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An overview of pharmacist roles in palliative care: a worldwide comparison

Abstract

Background. In order to fulfil the complex needs of terminally ill patients, palliative care demands an inter-professional collaborative network, including doctors, nurses, dieticians and social workers. Pharmacists in particular are essential members of this team, given the level of reliance on medications in this setting. The purpose of this review is to identify roles and services performed by palliative care pharmacists in dedicated palliative care settings worldwide and to map these findings against the Advanced Pharmacy Practice Framework.

Material and methods. Quasi-systematic review. Search strategy: Google Scholar, Medline/PubMed, Scopus and Embase were searched utilizing selected MeSH terms.

Results. A total of 24 sources of information were included in the review. This literature was collected from a range of countries, predominantly from the USA, UK and Australia with singular reports from Mexico, Japan, Qatar, Canada, Poland and Sweden. The literature identifies that pharmacist roles in palliative care are varied and quite extensive. Roles that were specifically tailored to the palliative setting included: aggressive symptom management (in particular pain control), deprescribing, advising on the use of complementary and alternative therapies, extemporaneous compounding of non-standard dosage forms and maintaining a timely supply of medications. Pharmacists in the UK, USA, Canada and Australia were found to perform an advanced level of practice (as their reported roles fulfilled the criteria of the majority of the domains in the APPF). However, pharmacists in other countries, in particular Mexico and Poland, did not present such an extensive scope of practice.

Conclusion. The literature identifies that there are differences in the types of palliative pharmacist practice between countries, which may have varying levels of impact upon patient outcomes. As pharmacists can make significant contributions to palliative care, it is important to encourage the benchmarking of practice across different clinical settings and countries to promote a consistent and equitable practice.

Medycyna Paliatywna w Praktyce 2016; 10, 4: 160–173

Key words: pharmacist roles, pharmacy services, palliative/hospice care

Introduction

Palliative care is a multi-dimensional practice, comprising medical, physical and spiritual interven-

tions aimed at improving a patient's quality of life [1]. In order to fulfil the complex needs of terminally ill patients, palliative care demands an inter-professional collaborative network, made up of doctors,

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Medycyna Paliatywna w Praktyce 2016; 10, 4, 160–173



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nurses, dieticians, social workers and pharmacists [2, 3]. The latter, in particular, are essential members of this team, especially when considering the level of reliance on medications in this setting. Terminal patients experience increased symptom burden requiring more intensified and potentially unique pharmacological dosing or regimens [4]. Pain in particular is a distressing symptom that requires specialised analgesia (e.g. special medication formulations, routes of administration) as bodily functions begin to deteriorate when the disease progresses [4]. Many patients also have complex medication regimens comprising off-label or unlicensed prescribing of medicines, which increases their risk of medication related problems [5, 6].

It is reported that upon referral to a dedicated palliative care setting, 20% of patients are taking at least 8 medications [2, 7]. A study by Currow et al. found that the number of medications prescribed to a palliative patient increased as death approached [7]. As such, pharmacists hold an integral position in medication management as well as palliative patient care. The literature highlights the positive impact of pharmacist practice through improved symptom control, identifying, preventing and resolving medication related problems, providing medication counselling as well as patient psychological support [6, 8–10].

However, palliative care is provided through a variety of settings, including patient's own homes, hospices and palliative care wards in hospitals. As such the roles performed by pharmacists in these settings may have a wide scope of practice. Little research has been undertaken to provide a comprehensive overview of pharmacist services in palliative care on a global scale. It is important to understand differences in practice between palliative care settings, to determine whether there are any inequalities in medication management. Therefore, the purpose of this review is to identify the roles performed by palliative care pharmacists in palliative care settings (inpatient and outpatient) worldwide and to map these services against the Advanced Pharmacy Practice Framework (APPF).

Material and methods

We performed a quasi-systematic review (a review that possesses some elements of a systematic review, including pre-defined selection criteria, however, includes grey literature and does not present a critical evaluation of the quality of studies) and extracted relevant publications relating to roles, interventions, activities and functions performed by pharmacists in palliative care settings [11–13]. The majority of

literature consisted of grey literature, review articles and reports as well as published studies. Due to the nature of the literature collected, a robust systematic review could not be performed. The amount and type of literature collected influenced the format of the review, precluding the full application of PRISMA guidelines, and leading to the adoption of a quasi-systematic review.

The literature was retrieved by searching the following electronic databases: Embase, Scopus, PubMed and Google Scholar. All sources of information including relevant studies, review papers and other publications were canvassed. It is acknowledged that particularly where practice is well established, it is not necessarily based on well-designed clinical trials. Therefore, a broader perspective was obtained by performing a supplemental Google search using the same search terms to identify relevant grey literature.

Search strategy

A two-tiered search strategy was used (Fig. 1). In Tier 1, a search was performed utilising the following Medical Subject Headings (MeSH) headings/keywords: *pharmacist interventions, clinical pharmacist, palliative care/therapy, hospice, clinical practice, and pharmacist role/activities*. The Boolean operator 'AND' was employed to combine the search terms. Manual bibliographic searches of all relevant articles were also performed in order to identify any articles that were not identified in the electronic searches. In Tier 2 of the search, relevant grey literature was identified through a Google search using the same MeSH terms. This tier was dedicated to finding service standards, position descriptions as well as descriptive reports.

Study selection

The selection criteria for the searches restricted the content to the following: (i) review articles (including literature reviews and opinion pieces), research articles, or grey literature (ii) with results containing information on pharmacist led activities relating to terminal patients in the palliative care setting and (iii) written in the English language. All full text articles meeting this criteria were retrieved and all evaluations pertaining to the types of pharmacist roles in palliative care were included in the review. Since palliative care has evolved in many countries in recent years we applied a date limit so that only recent articles published from the year 2000 or later, that is, 2000–2017, were taken into account.

The advanced pharmacy practice framework

The palliative care roles identified in the review were mapped out against the proposed Advanced Pharmacy

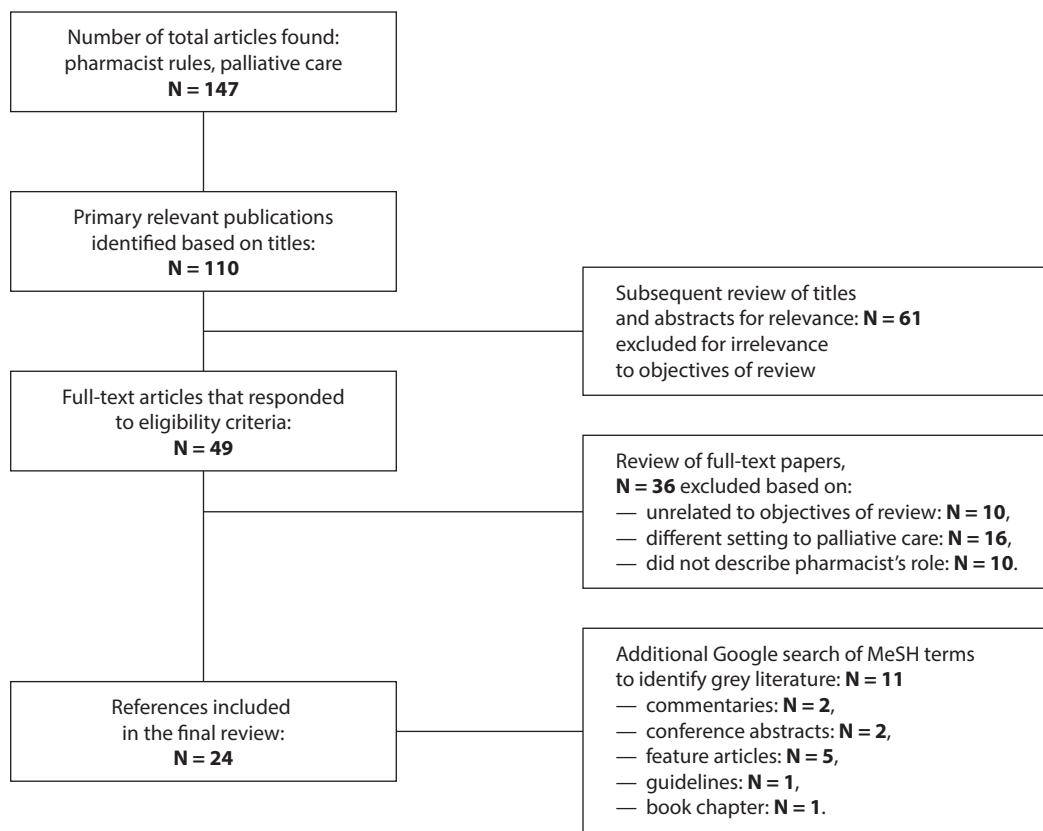


Figure 1. Search strategy

Practice Framework (APPF). The APPF describes the specific competencies, level of knowledge and skills required of a pharmacist to perform at an advanced level [14]. It is directed at pharmacy practice in any patient group, with the overarching aim of providing patient centered care and optimizing the use of medicines. Developed by the APPF Steering Committee and published by the Pharmacy Board of Australia, the framework proposes 5 domains that demonstrate an advanced level of pharmaceutical care services (Fig. 2).

Results

A total of 24 sources of information were included in the review (Tab. 1). This literature was collected from a range of countries, predominantly from the USA (12 of 24), Australia (4 of 24) and the UK (3 of 24) with singular reports from the Mexico, Japan, Qatar, Canada, Poland and Sweden. The types of articles collected consisted of qualitative (1) and quantitative studies (8) (total 9 of 24), review articles (2 of 24) and reports (2 of 24) as well as grey literature including feature articles (5 of 24), commentaries (2 of 24), conference abstracts (2 of 24), guidelines (1 of 24) and a book chapter (1 of 24).

Overall, the pharmacist roles identified in the literature were widespread across the pharmaceutical service spectrum and acknowledged pharmacist involvement in palliative care wards (h) (18 out of 24), hospices (hp) (3 out of 24) and in home-based care settings (hb) (3 out of 24) (Table 2). The literature from Australia, USA and the UK has reported that pharmacists provided pharmaceutical care services to both home care settings, (through community pharmacy), as well as in palliative care wards [3, 15–26]. A 2015 report by Gibbs identified that approximately 200 pharmacists were members of palliative care teams in the UK [17]. Gilbar et.al. found that 86% and 55% of palliative wards surveyed in Canada and Australia respectively identified pharmacist involvement in the palliative care team [18]. In the USA, Dispennette et.al. reported that pharmacists provided palliative pharmaceutical care services in different locations across the continuum of care, with 63% of their time spent in the acute care setting, 30% in the ambulatory care setting, and 7% in other settings (not specified) [26]. The literature collected from Japan (h), Qatar (h), Poland (hp) and Mexico (c) reported that pharmaceutical care services in these countries were provided in one setting, either hospitals (h), hospices (hp) or community care centres (c).

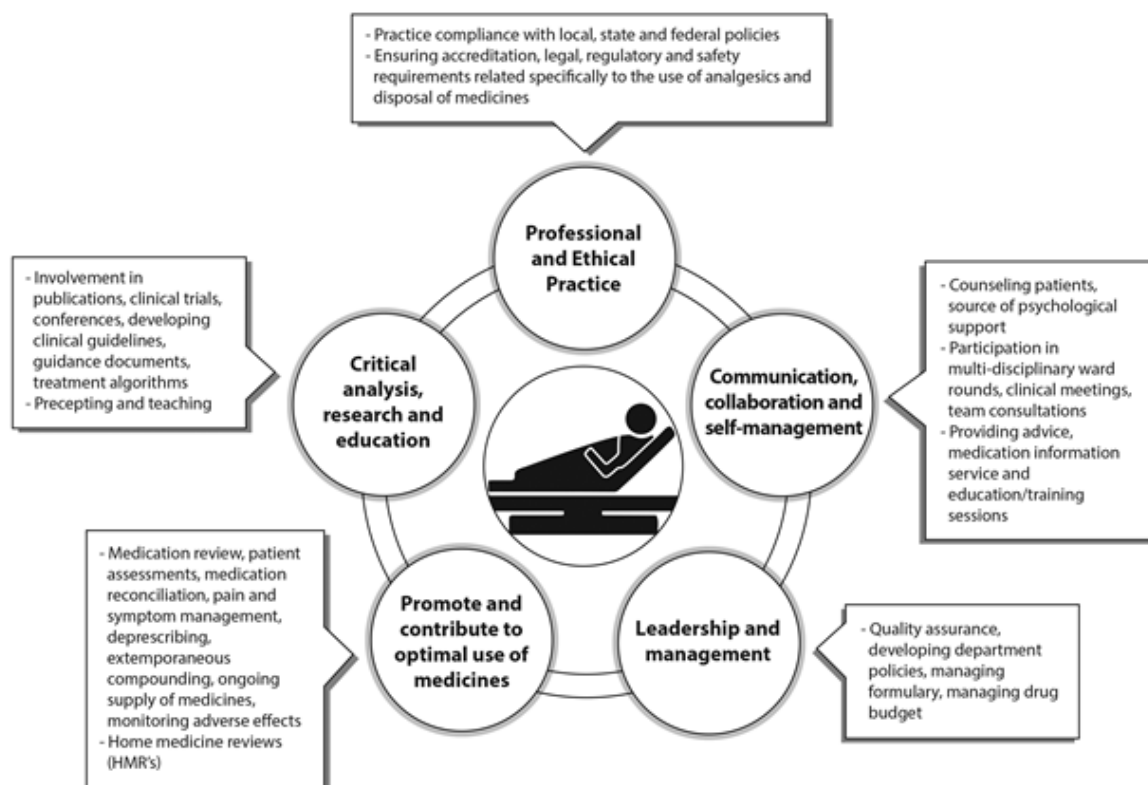


Figure 2. Pharmacist practice in the palliative care setting mapped against the advanced pharmacy practice framework. Adapted from: "An Advanced Pharmacy Practice Framework for Australia", <http://advancedpharmacypractice.com.au/download/framework/advanced-pharmacy-practice-framework.pdf> [14]

Table 1. References used in the review

Author	Year	Country	Type of Study	Setting	Main Findings
Atayee R. et.al. [8]	2008	USA	Prospective study	Ambulatory palliative care	The palliative care pharmacist performed daily team rounds, direct patient care, attended various lectures, independently assessed patients for symptom management, resolve and prevent medication-related problems, initiate/modify treatment regimens.
Austwick E., Brooks D. [15]	2004	UK	Review	Palliative care	The pharmacist performs several services in the palliative clinic including: medication histories, provision of clinical support for staff, counselling of patients and identification of medication-related problems.
Barbee Jr J. et.al. [16]	2016	USA	Electronic article	Palliative care	Pharmacists are essential in developing an individualized treatment regimen for each patient. They perform interventions including include medication reconciliation, patient education, geriatrics consultation, and multidisciplinary team consults to improve medication management.
Demler T.L. [32]	2016	USA	Electronic article	Palliative care	Pharmacists, particularly those with special training or experience in palliative care, bring added value to the services provided by hospice by counselling the patient in care, updating and educating the team regarding medications, and working with the team — particularly nursing staff — to closely monitor therapeutic responses.

Table 1 (cont). References used in the review

Dispennette R., Hall L. [26]	2015	USA	Prospective survey	Palliative care	The majority of pharmacists provided a variety of services, including medication regimen reviews, education of staff, dosage adjustments, opioid dose conversions, actively involved in precepting pharmacy learners and teaching in didactic settings.
Escutia Gutierrez R. et.al. [34]	2007	Mexico	Report	Palliative care institute	The palliative care institute performs three major services including a medication distribution system, medication information service, pharmacovigilance program and a home pharmacotherapy follow-up pilot program.
Gibbs M. [17]	2015	UK	Book chapter	Palliative care	Pharmacists are essential members of the palliative care team in the UK. They perform a wide range of roles including: timely provision of medications, co-counselling patients, educating other staff members, providing advice and guidance on the safe use of medications and medication order review.
Gilbar P., Stefaniuk K. [18]	2002	Australia Canada	Prospective survey	Palliative care wards	Australian pharmacists were more involved in administrative duties and basic supply functions, whereas Canadian pharmacists had greater participation in team meetings and ward rounds. Medication review was the most commonly performed role.
Herndon C. et.al. [19]	2016	USA	ASHP Guidelines	Palliative and Hospice Care	Highlights what roles pharmacists need to perform in US palliative care settings, including: direct patient care, medication order review and reconciliation, education and medication counselling and administrative roles.
Hill R. et.al. [28]	2007	USA	Feature article	Palliative care	Pharmacist responsibilities involve answering questions related to prescriptions, communication with other health care staff, providing educational in-service programs to staff, reviewing medication regimens, monitoring patient symptoms, managing patients alternative therapies and extemporaneously compounding medications.
Hussainy S. et.al. [20]	2011	Australia	Prospective study	Community palliative care	The project pharmacist demonstrated seven major roles: medication review, education for patients/carers, ensuring ongoing access to medications, providing information/education to team members, consulting/collaborating with team members, liaising with other health care professionals, symptom management.
Ise Y. et.al. [29]	2014	Japan	Prospective survey	Palliative care wards in cancer hospitals	Pharmacists perform a moderate level of clinical services for palliative care units. There is more emphasis on research and research roles including organising multidisciplinary conferences, and providing information to the team.
Jiwa M. et.al. [3]	2007	Australia	Report	Palliative care	Primary role for community pharmacists is the safe and efficient provision of medication and as a source of advice to patients and their carers. Other roles include: pain management, medication management reviews and psychosocial care.
Khan J. et.al. [27]	2016	UK	Conference abstract	Paediatric palliative care	Paediatric palliative pharmacists reported performing the following roles: supplying medications, responding to medication related enquiries, providing advice to other health care staff on compatibility of medications.
Leverence K. [35]	2015	USA	Commentary	Palliative care	Involved in multidisciplinary meetings, patient care visits, medication review, consultations with nurses and doctors, maintain formulary, medication policies/procedures and quality assurance.

Table 1 (cont). References used in the review

Mc Crate Protus B, et.al. [21]	2012	USA	Feature article	Hospice	Administrative duties, including medication use evaluations, development of guidelines and policies, medication therapy management and clinical education are important roles for pharmacists to perform in the hospice arena.
Naidu D. et.al. [36]	2015	USA	Conference abstract	Palliative ward	Within 24 hours of pharmacist intervention, an average pain score reduction (0 to 10 pain scale) of 2.6 points was seen in acute pain patients and 2.8 points was seen in chronic pain patients. In patients who had a documented pain goal, the pharmacist was able to meet the goal in 91% of these patients.
Norrstrom B. et.al. [30]	2010	Sweden	Prospective study	Palliative home care center	The inclusion of pharmaceutical expertise on a palliative care team is valuable, improving rational medication-handling processes including medication cost savings, and for queries regarding pharmaceutical issues.
Pawlowska I. et.al. [31]	2016	Poland	Cross-sectional study (survey)	Residential hospices	Pharmacists in Polish hospices rarely perform clinical services, and most are not considered members of the therapeutic team. Administrative roles are highly performed, including medication use documentation, managing the formulary etc.
Pruskowski J. et.al. [22]	2017	USA	Feature article	Palliative care	A palliative care clinical pharmacist can improve patient outcomes through the rational use of medications — important roles include de-prescribing and improving pain control and symptom management.
Swetenham K. et.al. [23]	2014	Australia	Qualitative study	Palliative care	Several advanced pharmacy practice roles were identified, including: providing home medicines reviews for community palliative care patients, improve access to medications on a around the clock basis, developing quality and safety framework, and identifying key performance indicators for evaluating the impact of this service.
Walker K. [24]	2010	USA	Review	Palliative care	Pharmacists are identified as pivotal members of the multi-disciplinary palliative team and perform roles including: medication histories, medication summaries, identification of medication-related problems, medication counselling and providing medication information.
Walker K. et.al. [25]	2010	USA	Commentary	Palliative Care	Several roles are performed by pharmacists which have been broken up into sections: provision of pharmaceuticals, optimising medication regimens, education and medication information, patient safety and administrative/formulary management.
Wilby K. et.al. [3]	2014	Qatar	Prospective study	Palliative Care ward	Clinical pharmacy interventions were identified, which included: discontinuation and initiation of medication therapy, education, counselling and increasing medication doses.

Domain 1: Professional and ethical practice

Two USA articles and one UK report identified that palliative care pharmacists have communicated with regulatory and licensing agencies to ensure practice compliance with local, state and federal policies relating to medication management (supply, prescribing, storage and documentation of medicines use)

[17, 19, 25]. Pharmacists in the USA were responsible for developing and updating medication use policies in accordance with evidence-based practices [19]. The ASHP guidelines also identified that it was an 'essential' role of the palliative pharmacist to ensure that practice procedures relating specifically to the use of analgesics and other symptom-based treatments

Table 2. Definitions

Term	Definition
Palliative care	<p>“Specialized medical care for people living with serious illness. It focuses on providing relief from the symptoms and stress of a serious illness, whatever the diagnosis. The goal is to improve quality of life for both the patient and the family. Palliative care is provided by a team of doctors, nurses and other specialists who work together with a patient’s other doctors to provide an extra layer of support. It is appropriate at any age and at any stage in a serious illness, including for those who are seeking curative or life prolonging treatments.”</p> <p>“Most palliative care consultation teams are interdisciplinary and consist of doctors (including generalists and specialists, as well as psychiatrists), nurse practitioners, registered nurses, social workers, psychologists, chaplains, pharmacists, and volunteers” [45].</p>
Community-based palliative care	<p>“Community-based palliative care programs provide important continuity of care for patients who are discharged from the hospital after being seen by an inpatient palliative care consultation service. In addition, community palliative care providers can act as consultants for patients who are not hospitalized but who have serious chronic illnesses, symptom distress, and difficulty managing complex treatment regimens. Community palliative care teams provide pain and symptom management, psychosocial and family support, skilled communication about patient and family concerns and priorities and how to address them, and coordination of home care needs, including housing, food, transportation, and equipment. Patients receive palliative care in conjunction with life-prolonging disease treatments. These services can be provided within the home, within a nursing home, within a palliative care outpatient practice, clinics, over the phone or through embedding or integration of a palliative care team within an existing outpatient primary care or specialty practice”[45, 46].</p>
Home-based palliative care	<p>“The provision of health services by formal and informal caregivers in the home in order to promote, restore, and maintain a person’s maximum level of comfort, function, and health including care towards a dignified death.”[47]</p>
Hospice-based palliative care	<p>“Hospice is a model for delivery of palliative care for patients at the end of life when curative or life-prolonging therapy is no longer beneficial”[45].</p>
Hospital-based palliative care	<p>“Hospital palliative care programs improve physical, psychosocial, and spiritual suffering of patients and families who are hospitalized with serious illnesses. Models of hospital-based palliative care services include palliative care consult services and dedicated inpatient palliative care units”[45].</p>

prescribed by other health care professionals in the palliative setting adhered to accreditation, legal, regulatory and safety requirements [19].

Domain 2: Communication, collaboration and self-management

It was particularly emphasised within the literature that pharmacists played a significant role as a member of the palliative interdisciplinary team, performing both a direct patient care role as well as a supportive role [3, 17–20, 27]. In this capacity, they assisted other medical staff with medication-related enquiries, participated in team rounds, clinical meetings and consulted with the therapeutic team, advising on pharmacotherapy [8, 15, 18–21, 23–31]. Studies from the USA highlighted that information requests commonly related to the use of alternative routes of administration, non-standard dosage forms, dosage adjustments, complementary and alternative thera-

pies, tapering or discontinuing medicines, off-label use of medicines, opioid dose conversions, psychological issues, medication interactions and differentiating between allergies and pseudoallergies [16, 26, 32]. Gilbar found that pharmacists in Australia and Canada were considered to be important members of the palliative care team, however participation in interdisciplinary team rounds (72.9% vs. 40.0%) and team meetings (64.4% vs. 45.2%) was more likely in Canada than Australia [18]. Only one paediatric-based study was included in the review, and Khan et. al. observed that in a paediatric palliative care unit in the UK, pharmacists routinely provided advice to other members of the interdisciplinary team on the compatibility and stability of medications, and that these contributions were highly valued by the medical staff (rated 9 out of 10) [27]. Other literature reported that in addition to providing a medical information service to medical staff, palliative care pharmacists

also provided education and training to other staff members on medication use in palliative care, as well as updates on clinical guidelines [15, 17–19, 21, 24–26, 28, 31, 33].

As well as supporting other medical staff, pharmacists were reported to have a strong role in the counselling and support of patients and their family members and carers. Studies showed that pharmacists commonly provided in-depth information and advice about symptom management and their medications [3, 15, 18–20, 23–25, 29, 31, 33, 34]. In particular, providing information about the correct administration of medications (i.e. patches, puffers etc.), the use of complementary and alternative therapies, discussing patient fears about overdosing or addiction with opioid use, and the risks and side-effects of prescribed treatment regimens [16, 25]. One UK-based article highlighted that pharmacists provided patients with written information, as well as patient information leaflets [15]. Gibbs identified that it was important for pharmacists to encourage and support suitable patients to independently manage their medications as it promoted confidence and control and contributed to successful discharge from palliative units to home care settings, preventing future re-admissions due to medication management issues [17]. Furthermore, an Australian study emphasised the importance of the pharmacist in a community pharmacy, in providing

psychological support to home-based and community-based patients and family members [20].

Domain 3: Leadership and management

Management or administrative roles, comprising organising the formulary (purchasing, stock control and storage), quality assurance (i.e. medication use evaluations), developing department policies, handling the medication budget, and attending non-clinical meetings were commonly reported in the literature [3, 18–21, 23, 25, 27, 30, 31, 34, 35]. Pharmacists in Poland, Australia and the USA were highly involved in administrative duties, whereas no information was available on these roles from Japan, Mexico, Qatar and the UK. (Table 3). A comparative study in Australia and Canada highlighted that twice as many Australians (59.5%) as Canadians (28.8%) considered administrative roles to be routine duties in the palliative care setting [18]. Similarly, Pawlowska et.al. identified that Polish pharmacists in hospices were highly involved in administrative work, in particular in managing the purchase, supply and distribution of medications through the hospice [31]. This was attributed to the strict legal regulations surrounding pharmacist practice in hospices, which require pharmacist involvement in procurement and documentation relating to medication supply [31]. McCrate Protus highlights that in the USA, administrative activities such as the processing

Table 3. Roles performed by pharmacist in palliative care settings

Countries	Roles Performed
Australia	<ul style="list-style-type: none"> Managing medication formulary [18] Attending non-clinical meetings [18] Quality assurance, identifying key performance indicators for evaluating the impact of pharmacy services [18, 23] Managing the medication budget [18] Supply/access to medications for patients around the clock [3, 20, 23] Developing symptom management/medication use protocols [3, 18, 20, 23] Sourcing household aids [3] Home medicine review [3, 20, 23] Counselling/education for patients - source of advice for patients and carers, in-depth information and advice about symptom management, medications [3, 18, 20, 23] Psychological/interpersonal support for patients and carers [3] Monitoring patient symptoms and managing them accordingly [20] Patient assessments [18] Medication review [18, 20, 23] Participation in interdisciplinary team rounds and clinical meetings [18] Medication-related information service to team members — e.g. off-label medications, dosing [18, 20, 23] Consultation/liaison with other members of the therapeutic team relating to advising on medication therapy and updating medication chart [20, 23] Education for staff [18] Participation in research and conferences [18] Extemporaneous compounding [18] Dispensing [18]

Table 3 (cont.). Roles performed by pharmacist in palliative care settings

Canada	<p>Managing medication formulary [18] Attend non-clinical meetings [18] Quality assurance [18] Manage medication budget [18] Medication supply to inpatient [18] Medication use protocols [18] Patient assessments [18] Review of medication orders [18] Participation in interdisciplinary team rounds and meetings [18] Advice on medication therapy [18] Medication information service [18] Education to staff and patients [18] Teaching, research, conferences [18] Extemporaneous compounding [18] Dispensing [18]</p>
Japan	<p>Counselling [29] Managing adverse effects and medication interactions [29] Participation in ward rounds [29] Providing medications information to staff [29] Participation in conferences [29]</p>
Mexico	<p>Provision and access to medications [34] Counselling patients [34] Home visits to patients [34] Monitor adverse drug reactions (ADR's) [34] Medication information service [34] Option to dispense medication at the patients doorstep [34]</p>
Poland	<p>Participation in tenders related to purchasing medication [31] Writing of guidelines for usage of medications at hospice [31] Documenting medication and medical device donations [31] Educating patients [31] Therapeutic drug monitoring (TDM) [31] Monitoring adverse drug reactions (ADRs) [31] Rationalising of therapy [31] Providing medication information to medical staff [31] Training hospice staff/volunteers [31] Participation in clinical trials in hospices [31] Dispensing medications [31]</p>
Qatar	<p>Counselling patients [33] Patient and staff education [33] Laboratory monitoring [33] Making pharmacotherapy recommendations to medical staff related to discontinuing therapy, Initiating therapy, dose increases, route of administration, dose frequency etc. [33] Referral of patients to other consult services [33]</p>
Sweden	<p>Checking the expiry dates of medications in stock [30] Meetings with the staff to develop and improve the medication-handling process [30] Dispensing of medications into dosette boxes as well as for storage and other medication-handling procedures [30] Give advice to medical staff regarding different pharmaceutical issues, such as extemporaneously compounded medications [30] Support medical staff in the use of licensed medicinal products and to follow up medications that could not be delivered from drug companies [30] Inform medical staff about new medication strengths, new packages, withdrawals of medications from the market and newly approved medications. Address complaints about medications [30]</p>
UK	<p>Prompt and efficient supply of medications to patients [15, 17, 27] Medication chart review [15, 17] Performing medication histories [15, 17] Maintaining a patients medication summary sheet [15] Identifying and resolving medication-related problems [15, 17] Counselling/education for patients and providing them with written medication information [15, 17] Participation in ward rounds [15] Answering medication related enquiries [17, 27]</p>

Table 3 (cont.). Roles performed by pharmacist in palliative care settings

UK	Providing advice/clinical support to nursing and medical staff on pharmacotherapy regimens, off-label prescribing, complementary medications [15, 17, 27] Provision of education to nursing staff on medication use in palliative care [15, 17] Extemporaneous compounding of non-standard dosage forms [17] Performing economic reviews [17]
USA	Formulary management [21, 25, 35] Interdisciplinary meetings [35] Quality assurance, medication utilisation evaluations [19, 21, 35] Cost-containment measures [21] Support medication contract negotiations with pharmacy vendors (i.e. wholesalers) [19] Stock medications [25] Development of medication policies and procedures, symptom management/clinical practice guidelines [19, 21, 24, 25, 35] Claims processing [21] Re-imburement structure for pharmacist services [19] Participation in drug therapeutics committees [19, 25] Communication with regulatory and licensing agencies to ensure practice compliance with local, state and federal policies [24] Aid with accreditation, legal, regulatory and safety requirements related to the use of analgesics and other symptom based treatments [19] Multi-disciplinary and solo patient visits [35] Counselling patients and family members [19, 24, 25] Independently assess patients for pain and symptom management [8, 19, 22, 32] Monitor adverse drug reactions, drug-drug reactions [28] Monitor therapeutic response (i.e. warfarin), patient symptoms [25, 28] Medication review [8, 25, 26, 28, 32, 35] Medication history/reconciliation [16, 19, 24, 25] Determine cost-effectiveness of medication regimen [25] Investigate medication errors [25] Identify, resolve and prevent medication related problems [8, 24, 36] Participation in inter-disciplinary ward rounds [8] Consultations with nurses and doctors [28, 35] Medication information service, assistance with opioid conversion calculations [24–26, 28, 32] Recommendations for symptom management, alternative routes of administration, discontinuing therapy, alternative therapies, appropriate medication therapy, advise on off-label medication use, compliance aids, dosage adjustments, allergies, tapering medications [8, 16, 19, 21, 25, 26, 28, 32] Educational in-services, continuing education programs for pharmacy and other medical staff, updating on new clinical guidelines [19, 21, 24–26, 28] Precepting students, teaching in didactic settings [21, 26] Participation in conferences and research [19, 21, 25] Extemporaneous compounding of non-commercially available medications, formulations [19, 25, 28, 32] Dispensing [25] De-prescribing [16, 22]

of medication reimbursement claims and medication utilisation evaluations were mainstay activities of hospice pharmacists [21]. Swedish pharmacists were also involved in checking expiry states of stock, and managing the storage conditions in the dispensary [30].

Domain 4: Promote and contribute to optimal use of medicines

Overall, patient-centred, clinical roles were the most highly reported throughout the literature. Each country identified in the review recognised pharmacist involvement in direct patient care duties (Tab. 3, Fig. 2). These roles encompassed a wide scope of practice, including medication review, patient assessments, monitoring adverse effects and medication interactions,

medication reconciliation/history taking, laboratory monitoring, and prescribing [8, 15, 17–20, 23–26, 28, 29, 33–35] (Tab. 3). Pharmacists in the USA, UK, Australia and Canada reported the highest involvement in these roles, whereas Poland, Mexico, Sweden and Qatar acknowledged that clinical roles were not well established in their respective countries [30, 31, 33, 34]. The average time that pharmacists spent on direct patient care activities varied in reports: Atayee et al. highlighted that pharmacists in their USA-based study spent approximately 2.5 hours per patient per visit, which was dedicated to preparing for patient consultations, assessing patient symptoms, communicating with clinicians, and making pharmacotherapy-related suggestions [8]. Gilbar identified that 35.7% and 61%

of pharmacists in Australia and Canada have respectively spent between 10–20 hours per week in palliative care [18]. Roles that were specifically performed in the palliative setting included aggressive pain control and symptom management, deprescribing, identification of adverse effects and interactions, extemporaneous compounding of non-standard dosage forms, use of complementary and alternative treatment regimens, use of off-label medications, and ongoing supply of appropriate medications [3, 8, 15, 17–20, 22–25, 27–29, 31, 32, 34, 36]. Symptom management in particular was a highly emphasised role, with Atayee et.al. reporting that 93% of referrals made to the pharmacist in their study were for pain management [8]. In their study utilising a retrospective review of patient medical records, Naidu et.al. observed that within 24 hours of a pharmacist intervention, the average pain score in acute and chronic pain patients was reduced by 2.6 and 2.8 points (on a 10 point pain scale) respectively [36]. Furthermore, palliative care often involves the prescribing of off-label medication, and Gibbs indicated that it was important for pharmacists to be involved in the decision-making process to ensure these medications were being used appropriately and with accountability [17].

An effective supply function was identified as an important pharmacist responsibility, particularly in community-based settings [3, 15, 17, 20, 23, 25, 27, 30, 34]. Often patients undergoing palliative care require medications as well as dose administration aids that are not commonly used and rely on pharmacists for a timely and ongoing supply [3]. Jiwa et.al. highlighted that this role was challenging due to the nature of the medications required (i.e. opioids, short shelf-life, large batches), however, was an important function as missing a dose of medication could potentially have significant effects on patients' quality of life [3].

Interestingly, only studies from Australia identified the performance of home medicine reviews (HMR's) for patients in home-based palliative care settings [3, 20, 23]. These reviews were identified as an extra level of support for patients who were being treated at home, and facilitated a better relationship between pharmacists and other primary care providers such as community care nurses [3, 23].

Other roles that were also commonly reported as key elements in optimizing medication management in palliative patients, but have been discussed elsewhere in this review, included: participation in interdisciplinary ward rounds, counseling patients, providing medication information to other staff, and providing education and training to other pharmacists and other medical staff [3, 8, 15–21, 23–34].

Domain 5: Critical analysis, research and education

The ASHP guidelines state that research activities should be pursued by palliative care pharmacists when possible, and extend to in the preparation of publications, developing clinical guidelines, guidance documents or treatment algorithms as well as providing education to student pharmacists and members of the interdisciplinary team [19]. However, research and education roles were not commonly reported in the literature. Several articles indicated that pharmacists did perform research activities such as: participation in conferences, contributing to publications, conducting clinical trials and precepting and teaching students [18, 19, 21, 25, 26, 29, 31]. Ise et.al. found that Japanese pharmacists in their palliative care ward exercised a higher level of activity in educational and research roles than in clinical based work [29]. In contrast, Gilbar reported that active involvement in palliative care research was uncommon in Australia and Canada, with 16.7% of Australian pharmacists and 1.7% of Canadian pharmacists involved [18]. Approximately 31% of Australian pharmacists and 27.1% of Canadian pharmacists were involved in teaching palliative care to pharmacy, medical, or nursing students, 14.1% and 15.3% of Australian and Canadian pharmacists, respectively, actively participated in conferences or seminars, or contributed to the palliative care literature [18].

Differences across settings

It is apparent that in community-based or home-based care settings, emphasis is placed on roles related to adequate supply of stock for patients and in the development of a relationship with patients [3, 34]. Community pharmacists have been reported to develop a rapport with patients so that they can provide ongoing interpersonal support throughout patients stages of illness, and also to carers and family members in dealing with bereavement [3]. This role was less prominent in studies based in palliative ward or hospice settings. Furthermore, pharmacists in community settings reportedly followed-up patients after discharge from hospital to ensure they were managing their medications appropriately [3]. Pharmacists' roles in hospice and palliative units were steered toward clinical roles such as medication chart reviews, adequate symptom management and collaboration with the interdisciplinary team. The USA-based studies in particular emphasise the importance of the pharmacist in communicating effectively with the team and providing advice and recommendations for appropriate changes to patients' medication regimens, such as

— when to discontinue therapy, to change doses, to add medications [8, 19, 21, 25, 28].

Benefits

Several studies have described the value of pharmacist involvement in the palliative care team. In the USA, pharmacists create individualised treatment plans for palliative patients, providing patient-centred care that takes into account their specific needs [16, 22, 32]. The most commonly reported benefits of pharmacist interventions related to patient outcomes, including improved quality of life and level of comfort through adequate symptom control, appropriate medication regimens and medication adherence [3, 8, 15, 18, 20–22, 27, 31]. Demler et al. highlighted that for palliative patients with pain and other distressing end-of-life symptoms, the effective and appropriate use of medications prevented negative experiences involving breakthrough pain as well as emergency department admissions, and as such helped to alleviate patient suffering [32]. Furthermore, a USA article highlighted that pharmacist's recommendations minimised the possibility of adverse-effects, toxicities and use of unnecessary medications [16].

Several articles also highlighted that pharmacist's involvement had positive associations for other members of the interdisciplinary team (i.e. doctors and nurses), including increased support and advice as well as preserving time for oncologists and other team members [8, 15, 18, 27]. Hussainy et al. reported that in their Australian-based pilot intervention study involving the integration of a pharmacist into a community palliative care team, other clinical staff in the team reported an improvement in their medication-related knowledge and skills, with a decrease in related medication errors [20].

Also commonly identified were the economic benefits of pharmacist roles. These included the use of more cost-effective medication regimens for patients and rationalising the use of medication to reduce unnecessary expenditure [16, 17, 22, 32]. The Swedish article identified that following the inclusion of a pharmacist into the interdisciplinary palliative team, there was an observed improvement in the supply of medications and a 7% decrease in medication costs [30]. In retrospectively reviewing the medical records of patients admitted to a palliative unit in a community hospital, Naidu et al. reported that over a period of 1 year, pharmacist interventions related to the discontinuation of medications that did not support palliative care goals had a potential estimated direct cost savings of \$100,000 (USD) [36].

Challenges/barriers

Among the barriers to the provision of pharmaceutical care to this patient population that have been identified in the literature, most related to the physical lack of pharmacists who possess the necessary skills for practising in palliative care, followed by the pharmacist's lack of time for managing palliative patients needs [3, 18, 29, 31, 35]. In community pharmacies, where pharmacists look after patients in home-based and community centre settings, a significant issue related to the ordering of palliative specific medications with short shelf lives as well as pain medications. These concerns related to a perceived increased risk of theft as well as a fear of not being able to sell medications before their expiry dates [3]. In hospices or palliative wards, additional barriers include the: lack of a defined palliative pharmacist position or role, limited opportunities for interacting with other members of the palliative medical team, as well as little recognition for the contribution of the pharmacist in palliative care [18, 29].

Discussion

To our knowledge, this is the first review to compare the roles of palliative care pharmacists on an international scale. Pharmacist practice in this setting is well publicised, however, we are unable to ascertain if these services are currently provided or offered to palliative patients worldwide due to the nature of the literature obtained, with several interventional studies and grey literature included in the review. However, it is apparent that, overall, those pharmacists who specialise in palliative care perform a diverse range of roles, ranging from quality assurance to being directly involved in patient care. As a result, the pharmacist can make significant contributions to palliative care, including appropriate symptom management, rational prescribing and psychological support, highlighting that they are well positioned in the holistic care of patients [37].

An important finding of this review highlights that pharmacist involvement in palliative care is not consistent worldwide. Whilst the literature collected is not representative of pharmaceutical care services on a global scale (due to the limited amount of literature from Asia, South America, Africa and Europe), it does provide an insight into the type of practice adopted in each country. Pharmacists in the UK, USA, Canada and Australia performed an advanced level of practice (as their reported roles fulfilled the criteria of the majority of the domains in the APPF). However, pharmacists in other countries, in particular Mexico and Poland, did not present such an extensive scope

of practice. Whilst the authors of the literature from these latter countries acknowledged that pharmacist involvement in palliative care settings was not highly developed, this draws attention to the gap in health equity between countries. The issue of health equity is of particular significance to palliative care, as the World Health Organisation (WHO) reports that a 2011 study conducted in 234 countries, territories and areas found that palliative care services were only well integrated in 20 countries, while 42% had no palliative care services at all and a further 32% had only isolated palliative care services [38]. Whilst these differences in practice between countries may be attributed to a wide variety of factors, including differences in health care systems, financing of palliative care, levels of palliative care services and practice culture, it is possible that as a result, patients in these countries are not provided with the highest attainable level of adequate pharmaceutical care, which may have varying levels of impact upon patient outcomes [39]. Equity is one of the fundamental principles of healthcare systems worldwide, and pharmacists, as well as medication experts must strive to equitably serve this patient population [40].

The WHO recommends several strategies to improve the provision of palliative care including: ensuring palliative care is delivered through inter-disciplinary teams; the implementation of a medications policy which ensures the availability of essential medications for managing symptoms, in particular opioid analgesics for the relief of pain and respiratory distress; as well as the development of policies for strengthening and expanding human resources, including training of existing health professionals [38]. Specifically for pharmacists, there are several palliative care specific educational opportunities that are able to develop pharmacist competencies [19]. These include the Scottish Palliative Care Pharmacists Association learning pack, the ASHP Research and Education Foundation Pain and Palliative Care traineeship as well as several online pharmacist support groups [41–44]. The ASHP guidelines also provide a list of useful resources including books, journals and websites that would be helpful in the professional development of the palliative care pharmacist [19].

Whilst the value of the palliative care pharmacist is widely acknowledged in the literature, an important finding of this review highlights that it is apparent that pharmacists, as medication experts, are not utilised to their maximum potential in some palliative care settings worldwide. Therefore, there is a need to promote health equity and benchmarking among palliative practice settings on a global scale, so that there is consistency in the provision of good pharmaceutical care.

Conclusions

Overall, whilst the majority of roles performed for this group of patients are similar to those performed in general clinical practice, there are several roles that were specifically emphasised as being important to this type of care, aimed at symptom control and achieving a comfortable quality of life, rather than curative treatments. The literature identifies that there are differences in the types of palliative pharmacist practice between countries, which may have varying levels of impact upon patient outcomes. As pharmacists can make significant contributions to palliative care, it is important to encourage the benchmarking of practice across different clinical settings and countries to promote a consistent and equitable practice.

Conflict of interest

The authors declare that they have no conflicts of interest relevant to the content of this manuscript.

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