male pharmacists more likely to supply inappropriate antibiotics for wound cases (27.3%, $N = 27/99$) compared to female pharmacists (15.0%, $N = 33/187$).

The factors that were found different between the two groups at p value less than 0.025 from bivariate analysis were included in a logistic regression to identify the factors that could predict the willingness to supply antibiotics by community pharmacists (using the SUPPLY variable). There was a high correlation between age and length of experience ($r = 0.86$, $p < 0.01$) and the role of the pharmacist at the pharmacy and type of pharmacy ($\rho = 0.71$, $p < 0.01$). To avoid multicollinearity, age and length of experience would not both be included in the logistic analysis at the same time. Similarly, role of the pharmacist at a pharmacy and the type of pharmacy would not both be put in the same logistic regression model.

Table 6-15 Association between demographic data and willingness to supply inappropriate antibiotics.

Demographic data	URI case-based			Diarrhoea case-based			Wound case-based		
	Less likely to supply	Likely to supply	χ^2	Less likely to supply	Likely to supply	χ^2 (p value)	Less likely to supply	Likely to supply	χ^2
Gender			1.93			0.50			6.73
Male	27 (27.3)	72 (72.7)	(p=0.17)	73 (73.7)	26 (26.3)	(p=0.48)	72 (72.7)	27 (27.3)	(p<0.01)
Female	77 (35.2)	142 (64.8)		171 (77.4)	50 (22.6)		187 (85.0)	33 (15.0)	
Education			0.49			0.43			3.07
BPharm	57 (34.3)	109 (65.7)	(p=0.78)	126 (75.0)	42 (25.0)	(p=0.81)	131 (78.4)	36 (21.6)	(p=0.22)
PharmD	35 (31.5)	76 (68.5)		87 (78.4)	24 (21.6)		91 (82.0)	20 (18.0)	
Higher education	12 (29.3)	29 (70.7)		31 (75.6)	10 (24.4)		37 (90.2)	3 (9.8)	
Role of pharmacist			0.98			4.17			0.04
Owner	62 (35.0)	115 (65.0)	(p=0.32)	128 (71.9)	50 (28.1)	(p=0.04)	143 (80.8)	34 (19.2)	(p=0.84)
Employee	42 (29.8)	99 (70.2)		116 (81.7)	26 (18.3)		116 (81.7)	26 (18.3)	
Type of pharmacy			1.53			4.57			0.46
Independent	76 (35.0)	141 (65.0)	(p=0.22)	160 (73.1)	59 (26.9)	(p=0.03)	180 (82.2)	39 (17.8)	(p=0.50)
Chain	28 (28.0)	72 (72.0)		84 (84.0)	16 (16.0)		79 (79.0)	21 (21.0)	
Accreditation status			0.61			2.19			0.34
No	52 (30.8)	117 (69.2)	(p=0.43)	124 (72.9)	46 (27.1)	(p=0.14)	136 (80.0)	34 (20.0)	(p=0.56)
Yes	52 (34.9)	97 (65.1)		120 (80.0)	30 (20.0)		123 (82.6)	26 (17.4)	
Participating in AMS			0.18			<0.01			0.09
Yes	38 (34.2)	73 (65.8)	(p=0.67)	85 (76.6)	26 (23.4)	(p=0.98)	91 (82.0)	20 (18.0)	(p=0.76)
No	65 (31.9)	139 (68.1)		158 (76.7)	48 (23.3)		166 (80.6)	40 (19.4)	
Location			2.01			0.58			6.90
Central	40 (32.5)	83 (67.5)	(p=0.57)	95 (77.2)	28 (22.8)	(p=0.90)	96 (78.7)	26 (21.3)	(p=0.08)
Northern	11 (25.0)	33 (75.0)		37 (80.4)	9 (19.6)		42 (91.3)	4 (8.7)	
Northeastern	32 (35.2)	59 (64.8)		68 (74.7)	23 (25.3)		78 (85.7)	13 (14.3)	
Southern	20 (37.7)	33 (62.3)		41 (77.4)	12 (22.6)		39 (73.6)	14 (26.4)	
Near competitive pharmacy			0.82			0.98			0.59
No	18 (38.3)	29 (61.7)	(p=0.37)	34 (70.8)	14 (29.2)	(p=0.32)	40 (85.1)	7 (14.9)	(p=0.44)
Yes	85 (31.6)	184 (68.4)		209 (77.4)	61 (22.6)		217 (80.4)	53 (19.6)	
Near competitive non-pharmacy			0.50			0.12			0.33
No	66 (31.3)	145 (68.7)	(p=0.48)	164 (77.0)	49 (23.0)	(p=0.73)	170 (80.2)	42 (19.8)	(p=0.57)
Yes	37 (35.2)	68 (64.8)		79 (75.2)	26 (24.8)		87 (82.9)	18 (17.1)	

As mentioned above, gender and type of pharmacists were included in the logistic regression to identify if it was possible to predict the willingness to supply inappropriate antibiotics by community pharmacists. Neither of these were found to be significant predictors of willingness to supply inappropriate antibiotics for URI cases (Table 6-16) according to the logistic regression analysis.

Again, age of pharmacist, role of pharmacist, and accreditation status of pharmacy were included in logistic regression analyses to identify the factors that predict the willingness to supply inappropriate antibiotics for diarrhoea cases. None of these three factors were found to significantly predict the willingness to supply antibiotics for diarrhoea cases (Table 6-16).

Lastly, gender, highest education level and location of pharmacy were included in logistic analysis for willingness to supply inappropriate antibiotics for wound cases. The results showed that females were less likely to supply inappropriate antibiotics for wound cases than men ($B = -0.77, p = 0.01$, Table 6-16).

As reported in section 6.4.1, type of pharmacy, accreditation status and location of pharmacy, and a nearby competitor pharmacy were found to be significantly different between the main survey and open online survey. Therefore, a logistic regression was conducted separately for the two surveys. The results found none of the demographic data were a significant influence to supply inappropriate antibiotics for URI, diarrhea or for wound cases.

Table 6-16 Logistic regression predicting likelihood of factors reporting the willingness to supply inappropriate antibiotics.

	B	p	Odds ratio	95 % C.I.	
				Lower	Upper
Willingness to supply inappropriate antibiotics for URI cases					
Gender					
Male	1				
Female	-0.40	0.14	0.67	0.40	1.13
Type of pharmacy					
Independent pharmacy	1				
Chain pharmacy	0.35	0.18	1.42	0.85	2.40
Willingness to supply inappropriate antibiotics for diarrhoea cases					
Age	0.12	.391	1.012	.985	1.040
Role of pharmacist					
Owner					
Employee	-0.36	0.27	0.70	0.37	1.32
Accreditation					
No	1				
Yes	-0.29	0.32	0.75	0.42	1.33
Willingness to supply inappropriate antibiotics for wound cases					
Gender					
Male	1				
Female	-0.77	0.01	0.46	0.25	0.84
Highest education					
Bpharm	1				
Pharm D.	-0.31	0.34	0.73	0.39	1.39
Higher education	-0.69	0.23	0.53	0.16	1.55
Location					
Central	1				
Northern	-0.97	0.09	0.38	0.12	1.17
Northeastern	-0.43	0.26	0.65	0.31	1.37
Southern	0.30	0.44	1.35	0.63	2.90

6.4.7 Association between demographic data and community pharmacists' practice score of antibiotic supplying

Bivariate correlations were undertaken to identify the demographic data that may be correlated with the practice score for antibiotic supply (PRACTICE). The results are presented in (Table 6-17). As can be seen, age and length of experience were found significantly correlated to the practice score on antibiotic supply. The findings showed that practice scores were increased (e.g. more appropriate supply) when the pharmacists' age or length of experience were decreased.

Gender was found to be correlated with the practice score of antibiotic supply for only wound cases ($p = 0.01$) with no correlation with other conditions or the total practice score.

The education level of pharmacists was found to correlate with the practice score of antibiotic supply for URI cases and the total practice score (all three conditions combined). Pharmacists who graduated from a Pharm D. programme were found to have a higher practice score than those who graduated with a BPharm and post graduate degree ($p < 0.05$).

The role of the pharmacist and type of community pharmacy was significantly correlated to practice score on antibiotic supply for URI cases, diarrhoea cases and total practice score. Pharmacists who were an employee or worked in a chain pharmacy were seen to have higher practice scores for the URI cases, diarrhoea cases and for the total practice score (Table 6-17).

Multiple linear regression was conducted to identify the factors that were predictors for the practice score for antibiotic supply. However, almost all of the correlations between the demographic data and practice score were less than 0.3. Therefore, linear regression was not appropriate to analyse the data set. Although, a linear regression was performed to confirm this. The results showed that the regression models explained less than ten percent of the variation in practice score. Therefore, these linear regression models are not reported.

Table 6-17 Bivariate correlation between demographic data and practice score on antibiotic supplying among community pharmacists.

Categories	URI score	Diarrhoea score	Wound score	Total practice score
Age ^a				
Correlation	-0.25	-0.22	-0.15	-0.32
<i>p value</i>	<0.01	<0.01	<0.01	<0.01
Length of experience ^a				
Correlation	-0.21	-0.18	-0.14	-0.26
<i>p value</i>	<0.01	<0.01	0.01	<0.01
Gender ^b				
correlation	0.01	0.06	0.21	0.11
<i>p value</i>	0.88	0.26	<0.01	0.06
Education ^b				
Correlation	0.13	0.11	0.10	-0.18
<i>p value</i>	0.02	0.06	0.09	<0.01
Role of pharmacist ^b				
Correlation	-0.17	-0.15	0.04	-0.17
<i>p value</i>	<0.01	<0.01	0.44	<0.01
Type of pharmacy ^b				
Correlation	0.17	0.15	0.01	0.17
<i>p value</i>	<0.01	<0.01	0.87	<0.01
Accreditation status ^b				
Correlation	0.10	0.10	-0.03	0.09
<i>p value</i>	0.09	0.08	0.59	0.11
Participation in AMS ^b				
Correlation	-0.08	-0.03	0.05	-0.06
<i>p value</i>	0.16	0.60	0.41	0.27
Pharmacy location				
Correlation	-0.01	0.08	0.05	0.06
<i>p value</i>	0.92	0.17	0.42	0.33
Near competitive pharmacy ^b				
Correlation	-0.02	-0.08	-0.01	-0.07
<i>p value</i>	0.69	0.15	0.91	0.22
Near competitive non-pharmacy ^b				
Correlation	-0.02	-0.03	0.01	-0.06
<i>p value</i>	0.77	0.60	0.84	0.27

^a Pearson's correlation test, ^b Spearman' rank test

6.4.8 Views of community pharmacists toward antibiotic supply and AMR

The community pharmacists' views about antibiotic supply and AMR problems in Thailand are presented in Table 6-18. The order of the statements in the table was not the same as the order in the questionnaire (Appendix 16). Pairs of positive and negative statements were not adjacent in the actual survey. The words in bold and underlined in the statements in the table were also used in the actual questionnaire, to highlight these words to study participants.

Table 6-18 Views of community pharmacists toward antibiotic supply and antimicrobial resistance.

Statements	Participant's response, n (%)					Median (IQR)
	1	2	3	4	5	
a. Antibiotic resistance is an important problem in the hospital setting but not a problem in the community. (N=319)	226 (70.8)	77 (24.1)	1 (0.3)	6 (1.9)	9 (2.8)	1.0 (1.0-2.0)
b. Antibiotic resistance is an important problem in the community setting. (N=319)	18 (5.6)	15 (4.7)	13 (4.1)	90 (28.2)	183 (57.4)	5.0 (4.0-5.0)
c. Antibiotic resistance resulting from the supply of antibiotics from community pharmacies is not a significant problem. (N=319)	166 (52.0)	120 (37.6)	17 (5.3)	12 (3.8)	4 (1.3)	1.0 (1.0-2.0)
d. The ease of availability of antibiotics from community pharmacies contributes to the problem of antibiotic resistance in Thailand. (N=319)	35 (11.0)	51 (16.0)	37 (11.6)	108 (33.9)	88 (27.6)	4.0 (2.0-5.0)
e. Community pharmacists have an important role to play to reduce the problem of antibiotic resistance. (N=319)	8 (2.5)	7 (2.2)	18 (5.6)	95 (29.8)	191 (59.9)	5.0 (4.0-5.0)
f. Antibiotics cure a patient with diarrhoea more quickly than not having an antibiotic, so they can return to work sooner.	137 (42.8)	122 (38.1)	24 (7.5)	27 (8.4)	10 (3.1)	2.0 (1.0-2.0)
g. Antibiotics cure a patient with a sore throat more quickly than not having an antibiotic, so they can return to work sooner.	119 (37.2)	124 (38.8)	35 (10.9)	31 (9.7)	11 (3.4)	2.0 (1.0-2.0)
h. If I am unsure whether or not a patient has a bacterial infection, I will supply an antibiotic just in case it is. (N=319)	99 (31.0)	146 (45.8)	51 (16.0)	18 (5.6)	5 (1.6)	2.0 (1.0-2.0)
i. It is important for pharmacists to only supply antibiotics when clinically needed, and not be driven by commercial pressures.	7 (2.2)	19 (5.9)	32 (10.0)	109 (34.1)	153 (47.8)	4.0 (4.0-5.0)
j. If I am in doubt which antibiotic is best for a patient, I will supply a newer one, just in case. (N=319)	161 (50.5)	122 (38.2)	21 (6.6)	13 (4.1)	2 (0.6)	1.0 (1.0-2.0)

Statements	Participant's response, n (%)					Median (IQR)
	1	2	3	4	5	
k. I supply antibiotics only if I am certain that a patient has a bacterial infection. (N=316)	4 (1.3)	12 (3.8)	25 (7.9)	134 (42.4)	141 (44.6)	4.0 (4.0-5.0)
l. In cases where patients have no drug allergy history and no contraindication, I will supply a first line antibiotic as recommended in practice guidelines.	15 (4.7)	7 (2.2)	12 (3.8)	107 (33.4)	179 (55.9)	5.0 (4.0-5.0)
m. I supply antibiotics when patients request them specifically because if I don't supply them, they will just go to another pharmacy. (N=319)	89 (27.8)	119 (37.2)	59 (18.4)	39 (12.2)	13 (4.1)	2.0 (1.0-3.0)
n. When the pharmacy is busy, I am more likely to supply antibiotics if a customer asks specifically for an antibiotic, compared to when the pharmacy is quiet. (N=319)	127 (39.8)	144 (45.1)	26 (8.2)	16 (5.0)	6 (1.9)	2.0 (1.0-2.0)
o. I am happy to supply an antibiotic without further questioning if a patient request one by name. (N=319)	158 (49.5)	119 (37.3)	24 (7.5)	13 (4.1)	5 (1.6)	2.0 (1.0-2.0)
p. It is important to supply a full course of antibiotics to a patient at the time, even when the patient says it is too expensive. (N=319)	5 (1.6)	16 (5.0)	13 (4.1)	113 (35.4)	172 (53.9)	5.0 (4.0-5.0)
q. If a patient cannot afford a full course of antibiotics all in one go, I will give them a smaller amount they are able to afford at that time, even when a longer duration of treatment is required.	56 (17.5)	79 (24.7)	64 (20.0)	106 (33.1)	15 (4.7)	3.0 (2.0-4.0)
r. It is good practice for patients to keep a supply of antibiotics at home in case they need them.	213 (66.6)	70 (21.9)	20 (6.3)	10 (3.1)	7 (2.2)	1.0 (1.0-2.0)

1 Strongly disagree, 2 Disagree, 3 Neutral, 4 Agree, 5 Strongly agree.

Almost all pharmacists (94.9%, N = 303/319) did not agree that antibiotic resistance was only a problem in the hospital setting (statement "a"). Likewise, most of respondents (85.6%, N = 273/319) agreed that AMR was an important problem in the community in Thailand (statement "b"). Almost ninety percent of pharmacists (89.6%, N = 286/319) did not think that antibiotic resistance from the supply from community pharmacies was not an important problem (statement "c"). However, just over sixty percent of respondents (61.5%, N = 196/319) agreed that the ease of availability of antibiotics from community pharmacies contributed to the antibiotic resistance problem in Thailand (statement "d"). Furthermore, 89.7% of pharmacists (N = 286/319) believed that community pharmacists could play an important role in reducing antibiotic resistance (statement "e").

With respect to the advantages of antibiotics (statements “f” and “g”), most pharmacists did not agree that antibiotics could cure a patient with diarrhoea or sore throat more quickly, 80.9% (N = 259/320) and 76.0% (N = 243/320), respectively.

Participants were asked about factors influencing their decision to supply antibiotics. The results showed that most pharmacists thought antibiotics should be supplied when it is certain to be a bacterial infection (statement “k”), and only first choice antibiotics should be supplied unless there is a contraindication for that antibiotic (statement “l”). Antibiotics should not be supplied just in case (statement “h”), 76.8% (N = 245/319) or under commercial pressure (statement “i”), 81.9% (N = 262/320) as reported by most of respondents. Sixty five percent of pharmacists (N = 208/319) did not agree that they supplied antibiotics when patients requested them because if they did not, patients will just go to another pharmacy (statement “m”).

Most respondents (88.7%, N = 283/319) did not agree to supply newer antibiotics when in doubt which antibiotic was the best (statement “g”). In addition, over eighty percent of respondents reported that pharmacists should not supply antibiotics for patients who requested them just to reduce customers’ waiting time (statement “n”), 84.9% (N = 271) or because of a patient requested them by name (statement “o”), 86.8% (N = 277/319).

Almost ninety percent of respondent (89.3%, N = 285/319) agreed that supplying a full course of antibiotics is important (statement “p”). Although, 37.8% (N = 121/320) reported they would supply smaller amounts of antibiotics rather than the full course if a patient could not afford the course (statement “q”). Lastly, 88.5% of participants (N = 283/320) did not agree that patients should keep a supply of antibiotics at home.

6.4.9 Factor analysis for views of community pharmacists on antibiotic supplying and AMR

Factor analysis was conducted to reduce community pharmacists’ responses to the 18 statements on antibiotic supply and AMR (Table 6-18) by grouping the

statements which reflect an underlying construct together under one factor. As a result, all statements relating to pharmacists' views would be grouped into a number of factors using factor analysis. To perform principal component analysis, firstly, factorability of the 18 statements about community pharmacists' views was examined. It was observed that

Eleven of the 18 items correlated at least 0.3 with at least one other item, suggesting reasonable factorability. Secondly, the Kaiser-Meyer-Olkin measure of sampling adequacy was 0.78, above the commonly recommended value of 0.6. Bartlett's test of sphericity significantly indicated that the items are related, and a factor analysis may be useful with the data ($\chi^2 (153) = 992.67, p < 0.01$). Finally, the communalities were all above 0.3, further confirming that each item shared some common variance with other items. Given these overall indicators, factor analysis was deemed to be suitable with all 18 items.

A five-factor solution which explained 51.5% of the variance was identified. However, this solution was not chosen because one of the factors consisted of only one statement. Ideally, three or more items loading (e.g. scoring highly) on each factor is optimal. Therefore, the five-factor solution was not suitable.

Then, solutions for four factors using all 18 items was examined using oblimin rotations of the factor loading matrix. However, two items were found with communalities less than 0.3. Therefore, only 16 items were used to run the factor analysis. The Kaiser-Meyer-Olkin measure of sampling adequacy for 16 items was 0.78, Bartlett's test of sphericity was significant ($\chi^2 (153) = 874.29, p < 0.01$), and the communalities were all above 0.3, which confirmed that factor analysis could be performed. The four-factor solution included all 16 statements and explained 49.6% of the variance. This provided the best-defined factor structure, with all items having a factor loading of 0.4 or above (Table 6-19).

The statements under each factor were examined to see what concept could describe all statements in common. All three statements under factor 1 described the need to satisfy customer. While, statements 4 to 9 under factor 2 related to supplying antibiotics appropriately. The three statements under factor 3 related

to concerns about AMR by community pharmacists. Finally, all four statements under factor 4 described perceptions of community pharmacists toward advantages of antibiotics.

Table 6-19 Factor loadings and communalities based on a principal components analysis from community pharmacists' views toward antibiotic supplying and AMR.

	Factor 1	Factor 2	Factor 3	Factor 4
1. I supply antibiotics when patients request them specifically because if I don't supply them, they will just go to another pharmacy.	0.65			
2. When the pharmacy is busy, I am more likely to supply antibiotics if a customer asks specifically for an antibiotic, compared to when the pharmacy is quiet.	0.69			
3. I am happy to supply an antibiotic without further questioning if a patient request one by name.	0.76			
4. It is important for pharmacists to only supply antibiotics when clinically needed, and not be driven by commercial pressures.		0.63		
5. It is important to supply a full course of antibiotics to a patient at the time, even when the patient says it is too expensive.		0.67		
6. Antibiotic resistance is an important problem in the community setting.		0.54		
7. I supply antibiotics only if I am certain that a patient has a bacterial infection.		0.54		
8. Community pharmacists have an important role to play to reduce the problem of antibiotic resistance.		0.58		
9. In cases where patients have no drug allergy history and no contraindication, I will supply a first line antibiotic as recommended in practice guidelines.		0.54		
10 Antibiotic resistance is an important problem in the hospital setting but not a problem in the community.			0.67	
11. The ease of availability of antibiotics from community pharmacies contributes to the problem of antibiotic resistance in Thailand.	0.34		-0.50	
12. Antibiotic resistance resulting from the supply of antibiotics from community pharmacies is not a significant problem.			0.69	
13. Antibiotics cure a patient with a sore throat more quickly than not having an antibiotic, so they can return to work sooner.				-0.79
14. If I am unsure whether or not a patient has a bacterial infection, I will supply an antibiotic just in case it is.				-0.61
15. If I am in doubt which antibiotic is best for a patient, I will supply a newer one, just in case.				-0.43
16. Antibiotics cure a patient with diarrhoea more quickly than not having an antibiotic, so they can return to work sooner.				-0.79

6.4.10 Associations between community pharmacists' views and the willingness to supply inappropriate antibiotics by community pharmacists.

The four factor-groups were used to analyse the relationship between community pharmacists' views and their willingness to supply inappropriate antibiotics (the SUPPLY variable). Composite scores were created for each of the four factors, based on the score of the items under each factor and summing these up to create four new variables. Logistic regression was conducted to identify the relationship between the SUPPLY variable and the summative score for each of the four factor variables

Only factor 4 which covered pharmacists' perceptions of the advantages of antibiotics was found to be significantly associated with willingness to supply inappropriate antibiotics for URI, diarrhoea and wound cases. When community pharmacists perceived that antibiotics were more likely to be benefit, they are more willing to supply them (Table 6-20).

Table 6-20 Logistic regression of factors reporting the willingness to supply inappropriate antibiotics.

Factor	B	p	Odds ratio	95 % C.I.	
				Lower	Upper
Willingness to supply inappropriate antibiotics for URI cases					
Factor 1 satisfying customers	0.02	0.77	1.02	0.90	1.15
Factor 2 supplying antibiotics appropriately	-0.02	0.63	0.98	0.91	1.06
Factor 3 concerning about AMR	-0.01	0.93	0.99	0.88	1.12
Factor 4 perceptions toward advantages of antibiotics	0.17	< 0.01	1.19	1.07	1.32
Willingness to supply inappropriate antibiotics for diarrhoea cases					
Factor 1 satisfying customers	-0.04	0.56	0.96	0.84	1.10
Factor 2 supplying antibiotics appropriately	-0.02	0.66	0.98	0.91	1.07
Factor 3 concerning about AMR	0.03	0.64	1.03	0.90	1.19
Factor 4 perceptions toward advantages of antibiotics	0.17	< 0.01	1.18	1.06	1.32
Willingness to supply inappropriate antibiotics for wound cases					
Factor 1 satisfying customers	-0.12	0.12	0.88	0.76	1.03
Factor 2 supplying antibiotics appropriately	0.08	0.14	1.08	0.98	1.19
Factor 3 concerning about AMR	-0.10	0.17	0.91	0.79	1.04
Factor 4 perceptions toward advantages of antibiotics	0.15	0.01	1.16	1.03	1.31

6.4.11 Associations between community pharmacists' views and the practice scores of community pharmacists.

A linear regression was performed to identify the relationship between the four factor analysis variables, and the practice score, the PRACTICE variable. The results showed that only perceptions toward advantages of antibiotics (factor 4) was associated with the URI practice score (Beta = -0.12, $p < 0.01$), diarrhoea practice score (Beta = -0.16, $p < 0.01$), and total practice score (Beta = -0.33, $p < 0.01$). When community pharmacists perceived that antibiotics are more likely to be benefit, the practice score was decreased indicating less appropriate supply. However, the views explained only a small amount of the variance in practice scores, 11.0%, 3.0% and 11.0% for URI practice score, diarrhoea practice score, and total practice score, respectively. There was no factor that was found to

significantly predict the wound practice score. Table 6-21 presents the associations between community pharmacists' views and the practice score on antibiotic supply.

Table 6-21 Linear regression model toward association between community pharmacists views and practice score on antibiotic supplying.

	Beta	p	95 % C.I.	
			Lower	Upper
URI practice score (R² = 0.11, p < 0.01)				
Factor 1 satisfying customers	0.01	0.58	-0.03	0.06
Factor 2 supplying antibiotics appropriately	0.02	0.62	-0.02	0.04
Factor 3 concerning about AMR	-0.02	0.51	-0.07	0.03
Factor 4 perceptions toward advantages of antibiotics	-0.12	< 0.01	-0.16	-0.08
Diarrhoea practice score (R² = 0.03, p = 0.03)				
Factor 1 satisfying customers	-.02	0.72	-0.05	0.03
Factor 2 supplying antibiotics appropriately	0.01	0.93	-0.02	0.03
Factor 3 concerning about AMR	0.03	0.59	-0.03	0.05
Factor 4 perceptions toward advantages of antibiotics	-0.16	< 0.01	-0.08	-0.01
Wound practice score (R² = 0.03, p = 0.06)				
Factor 1 satisfying customers	0.01	0.90	-0.03	0.04
Factor 2 supplying antibiotics appropriately	-0.10	0.10	-0.04	0.00
Factor 3 concerning about AMR	0.12	0.04	0.00	0.08
Factor 4 perceptions toward advantages of antibiotics	-0.11	0.07	-0.06	0.00
Total practice score (R² = 0.11, p < 0.01)				
Factor 1 satisfying customers	0.02	0.81	-0.07	0.09
Factor 2 supplying antibiotics appropriately	-0.02	0.70	-0.06	0.04
Factor 3 concerning about AMR	0.04	0.44	-0.05	0.12
Factor 4 perceptions toward advantages of antibiotics	-0.33	<0.01	-0.25	-0.12

6.4.12 Community pharmacists' views regarding the strategies to improve antibiotic use in community Thailand in Thailand

Question 8 in the questionnaire asked participants their views regarding their priorities as a strategy to improve appropriate antibiotic use in the community pharmacy setting in Thailand. The top three strategies reported by community pharmacies were raising awareness among pharmacy students (strategy "e", 73.3%), and the public (strategy "b", 71.8%) regarding rational antibiotic use, and

greater use of enforcement of laws which prohibit the illegal supply of antibiotics from non-Type I pharmacies by non-qualified pharmacists (strategy “h”, 65.2%). Over half of pharmacists also reported that regularly providing updated clinical practice guidelines on the treatment of infectious disease (strategy “f”, 63.3%), patient education by community pharmacists during pharmacy services (strategy “a”, 62.1%), raising awareness of rational antibiotic use among community pharmacists (strategy “d”, 60.5%), and public education about rational antibiotic use (strategy “c”, 52.4%) were very high priority strategies. Only 34.7% of participants thought that providing monetary incentives for community pharmacies to take part in appropriate antibiotic use campaigns (strategy “i”) was a very high priority strategy to improve appropriate antibiotic use in community pharmacies in Thailand. In addition, reclassification of all antibiotics as prescription only medicines (strategy “g”) was reported as the lowest priority strategy to decrease inappropriate use of antibiotics. One quarter of pharmacists (25.7%) said this strategy was not a priority at all. Table 6-22 shows the views of community pharmacists regarding the priority of the strategies to improve antibiotic use.

Table 6-22 Community pharmacists' views regarding the priority of the strategies to improve antibiotic use in community in Thailand.

Statements	Postal Survey					Median (IQR)
	Participant's response, n (%)					
	1	2	3	4	5	
a. Patient education by pharmacists in community pharmacies at the time medicines are supplied to patients. (N=319)	1 (0.3)	-	17 (5.3)	103 (32.3)	198 (62.1)	5.0 (4.0-5.0)
b. Raising awareness of rational antibiotic use, including antimicrobial resistance, among the public through media such as TV, radio and social media. (N=319)	1 (0.3)	2 (0.6)	9 (2.8)	78 (24.5)	229 (71.8)	5.0 (4.0-5.0)
c. Educational programs of rational antibiotic use, including antimicrobial resistance, directed at the public. (N=319)	2 (0.6)	5 (1.6)	36 (11.3)	109 (34.2)	167 (52.4)	5.0 (4.0-5.0)
d. Raising awareness of rational antibiotic use, including antimicrobial resistance, among community pharmacists. (N=319)	2 (0.6)	4 (1.3)	18 (5.6)	102 (32.0)	193 (60.5)	5.0 (4.0-5.0)
e. Raising awareness of rational antibiotic use, including antimicrobial resistance, among pharmacy students. (N=318)	2 (0.6)	2 (0.6)	9 (2.8)	72 (22.6)	233 (73.3)	5.0 (4.0-5.0)
f. Providing regularly updated clinical practice guidelines to community pharmacies on the treatment of infectious diseases. (N=319)	1 (0.3)	3 (0.9)	18 (5.6)	95 (29.8)	202 (63.3)	5.0 (4.0-5.0)
g. Reclassification of all antibiotics as prescription-only. (N=319)	82 (25.7)	74 (23.2)	80 (25.1)	41 (12.9)	42 (13.2)	3.0 (1.0-4.0)
h. Enforcement of regulations which prohibit supply of antibiotics from non-pharmacies, and by non-pharmacists. (N=319)	4 (1.3)	7 (2.2)	21 (6.6)	79 (24.8)	208 (65.2)	5.0 (4.0-5.0)
i. Providing monetary incentives for community pharmacies to be involved in antibiotic use campaigns (N=317)	23 (7.2)	20 (6.3)	90 (28.4)	74 (23.3)	110 (34.7)	4.0 (3.0-5.0)

1-Not a priority, 2-low priority, 3-medium priority, 4-high priority, 5-very high priority

6.4.13 Improving rational use of antibiotics in Thailand: community pharmacists' views.

Question 9 in the questionnaire (see Appendix 16) asked the participants to indicate their views toward antibiotic use, AMR, and/or how to improve rational antibiotic use in Thailand as an open text question. One-hundred-forty-one pharmacists responded to this question (92 from main survey, 49 from open online survey). All comments are presented in Appendix 18. Five major themes were identified using content analysis regarding how to improve the appropriate use of antibiotics in Thailand, namely:

- 1) the role of community pharmacists in improving rational antibiotic use: supplying antibiotics appropriately, educating patients during pharmacy services, and encouraging patients to have the full course of antibiotics.
- 2) updating knowledge and raising awareness regarding antibiotic use and AMR.
- 3) public education: ways to educate the public, and key messages to communicate with the public.
- 4) improving the rational use of antibiotics throughout the whole health system: inappropriate use of antibiotics by healthcare professionals, and consistent messages throughout the health system to all healthcare professionals.
- 5) development and enforcement of laws and regulations regarding antibiotics use: enforcement of laws and regulations regarding the supply of antibiotics by non-qualified pharmacists and in non-qualified pharmacies, withdrawing inappropriate pack sizes of antibiotics, and the re-classification of antibiotics.

6.4.13.1 Theme 1: Role of community pharmacists

Respondents stated that supplying antibiotics appropriately was important. Some respondents stated that antibiotics should be supplied only when the patient's condition is definitely a bacterial infection and with a proper indication.

Supplying antibiotics appropriately and only when necessary.

[Main survey p038]

Antibiotics should be supplied only when there is certainty of it being a bacterial infection, for example, wound with pus and fever. If there is no certainty, antibiotics shouldn't be supplied.

[Main survey p056]

Some respondents discussed the role of community pharmacists towards improving appropriate antibiotic use. Patient education during pharmacy services was reported as an important role for pharmacists to change patients' behaviours. This role would also improve the reputation of pharmacies to patients and build trust with patients.

The most important thing is the public has knowledge and understanding of the use of antibiotics appropriately. Community pharmacies should take the role to educate their patients about the appropriate use of antibiotics. [Main survey p053]

In addition, educational tools should be provided to every pharmacy by the government to educate patients at pharmacies.

[Government] Should be providing the same education tools to every pharmacy that could help pharmacists to educate their patients, for example, education tools about conditions, signs and symptoms that should have antibiotics. [Main survey p049]

Some respondents reported that some patients would not be able to afford the cost of a full antibiotic course at one time. Therefore, some community pharmacists split the course of the antibiotic and recommended them to come back for the rest of the antibiotic. One of respondents suggested supplying free antibiotics for patients who could not afford the full cost. Telephone follow-up was another way to encourage patients to complete the course of antibiotics.

Community pharmacists should explain the importance of finishing the course of antibiotics [Open online survey 7096]

Supplying the full course of antibiotics is good, but most people receive daily wages and other expenses. I will supply antibiotics in

amount that they can afford at a time and tell them to come back until they have the full course. I will also ask for their phone number [to follow up]. [Main survey o7281]

6.4.13.2 Theme 2: Updating knowledge and raising awareness regarding antibiotic use and AMR

The importance of awareness towards AMR by community pharmacists was reported by some respondents. Moreover, one respondent also mentioned raising awareness about antibiotic use and AMR among pharmacy students.

All community pharmacists should be aware about the importance of appropriate antibiotic use. [Main survey p025]

Cultivating awareness about the importance of antibiotic use and antimicrobial resistance problems among pharmacy students. [Main survey p063]

Updated knowledge is also needed for appropriate antibiotic use and was reported by respondents. Community pharmacists should be provided with continuous education to update their knowledge about antibiotic use.

Should provide training and education on updated knowledge about antibiotic use and resistant antibiotics among community pharmacists. [Main survey p013]

6.4.13.3 Theme 3: Public education

Public education was key to improving rational antibiotic use as reported by many respondents. Some pharmacists stated that this could help to decrease patient demand for antibiotics.

Educating the public about self-care and appropriate drug use is very important. [Main survey p023]

Patient education should be done. This can help to decrease patients' expectations to have antibiotics. [Open online survey 9538]

Mass education via television and social media that was accessible to many people was a method suggested by many community pharmacists. Some pharmacists stated that it was important to start education about antibiotics to children in school.

Most people easily believe information from media rather than advice from healthcare professionals. They asked for unnecessary antibiotics even though they were explained the reasons. So, providing information through to the public via media to make people understand about the appropriate use of antibiotics.

[Main survey o4088]

Should educate about appropriate antibiotic use in primary school to raise their awareness since they were young.

[Open online survey 2621]

The messages that are used to communicate was also a key factor for their effectiveness. The pharmacists suggested that the content of communications to the public should include causes of AMR, the risks of antibiotics and AMR, the difference between antibiotics and anti-inflammatories, and encouraging the public to consult healthcare professionals for their illness.

Should provide the education tools about the risks of resistant microbials and obtaining antibiotics from non-healthcare professionals. These education tools should be easy to understand and provided via media that can be accessed by most people including people in rural areas, and un-educated people.

[Main survey o1702]

Should educate the public through various media. The public usually believe easily accessible media. Education about the risks of using antibiotics inappropriately, telling them about antibiotics that people are usually taking. [Open online survey 4181]

6.4.13.4 Theme 4: Improving the rational use of antibiotics across all stakeholders

One respondent felt that community pharmacy was being blamed for AMR. Hospitals and clinics supplying alternative antibiotics rather than first line antibiotics was reported by many community pharmacists and this resulted in patients putting pressure on pharmacists to supply them with the same antibiotics that had been obtained from physicians.

Antibiotic resistance could be caused by overuse of antibiotics in livestock and over prescribing of antibiotics from hospitals and clinics. In private hospitals and clinics, doctors usually prescribe newer and high potency antibiotics. I also work at a public hospital and a private hospital. At a pharmacy, patients came and consulted about antibiotics they obtained from clinics. Don't just blame the pharmacy. Pharmacies are the good place to provide information of rational drug use. [Main survey p028]

As reported by many respondents, AMR is a responsibility for all healthcare professionals and the public. Many pharmacists suggested promoting the rational use of antibiotics to the public, government hospitals, private hospitals, clinics and pharmacies, and to all healthcare professionals including doctors, pharmacists, and nurses.

To improve appropriate antibiotic use in Thailand, participation from every stakeholder is required, including hospitals, clinics, pharmacies, and public. [Main survey p053]

*Every stakeholder must take this problem seriously.
[Main survey o0830]*

In many pharmacies, young pharmacists are aware about rational drug use and try to advise patients to have appropriate antibiotics. While physicians in private hospitals, clinics prescribe many antibiotics without indications, so antimicrobial resistance

problems are not only pharmacy's responsibility. Should promote the importance of rational drug use to physicians as well.

[Main survey o6783]

6.4.13.5 Theme 5: Law revision and enforcement

In Thailand, legally, antibiotics can only be supplied by community pharmacists from a Type I pharmacy. However, weak enforcement of these laws results in the sale of antibiotics by non-pharmacists and from non-qualified pharmacies, such as Type II pharmacies¹⁷ and grocery stores. This unlawful sale of antibiotics was reported as a cause of AMR. It was suggested the government should enforce the law more seriously preventing the illegal sale of antibiotics.

Should enforce the law seriously, particularly, selling illegal antibiotics from grocery stores which is inappropriate and can cause antibiotic resistance. [Main survey p047]

They should have ways of monitoring Type I pharmacies to have a pharmacist to provide pharmacy services all the time. This will help to improve the appropriate supply of antibiotics and other medicines. [Main survey p032]

Some respondents suggested that the government should reconsider the information on antibiotic packaging, such as brand names, and indications, that could mislead the public regarding the advantages of antibiotics. Moreover, a few respondents stated that some antimicrobials came in inappropriate pack sizes such as rifampicin with three tablets per bottle and it was suggested such packs should be withdrawn.

Prohibiting the advertisement of antibiotics directly or indirectly. Thai-FDA should not allow the registration of brand of antibiotics with packaging that can make people misunderstand efficacy of

¹⁷ A Type II pharmacy is licensed to sell only ready-packed modern medicines that are not classed as "dangerous drugs" or specially controlled drugs. These pharmacies do not require the presence of a registered pharmacist.

antibiotics, for example, Sulfa 500,000 instead of Sulfa 500 mg, or Pen V 500,000. [Main survey p014]

Should reconsider information that is provided on antibiotic packages. Some drugs put many indications on the package and make people misunderstand about the benefit of the drug, for example, TC mycin®, penicillin. [Main survey o7797]

Antibiotic re-classification was another suggestion mentioned by pharmacists. Some pharmacists suggested reclassifying all antibiotics as prescription only medicines. However, some pharmacists stated that changing all antibiotics to prescription only may not help to improve antibiotic use. While respondents suggested changing the whole prescribing and dispensing system in order to re-classify all antibiotics to prescription only medicines, they also suggested that physicians should not be allowed to dispense medicines directly to patients as well. On the other hand, some pharmacists suggested re-classifying some antibiotics, particularly, newer antibiotics, to be special control medicines that require a prescription to dispense or can be dispensed from hospitals only.

To dispense antibiotics, a prescription should be required. Easy access of antibiotics from pharmacies, clinics, nursing clinics, Type II pharmacies, grocery stores can increase antimicrobial resistance. Therefore, requiring a prescription to dispense antibiotics may help to decrease the problem. [Open online survey 7543]

I don't agree to classify all antibiotics as prescription only medicines. From my experience working in hospital and pharmacy, I found that many physicians over prescribe antibiotics, particularly in private hospitals and clinics. If patients get a prescription from these physicians without bacterial infection, they may use a prescription as an excuse to buy antibiotics. I saw some patients came to my pharmacy with a prescription, but they amended the number of tablets on the

prescription to get more medicines. I think, we should promote rational drug use among both public and private health facilities to control antibiotic prescribing by physicians and supply by community pharmacists. [Open online survey o9274]

1. Separation of prescribing and dispensing like some developed countries, 2. Classify antibiotics as special control medicines which require a prescription for dispensing. [Main survey o1542]

Some antibiotics should not be allowed to be supplied or dispensed outside of hospitals, for example, fourth and fifth generation cephalosporins. [Main survey o1971]

In conclusion, the study was successful in exploring inappropriate practices by community pharmacists towards the supply of antibiotic for URIs, acute diarrhoea, and simple wound. Moreover, the factors influencing the supply of antibiotics were identified. In addition, the pharmacists made a number of suggestions relating to the supply and use of antibiotics in Thailand including the need for the improved education of healthcare professionals and the public. The following section (1.5) will describe the strengths and limitations of the study.

6.5 Strengths and limitations

The strength of this study is that it is the first national cross-sectional survey to identify the factors influencing the supply of antibiotics from a sample of community pharmacists in Thailand. Furthermore, the study explored the views of community pharmacists regarding improving appropriate use of antibiotics by community pharmacists in Thailand. This research updates previous studies related to antibiotic use in community pharmacies in Thailand which were conducted about a decade ago and were conducted in only a few provinces (Apisarnthanarak et al. 2008; Saengcharoen et al. 2008a; Saengcharoen and Lerkiatbundit 2010). The questionnaire used in the study was developed by the research team from empirical data obtained from semi-structured interviews with community pharmacists and patients, presented in chapters four and five, respectively, to attempt to ensure that the relevance of the questionnaire was

suitable within the current community pharmacy context in Thailand. This study also assessed appropriateness of antibiotic dosage regimens by community pharmacies which has not been studied before.

There are three key limitations to the findings of this study. Firstly, since the study had a lower response rate than expected, the findings may not represent the wider practice and views of community pharmacists in Thailand. However, systematic random sampling was used to recruit community pharmacists for the main survey. The study sample was diverse in terms of gender, age, length of experience, type of pharmacy, accreditation status of pharmacy, and was from different regions of the country. Secondly, as this was a self-administered questionnaire-based study, there is the possibility that participants may have over-reported desirable practices or views, or under-reported undesirable practices or views (Warner 2008). As a result, the appropriateness of antibiotic supply by community pharmacists found in this study may be likely to represent a more favorable picture than might actually be the situation. Lastly, the survey was unable to look at the effect of patient demand, which was found to be an important influencing factor on antibiotic supply by community pharmacists. This may be because a survey is not the most suitable method to explore this issue. To explore the effect of patient demand on antibiotic supply from community pharmacies, stimulated patient method may be further conducted. However, despite the limitations described above, this study may be considered the first step in evaluating the practice and views of community pharmacists towards supplying antibiotics and AMR which provides basic information for improving rational antibiotic use in Thailand. Future research should investigate the differences in what community pharmacists “claim” about their practice and what they actually do in real practice.

6.6 Discussion

This is the first national cross-sectional survey about antibiotic supply in community pharmacists in Thailand. The study aimed to evaluate the appropriateness of the intended supply of antibiotics for URIs, diarrhoea, and simple wound by community pharmacists in Thailand. More importantly, this study aimed to explore the views of community pharmacists regarding factors

influencing antibiotic supply by community pharmacists, and ways to improve rational use of antibiotics in Thailand

6.6.1 Appropriateness and influencing factors of antibiotic supplying by community pharmacists

Nine case-scenarios, comprising the three URI cases, the three diarrhoea cases, and the three wound cases were used to evaluate the appropriateness of supplying antibiotics by community pharmacists. Just over half of URIs instances (51.2%), inappropriate antibiotic treatments were recommended for the URIs cases according to the clinical practice guideline provided for community pharmacies in Thailand (RDU Pharmacy Eagle 2017; Thavornwattanayong et al. 2017). Commonly, URIs are mostly self-limiting and normally no antibiotic treatment is needed. High proportion of inappropriate supply of antibiotics for URIs which antibiotic is not required from pharmacies was also recently reported in some developing countries. In China, a simulated client (SMC) study revealed that pharmacists supplied a high proportion of cases with antibiotics, 88.4% (130/147 cases) for acute cough (Shi et al. 2020). Another SMC study of 2411 pharmacies in China (Chang et al. 2019) also reported 70.1% (N = 1690) of pharmacies supplied antibiotics for acute adult URIs. In addition, a study in Sri Lanka reported that 43% (26/60 pharmacies) of pharmacy staff supplied antibiotics for acute sore throat (Zawahir et al. 2019b). A study in Egypt showed that 98.3% (234/238) of pharmacy visits, antibiotics were supplied for viral URIs cases (Abdelaziz et al. 2019). Most of these studies showed a higher rate of inappropriate supply of antibiotics for URIs compared to what found in the present study. This might be because, in many occurrences in previous studies, antibiotics were supplied by non-pharmacists. In addition, pressure from clients to supply antibiotics was also reported. While, in this study, all participants were qualified pharmacists, and the recommendation to supply antibiotics was based only on the presented clinical symptoms of patients without any pressure from patients.

Moreover, three quarter of antibiotic regimens were suggested for GAS infection case was inappropriate, which included inappropriate drug choice, inappropriate dose and/or dosing interval, and/or inadequate period of time. The three most

commonly recommended inappropriate antibiotics for URIs by community pharmacists in this study were co-amoxiclav, roxithromycin, and azithromycin, which have been classified by the WHO as critically important antibiotics (World Health Organization 2019). The emergence of resistance to these antibiotics could have a significant impact on population health. Over forty percent of pharmacists suggested a dose of amoxicillin higher than recommend by the guidelines. This possibly because of pharmacist were aware of financial status of patients and a high treatment cost.

For diarrhoea treatments, the majority (88.6%) of antibiotic treatments recommended for diarrhoea cases were appropriately. Almost one third of pharmacists would supply antibiotics for watery diarrhoea with fever in children. Interestingly, a few studies conducted in Thailand using simulated client method were reported a higher rate of antibiotic supplying for childhood diarrhoea from community pharmacists. A study conducted in southern Thailand in 2008 reported that 48.9% (47/96) percent of community pharmacists supplied antibiotics for a child with viral diarrhoea (Saengcharoen and Lerkiatbundit 2010). While, a higher rate of supplying antibiotics for non-bacterial infections in childhood diarrhoea was also reported following a simulated-client-study in Khon Kaen, Thailand, in 2014; antibiotics were supply inappropriately for a fourteen month old boy with watery diarrhoea and no signs of a bacterial infection from 68.1% (62/91) of community pharmacists (Jaisue et al. 2017). The present study showed a lower rate of supplying antibiotics for childhood diarrhoea than those two previous studies in Thailand. This might be because those two previous studies used simulated clients while this study used a self-administered questionnaire where the respondents might over-report desirable practices. On the other hand, the lower rate of antibiotic supply for childhood diarrhoea might be a result of the improving antibiotic use campaign in Thailand. The perception of pharmacists that antibiotics had a faster effect and could reduce the duration of diarrhoea in children might influence their willingness to supply antibiotics for childhood diarrhoea (Saengcharoen and Lerkiatbundit 2010).

The inappropriate recommended antibiotic treatments for case vignettes in this study, may result from a lack of up-to-date knowledge regarding patient assessment and antibiotic treatments. A cross-sectional survey study in Shiraz, Iran (Foroughinia and Zarei 2016) pointed out that about 60.3% of 90 pharmacists had poor knowledge regarding the application of medicines used for the treatment of children's diarrhoea; the authors also stated that the inability of pharmacists to completely assess the patient's problem and the inaccurate diagnosis of the patients' condition could lead to inappropriate recommendations. In addition, a cross-sectional survey study (Saengcharoen et al. 2016) in 703 community pharmacists in Southern Thailand concluded that pharmacists who are knowledgeable on the Centor criteria used for GAS infection diagnosis were more likely to appropriately diagnose streptococcal pharyngitis and less likely to supply antibiotics inappropriately. Thus, more education regarding the patient assessment and antibiotic treatments of infectious diseases is needed to improve the rational supply of antibiotics from community pharmacists in Thailand.

In this study, the findings showed that age and length of experience in community pharmacy correlated with the appropriate supply of antibiotics. Younger pharmacists and pharmacists with less experience in community pharmacy would supply antibiotics more appropriately. A similar association was also reported in a previous study in Thailand; greater practice experience in community pharmacy potentially increased the likelihood of inappropriate antibiotic use was reported in Southern Thailand (Saengcharoen et al. 2016). Likewise, a study in Lebanon found that pharmacists with more experience in pharmacies had less knowledge about the appropriate use of antibiotics. compared to those with less experience (Zahreddine et al. 2018). Age and experience were positively correlated, as expected. Possibly, older age and longer practice experience means they had been qualified for a longer time; they might not keep up to date and/or their education might not have covered antibiotic use and AMR to same level as now, if at all.

Highest education level of pharmacists was also shown to be associated with appropriateness of antibiotic supply. Pharmacists who graduated from a Pharm D. programme supplied antibiotics more appropriately than those who graduated

with a BPharm. This is possibly the result of pharmacy education programme reforms in Thailand, transitioning from a 5-year bachelor's degree programme to 6-year Pharm D programme, which comes with enhanced clinical practice in the sixth year of study (Chanakit et al. 2015; Chaiyakunapruk et al. 2016). Therefore, pharmacists who had Pharm D would be more likely to be competent in clinical practice. In addition, since 2016, almost all qualified pharmacists have a Pharm D degree.

The findings also showed that pharmacy owners were more likely to supply inappropriate antibiotics as were community pharmacists who worked in independent pharmacies. Similarly, a cross-sectional survey study conducted in Bangkok and Chonburi in Thailand in 2017 found that pharmacists who worked in a chain pharmacy have more knowledge regarding antibiotic use than others who worked in an independent pharmacy (Siltrakool 2018). This is possibly because employee pharmacists were usually recently graduated pharmacists. In line with a cross-sectional survey with 90 community pharmacists in Iran (Foroughinia and Zarei 2016) which found that recently graduated pharmacists had more knowledge of the medicines used for the treatment of diarrhoea than the ones who had graduated much earlier. Again, these findings are likely to support that up to date knowledge of antibiotic treatments is an essential factor for the appropriate supply of antibiotics from community pharmacists.

Additionally, in this study, perceptions of the advantages of antibiotics were found to be significantly associated with appropriateness of antibiotic supply by community pharmacists. When community pharmacists perceived that antibiotics were more beneficial, they were more likely to supply antibiotics. In this respect, other previous studies with community pharmacists has reflected that beliefs in the benefit of antibiotics influenced the use of antibiotics. A survey study in 661 community pharmacies in Thailand found that the practice by community pharmacists of using antibiotics for URIs is explained by pharmacists' incorrect beliefs that antibiotics can shorten the duration and reduce the complications of the common cold (Saengcharoen et al. 2008b). In addition, beliefs in a quick recovery was a significant determinant of intention to dispense

antibiotics for childhood diarrhoea which was reported in a survey study conducted in 115 pharmacies in Thailand (Saengcharoen and Lerkiatbundit 2010). A recent survey study in 703 community pharmacies in Southern Thailand also reported that antibiotic supply by community pharmacists was related to their perception that antibiotics shorten the duration of illness or prevent the complications (Saengcharoen et al. 2016). Perceptions that antibiotics would help patients to relieve the symptoms of URIs and/or acute diarrhoea quickly may result from their own experience and/or lack of knowledge regarding disease management, antibiotics treatment and outcomes.

Furthermore, The Community Pharmacy Accreditation Project in Thailand was introduced in 2002 to ensure the delivery of high-quality pharmaceutical care by community pharmacies in Thailand. Surprisingly, accreditation status of pharmacy was found not to be significantly associated with the appropriate supply of antibiotics. Similar results were found in a mixed method study, using observation followed by semi-structured interviews, in thirty community pharmacies in Vietnam. They found there was no significant difference between Good Pharmacy Practice (GPP) certified pharmacies and non-GPP certified pharmacies regarding antibiotic supply practice (Nga et al. 2014). The findings might be due to the fact that pharmacy accreditation rules focus on the infrastructure of pharmacies. In terms of rational pharmacy practice, there are no checks to monitor and control the appropriateness of antibiotic supply practice. Therefore, monitoring of the rational supply of medicines from community pharmacies may be needed to promote the appropriate supply of medicines in community pharmacies in Thailand.

6.6.2 Proposed strategies to improve rational use of antibiotics.

To attempt to reduce the inappropriate use of antibiotics, a multifaceted strategy is required. In this study, most participants thought that many strategies involving the public, community pharmacists, health professions and the government, were all high priority strategies to improve antibiotic use in Thailand.

6.6.2.1 Strategies related to the public

Public awareness and knowledge of antibiotic use and AMR were reported as an important consideration to reduce inappropriate antibiotic use. Improving awareness and understanding of AMR through effective public communication programmes that target the different audiences in human health, animal health and agriculture practice is recommended by WHO (World Health Organization 2015a). Likewise, many community pharmacists in this study recommended raising public awareness and public education about antibiotic use and AMR as high priority tactics to tackling AMR. Similar to other countries, initiating public education campaigns to inform patients on the optimal use of antibiotics were acknowledged (Llor and Bjerrum 2014; Godman et al. 2017; Hoxha et al. 2018). This is particularly important for patients with lower and middle educational levels as they are the most likely to try to self-medicate with antibiotics (Jorgji et al. 2014; Hadi et al. 2016; Barker et al. 2017b). An improvement in general public knowledge and a change in their behaviour towards antibiotic use and increasing awareness regarding the misuse of antibiotics could also reduce the inappropriate supply of antibiotics (Abujheisha et al. 2017; Abujheisha 2018)

To educate the public, various medias were recommended, for example, television, social media and brochures or pamphlets, as well as, education being provided by healthcare professionals during consultations. Implementation in school curricula was also recommended. These findings concur with the suggestion by WHO to include antimicrobial use and resistance in school curricula in order to promote a better understanding and awareness, as well as, provide accurate and relevant information through the media. These interventions will help to improve awareness and understanding of antimicrobial resistance through the public (World Health Organization 2015a). Pharmacists in Qatar stated that the general population should be educated through various means including education via the media, awareness campaigns at public venues, as well as routine counseling and education in the community and at pharmacies (Black et al. 2014). Multiple educational interventions targeting the general population to improve overall knowledge and use of antibiotics as recommended in the present study are

consistent with those previously recommended in the literature (Kardas et al. 2005; Kotwani et al. 2012; Del Fiol et al. 2015).

6.6.2.2 Strategies related to community pharmacists

Community pharmacies are often the first point of contact for the public to consult about their health problems. Community pharmacists have the roles to deliver treatments for mild illness, counsel patients, and prevent irrational drug use. Therefore, community pharmacist could play important roles to improve rational use of antibiotics through the appropriate treatment for certain bacterial infections and counselling of patients to ensure appropriate use of antibiotics (International Pharmaceutical Federation 2015).

Knowledge, attitudes and perceptions of community pharmacists towards antibiotic use and resistance is likely to influence supply behaviours. It has been suggested that the attitude and knowledge of healthcare professionals determines the quality of prescribing/supplying of antibiotics, as measured by indicators obtained from clinical practice (Machowska and Stålsby Lundborg 2019). In this study, the findings revealed that many community pharmacists lacked up-to-date knowledge towards antibiotic use and antimicrobial susceptibility in Thailand. WHO suggested establishing AMR as a core component of professional education, training, certification and development for the health and veterinary sectors and agriculture practice (World Health Organization 2015a). Continuous Professional Education (CPE) or lifelong learning was identified as having a direct influence on antibiotic use by healthcare professionals. Individual pharmacists have a responsibility to update, develop and acquire new knowledge and skills, in ensuring continuing competence as professionals throughout their careers. In Thailand, compulsory CPE for licence renewal for pharmacists was implemented from 2014. Adequate and appropriate training on antibiotic treatment and AMR should be provided for CPE credits. Moreover, providing updated practice guidelines to community pharmacies was suggested to improve the appropriate use of antibiotics. Similar results have also been reported in other studies in Brazil, Albania, and Egypt (Del Fiol et al. 2015; Gebretekle and Serbessa 2016; Zakaa El-din et al. 2018).

The results of the present study revealed positive perceptions by community pharmacists towards the important role of community pharmacists in reducing the antibiotic resistance problem. However, in the present study, over 60% of pharmacies (64.4%) reported not having participated in an AMS campaign in Thailand even though most of the pharmacists in this study rated the importance of AMS highly. About 30% of pharmacists who reported not participating in an AMS campaign stated that they had never heard about such antimicrobial stewardship campaigns or did not know how to take part in the campaigns. This is possibly reflecting a lack of publicity about the campaigns among community pharmacies and that antimicrobial stewardship in community pharmacy requires improvement. Other reasons for non-participation in antimicrobial stewardship campaigns include the following: participants did not have time or were not interested in participating in the campaign, had no incentive for participation, and whether or not they could participate depended on the company's policy. Comparatively, Mason et al. (2018) reported that although 81% of 240 community pharmacists in a study in London indicated that AMR awareness campaigns are important to educate members of the public, their motivation in running such campaigns was lacking, with 80% never initiating an antibiotic awareness campaign. A study in the USA reported on the factors that might enable community pharmacists to participate in the campaign, including, the availability of pamphlets and the endorsement of the project by key groups, support by bosses, physicians, and professional groups, and those that offered antibiotic education (Coleman 2003). The community pharmacists in Thailand need to be inspired to participate in AMS programme. Possible ways to encourage the community pharmacists to participate in a campaign includes effective publicity of the campaign, support from the pharmacy professional organizations, and the Ministry of Public Health; and conferences to include the provision of training or workshops about AMS.

Patient counselling by community pharmacists about appropriate antibiotic use and AMR was also important to improve antibiotic use in the community and was suggested by the participants. A recent study in Thailand (Singhan and Permsuwan 2020) showed that patient counseling by community pharmacists

using educational aids was effective in reducing patient expectation and the inappropriate use of antibiotics. Over seventy percent of patients (184/240) who requested antibiotics did not obtain antibiotics after being counseled by pharmacists. However, this study was conducted in a Chiang Mai University pharmacy where profit was not the main aim of the pharmacy, unlike most business-oriented pharmacies in Thailand. In addition, the counseling took 10 – 15 minutes in a private counseling room which may not be applicable for all other pharmacies. Nonetheless, community pharmacists should be encouraged to provide more appropriate information about antibiotic use. Community pharmacies should be supported by providing them with the patient educational tools regarding appropriate antibiotic use and AMR.

6.6.2.3 Strategies related to professional organizations and the government

According to the existing legislation in Thailand, every Type I community pharmacy must have a qualified pharmacist present during opening hours. In addition, Type II pharmacies are not allowed to supply what are termed ‘dangerous drugs’ in Thailand which include antibiotics. However, these regulations are not consistently monitored by government authorities, and therefore, in many cases, pharmacists are not present when medicines, including antibiotics, are sold in the absence of a pharmacist. These findings have also been reported in previous studies in Thailand (Saengcharoen et al. 2008a; Saengcharoen and Lerkiatbundit 2010). Supplying medicines by non-pharmacists was identified as an important factor leading to the inappropriate supply of medicines from community pharmacies in many countries (Sakeena et al. 2018a).

Weak regulatory enforcement of medicine supplies was also a serious issue in other developing countries and contributes to the inappropriate supply of antibiotics and AMR (Butt et al. 2005; Okeke et al. 2005; Zargarzadeh et al. 2013; Foroughinia and Zarei 2016; Kotb and ElBagoury 2018; Zawahir et al. 2019b). Strict regulatory enforcement mechanisms were suggested as effective strategies by healthcare professionals (Abuirmeileh et al. 2014; Gebretekle and Serbessa 2016). Rigorous implementation of restrictions on over-the-counter supply of antibiotics has been shown to be effective in reducing non-prescription antibiotic

consumption in Brazil, Mexico, Chile and South Korea (Bavestrello et al. 2002; Park et al. 2005; Santa-Ana-Tellez et al. 2013). Therefore, greater enforcement of legislation regarding illegal supplying of antibiotics by non-pharmacists and from non-Type I pharmacies is important to improve judicious use of antibiotics in Thailand. This was suggested by many participants in the present study. A recent study in Saudi Arabia (Al-Tannir et al. 2020) showed that strong re-enforcement of the laws to prohibit the supply of antibiotics was successful in reducing the supply of antibiotics from pharmacies.

Re-classifying antibiotics is another strategy to reduce the use of antibiotics. Interestingly, the majority of pharmacists did not think that classifying all antibiotics to be prescription only medicines was a high priority strategy to improve antibiotic use in Thailand. Similarly, another study (Sumpradit et al. 2013) found that most physicians in private medical clinics (77%) agreed with a prescription only measure for all antibiotics, while only 5% of community pharmacist agreed with the measure. In addition, 74% and 36% of physician and community pharmacists, respectively, agreed that some antibiotics should be classified as prescription only medicines (Sumpradit et al. 2013). This might be explained by the fact that reclassifying antibiotics to be a prescription only medicine would negatively affect the business. Another study in Cairo, Egypt, found that about half of pharmacists agreed that prohibition of dispensing antibiotics without prescription will decrease sales and profits of the pharmacy (Zakaa El-din et al. 2018). Moreover, the illegal supply of prescription only medicines without a prescription from community pharmacies in Thailand has been reported (Panpud 2016); therefore, community pharmacists might think this measure would not help to reduce the inappropriate use of antibiotics in Thailand. However, implementation of measures to reclassify some antibiotics, particularly newer antibiotics to be special control medicines which allows use in hospitals only, was suggested by some respondents. This measure could reduce the use of certain antibiotics in communities. A study in Greece showed that the additional restrictions in dispensing for fluoroquinolones were effective in reducing the supply of ciprofloxacin from community pharmacies, although not eliminating their supply (Plachouras et al. 2010). After all, both re-enforcement of the existing

laws and revising laws and regulation regarding antibiotic use should be considered in order to restrict the dispensing/supply of antibiotics in Thailand. These strategies may help reduce the inappropriate use of antibiotics from health facilities and community pharmacies.

As reported by some community pharmacists in this study, overprescribing of antibiotics by physicians, particularly from private clinics and hospitals, was also an important cause of AMR. This could be a driving factor influencing community pharmacists to supply antibiotics to patients who request the same antibiotics for similar symptoms, previously supplied by a private clinic or hospital. Similar findings were also reported by researchers in Portugal (Roque et al. 2013). A study conducted among parents in Pakistan reported that the most common reason to obtain non-prescription antibiotics for their children for URIs was that the same antibiotics had been previously prescribed by their physicians (Siddiqui et al. 2014). Therefore, changing the antibiotic prescribing habits of physicians could reduce the inappropriate use of antibiotics (Kotwani et al. 2012; Roque et al. 2015) and potentially their supply from community pharmacies.

Hence AMR is a responsibility for all healthcare providers, including both community pharmacists and physicians. Therefore, everybody in all disciplines should participate in helping to tackle the problem (World Health Organization 2015a). The same messages about improving antibiotic use should be delivered throughout the whole system, including physicians, nurses, private medical clinics, private nurse clinics, and private hospitals, not only focusing on community pharmacists in community pharmacies.

6.7 Conclusions

The study revealed the high rate of inappropriate supply of antibiotics, particularly for URIs, from community pharmacies in Thailand. Factors such as age, length of experience in community pharmacy, education level and employment status were found to be associated with the appropriateness of antibiotic supply. In addition, perceived benefits of antibiotics were another factor influencing the supply of antibiotics by community pharmacists. These findings

may relate to a lack of up-to-date knowledge by community pharmacists regarding treatment and diagnosis of infectious disease. Further studies to confirm this are needed.

Chapter Seven

Discussion and conclusion

7 Discussion and conclusion

This final chapter reviews the key findings from the three phases of this study which are related to the overall aims of this PhD research and demonstrate how the findings are related to the wider literature. The strengths and limitations are discussed. The implications of the findings to improve appropriate antibiotic use in community pharmacies in Thailand are also explained. Suggestions for future research are offered and the researcher's reflections on the research are also presented.

7.1 Introduction

Anecdotal reports suggested that antibiotics are supplied inappropriately from community pharmacies as well as that there is overuse and misuse of antibiotics by the public in Thailand. Understanding community pharmacists' behaviour regarding antibiotic supply and the public's behaviour regarding antibiotic use, and the contributing factors to these behaviours, is important to develop effective interventions to promote appropriate supply and the use of antibiotics within the country.

The overall aims of this research were to (a) explore the factors influencing the appropriate supply of antibiotics from community pharmacists in Thailand and (b) to explore why and how Thai citizens use antibiotics supplied from community pharmacies. The work was undertaken in order to inform the development of evidenced based strategies to promote appropriate antibiotic supply from community pharmacies.

A sequential exploratory mixed method design was used in this study to achieve the aims of the thesis. A qualitative approach using semi-structured interviews was conducted first to explore the issues and was followed by a survey of a sample of community pharmacists across Thailand.

The community pharmacist interview study succeeded in obtaining the practices of community pharmacists regarding antibiotic supply and gave the reasoning behind their decisions whether or not supply antibiotics to patients. The views of

community pharmacists on the ways to improve the rational use of antibiotics were also obtained. Moreover, the public interview study provided their views and experiences of antibiotic use following supply from community pharmacists. The study succeeded in exploring how individuals obtained and used antibiotics, as well as their knowledge about issues relating to AMR and their suggestions to improve appropriate antibiotic use in communities.

The findings from the qualitative phase were useful to develop the questionnaire used with a sample of community pharmacists across Thailand to (a) evaluate the appropriateness of the intended supply of antibiotics by community pharmacists, (b) identify the factors influencing the supply of antibiotics by community pharmacists, and (c) explore the views of pharmacists regarding the ways to potentially improve the rational use of antibiotics from community pharmacies.

The objectives of each chapter and the overall aims of the study were met, revealing the appropriateness (or not) of supply and the factors influencing the appropriateness of antibiotic supply by community pharmacists, the appropriateness of public behaviours regarding antibiotic use, and suggested ways to improve the rational use of antibiotics in community pharmacies and communities (community pharmacists' and public views). The key findings from the study will be discussed in the following section.

7.2 Discussion of the key findings

The key findings from each phase of study were discussed in chapter 4, 5, and 6. In this chapter, the findings from both interviews and survey with the similarities and differences have been integrated and triangulated in this section in order to provide a better understanding of the issues relating to antibiotic supply from community pharmacies in Thailand.

This study revealed that inappropriate antibiotic supply from community pharmacies is still going on in Thailand. The different parts of this study, the interview and survey study, found that inadequate knowledge and wrong beliefs of some community pharmacists contributed to the irrational supply of antibiotics. Moreover, patient demand for antibiotics and commercial

pressures/interests were also important driving factors to supply antibiotics by community pharmacists. Figure 7-1 shows important factors contributing to inappropriate supply of antibiotics from community pharmacists and suggestions to improve the rational supply of antibiotics. Key findings regarding the supply and use of antibiotics from community pharmacies are discussed below.

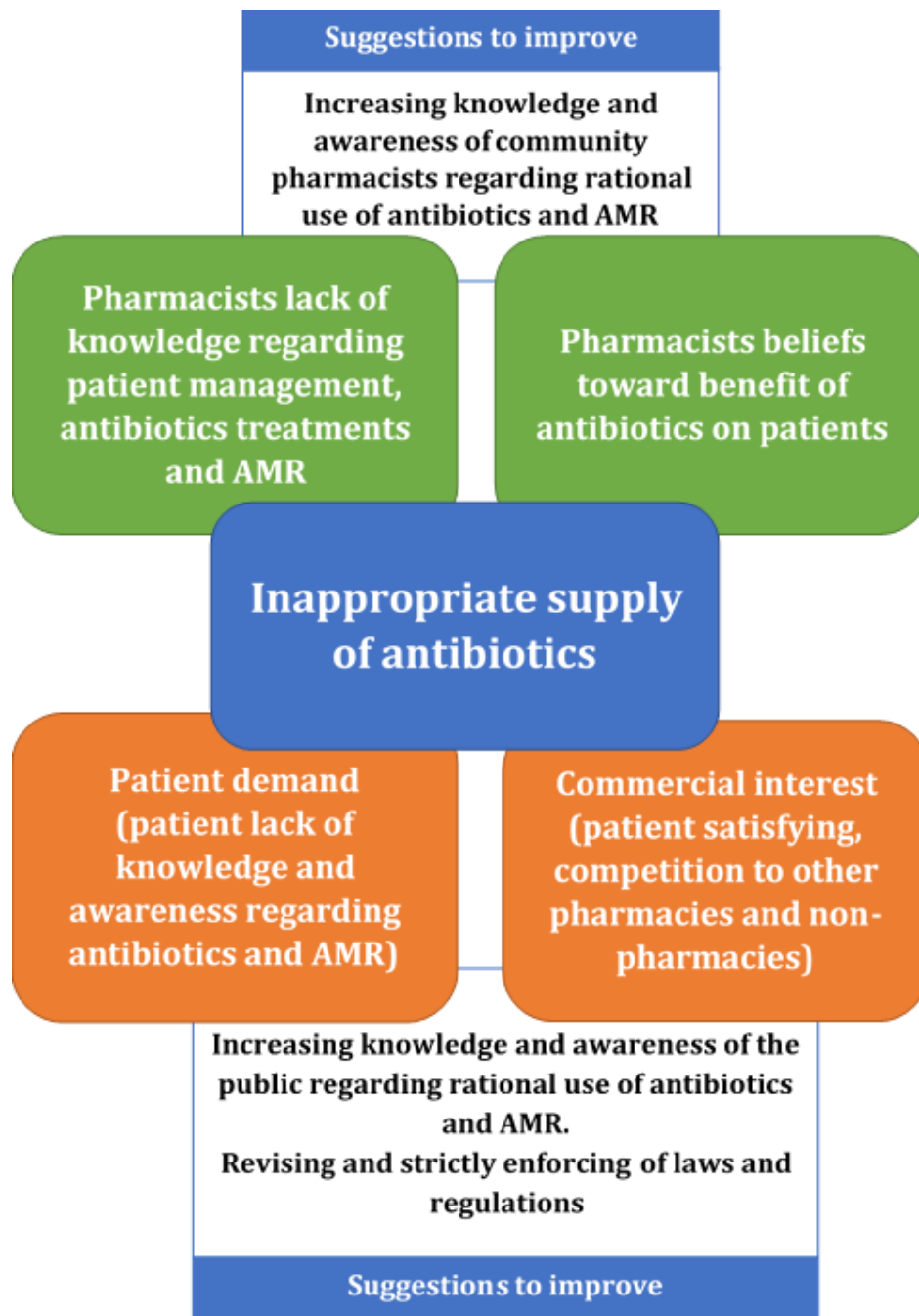


Figure 7-1 Factors influencing the supply of antibiotics by community pharmacists and suggested ways to improve the rational supply of antibiotics.

7.2.1 Knowledge of community pharmacists regarding infectious disease management

The results from the pharmacist (chapter 4 section 4.4.1) and public interview (chapter 5 section 5.4.4.2) studies revealed that the inappropriate supply of antibiotics by community pharmacists had occurred, for example, the supply antibiotics without an indication or, the supply of a shorter duration of antibiotics than recommended. Inadequate knowledge by community pharmacists was a factor contributing to the inappropriate supply of antibiotics, a finding reported by others (Reynolds and McKee 2009; Zapata-Cachafeiro et al. 2014; Khan et al. 2016).

Lack of up-to-date knowledge of community pharmacists might have contributed to the inappropriate supply of an antibiotic, type of antibiotic and/or inappropriate antibiotic regimens. This was established during pharmacist interviews (chapter 4 section 4.4.1) and from responses to the survey (chapter 6 section 6.4.3).

The findings from the community pharmacist interviews revealed that some community pharmacists mentioned some inappropriate key symptoms/criteria as a basis for supplying antibiotics for their patients. For example, many pharmacists (chapter 4 section 4.4.1) stated that they would supply antibiotics when patients with URI symptoms had a severe sore throat, fever, or discoloured nasal discharge or sputum, and the symptoms lasted longer than three or four days. However, according to the guidelines (RDU Pharmacy Eagle 2017; Thavornwattanayong et al. 2017), these were not key symptoms for which antibiotics were indicated for patients with a sore throat. Similarly, as reported in chapter 6 (section 6.4.3), 45.9% of community pharmacists would supply antibiotics for a boy with a sore throat for 2 days accompanied by mild fever, a productive cough with thick and coloured discharge; whereas antibiotics would not be recommended in this scenario according to the guidelines (RDU Pharmacy Eagle 2017; Thavornwattanayong et al. 2017).

Fever was commonly reported as an indicator by pharmacists to supply antibiotics for acute diarrhoea patients, as reported in chapter 4. Although, fever can be present in some acute diarrhoeal infections, antimicrobials are not always recommended for acute diarrhoea with fever (World Health Organization 2005; RDU Pharmacy Eagle 2017; Thavornwattanayong et al. 2017). Similarly, in chapter 6, 22.8% of community pharmacists would recommend antibiotics for a boy with acute diarrhoea accompanied by mild fever, nausea and mild abdominal pain; whereas antibiotics are not recommended according to the guidelines (RDU Pharmacy Eagle 2017; Thavornwattanayong et al. 2017). These inappropriate choices may be because community pharmacists lacked appropriate knowledge of patient assessment in order to differentiate between patient conditions.

Moreover, the findings from the survey (chapter 6 section 6.4.3) also revealed that community pharmacists lacked knowledge about antibiotic therapy for URIs, diarrhoea, and simple wounds. The findings presented in chapter 4 (section 4.4.1.4) showed that some pharmacists indicated at interview they would supply alternative antibiotics rather than a first line antibiotic. Additionally, the results from the survey (chapter 6 section 6.4.3) showed that 25.5% of community pharmacists intended to supply antibiotics that were not first line for a case vignette with GAS infection. Moreover, incorrect dosage regimens for antibiotic treatments were stated by over half of community pharmacists. This may be a result from a lack of up-to-date knowledge of community pharmacists. However, this study was not designed to find out reasons why community pharmacists would/would not supply antibiotics for specific cases. Therefore, future interview studies may be needed to answer this question.

The survey study (chapter 6 section 6.4.7) also found that the appropriateness of the supply of antibiotics was significantly related to age, length of experience, and highest education level reached by community pharmacists. A higher proportion of younger pharmacists would supply antibiotics more appropriately. A higher proportion of pharmacists graduating with a Pharm D would supply antibiotics more appropriately than those who graduated with a BPharm. The negative relationship between length of experience of community pharmacists and

appropriate use of antibiotics was also reported in a study in Southern Thailand (Saengcharoen et al. 2016), and a study in Lebanon (Zahreddine et al. 2018). This may be because older and more experienced pharmacists might not keep up to date on current antibiotic treatments and AMR. Therefore, to improve the appropriate supply of antibiotics from community pharmacies in Thailand, updating the knowledge of pharmacists on antibiotic therapy is needed.

The findings from both the interview study (chapter 4 section 4.4.4.4) and survey study (chapter 6 section and section 6.4.13.2) confirmed that improving knowledge and raising awareness of community pharmacists regarding rational use of antibiotics are desired. The participants suggested that updated clinical practice guidelines on the treatment of infectious diseases should be regularly provided to community pharmacists. Moreover, more educational activities related to antibiotic use in community pharmacy for continuing pharmacy education (CPE) credits should be provided to help them update their knowledge.

7.2.2 Pharmacists' views regard antibiotics and AMR

The findings in chapter 4 (section 4.4.2) revealed that some community pharmacists perceived that AMR is not a serious health issue in communities and/or could be easily solved by new antibiotics. However, the findings from the survey revealed that 85.6% of community pharmacist agreed that AMR is important issue in the community (chapter 6 section 6.4.8). Although, this was not translated into practice where there appeared to be a willingness to supply antibiotics, inappropriately on occasion. This may be because the supply of antibiotics by community pharmacists is influenced by many other factors, for example, patient pressure and commercial pressure (Black et al. 2014; Barker et al. 2017b; Salim and Elgizoli 2017)

The findings from chapter 4 (section 4.4.1.4) found that some community pharmacists believed antibiotics could help patients with URIs and acute diarrhoea would be cured faster. They also reported they supplied antibiotics to patients that they thought antibiotics would be of benefit even though the symptoms of the patients did not meet the criteria for antibiotics at the time of the

consultation. In addition, from the survey, the belief that antibiotics would be of benefit was significantly associated with willingness to supply antibiotics (chapter 6 section 6.4.11). These findings were similar to previous survey studies in Southern Thailand which reported that a belief in a quick recovery was a significant factor in predicting the intention to supply antibiotics for childhood diarrhoea (N=115) (Saengcharoen and Lerkiatbundit 2010); and the perception that antibiotics shortened the duration of illness or prevented complications was related to antibiotic supply by community pharmacists (N=703) (Saengcharoen et al. 2016). Therefore, educating community pharmacists about the correct advantages and disadvantages of antibiotics is essential to improve the rational supply of antibiotics.

7.2.3 Public lack of knowledge regarding antibiotic and AMR

As reported in chapter 4 (section 4.4.2), community pharmacists reported a wide range of misconceptions and inappropriate behaviours with regards to antibiotic use by patients, for example, that antibiotics resolve all illness episodes, and that newer antibiotics were more effective than older antibiotics. Community pharmacists thought that a lack of knowledge and the beliefs of people on the benefit of antibiotics were the main reasons for patients to request antibiotics from pharmacies. In addition, pharmacies are commercial businesses, therefore, customer satisfaction is important to maintain customers and the viability of the business. Pharmacists preferred to please their customers to keep them loyal to the pharmacy. For example, they would supply inappropriate antibiotics if patients insisted on having them. These findings were similar with the findings from the Thai citizen interviews. The findings from chapter 5 (section 5.4.2 and 5.4.3) revealed that the participants lacked knowledge about antibiotics and AMR. Their perceptions on antibiotics were from their own or their relatives' experiences. Using antibiotics successfully in the past led people to believe that antibiotics were required, and they then requested them from a pharmacy. Moreover, the general population were not aware about the disadvantages of inappropriate use of antibiotics. The participants also reported that community pharmacists were keen to please customers by supplying antibiotics as they had

requested. Sometimes, community pharmacists supplied antibiotics for them even though the pharmacists said antibiotics were not required. Past experiences of successful antibiotic use and having an antibiotic prescribed/supplied by healthcare professionals reinforced the misunderstandings of patients (Widayati et al. 2015; Nawafleh et al. 2016; Alhomoud et al. 2017; Irawati et al. 2019). This may contribute to the inappropriate use of antibiotics by the public.

Public education was suggested by both community pharmacists (chapter 4 section 4.4.4.1, chapter 6 section 6.4.12 and 6.4.13.3) and Thai citizens (chapter 5 section 5.4.4.1) in order to improve appropriate use of antibiotics in Thailand. Various methods to educate the public were offered, for example, educating by VHVs or healthcare workers, educating through television, radio, and/or social media, or educating the young population in school. Various educational interventions to improve the knowledge of the public have been recommended in previous literature (Huttner et al. 2010; Roque et al. 2014). The most commonly suggested educational programme for the public was providing effective mass media campaigns, for example, billboards, radio, television, and websites (Ilhan et al. 2009; Sarahroodi and Arzi 2009; Barah and Gonclaves 2010; Askarian and Maharlouie 2012; Kotwani et al. 2012; Shehadeh et al. 2012; Suaifan et al. 2012; Jose et al. 2013; Belkina et al. 2014; Cheaito et al. 2014; Darwish et al. 2014; Emeka et al. 2014; Allison et al. 2017; Kotwani et al. 2017). Despite the potential of social media, its limitations should be considered. The mass-media interventions may be able to access a large number of the general population, however a high budget will be needed to regularly provide the information (Huttner et al. 2010). Moreover, information posted on social media consists of messages from both reliable and non-reliable sources. Many people may not be aware of the reliability of such information. Additionally, public engagement is a key essential criterion for successful social change (Guo and Saxton 2018). Attractive media should be created to draw the attention of the public.

Public education campaigns have been shown to be effective in changing attitudes and improving knowledge among the general population regarding antibiotic use and resistance (Finch et al. 2004). A pilot study with 34 pharmacies customers in

New South Wales, Australia demonstrated that antibiotic knowledge in the intervention group was increased after they had received extensive verbal education leaflets about antibiotic use from pharmacies (Northey et al. 2015). In addition, an experimental design was used to assess the effects of an educational leaflet on patients' adherence to antibiotic treatments. In total, 400 patients (200 individuals within each of the intervention and control groups) participated the study. The findings revealed that using an educational leaflet about appropriate antibiotic use to counsel patients in community pharmacies improved adherence to antibiotics (West and Cordina 2019).

Furthermore, the incorporation of antibiotic use and resistance information in school curricula to promote a better understanding and awareness from an early age was considered an important strategic approach, suggested by community pharmacists in this study and WHO (World Health Organization 2015a). This method might help to cultivate the younger generation about the appropriate knowledge and attitudes towards antibiotics and AMR.

Changing beliefs and the behaviour of the public needs time and requires continuous public health campaigns to raise the awareness of the problem of irrational use of antibiotics among the public. Eventually, this may meet the long term objective of reducing inappropriate antibiotic use, and contribute to reduced antibiotic resistance nationally and globally (Alhomoud et al. 2017; Zawahir et al. 2019c)

7.2.4 Weak enforcement and inadequate regulation of antibiotic supply

Community pharmacists within the interview study and the survey study (chapter 4 section 4.4.4.5 and chapter 6 section 6.4.13.5) indicated that the illegal supply of antibiotics (by non-licensed pharmacists and from grocery stores) occurred in Thailand. Similar findings were reported by the public. The participants from Thai citizen interviews (chapter 5 section 5.4.1.1 and 5.4.4.3) stated that sometimes they were supplied antibiotics from a community pharmacy by a non-pharmacist. Some people reported that they have bought antibiotics from a grocery store. However, the public might not be aware that the supply of antibiotics by non-

pharmacists, and from grocery stores, is illegal. These findings may reflect inadequate regulation and enforcement of drug distribution and sales which may contribute to the easy access and inappropriate use of antibiotics (Akinyandenu and Akinyandenu 2014; Black et al. 2014; Nga et al. 2014; Dillip et al. 2015; International Pharmaceutical Federation 2015; Gebretekle and Serbessa 2016; Hadi et al. 2016; Zaka El-din et al. 2018). Therefore, greater enforcement of legislation regarding the illegal supply of antibiotics by non-pharmacists and from non-Type I pharmacies is important to improve the rational use of antibiotics in Thailand.

Currently, in Thailand, most antibiotics are classified as dangerous drugs which means these antibiotics can be supplied from community pharmacies without a medical prescription. This contributes to the relatively easy access of antibiotics from community pharmacies and may lead to overuse and inappropriate use of antibiotics. Some community pharmacists during interview suggested restricting the over-the counter supply of some or all antibiotics from community pharmacies. However, the findings from the survey revealed that the majority of pharmacists did not agree that classifying all antibiotics to be prescription only medicines is a high priority strategy to improve antibiotic use in Thailand. This may be because community pharmacists might think this method would not help to reduce the supply of antibiotics from community pharmacies or this may affect the pharmacy business. Nonetheless, the restrictions on antibiotic supply from community pharmacies have been found to reduce the over-the-counter supply of antibiotics in some settings (Bavestrello et al. 2002; Park et al. 2005; Santa-Ana-Tellez et al. 2013).

7.3 Implications for policy, practice and the profession

Interventions that should be developed and implemented to improve appropriate supply and use of antibiotics based on the findings from this research are outlined below.

7.3.1 National antibiotic guidelines

Establishing, updating and increasing provision of national treatment guidelines was suggested to improve antibiotic use by healthcare professionals (Abasaheed et al. 2009; Roque et al. 2014; Al Rasheed et al. 2016; Goff et al. 2017). Nowadays, it appears that Thai antibiotic guidelines for community pharmacy have not been widely accessible, partly because community pharmacists' lack of awareness of their availability. This suggests that updated guidelines must be better disseminated among pharmacies and their availability more widely known. Furthermore, guidelines should include practical diagnostic criteria for helping community pharmacists to assess the patients. In addition, criteria for making a diagnosis, where appropriate, and antibiotic guidelines for the most common infectious diseases presenting in a pharmacy (e.g. URIs, diarrhoea, simple wounds), could be offered on mobile applications that could make access easier for pharmacists and potentially increase their usability; however, this requires further investigation.

7.3.2 Continuing pharmacy education (CPE)

Continuing professional education has been a suggested method for improving appropriate treatment in several studies (Laing et al. 2001; World Health Organization 2015a; Gebretekle and Serbessa 2016; Sakeena et al. 2018a; Saleem et al. 2019). Educating community pharmacist may be important to overcome inappropriate antibiotic use. Currently however, CPE is compulsory in order to renew the pharmacist's licence to practice (Center for Continuing Pharmaceutical Education 2019). Seminars, training, workshops, and articles related to infectious disease management in community pharmacy are limited. Therefore, regular educational activities related to infectious disease management in community pharmacy are needed to promote appropriate antibiotic supply. Although pharmacists with many years of experience could benefit more from such CPE, all community pharmacists should be given the opportunity to participate in educational activities that help raise community pharmacists' awareness of the appropriate use of antibiotics. Educational activities should specifically target the over-supply of antibiotics including broad-spectrum antibiotics and provide

community pharmacists with the up-to-date antibiotic recommendations according to national antibiotic guidelines. Community pharmacists could also benefit from communication training to facilitate decision-making and prepare and/or empower pharmacists to decline antibiotic requests. This can be associated with the provision of educational tools for patients that can be used during consultations and help support community pharmacists in patient education. For example, a mirror with side-by-side pictures of a typical bacterial and viral throat infection (Figure 1-2) was provided to pharmacies that participated in ASU campaign. This tool was used to help consumers who asked for antibiotic to check their throats in the mirror and decide whether or not they thought antibiotics were needed.

7.3.3 Community pharmacist involvement

Community pharmacists are uniquely positioned in being easily accessible to the public in many parts of Thailand. Community pharmacists are also a key information source regarding clinical issues for patients, not only as suppliers of antibiotics but also as educational channels for patients. With capacity, opportunity and motivation, community pharmacists could play an important role to improve rational antibiotic use and reduce resistance (International Pharmaceutical Federation 2015; Essack et al. 2018; Singhan and Permsuwan 2020). For example, community pharmacists could be targeted to provide and display information materials in campaigns (Huttner et al. 2010).

Currently, many community pharmacists in Thailand are not aware of, and have not been involved in, AMS. Promoting the important role of community pharmacists to decrease the inappropriate use of antibiotics, as well as encouraging them to participate in AMS programme are needed. Incentives for community pharmacies may be useful to persuade pharmacies to participate in AMS programmes, as they might think they could lose money if they don't supply an antibiotic.

7.3.4 General public knowledge and awareness

Lack of knowledge and awareness within the general population regarding antibiotics and AMR may contribute to the inappropriate use of antibiotics. Public education is an important strategy to change the norm of antibiotic utilization. Increased national awareness of antimicrobial resistance through public communication programmes is suggested by WHO (World Health Organization 2015a).

As reported in this study, the general public's knowledge and awareness of appropriate antibiotic use remains inadequate. This must be improved. The public need to understand the difference between bacterial and viral infections, antibiotics and anti-inflammatory drugs, and that viral infections or non-bacterial inflammation do not require antibiotic treatment. People need to be aware of the disadvantages of inappropriate antibiotics as well. Additionally, they must also be encouraged to consult and/or appropriate educated other healthcare professionals before using antibiotics.

Nationwide campaigns that harness the power of mass media such as television, radio, and social media should be undertaken, with appropriate key messages delivered in an easily comprehensible manner. Moreover, in Thailand, there are VHVs who have a major role in providing self-care and communicate health information to villagers in rural communities. Communicating the above key messages to people by VHVs may be another effective way. Furthermore, incorporation of the topics of antibiotic use and resistance in school curricula may help to increase knowledge and awareness of young people which may improve the appropriate use of antibiotics in the long term. This strategy was also suggested by the WHO (World Health Organization 2015a). However, the effectiveness of such interventions has yet to be evaluated.

7.3.5 Revision and reinforcement of laws and regulations

To control access to antibiotics, relevant laws and regulations should be reviewed and enforced, and developed if appropriate, to try to ensure that antibiotics are supplied legally. Consideration of the consequences or penalties for violating the

law was considered important to reduce the illegal supply of antibiotics (Nyazema et al. 2007; Dameh et al. 2012; Abdelaziz et al. 2019). According to Thailand's national strategic plan on antimicrobial resistance (2017 – 2021), improving regulation of antimicrobial distribution by re-classifying certain antimicrobials and ensuring effective law enforcement is one out of five strategies to tackle with AMR in Thailand. However, an amendment of the laws on this issue have not been implemented.

7.4 Research strengths and limitation

This research has made a unique contribution to the literature. A literature review was conducted to inform the direction for the design of this study. There was limited literature on the topic relating to factors influencing the supply of antibiotics from community pharmacies in Thailand. Additionally, of those few studies in this country, most were conducted in only one region (Southern Thailand) and furthermore over a decade ago. Some contexts have changed over time, for example, new GPP regulation, continuous pharmacy education regulation and an increased number of licensed pharmacists.

The research has shed light on community pharmacists' views from all regions in Thailand. This had not previously been reported in the literature. The interviews with community pharmacists and the public were the first qualitative studies regarding antibiotic use and supply from community pharmacies conducted in Thailand. The survey study provided an original piece of work exploring the views and experiences of a large number of community pharmacists across Thailand.

The methodology was a particular strength. This study used a multi methods approach that combined quantitative and qualitative approaches to help understand the topic and to achieve the aims of research (Johnson and Onwuegbuzie 2004; Creswell et al. 2011; Creswell 2014). Semi-structured interviews allowed a depth of exploration and identified issues from the perspectives of the participants to be captured. The semi-structured interviews with community pharmacists and the public provided some interesting issues, for example the appropriateness of antibiotic supply by community pharmacists and

the views of community pharmacists regarding antibiotics and AMR, which were used to develop new items for the quantitative instrument (Creswell et al. 2011). The developed questionnaire based on the findings from the qualitative phases and the literature was suitable and allowed for the identification of the appropriateness of practice and the factors influencing antibiotic supply by Thai community pharmacists.

Although a mixed methods approach was utilized to reduce the limitations of undertaking a single methodological approach (Johnson and Onwuegbuzie 2004) some limitations still remained. The details about limitations of each phase in this study are explained in detail in the separate chapters (see chapter 4 section 4.5, chapter 5 section 5.5, and chapter 6 section 6.5), and therefore are briefly touched upon below.

Firstly, for the interview studies, a small number of community pharmacists and Thai residents participated in the study. Additionally, the participants were from a limited geographical area in Thailand. It is unclear whether there are differences in the behaviours, experiences and views of those who participated and those who did not. It would have been good to recruit more participants. However, the findings from the interview study were useful in developing a questionnaire for the survey study. Secondly, recall bias (Raphael 1987) may have occurred when respondents were answering questions, thus under or over reporting views compared to actual behaviour especially if they were related to less recent experiences.

The survey study recruited community pharmacists across Thailand, although the response rate was low at 21.1%. A greater response rate would have been beneficial in aiding the generalizability of the data (Babbie 2016b). In addition, there are chances that the samples from which data were collected were unrepresentative and nonresponse error may be an issue. Those who participated may have different practices and views about antibiotic supply and AMR from those who declined (Dillman et al. 2014b). Social desirability bias (Grimm 2010) may have also led individuals to over-report desirable practices or views, or under-report undesirable practices or views. In this survey, a lower rate of

antibiotic supply for childhood diarrhoea had been found compared with two previous simulated client studies in Thailand. This might be an effect of social desirability bias.

7.5 Implications for future research

Outlined below are some possibilities for future research.

Although this study has explored a number of barriers that contribute to irrational supply of antibiotics from community pharmacies in Thailand and the ways to overcome those barriers, it is clear that further studies would be needed to more fully understand the practices and views of community pharmacists toward antibiotic supply.

As reported above and in more detail in chapter 4 and chapter 6, the inappropriate supply of antibiotics from community pharmacists may be related to a lack of up-to-date knowledge by community pharmacists regarding treatment and diagnosis of infectious disease. Therefore, further studies to confirm this are needed. Interview studies using case vignettes, particularly those based on URIs, acute diarrhoea and simple wounds, should be used to examine the knowledge of community pharmacists toward patient differentiation and antibiotic treatments.

Secondly, educational tools for pharmacists such as mobile applications, algorithms for the management of URIs, acute diarrhoea, and simple wounds should be developed. Then, further study to investigate if these educational tools improve the rational supply of antibiotics from community pharmacies should be conducted.

The effect of community pharmacists' counselling using patient educational aids on reducing inappropriate antibiotics use should be further investigated. A two-group control trial with community pharmacists may be used. The intervention arm could be provided pharmacist counselling with patient education aids, while the control arm could be provided only general patient information. However, such studies are complex, expensive and require appropriate expertise.

This study did not examine the actual practice of community pharmacists. Understanding antibiotic supply patterns may be useful for any AMS activities to succeed. To-date, no coordinated system exists in Thailand to collect data on medicine supply from community pharmacies. Research on community pharmacist concordance to guidelines is necessary. The simulated patient method could be used to examine the practice of community pharmacies, such as, approaching the patient, history taking, patient advice, and appropriateness of antibiotic supply. Moreover, this method could also be used to explore influencing of patient demand on antibiotic supply by community pharmacists. The same clinical scenario could be used to compare the antibiotic supply for actors portray more demanding patients and those patient-actor who is less demanding. However, there are ethical issues associated with this approach in addition to a number of methodological challenges, including consistency of simulated patients between visits and between different simulated patients. Furthermore, considerable expense, time and other resources, as well as expertise would be needed in the design, conduct and analysis.

Finally, the findings from the public interviews revealed that a few participants misunderstood the messages they received about antibiotic use. This contributed to the inappropriate use of antibiotics, for example, some stopped taking antibiotics as soon as possible because they had been educated to not overuse antibiotics. Therefore, an interview study is needed to understand how the public perceive antibiotic use campaigns and their perception of the delivered messages. This could help to improve the way messages are communicated with the general population in Thailand.

7.6 Conclusion

This study has successfully identified using a mixed-methods approach that antibiotic supply from community pharmacists is not always appropriate and is influenced by clinical factors, patient demographics and associated contexts but also by patient demands and expectations, business considerations and community pharmacist knowledge and awareness of antibiotics and AMR. These findings suggest there is need for a strategy to improve the appropriate supply

and use of antibiotics, targeting healthcare professionals, the public, and policy makers. Examples of key areas of focus, as identified by study participants, include:

- Raising knowledge and awareness regarding appropriate antibiotic treatment and AMR among community pharmacists to ensure that they have adequate, up-to-date knowledge of antibiotics and symptomatic treatment, and that they are aware and act on the clinical guidelines for the supply of antibiotic use. Adequate training, educational tools, and patient education aids should be provided to community pharmacies.
- Raising awareness and knowledge about antibiotics, their appropriate use, and the disadvantages of inappropriate antibiotic use among the public. This may help to change attitudes of the public regarding antibiotic use and may reduce patient expectations for antibiotics.
- Strictly enforcing existing drug laws on antibiotic supply by authorised healthcare professionals and considering reclassifying appropriate antibiotics, together with implementing appropriate regulatory and healthcare systems to control the supply of antibiotics.

Developing and implementing a range of public, professional and regulatory strategies to improve antibiotic supply and raise awareness of AMR, should support the improvement in the appropriate supply of antibiotics from community pharmacies in Thailand.

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Appendix 1 Ethical approval letters for qualitative study in community pharmacists

Ethical approval from the Cardiff School of Pharmacy and Pharmaceutical Sciences for qualitative study in community pharmacists.

SPPS Ethics Approval Notification (EAN)

8/9/14 v12

**Cardiff School of Pharmacy and Pharmaceutical Sciences,
Research Ethics Approval**

This form has been signed by the School Research Ethics Officer as evidence that approval has been granted by the Cardiff School of Pharmacy and Pharmaceutical Sciences Research Ethics Committee for the following study:


Project title:	1617-35 Exploring the factors that influence the supply of antibiotics by community pharmacists in Thailand.
----------------	--

This is a/an:	Undergraduate project	
	ERASMUS project	
	Postgraduate project	X
	Staff project	

Name of researcher: (PG/Staff projects only)	Mrs. Sisira Donsamak
Name of supervisor(s):	Professor Dai John Professor Marjorie Weiss

STATEMENT OF ETHICS APPROVAL

This project has been considered and has been approved by the Cardiff School of Pharmacy and Pharmaceutical Sciences Research Ethics Committee

Signed  Name R Deslandes Date 29/6/17
(Deputy Chair, School Research Ethics Committee)

Ethical approval from Research Ethics Committee of Ubon Ratchathani University, Thailand for qualitative study in community pharmacists.



มหาวิทยาลัยอุบลราชธานี
หนังสือฉบับนี้ให้ไว้เพื่อแสดงว่า

ชื่อข้อเสนอการวิจัย ภาษาไทย	การศึกษาปัจจัยที่มีผลกระทบต่อการจ่ายยาปฏิชีวนะของเภสัชกรในร้านยา
ชื่อข้อเสนอการวิจัย ภาษาอังกฤษ	Exploring the factors that influence the supply of antibiotics by community pharmacists in Thailand.
รหัสข้อเสนอการวิจัย	UBU – REC – 27 / 2560
สังกัด	คณะเภสัชศาสตร์
ผู้วิจัยหลัก	นางศศิรา ดอนสมัคร
หมายเลขใบรับรอง	UBU – REC – 27 / 2560
วันที่ให้ใบรับรอง	10 ตุลาคม 2560
วันหมดอายุใบรับรอง	11 ตุลาคม 2561

ข้อเสนอการวิจัยดังกล่าวนี้ ได้รับการพิจารณาจากคณะกรรมการจริยธรรมการวิจัยในมนุษย์ มหาวิทยาลัยอุบลราชธานีแล้ว คณะกรรมการ ฯ มีความเห็นว่า ข้อเสนอการวิจัยที่จะดำเนินการ มีความสอดคล้องกับหลักจริยธรรมสากล ตลอดจนกฎหมาย ข้อบังคับและข้อกำหนดภายในประเทศ จึงเห็นสมควรให้ดำเนินการวิจัยตามข้อเสนอการวิจัยนี้ได้

(ผู้ช่วยศาสตราจารย์น้องเล็ก คุณวราดิศัย)
ประธานคณะกรรมการจริยธรรมการวิจัยในมนุษย์
มหาวิทยาลัยอุบลราชธานี

10 ต.ค. 2560

Appendix 2 Interview guide for community pharmacist interviews

Topic Guide in English

Welcome, introduce self, obtain consent, check recorder is working

Check interviewee understands purpose of project and ask if there are any questions

Remind that all answers are confidential

Once interviewee is happy to start, start recording– interviewee having confirmed they consent.

Introductory questions

- Ask about demographic characteristics of pharmacist (education, years qualified, current and previous experience in community pharmacy).

Questions related to supplying the antibiotics from community pharmacy

- Ask about the last time they (a) supplied an antibiotic AND (b) did not supply antibiotic for each of sore throat, diarrhoea, simple wounds and reasoning behind decisions.
- Factors that influence your decision whether or not to supply antibiotics when a patient asks for an antibiotic for (one by one) sore throat, diarrhoea, simple wounds.
- Factors that influence your decision whether or not to supply antibiotics when a patient presents at the pharmacy with (one by one) sore throat, diarrhoea, simple wounds but does not ask for an antibiotic.
- Other than sore throat, diarrhoea or simple wounds for what other conditions do you supply antibiotics.
- Any pressures to supply antibiotics under circumstances where they are not appropriate.

Questions related to improving appropriate use of antibiotic in community pharmacies

- The opinions about Antibiotic Smart Use programme or Rational Drug Use programme in Thailand
- The suggestion about how antibiotic use in community pharmacy could be improved, barriers and how they might be overcome.
- The opinions about antibiotic resistance situation in Thailand.
- Role of education & training, Continuing Pharmaceutical Education (CPE) of pharmacists.
- Role of public education on antibiotic use.
- Other regarding antibiotic use or antibiotic resistance that participant would like to add.

Closure and thanks.

General prompts

- Can you explain that in more detail, why do you think that?
- Can you give a more detailed description of what happened?
- Do you have any further examples of this?
- Do you think the decision you made was appropriate? Why?

Topic guide in Thai

ผู้วิจัยกล่าวสวัสดิ์และแนะนำตัวและโครงการวิจัยรวมถึงขอคำยินยอมในการสัมภาษณ์และบันทึกข้อมูล เปิดโอกาสให้ผู้เข้าร่วมการศึกษาสอบถามข้อมูลเพิ่มเติม เริ่มการสัมภาษณ์เมื่อผู้ให้สัมภาษณ์หมดข้อซักถามและให้ความยินยอมในการเข้าร่วมการศึกษา

คำถามเบื้องต้น

- ข้อมูลทั่วไปเกี่ยวกับผู้เข้าร่วมการศึกษา เช่น อายุ ระดับการศึกษา ประสบการณ์การทำงานในร้านยา

คำถามเกี่ยวกับการจ่ายยาปฏิชีวนะแก่ผู้ป่วยโดยเภสัชกรในร้านยา

- ขอให้ท่านเล่าประสบการณ์เกี่ยวกับครั้งล่าสุดในการจ่ายยา/ไม่จ่ายยาปฏิชีวนะแก่ผู้ป่วยที่มีอาการเจ็บคอ ท้องเสีย แผลสด รวมถึงเหตุผลประกอบการตัดสินใจดังกล่าว
- ปัจจัยใดบ้างที่มีผลต่อการตัดสินใจจ่าย/ไม่จ่ายยาปฏิชีวนะแก่ผู้ป่วยที่มีอาการเจ็บคอ ท้องเสีย แผลสด กรณีที่ผู้ป่วยที่มาใช้บริการมาขอซื้อยาปฏิชีวนะ
- ปัจจัยใดบ้างที่มีผลต่อการตัดสินใจจ่าย/ไม่จ่ายยาปฏิชีวนะแก่ผู้ป่วยที่มีอาการเจ็บคอ ท้องเสีย แผลสด กรณีที่ผู้ป่วยที่มาใช้บริการให้ข้อมูลเกี่ยวกับอาการโดยไม่ระบุว่าขอซื้อยาปฏิชีวนะ
- ปัจจัยใดบ้างที่มีผลต่อการตัดสินใจจ่าย/ไม่จ่ายยาปฏิชีวนะแก่ผู้ป่วย ในกรณีที่มีผู้มารับบริการด้วยอาการหรือโรคอื่นๆ นอกเหนือจากอาการ เจ็บคอ ท้องเสีย หรือ แผลสด
- แร้งกดดันที่อาจเกิดขึ้นเมื่อจ่ายยาปฏิชีวนะในสถานการณ์ที่การใช้ยาปฏิชีวนะไม่มีความเหมาะสม

คำถามเกี่ยวกับแนวทางการปรับปรุงการใช้ยาอย่างสมเหตุผลในร้านยา

- โปรดแสดงความคิดเห็นเกี่ยวกับโครงการส่งเสริมการใช้ยาปฏิชีวนะอย่างสมเหตุผลในประเทศไทย เช่น Antibiotic Smart Use หรือ Rational Drug Use
- โปรดเสนอแนะเกี่ยวกับการพัฒนาการใช้ยาปฏิชีวนะในประเทศไทย รวมถึงอุปสรรคที่พบและการแก้ไขอุปสรรคดังกล่าว
- ความคิดเห็นของท่านต่อสถานการณ์เชื้อดื้อยาในประเทศไทย
- ความคิดเห็นของท่านต่อบทบาทของการจัดศึกษา ฝึกอบรม การศึกษาต่อเนื่องทางเภสัชศาสตร์ (Continuing Pharmaceutical Education: CPE) ของเภสัชกร ต่อการใช้ยาปฏิชีวนะอย่างสมเหตุผล
- ความคิดเห็นของท่านต่อบทบาทของการให้ความรู้แก่สาธารณชนเกี่ยวกับการใช้ยาปฏิชีวนะ ต่อการใช้ยาปฏิชีวนะอย่างสมเหตุผล
- ท่านมีข้อคิดเห็น หรือข้อเสนอแนะอื่นๆ ที่เกี่ยวข้องกับ การใช้ยาปฏิชีวนะหรือเชื้อดื้อยาที่ต้องการเสนอเพิ่มเติมหรือไม่

ปิดการสัมภาษณ์และกล่าวขอบคุณ

คำถามเพื่อให้ผู้ถูกสัมภาษณ์แสดงความคิดเห็นเพิ่มเติม

- ขอให้อธิบายเพิ่มเติม หรือให้เหตุผลเพิ่มเติม
- ขอให้บอกรายละเอียดเพิ่มเติม
- ขอให้ยกตัวอย่างประกอบ
- ขอให้ประเมินว่าการตัดสินใจนั้นเหมาะสมหรือไม่อย่างไร

Appendix 3 Invitation email for the qualitative pharmacist study.

Invitation email in English

Dear Sir/Madam,

My name is Sisira Donsamk and I am currently in the first year of my PhD in Pharmacy at Cardiff University. I am interested in antibiotic utilization in community pharmacies as part of my PhD programme.

The project aims to explore the community pharmacists' views on the factor influencing the use of antibiotics. Finding from this research could be used to develop effective strategies for improving the rational use of antibiotics in community settings in Thailand.

Your opinions are key to ensure the improved use of antibiotics. It would be appreciated if you could spare up to 30 minutes of your time in order to participate in a short interview. The interview will be conducted face to face at your practice or via other means such as Line, Facebook, Skype or telephone.

In the interview, I will be asking about your common practices in supplying antibiotics, your opinions about factors influencing the supply of antibiotics and how rational use of antibiotics in community pharmacies could be improved. If acceptable to you, the interview will be audio-recorded.

If you are interested, please contact me at DonsamakS@cardiff.ac.uk. I will then provide you with an information sheet giving you more information about the project as well as a consent form.

Please contact me if you have any queries about the project.

Many thanks,

Sisira Donsamak

Invitation email in Thai

เรื่อง ขอความอนุเคราะห์ให้สัมภาษณ์ข้อมูลเพื่อการวิจัย

เรียน เกสซ์กรประจำร้าน

เนื่องด้วยข้าพเจ้า นางศิริรา ดอนสมัคร์ ขณะนี้กำลังศึกษาต่อหลักสูตรปริญญาเอก สาขาเภสัชศาสตร์ คณะเภสัชศาสตร์ มหาวิทยาลัยคาร์ดิฟฟ์ ประเทศเวลส์ สหราชอาณาจักร ได้รับอนุมัติให้ทำวิทยานิพนธ์ เรื่อง “การสำรวจปัจจัยที่มีผลต่อการจ่ายยาปฏิชีวนะของเกสซ์กรร้านยาในประเทศไทย”

การศึกษานี้มีวัตถุประสงค์เพื่อศึกษาปัจจัยที่มีผลต่อการตัดสินใจจ่ายหรือไม่จ่ายยาปฏิชีวนะแก่ผู้ป่วยที่มารับบริการของเกสซ์กรร้านยาในประเทศไทย โดยหวังว่าผลการศึกษาในครั้งนี้จะสามารถนำมาใช้ในการพัฒนาการจ่ายยาปฏิชีวนะอย่างสมเหตุสมผลในร้านยาต่อไป

ข้อมูลที่ได้รับจากท่านเป็นกุญแจสำคัญสำหรับการพัฒนาการจ่ายยาปฏิชีวนะอย่างสมเหตุสมผล การสัมภาษณ์ใช้เวลาประมาณ 30 นาที ในวัน เวลา สถานที่ที่ท่านสะดวก โดยการสัมภาษณ์สามารถดำเนินการในรูปแบบการสัมภาษณ์ตัวต่อตัว ทางโทรศัพท์ หรือผ่านโปรแกรมการสนทนา เช่น Skype, Line หรือ Facebook โดยระหว่างการสนทนาจะมีการบันทึกการสัมภาษณ์ด้วยเครื่องบันทึกเสียง ทั้งนี้เป็นไปโดยความยินยอมของท่าน

ในการศึกษานี้ท่านจะถูกถามเกี่ยวกับการจ่าย/ไม่จ่ายยาปฏิชีวนะแก่ผู้ป่วย โดยเฉพาะในโรคติดเชื้อทางเดินหายใจส่วนบน ท้องเสีย และแผลสด ความคิดเห็นเกี่ยวกับการปรับปรุงการจ่ายยาปฏิชีวนะอย่างสมเหตุสมผลในร้านยา หากท่านไม่ประสงค์จะให้ข้อมูล ท่านสามารถถอนตัวจากการศึกษาเมื่อใดก็ได้ โดยไม่จำเป็นต้องให้เหตุผล

จึงเรียนมาเพื่อขอความอนุเคราะห์จากท่านในการอนุญาตให้ข้าพเจ้าดำเนินการสัมภาษณ์ข้อมูลการวิจัย หากท่านมีคำถามที่เกี่ยวข้องกับการศึกษานี้หรือขอเสนอแนะเพิ่มเติม หรือสนใจเข้าร่วมการศึกษากรุณาติดต่อผู้ทำการศึกษาได้ที่อีเมล donsamaks@cardiff.ac.uk, sisira.d@ubu.ac.th, โทร 08-6499-8131 Line ID: 0894281593 หรือ Facebook: Sisira Donsamak

ขอแสดงความนับถือ

นางศิริรา ดอนสมัคร์

Appendix 4 Participant information sheet for the qualitative pharmacist study.

Participant Information Sheet in English

Please take the time to read through the information before deciding whether or not you wish to participate. If you have any questions please feel free to contact me, Sisira Donsamak. You can also contact (in English) the project supervisor.

Project title: Exploring the factors that influence the supply of antibiotics by community pharmacists in Thailand.

Research Student:

Sisira Donsamak

School of Pharmacy & Pharmaceutical Sciences, Cardiff University, +447783664833

Email: DonsamakS@cardiff.ac.uk

Line ID: 0894281593

Facebook: Sisira Donsamak

Note: Thailand phone number will be added after the research are at Thailand.

Cardiff University project supervisor:

Professor Dai John

School of Pharmacy & Pharmaceutical Sciences, Cardiff University, +442920 875804

Email: JohnDN@cardiff.ac.uk

Professor Marjorie Weiss

School of Pharmacy & Pharmaceutical Sciences, Cardiff University

Email: WeissM1@cardiff.ac.uk

Funding

Thai Royal Government,

School of Pharmacy & Pharmaceutical Sciences, Cardiff University.

What is the purpose of the study?

The aim of the study is to identify the factors and barriers that influence the supply of anti-biotics from community pharmacists in Thailand. It is hoped that the findings could be useful for developing strategies to improve the rational use of antibiotics in Thailand.

Participant Information sheet _version 0.2_21 Aug 2017

Who will be undertaking the research?

The study is being undertaken by Sisira Donsamak, Dai John, and Marjorie Weiss. The interviews will be conducted by the researcher, Sisira Donsamak, who is Thai native speaker. This study has been approved by Cardiff University's School of Pharmacy and Pharmaceutical Sciences Research Ethics Committee and Research Ethics Committee of Ubon Ratchathani University, Thailand.

Why have I been invited to participate in this study?

You have been invited to take part because you are a pharmacist who works in a community pharmacy in Thailand.

How will the research take place?

If you consent, you will be invited to take part in a one-to-one interview which, with your permission, will be audio-recorded. The interview will either be done face to face at your pharmacy or can be conducted via video call or telephone. You do not need to take part if you do not want to. You are free to withdraw at any time and without giving a reason. Interviews will take place at a mutually convenient location and time.

I will be asking about your practice in supplying antibiotics, your opinions about factors influencing the supply of antibiotic and the barriers to the appropriate use of antibiotics. If you feel uncomfortable with any question you can refuse to answer these questions.

The interview should last no more than 30 minutes.

Do I have to take part?

The decision to take part entirely up to you. If you wish to take part, I will arrange a mutually convenient time and location. If you are willing to take part, please sign the two enclosed copies of the consent form at the start of the interview. The researcher will also sign both copies. One copy of the form is for you to keep. The other copy will be retained by the research team.

You are free to withdraw from the study at any time without giving a reason. If you require more information before consenting, please feel free to contact myself (see contact details above). Contact with the research team does not commit you to participating.

Participant Information sheet _version 0.2_21 Aug 2017

How will the information collected be used?

Confidentiality will be ensured at all stages of the research process.

All information collected from you will be treated confidentially. The transcripts will be anonymised. It will be number coded with your name removed so that you cannot be recognized from it. Any names that you use in the interview will also be removed. You will also not be identified by name in any subsequent report of publication. The audio files of your interview will be kept on the password protection computer laptop during traveling.

Consent forms, transcripts, and recordings will be kept securely in the School of Pharmacy & Pharmaceutical Sciences. Any information retained on university password protected computers will be anonymised (containing a reference number in place of your personal data).

Any personal details that are collected during the study will only be seen by the research team and will not be kept for any longer than 1 year.

What happens if there is a problem?

If you have any concerns or complaints during the course of this research project, please contact Professor Dai John (JohnDN@cardiff.ac.uk) who will address the issue. If you remain unhappy and wish to complain formally, you can do this by contacting the Director of Research, Andrew Westwell (WestwellA@cardiff.ac.uk), Cardiff School of Pharmacy and Pharmaceutical Sciences, Redwood Building, King Edward VII Avenue, Cardiff CF10 3NB.

You also complain through the Office of Research Promotion and Management, Office of the President, Ubon Ratchathani University, Warin Chamrab, Ubon Ratchathani, 34190, Tel. 08-6471-0582.

Who to contact for more information?

Please feel free to contact Sisira Donsamak if you have any further questions.

Participant information sheet in Thai

เอกสารชี้แจงผู้เข้าร่วมวิจัย สำหรับผู้เข้าร่วมวิจัยที่มีอายุ 18 ปีบริบูรณ์ขึ้นไป
(Participant Information Sheet)

โปรดอ่านเอกสารชี้แจงฉบับนี้ก่อนตัดสินใจเข้าร่วมหรือไม่เข้าในการศึกษา หากท่านมีข้อสงสัย โปรดสอบถามหัวหน้าโครงการวิจัย (ศิริรา ดอนสมัค) หรือที่ปรึกษางานวิจัย (ภาษาอังกฤษ) ให้ช่วยอธิบายจนกว่าจะเข้าใจดี ท่านจะได้รับเอกสารนี้กลับไปอ่านที่บ้านเพื่อปรึกษาหารือกับญาติพี่น้อง เพื่อนสนิท หรือผู้อื่นที่ท่านต้องการปรึกษา เพื่อช่วยในการตัดสินใจเข้าร่วมการวิจัย

ชื่อโครงการ การศึกษาปัจจัยที่มีผลต่อการจ่ายยาปฏิชีวนะของเภสัชกรในร้านยา

ชื่อผู้วิจัย นางศิริรา ดอนสมัค

คณะเภสัชศาสตร์ มหาวิทยาลัยคาร์ดิฟฟ์ ประเทศเวลส์ สหราชอาณาจักร โทรศัพท์ +447783664833

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อาจารย์ที่ปรึกษางานวิจัย

ศาสตราจารย์ ไค จอห์น

คณะเภสัชศาสตร์ มหาวิทยาลัยคาร์ดิฟฟ์ ประเทศเวลส์ สหราชอาณาจักร โทรศัพท์ +442920 875804

E-mail: JohnDN@cardiff.ac.uk

ศาสตราจารย์ มาร์จอรี เวสส์

คณะเภสัชศาสตร์ มหาวิทยาลัยคาร์ดิฟฟ์ ประเทศเวลส์ สหราชอาณาจักร

E-mail: WeissM1@cardiff.ac.uk

ผู้ให้ทุน รัฐบาลไทย และมหาวิทยาลัยคาร์ดิฟฟ์ ประเทศเวลส์ สหราชอาณาจักร

วัตถุประสงค์การศึกษา

การศึกษานี้มีวัตถุประสงค์เพื่อค้นหาปัจจัยที่มีผลต่อการตัดสินใจจ่ายหรือไม่จ่ายยาปฏิชีวนะแก่ผู้ป่วยที่มารับบริการของเภสัชกรร้านยาในประเทศไทย โดยผู้วิจัยหวังว่าผลการศึกษาในครั้งนี้จะเป็นประโยชน์ในการนำไปใช้วางแผนกลยุทธ์การปรับปรุงการใช้ยาปฏิชีวนะอย่างสมเหตุสมผลในร้านยาในประเทศไทย

ผู้ดำเนินการศึกษา

การวิจัยนี้ดำเนินการศึกษาโดย นางศิริรา ดอนสมัค นักศึกษาปริญญาเอก สาขาเภสัชกรรม คณะเภสัชศาสตร์ มหาวิทยาลัยคาร์ดิฟฟ์ ภายใต้การควบคุมดูแลของอาจารย์ที่ปรึกษา ศาสตราจารย์ ไค จอห์น และศาสตราจารย์ มาร์จอรี เวสส์ โดยการสัมภาษณ์ดำเนินการเป็นภาษาไทย โดยผู้วิจัย นางศิริรา ดอนสมัค

โครงการวิจัยนี้ได้รับการพิจารณารับรอง จากคณะกรรมการจริยธรรมการวิจัยในมนุษย์ของมหาวิทยาลัยอุบลราชธานี และคณะกรรมการจริยธรรมการวิจัยในมนุษย์ คณะเภสัชศาสตร์ มหาวิทยาลัยคาร์ดิฟฟ์

ท่านได้รับเชิญเข้าร่วมโครงการเพราะคุณสมบัติต่อไปนี้

เป็นเภสัชกรที่ปฏิบัติงานในร้านยา ในประเทศไทย

การดำเนินการสัมภาษณ์เก็บข้อมูล

หากท่านให้ความยินยอมในการเข้าร่วมการศึกษา ท่านจะถูกเชิญให้สัมภาษณ์โดยจะมีการบันทึกเสียงระหว่างการสัมภาษณ์ ซึ่งการสัมภาษณ์จะเป็นแบบตัวต่อตัว ณ ร้านยาของท่าน หรือโทรศัพท์ หรือ การสัมภาษณ์ผ่านระบบการ

Participant Information sheet _version 0.2_21 Aug 2017

สนทนาแบบเห็นภาพ (video call) เช่น Skype, Line, Facebook เป็นต้น การสัมภาษณ์จะดำเนินการในวัน เวลา ที่ท่านสะดวก โดยการสัมภาษณ์คาดว่าจะใช้เวลาประมาณ 30 นาที

ในการศึกษานี้ท่านจะถูกถามเกี่ยวกับการจ่าย/ไม่จ่ายยาปฏิชีวนะแก่ผู้ป่วย โดยเฉพาะในโรคติดเชื้อทางเดินหายใจส่วนบน ท้องเสีย และแผลสด ความคิดเห็นเกี่ยวกับการปรับปรุงการใช้ยาปฏิชีวนะอย่างสมเหตุสมผลในร้านยา กรณีที่ท่านเกิดความไม่สบายใจในการตอบคำถามบางข้อ ท่านสามารถปฏิเสธการตอบคำถามดังกล่าวได้ หรือกรณีที่ท่านไม่สบายใจในการให้สัมภาษณ์ต่อ ท่านสามารถขอหยุดและถอนตัวจากการศึกษาได้ทันทีโดยไม่จำเป็นต้องอธิบายเหตุผล

ความสมัครใจในการร่วมให้ข้อมูล

การตัดสินใจเข้าร่วมการศึกษานี้เป็นไปโดยความสมัครใจของท่านเท่านั้น หากท่านประสงค์จะเข้าร่วมการศึกษา ผู้วิจัยจะขอคืนวัน เวลา สถานที่ที่ท่านสะดวกในการให้ข้อมูล ท่านสามารถถอนตัวจากการศึกษาเมื่อใดก็ได้ โดยไม่จำเป็นต้องให้เหตุผล หรือแจ้งให้ผู้วิจัยทราบล่วงหน้า ก่อนการสัมภาษณ์เริ่มต้นผู้วิจัยจะขอให้ท่านลงนามในใบยินยอมเข้าร่วมการศึกษา จำนวน 2 ชุด เช่นเดียวกับผู้วิจัย โดยเอกสาร 1 ชุด ผู้วิจัยจะมอบให้ท่านเป็นผู้เก็บรักษา และทีมผู้วิจัยเป็นผู้เก็บไว้ 1 ชุด หากท่านไม่ประสงค์จะให้ข้อมูล ท่านสามารถถอนตัวจากการศึกษาเมื่อใดก็ได้ โดยไม่จำเป็นต้องให้เหตุผล หากท่านต้องการข้อมูลเพิ่มเติมก่อนตัดสินใจเข้าร่วมโครงการ โปรดติดต่อผู้วิจัยตามที่ติดต่อที่ระบุไว้ข้างต้น การติดต่อกับผู้วิจัยดังกล่าวยังไม่นับว่าเป็นการตัดสินใจเข้าร่วมการศึกษา

การเข้าร่วมการศึกษานี้ท่านจะไม่ได้รับค่าตอบแทนใดๆ และไม่ต้องรับผิดชอบค่าใช้จ่ายใดๆ ทั้งสิ้น

การเก็บรักษาความลับของข้อมูลส่วนบุคคลและการนำข้อมูลไปใช้

ข้อมูลส่วนตัวของผู้เข้าร่วมวิจัยจะถูกเก็บเป็นความลับในทุกขั้นตอนของการวิจัย ดังนี้

- ไฟล์บันทึกเสียงการสัมภาษณ์จะเก็บไว้ในคอมพิวเตอร์พกพาที่มีการกำหนดรหัสผ่านสำหรับการเข้าใช้ ก่อนที่จะถูกถอดความ
- ข้อมูลที่ได้หลังจากการถอดความจากการบันทึกเสียง จะไม่มีการระบุข้อมูลส่วนตัวของผู้ให้สัมภาษณ์ซึ่งนำไปสู่การระบุตัวตนของผู้ให้ข้อมูล และจะเก็บไว้ในคอมพิวเตอร์พกพาที่มีรหัสผ่านสำหรับการเข้าใช้งาน
- หนังสือยินยอมเข้าร่วมการศึกษา ข้อมูลจากการสัมภาษณ์ เครื่องบันทึกเสียง จะได้รับการเก็บในชั้นที่มีกุญแจล็อก และเก็บรักษาในคณะเภสัชศาสตร์ มหาวิทยาลัยคาร์ดิฟฟ์ (School of Pharmacy and Pharmaceutical Sciences, Cardiff University) ซึ่งมีระบบการรักษาความปลอดภัย
- เฉพาะทีมผู้วิจัยเท่านั้นที่มีสิทธิ์เข้าถึงข้อมูลส่วนตัวของผู้เข้าร่วมการศึกษา ซึ่งข้อมูลนี้จะเก็บไว้ไม่เกิน 1 ปี
- ข้อมูลที่ได้จะถูกนำไปวิเคราะห์และนำเสนอในภาพรวม ข้อความในการสนทนาบางตอนอาจถูกอ้างอิงในรายงานแต่จะไม่ระบุชื่อของผู้ให้สัมภาษณ์ และไม่มีข้อมูลใดๆ ที่จะนำไปสู่การระบุตัวผู้เข้าร่วมวิจัย

กรณีเกิดปัญหาหรือข้อสงสัย

โครงการวิจัยนี้ได้รับการพิจารณารับรอง จากคณะกรรมการจริยธรรมการวิจัยในมนุษย์ของมหาวิทยาลัยอุบลราชธานี และคณะกรรมการจริยธรรมการวิจัยในมนุษย์ คณะเภสัชศาสตร์ มหาวิทยาลัยคาร์ดิฟฟ์

หากท่านมีข้อสงสัยในระหว่างโครงการวิจัยนี้โปรดติดต่อ Professor Dai John (JohnDN@cardiff.ac.uk) ซึ่งจะเป็นผู้ดำเนินการแก้ไขปัญหาให้ท่าน หากท่านยังไม่สบายใจ ได้รับการปฏิบัติไม่ตรงตามที่ระบุ หรือมีข้อร้องเรียน และต้องการร้องเรียนอย่างเป็นทางการ ท่านสามารถดำเนินการได้โดยติดต่อผู้อำนวยการฝ่ายวิจัย Andrew Westwell (WestwellA@cardiff.ac.uk), Cardiff School of Pharmacy and Pharmaceutical Sciences, Redwood Building, King Edward VII Avenue, Cardiff CF10 3NB

หรือกรุณาติดต่อ สำนักงานส่งเสริมบริหารงานวิจัยฯ มหาวิทยาลัยอุบลราชธานี อำเภอวารินชำราบ จังหวัดอุบลราชธานี 34190 หมายเลขโทรศัพท์ 086-4710582

กรณีต้องการข้อมูลเพิ่มเติม

กรุณาติดต่อผู้วิจัย นางศิริรา ดอนสมัคร ตามช่องทางการติดต่อที่ระบุไว้ข้างต้น หากท่านต้องการข้อมูลเพิ่มเติม

Participant Information sheet _version 0.2_21 Aug 2017

Appendix 5 Consent form for the qualitative pharmacist study.

Consent Form in English

Please read the following statements and initial the boxes next to the statements if you agree to give your consent:

- I confirm that I have read, understood and had time to consider the participant information sheet (version 1.2_16 Jun_2017) for this study.
- I have had the opportunity to ask questions and have had these answered satisfactorily.
- I understand that taking part in this study is voluntary and I am free to withdraw at any time, without giving any reason
- I give consent for my interview (face to face, Skype, Line, Messenger or telephone) to be audio-recorded.
- I understand that verbatim quotes may be used in reports and/or publications and if so, they will be anonymised.
- I agree to be contacted by the researchers, for example, if clarification is needed regarding any points discussed during the interview.

Participant details:

Name (please print):

Email address:

Signature:

Date:

Researcher details:

Name:

Signature:

Date:

Informed Consent form version 0.2_21 Aug 2017

Consent form in Thai

หนังสือแสดงเจตนายินยอมเข้าร่วมการวิจัยโดยได้รับการบอกกล่าวและเต็มใจ

กรุณาทำเครื่องหมาย ในช่อง

1. ข้าพเจ้าได้รับทราบรายละเอียดเกี่ยวกับที่มาและวัตถุประสงค์ในการทำวิจัย โดยได้อ่านรายละเอียดในเอกสารชี้แจงผู้เข้าร่วมงานวิจัย (Version 0.1_26 Jun 2017) โดยตลอด และได้รับคำอธิบายจากผู้วิจัยจนเข้าใจเป็นอย่างดีแล้ว
2. ข้าพเจ้าได้มีโอกาสในการซักถามเกี่ยวกับการศึกษา และได้รับคำตอบจนเป็นที่พอใจแล้ว
3. ข้าพเจ้ายินยอมเข้าร่วมโครงการวิจัยนี้ด้วยความสมัครใจ ข้าพเจ้ามีสิทธิจะบอกเลิกการร่วมโครงการวิจัยเมื่อใดก็ได้ และการบอกเลิกการร่วมโครงการวิจัยจะไม่มีผลกระทบใดๆ ทุกประการ
4. ข้าพเจ้ายินยอมให้สัมภาษณ์โดยมีการบันทึกการสนทนาที่เกิดขึ้นด้วยเครื่องบันทึกเสียง
5. ข้าพเจ้ารับทราบว่า ข้อความในการสนทนาบางตอนอาจถูกอ้างอิงในรายงานวิทยานิพนธ์หรือผลงานเผยแพร่ทางวิชาการโดยจะนำเสนอภาพรวมโดยไม่ระบุชื่อของผู้ให้สัมภาษณ์แต่อย่างใด และไม่มีข้อมูลๆ ที่จะนำไปสู่การระบุตัวข้าพเจ้า
6. ข้าพเจ้ายินยอมให้ผู้วิจัยติดต่อข้าพเจ้าหากจำเป็น เช่น การสอบถามเพื่อความกระจ่างในข้อมูลที่ให้สัมภาษณ์ไว้
7. ข้าพเจ้าได้อ่านข้อความข้างต้นแล้ว มีความเข้าใจดีทุกประการ และลงนามยินยอมด้วยความเต็มใจ

ผู้เข้าร่วมการวิจัย:

ชื่อ - สกุล (ตัวบรรจง):

อีเมลล์:

ลายเซ็นต์:

วันที่:

ผู้วิจัย:

ชื่อ - สกุล (ตัวบรรจง):

ลายเซ็นต์:

วันที่:

Informed Consent form version 0.2_21 Aug 2017

Appendix 6 Scoring tools to identify patients who are more likely to benefit from antibiotics for sore throat caused by streptococcal bacteria.

1. Fever PAIN criteria: consists of 5 criterions;

- 1.1 Fever (during previous 24 hours)
- 1.2 Purulence (pus on tonsils)
- 1.3 Attend rapidly (within 3 days after onset of symptoms)
- 1.4 Severely Inflamed tonsils
- 1.5 No cough or coryza (inflammation of mucus membranes in the nose)

Each of the FeverPAIN criteria score 1 point (maximum score of 5). Higher scores suggest more severe symptoms and likely bacterial (streptococcal) cause. A score of 0 or 1 is likely to be associated with a 13 to 18% likelihood of isolating streptococcus. A score of 2 or 3 is likely to be associated with a 34 to 40% likelihood of isolating streptococcus. A score of 4 or 5 is likely to be associated with a 62 to 65% likelihood of isolating streptococcus.

2. Centor criteria: consists of 4 criterions;

- 2.1 Tonsillar exudate
- 2.2 Tender anterior cervical lymphadenopathy or lymphadenitis
- 2.3 History of fever (over 38°C)
- 2.4 Absence of cough

Each of the Centor criteria score 1 point (maximum score of 4). A score of 0, 1 or 2 is likely to be associated with a 3 to 17% likelihood of isolating streptococcus. A score of 3 or 4 is likely to be associated with a 32 to 56% likelihood of isolating streptococcus.

Appendix 7 Ethical approval letters for qualitative study in Thai citizens

Ethical approval from the Cardiff School of Pharmacy and Pharmaceutical Sciences for qualitative study in Thai citizen

SPPS Ethics Approval Notification (EAN)

8/9/14 v12

**Cardiff School of Pharmacy and Pharmaceutical Sciences,
Research Ethics Approval**

This form has been signed by the School Research Ethics Officer as evidence that approval has been granted by the Cardiff School of Pharmacy and Pharmaceutical Sciences Research Ethics Committee for the following study:

Project title:	1617-38 Exploring the factors that influence antibiotic use of patients supplied from community pharmacies in Thailand
----------------	--

This is a/an:	Undergraduate project	
	ERASMUS project	
	Postgraduate project	X
	Staff project	

Name of researcher: (PG/Staff projects only)	Sisira Donsamak
Name of supervisor(s):	Dai John, Marjorie Weiss

STATEMENT OF ETHICS APPROVAL

This project has been considered and has been approved by the Cardiff School of Pharmacy and Pharmaceutical Sciences Research Ethics Committee

Signed  Name R Price-Davies Date 22/8/17
(Chair, School Research Ethics Committee)

**Ethical approval from Research Ethics Committee of Ubon Ratchathani
University, Thailand for the qualitative study in patients.**



มหาวิทยาลัยอุบลราชธานี
หนังสือฉบับนี้ให้ไว้เพื่อแสดงว่า

ชื่อข้อเสนอการวิจัย ภาษาไทย	การศึกษาปัจจัยที่มีผลต่อการใช้ยาปฏิชีวนะของผู้ป่วย ในจังหวัดอุบลราชธานี
ชื่อข้อเสนอการวิจัย ภาษาอังกฤษ	Exploring the factors that influence antibiotics use of patients in Ubon Ratchathani.
รหัสข้อเสนอการวิจัย	UBU – REC – 26 / 2560
สังกัด	คณะเภสัชศาสตร์
ผู้วิจัยหลัก	นางศศิรา ดอนสมัคร
หมายเลขใบรับรอง	UBU – REC – 26 / 2560
วันที่ให้ใบรับรอง	10 ตุลาคม 2560
วันหมดอายุใบรับรอง	11 ตุลาคม 2561

ข้อเสนอการวิจัยดังกล่าวนี้ ได้รับการพิจารณาจากคณะกรรมการ
จริยธรรมการวิจัยในมนุษย์ มหาวิทยาลัยอุบลราชธานีแล้ว คณะกรรมการ ฯ มีความเห็นว่า ข้อเสนอ
การวิจัยที่จะดำเนินการ มีความสอดคล้องกับหลักจริยธรรมสากล ตลอดจนกฎหมาย ข้อบังคับและ
ข้อกำหนดภายในประเทศ จึงเห็นสมควรให้ดำเนินการวิจัยตามข้อเสนอการวิจัยนี้ได้

(ผู้ช่วยศาสตราจารย์รองเล็ก คุณวรชาติชัย)
ประธานคณะกรรมการจริยธรรมการวิจัยในมนุษย์
มหาวิทยาลัยอุบลราชธานี

10 ต.ค. 2560

Appendix 8 Interview guide for patient interviews

Topic Guide in English

Welcome, introduce self, obtain consent, check recorder is working

Check interviewee understands purpose of project and ask if there are any questions

Remind that all answers are confidential

Once interviewee is happy to start, start recording– interviewee having confirmed they consent.

Introductory questions

- Ask about demographic characteristics of participant (age, occupation, education)

Questions related to use of antibiotics supplied from community pharmacies

- Ask about the last time they bought an antibiotic from community pharmacy, and reasons for using e.g. indication. When and what was the antibiotic? How did they take it? What happened? (outcomes)
- Ask about how did they use antibiotics and reasoning behind decisions. (This will also include exploring use of antibiotics obtained other than from a community pharmacy, if appropriate)
- Factors that influence their decision **whether or not** to obtain antibiotics from community pharmacy, direct request and/or on recommendation of pharmacist
- Their view on the advantages and disadvantages of antibiotics.

Questions related to improving appropriate use of antibiotic of patients

- Ask about views on (general) antibiotic resistance.
- Knowledge, and if known, views about antibiotic use campaign in Thailand.
- The suggestions about how appropriate use of antibiotics in community could be improved, barriers and how they might be overcome.
- Other regarding antibiotic use or antibiotic resistance that participant would like to add.

Closure and thanks.

General prompts

- Can you explain that in more detail, why do you think that?
- Can you give a more detailed description of what happened?
- Do you have any further examples of this?
- Do you think the decision you made was appropriate? Why?

Topic Guide in Thai

ผู้วิจัยกล่าวสวัสดิ์และแนะนำตัวและโครงการวิจัยรวมถึงขอคำยินยอมในการสัมภาษณ์และบันทึกข้อมูล เปิดโอกาสให้ผู้เข้าร่วมการศึกษาสอบถามข้อมูลเพิ่มเติม เริ่มการสัมภาษณ์เมื่อผู้ให้สัมภาษณ์หมดข้อซักถามและให้ความยินยอมในการเข้าร่วมการศึกษา

คำถามเบื้องต้น

- ข้อมูลทั่วไปเกี่ยวกับผู้เข้าร่วมการศึกษา เช่น อายุ ระดับการศึกษา อาชีพ

คำถามเกี่ยวกับการใช้ยาปฏิชีวนะที่ได้รับจากร้านยา

- ขอให้ท่านเล่าประสบการณ์ล่าสุดที่ได้รับปฏิชีวนะจากร้านยาว่าเกิดขึ้นเมื่อไร อาการเจ็บป่วยที่เกิดขึ้น ยาปฏิชีวนะที่ได้รับ รับประทานอย่างไร อาการหลังจากได้รับยาเป็นอย่างไร และเหตุผลที่ท่านเลือกเข้ารับบริการที่ร้านยา
- โดยปกติเมื่อใดที่ท่านตัดสินใจกินยาปฏิชีวนะ เพราะเหตุใด (รวมถึงการใช้ยาปฏิชีวนะที่ได้รับจากที่อื่นนอกเหนือจากร้านยา)
- ปัจจัยใดบ้างที่มีผลต่อการตัดสินใจขอซื้อใช้ยาปฏิชีวนะจากร้านยาด้วยตนเอง
- ท่านคิดว่ายาปฏิชีวนะมีข้อดีข้อเสียอย่างไรบ้าง

คำถามเกี่ยวกับแนวทางการส่งเสริมการใช้ยาที่เหมาะสม

- ท่านมีความคิดเห็นอย่างไรต่อเชื้อดื้อยา
- ท่านเคยทราบเกี่ยวกับโครงการส่งเสริมการใช้ยาปฏิชีวนะอย่างเหมาะสมหรือไม่ ท่านมีความคิดเห็นอย่างไรต่อโครงการดังกล่าว
- ท่านมีข้อเสนอแนะอย่างไรเกี่ยวกับการส่งเสริมการใช้ยาที่เหมาะสมในชุมชน
- ท่านมีข้อคิดเห็น หรือข้อเสนอแนะอื่นๆ ที่เกี่ยวข้องกับการใช้ยาปฏิชีวนะหรือเชื้อดื้อยาที่ต้องการเสนอเพิ่มเติมหรือไม่

ปิดการสัมภาษณ์และกล่าวขอบคุณ

คำถามเพื่อให้ผู้ถูกสัมภาษณ์แสดงความคิดเห็นเพิ่มเติม

- ขอให้อธิบายเพิ่มเติม หรือให้เหตุผลเพิ่มเติม
- ขอให้บอกรายละเอียดเพิ่มเติม
- ขอให้ยกตัวอย่างประกอบ
- ขอให้ประเมินว่าการตัดสินใจนั้นเหมาะสมหรือไม่อย่างไร

Appendix 9 Invitation flyers for the qualitative patient study.

Invitation flyers in English

My name is Sisira Donsamk and I am currently in the first year of my PhD in Pharmacy at Cardiff University in the UK. I am interested in how, when and for what reasons people use antibiotics supplied from community in Thailand as part of my PhD programme.

If you Thai resident aged 18 years or over, could read and write Thai, and have had antibiotics in the last 6-8 months, it would be appreciated if you could spare up to 30 minutes of your time in order to participate in a short interview. The interview will be conducted face to face in meeting room of University's building. However, telephone or video call (e.g. Line, Facebook, Skype) will be used if you unable to do the face to face interview.

In the interview, I will be asking about your use of antibiotics. If acceptable to you, the interview will be audio-recorded.

If you are interested please contact me at DonsamakS@cardiff.ac.uk, Tel 08-6499-8131, line ID: 0894281593, or FB: Sisira Donsamak. I will then provide you with an information sheet giving you more information about the project as well as a consent form.

Please contact me if you have any queries about the project.

Many thanks,

Sisira Donsamak

Invitation flyers in Thai

หนังสือเชิญชวนเข้าร่วมการวิจัย

ข้าพเจ้า นางศิริรา ดอนสมักร ขณะนี้กำลังศึกษาต่อหลักสูตรปริญญาเอก สาขาเภสัชศาสตร์ คณะเภสัชศาสตร์ มหาวิทยาลัยคาร์ดิฟฟ์ ประเทศเวลส์ สหราชอาณาจักร มีความสนใจศึกษาปัจจัยหรือเหตุผลในการใช้ยาปฏิชีวนะของผู้ป่วยที่ได้รับยาปฏิชีวนะจากร้านยา ซึ่งการศึกษานี้เป็นส่วนหนึ่งในการศึกษาปริญญาเอกของข้าพเจ้า

หากท่านเป็นคนไทย มีอายุ 18 ปีบริบูรณ์ขึ้นไป สามารถอ่านและเขียนภาษาไทยได้ เคยได้รับยาปฏิชีวนะจากร้านใน 8 เดือนที่ผ่านมา ข้าพเจ้าขอเชิญท่านเข้าร่วมให้ข้อมูลโดยการสัมภาษณ์ในวัน เวลาที่ท่านสะดวก โดยการสัมภาษณ์สามารถดำเนินการในรูปแบบการสัมภาษณ์ตัวต่อตัว (ในห้องประชุมย่อยของหอสมุดกลาง มหาวิทยาลัยอุบลราชธานี หรือห้องประชุมอื่นภายในมหาวิทยาลัยอุบลราชธานี ทางโทรศัพท์) หรือผ่านโปรแกรมการสนทนา เช่น Skype (สไกป์), Line (ไลน์) หรือ Facebook (เฟสบุ๊ค) โดยระหว่างการสนทนาจะมีการบันทึกการสัมภาษณ์ด้วยเครื่องบันทึกเสียง ทั้งนี้เป็นไปโดยความยินยอมของท่าน โดยการสัมภาษณ์ใช้เวลาประมาณ 30 นาที

จึงเรียนมาเพื่อขอความอนุเคราะห์จากท่านในการอนุญาตให้ข้าพเจ้าดำเนินการสัมภาษณ์ข้อมูลการวิจัย หากท่านมีคำถามที่เกี่ยวข้องกับการศึกษานี้หรือข้อเสนอแนะเพิ่มเติม หรือสนใจเข้าร่วมการศึกษา กรุณาติดต่อข้าพเจ้าได้ที่ donsamaks@cardiff.ac.uk โทร 086-4998131 เฟสบุ๊ค (Facebook) Sisira Donsamak หรือ ไลน์ไอดี (Line ID) 0894281593 ซึ่งข้าพเจ้าจะได้ส่งหนังสือชี้แจงการศึกษาและหนังสือยินยอมเข้าร่วมการศึกษาเพื่อให้ท่านทราบรายละเอียดเกี่ยวกับการศึกษาต่อไป

ขอแสดงความนับถือ

นางศิริรา ดอนสมักร

Appendix 10 Participant information sheet for the qualitative pharmacist study.

Participant Information Sheet in English

Please take the time to read through the information before deciding whether or not you wish to participate. If you have any questions please feel free to contact me, Sisira Donsamak. You can also contact (in English) one or both of the project supervisors.

Project title: Exploring the factors that influence antibiotic use of patients supplied from community pharmacies in Thailand

Research Student:

Sisira Donsamak

School of Pharmacy & Pharmaceutical Sciences, Cardiff University, [Thailand phone number], +447783664833

Email: DonsamakS@cardiff.ac.uk

Cardiff University project supervisor:

Professor Dai John

School of Pharmacy & Pharmaceutical Sciences, Cardiff University, +442920 875804

Email: JohnDN@cardiff.ac.uk

Professor Marjorie Weiss

School of Pharmacy & Pharmaceutical Sciences, Cardiff University

Email: WeissM1@cardiff.ac.uk

Funding

Thai Royal Government,

School of Pharmacy & Pharmaceutical Sciences, Cardiff University.

What is the purpose of the study?

The project aims to explore the reasons patients obtain antibiotics from community pharmacies in Thailand and how they use them.

Who will be undertaking the research?

The study is being undertaken by Sisira Donsamak, Dai John, and Marjorie Weiss. The interviews will be conducted by the researcher, Sisira Donsamak, who is a Thai native speaker.

This study has been approved by Cardiff University's School of Pharmacy and Pharmaceutical Sciences Research Ethics Committee and Research Ethics Committee of Ubon Ratchathani University, Thailand.

Why have I been invited to participate in this study?

You have been invited to take part in this study for the following reasons:

- You are Thai resident.
- You are 18 years old or older.
- You have taken antibiotics in the last 8 months.

How will the research take place?

If you consent, you will be invited to take part in the interview. With your permission, the interview will be audio-recorded. The interview will either be done face to face at a meeting room of the University, or can be conducted via telephone or video call (e.g. Line, Facebook, Skype). You do not need to take part if you do not want to. You are free to withdraw at any time and without giving a reason. Interviews will take place at a mutually convenient location and time.

I will be asking about your use of antibiotics. The interview should last no more than 30 minutes.

Do I have to take part?

The decision to take part entirely up to you. If you wish to take part I will arrange a mutually convenient time and location. You will be asked to sign the two enclosed copies of the consent form at the start of the interview. The researcher will also sign both copies. One copy of the form is for you to keep. The other copy will be retained by the research team. In case of the interview are conducted by phone or video call, you will be asked to sign the consent form, then take a photo or scan the consent form and send it to me. I will sign this consent form and send back to you.

You are free to withdraw from the study at any time without giving a reason. If you require more information before consenting please feel free to contact me (see contact details above). Contact with the research team does not commit you to participating.

How will the information collected be used?

Confidentiality will be ensured at all stages of the research process. The audio files will be kept on the password protection computer laptop during travelling. The transcripts will be anonymised. Consent forms, transcripts, and recordings will be kept securely in the School of Pharmacy & Pharmaceutical Sciences. Any information retained on university password protected computers will be anonymised (containing a reference number in place of your personal data).

Any personal details that are collected during the study will only be seen by the research team and will not be kept for any longer than 1 year.

What happens if there is a problem?

If you have any concerns or complaints during the course of this research project, please contact Professor Dai John (JohnDN@cardiff.ac.uk) who will address the issue. If you remain unhappy and wish to complain formally, you can do this by contacting the Director of Research, Andrew Westwell (WestwellA@cardiff.ac.uk), Cardiff School of Pharmacy and Pharmaceutical Sciences, Redwood Building, King Edward VII Avenue, Cardiff CF10 3NB.

You also complain through the Office of Research Promotion and Management, Office of the President, Ubon Ratchathani University, Warin Chamrab, Ubon Ratchathani, 34190, Tel. 08-6471-0582.

Who to contact for more information?

Please feel free to contact me in Thai or the other researcher in English if you have any further questions.

Participant Information Sheet in Thai

เอกสารชี้แจงผู้เข้าร่วมวิจัย สำหรับผู้เข้าร่วมวิจัยที่มีอายุ 18 ปีบริบูรณ์ขึ้นไป
(Participant Information Sheet)

โปรดอ่านเอกสารชี้แจงฉบับนี้ก่อนตัดสินใจเข้าร่วมหรือไม่เข้าในการศึกษา หากท่านมีข้อสงสัย โปรดสอบถามหัวหน้าโครงการวิจัย (ศิริรา ดอนสมัคร) หรือที่ปรึกษางานวิจัย (ภาษาอังกฤษ) ให้ช่วยอธิบายจนกว่าจะเข้าใจดี ท่านจะได้รับเอกสารนี้กลับไปอ่านที่บ้านเพื่อปรึกษากับญาติพี่น้อง เพื่อนสนิท หรือผู้อื่นที่ท่านต้องการปรึกษา เพื่อช่วยในการตัดสินใจเข้าร่วมการวิจัย

ชื่อโครงการ การศึกษาปัจจัยที่มีผลต่อการใช้ยาปฏิชีวนะของผู้ป่วย ในจังหวัดอุบลราชธานี

ชื่อผู้วิจัย นางศิริรา ดอนสมัคร

คณะเภสัชศาสตร์ มหาวิทยาลัยคาร์ดิฟฟ์ ประเทศเวลส์ สหราชอาณาจักร โทรศัพท์ +447783664833

E-mail: Donsamak@cardiff.ac.uk, sisira.d@ubu.ac.th

Line ID: 0894281593

Facebook: Sisira Donsamak

อาจารย์ที่ปรึกษางานวิจัย

ศาสตราจารย์ ได จอห์น

คณะเภสัชศาสตร์ มหาวิทยาลัยคาร์ดิฟฟ์ ประเทศเวลส์ สหราชอาณาจักร โทรศัพท์ +442920 875804

E-mail: JohnDN@cardiff.ac.uk

ศาสตราจารย์ มาร์จอรี เวสส์

คณะเภสัชศาสตร์ มหาวิทยาลัยคาร์ดิฟฟ์ ประเทศเวลส์ สหราชอาณาจักร

E-mail: WeissM1@cardiff.ac.uk

ผู้ให้ทุน รัฐบาลไทย และมหาวิทยาลัยคาร์ดิฟฟ์ ประเทศเวลส์ สหราชอาณาจักร

วัตถุประสงค์การศึกษา

การศึกษานี้มีวัตถุประสงค์เพื่อศึกษาปัจจัยที่มีผลต่อการใช้ยาปฏิชีวนะของผู้ป่วยที่มารับบริการในร้านยา โดยผู้วิจัยหวังว่า ผลการศึกษาในครั้งนี้จะเป็นประโยชน์ในการนำไปใช้ในการปรับปรุงการใช้ยาปฏิชีวนะของผู้ป่วยให้มีความเหมาะสมมากยิ่งขึ้น

ผู้ดำเนินการศึกษา

การวิจัยนี้ดำเนินการศึกษาโดย นางศิริรา ดอนสมัคร นักศึกษาปริญญาเอก สาขาเภสัชกรรม คณะเภสัชศาสตร์ มหาวิทยาลัยคาร์ดิฟฟ์ ภายใต้การควบคุมดูแลของอาจารย์ที่ปรึกษา ศาสตราจารย์ ได จอห์น และศาสตราจารย์ มาร์จอรี เวสส์ โดยการสัมภาษณ์ดำเนินการเป็นภาษาไทย โดยผู้วิจัย นางศิริรา ดอนสมัคร

โครงการวิจัยนี้ได้รับการพิจารณารับรอง จากคณะกรรมการจริยธรรมการวิจัยในมนุษย์ของมหาวิทยาลัยอุบลราชธานี และคณะกรรมการจริยธรรมการวิจัยในมนุษย์ คณะเภสัชศาสตร์ มหาวิทยาลัยคาร์ดิฟฟ์

ท่านได้รับเชิญเข้าร่วมโครงการเพราะคุณสมบัติต่อไปนี้

ท่านได้รับเชิญเข้าร่วมการศึกษานี้เนื่องจากเหตุผลดังต่อไปนี้

- ท่านเป็นคนไทย
- ท่านมีอายุตั้งแต่ 18 ปีบริบูรณ์ขึ้นไป
- ท่านเคยได้รับยาปฏิชีวนะจากร้านยาอย่างน้อย 1 ครั้ง ภายใน 8 เดือนที่ผ่านมา

การดำเนินการสัมภาษณ์เก็บข้อมูล

หากท่านให้ความยินยอมในการเข้าร่วมการศึกษา ท่านจะถูกเชิญให้สัมภาษณ์โดยจะมีการบันทึกเสียงระหว่างการสัมภาษณ์ ซึ่งการสัมภาษณ์จะเป็นแบบตัวต่อตัว ณ ห้องประชุมย่อยของสำนักวิทยบริการ มหาวิทยาลัยอุบลราชธานี (หอสมุดกลาง) หรือห้องประชุมอื่นของมหาวิทยาลัยอุบลราชธานี หรือโทรศัพท์ หรือ การสัมภาษณ์ผ่านระบบการสนทนาแบบเห็นภาพ (video call) เช่น Skype (สไกป์) , Line (ไลน์), Facebook (เฟสบุ๊ค) เป็นต้น การสัมภาษณ์จะดำเนินการในวัน เวลา ที่ท่านสะดวก โดยการสัมภาษณ์คาดว่าจะใช้เวลาประมาณ 30 นาที

ในการศึกษานี้ท่านจะถูกถามเกี่ยวกับการใช้ยาปฏิชีวนะของท่านที่ผ่านมา ซึ่งอาจทำให้ท่านไม่สบายใจในการตอบคำถามบางข้อ หากมีคำถามที่ทำให้ท่านไม่สบายใจหากท่านไม่สะดวกในการตอบคำถามใดๆ ท่านสามารถปฏิเสธการตอบคำถามดังกล่าวได้ หรือหากท่านไม่ประสงค์จะให้ข้อมูล ท่านสามารถถอนตัวจากการศึกษาเมื่อใดก็ได้ โดยไม่จำเป็นต้องให้เหตุผล

ความสมัครใจในการร่วมให้ข้อมูล

การตัดสินใจเข้าร่วมการศึกษานี้เป็นไปโดยความสมัครใจของท่านเท่านั้น หากท่านประสงค์จะเข้าร่วมการศึกษา ผู้วิจัยจะขอคืนวัน เวลา สถานที่ที่ท่านสะดวกในการให้ข้อมูล ท่านสามารถถอนตัวจากการศึกษาเมื่อใดก็ได้ โดยไม่จำเป็นต้องให้เหตุผล หรือแจ้งให้ผู้วิจัยทราบล่วงหน้า ก่อนการสัมภาษณ์เริ่มต้นผู้วิจัยจะขอให้ท่านลงชื่อในใบยินยอมเข้าร่วมการศึกษารายชื่อ 2 ชุด เช่นเดียวกับผู้วิจัย โดยเอกสาร 1 ชุด ผู้วิจัยจะมอบให้ท่านเป็นผู้เก็บรักษา และทีมผู้วิจัยเป็นผู้เก็บไว้ 1 ชุด การเข้าร่วมการศึกษานี้ท่านจะไม่ได้รับค่าตอบแทนใดๆ และไม่ได้รับผิดชอบค่าใช้จ่ายใดๆ ทั้งสิ้น

การเก็บรักษาความลับของข้อมูลส่วนบุคคลและการนำข้อมูลไปใช้

ข้อมูลส่วนตัวของผู้เข้าร่วมวิจัยจะถูกเก็บเป็นความลับในทุกขั้นตอนของการวิจัย ดังนี้

- ไฟล์บันทึกเสียงการสัมภาษณ์จะเก็บไว้ในคอมพิวเตอร์พกพาที่มีการกำหนดรหัสผ่านสำหรับการเข้าใช้ก่อนที่จะถูกถอดความ
- ข้อมูลที่ได้หลังจากการถอดความจากการบันทึกเสียง จะไม่มีการระบุข้อมูลส่วนตัวของผู้ให้สัมภาษณ์ซึ่งนำไปสู่การระบุตัวตนของผู้ให้ข้อมูล และจะเก็บไว้ในคอมพิวเตอร์พกพาที่มีรหัสผ่านสำหรับการเข้าใช้งาน
- หนังสือยินยอมเข้าร่วมการศึกษา ข้อมูลจากการสัมภาษณ์ เครื่องบันทึกเสียง จะได้รับการเก็บในชั้นที่มีกุญแจล็อก และเก็บรักษาในคณะเภสัชศาสตร์ มหาวิทยาลัยคาร์ดิฟฟ์ (School of Pharmacy and Pharmaceutical Sciences, Cardiff University) ซึ่งมีระบบการรักษาความปลอดภัย
- เฉพาะทีมผู้วิจัยเท่านั้นที่มีสิทธิ์เข้าถึงข้อมูลส่วนตัวของผู้เข้าร่วมการศึกษา ซึ่งข้อมูลนี้จะเก็บไว้ไม่เกิน 1 ปี
- ข้อมูลที่ได้จะถูกนำไปวิเคราะห์และสำเนาในภาพรวม ข้อความในการสนทนาบางตอนอาจถูกอ้างอิงในรายงานแต่จะไม่ระบุชื่อของผู้ให้สัมภาษณ์ และไม่มีข้อมูลใดๆ ที่จะนำไปสู่การระบุตัวผู้เข้าร่วมวิจัย

กรณีเกิดปัญหาหรือข้อสงสัย

โครงการวิจัยนี้ได้รับการพิจารณารับรอง จากคณะกรรมการจริยธรรมการวิจัยในมนุษย์ของมหาวิทยาลัยอุบลราชธานี และคณะกรรมการจริยธรรมการวิจัยในมนุษย์ คณะเภสัชศาสตร์ มหาวิทยาลัยคาร์ดิฟฟ์

หากท่านมีข้อสงสัยในระหว่างโครงการวิจัยนี้โปรดติดต่อ Professor Dai John (JohnDN@cardiff.ac.uk) ซึ่งจะเป็นผู้ดำเนินการแก้ไขปัญหาให้ท่าน หากท่านยังไม่สบายใจ ได้รับการปฏิบัติไม่ตรงตามที่ระบุ หรือมีข้อร้องเรียน และต้องการร้องเรียนอย่างเป็นทางการ ท่านสามารถดำเนินการได้โดยติดต่อผู้อำนวยการฝ่ายวิจัย Andrew Westwell (WestwellA@cardiff.ac.uk), Cardiff School of Pharmacy and Pharmaceutical Sciences, Redwood Building, King Edward VII Avenue, Cardiff CF10 3NB

หรือกรุณาติดต่อ สำนักงานส่งเสริมบริหารงานวิจัยฯ มหาวิทยาลัยอุบลราชธานี อำเภอวารินชำราบ จังหวัดอุบลราชธานี 34190 หมายเลขโทรศัพท์ 086-4710582

กรณีต้องการข้อมูลเพิ่มเติม

กรุณาติดต่อผู้วิจัย นางศิริรา ตอนสมศรี ตามช่องทางการติดต่อที่ระบุไว้ข้างต้น หากท่านต้องการข้อมูลเพิ่มเติม

Appendix 11 Consent form for the qualitative pharmacist study.

Consent Form in English

Please read the following statements and initial the boxes next to the statements if you agree to give your consent:

1. I confirm that I have read, understood and had time to consider the information the participant information sheet (Version 0.0_29 Jun 2017) for this study.

1. I have had the opportunity to ask questions and have had these answered satisfactorily.

2. I understand that taking part in this study is voluntary and I am free to withdraw at any time.

3. I give consent for my interview (face to face, Skype, Line, Messenger or telephone) to be audio-recorded.

4. I understand that verbatim quotes may be used in reports and/or publications and if so, they will be anonymised.

5. I agree to be contacted by the researchers, for example, if clarification is needed regarding any points discussed during the interview.

Participant details

Name (please print):

Email address:

Signature:

Date:

Researcher details:

Name:

Signature:

Date:

Consent form in Thai

หนังสือแสดงเจตนายินยอมเข้าร่วมการวิจัยโดยได้รับการบอกกล่าวและเต็มใจ

กรุณาทำเครื่องหมาย ในช่อง

1. ข้าพเจ้าได้รับทราบรายละเอียดเกี่ยวกับที่มาและวัตถุประสงค์ในการทำวิจัย โดยได้อ่านรายละเอียดในเอกสารชี้แจงผู้เข้าร่วมงานวิจัย (Version 0.2_21 Aug 2017) โดยตลอด และได้รับคำอธิบายจากผู้วิจัยจนเข้าใจเป็นอย่างดีแล้ว
2. ข้าพเจ้าได้มีโอกาสในการซักถามเกี่ยวกับการศึกษา และได้รับคำตอบจนเป็นที่พอใจแล้ว
3. ข้าพเจ้ายินยอมเข้าร่วมโครงการวิจัยนี้ด้วยความสมัครใจ ข้าพเจ้ามีสิทธิจะบอกเลิกการร่วมโครงการวิจัยเมื่อใดก็ได้ และการบอกเลิกการร่วมโครงการวิจัยจะไม่มีผลกระทบใดๆ ทุกประการ
4. ข้าพเจ้ายินยอมให้สัมภาษณ์โดยมีการบันทึกการสนทนาที่เกิดขึ้นด้วยเครื่องบันทึกเสียง
5. ข้าพเจ้ารับทราบว่า ข้อความในการสนทนาบางตอนอาจถูกอ้างอิงในรายงานวิทยานิพนธ์หรือผลงานเผยแพร่ทางวิชาการโดยจะนำเสนอภาพรวมโดยไม่ระบุชื่อของผู้ให้สัมภาษณ์แต่อย่างใด และไม่มีข้อมูลๆ ที่จะนำไปสู่การระบุตัวข้าพเจ้า
6. ข้าพเจ้ายินยอมให้ผู้วิจัยติดต่อข้าพเจ้าหากจำเป็น เช่น การสอบถามเพื่อให้ความกระจ่างในข้อมูลที่ให้สัมภาษณ์ไว้
7. ข้าพเจ้าได้อ่านข้อความข้างต้นแล้ว มีความเข้าใจดีทุกประการ และลงนามยินยอมด้วยความเต็มใจ

ผู้เข้าร่วมการวิจัย:

ชื่อ - สกุล (ตัวบรรจง):

อีเมล:

ลายเซ็น:

วันที่:

ผู้วิจัย:

ชื่อ - สกุล (ตัวบรรจง):

ลายเซ็น:

วันที่:

Appendix 12 Ethical approval survey study.

Ethical approval from the Cardiff School of Pharmacy and Pharmaceutical Sciences for survey study

SPPS Ethics Approval Notification (EAN)

8/9/14 v12

**Cardiff School of Pharmacy and Pharmaceutical Sciences,
Research Ethics Approval**

This form has been signed by the School Research Ethics Officer as evidence that approval has been granted by the Cardiff School of Pharmacy and Pharmaceutical Sciences Research Ethics Committee for the following study:

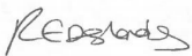
Project title:	1819-22: Exploring the factors that influence the supply of antibiotics by community pharmacists in Thailand.
----------------	---

This is a/an:	Undergraduate project	
	ERASMUS project	
	Postgraduate project	X
	Staff project	

Name of researcher: (PG/Staff projects only)	Sisira Donsamak
Name of supervisor(s):	Dai John and Marjorie Weiss

STATEMENT OF ETHICS APPROVAL

This project has been considered and has been approved by the Cardiff School of Pharmacy and Pharmaceutical Sciences Research Ethics Committee

Signed  Name R Deslandes Date 22/07/19
(Chair, School Research Ethics Committee)

Cardiff School of Pharmacy and Pharmaceutical Sciences, Research Ethics Approval

AMENDMENT APPROVAL

This form has been signed by the School Research Ethics Officer as evidence that approval has been granted by the Cardiff School of Pharmacy and Pharmaceutical Sciences Research Ethics Committee for amendment(s) to the following study:

Project ref and title:	1819-22: Exploring the factors that influence the supply of antibiotics by community pharmacists in Thailand.
------------------------	---

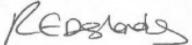
Name of researcher: (PG/Staff projects only)	Sisira Donsamak
Name of supervisor(s):	Dai John and Marjorie Weiss

The amendment(s) dated 18 Sep 2019 have been reviewed and approved.

Any further amendments will require approval.

STATEMENT OF ETHICS APPROVAL

The proposed amendment(s) have been considered and approved by the Cardiff School of Pharmacy and Pharmaceutical Sciences Research Ethics Committee

Signed  Name R Deslandes Date 23/09/19
(Chair, School Research Ethics Committee)

Ethical approval from the *Cardiff* School of Pharmacy and Pharmaceutical Sciences for survey study



มหาวิทยาลัยอุบลราชธานี
หนังสือฉบับนี้ให้ไว้เพื่อแสดงว่า

ชื่อข้อเสนอการวิจัย ภาษาไทย	การสำรวจปัจจัยที่มีผลต่อการจ่ายยาปฏิชีวนะของเภสัชกรในร้านยาในประเทศไทย
ชื่อข้อเสนอการวิจัย ภาษาอังกฤษ	Exploring the factors that influence the supply of antibiotic by community pharmacists in Thailand.
รหัสข้อเสนอการวิจัย	UBU – REC – 28 / 2562
สังกัด	คณะเภสัชศาสตร์
ผู้วิจัยหลัก	นางศศิรา ตอนสมัคร
หมายเลขใบรับรอง	UBU – REC – 28 / 2562
วันที่ให้ใบรับรอง	12 กรกฎาคม 2562

ข้อเสนอการวิจัยดังกล่าวนี้ ได้รับการพิจารณาจากคณะกรรมการจริยธรรมการวิจัยในมนุษย์ มหาวิทยาลัยอุบลราชธานีแล้ว คณะกรรมการฯ มีความเห็นว่า ข้อเสนอการวิจัยที่จะดำเนินการ มีความสอดคล้องกับหลักจริยธรรมสากล ตลอดจนกฎหมาย ข้อบังคับและข้อกำหนดภายในประเทศ จึงเห็นสมควรให้ดำเนินการวิจัยตามข้อเสนอการวิจัยนี้ได้

(ผู้ช่วยศาสตราจารย์น้องเล็ก คุณวรชาติชัย)
ประธานคณะกรรมการจริยธรรมการวิจัยในมนุษย์
มหาวิทยาลัยอุบลราชธานี
12 ก.ค. 2562

Appendix 13 Questionnaire for pilot study: English and Thai version.

Questionnaire for community pharmacist's views and practice towards antibiotics usage and antibiotic resistance

This survey asks about your opinions on antibiotics use in community pharmacy. Your responses will be useful to raise appropriate antibiotic use in the communities.

Notes for completion

- Taking part in the **survey is voluntary.**
 - A pharmacist who works at the pharmacy, please complete the questionnaire. In case that there are more than one pharmacist work at the pharmacy, please only one pharmacist responses to the questionnaire.
 - The questionnaire should take **around fifteen minutes to complete.**
 - All data collected in this survey will be analysed and reported in overview without identifiable data.
 - Please complete this survey and return it to the researcher ***or*** complete the questionnaire online (**link and or QR code was provided**)
-

Part 1: Views regarding antibiotic supply and antimicrobial resistance

1. Based on your experiences, would you recommend antibiotics treatment for the following cases?

(Note: For each scenario below, the patient or caregiver presents at your pharmacy with the specified symptoms and does **not** ask for a specific medicine. Please assume that they can afford the cost of medicines. In each case the person with symptoms has no comorbidity or undiagnosed underlying disease, uses **no** other medication and has **no** history of drug allergy or intolerance).

Please complete the information in the spaces provided if you would provide an antibiotic in the circumstances described. Please tick no if you would not recommend an antibiotic.

a. 6-year-old boy, weight 20 kg, presenting with a sore throat for 2 days accompanied by mild fever, productive cough with thick and coloured discharge. There are no other symptoms. <input type="checkbox"/> No <input type="checkbox"/> Yes, Drug..... dose.....mg, times/day, for.....day(s).
b. 14-year-old girl presenting with sore throat for 2 days, accompanied by high grade fever, no cough, no runny nose or any other symptoms. She is not pregnant or breast-feeding and has are no other symptoms. <input type="checkbox"/> No <input type="checkbox"/> Yes, Drug..... dose.....mg, times/day, for.....day(s).

<p>c. 43-year-old man with a severe sore throat for 2 days accompanied by high grade fever, tender lymph nodes, pus on tonsils but no cough. There are no other symptoms</p> <p><input type="checkbox"/> No</p> <p><input type="checkbox"/> Yes, Drug..... dose.....mg, times/day, for.....day(s).</p>
<p>d. 70 year-old-woman with watery stool 3 times within the last 12 hours, no fever and no other symptoms. There are no signs of dehydration.</p> <p><input type="checkbox"/> No</p> <p><input type="checkbox"/> Yes, Drug..... dose.....mg, times/day, for.....day(s).</p>
<p>e. 30 year-old-woman with diarrhoea with blood visible in stools since yesterday evening, accompanied with high grade fever, and abdominal cramps. She is not pregnant or breast-feeding and has are no other symptoms.</p> <p><input type="checkbox"/> No</p> <p><input type="checkbox"/> Yes, Drug..... dose.....mg, times/day, for.....day(s).</p>
<p>f. 3 year-old-boy, weight 15 kg, with watery stool 4 times within the last 10 hours accompanied by mild fever, nausea and mild abdominal pain. There is no sign of dehydration and there are no other symptoms.</p> <p><input type="checkbox"/> No</p> <p><input type="checkbox"/> Yes, Drug..... dose.....mg, times/day, for.....day(s).</p>
<p>g. 35 year-old-man who had a motorcycle accident (about 15 minutes earlier) with many minor, superficial scratches on the left arm and left leg.</p> <p><input type="checkbox"/> No</p> <p><input type="checkbox"/> Yes, Drug..... dose.....mg, times/day, for.....day(s).</p>
<p>h. 7-year-old-girl who has a fresh, thin, shallow cut wound on left index finger about 1 cm long, which happened about 30 minutes earlier.</p> <p><input type="checkbox"/> No</p> <p><input type="checkbox"/> Yes, Drug..... dose.....mg, times/day, for.....day(s).</p>
<p>i. 50-year-old man who has a shallow wound on the right calf, about 1 cm in diameter. He had a cut wound by barbed wire about 4 days ago. The skin surrounding the wound has become red, swollen and sore, and with pus. The patient confirmed that he had a recent tetanus vaccination booster.</p> <p><input type="checkbox"/> No</p> <p><input type="checkbox"/> Yes, Drug..... dose.....mg, times/day, for.....day(s).</p>

2. Based on your experience, please check the box that most closely relates to your views for each statement (a to r) in the table below.
(1-strongly disagree, 2-disagree, 3-neutral, 4-agree, 5-strongly agree)

	1	2	3	4	5
a. Antibiotic resistance is an important problem in the hospital setting but <u>not</u> a problem in the community.					
b. Antibiotics cure a patient with a sore throat more quickly than not having an antibiotic, so they can return to work sooner.					
c. The ease of availability of antibiotics from community pharmacies contributes to the problem of antibiotic resistance in Thailand.					
d. If I am unsure whether or not a patient has a bacterial infection, I will supply an antibiotic just in case it is.					
e. If I am in doubt which antibiotic is best for a patient, I will supply a newer one, just in case.					
f. I supply antibiotics when patients request them specifically because if I don't supply them, they will just go to another pharmacy.					
g. Antibiotics cure a patient with diarrhoea more quickly than not having an antibiotic, so they can return to work sooner.					
h. It is important for pharmacists to only supply antibiotics when clinically needed, and <u>not</u> be driven by commercial pressures.					
i. When the pharmacy is busy, I am more likely to supply antibiotics if a customer asks specifically for an antibiotic, compared to when the pharmacy is quiet.					
j. It is important to supply a full course of antibiotics to a patient at the time, even when the patient says it is too expensive.					
k. I am happy to supply an antibiotic without further questioning if a patient requests one by name.					
l. Antibiotic resistance is an important problem in the community setting.					
m. I supply antibiotics <u>only</u> if I am certain that a patient has a bacterial infection.					
n. Antibiotic resistance resulting from the supply of antibiotics from community pharmacies is <u>not</u> a significant problem.					
o. Community pharmacists have an important role to play to reduce the problem of antibiotic resistance.					
p. In cases where patients have <u>no</u> drug allergy history and <u>no</u> contraindication, I will supply a first line antibiotic as recommended in practice guidelines.					

	1	2	3	4	5
q. If a patient cannot afford a full course of antibiotics all in one go, I will give them a smaller amount they are able to afford at that time, even when a longer duration of treatment is required					
r. It is good practice for patients to keep a supply of antibiotics at home in case they need them.					

3. For each statement below please check the box that most closely matches your view regarding its **priority** as a strategy to improve appropriate antibiotic use in the community pharmacy setting in Thailand.

(1-Not a priority, 2-low priority, 3-medium priority, 4-high priority, 5-very high priority)

Items	1	2	3	4	5
a. Patient education by pharmacists in community pharmacies at the time medicines are supplied to patients.					
b. Raising awareness of rational antibiotic use, including antimicrobial resistance, among the public through media such as TV, radio and social media.					
c. Educational programs of rational antibiotic use, including antimicrobial resistance, directed at the public.					
d. Raising awareness of rational antibiotic use, including antimicrobial resistance, among community pharmacists.					
e. Raising awareness of rational antibiotic use, including antimicrobial resistance, among pharmacy students.					
f. Providing regularly updated clinical practice guidelines to community pharmacies on the treatment of infectious diseases.					
g. Reclassification of all antibiotics as prescription-only.					
h. Enforcement of regulations which prohibit supply of antibiotics from non-pharmacies, and by non-pharmacists.					
i. Providing monetary incentives for community pharmacies to be involved in antibiotic use campaigns					

4. Do you have any other comments/views about antibiotics, and/or antibiotic resistance and/or how to improve rational antibiotic use in Thailand?

.....

.....

.....

.....

.....

Part 2: Demographic data of the pharmacy

Please check the box(es) or fill in the blank that most closely relates to this pharmacy. If you work for more than one pharmacy, please provide responses relating to the pharmacy to which this questionnaire has been sent.

5. Type of your pharmacy
 - Independent pharmacy
 - Chain pharmacy
6. Is your pharmacy an accredited pharmacy?
 - No
 - Yes
7. Your pharmacy location: Postcode.....
8. Is there any competitor Type I pharmacy closed to this pharmacy?
 - No
 - Yes, please specify the distance from your pharmacy to the nearest onemetres.
9. Is there any competitor non-Type I pharmacy that sells antibiotics (e.g. Type II pharmacy, grocery store) close to this pharmacy?
 - No
 - Yes, please specify the distance from your pharmacy to the nearest onemetres.
10. Have you taken part in an antibiotic awareness campaign to promote the rational use of antibiotics such as Antibiotic Smart Use (ASU) or Rational Drug Use (RDU)?
 - Yes
 - No, please provide the reason by ticking the box(es) as appropriate. Tick all that apply
 - I have never heard about such campaigns
 - I do not have enough time to participate
 - I was not interested in participating in the campaign
 - There was no payment
 - Other, please specify.....

Part 3: Demographic data of the respondent

Please check the box(es) or fill in the blank that most related with you.

11. Your role at the pharmacy

- Owner and full-time pharmacist
- Owner and part time pharmacist
- Employee and full-time pharmacist
- Employee and time pharmacist

12. Gender

- Male Female

13. Age..... Years-old

14. Length of your experience working in the community pharmacy sector.....Years

15. Highest education

- Bachelor of Pharmacy
- Pharm D.
- Other, please specify.....

******Thank you for completing this questionnaire******

**แบบสอบถามความคิดเห็นเภสัชกรร้านยาเกี่ยวกับ
การใช้ยาปฏิชีวนะและการดื้อยาปฏิชีวนะของแบคทีเรีย**

แบบสอบถามชุดนี้มีวัตถุประสงค์เพื่อสอบถามความคิดเห็นเกี่ยวกับการใช้ยาปฏิชีวนะในร้านยา โดยผู้วิจัยหวังว่า ข้อมูลที่ได้รับจะสามารถนำไปใช้เพื่อให้เกิดประโยชน์ในการส่งเสริมให้การใช้ยาปฏิชีวนะอย่างเหมาะสมต่อไป

คำชี้แจง

- การตอบแบบสอบถามนี้เป็นไปตามความสมัครใจของท่าน
- ขอความร่วมมือจากเภสัชกรที่ปฏิบัติหน้าที่ในร้านยาในการให้ข้อมูลและความคิดเห็น ในกรณีที่ร้านยามีเภสัชกรปฏิบัติหน้าที่มากกว่า 1 ท่าน ขอให้เภสัชกรเภสัชกรเพียง 1 ท่านเป็นผู้ตอบแบบสอบถาม
- แบบสอบถามนี้ใช้เวลาในการตอบ **ประมาณ 15 นาที**
- แบบสอบถามนี้เป็นส่วนหนึ่งของวิทยานิพนธ์ระดับปริญญาเอกของผู้วิจัยข้อมูลที่ได้จากการตอบ
- แบบสอบถามนี้จะถูกวิเคราะห์และนำเสนอในภาพรวม โดยไม่มีข้อมูลส่วนหนึ่งส่วนใดที่สามารถบ่งชี้ถึงข้อมูลเฉพาะของแต่ละร้านหรือผู้ตอบแบบสอบถาม
- ท่านสามารถตอบแบบสอบถามและส่งกลับโดยใช้ซองจดหมายติดแสตมป์ที่แนบมาพร้อมกันนี้ **หรือ**สามารถเข้าไปตอบได้ที่

<https://cardiff.onlinesurveys.ac.uk/pilotstudy> หรือ โดยเลือกตอบเพียงช่องทางเดียว



หากท่านมีข้อสงสัยหรือต้องการติดต่อผู้วิจัย สามารถติดต่อได้ทาง donsamaks@cardiff.ac.uk

ส่วนที่ 1 ความคิดเห็นเกี่ยวกับการจ่ายยาปฏิชีวนะและเชื้อดื้อยา

1. **จากประสบการณ์ของท่าน** ท่านจะแนะนำยาปฏิชีวนะสำหรับผู้ป่วยที่มีอาการดังต่อไปนี้หรือไม่ (หมายเหตุ: จากสถานการณ์ที่กำหนด ผู้ป่วยหรือผู้ดูแลมาร้านยาและบอกรายละเอียดอาการโดยไม่ได้ระบุว่าต้องการยาใดเป็นพิเศษ และไม่มีปัญหาด้านเศรษฐกิจในการชำระค่ายา ในแต่ละสถานการณ์ผู้ป่วยไม่มีโรคร่วมอื่นๆ **ไม่ได้**อยู่ระหว่างการใช้ยาใดๆ และ**ไม่มี**ประวัติการแพ้ยา)

a. เด็กชายอายุ 6 ปี น้ำหนัก 20 kg มีอาการเจ็บคอมา 2 วัน มีไข้ ไอมีเสมหะข้นสีเขียว
<input type="checkbox"/> ไม่จ่ายยาปฏิชีวนะ
<input type="checkbox"/> จ่ายยาปฏิชีวนะ ชื่อยา..... ขนาดยา..... mg ครั้ง/วัน เป็นเวลา.....วัน
b. เด็กหญิงอายุ 14 ปี มีอาการเจ็บคอมา 2 วัน ตัวร้อนมาก ไม่ไอ ไม่มีน้ำมูก
<input type="checkbox"/> ไม่จ่ายยาปฏิชีวนะ
<input type="checkbox"/> จ่ายยาปฏิชีวนะ ชื่อยา..... ขนาดยา..... mg ครั้ง/วัน เป็นเวลา.....วัน

<p>c. ชายอายุ 43 ปี เจ็บคอมากมา 2 วัน ตัวร้อนมาก ไม่ไอ ต่อมทอนซิลที่คอบวม มีตุ่มหนองที่ต่อมทอนซิล</p> <p><input type="checkbox"/> ไม่จ่ายยาปฏิชีวนะ</p> <p><input type="checkbox"/> จ่ายยาปฏิชีวนะ ชื่อยา..... ขนาดยา..... mg ครั้ง/วัน เป็นเวลา.....วัน</p>
<p>d. หญิงอายุ 70 ปี ถ่ายเหลวเป็นน้ำ 3 ครั้งใน 12 ชั่วโมงที่ผ่านมา ไม่มีไข้ ไม่มีอาการอื่นๆ ร่วมด้วย และไม่มีอาการแสดงของภาวะขาดน้ำ</p> <p><input type="checkbox"/> ไม่จ่ายยาปฏิชีวนะ</p> <p><input type="checkbox"/> จ่ายยาปฏิชีวนะ ชื่อยา..... ขนาดยา..... mg ครั้ง/วัน เป็นเวลา.....วัน</p>
<p>e. หญิงอายุ 30 ปี มีอาการท้องเสีย มีเลือดปนในอุจจาระ เริ่มมีอาการเมื่อบริโภคอาหารเย็น ตัวร้อนมาก และมีอาการปวดเกร็งช่องท้อง</p> <p><input type="checkbox"/> ไม่จ่ายยาปฏิชีวนะ</p> <p><input type="checkbox"/> จ่ายยาปฏิชีวนะ ชื่อยา..... ขนาดยา..... mg ครั้ง/วัน เป็นเวลา.....วัน</p>
<p>f. เด็กชายอายุ 3 ปี น้ำหนัก 15 kg ถ่ายเหลวเป็นน้ำ 4 ครั้ง ใน 10 ชั่วโมงที่ผ่านมา มีไข้ ผู้ปกครองสังเกตเห็นว่ามีอาการคลื่นไส้ ปวดท้องเล็กน้อย ไม่มีอาการของภาวะขาดน้ำ</p> <p><input type="checkbox"/> ไม่จ่ายยาปฏิชีวนะ</p> <p><input type="checkbox"/> จ่ายยาปฏิชีวนะ ชื่อยา..... ขนาดยา..... mg ครั้ง/วัน เป็นเวลา.....วัน</p>
<p>g. ชายไทยอายุ 35 ปี ประสบอุบัติเหตุรถจักรยานยนต์ (ประมาณ 15 นาทีที่ผ่านมา) มีแผลถลอกที่แขนซ้ายและขาซ้าย</p> <p><input type="checkbox"/> ไม่จ่ายยาปฏิชีวนะ</p> <p><input type="checkbox"/> จ่ายยาปฏิชีวนะ ชื่อยา..... ขนาดยา..... mg ครั้ง/วัน เป็นเวลา.....วัน</p>
<p>h. เด็กหญิงอายุ 7 ปี น้ำหนัก 20 kg มีแผลสดจากการถูกมีดบาด เป็นแผลบาดตื้นขนาดประมาณ 1 เซนติเมตรที่นิ้วชี้ซ้าย เมื่อประมาณ 30 นาทีที่ผ่านมา</p> <p><input type="checkbox"/> ไม่จ่ายยาปฏิชีวนะ</p> <p><input type="checkbox"/> จ่ายยาปฏิชีวนะ ชื่อยา..... ขนาดยา..... mg ครั้ง/วัน เป็นเวลา.....วัน</p>
<p>i. ชายไทยอายุ 50 ปี มีแผลตื้นขนาดประมาณ 1 เซนติเมตรที่น่องขาขวา เป็นแผลถูกบาดเมื่อประมาณ 4 วันก่อน ตอนนั้นแผลเริ่มบวม แดง มีอาการปวดและมีหนองที่แผล ผู้ป่วยได้รับวัคซีนบาดทะยักเมื่อไม่นานมานี้</p> <p><input type="checkbox"/> ไม่จ่ายยาปฏิชีวนะ</p> <p><input type="checkbox"/> จ่ายยาปฏิชีวนะ ชื่อยา..... ขนาดยา..... mg ครั้ง/วัน เป็นเวลา.....วัน</p>

2. จากประสบการณ์ของท่านโปรดทำเครื่องหมายในช่องที่ตรงกับความคิดเห็นของท่านมากที่สุด

(1-ไม่เห็นด้วยอย่างยิ่ง 2-ไม่เห็นด้วย 3-เฉยๆ 4-เห็นด้วย 5-เห็นด้วยอย่างยิ่ง)					
	1	2	3	4	5
a. เชื้อดื้อยาปฏิชีวนะเป็นปัญหาสำคัญในโรงพยาบาลเท่านั้น ไม่ใช่ ปัญหาสำคัญในชุมชน					
b. ยาปฏิชีวนะรักษาผู้ป่วยที่มีอาการเจ็บคอให้หายเร็วกว่าไม่ได้รับยาปฏิชีวนะ ทำให้ผู้ป่วยกลับไปทำงานได้เร็วขึ้น					
c. การเข้าถึงยาปฏิชีวนะได้ง่ายจากร้านยาส่งผลให้เกิดปัญหาเชื้อดื้อยาปฏิชีวนะในประเทศไทย					
d. หากท่านไม่แน่ใจว่าผู้ป่วยติดเชื้อแบคทีเรียหรือไม่ ท่านจะจ่ายยาปฏิชีวนะไปก่อน					
e. หากท่านไม่มั่นใจว่ายาปฏิชีวนะใดที่ดีที่สุดสำหรับผู้ป่วย ท่านจะจ่ายยาปฏิชีวนะตัวที่ออกใหม่กว่า					
f. ท่านจ่ายยาปฏิชีวนะแก่ผู้ป่วยที่เรียกหาอย่างดังกล่าว เนื่องจากหากท่านไม่จ่าย ผู้ป่วยก็สามารถไปซื้อได้จากร้านยาอื่น					
g. ยาปฏิชีวนะรักษาผู้ป่วยท้องเสียให้หายเร็วกว่าไม่ได้รับยาปฏิชีวนะ ทำให้ผู้ป่วยกลับไปทำงานได้เร็วขึ้น					
h. เป็นสิ่งสำคัญที่เภสัชกรต้องจ่ายยาปฏิชีวนะเมื่อมีความจำเป็นทางคลินิกเท่านั้น ไม่ควร มีปัจจัยด้านธุรกิจเข้ามาเกี่ยวข้อง					
i. หากมีลูกค้าหลายรายรอรับบริการจากท่าน ท่านมักจะจ่ายยาปฏิชีวนะให้ลูกค้าที่มาเรียกหา ยาปฏิชีวนะเพื่อไม่ให้ลูกค้ารอนาน					
j. การจ่ายยาปฏิชีวนะครบคอร์สเป็นเรื่องสำคัญแม้ว่าผู้ป่วยกล่าวว่าราคาแพงเกินไป					
k. ท่านยินดีที่จะจ่ายยาปฏิชีวนะแก่ผู้ป่วยที่เรียกหา ยาปฏิชีวนะโดยระบุชื่อยาที่ชัดเจนโดยไม่ต้องถามอาการ					
l. เชื้อดื้อยาปฏิชีวนะเป็นปัญหาสำคัญในชุมชน					
m. ท่านจ่ายยาปฏิชีวนะในกรณีที่ท่านมั่นใจว่าเป็นการติดเชื้อแบคทีเรีย เท่านั้น					
n. เชื้อดื้อยาปฏิชีวนะที่เป็นผลมาจากการจ่ายยาปฏิชีวนะจากร้านยา ไม่ใช่ ปัญหาสำคัญ					
o. เภสัชกรร้านยามีบทบาทสำคัญในการลดปัญหาเชื้อดื้อยาปฏิชีวนะ					
p. หากผู้ป่วยไม่มีประวัติแพ้ยาหรือไม่มีข้อห้ามใช้ใดๆ ท่านจะจ่ายยาที่เป็นทางเลือกแรกที่ระบุในแนวทางการรักษา					
q. หากผู้ป่วยไม่สามารถจ่ายค่ายาปฏิชีวนะครบคอร์สได้ ท่านจะจ่ายยาปฏิชีวนะตามจำนวนที่ผู้ป่วยสามารถจ่ายค่ายาได้แม้ว่าการใช้ยาปฏิชีวนะให้ครบคอร์สจะมีความเหมาะสมกว่า					

(1- ไม่เห็นด้วยอย่างยิ่ง 2- ไม่เห็นด้วย 3- เฉยๆ 4-เห็นด้วย 5-เห็นด้วยอย่างยิ่ง)					
	1	2	3	4	5
r. ผู้ป่วยควรมียาปฏิชีวนะเก็บไว้ที่บ้านในกรณี que ผู้ป่วยอาจจำเป็นต้องได้รับยาปฏิชีวนะ					

3. จากข้อความต่อไปนี้ กรุณาทำเครื่องหมายในช่องที่ตรงกับความเห็นของท่านมากที่สุดเกี่ยวกับ **ลำดับความสำคัญ** ของกลยุทธ์ในการส่งเสริมการใช้อยาปฏิชีวนะอย่างสมเหตุสมผลในร้านยาในประเทศไทย (1-ลำดับความสำคัญน้อยที่สุด, 2-น้อย, 3-ปานกลาง, 4-มาก, 5-ลำดับความสำคัญมากที่สุด)

	1	2	3	4	5
a. การให้ความรู้แก่ผู้ป่วยเกี่ยวกับการใช้อยาปฏิชีวนะอย่างเหมาะสมและเชื่อถือยาโดยเภสัชกรร้านยาในร้านยา					
b. การสร้างความตระหนักแก่ประชาชนเกี่ยวกับการใช้อยาปฏิชีวนะอย่างเหมาะสมและเชื่อถือยาผ่านสื่อ เช่น โทรทัศน์ วิทยุ โซเชียลมีเดีย					
c. การให้ความรู้แก่ประชาชนเกี่ยวกับการใช้อยาปฏิชีวนะอย่างเหมาะสมและเชื่อถือยาโดยการเข้าไปให้ความรู้โดยตรงในชุมชน					
d. การสร้างความตระหนักแก่เภสัชกรร้านยาเกี่ยวกับการใช้อยาปฏิชีวนะอย่างเหมาะสมและเชื่อถือยา					
e. การสร้างความตระหนักแก่นักศึกษาเภสัชศาสตร์เกี่ยวกับการใช้อยาปฏิชีวนะอย่างเหมาะสมและเชื่อถือยา					
f. การจัดส่งแนวทางจรรยาบรรณมาตรฐานที่เป็นปัจจุบันสำหรับโรคติดเชื้อแก่ร้านยา					
g. การแก้ไขกฎหมายให้ยาปฏิชีวนะทุกชนิดเป็นยาที่จ่ายได้ในร้านยาเมื่อมีใบสั่งยาเท่านั้น					
h. การบังคับใช้กฎหมายอย่างเคร่งครัดเกี่ยวกับการขายยาปฏิชีวนะจากร้านที่ไม่ใช่ร้านยา ขย. 1 และการขายยาปฏิชีวนะโดยบุคคลที่ไม่ใช่เภสัชกร					
i. การจ่ายค่าตอบแทนแก่ร้านยาที่เข้าร่วมโครงการส่งเสริมการใช้อยาปฏิชีวนะอย่างเหมาะสม					

4. ท่านมีข้อเสนอแนะหรือความคิดเห็นอื่นๆ เกี่ยวกับการใช้อยาปฏิชีวนะ เชื่อถือยา หรือกลยุทธ์ในการส่งเสริมให้เกิดการใช้อยาปฏิชีวนะอย่างเหมาะสมในประเทศไทยอย่างไร

.....

.....

.....

.....

ส่วนที่ 2 ข้อมูลทั่วไปของร้านยา

กรุณาทำเครื่องหมายในช่องหรือเติมข้อความในช่องว่างที่ตรงกับร้านยาของท่าน กรณีที่ท่านทำงานในร้านยามากกว่าหนึ่งร้านให้ท่านตอบคำถามตามข้อมูลของร้านยาที่ท่านได้รับแบบสอบถาม

5. ประเภทของร้านยา
 - ร้านยาเดี่ยว
 - ร้านยา Chain store
6. ร้านยาท่านเป็นร้านยาคุณภาพหรือไม่
 - ไม่ใช่
 - ใช่
7. รหัสไปรษณีย์ร้านยา
8. ร้านยาของท่านมีร้านยา ขย. 1 ที่เป็นร้านยาคู่แข่งในบริเวณใกล้เคียงหรือไม่
 - ไม่มี
 - มี; โปรดระบุระยะห่างจากร้านยาท่านถึงร้านยาที่ใกล้ที่สุด.....เมตร
9. ร้านยาท่านมีร้านคู่แข่งที่ไม่ใช่ร้านยา ขย. 1 ที่ขายยาปฏิชีวนะ (เช่น ร้านยา ขย.2 ร้านชำ) ในบริเวณใกล้เคียงหรือไม่
 - ไม่มี
 - มี; โปรดระบุระยะห่างจากร้านยาท่านถึงร้านที่ใกล้ที่สุด.....เมตร
10. ร้านยาท่านได้เข้าร่วมโครงการส่งเสริมการใช้ยาปฏิชีวนะอย่างเหมาะสม เช่น Antibiotic Smart Use (ASU) หรือ Rational Drug Use (RDU) หรือไม่
 - เข้าร่วม
 - ไม่ได้เข้าร่วม; โปรดทำเครื่องหมายในช่องที่ตรงตามความคิดของท่าน (เลือกได้มากกว่า 1 ข้อ)
 - ท่านไม่เคยรู้จักโครงการดังกล่าว
 - ท่านไม่มีเวลาในการเข้าร่วมโครงการดังกล่าว
 - ท่านไม่สนใจเข้าร่วมโครงการดังกล่าว
 - ไม่มีค่าตอบแทนในการเข้าร่วมโครงการดังกล่าว
 - อื่นๆ โปรดระบุ.....

ส่วนที่ 3 ข้อมูลทั่วไปของผู้ตอบแบบสอบถาม

โปรดทำเครื่องหมายในช่องหรือเติมข้อความในช่องว่างที่ตรงกับท่าน

1. ตำแหน่งของท่านในร้านยา
 - เจ้าของร้านยาและเภสัชกรประจำ
 - เจ้าของร้านยาและเภสัชกรพาร์ทไทม์
 - ลูกจ้างและเภสัชกรประจำ
 - ลูกจ้างและเภสัชกรพาร์ทไทม์
2. เพศ
 - ชาย หญิง
3. อายุ ปี
4. ประสบการณ์การทำงานในร้านยา ปี
5. การศึกษาสูงสุด
 - ปริญญาตรีเภสัชศาสตร์ (หลักสูตร 5 ปี)
 - Pharm D. (หลักสูตร 6 ปี)
 - อื่นๆ โปรดระบุ.....

*****ขอขอบพระคุณเป็นอย่างสูง*****

Appendix 14 A cover letter for survey study: English and Thai version.

Cover letter in English

Dear Sir/Madam,

My name is Sisira Donsamak and I am currently in the third year of my PhD in Pharmacy at Cardiff University. I am interested in antibiotic utilization in community pharmacies as part of my PhD programme.

The project aims to explore community pharmacists' views on the factors influencing the use of antibiotics. Findings from this research could be used to develop effective strategies for improving the rational use of antibiotics in community settings in Thailand.

Your opinions, as a community pharmacist, are key to help us understand issues relating to antibiotic use in the community. Taking part in the survey is **voluntary**. It would be appreciated if you could spare about 15 minutes of your time in order to complete the questionnaire. This survey asks your opinions on antibiotic use in community pharmacy. The Questionnaire consists of 3 parts; part 1 Views regarding antibiotic supply and antimicrobial resistance, part 2 Demographic data of the pharmacy, and part 3 Demographic data of the respondent.

If you are interested, please complete the paper-based questionnaire and return it to me by using the stamped envelope provided **OR** complete the questionnaire online using the link/QR code provided.

Please choose only one way to complete the questionnaire. If there is more than one pharmacist working at the pharmacy to which this survey was sent, please could only one pharmacist respond to the questionnaire.

All data collected in this survey will be analysed and reported in overview without identifiable data.

If you have any queries or would like to have more information, please contact me at DonsamakS@cardiff.ac.uk.

If you have any concerns or complaints during the course of this research project, please contact Professor Dai John (JohnDN@cardiff.ac.uk) who will address the issue. If you remain unhappy and wish to complain formally, you can do this by contacting the the Office of Research Promotion and Management, Office of the President, Ubon Ratchathani University, Warin Chamrab, Ubon Ratchathani, 34190, Tel. 08-6471-0582. You also complain through Director of Research, Cardiff School of Pharmacy and Pharmaceutical Sciences, Redwood Building, King Edward VII Avenue, Cardiff CF10 3NB, phrmyresoffice@cardiff.ac.uk.

Many thanks,

Sisira Donsamak

Cover letter in Thai

เรียน ผู้จัดการร้านยา/เภสัชกรร้านยา (ฟูล์ไทม์/พาร์ทไทม์)

ดิฉัน นางศิริรา ดอนสมักร ขณะนี้กำลังศึกษาต่อหลักสูตรปริญญาเอก สาขาเภสัชศาสตร์ คณะเภสัชศาสตร์ มหาวิทยาลัยคาร์ดิฟฟ์ ประเทศเวลส์ สหราชอาณาจักร ได้รับอนุมัติให้ทำวิทยานิพนธ์ เรื่อง “การสำรวจปัจจัยที่มีผลต่อการจ่ายยาปฏิชีวนะของเภสัชกรร้านยาในประเทศไทย” โดยการศึกษานี้มีวัตถุประสงค์เพื่อศึกษาปัจจัยที่มีผลต่อการตัดสินใจจ่ายหรือไม่จ่ายยาปฏิชีวนะแก่ผู้ป่วยที่มารับบริการของเภสัชกรร้านยาในประเทศไทย โดยหวังว่าผลการศึกษาในครั้งนี้จะสามารถนำมาใช้ในการพัฒนากลยุทธ์ในการส่งเสริมการจ่ายยาปฏิชีวนะอย่างสมเหตุสมผลในร้านยาและชุมชนต่อไป

ข้อมูลที่ได้รับจากท่านเป็นกุญแจสำคัญในการวางแผนกลยุทธ์การส่งเสริมจ่ายยาปฏิชีวนะอย่างสมเหตุสมผลในร้านยา ผู้วิจัยหวังเป็นอย่างยิ่งว่าท่านจะยินดีสละเวลา ประมาณ 15 นาที ในการตอบแบบสอบถามนี้ โดยแบบสอบถามประกอบด้วย 3 ส่วนสำคัญคือ 1) ข้อมูลทั่วไปของผู้ตอบแบบสอบถาม 2) ความคิดเห็นของเภสัชกรต่อการจ่ายยาและการจ่ายยาปฏิชีวนะของเชื่อบคที่เรีย 3) ข้อมูลทั่วไปของร้านยา

หากท่านยินดีเข้าร่วมการศึกษา ท่านสามารถตอบแบบสอบถามที่แนบมาพร้อมจดหมายฉบับนี้และส่งคืนทางไปรษณีย์ หรือ ตอบแบบสอบถามออนไลน์ตามลิงค์ที่แนบมาพร้อมแบบสอบถามนี้ เพียงทางใดทางหนึ่ง ในกรณีที่ร้านยามีเภสัชกรปฏิบัติหน้าที่มากกว่า 1 ท่าน ขอให้เภสัชกรเภสัชกรเพียง 1 ท่านเป็นผู้ตอบแบบสอบถาม

แบบสอบถามนี้จะถูกวิเคราะห์และนำเสนอในภาพรวม โดยไม่มีข้อมูลส่วนหนึ่งส่วนใดที่สามารถบ่งชี้ถึงข้อมูลเฉพาะของแต่ละร้านหรือผู้ตอบแบบสอบถาม

โครงการวิจัยนี้ได้รับการพิจารณารับรอง จากคณะกรรมการจริยธรรมการวิจัยในมนุษย์ของมหาวิทยาลัยอุบลราชธานี และคณะกรรมการจริยธรรมการวิจัยในมนุษย์ คณะเภสัชศาสตร์ มหาวิทยาลัยคาร์ดิฟฟ์ หากท่านมีข้อสงสัย ไม่สบายใจ ได้รับการปฏิบัติไม่ตรงตามที่ระบุ หรือมีข้อร้องเรียน กรุณาติดต่อ Professor Dai John (JohnDN@cardiff.ac.uk) หากท่านยังไม่ได้รับความพึงพอใจท่านสามารถร้องเรียนอย่างเป็นทางการไปยังสำนักงานส่งเสริมบริหารงานวิจัยฯ มหาวิทยาลัยอุบลราชธานี อำเภอวารินชำราบ จังหวัดอุบลราชธานี 34190 หมายเลขโทรศัพท์ 086-4710582 หรือ Director of Research, Cardiff School of Pharmacy and Pharmaceutical Sciences, Redwood Building, King Edward VII Avenue, Cardiff CF10 3NB, phrmyresoffice@cardiff.ac.uk.

จึงเรียนมาเพื่อขอความอนุเคราะห์จากท่านในการตอบแบบสอบถาม หากท่านมีคำถามที่เกี่ยวข้องกับการศึกษานี้หรือข้อเสนอแนะเพิ่มเติม กรุณาติดต่อผู้วิจัยได้ที่อีเมล donsamaks@cardiff.ac.uk

ขอแสดงความนับถือ

นางศิริรา ดอนสมักร

Appendix 15 A postcard reminder for survey study: English and Thai version.

Postcard reminder in English

Dear Pharmacy manager/pharmacist

Recently, a copy of a questionnaire asking about community pharmacists' views on, and practices relating to antibiotic usage and antibiotic resistance was mailed to you.

Your opinions, as a community pharmacist, are key to help us understand issues relating to antibiotic use in the community. Please take a moment to complete the paper version of the questionnaire we sent and return to or complete the survey online [the survey link was provided here]. If you have already returned the survey, your assistance is much appreciated.

QR CODE

Here

SCAN ME

Many thanks,
Sisira Donsamak

Postcard reminder in Thai

เรียน เกษีกรร้านยา (พาร์ทไทม์/พูลไทม์)

ตามที่เมื่อเร็วๆ นี้ผู้วิจัยได้ส่งแบบสอบถามทางไปรษณีย์ไปยังร้านยาของท่านเพื่อสอบถามเกี่ยวกับความเห็นของท่านเกี่ยวกับยาปฏิชีวนะและการดื้อยาของเชื้อแบคทีเรีย

ข้อมูลที่ได้รับจากท่านเป็นกุญแจสำคัญในการวางแผนกลยุทธ์การส่งเสริมใช้ยาปฏิชีวนะอย่างสมเหตุผลในร้านยาและชุมชน ผู้วิจัยหวังเป็นอย่างยิ่งว่าท่านจะยินดีสละเวลาประมาณ 15 นาทีในการตอบแบบสอบถามที่เคยได้รับและส่งคืนทางไปรษณีย์ **หรือ** ตอบแบบสอบถามออนไลน์ได้ที่ [\[ลิงค์สำหรับตอบแบบสอบถามออนไลน์\]](#)

QR CODE

Here

SCAN ME

หากท่านได้ทำการตอบกลับแบบสอบถามนี้แล้ว ผู้วิจัยขอขอบพระคุณท่านเป็นอย่างสูง

ขอแสดงความนับถือ

ศศิรา ดอนสมัค

Appendix 16 Questionnaire using for survey study: English and Thai version.

Questionnaire for community pharmacist's views and practice towards antibiotics usage and antibiotic resistance

This survey asks about your opinions on antibiotics use in community pharmacy. Your responses will be useful to raise appropriate antibiotic use in the communities.

Notes for completion

- Taking part in the **survey is voluntary.**
- A pharmacist who works at the pharmacy, please complete the questionnaire. In case that there are more than one pharmacist work at the pharmacy, please only one pharmacist responses to the questionnaire.
- The questionnaire should take **around fifteen minutes to complete.**
- All data collected in this survey will be analysed and reported in overview without identifiable data.
- Please complete this survey and return it to the researcher ***or*** complete the questionnaire online (**link and or QR code will be provided later**)

Part 1: Demographic data of the respondent

Please check the box(es) or fill in the blank that most related with you.

1. Your role at the pharmacy
 - Owner and full-time pharmacist
 - Owner and part time pharmacist
 - Employee and full-time pharmacist
 - Employee and time pharmacist
2. Gender
 - Male Female
3. Age..... Years-old
4. Length of your experience working in the community pharmacy sector.....Years
5. Highest education
 - Bachelor of Pharmacy
 - Pharm D.
 - Other, please specify.....

Part 2: Views regarding antibiotic supply and antimicrobial resistance

6. ***Based on your experiences,*** would you recommend antibiotics treatment for the following cases? (***This is not a test. We are interested in your views and experiences.***)

(Note: For each scenario below, the patient or caregiver presents at your pharmacy with the specified symptoms and does **not** ask for a specific medicine. Please assume that they can afford the cost of medicines. In each case the person with symptoms has no comorbidity or undiagnosed underlying disease, uses **no** other medication and has **no** history of drug allergy or intolerance).

Please complete the information in the spaces provided if you would provide an antibiotic in the circumstances described. Please tick no if you would not recommend an antibiotic.

<p>a. 6-year-old boy, weight 20 kg, presenting with a sore throat for 2 days accompanied by mild fever, productive cough with thick and coloured discharge. There are no other symptoms.</p> <p><input type="checkbox"/> No</p> <p><input type="checkbox"/> Yes, Drug..... dose.....mg, times/day, for.....day(s).</p>
<p>b. 14-year-old girl presenting with sore throat for 2 days, accompanied by high grade fever, no cough, no runny nose or any other symptoms. She is not pregnant or breast-feeding and has are no other symptoms.</p> <p><input type="checkbox"/> No</p> <p><input type="checkbox"/> Yes, Drug..... dose.....mg, times/day, for.....day(s).</p>
<p>c. 43-year-old man with a severe sore throat for 2 days accompanied by high grade fever, tender lymph nodes, pus on tonsils but no cough. There are no other symptoms</p> <p><input type="checkbox"/> No</p> <p><input type="checkbox"/> Yes, Drug..... dose.....mg, times/day, for.....day(s).</p>
<p>d. 70 year-old-woman with watery stool 3 times within the last 12 hours, no fever and no other symptoms. There are no signs of dehydration.</p> <p><input type="checkbox"/> No</p> <p><input type="checkbox"/> Yes, Drug..... dose.....mg, times/day, for.....day(s).</p>
<p>e. 30 year-old-woman with diarrhoea with blood visible in stools since yesterday evening, accompanied with high grade fever, and abdominal cramps. She is not pregnant or breast-feeding and has are no other symptoms.</p> <p><input type="checkbox"/> No</p> <p><input type="checkbox"/> Yes, Drug..... dose.....mg, times/day, for.....day(s).</p>
<p>f. 3 year-old-boy, weight 15 kg, with watery stool 4 times within the last 10 hours accompanied by mild fever, nausea and mild abdominal pain. There is no sign of dehydration and there are no other symptoms.</p> <p><input type="checkbox"/> No</p>

<input type="checkbox"/> Yes, Drug..... dose.....mg, times/day, for.....day(s).
g. 35 year-old-man who had a motorcycle accident (about 15 minutes earlier) with many minor, superficial scratches on the left arm and left leg. <input type="checkbox"/> No <input type="checkbox"/> Yes, Drug..... dose.....mg, times/day, for.....day(s).
h. 7-year-old-girl who has a fresh, thin, shallow cut wound on left index finger about 1 cm long, which happened about 30 minutes earlier. <input type="checkbox"/> No <input type="checkbox"/> Yes, Drug..... dose.....mg, times/day, for.....day(s).
i. 50-year-old man who has a shallow wound on the right calf, about 1 cm in diameter. He had a cut wound by barbed wire about 4 days ago. The skin surrounding the wound has become red, swollen and sore, and with pus. The patient confirmed that he had a recent tetanus vaccination booster. <input type="checkbox"/> No <input type="checkbox"/> Yes, Drug..... dose.....mg, times/day, for.....day(s).

7. Based on your experience, please check the box that most closely relates to your views for each statement (a to r) in the table below.
(1-strongly disagree, 2-disagree, 3-neutral, 4-agree, 5-strongly agree)

	1	2	3	4	5
a. Antibiotic resistance is an important problem in the hospital setting but <u>not</u> a problem in the community.					
b. Antibiotics cure a patient with a sore throat more quickly than not having an antibiotic, so they can return to work sooner.					
c. The ease of availability of antibiotics from community pharmacies contributes to the problem of antibiotic resistance in Thailand.					
d. If I am unsure whether or not a patient has a bacterial infection, I will supply an antibiotic just in case it is.					
e. If I am in doubt which antibiotic is best for a patient, I will supply a newer one, just in case.					
f. I supply antibiotics when patients request them specifically because if I don't supply them, they will just go to another pharmacy.					
g. Antibiotics cure a patient with diarrhoea more quickly than not having an antibiotic, so they can return to work sooner.					
h. It is important for pharmacists to only supply antibiotics when clinically needed, and <u>not</u> be driven by commercial pressures.					

	1	2	3	4	5
i. When the pharmacy is busy, I am more likely to supply antibiotics if a customer asks specifically for an antibiotic, compared to when the pharmacy is quiet.					
j. It is important to supply a full course of antibiotics to a patient at the time, even when the patient says it is too expensive.					
k. I am happy to supply an antibiotic without further questioning if a patient requests one by name.					
l. Antibiotic resistance is an important problem in the community setting.					
m. I supply antibiotics only if I am certain that a patient has a bacterial infection.					
n. Antibiotic resistance resulting from the supply of antibiotics from community pharmacies is <u>not</u> a significant problem.					
o. Community pharmacists have an important role to play to reduce the problem of antibiotic resistance.					
p. In cases where patients have <u>no</u> drug allergy history and <u>no</u> contraindication, I will supply a first line antibiotic as recommended in practice guidelines.					
q. If a patient cannot afford a full course of antibiotics all in one go, I will give them a smaller amount they are able to afford at that time, even when a longer duration of treatment is required					
r. It is good practice for patients to keep a supply of antibiotics at home in case they need them.					

8. For each statement (a to i) below please check the box that most closely matches your view regarding its **priority** as a strategy to improve appropriate antibiotic use in the community pharmacy setting in Thailand.
(1-Not a priority, 2-low priority, 3-medium priority, 4-high priority, 5-very high priority)Items

Statements	1	2	3	4	5
a. Patient education by pharmacists in community pharmacies at the time medicines are supplied to patients.					
b. Raising awareness of rational antibiotic use, including antimicrobial resistance, among the public through media such as TV, radio and social media.					
c. Educational programs of rational antibiotic use, including antimicrobial resistance, directed at the public.					
d. Raising awareness of rational antibiotic use, including antimicrobial resistance, among community pharmacists.					
e. Raising awareness of rational antibiotic use, including antimicrobial resistance, among pharmacy students.					
f. Providing regularly updated clinical practice guidelines to community pharmacies on the treatment of infectious diseases.					
g. Reclassification of all antibiotics as prescription-only.					
h. Enforcement of regulations which prohibit supply of antibiotics from non-pharmacies, and by non-pharmacists.					
i. Providing monetary incentives for community pharmacies to be involved in antibiotic use campaigns					

9. Do you have any other comments/views about antibiotics, and/or antibiotic resistance and/or how to improve rational antibiotic use in Thailand?

.....
.....
.....

Part 3: Demographic data of the pharmacy

Please check the box(es) or fill in the blank that most closely relates to this pharmacy. If you work for more than one pharmacy, please provide responses relating to the pharmacy to which this questionnaire has been sent.

10. Type of your pharmacy

Independent pharmacy

Chain pharmacy

11. Is your pharmacy an accredited pharmacy?

No

Yes

12. Your pharmacy location: Postcode.....

13. Is there any competitor Type I pharmacy closed to this pharmacy?

No

Yes, please specify the distance from your pharmacy to the nearest onemetres.

14. Is there any competitor non-Type I pharmacy that sells antibiotics (e.g. Type II pharmacy, grocery store) close to this pharmacy?
- No
 - Yes, please specify the distance from your pharmacy to the nearest onemetres.
15. Have you taken part in an antibiotic awareness campaign to promote the rational use of antibiotics such as Antibiotic Smart Use (ASU) or Rational Drug Use (RDU)?
- Yes
 - No, please provide the reason by ticking the box(es) as appropriate. Tick all that apply
 - I have never heard about such campaigns
 - I do not have enough time to participate
 - I was not interested in participating in the campaign
 - There was no payment
 - Other, please specify

******Thank you for completing this questionnaire******

แบบสอบถามความคิดเห็นเภสัชกรร้านยาเกี่ยวกับ การใช้ยาปฏิชีวนะและการดื้อยาปฏิชีวนะของแบคทีเรีย

แบบสอบถามชุดนี้มีวัตถุประสงค์เพื่อสอบถามความคิดเห็นเกี่ยวกับการใช้ยาปฏิชีวนะในร้านยา โดยผู้วิจัยหวังว่า
ข้อมูลที่ได้รับจะสามารถนำไปใช้เพื่อให้เกิดประโยชน์ในการส่งเสริมให้การใช้ยาปฏิชีวนะอย่างเหมาะสมต่อไป

คำชี้แจง

- การตอบแบบสอบถามนี้เป็นไปตามความสมัครใจของท่าน
- ขอความร่วมมือจากเภสัชกรที่ปฏิบัติหน้าที่ในร้านยาในการให้ข้อมูลและความคิดเห็น ในกรณีที่ร้านยามี
เภสัชกรปฏิบัติหน้าที่มากกว่า 1 ท่าน ขอให้เภสัชกรเภสัชกรเพียง 1 ท่านเป็นผู้ตอบแบบสอบถาม
- แบบสอบถามนี้ใช้เวลาในการตอบประมาณ 15 นาที
- แบบสอบถามนี้เป็นส่วนหนึ่งของวิทยานิพนธ์ระดับปริญญาเอกของผู้วิจัยข้อมูลที่ได้จากการตอบ
- แบบสอบถามนี้จะถูกวิเคราะห์และนำเสนอในภาพรวม โดยไม่มีข้อมูลส่วนหนึ่งส่วนใด
ที่สามารถบ่งชี้ถึงข้อมูลเฉพาะของแต่ละร้านหรือผู้ตอบแบบสอบถาม
- ท่านสามารถตอบแบบสอบถามและส่งกลับโดยใช้ซองจดหมายติดแสตมป์ที่แนบมา
พร้อมกันนี้ หรือสามารถเข้าไปตอบได้ที่

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เดียว

หากท่านมีข้อสงสัยหรือต้องการติดต่อผู้วิจัย สามารถติดต่อได้ทาง

donsamaks@cardiff.ac.uk



SCAN ME

ส่วนที่ 1 ข้อมูลทั่วไปของผู้ตอบแบบสอบถาม

โปรดทำเครื่องหมายในช่องหรือเติมข้อความในช่องว่างที่ตรงกับท่าน

2. ตำแหน่งของท่านในร้านยา

- เจ้าของร้านยาและเภสัชกรประจำ
- เจ้าของร้านยาและเภสัชกรพาร์ทไทม์
- ลูกจ้างและเภสัชกรประจำ
- ลูกจ้างและเภสัชกรพาร์ทไทม์

2. เพศ

- ชาย
- หญิง

3. อายุ ปี
4. ประสบการณ์การทำงานในร้านยา ปี
5. การศึกษาสูงสุด
 - ปริญญาตรีเภสัชศาสตร์ (หลักสูตร 5 ปี)
 - Pharm D. (หลักสูตร 6 ปี)
 - อื่นๆ โปรดระบุ.....

ส่วนที่ 2 ความคิดเห็นเกี่ยวกับการจ่ายยาปฏิชีวนะและเชื้อดื้อยา

6. จากประสบการณ์ของท่าน ท่านจะแนะนำยาปฏิชีวนะสำหรับผู้ป่วยที่มีอาการดังต่อไปนี้หรือไม่ (ข้อคำถามไม่ใช่ข้อสอบ ผู้วิจัยเพียงความสนใจในความคิดเห็นจากประสบการณ์ของท่านเท่านั้น)

(หมายเหตุ: จากสถานการณ์ที่กำหนด ผู้ป่วยหรือผู้ดูแลมาร้านยาและบอกรายละเอียดอาการโดยไม่ได้ระบุว่าต้องการยาใดเป็นพิเศษ และไม่มีปัญหาด้านเศรษฐกิจในการชำระค่ายา ในแต่ละสถานการณ์ผู้ป่วยไม่มีโรคร่วมอื่นๆ ไม่ได้อยู่ระหว่างการให้ยาใดๆ และไม่มีประวัติการแพ้ยา)

<p>a. เด็กชายอายุ 6 ปี น้ำหนัก 20 kg มีอาการเจ็บคอมา 2 วัน มีไข้ ไอมีเสมหะชั้นสีเขียว</p> <p><input type="checkbox"/> ไม่จ่ายยาปฏิชีวนะ</p> <p><input type="checkbox"/> จ่ายยาปฏิชีวนะ ชื่อยา..... ขนาดยา..... mg ครั้ง/วัน เป็นเวลา.....วัน</p>
<p>b. เด็กหญิงอายุ 14 ปี มีอาการเจ็บคอมา 2 วัน ตัวร้อนมาก ไม่ไอ ไม่มีน้ำมูก</p> <p><input type="checkbox"/> ไม่จ่ายยาปฏิชีวนะ</p> <p><input type="checkbox"/> จ่ายยาปฏิชีวนะ ชื่อยา..... ขนาดยา..... mg ครั้ง/วัน เป็นเวลา.....วัน</p>
<p>c. ชายอายุ 43 ปี เจ็บคอมากมา 2 วัน ตัวร้อนมาก ไม่ไอ ต่อมทอนซิลอักเสบ มีตุ่มหนองที่ต่อมทอนซิล</p> <p><input type="checkbox"/> ไม่จ่ายยาปฏิชีวนะ</p> <p><input type="checkbox"/> จ่ายยาปฏิชีวนะ ชื่อยา..... ขนาดยา..... mg ครั้ง/วัน เป็นเวลา.....วัน</p>
<p>d. หญิงอายุ 70 ปี ถ่ายเหลวเป็นน้ำ 3 ครั้งใน 12 ชั่วโมงที่ผ่านมา ไม่มีไข้ ไม่มีอาการอื่นๆ ร่วมด้วย และไม่มีอาการแสดงของภาวะขาดน้ำ</p> <p><input type="checkbox"/> ไม่จ่ายยาปฏิชีวนะ</p> <p><input type="checkbox"/> จ่ายยาปฏิชีวนะ ชื่อยา..... ขนาดยา..... mg ครั้ง/วัน เป็นเวลา.....วัน</p>
<p>e. หญิงอายุ 30 ปี มีอาการท้องเสีย มีเลือดปนในอุจจาระ เริ่มมีอาการเมื่อยานตอนเย็น ตัวร้อนมาก และมีอาการปวดเกร็งช่องท้อง</p>

<input type="checkbox"/> ไม่จ่ายยาปฏิชีวนะ <input type="checkbox"/> จ่ายยาปฏิชีวนะ ชื่อยา..... ขนาดยา..... mg ครั้ง/วัน เป็นเวลา.....วัน
<p>f. เด็กชายอายุ 3 ปี น้ำหนัก 15 kg ถ่ายเหลวเป็นน้ำ 4 ครั้ง ใน 10 ชั่วโมงที่ผ่านมา มีไข้ ผู้ปกครองสังเกตว่ามีอาการคลื่นไส้ ปวดท้องเล็กน้อย ไม่มีอาการของภาวะขาดน้ำ</p> <input type="checkbox"/> ไม่จ่ายยาปฏิชีวนะ <input type="checkbox"/> จ่ายยาปฏิชีวนะ ชื่อยา..... ขนาดยา..... mg ครั้ง/วัน เป็นเวลา.....วัน
<p>g. ชายไทยอายุ 35 ปี ประสบอุบัติเหตุรถจักรยานยนต์ (ประมาณ 15 นาทีที่ผ่านมา) มีแผลถลอกตื้นๆ หลายแผลที่แขนซ้ายและขาซ้าย</p> <input type="checkbox"/> ไม่จ่ายยาปฏิชีวนะ <input type="checkbox"/> จ่ายยาปฏิชีวนะ ชื่อยา..... ขนาดยา..... mg ครั้ง/วัน เป็นเวลา.....วัน
<p>h. เด็กหญิงอายุ 7 ปี น้ำหนัก 20 kg มีแผลสดจากการถูกมีดบาด เป็นแผลบาดตื้นขนาดประมาณ 1 เซนติเมตรที่นิ้วชี้ซ้าย เมื่อประมาณ 30 นาทีที่ผ่านมา</p> <input type="checkbox"/> ไม่จ่ายยาปฏิชีวนะ <input type="checkbox"/> จ่ายยาปฏิชีวนะ ชื่อยา..... ขนาดยา..... mg ครั้ง/วัน เป็นเวลา.....วัน
<p>i. ชายไทยอายุ 50 ปี มีแผลตื้นขนาดประมาณ 1 เซนติเมตรที่น่องขาขวา เป็นแผลถูกบาดเมื่อประมาณ 4 วันก่อน ตอนนั้นแผลเริ่มบวมแดง มีอาการปวดและมีหนองที่แผล ผู้ป่วยได้รับวัคซีนบาดทะยักเมื่อไม่นานมานี้</p> <input type="checkbox"/> ไม่จ่ายยาปฏิชีวนะ <input type="checkbox"/> จ่ายยาปฏิชีวนะ ชื่อยา..... ขนาดยา..... mg ครั้ง/วัน เป็นเวลา.....วัน

7. จากประสบการณ์ของท่านโปรดทำเครื่องหมายในช่องที่ตรงกับความคิดเห็นของท่านมากที่สุด

	1- ไม่เห็นด้วยอย่างยิ่ง 2- ไม่เห็นด้วย 3- เฉยๆ 4- เห็นด้วย 5- เห็นด้วยอย่างยิ่ง				
	1	2	3	4	5
a. เชื้อดื้อยาปฏิชีวนะเป็นปัญหาสำคัญในโรงพยาบาลเท่านั้น ไม่ใช่ปัญหาสำคัญในชุมชน					
b. ยาปฏิชีวนะรักษาผู้ป่วยที่มีอาการเจ็บคอให้หายเร็วกว่าไม่ได้รับยาปฏิชีวนะ ทำให้ผู้ป่วยกลับไปทำงานได้เร็วขึ้น					
c. การเข้าถึงยาปฏิชีวนะได้ง่ายจากร้านยาส่งผลให้เกิดปัญหาเชื้อดื้อยาปฏิชีวนะในประเทศไทย					

1- ไม่เห็นด้วยอย่างยิ่ง 2- ไม่เห็นด้วย 3- เฉยๆ 4-เห็นด้วย 5-เห็นด้วยอย่างยิ่ง					
	1	2	3	4	5
d. หากท่านไม่แน่ใจว่าผู้ป่วยติดเชื้อแบคทีเรียหรือไม่ ท่านจะจ่ายยาปฏิชีวนะไปก่อน					
e. หากท่านไม่มั่นใจว่ายาปฏิชีวนะใดที่ดีที่สุดสำหรับผู้ป่วย ท่านจะจ่ายยาปฏิชีวนะตัวที่ออกใหม่กว่า					
f. ท่านจ่ายยาปฏิชีวนะแก่ผู้ป่วยที่เรียกหาหาดังกล่าว เนื่องจากหากท่านไม่จ่าย ผู้ป่วยก็สามารถไปซื้อได้จากร้านยาอื่น					
g. ยาปฏิชีวนะรักษาผู้ป่วยท้องเสียให้หายเร็วกว่าไม่ได้รับยาปฏิชีวนะ ทำให้ผู้ป่วยกลับไปทำงานได้เร็วขึ้น					
h. เป็นสิ่งสำคัญที่เภสัชกรต้องจ่ายยาปฏิชีวนะเมื่อมีความจำเป็นทางคลินิกเท่านั้น ไม่ควร มีปัจจัยด้านธุรกิจเข้ามาเกี่ยวข้อง					
i. หากมีลูกค้าหลายรายรอรับบริการจากท่าน ท่านมักจะจ่ายยาปฏิชีวนะให้ลูกค้าที่มาเรียกหายาปฏิชีวนะเพื่อไม่ให้ลูกค้ารายอื่นรอนาน					
j. การจ่ายยาปฏิชีวนะครบคอร์สเป็นเรื่องสำคัญแม้ว่าผู้ป่วยกล่าวว่าราคาแพงเกินไป					
k. ท่านยินดีที่จะจ่ายยาปฏิชีวนะแก่ผู้ป่วยที่เรียกหายาปฏิชีวนะโดยระบุชื่อยาที่ชัดเจนโดยไม่ต้องถามอาการ					
l. เชื้อดื้อยาปฏิชีวนะเป็นปัญหาสำคัญในชุมชน					
m. ท่านจ่ายยาปฏิชีวนะในกรณีที่ท่านมั่นใจว่าเป็นการติดเชื้อแบคทีเรีย เท่านั้น					
n. เชื้อดื้อยาปฏิชีวนะที่เป็นผลมาจากการจ่ายยาปฏิชีวนะจากร้านยา ไม่ใช่ ปัญหาสำคัญ					
o. เภสัชกรร้านยามีบทบาทสำคัญในการลดปัญหาเชื้อดื้อยาปฏิชีวนะ					
p. หากผู้ป่วยไม่มีประวัติแพ้ยาหรือไม่มีข้อห้ามใช้ใดๆ ท่านจะจ่ายยาที่เป็นทางเลือกแรกที่ระบุในแนวทางการรักษา					
q. หากผู้ป่วยไม่สามารถจ่ายค่ายาปฏิชีวนะครบคอร์สได้ ท่านจะจ่ายยาปฏิชีวนะตามจำนวนที่ผู้ป่วยสามารถจ่ายค่ายาได้แม้ว่าการใช้ยาปฏิชีวนะให้ครบคอร์สจะมีความเหมาะสมกว่า					
r. ผู้ป่วยควรมียาปฏิชีวนะเก็บไว้ที่บ้านในกรณีที่ผู้ป่วยอาจจำเป็นต้องได้รับยาปฏิชีวนะ					

8. จากข้อความต่อไปนี้ กรุณาทำเครื่องหมายในช่องที่ตรงกับความเห็นของท่านมากที่สุดเกี่ยวกับ **ลำดับความสำคัญ**ของกลยุทธ์ในการส่งเสริมการใช้ยาปฏิชีวนะอย่างสมเหตุสมผลในร้านยาในประเทศไทย

1-ลำดับความสำคัญน้อยที่สุด, 2-น้อย, 3-ปานกลาง, 4-มาก, 5-ลำดับความสำคัญมากที่สุด					
	1	2	3	4	5
a. การให้ความรู้แก่ผู้ป่วยเกี่ยวกับการใช้ยาปฏิชีวนะอย่างเหมาะสมและเช็ดดื้อยาโดยเภสัชกรร้านยาในร้านยา					
b. การสร้างความตระหนักแก่ประชาชนเกี่ยวกับการใช้ยาปฏิชีวนะอย่างเหมาะสมและเช็ดดื้อยามานสื่อ เช่น โทรทัศน์ วิทยุ โซเชียลมีเดีย					
c. การให้ความรู้แก่ประชาชนเกี่ยวกับการใช้ยาปฏิชีวนะอย่างเหมาะสมและเช็ดดื้อยาโดยการเข้าไปให้ความรู้โดยตรงในชุมชน					
d. การสร้างความตระหนักแก่เภสัชกรร้านยาเกี่ยวกับการใช้ยาปฏิชีวนะอย่างเหมาะสมและเช็ดดื้อยา					
e. การสร้างความตระหนักแก่นักศึกษาเภสัชศาสตร์เกี่ยวกับการใช้ยาปฏิชีวนะอย่างเหมาะสมและเช็ดดื้อยา					
f. การจัดส่งแนวทางการรักษามาตรฐานที่เป็นปัจจุบันสำหรับโรคติดเชื้อแก่ร้านยา					
g. การแก้ไขกฎหมายให้ยาปฏิชีวนะทุกชนิดเป็นยาที่จ่ายได้ในร้านยาเมื่อมีใบสั่งยาเท่านั้น					
h. การบังคับใช้กฎหมายอย่างเคร่งครัดเกี่ยวกับการขายยาปฏิชีวนะจากร้านที่ไม่ใช่ร้านยา ขย. 1 และการขายยาปฏิชีวนะโดยบุคคลที่ไม่ใช่เภสัชกร					
i. การจ่ายค่าตอบแทนแก่ร้านยาที่เข้าร่วมโครงการส่งเสริมการใช้ยาปฏิชีวนะอย่างเหมาะสม					

9. ท่านมีข้อเสนอแนะหรือความคิดเห็นอื่นๆ เกี่ยวกับการใช้ยาปฏิชีวนะ เช็ดดื้อยา หรือกลยุทธ์ในการส่งเสริมให้เกิดการใช้ยาปฏิชีวนะอย่างเหมาะสมในประเทศไทยอย่างไร

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ส่วนที่ 3 ข้อมูลทั่วไปของร้านยา

กรุณาทำเครื่องหมายในช่องหรือเติมข้อความในช่องว่างที่ตรงกับร้านยาของท่าน กรณีที่ท่านทำงานในร้านยา มากกว่าหนึ่งร้านให้ท่านตอบคำถามตามข้อมูลของร้านยาที่ท่านได้รับแบบสอบถาม

10. ประเภทของร้านยา

ร้านยาเดี่ยว

ร้านยา Chain store

11. ร้านยาท่านเป็นร้านยาคุณภาพหรือไม่

ไม่ใช่

ใช่

12. รหัสไปรษณีย์ร้านยา

13. ร้านยาของท่านมีร้านยา ขย. 1 ที่เป็นร้านยาคู่แข่งในบริเวณใกล้เคียงหรือไม่

ไม่มี

มี; โปรดระบุระยะห่างจากร้านยาท่านถึงร้านยาที่ใกล้ที่สุด.....เมตร

14. ร้านยาท่านมีร้านคู่แข่งที่ไม่ใช่ร้านยา ขย. 1 ที่ขายยาปฏิชีวนะ (เช่น ร้านยา ขย.2 ร้านชำ) ในบริเวณใกล้เคียงหรือไม่

ไม่มี

มี; โปรดระบุระยะห่างจากร้านยาท่านถึงร้านที่ใกล้ที่สุด.....เมตร

15. ร้านยาท่านได้เข้าร่วมโครงการส่งเสริมการใช้ยาปฏิชีวนะอย่างเหมาะสม เช่น Antibiotic Smart Use (ASU) หรือ Rational Drug Use (RDU) หรือไม่

เข้าร่วม

ไม่ได้เข้าร่วม; โปรดทำเครื่องหมายในช่องที่ตรงตามความคิดของท่าน (เลือกได้มากกว่า 1 ข้อ)

ท่านไม่เคยรู้จักโครงการดังกล่าว

ท่านไม่มีเวลาในการเข้าร่วมโครงการดังกล่าว

ท่านไม่สนใจเข้าร่วมโครงการดังกล่าว

ไม่มีค่าตอบแทนในการเข้าร่วมโครงการดังกล่าว

อื่นๆ โปรดระบุ.....

*****ขอขอบพระคุณเป็นอย่างสูง*****

Appendix 17 Bivariate correlation between demographic data and practice score on antibiotic supplying among community pharmacists.

Categories	Postal survey				Online survey				Combined survey data			
	URI score	Diarrhoea score	Wound score	Total practice score	URI score	Diarrhoea score	Wound score	Total practice score	URI score	Diarrhoea score	Wound score	Total practice score
Age ^a												
Correlation	-0.22	-0.24	-0.20	-0.33	-0.34	-0.18	0.03	-0.29	-0.25	-0.22	-0.15	-0.32
p value	<0.01	<0.01	<0.01	<0.01	<0.01	0.06	0.72	<0.01	<0.01	<0.01	<0.01	<0.01
Length of experience ^a												
Correlation	-0.14	-0.16	-0.20	-0.24	-0.37	-0.24	0.001	-0.34	-0.21	-0.18	-0.14	-0.26
p value	0.04	0.02	<0.01	<0.01	<0.01	0.01	0.99	<0.01	<0.01	<0.01	0.01	<0.01
Gender ^b												
correlation	0.11	0.10	0.21	0.19	0.11	0.10	0.20	0.19	0.01	0.06	0.21	0.11
p value	0.11	0.16	<0.01	<0.01	0.11	0.16	<0.01	<0.01	0.88	0.26	<0.01	0.06
Education ^b												
Correlation	0.10	0.10	0.13	0.16	0.10	0.12	0.03	0.21	0.13	0.11	0.10	-0.18
p value	0.17	0.16	0.07	0.027	0.17	0.22	0.74	0.03	0.02	0.06	0.09	<0.01
Role of pharmacist ^b												
Correlation	0.16	0.15	0.12	0.19	0.17	0.15	-0.07	0.13	-0.17	-0.15	0.04	-0.17
p value	0.02	0.036	0.09	<0.01	0.07	0.12	0.49	0.17	<0.01	<0.01	0.44	<0.01
Type of pharmacy ^b												
Correlation	0.17	0.16	0.13	0.20	0.21	0.14	-0.17	0.15	0.17	0.15	0.01	0.17
p value	0.02	0.026	0.87	<0.01	0.03	0.13	0.08	0.12	<0.01	<0.01	0.87	<0.01
Accreditation status ^b												
Correlation	0.14	0.09	0.05	0.15	0.05	0.11	-0.11	0.34	0.10	0.10	-0.03	0.09
p value	0.044	0.19	0.52	0.035	0.61	0.24	0.23	<0.01	0.09	0.08	0.59	0.11
Participation in AMS ^b												
Correlation	-0.10	0.09	0.05	0.15	-0.06	0.04	-0.04	-0.05	-0.08	-0.03	0.05	-0.06
p value	0.18	0.19	0.52	0.035	0.56	0.67	0.65	0.60	0.16	0.60	0.41	0.27

Categories	Postal survey				Online survey				Combined survey data			
Pharmacy location												
Correlation	0.22	0.13	0.01	0.09	-0.07	-0.001	0.11	-0.01	-0.01	0.08	0.05	0.06
<i>p value</i>	0.76	0.06	0.91	0.22	0.44	0.99	0.26	0.88	0.92	0.17	0.42	0.33
Near competitive pharmacy ^b												
Correlation	-0.30	-0.21	-0.09	-0.19	< 0.01	0.13	0.12	0.11	-0.02	-0.08	-0.01	-0.07
<i>p value</i>	0.67	<0.01	0.20	<0.01	0.99	0.19	0.21	0.25	0.69	0.15	0.91	0.22
Near competitive non-pharmacy ^b												
Correlation	-0.02	0.02	0.03	0.02	-0.03	-0.10	0.01	-0.10	-0.02	-0.03	0.01	-0.06
<i>p value</i>	0.79	0.79	0.64	0.76	0.76	0.27	0.91	0.30	0.77	0.60	0.84	0.27

^a Pearson's correlation test, ^b Spearman's rank correlation

Appendix 18 Comments of respondents regarding antibiotic use, antimicrobial resistance, and improving appropriate antibiotic use.

ID	Comments	Theme
Main survey: returned paper questionnaire		
004	Raising awareness about antimicrobial resistance among pharmacists. And educate the public through various medias about important of appropriate antibiotic use.	Theme 1 Theme 3
008	In practical, the laws and regulation are not fully enforced, it's less than 50%.	Them 5
013	Should provide training and education on updated knowledge about antibiotic use and resistant antibiotics among community pharmacists.	Theme 2
014	Prohibiting direct and indirect advertisements names of antibiotic through medias. Encouraging the public to use antibiotics appropriately by obtaining from healthcare professionals only. Educating public about the different between antiinflammation drugs such as NSAIDs and antibiotics. Prohibiting the advertisement of antibiotics directly or indirectly. Thai-FDA should not allow to register antibiotics which packaging that can make people misunderstand about antibiotics, for example, Sulfa 500,000 instead of Sulfa 500 mg, or Pen V 500,000.	Theme 3 Theme 5
016	Continuously educating the public about antibiotics. Every pharmacy must have pharmacists to supply antibiotics.	Theme 3 Theme 5
020	Adding rational antibiotic use as essential topics for continuous pharmacy education (CPE) that every pharmacist must pass this topic	Theme 2
021	Antibiotics must be supply from pharmacies by pharmacists only.	Theme 5
023	Every stakeholder should participate in Rational Drug Use programme and should have strategy plans about this. Educating the public about self-care and appropriate drug use is very important.	Theme 4 Theme 3
024	In communities, Type II pharmacies sale antibiotics to grocery stores. They should be strictly control of illegal supply of antibiotics from Type II pharmacies and grocery stores. Most Type I community pharmacies in the area have full time community pharmacists to provide the services, so, there is a small problem of oversupply of unnecessary antibiotics to patients.	Theme 5
025	All community pharmacists should be aware about the importance of appropriate antibiotic use.	Theme 1 Theme 3
026	All private hospitals, clinics and pharmacies should be improved appropriate use of antibiotics. Private hospitals should decrease supplying inappropriate antibiotics. Recently new generations of antibiotics should be prescribed based-on antibiotic susceptibility testing.	Theme 4 Theme 5

ID	Comments	Theme
	Classify some antibiotics to not be allowed in pharmacies, such as new generations of antibiotics.	
027	<p>Most pts. Could not afford the full course of antibiotics, so they asked to buy antibiotics little by little.</p> <p>Nowadays, there is very little problem about antibiotic resistance in community pharmacies. Old antibiotics are effective, such as, ampicillin, amoxicillin, erythromycin.</p>	Theme 1
028	<p>Antibiotic resistance could be caused by overuse of antibiotics in livestock and over prescribing of antibiotics from hospitals and clinics. In private hospitals and clinics, doctors usually prescribe newer and high potency antibiotics. I also work at a public hospital and a private hospital. At a pharmacy, patients came and consulted about antibiotics they obtained from clinics. Don't just blame the pharmacy. Pharmacies are the good place to provide information of rational drug use.</p>	Theme 4 Theme 1
029	<p>A reason contribute to inappropriate use of antibiotics in community pharmacies is belief of public that antibiotics (which they call "Ya-Kae-Ag-Seb" which means antiinflammation) can cure almost every illness. When a pharmacist explain that antibiotics are not required for their conditions, they blame a pharmacist not have enough knowledge. Sometimes, when pharmacists tell patients to have a full course of antibiotics, they think we want to make high profit. The government should educate the public about all of these seriously.</p>	Theme 3
030	<p>According to Rational Drug Use campaign, public is more aware and perceive advantages of overuse of antibiotics. In pharmacies, community pharmacists take part to educate patients about antibiotic use, which make the reputation of community pharmacies to public and make the public more trust in pharmacies. Then, antimicrobial resistance should be decreased.</p>	Theme 1
032	<p>They should have ways of monitoring Type I pharmacies to have a pharmacist to provide pharmacy services all the time. This will help to improve the appropriate supply of antibiotics and other medicines.</p> <p>In pharmacies which doesn't have a pharmacist, sometimes, they supply only a table of antibiotic. Drug information on packages of some antibiotics, e.g. tetracycline, makes public misunderstand about antibiotics.</p>	Theme 5
033	<p>Should control prescribing/supplying of antibiotics throughout hospitals, clinics, and pharmacies. I found that many children obtain newer antibiotics such as Omnicef® [cefдинир], so amoxicillin may not effective for them in the future.</p> <p>Should educate village health volunteers about rational drug use.</p>	Theme 4 Theme 3
037	<p>Antibiotics should be supplied with proper indication. there is indicated.</p>	Theme 1
038	<p>Supplying antibiotics appropriately and only when necessary.</p>	Theme 1
040	<p>Should providing public education about antibiotic via television, internet or advertisements on YouTube.</p>	Theme 3

ID	Comments	Theme
043	<p>Should educate community pharmacists among community pharmacists about diagnosis and appropriate use of antibiotics, so they can supply antibiotics appropriately.</p> <p>Community pharmacist should be aware about the benefits and risks of antibiotics use.</p>	Theme 2
045	<p>Reasonably supplying antibiotic based on the benefit of patients.</p> <p>Withdrawn some packaging of antibiotics, such as, rifampicin three tablets per bottle, penicillin 500,000. These antibiotics were found a lot at grocery stores.</p>	Theme 1
047	<p>Should enforce the law seriously, particularly, selling illegal antibiotics from grocery stores which is inappropriate and can cause antibiotic resistance.</p> <p>To dispense antibiotics from pharmacies should be required a prescription.</p>	Theme 5
048	<p>Should educate the public about appropriate use of antibiotics, particularly risks of taking antibiotics inappropriately for some conditions, such as, sore throat, wound, diarrhoea.</p>	Theme 3
049	<p>[Government] Should be providing the same education tools to every pharmacy that could help pharmacists to educate their patients, for example, education tools about conditions, signs and symptoms that should have antibiotics.</p>	Theme 1
050	<p>As I am a pharmacist, I always tell patients whether or not their condition needs antibiotics. But, If the patients still insist to have antibiotics, I'll supply them and educate them that they do not actually need antibiotics.</p>	Theme 3
051	<p>Follow up via phone, asking for symptoms, side effects or any allergic that could happen, and their compliance. This will be benefit to patients and also make a good reputation of pharmacies.</p>	Theme 1
052	<p>Physicians prescribe newer antibiotics for their patients. When the patients come to pharmacies, even with mild symptoms, they want to have the same antibiotics. Physicians should educate their patients about prescribed antibiotics because sometimes, the patients did not trust pharmacists.</p> <p>Enforcement community pharmacies to provide pharmacy services by pharmacists only.</p>	Theme 4 Theme 5
053	<p>To improve appropriate antibiotic use in Thailand, participation from every stakeholder is required, including hospitals, clinics, pharmacies, and public.</p> <p>The most important thing is the public has knowledge and understanding of the use of antibiotics appropriately. Community pharmacies should take the role to educate their patients about the appropriate use of antibiotics.</p>	Theme 4 Theme 3 Theme 1
056	<p>Antibiotics should be supplied only when there is certainty of it being a bacterial infection, for example, wound with pus and fever. If there is no certainty, antibiotics shouldn't be supplied.</p>	Theme 1
058	<p>Physicians prescribe more inappropriately antibiotics than pharmacists.</p> <p>If patients cannot afford the cost of full course antibiotics, I will advise them to come back and obtain the rest of antibiotics.</p>	Theme 1

ID	Comments	Theme
059	All pharmacies, clinics, and public and private hospitals are influenced by drug companies to supply antibiotics. Drug companies offer the rewards for high purchasing, such as, an oversea trip. This is an obstacle to improve rational drug use.	Theme 5
060	Not only pharmacies, clinics also responsible for antibiotic resistance.	Theme 4
061	Educate the public. Also using the same policy with clinics and private hospitals.	Theme 3 Theme 4
063	In pharmacies, we can only take patient history to make the decision to supply antibiotics. Cultivating awareness about the importance of antibiotic use and antimicrobial resistance problems among pharmacy students. Not only pharmacies, private hospitals also responsible for antibiotic resistance. Patients are also important, providing education tools from governments is important.	Theme 2 Theme 3 Theme 4
067	Regularly updating knowledge about appropriate antibiotic use and antimicrobial resistance situations.	Theme 2
069	Should promote appropriate use of antibiotics in clinics and private hospitals too.	Theme 4
072	Should raise awareness and educate the public about antibiotic use and antimicrobial resistance situation. Overprescribing antibiotics from private hospitals resulting in more patients requesting from pharmacies because most patients trust physicians more than pharmacists. Should educate the public about community pharmacists' role and appropriate antibiotic use. Should not implicate the regulation to force only pharmacists too much. Not only pharmacies that responsible for antimicrobial resistance.	Theme 3 Theme 4
076	There are very few prescriptions are brought to a pharmacy. As long as clinics and hospitals dispense antibiotics to their patients. Most antibiotic resistances are caused by hospitals. Some patients came to my pharmacy and asked for newer antibiotics.	Theme 4
080	Raising awareness about antibiotic use and antimicrobial resistance.	
081	Thai people overuse of antibiotics resulting in antimicrobial resistance.	
082	Re-classification some antibiotics to be special control medicine may decrease inappropriate use of antibiotics	Theme 5
084	RDU (Rational Drug Use) project should provide education to pharmacists, education tools to educate patients such as brochures to all pharmacies.	Theme 1
086	Educate the public via television. Educate people in hospitals while they are waiting for the services.	Theme 3
088	Educating public about advantages and disadvantages of antibiotics.	Theme 3

ID	Comments	Theme
	Community pharmacists must supply appropriate antibiotics and should be aware about the risks of inappropriate antibiotic use. Promoting the appropriate use of antibiotics.	Theme 2
Mains survey: completed questionnaire online		
0338	Should educate the public more about antibiotics.	Theme 3
0923	Overuse of antibiotics is resulting from patients obtain antibiotics from clinics or private hospitals, then requesting the same antibiotics from pharmacies when they get sick again. The patients usually excuse that they had it before or had it from a doctor before. Should promote appropriate use of antibiotics among physicians too.	Theme 4
4513	Education the public is the most important.	Theme 3
0923	One cause of antimicrobial resistance is over prescribing of antibiotics form clinics. Physicians prescribe antibiotics for almost all patients with not full course of antibiotics.	Theme 4
8024	Even though Antibiotic Smart Use campaign was implemented, supplying antibiotics from community pharmacies is not decrease. This is because the public misunderstand that they need antibiotics to get better. If the beliefs of the public about antibiotics is change, the campaign will be successful.	Theme 3
1519	To reduce antibiotic resistance, public education is more important than control the supplying of antibiotics.	Theme 3
4088	Patient education by healthcare professionals may not enough. Most people easily believe information from media rather than advice from healthcare professionals. They asked for unnecessary antibiotics even though they were explained the reasons. So, providing information through to the public via media to make people understand about the appropriate use of antibiotics.	Theme 3
8475	Educate the public. Enforce the law the same to all infirmaries equally. Over supplying of antibiotics usually from pharmacies that do not have full time pharmacies and wholesale pharmacies that more concern about business. Illegal supply of antibiotics should be control.	Theme 3 Theme 5
3565	Community pharmacists should supply only first line antibiotic and should supply alternative antibiotic only when a patient allergic to the first line antibiotic.	Theme 1
9819	Not only raising awareness among community pharmacists, should raising awareness among physicians in clinics, and private hospitals. Overuse of antibiotics cause by the patients used to obtained antibiotics from healthcare professionals.	Theme 4
6963	Thailand has laws and regulations on drugs that specify penalties for pharmacists. But there is no penalty for physicians, dentists, or nurses who prescribes and dispenses inappropriate medicine. Many clinics still illegally prescribed and dispensed medicines.	Theme 4

ID	Comments	Theme
9896	Publicity about antibiotic to the public via television. Decreasing the availability of antibiotics from infirmaries. Punish those who violate the law	Theme 3 Theme 5
8583	Should control prescribing of antibiotics by physicians from clinics because they prescribe newer and expensive antibiotics.	Theme 4
8514	New antibiotic should be allowed to dispense from hospitals only. Many clinics dispense a lot of new antibiotics to patient. This make patients believe that these antibiotics are good, help them cure faster. When they get sick, they may visit a pharmacy to get the same drug with lower price. Pharmacies usually have these new antibiotics in case patients asking for them even sometimes patients don't need to use new antibiotics.	Theme 5
4750	Most resistant microbials are caused by private hospitals that usually supply newer antibiotics to make sure patients are cured. Most serious resistant microbials are from hospitals.	Theme 4
0380	It should have a fund for potential owner pharmacists to observe the best practice/update knowledge/present their practice.	Theme 2
4528	It should have the same standard to control prescribing/dispensing/supplying of antibiotics from all pharmacies, clinics, and hospitals.	Theme 4
2233	Withdrawn registration of some registered antibiotics e.g. kanamysin, TC-mycin® [tetracycline] because these drugs caused a lot of resistant microbials in human, animals, and environment.	Theme 5
2872	I think to prescribe antibiotics should depend on Lab test rather than personal opinion.	-
1702	Should provide the education tools about the risks of resistant microbials and obtaining antibiotics from non-healthcare professionals. These education tools should be easy to understand and provided via media that can be accessed by most people including people in rural areas, and uneducated people.	Theme 3
2660	Customers think they have enough knowledge. I have to tell them medicines are not foods. Should educate about rational drug use among students in secondary school. Many grocery stores are selling antibiotics.	Theme 3 Theme 5
0921	As I am a community pharmacist, I always tell my patients about appropriate antibiotic use and resistance. I'm disheartened with misunderstanding of patients. If possible, it should publicize about serious consequences of antimicrobial resistance e.g. number of deaths, pictures of patients with resistant bacterial infections. People should be able accesses to this information. It' the truth that customer can easily go to another pharmacy if we don't supply what they want.	Theme 3
4530	Should raising awareness about appropriate antibiotics use among healthcare professionals and public.	Theme 4 Theme 3

ID	Comments	Theme
	Healthcare professionals should educate their patients every time they prescribe/dispense/supply antibiotics.	
6307	Antibiotics should be dispensed from pharmacies with a prescription only, and every clinic should have pharmacist(s) to dispense medicines.	Theme 5
6601	Should prohibit supplying of antibiotics from pharmacies. Or should have the same standard for all healthcare professionals. Prohibit supplying from clinics with no pharmacists	Theme 4 Theme 5
4171	I think, pharmacists already aware about the problem. I think, should control Type II pharmacies to not sell antibiotics. Type II pharmacies and nurse clinics supply a lot of antibiotics. They even sell special control medicines. They even sell Ropect®. If these Type II pharmacies and nurse clinics have not been controlled to only legally sell medicines, it will be difficult for Type I pharmacies to refuse their customers.	Theme 5
5393	I believe that mostly community pharmacists supply appropriate antibiotics. Doctor clinics and nurse clinics should be promoted to prescribe/dispense/supply antibiotics appropriately too.	Theme 4
5649	To improve appropriate antibiotic use, physicians who work in clinics and hospitals should be promoted to prescribe antibiotics appropriately, do not use too broad-spectrum antibiotics. All community pharmacists, physicians, community pharmacies, clinics, private hospitals should cooperate to improve appropriate use of antibiotics.	Theme 4
7797	<p>To tackle with antimicrobial resistance problem, every stakeholder, particularly private hospitals, should participate. Sometimes, patients came to ask for the same antibiotics which they obtained from a hospital. Should educate the public about antimicrobial resistance problem. Many patients ask for Ya-Kae-Ag-seb (which they mean antibiotic) because they think it is anti-inflammatory drug. Some patients take amoxicillin for back pain because they think it is anti-inflammatory drug. Someone believe when I explain that they don't need antibiotics, but someone don't. They think having antibiotics help them cure faster.</p> <p>Should reconsider information that is provided on antibiotic packages. Some drugs put many indications on the package and make people misunderstand about the benefit of the drug, for example, TC mycin®, penicillin.</p>	Theme 3 Theme 4 Theme 5
5699	Should raising awareness and educate about antibiotics to the public in the communities because many people do not have enough knowledge about antibiotics, and they use them inappropriately. Healthcare professionals should take part to educate the public.	Theme 3
1971	Some antibiotics should not be allowed to be supplied or dispensed outside of hospitals, for example, fourth and fifth generation cephalosporins.	Theme 5
2925	In case patients cannot afford the full course of antibiotics, I will supply full course of antibiotics without charging for the extra cost. This will help patient to having full course antibiotics and decrease a problem of antimicrobial resistance.	Theme 1

ID	Comments	Theme
2201	Should promote appropriate use of antibiotic in the hospitals too. Many times, patients ask for newer antibiotic which is not a first line antibiotic. Most of these antibiotics were from hospitals, particularly, private hospitals. If patients don't obtain those antibiotics before, they won't pressure a pharmacist to supply them.	Theme 4
0379	Pharmacists and pharmacy students were educated to supply appropriate antibiotics when they were studying at universities. So, they aware of supplying appropriate antibiotics and supply appropriate antibiotics. On the other hand, we found many times that physicians prescribe antibiotics with no indication or non-first line antibiotics, resulting to overuse of antibiotics.	Theme 4
2761	Should educate the public about the difference between inflammatory with infection and inflammatory without infection, types of microbial and indication of antibiotics. For example, people think antibiotics are for cold, cough, and sore throat. Public education should be short clips and continuous publicize via social medias, television, or radio.	Theme 3
7281	Supplying the full course of antibiotics is good, but most people receive daily wages and other expenses. I will supply antibiotics in amount that they can afford at a time and tell them to come back until they have the full course. I will also ask for their phone number [to follow up]. If antibiotics are re-classified to be prescription only medicine, no physicians are going to give a prescription to a patient and. As professional, we aware about antimicrobial resistance. But antimicrobial resistance does not cause by on Type I pharmacies. Type II pharmacies (which illegally supply antibiotics), private hospitals and other also responsible for antimicrobial resistance.	Theme 1 Theme 4
0830	Every stakeholder must take this problem seriously.	Theme 4
7011	Antimicrobial resistance is caused by many factors. Ease accessible of antibiotics is only one reason. Should promote appropriate antibiotics use to all stakeholders. I heard from some of my friends that they had customers came to ask for antibiotic for livestock or agriculture. This is also a cause of antimicrobial resistance. Only promoting appropriate antibiotic supply in community pharmacies is not enough to solve antimicrobial resistance problem.	Theme 4
4780	Cause of antimicrobial resistance is more likely to be inappropriate prescribe/dispense of antibiotics by physicians from hospitals. Sometimes patients didn't need to have antibiotics which prescribed by physicians. This is overprescribing and cause antimicrobial resistance.	Theme 4
8161	Should promote appropriate use of antibiotics to all pharmacies, clinics, and hospitals.	Theme 4
8366	Nowadays, patients easily obtain antibiotics from hospitals. Sometimes, physicians at hospitals tell specifically antibiotics to patients to buy them from a pharmacy.	Theme 4

ID	Comments	Theme
1542	1. Separation of prescribing and dispensing like some developed countries, 2. Classify antibiotics as special control medicines which require a prescription for dispensing.	Theme 5
6783	In many pharmacies, young pharmacists are aware about rational drug use and try to advise patients to have appropriate antibiotics. While physicians in private hospitals, clinics prescribe many antibiotics without indications, so antimicrobial resistance problems are not only pharmacy's responsibility. Should promote the importance of rational drug use to physicians as well.	Theme 4
8602	People in communities have no knowledge about having medicine. In the past 7 years that I have been working at a community pharmacy, I always educate them, but they did not really believe in my advices. They believe their neighbour, internet. Public education is not needed.	Theme 3
4451	Continuously educate the public via various medias.	Theme 3
6689	Should promote appropriate use of antibiotics among physicians. There is over prescribe of antibiotics from hospitals.	Theme 4
4068	Should do the same thing throughout every stakeholder.	Theme 4
Open online survey		
8818	Should control dispensing of antibiotics from clinics and private hospitals too. They over dispense of antibiotics, particularly, newer and expensive antibiotics.	Theme 4
9057	Should control dispensing of antibiotics from clinics too.	Theme 4
9115	Antimicrobial resistance in community doesn't only contribute by supplying antibiotics from pharmacies because we do not supply new or broad-spectrum antibiotics. We usually supply first line antibiotics. But, in the clinics, physicians prescribe non-first line antibiotics which may cause antibiotic resistance.	Theme 4
9230	Government should promote rational antibiotics use and provide education tools for providing to patients to raise their awareness.	Theme 1:
9274	I don't agree to classify all antibiotics as prescription only medicines. From my experience working in hospital and pharmacy, I found that many physicians over prescribe antibiotics, particularly in private hospitals and clinics. If patients get a prescription from these physicians without bacterial infection, they may use a prescription as an excuse to buy antibiotics. I saw some patients came to my pharmacy with a prescription, but they amended the number of tablets on the prescription to get more medicines. I think, we should promote rational drug use among both public and private health facilities to control antibiotic prescribing by physicians and supply by community pharmacists.	Theme 4
9819	Nowadays, most healthcare professionals think that Type I pharmacies, which require pharmacists, is contribution for antimicrobial resistance, but there are Type II pharmacies and grocery stores that sale antibiotics illegally	Theme 5

ID	Comments	Theme
0421	Patients don't understand the difference between antibiotics and antiinflammation drugs. They call antibiotics as "Yar-Kae-Ag-Seb" [which means antiinflammation] and they don't think that overuse of these drugs could cause antibiotic resistance, so they ask for "Yar-Kae-Ag-Seb". Sometimes, patients refuse to have antibiotics and ask for "Yar-Kae-Ag-Seb" which actually is antibiotics".	Theme 3
0737	Education medias should be short clips, short films, case studies,	Theme 3
9367	From my experience, inappropriate supply of antibiotics from community pharmacies is because customers requested and did not believe the advices of a pharmacist. I think, the public should be educated about the impact of inappropriate use of antibiotics via various medias, particularly, television which is trustful and can access to most people included elderly. Social medias are suitable for young generation.	Theme 3
1348	Supplying antibiotics from pharmacies is not the main cause of antimicrobial resistance. The most importance cause of antimicrobial resistance is inappropriate prescribing from clinics or private hospitals. Don't blame only community pharmacists.	Theme 4
0631	Make community pharmacies to report every antibiotic supplying case to raise the awareness about appropriate antibiotics use.	Theme 5
1749	Should strictly control prescribing/dispensing/suppling of antibiotics from others infirmary too.	Theme 4
1918	Should promote rational antibiotics use throughout clinics too.	Theme 4
3203	Patient education is important. Community pharmacists should education their patients. Moreover, should educate the public via social medias and television.	Theme 1 Theme 3
4485	Should have regularly monitoring programme in private hospitals, clinics, and pharmacies about antibiotic use and make them to report all antibiotic use.	Theme 4 Theme 5
4614	Every healthcare professional is involved not only community pharmacists. Strictly control of antibiotic supplying only in community pharmacies is not an effective solution.	Theme 4
6376	Should have strategy regarding to change the public's believe about antibiotics.	Theme 3
6246	Communicate about the important of antimicrobial resistance throughout the public via various medias.	Theme 3
4181	Should educate the public through various media. The public usually believe easily accessible media. Education about the risks of using antibiotics inappropriately, telling them about antibiotics that people are usually taking.	Theme 3
8981	Supplying of antibiotic should be allowed only in pharmacies with full time pharmacists.	Theme 5

ID	Comments	Theme
5475	Not only pharmacy that supply inappropriate antibiotics, hospitals, clinics, dental practices also prescribe antibiotics appropriately. Should promote rational antibiotic use to all of these.	Theme 4
5712	We (community pharmacists) can supply the full course of antibiotics by choose the cheap brand, so patients can have full course of antibiotics.	Theme 1
5735	The whole system has to be changed. For example, before re-classify antibiotics to prescription only medicine, prescription and dispensing should be separated. The prices of medicines should be control too. Making pharmacies' owner to decrease the sales of antibiotics is hard because it affects the profits. Dispensing separation system should be implemented.	Theme 4
6285	To promote appropriate use of antibiotics, firstly, should educate people in communities via various medias e.g. short conversation on radio. Secondly, building the good conscience about rational drug use among pharmacy students. These two methods may take a long time and need to be continuous doing; therefore, this should be made as a policy.	Theme 3 Theme 2
5778	Promote appropriate use of antibiotics among communities to raise their awareness about antimicrobial resistance situation. Publicize poster about appropriate antibiotic use in community places, such as, community markets, cinemas, or Line application.	Theme 3
6534	The government, education sectors, and professional sectors are the important key factors to solve the problem.	Theme 4
6626	Physicians working at clinics prescribe and dispense antibiotics for only three days. Nurses working in factories supply four tablets of antibiotics. How do we change this? Patients are users. How do they use antibiotics appropriately while they receive inappropriate prescribing/supplying of antibiotics?	Theme 4
6646	Many people over 30 years old believe that antibiotics can be taken only 1 tablet and can stop taking when symptoms resolve. Some patients asked for TC-mycin® [tetracycline] for back pain. Teenagers seem to be more understand and aware about antibiotic use. However, if they go to visit physicians and obtain antibiotics without indication for bacterial infection, their thought will be changed.	Theme 3
6729	Other healthcare professionals should be involved too. For example, many patients obtained antibiotics from clinics, then they came to buy the same antibiotics from pharmacies. Patients thinks they need antibiotics even for self-limited diseases.	Theme 4
6873	Both physicians and pharmacists prescribe/dispense/supply antibiotics inappropriately.	Theme 4
7096	Community pharmacists should explain the importance of finishing the course of antibiotics.	Theme 1

ID	Comments	Theme
511	Should have the same role to control inappropriate supplying of antibiotics from pharmacies and prescribing/dispensing from clinics. Wholesaling of antibiotics to grocery store or non-Type I pharmacies should be controlled.	Theme 4
9538	Preparing and providing updated clinical practice guideline. Patient education should be done. This can help to decrease patients' expectations to have antibiotics.	Theme 2 Theme 3
5693	Should add these topics about antibiotics and antimicrobial resistance in the curriculum for secondary school students. Should promote rational drug use throughout physician and nurse clinics too.	Theme 3 Theme 4
7713	I agree to reclassify all antibiotics to be prescription only medicine if the whole dispensing system is changed to dispensing separation system. I mean, clinics should not be allowed to dispense antibiotics to the patient like many countries. If clinic still be allowed to dispense antibiotics to their patient, I will not agree to reclassify all antibiotics to be prescription only medicine because this may affect the business.	Theme 4
7457	Seriously enforce the laws regarding illegal supply of antibiotics form Type II pharmacies, grocery stores and every Type I pharmacy must have pharmacist(s) to provide pharmacy services. Educating the public about antibiotics and antiinflammation is the most important.	Theme 5 Theme 3
7543	To dispense antibiotics, a prescription should be required. Easy access of antibiotics from pharmacies, clinics, nursing clinics, Type II pharmacies, grocery stores can increase antimicrobial resistance. Therefore, requiring a prescription to dispense antibiotics may help to decrease the problem.	Theme 3 Theme 4
2621	Should educate about appropriate antibiotic use in primary school to raise their awareness since they were young.	Theme 3
8142	Controlling supplying antibiotics from pharmacies is only one thing. Overuse of antibiotics in livestock and agriculture also responsible for antimicrobial resistance. It should control the distribution of antibiotics from other resources as well.	Theme 4
9219	Educate the public using various medias.	Theme 3
5920	Raising awareness among pharmacist to think about patient more than profits. Educate the public using social medias.	Theme 2 Theme 3
1250	Educating young people.	Theme 3
0399	The same messages should be communicated throughout the whole system, physicians, nurses, pharmacists and other healthcare professional. Using antibiotics in livestock should be control as well. Educate the public about appropriate use of antibiotics.	Theme 4 Theme 3
9654	Community pharmacist should aware about antimicrobial resistance more than their profit.	Theme 2

ID	Comments	Theme
3168	<p>Ever stakeholder should be involved. Firstly, educate young people by implement in the curriculum. Secondly, raising awareness regarding appropriate antibiotic use among the public. Thirdly, promoting appropriate antibiotic use among private hospitals. Inappropriate prescribing antibiotics by physicians resulting patients misunderstanding about antibiotics. This make patients think they should have antibiotics when they have sore throat, diarrhoea.</p> <p>Finally, community pharmacists should regularly update their knowledge to improve appropriate antibiotics use.</p>	<p>Theme 3 Theme 4 Theme 2</p>
1959	Promoting rational drug use in communities, students.	Theme 3
8140	Many times, parents/guardians took a package of antibiotic to buy from a pharmacy. Most of these antibiotics were very broad spectrum and expensive. This can cause antibiotic resistance.	Theme 4
7664	Should promote appropriate antibiotic use among community pharmacies and clinics.	Theme 4
9386	Cause of antimicrobial resistance is more likely to be inappropriate prescribe/dispense of antibiotics from clinics than pharmacies.	Theme 4

Theme 1: roles of community pharmacists toward improving rational antibiotic use; theme 2: updating knowledge and raising awareness regarding antibiotic use and AMR; theme 3: public education; theme 4: improving rational use of antibiotics throughout the whole health system; theme 5 development and enforcement of laws and regulations regarding antibiotic use.