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Citation for final published version:

Stenner, Karen, Edwards, Jude, Mold, Freda, Otter, Simon, Courtenay, Molly , Moore, Ann and Carey, Nicola 2018. Medicines management activity with physiotherapy and podiatry: a systematic mixed studies review. *Health Policy* 122 (12) , pp. 1333-1339.  
[10.1016/j.healthpol.2018.10.004](https://doi.org/10.1016/j.healthpol.2018.10.004)

Publishers page: <https://doi.org/10.1016/j.healthpol.2018.10.004>

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Article accepted by ‘Health Policy’ Oct 4<sup>th</sup> 2018

**Title: Medicines management activity with physiotherapy and podiatry: a systematic mixed studies review**

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**Keywords:** allied health professionals, systematic review, medication management, physiotherapy, podiatry

## **Acknowledgement**

The authors would like to acknowledge that this research was funded by the UK Department of Health Policy Research Programme (grant number PR-R7-0513-11002). The views expressed in this publication are those of the authors and do not necessarily reflect those of the Department of Health.

## **Conflict of interest**

The authors declare that there is no conflict of interest.

## **Abstract**

**Objective:** Making best use of existing skills to increase service capacity is a global challenge. The aim was to systematically review physiotherapy and podiatrist prescribing and medicines management activity, including evidence of impact on patient care, levels of knowledge and attitudes towards extended medicines role.

**Methods:** A search of MEDLINE, CINAHL, and Cochrane databases, using terms to identify prescribing and medicines management across a range of roles, was conducted from January 1985 to May 2016 for physiotherapy, and January 1968 to May 2016 for podiatry. Hand searching of citations and databases from professional organisations was undertaken. Data were extracted and analysed descriptively, and quality appraised by 2 reviewers using the mixed methods appraisal tool.

**Results:** 1316 papers were identified, and 21 included in the review. No studies were identified that reported prescribing and no studies specific to podiatry met the inclusion criteria. Physiotherapists were highly involved in administering medicines, providing medicines advice, and recommending new medicines. Patient satisfaction, cost and outcomes were equivalent when comparing physiotherapist-led injection therapy to traditional care. Pharmacology knowledge was variable and unmet training needs identified.

**Conclusion:** Medicines management practices were identified in physiotherapy and positive outcomes of extended scope physiotherapy. There was a lack of evidence regarding podiatric practice. Review of educational preparation for medicines management is recommended along with evaluation of medicines management practice.

**Keywords:** Policy development; Physiotherapy; Podiatry; Medicines management; Prescribing; Systematic review; Allied Health Professions

## **INTRODUCTION**

Given increasing demand on health services, there is a need for strategies to build sustainable health systems with improved reach and efficiency (1). A report by the World Health Organisation (2) focuses on the important role of research in advancing progress towards universal health coverage. Understanding how to make the best use of existing skills and resources has been identified as a global challenge (2). One strategy to improve coverage is to extend the range of professionals who can prescribe medicines to include nurses, pharmacists and allied health professionals (AHPs). Prescribing by nurses and pharmacists offers care comparable to that provided by doctors and can improve patient satisfaction, access and adherence to medicines (3,4). AHPs, such as physiotherapists and podiatrists, often work independently and can be the first point of contact for patients, making them ideally placed to undertake advanced practice roles in assessment, diagnostics and administration of medicines (5). If these professionals can prescribe medicine, it may prevent an appointment with a doctor and improve timeliness and access to treatment (6).

Physiotherapy is a recognised profession in over 110 countries and more than a million practitioners work in healthcare and/or as independent practitioners (7). Concerned chiefly with human function and movement (8), physiotherapy identifies and maximizes quality of life and movement potential within the five spheres of promotion, prevention, treatment/intervention and rehabilitation (7). There is evidence that advanced practice physiotherapists provide care that is equal to doctors in relation to diagnostic accuracy, patient satisfaction, treatment effectiveness and costs (9). Recognition of podiatry as a profession varies internationally. Podiatrists in the UK deliver a variety of physical, pharmaceutical and related interventions aimed at improving foot health and mobility (10) and work within general clinics, paediatrics, biomechanics, and high risk patient management. Some also specialise in foot surgery, achieving consultant podiatric surgeon status (11).

Physiotherapists and podiatrists in the UK can administer medicine under the legal framework of Patient Group Directions (PGDs) (see Table 1 for glossary of terms). There are an estimated 3,000 physiotherapists trained in injection therapy in the UK (6) Podiatrists have had access to local anaesthesia since the 1970s and the ability to administer and supply a limited number of prescription only medicines via exemptions for 10 years (Table 1). Following the introduction of a form of dependent prescribing (Supplementary prescribing) in 2005 (6) legislative change in 2013 has entitled physiotherapists and podiatrists to prescribe medicine independently of a doctor (Table 1). It is anticipated that independent prescribing will improve patient access to medicines, service efficiency and quality of care (12) and is aligned with current health policy encouraging one-stop-shop services that meet demand at the point of contact (13,14). Other countries have seen similar role extension within physiotherapy and podiatry, however legislation to prescribe appears to be limited to military physiotherapists in the USA and podiatrists in some Canadian states (15). Physiotherapists have authorisation to provide advice about and/or to administer or supply medicines in some states in Australia, New Zealand and Canada, and podiatrists have similar authority in Australia and some European countries.

It is important to assess current practice in order to scope the potential contribution of AHPs to medicines delivery, however the extent of physiotherapy and podiatry involvement in medicines management is largely unknown. Systematic reviews on AHP roles have identified that most studies are of low quality and few report on patient outcome measures (5, 24-25). International literature focusing on medicines delivery is limited and there has been no comprehensive review of this evidence to date. This review will therefore examine the current literature relating to prescribing and other medicines management activity by physiotherapists and podiatrists.

## **Aim**

To systematically review current evidence regarding physiotherapy and podiatrist prescribing and medicines management activity, including evidence of impact on patient care, levels of knowledge and attitudes towards extended medicines role.

## **METHODS**

This review was conducted following the guidelines offered by the Preferred Reporting Items of Systematic Reviews and Meta-Analysis (PRISMA) framework (26). The study aims were structured using the elements of PICO (Population, intervention, comparator and outcome).

See Table 2.

### **Search Strategy**

The search strategy was applied across international electronic databases MEDLINE, CINAHL (via EBSCO) & Cochrane, supplemented with hand searching of relevant citations. Further searches were conducted using databases from professional organisations (n=11) and trial registers (n=4) (Appendix 1). Searches were conducted from the first recorded modern day activity on medicines management in the literature, as determined by a prior scoping search: January 1998 to May 2016 (physiotherapy), and January 1968 to May 2016 for podiatry.

Search terms represented medicines management and prescribing activities across a range of professional roles and across a range of care settings (Appendix 2). Each database was searched using the Index Terms (i.e. MeSH/index terms) unique to each database and a combination of Boolean (AND/OR) keywords in the title or abstract. Search strategies were developed by JE and checked by FM. No limits were placed on the searches at this stage other than inclusion of papers published in English. Search results were stored and managed using Endnote (v7.2). The total number of papers identified was 1316 and of these 130 were duplications across databases. At this stage 1186 articles were subject to screening.

## **Study Selection, Screening and Data Extraction**

Titles and abstracts were screened independently by two authors using the criteria detailed in Table 2. No limits were placed on methodology, clinical speciality, health care setting, or geographical area in order to be inclusive of all internationally relevant literature regardless of differences in healthcare setting. Disagreement was resolved by reviewing and discussing the full text version with the author team. A data extraction form (Table 3) was created to capture details about the study design, data collection methods, intervention, participant characteristics, outcome measures, study findings and study limitations. Data was also captured which would inform our review questions. This included information on:

- service settings/ characteristics;
- medicines management activities;
- level of knowledge or attitudes towards prescribing roles;
- issues that may impact on medicines management role;
- any evidence for the effectiveness of these roles.

Data extraction was undertaken by JE, FM, KS and NC content was discussed in regular author team meetings.

## **Data Quality**

Quality was evaluated using the Mixed Methods Appraisal Tool (MMAT) (27-28). The MMAT includes 3 methodological domains; mixed methods, qualitative and quantitative (the latter subdivided as randomised controlled, non-randomised and descriptive) (29). Domains are scored on 4 criteria, assigned 25% each, thereby affording an individual score out of 100. The inter-rater reliability of the MMAT is 0.94 (28). Two authors (JE & FM) appraised each study.

Disagreement was resolved with a discussion in the author team meeting. For the purposes of this review, a score of less than 50 was considered low quality and excluded. Scores 50 and 75 were considered medium quality and 100 considered high quality. The MMAT scores for individual studies are presented in Table 3.

## **Analysis**

Data was analysed thematically; focusing on data which would answer our key research questions. Experimental trials included in this review used different outcome measures and, due to heterogeneity, we were unable to conduct a meta-analysis.

## **REVIEW FINDINGS**

Of the 32 eligible empirical studies, 21 scored 50 or over on the MMAT and were included in the review. Papers reported on 17 studies, including: randomised controlled trials (n=3), cohort studies (n=3), case series (n=1), questionnaire surveys (n=8) and qualitative (n=2). Papers originated from Australia (n=7), New Zealand (n=1), Nigeria (n=2), South Africa (n=1), UK (n=9) and USA (n=1). Details of the final included papers are presented in the Preferred Reporting Items for Systematic reviews and Meta-analysis (PRISMA) flowchart (Appendix 3) and Table 3.

No studies were identified that specifically evaluated prescribing by physiotherapists or podiatrists and no studies relating specifically to podiatry met the inclusion criteria.

Four main themes were identified in the data relating to physiotherapy. These were:

1. Extent of involvement in medicines advice or administration.
2. Knowledge levels and training needs relating to role in medicines management or advice.
3. Attitudes towards physiotherapist prescribing or extended medicines role.

#### 4. Care outcomes and costs.

##### **1. Extent of involvement in medicine advice or administration**

Nine articles (30-38) provided evidence that physiotherapists are involved in: a) administering medicines to clients or b) advising about or recommending medicines. With the exception of a case series study (30), all were questionnaire surveys.

###### **a) Administration of medicines**

Research commissioned in Australia (32-35) followed concerns that physiotherapists were practicing outside New South Wales medicines legislation that allows the administration of Prescription Only Medicines (POM) once medicines have been obtained by the patient. Of the 472 physiotherapists surveyed (32), 27% administered POMs, of which 6% were acting outside the legal framework by independently deciding on dosage without medical instruction. The study also found that Over the Counter (OTC) medicines, which appropriately trained physiotherapists in Australia are permitted to administer, were administered on a weekly (32%) or daily (17%) basis. Private practitioners were more engaged in administering OTC medicine than publicly funded practitioners (34). A further study (37) surveyed Australian physiotherapists with respect to use of non-steroidal anti-inflammatories (NSAIDs) available OTC: topical NSAIDs were regularly applied by 20%, of the sample (n=285) against professional practice guidance. Similarly, in South Africa (where administration, storage and prescribing of medicines by physiotherapists is not supported by current legislation), 64% of 461 physiotherapists surveyed (38) reported administering medicines and 26% stocked medicines.

In North America, physiotherapist roles were found to affect their involvement in medicines administration (36). In this survey, physiotherapists providing healthcare at the first point of

entry into primary care (primary contact roles) were more frequently involved in administration of OTC medications and ordering imaging studies than those in non-primary contact roles. Three groups were recruited: civilian primary contact physiotherapists (n=37), military primary contact physiotherapists (n=82), and non-primary contact civilian physiotherapists (n=103). OTC medicines were administered by 61% of military and 38% of civilian physiotherapists, mainly for MSK conditions, compared to 6.2% of non-primary contact physiotherapists. Establishing a physical therapy diagnosis and prescribing or administering OTC were considered to be important professional tasks in these roles, as was maintaining effective communication with physicians and other healthcare providers. The legislative framework for non-military physiotherapist involvement in administering medicine in this study was unclear. Only one study (30) reported on physiotherapists' role in medicines administration in the UK. This study focused on intra-articular injections for knee osteoarthritis in an outpatient clinic, finding similar outcomes to physician-led services.

### **b) Advising and recommending medicines**

Direct evidence of physiotherapist involvement in advising patients about medication was reported in surveys conducted in Australia (34-35,37) and New Zealand (31). In Australia, while most physiotherapists questioned new clients about POM (61.5%) and OTC (74%) medicine use, fewer (53%) kept a record of POMs, and 24.4% considered this information when planning a treatment regime (35). The majority advised clients about prescription (86%) and OTC (82%) medicine (33,34). This included advising clients to consult a doctor, advising how and when to take medicines, where to obtain them and when to cease them (33,34), as well as precautions, contraindications and side-effects (37). Reasons for providing advice included: having been asked by clients; detecting incorrect use or ineffective medicine regime; and advice given by the doctor being perceived as inadequate. Those who did not provide

advice were concerned about inadequate training and a lack of legal entitlement and responsibility for this role (33,34).

In New Zealand, a survey of musculoskeletal physiotherapists (n=278) found that the majority (81%) recommend oral NSAIDs or paracetamol to clients, often advising purchase of paracetamol over the counter (31). Information on risks and side effects was routinely provided by 83%.

## **2. Knowledge levels and training needs relating to role in medicines management or advice**

A need for more comprehensive training in pharmacology is highlighted in several surveys (31-32,35,37-40). Focusing on topical analgesics, anti-inflammatory agents, and antibiotics, a Nigerian study (39) concluded that awareness of common drug doses was poor and there was a need for updated knowledge amongst physiotherapists. Similarly, in Australia (35) and New Zealand (31) many respondents indicated large gaps in self-reported knowledge, with insufficient training cited as a considerable issue (37). At the time of these reports, Australia lacked competency standards or a set standard for curriculum content for pharmaceutical education for physiotherapists. A similar pattern is reported for South Africa where variable access to initial and ongoing training in pharmacology was reported despite the fact that pharmacological training guidelines for physiotherapists have existed since 1994 (38).

## **3. Attitudes towards physiotherapist prescribing or extended medicines role**

Overall, physiotherapists in South Africa (38), Nigeria (39) and the UK (41), support an increased role in medicines management and prescribing. Anticipated benefits of this advanced role include: increased quality of care; improved service efficiency; use of skills; and enhanced professional status. Barriers cited include: the need for more comprehensive pharmacology training; issues with liability and insurance cover; and resistance to changes to traditional roles

(38,41-42). Physiotherapists undertaking extended roles in medicines management are reported to experience an initial lack of confidence and an increased awareness of risks and contraindications (41). In Australia, rural, sports and first contact physiotherapists have been in favour of extending their role for prescribing of NSAIDs, if support is provided from pharmacists (43). In contrast, evidence suggests that hospital-based physiotherapists are less supportive of increasing their involvement in medicines or prescribing (37,43). Mixed views with regards to providing advice, along with concerns about legality, access to medical records and patient safety have been reported, despite physiotherapists routinely being asked by clients for medicines advice (32-33, 35,43).

Healthcare professionals in the UK (42) and Australia (44), are reported to be confident in the ability of physiotherapists to undertake advanced tasks in diagnosing and treating musculoskeletal conditions, although not all are supportive of a prescribing role (42). Patients were reported to be satisfied with the care provided by an advance scope physiotherapist, although not all patients were aware that they were seeing a physiotherapist rather than a doctor (45).

#### **4. Care and cost outcomes**

Outcomes of physiotherapist-led assessment and management, as compared to routine care provided by doctors or nurses was the subject of 6 papers: three randomised controlled trials (RCTs) (45-47), two cohort studies (44,48), and a retrospective case note review (49). Three studies included economic data (45-46, 50).

In a RCT by Daker-White *et.al.* (46), new referrals to two UK orthopaedic outpatient departments were randomly allocated to assessment and management by extended scope physiotherapists (ESPs) or to trainee surgeons. ESPs received one-to-one training by a consultant to instigate (but not prescribe) the same management options as doctors, including

intra-articular injections and analgesics. No significant differences were found between groups at 6 months in any outcomes apart from the ‘perceived treatment quality’ subscale of patient satisfaction which favoured the ESP arm. In-hospital costs were reduced in the ESP arm who requested fewer x-rays and surgical referrals.

Outcomes of care provided by physiotherapists to patients with soft tissue injury in UK emergency departments were compared to usual care provided by doctors and emergency nurse practitioners (ENP) in four papers (45,47,48,50). In these studies, physiotherapists were able to supply or administer analgesia via PGD. The first was a block randomised, non-inferiority trial in an accident and emergency department (45). Results showed higher satisfaction and quality of life at 3 months in the physiotherapy arm, but no differences in outcomes at 6 months. A similar and more recent block RCT in an emergency department reported equivalence in functional outcomes and health related quality of life at 8 weeks and no difference in recovery rates between the 3 professional groups (47). A single centre prospective cohort study (48) reported equivalent functional outcome scores at 1 week follow-up across the three staff groups. Patient satisfaction was higher in the ESP group for advice, explanation of assessment and time to ask questions, however ESPs were found to spend more time with patients than ENPs or doctors (25 minutes, compared to 15 and 20 respectively) (48). In an Australian ED department, a prospective cohort study was used to assess the impact of an Advanced Scope of Practice Physiotherapist (ASoP-PP) service on triage targets (44). Requests for imaging and prescriptions were made via doctors as there was no legislation to allow the ASoP-PP to independently provide medicines management in Australia, however these tasks made up 50-70% of the volume of provision per patient. The service did not significantly impact on compliance rates with triage targets but did significantly reduce length of stay and length of wait on shifts where the ASoP-PP was present. While these latter studies support the case for ESP role in minor injury care, the long term impact was not assessed.

In all settings studied, physiotherapists were recorded as providing more general advice and reassurance to patients than doctors or nurses (46,49), but less specific advice or analgesia (45-47,49,50).

Economic data collected by Richardson et.al.(45) on use of health and social services and personal costs at treatment and follow-up showed no significant differences in service related or health and social care costs. However, patterns of service use were different, for example, fewer prescriptions were issued in the physiotherapy arm but referrals to other services were higher. A cost-minimisation analysis from the McLellan trial (50) based on data collected during 8 weeks following injury, indicated that ESPs are at best equivalent, if not more expensive than routine care. While indirect costs were equivalent or more expensive, direct costs were equivalent or cheaper for the ESP group, mainly due to preference for supplying supportive equipment (e.g. leg crutches, braces) than administering medicine.

## **Data Quality**

Overall study quality was moderate, with only one study identified as high quality (30), and a lack of podiatry related evidence. Generalisability of the descriptive studies was limited in many cases by low response rates (under 40% response rate in 4 studies: 32, 36-38). The range and variability of outcome measures used in the RCTs, differing lengths of follow-up and under powering in some studies make it difficult to generalise the findings from this aspect of the review (46).

## **DISCUSSION**

This is the first comprehensive systematic review of physiotherapist and podiatrist prescribing and medicines management activity and related outcomes. The review is timely and of international relevance given the potential to improve health services through making better use of the skills of AHPs (51).

The review identified a lack of research on podiatrist involvement in medicines management. In contrast, a range of predominantly descriptive studies report on physiotherapy involvement in medicines management, with some medium and high quality intervention studies. In line with findings from a systematic review of non-medical prescribing (4), there is some evidence from RCTs that care provided by ESPs with training in MMA is equivalent to that of doctors or nurses in emergency and orthopaedic departments. However, long-term outcomes have not been studied and economic analysis indicates that ESP care may be more expensive in some respects. While there is evidence of increased patient satisfaction for ESP care, this may be attributable to longer consultation times and more research is needed to further investigate these differences.

There is a high level of involvement by physiotherapists in providing advice to patients about medicine, and substantial involvement in administering both prescription only and non-prescription medicines in countries where research was identified. Key areas in which physiotherapists administer medicines indicate where a prescribing role is likely to be beneficial: musculoskeletal conditions, respiratory conditions and sports injury. The main drug types administered are bronchodilators, NSAIDs and analgesics. Involvement in MMA varied according to setting and context and while there was general support for an increased MMA role, this varied in and across geographical regions and settings. Greater need for MMA was reported amongst private practitioners (34,37), first contact practitioners and by those working

in rural settings with poor access from other sources (37). Indeed, the geographical spread of studies suggests that interest predominates in countries with larger rural populations, or stretched healthcare resources, where extended medicines roles could improve efficiency or meet gaps in existing provision, as is often the case with nurse prescribing (4).

Findings indicate a need to improve knowledge and understanding of medications that are commonly recommended or administered, such as NSAIDs. While evidence from the client perspective is limited (44), a high patient demand for information about medicine was reported, however levels of training and legislation to support safe MMA were inconsistent with this demand (33-34). Development of jurisdictional support for nurse involvement in MMA is similarly reported to vary internationally (3), but research indicates that where appropriate support and training are in place there is scope for improving patient care (4), as may also be the case for AHPs (51). Findings suggest that a more strategic approach to setting educational standards and competencies at national level is required. Legislation in the UK determines which professions may act as prescribers, and prescribing competencies (52) and educational requirements are set out in prescribing standards, which for AHPs are overseen by the Health and Care Professions Council (53). Work has also taken place to provide a national definition and framework for multi-professional advanced clinical practice roles in order to promote consistency in the development of these roles in England (54). However, there is an argument that preparation for medicines management should begin at pre-registration level and, with this in mind, consultations are underway to overhaul standards for the delivery of nursing and midwifery education in the UK to ensure that nurses are prepared to undertake more complex tasks required of them in the modern health service (55). Similar work on defining and regulating prescribing models for AHPs is underway in Australia (56).

Research on prescribing was restricted to views about a potential prescribing role, perhaps reflecting the early stage in the development of these prescribing roles internationally. Barriers

relating to liability, adequate training and role conflict echo those reported in the early days of nurse prescribing (57), as do anticipated benefits (3,6). Other countries are considering the introduction of extended medicines management roles for AHPs (56) and prescribing responsibilities are being extended to other AHPs in the UK, including dieticians and radiographers (58). In order to understand the contribution that AHPs can play in the UK and elsewhere in leading improvements to service provision and expanding reach to remote areas, an urgent and more robust approach to evaluation of ESP is required.

Limitations of this review are that the exclusion of low quality studies may have restricted the diversity and range of descriptive findings relating to medicines management activity globally. There was inconsistency in the use of terms, indicating that the legal distinction between ‘prescribing’ and ‘administering’ medicine is not widely agreed and differs between countries.

## **CONCLUSION**

Extending the scope of allied health care practice to include more medicines management has the potential to improve patient care and contribute to building efficient and sustainable health systems. This review identified a mismatch in many countries between client demand for medicines and medicine advice and the educational preparation and governance to support physiotherapists to meet this demand. In the UK where such legislation is in place, research is required to evaluate the impact of prescribing and other medicines management activity by physiotherapists and podiatrists and to explore the views of key stakeholders (including patients, doctors, nurses, pharmacists, commissioners) regarding policy change in relation to this. The review indicates a need to improve physiotherapy education at under-graduate and post-graduate level regarding the use of commonly used medications such as NSAIDs, including education on clinical indications, contraindications, drug interactions and side

effects. Working towards agreed standards of practice for different models of medicines management, the associated competencies and educational requirements, may help to clarify and improve consistency of practice for AHPs. A review of legislative and educational support for physiotherapist involvement in delivering medicines to patients is recommended in countries where this practice is common.

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**Table 1. Glossary of terms**

<b>Administration</b>	To give a medicine either by introduction into the body, whether by direct contact with the body or not (e.g. orally or by injection), or by external application, e.g. application of an impregnated dressing (6).
<b>Advice</b>	The act of giving information, opinion, or recommendation for further intervention or actions to service users pertaining to aspects of the condition for which they are seeking intervention (16). This may include guidance to seek the opinion of another health professional. To advise on the use of medicines, it is imperative that the professional has the appropriate knowledge of the medicine, its pharmacology and dynamics and how it is handled in the body, as well as the legal framework surrounding medicines.
<b>Exemptions</b>	'Profession specific exemptions (established via Statutory Instrument) allow certain listed medicines to be sold/supplied and/or administered to patients by podiatrists who have attained the required qualifications and are recognised by the Health and Care Professions Council as competent to do so (as indicated by specific annotations to the HCPC register). Exemptions are not a form of prescribing.'(11).
<b>Extended scope of practice</b>	Practitioners, such as extended scope physiotherapists, working at a high level of expertise who have extended their practice and skills in a specialised clinical area (17).
<b>Independent prescribing (IP)</b>	Prescribing by an appropriate practitioner responsible and accountable for the assessment of patients with undiagnosed or diagnosed conditions and for decisions about the clinical management required, including prescribing (18).
<b>Injection Therapy</b>	The delivery of POMs and other products by injection to intra and extra-articular tissues and joint spaces (19) with the objective of reducing inflammation and improving joint mobility. Considered a post-registration technique in physiotherapy (20).
<b>Medicines Management Activities (MMA)</b>	A system of processes and behaviours that determines how medicines are used by patients and by the NHS (21). For the purposes of this review, MMA refers to prescribing and/or the process of giving advice about medicines and the supply and administration of medicines.
<b>Non-medical Prescribing (NMP)</b>	Prescribing by specially trained nurses, optometrists, pharmacists, physiotherapists, podiatrists and radiographers, working within their clinical competence as either independent or supplementary prescribers (18).
<b>Patient Group Directions (PGD)</b>	Written instructions that allow the supply and/or administration of a specified medicine(s), by named, authorised, registered health professionals, to a pre-defined group of patients needing prophylaxis or treatment for a condition

	<p>described in the PGD, without the need for a prescription or an instruction from a prescriber (22).</p> <p>While PGDs are designed for POM, some organisations use PGDs as best practice for over the counter (OTC) medicine.</p>
<b>Patient Specific Directions (PSD)</b>	Written instructions by an independent prescriber for medicines to be supplied and/or administered to a named patient after the independent prescriber has assessed the patient on an individual basis (11). PSDs provide a clear demarcation of responsibilities with the independent prescriber responsible for prescribing, and a delegated individual or profession responsible for the supply and/or administration of medicines
<b>Prescribing</b>	To authorise in writing the supply and administration of a medicine or other healthcare treatment for a named individual patient (22).
<b>Supplementary Prescribing (SP)</b>	The working definition of supplementary prescribing is “a voluntary partnership between an independent prescriber (a doctor or dentist) and a supplementary prescriber to implement an agreed patient-specific Clinical Management Plan with the patient’s agreement (23).
<b>Supply</b>	To provide a medicine directly to a patient or carer for administration (6).

n.b. the definitions and terms used in this table may be specific to the UK context

**Table 2. PICO**

<b>Population</b>	Defined as the care provided by podiatrists or physiotherapists across a range of roles; and across all patient groups in all care settings. This may also include the range of patients under the care of these professional groups.
<b>Intervention</b>	If applicable, any intervention by podiatrists or physiotherapists relating to the use of prescribing (defined as <i>authorising in writing</i> the supply and/or administration of a medicine or other healthcare treatment for a named individual patient) and/or medicines management activity (involving giving advice about medicines, or the supply and administration of medicines to patients or carers). Types of interventions will include whether they impact on workforce issues or patient/ carer issues.
<b>Comparator</b>	The use of prescribing staff and services that support this role compared to non-prescribers within services; or no comparator for descriptive studies.
<b>Outcome</b>	Any patient-reported, service or health related outcomes that are measured or identified across services areas.

**Table 3** Data Extraction Form

<i>First author, year, (country)</i>	<i>Method</i>	<i>Sample/Number of Participants/Response rate</i>	<i>Content of Intervention/Medicines Management or Prescribing Activity</i>	<i>Main outcome measures</i>	<i>Methods used to support reliability and validity</i>	<i>Main Findings</i>	<i>MMAT score</i>
Atkins, 2003 (UK)	Phenomenological study unstructured interviews	n=11  Convenience sample, MSK PTs (3 ESPs), from primary/ secondary care (n=5), private practice (n=5), commercial industry (n=1).	Barriers and facilitators to implementation of injection therapy	Not applicable	Transcriptions verified by participants.	<ul style="list-style-type: none"> <li>Facilitators: physician support, good relationship and communication with GPs; use of PGDs</li> <li>Barriers: physicians, manager &amp; PT resistance; quality of supervision during training; organizational barriers in setting up PGDs; lack of prescriptive authority</li> <li>Level of responsibility and potential for adverse reactions linked with anxiety</li> </ul>	75%
Ball, 2007 (UK)	Retrospective case note review	n=643 patients attending ED March-May 2005 with closed musculoskeletal conditions	Comparison of management of closed musculoskeletal conditions by ESP (n=164)/ENP (n=142) /doctors (SHO n=130) /registrar (n=135)/ consultant (n=72)	Frequency of x-rays, patients given advice, analgesics, bandages or support, & follow-up	Not discussed	<ul style="list-style-type: none"> <li>ESPs documented more general advice than other clinicians (<math>p=0.07</math>)</li> <li>ESPs most likely to record giving of advice re analgesia (<math>p=0.001</math>).</li> <li>ESP most likely to suggest follow up (<math>p=0.03</math>)</li> </ul>	75%
Birchall, 2008 (UK)	Prospective, consecutive case series with follow up	n=98/ 100 recruited patients with osteoarthritis in one or both knees referred to PT led clinic, by Hospital consultant (n=56 completed study to 52 weeks)	Patterns of clinical change using repeated measures based on course of 5 x weekly intra-articular knee injections (hyaluronic acid) administered by ESP, with relative rest for 48 hrs & avoidance of strenuous activity & gradual return to normal activities.	<i>Primary:</i> pain, physical functioning and patient global assessment of change @ 0, 5, 13, 26 and 52 weeks.  <i>Secondary:</i> oral and topical analgesia, BMI	Western Ontario McMaster Universities Osteoarthritis Index (WOMAC) Likert 3.0 pain (0–20) and physical function (0–68)  Outcome Measures in Rheumatology and Osteoarthritis Research Society International OMERACT-OARSI) used to classify outcome at each follow-up	<ul style="list-style-type: none"> <li>Significant pain reduction at five weeks, still below baseline at 13 weeks</li> <li>Variability in response, and return to baseline levels similar to previous RCTs in this area</li> <li>Physiotherapy led knee injection service achieved high treatment compliance rates and comparable functional outcomes to those reported in similar RCTs with Doctor led-service</li> </ul>	100%

Braund, 2011 (New Zealand)	Questionnaire	n=278/ 948 (29.3%) MSK PTs contacted via New Zealand Society of Physiotherapists	Exploration of current practices regarding recommendation of paracetamol and NSAIDs to patients; knowledge with regards to adverse effects of these classes of medications and patient factors associated with increased risk of adverse effects.	N/A	•Previous survey (Braund 2006) •Pilot testing	<ul style="list-style-type: none"> <li>&gt; 70% sometimes or often recommended oral NSAIDS or oral paracetamol</li> <li>More likely to recommend paracetamol bought direct from supermarket or pharmacy (53%) and to consult a pharmacist or GP about NSAIDs (44%).</li> <li>83% provide information on side effects, 69% on potential risks, 55.5% recommend dose: i.e. practicing outside general scope of physio practice</li> <li>Variable knowledge re potential side effects and risks – 70% identified gastrointestinal upset/bleed, &lt; 31% risks related to respiratory, renal or allergies</li> <li>PTs who regularly recommended identified significantly more risks (p=0.004)</li> </ul>	50%
Daker-White, 1999 (UK)	Randomized controlled trial	<p>n=481 patients (244-Doctor care, 237 PT care) new GP referrals to two secondary care orthopedic outpatients.</p> <p>Allocation sequence generated by random numbers.</p> <p>(Doctor care: 191/244 (78%), PT 192/237 (91%) completed study)</p>	<p>Assessment and management of newly referred patients by extended scope physiotherapists or doctors</p> <p>Physiotherapists received 1:1 training with consultant and could instigate (but not prescribe) the same management options as doctors, including intra-articular injections, oral NSAIDs and analgesics.</p>	<p><i>Primary:</i> pain, functional disability and perceived handicap at 4/12 follow up</p> <p><i>Secondary:</i></p>	<ul style="list-style-type: none"> <li>Disease Repercussions Profile,</li> <li>Functional disability: Oswestry, back pain questionnaire WOMAC questionnaire, St Michael's Hospital Patient Self Evaluation, Modified American Shoulder &amp; Elbow Surgeons Shoulder Patient Self-Evaluation Form</li> <li>Visual analogue scales</li> </ul> <p>Self-efficacy questionnaire, Hospital</p>	<ul style="list-style-type: none"> <li>No clinically important differences between the two groups in primary outcome (&gt;0.05)</li> <li>PTs higher level of Satisfaction on the 'perceived treatment quality' (p=0.001)</li> <li>PTs administered equal numbers of intra-articular injections compared to doctors (p=0.70), fewer intra-muscular injections (7 vs. 1, p=0.04) and no NSAIDs or analgesics (p=0.06).</li> <li>PT in-hospital costs were less due to less x-ray requests ( p&lt;0.001) &amp; surgical referrals (p=0.005).</li> </ul>	75%

				Health & psychological status, health related quality of life, self efficacy, satisfaction with care & GP, resource use  a mean 5.6 months follow-up	Anxiety and Depression Scale (psychological status), SF-36 (general health status measure), EuroQol EQ-5D, process data		
Donato, 2004 (USA)	Questionnaire	n=222/ 462 (49%) PTs  Of which PCC PTs= 212 (n-56.1% were primary contact military PTs & 43.9% were primary contact civilian PTs) who were compared to non-primary contact civilian PTs (n=103/250).	Exploration of frequency & perceived importance of professional responsibilities, procedures (i.e. tests, measurements & interventions), and knowledge areas of PTs practicing in primary contact setting with PTs in non PCC settings.	Not applicable	<ul style="list-style-type: none"> <li>• Content informed by literature review and panel of experts (n=19), and 3 round Delphi technique</li> <li>• Piloted</li> </ul>	<ul style="list-style-type: none"> <li>• Only PC military MSK PTS have prescribing authority in US</li> <li>• OTC medicines were administered mainly for MSK by 61% (n=50) of military PTs, 38% (n=14) of civilian PTs conditions, and 6.2% (n=6) of non-primary contact PTs</li> <li>• Non-narcotic medications were administered by 49% (n=40) of military PTs and 16% (n=6) of civilian PTs respectively.</li> <li>• Significant differences in professional responsibilities between primary and non-primary contact PTs p&lt;0.001</li> </ul>	75%
Grimmer, 2002 (Australia)	Questionnaire	n=285/750 (38%) random sample of registered PTs in South Australia, Tasmania and Australia Capital	Exploration of knowledge, treatment behaviours and attitudes of regarding the use of NSAIDs in clinical practice	Not applicable	<ul style="list-style-type: none"> <li>•Content informed by 30 semi-structured interviews with PTs</li> <li>•face, content &amp; construct, validity, processes outlined by Carmines &amp; Zeller (1979); Hunt et al (1982).</li> <li>•Piloted</li> </ul>	<ul style="list-style-type: none"> <li>•55% (n=157) of PTs regularly made direct recommendations to patients about use of NSAIDs</li> <li>• Most popular recommendations were for use of OTC topical NSAIDS (83%), followed by oral NSAIDS (78%), often recommended by brand name (61%).</li> <li>• 96% gave advice on precautions,&gt; 80% contraindications &amp; side effects and &lt;45% dosage.</li> </ul>	50%

						<ul style="list-style-type: none"> <li>• 64% (n=182) directed patients to their physicians or pharmacists re NSAID purchase.</li> <li>• Only 26% gave advice on drug interactions</li> <li>• 65% recorded discussions with patients regarding</li> <li>• Nearly 90% correctly identified side effects, contraindications and clinical application of oral NSAIDs.</li> <li>• &gt; 40 % had poor knowledge of medicines legislation</li> <li>• Private PT strong support for prescribing legislations, but variable in other settings</li> </ul>	
Holdsworth 2008 (UK)	Questionnaire	117/ 161 (73% response rate) of PTS (n=47/64) and GPs (n=70/97) from 26 general practices in Scotland engaged in pilot physiotherapy self-referral scheme	Exploration of the views of PTs and GPs on self-referral and physiotherapy scope of practice, attitudes to prescribing and monitoring NSAIDs	Not applicable	<ul style="list-style-type: none"> <li>• Content informed by clinician interviews</li> <li>• Piloted</li> </ul>	<ul style="list-style-type: none"> <li>• 70% (n=68) of GPs and 77% of PTs endorsed PTs practising as primary contact practitioners</li> <li>• &gt; 80% PTs and GPs supportive of PTs monitoring &amp; prescribing NSAIDs</li> <li>• 38% GPs (n=26) thought prescribing should not be considered, only 10% (n=7) believed it would bring definite patient benefit.</li> </ul>	50%
Kumar (2005) (Australia)	Semi-structured interveiws	n=30 PTs from South Australia, Tasmania and Australia Capital Territory, Australia	Views on understanding of the role of PTs in the use, recommendation & delivery of NSAIDS.	Not applicable	Transcripts verified by participants (n=3)	<ul style="list-style-type: none"> <li>• High demand from patients for medicines information.</li> <li>• PTs regularly asked for advice on NSAIDs</li> <li>• Concerns about PT lack of knowledge of pharmacology to support advice given to patients, especially long term use of NSAIDs</li> <li>• Concern about poor access to patient medical records</li> <li>• Rural, sports and first contact PTs in support of PT prescribing of NSAIDs with pharmacist support</li> <li>• Hospital based PTs resistant to PT prescribing.</li> </ul>	50%

Lansbury, 1998 (Australia)	Questionnaire	n=472/600 (72.5%). Random sample of 25% registered physical therapists in New South Wales, Australia (n=2662)	PT views on administration, advice on POMs	N/A	<ul style="list-style-type: none"> <li>Content developed in consultation with the NSWPRB</li> <li>Piloted-multiple stages</li> </ul>	<ul style="list-style-type: none"> <li>51.8%, (n=243) worked in private practice</li> <li>Musculoskeletal (55.9%, n=261), sports (36.8%, n=172) and rehabilitation (23.3%, n=104) predominant specialities.</li> <li>27.4 % (n=127) of PTs administered POMs; 40 % (n =48) on a daily or weekly basis. Frequency varied from daily (13%) to &lt; monthly (49.2%) and the majority were administering the dose prescribed by a physician</li> <li>Only 41 % (n=248) formally trained in administration of POMs.</li> <li>Private practitioners more likely to give POMs (<math>p&lt;0.0001</math>).</li> <li>Common drugs administered: bronchodilators 84.6% (n = 110) topical agents 29.2 % (n= 38), analgesics, 16.2 % (n =21), NSAIDs 6.9% (n = 9) and antibiotics (6.2%).</li> </ul>	50%
Lansbury, 2002a (Australia) <i>Reporting from Lansbury 1998 dataset</i>	Questionnaire	n=472/600 (72.5%). Random sample of 25% registered physical therapists in New South Wales, Australia (n=2662)	PT experience and views on providing advice on POMs.	N/A	<ul style="list-style-type: none"> <li>Content developed in consultation with the NSWPRB</li> <li>Piloted-multiple stages</li> </ul>	<ul style="list-style-type: none"> <li>85.9% (n = 399) gave POM advice as patients requested it (77.9%, n=311) or incorrect usage detected (74.9%, n=178)</li> <li>Advice given included 73.8% (n=299) how to take medicines, 53.1% (n=215) when to take &amp; 26.9% (n=109) frequency</li> <li>14.2% (n=66) did not give advice as considered themselves not responsible, untrained, or not legally entitled to do so.</li> <li>74.4% (n=343) made recommendations for new drugs, although this was accompanied by advice to consult a doctor in 94% (n=330) of cases.</li> </ul>	50%

						<ul style="list-style-type: none"> <li>Medicines recommended included analgesics, NSAIDs, general anti-inflammatory medicines and inhalers.</li> <li>The amount of advice given was associated with years of experience (<math>p&lt;0.05</math>) and working in private practice (<math>p&lt;0.05</math>)</li> </ul>	
Lansbury, 2002b (Australia)  <i>Reporting from Lansbury 1998 dataset</i>	Questionnaire	n=472/600 (72.5%). Random sample of 25% registered physical therapists in New South Wales, Australia (n=2662)	PTs views and practice in administration or providing advice on over the counter (OTC) medicines.	N/A	<ul style="list-style-type: none"> <li>Content developed in consultation with the NSWPRB</li> <li>Piloted-multiple stages</li> </ul>	<ul style="list-style-type: none"> <li>OTC MMAs variable, 82% (n=358) gave advice at some point,</li> <li>Providing information on dose schedule, safety &amp; to see pharmacist/GP was common.</li> <li>33% (n=147) administered non-prescription medicines, often independent of physician guidance.</li> <li>Greater pharmacology training required; 10.3% (n=35) PTs aware of contraindications or side effects with 18.5% (n=80) reporting inadequate pharmacology training.</li> </ul>	50%
McClellan, 2006 (UK)	Prospective cohort study	Patient satisfaction n=351/780 (45%) response rate  Functional outcome of unilateral ankle soft tissue injury n=91/489 @ 4 weeks	Evaluating the effect of introducing an ESP in the adult ED, comparing three different practitioners: doctors, emergency nurse practitioners (ENPs), and ESPs.	<i>Primary:</i> Patient satisfaction 1 week after ED attendance. <i>Secondary:</i> Functional outcome of unilateral ankle STI at 4 and 16 weeks after injury, pain VAS.	Validated SF- 36, piloting of satisfaction questionnaire, Visual analogue scores	<ul style="list-style-type: none"> <li>ESP &gt; patient satisfaction than for ENPs or doctors for good advice/information (<math>p=0.03</math>), time to ask questions (<math>p=0.05</math>), and explanation of assessment (<math>p=0.01</math>).</li> <li>ESP&gt;overall satisfaction was higher compared to ENP and doctors (<math>p=0.048</math>).</li> <li>ESP&lt; waiting time &amp; longer consultations than doctors or ENPs</li> <li>Functional outcome scores were comparable across groups. Trend to improved pain and function one month after injury in patients seen by ESPs compared to doctors and ENPs</li> </ul>	50%

McClellan, 2012 (UK)	Randomised controlled trial.	Adult patients with peripheral soft tissue injury <72 hour old were block randomised to receive care from an ESP (n=126), ENP (n=123) or any grade ED doctor (n=123) (total n=372).	To evaluate the clinical effectiveness of soft tissue injury management by ENPs, & ESPs compared routine ED Doctor care.	<p><i>Primary outcome:</i> Functional recovery @ 2 &amp; 8 weeks</p> <p><i>Secondary:</i> Health related Quality of Life preference based utility scores, clinician contact time, frequency of treatment types, medicines used, health resource use.</p>	<p>Disability of the Arm, Shoulder and Hand score (DASH) for upper-extremity injuries, &amp; Lower Extremity Functional Score (LEFS) for lower-extremity injuries</p> <p>Validated SF-12v2 and SF-6D,</p>	<ul style="list-style-type: none"> <li>• ESPs achieved equivalent clinical outcomes to routine models of care delivered by ENPs and doctors</li> <li>• Results showed equivalence in functional outcomes and Quality of Life with those treated by doctors at 8 weeks and no difference in recovery rates between the 3 professional groups.</li> <li>• ESPs administered fewer analgesics and anti-inflammatories (<math>p&lt;0.001</math>) and had longer consultation times</li> </ul>	75%
McClellan, 2013 (UK)  <i>Analysis of McClellan 2012 dataset</i>	Randomised controlled trial.	Adult patients with peripheral soft tissue injury <72 hour old were block randomised to receive care from an ESP (n=126), ENP (n=123) or any grade ED doctor (n=123) (total n=372).	To evaluate & compare cost effectiveness of treatment of soft tissue injury by ENPs, & ESPs and ED Doctor care	<p><i>Primary outcomes:</i> cost per hour/ patient contact and cost per patient per hour.</p> <p><i>Secondary outcomes:</i> direct cost per hour per patient &amp; indirect cost per hour per patient contact</p> <p>based on data collected during 8 weeks following injury</p>		<ul style="list-style-type: none"> <li>• Direct costs for ESP are at best equivalent, if not more expensive than routine care</li> <li>• Indirect costs for ESPs were equivalent or cheaper to routine care, mainly due to preference for supplying supportive equipment (e.g. leg crutches, braces) than administering medicine</li> </ul>	75%
Morris 2015 (Australia)	Prospective observational cohort study with embedded	N=51,223 episodes of care treated in Emergency Department (ED), of which 13,495 were treated in 'Fast	To assess the impact of Advanced Scope of Practice Physiotherapist (ASoP-PT) service on	<p><i>Primary</i> Length of stay Length of wait</p> <p><i>Secondary</i></p>		<ul style="list-style-type: none"> <li>• 836 (6.19%) of the 13,495 episodes attending Fast Track were treated by the ASoP-PT. Patients were predominantly classed as semi-</li> </ul>	75%

	qualitative interview study	Track' service over 53 week period (Oct 2011-Nov 2012). Consecutive patients. Fast Track designated as less urgent, minor illnesses and injuries, predominantly MSK  Patient interviews (n=11) Physician and nurse interviews (n= not stated)	triage targets, patient and staff satisfaction  ASoP-PT was a qualified prescriber but unable to prescribe or independently provide medicines management under local legislation and so these tasks were undertaken by a physician.	Patient and service activity data  Staff and patient satisfaction		urgent (68.3%) and non-urgent 24.5%). <ul style="list-style-type: none"><li>Length of stay and length of wait were significantly reduced on shifts where the ASoP-PT was present. There was no significant difference in compliance with triage targets.</li><li>Requests for imaging and prescriptions constituted between 50-70% of the volume of provision per patient per month. Xray imaging was ordered most frequently (72.8%, n=577). Panadine Forte (20.8%, n= 165) and paracetamol (17.3%, n= 137) the most frequently ordered medications.</li><li>No adverse events were reported</li><li>Doctors and nurses positive views about ASoP-PT impact on service efficiency and increased knowledge. Majority of patients were satisfied with ASoP-OT care, although not always aware that they were seeing a physiotherapist</li></ul>	
Onigbinde, 2012 (SW Nigeria)	Questionnaire	n=152/ 200 (76% response rate of which 135 analysed)  Questionnaire hand delivered to PTs from 5 university teaching hospitals, 2 state, 1 private, 2 private clinics, and 3 PT training schools.	Exploration of knowledge of topical medicines in clinical practice.  .	NA	Four section questionnaire adapted from Grimmer et al (2002).  Piloted	<ul style="list-style-type: none"><li>41% (n=55) had recently updated their knowledge on topical medicines, whilst 17.8% (n=24) had never updated</li><li>Knowledge of topical medicines pharmacology poor; mean score 5.21 (SD 2.52) out of 16</li><li>Knowledge of indications, actions and side effects of common topical agents poor: 81% (n=109) misunderstood the mechanism of action for topical NSAIDs and 66% (n=89) were unable to identify risks associated with topical medicines.</li></ul>	50%

						<ul style="list-style-type: none"> <li>• Significant association between length of clinical experience and pharmacology knowledge (<math>p=0.03</math>)</li> <li>• Limited access to physiotherapy training opportunities in pharmacology identified</li> </ul>	
Onigbinde, 2013 (SW Nigeria)	Questionnaire	n=107/150 (71.3%) PTs > 1 year qualified experience from government and private hospitals; clinics and training institutions.	Exploration of knowledge of topical medicines in clinical practice  Views on pharmacology education on topical medications	NA	Four section questionnaire adapted from Grimmer et al (2002) & Onigbinde, 2012  Piloted	<ul style="list-style-type: none"> <li>• Respondents had good knowledge of indications of topical analgesics e.g. Diclofenac</li> <li>• 78% (n=83) were unable to correctly identify the FTU gram equivalent for topical cream and gel</li> <li>• 55.1% (n=59) of respondents had received undergraduate pharmacology education</li> <li>• Level of knowledge not associated undergraduate pharmacology training</li> <li>• 65.4% (n=70) supported legislation granting authority to prescribe topical medicines</li> </ul>	50%
Richardson 2005 (UK)	Randomised Controlled Trial	766/844 (91%) eligible consented & randomised  Block randomisation in A&E department patients with soft tissue injury without fracture  a) Initial assessment and management by a physiotherapist (n=382): return to usual activity n=278 (73%), Satisfaction n=306 (80%), 3 months n=207 (54%), 6 months n=198, (51%)	Comparison of clinical effectiveness and costs of two alternative assessment routes for patients presenting with musculoskeletal problems to an A&E department.  Two physiotherapists (III grade) worked A&E day shifts for the purpose of the project and were able to request radiographs and prescriptions for analgesia from medical staff.	<i>Primary outcome:</i> days before return to usual activity  <i>Secondary outcome:</i> patient satisfaction, quality of life, function and pain levels at 3 and 6 months  Economic data collected on use of health and social services and personal	Pilot study Goldstein satisfaction instrument (2000)	<ul style="list-style-type: none"> <li>• higher satisfaction in physiotherapy arm (89% to 74%, <math>p=0.0001</math>)</li> <li>• higher quality of life at 3 months in physiotherapy arm, no differences at 6 months</li> <li>• Median days before return to usual activities (available for 73% of those randomised) was greater in the physiotherapist group (41 days compared with 28.5 days; hazard ratio 0.85 <math>p=0.071</math>). not significant</li> <li>• Patterns of service use were different, e.g. the physiotherapy arm saw fewer prescriptions issued but higher referrals to other services but. no significant differences in service related or health &amp; social care costs</li> </ul>	50%

		b) Routine A&E assessment and management by either a doctor or emergency nurse practitioner (n=384).  Return to usual activity n=280 (73%), Satisfaction n=303 (79%), 3 months n=209 (54%), 6 months n=179 (47%)		costs at treatment and follow-up			
Sullivan, 1999 (Australia)  <i>Reporting from Lansbury 1998 dataset</i>	Questionnaire	n=472/600 (72.5%). Random sample of 25% registered physical therapists in New South Wales, Australia (n=2662).	Knowledge of prescription only medicines	N/A	Content developed in consultation with the NSWPRB.  Piloted-multiple stages	<ul style="list-style-type: none"> <li>• Documentation of medicines history varied; 52.9% (n = 244) kept a record at every consultation</li> <li>• Only 28.1% (n = 125) felt adequately Trained in POMs most of the time: 12.3% (n = 57) never felt adequately trained</li> <li>• Knowledge of contraindications varied only 38.4% (n = 179) aware most times</li> <li>• Private practice PTs reported greater knowledge of the effectiveness of POMs than PTs in public health settings (&lt; 0.05)</li> </ul>	50%
Unger 2006 (South Africa)	Questionnaire	n=448/4480 (10%) registered PTs	Views on medicines administration and prescribing.	N/A	3 sections adapted from Grimmer (2002)  Piloted	<ul style="list-style-type: none"> <li>• The inclusion of pharmacological training within undergraduate qualification was reported by 53% of PTs</li> <li>• 60% had never updated this knowledge through formal or informal education, although 90% had sourced drug information in the past 6 months</li> <li>• 64% (n=294) of PTs administered medicines including inhalers and NSAIDs</li> <li>• 45% (n=132) of those administering medicines considered contraindications</li> </ul>	50%

						<ul style="list-style-type: none"><li>• 26% (n=119) supplied respiratory medicines, contrary to medicines legislation</li><li>• 70% of PTs surveyed and 63% supported a prescribing role</li><li>• Acceptance of a prescribing role was dependent upon this remaining a voluntary option guided by clearly defined guidelines and scope of practice</li></ul>	
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**Appendix 1. List of databases and sources searched**

Databases	Professional organisation websites	Trial Registers
MEDLINE	The Chartered Society of Physiotherapy (UK) - <a href="http://www.csp.org.uk/">http://www.csp.org.uk/</a>	ClinicalTrials.gov - <a href="https://clinicaltrials.gov/">https://clinicaltrials.gov/</a>
CINAHL	The American Physical Therapy Association - <a href="http://www.apta.org/">http://www.apta.org/</a>	International Standard Randomised Controlled Trials - <a href="http://www.isRCTN.com/">http://www.isRCTN.com/</a>
Cochrane Central Register of Controlled Trials	The Australian Physiotherapy Association - <a href="http://www.physiotherapy.asn.au/">http://www.physiotherapy.asn.au/</a>	<b>Australian New Zealand Clinical Trials Registry</b> - <a href="http://www.anzctr.org.au/">http://www.anzctr.org.au/</a>
OpenGrey - <a href="http://www.opengrey.eu/">http://www.opengrey.eu/</a>	The New Zealand Physiotherapy Association - <a href="http://physiotherapy.org.nz/">http://physiotherapy.org.nz/</a>	UK Clinical Research Network Study Portfolio - <a href="http://public.ukcrn.org.uk/search/">http://public.ukcrn.org.uk/search/</a>
Frontline	The Canadian Physiotherapy Association - <a href="http://www.physiotherapy.ca/">http://www.physiotherapy.ca/</a>	
Google Scholar	The Nigerian Society of Physiotherapy - <a href="http://www.nigeriaphysio.org/">http://www.nigeriaphysio.org/</a>	
	The South African Society of Physiotherapy - <a href="http://www.physiosa.org.za/">http://www.physiosa.org.za/</a>	
	The Society of Chiropodists and Podiatrists – <a href="http://www.scpod.org/#">http://www.scpod.org/#</a>	
	The British Chiropody and Podiatry Association – <a href="http://www.bcha-uk.org/">http://www.bcha-uk.org/</a>	
	The Podiatry Board of Australia - <a href="http://www.podiatryboard.gov.au/">http://www.podiatryboard.gov.au/</a>	
	The Podiatrists Board of New Zealand - <a href="http://www.podiatristsboard.org.nz/default.aspx">http://www.podiatristsboard.org.nz/default.aspx</a>	

## **Appendix 2. Extract of search string**

<b>Database:</b> Medline <b>Platform:</b> EBSCO <b>Limits:</b> <b>Physiotherapy Limiters</b> - Date of Publication: 19850501-20140731, Human only <b>Podiatry Limiters</b> - Date of Publication: 19680101-20160531, Human only <b>Search modes</b> - Boolean/Phrase	
1 "physical therap*".ti.ab 2 "physiotherap*".ti.ab 3 (MH "Physical Therapy Modalities") 4 "extended scope of practice".ti.ab 5 "ESP".ti.ab 6 "extended scope physiotherap*".ti.ab 7 "enhanced scope of practice".ti.ab 8 "advanced practice*".ti.ab 9 "advanced practitioner*".ti.ab 10 "allied health professional*".ti.ab 11 prescrib*.ti.ab 12 "prescribing right*".ti.ab 13 "non-medical prescrib*".ti.ab 14 "independent prescrib*".ti.ab 15 "supplementary prescrib*".ti.ab 16 "patient group direct*".ti.ab 17 "patient specific direct*".ti.ab 18 exemption*ti.ab 19 "injection therap*".ti.ab 20 Podiatry.ti.ab 21 (MH "Podiatry") 22 "specialist podiatrist".kw 23 "Consultant Podiatric Surgeon".kw 24 "podiatric surgeon".ti.ab 25 OR/1-10 (Physiotherapy terms ) 26 OR/8-10 OR/20-24 (Podiatry terms ) 27 OR/11-19 (Prescribing terms) 28 25 AND 27 29 26 AND 27 30 28 OR 29 (Physio and Pod together)	
<b>Key</b> Ti – title word Ab – abstract word MH – Main index/ MeSH term Kw – Key Word	

### Appendix 3. PRISMA flow chart

