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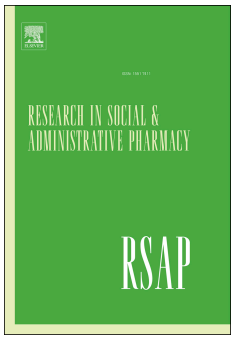

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A global evidence review of systemic factors influencing participation in pharmacy professional development activities

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Abstract:

Background: Changes to the pharmacy profession have meant that a pharmacy degree can no longer serve as an endpoint to professional training within pharmacy. Continuing learning and training are imperative in order to provide high-quality healthcare services. Investing in healthcare workers' education and training not only has a positive impact on employment rates and economic growth but also results in remarkable improvement in health and population outcomes. **Objectives:** To identify factors affecting pharmacists' participation in Continuing Education (CE) or Continuing Professional Development (CPD) activities. **Methods:** Relevant literature was identified through a systematic search of the following databases: EMBASE, (CINAHL Plus, SCOPUS, PsysINFO, PubMed, Australian Education Index (AEI) and British Education Index (BEI). **Results:** Two hundred eighty-seven studies were screened, and thirty-two studies were included in this review. Reviewing the retrieved studies identified four factors that may influence pharmacists' participation in professional development activities. Factors identified comprised: attitudes, access to needs-based education, support, and policy. **Conclusion:** Understanding the connection between needs-based education, systems of support, and professional policies may help leaders and policy makers to make more informed decisions with regards to pharmacy workforce development by creating better strategies for pharmacists' education, training, and career development.

Background

Globally, countries are paying increasing attention to ways of evolving healthcare services and developing the healthcare workforce to be contemporary with advancements in competencies, technology, and therapeutic management of diseases. As "there is no healthcare without a workforce",[1] regional policy reports and international organisations have called for immediate actions to address healthcare workforce capacity and development, including the pharmacy workforce.[2-7]

In recent years, the pharmaceutical profession has witnessed substantial transformation with unprecedented changes occurring within both pharmacy practice, delivery of primary healthcare services, and pharmacy education. These drivers necessitate that educators and policy makers re-evaluate the workforce capacities, both quantitative and qualitative, and reshape practice scopes to be able to meet national health needs.[8] Moreover, planning and development of the pharmaceutical workforce is fundamental for achieving universal health coverage by 2030.[2, 9] In order to fulfil their new roles and extended scopes, pharmacists need to maintain and improve their knowledge, skills, and performance to ensure competency in the extended pharmaceutical services they provide to their patients. Professional education plays a critical role in preparing a competent pharmacy workforce to meet the healthcare needs of the public.[8] Global reports have shown that investing in healthcare workers' education and training not only has a positive impact on employment rates and economic growth but also results in remarkable improvement in health and population outcomes.[10, 11]

Continuing education (CE) has been defined as "a structured educational activity designed or intended to support the continuing development of pharmacists and/or pharmacy technicians to maintain and enhance their competence."[12] In 2000, the profession began to explore and discuss different approaches and models, such as Continuing Professional Development (CPD), as strategies to enhance continuing education and its outcomes. In 2002, the International Pharmaceutical Federation (FIP) adopted the concept of CPD and a structured five-step cyclic process (reflect, plan,

act, document, evaluate) to help pharmacists manage their self-directed, self-centred learning. CPD has been defined by the FIP as "the responsibility of individual pharmacists for systematic maintenance, development and broadening of knowledge, skills, and attitudes, to ensure continuing competence as a professional, throughout their careers".[13] CPD encompasses lifelong learning with a view to attaining consistent performance within a scope of practice. However, countries have adopted differing systems for ensuring pharmacists' competence. Some countries require completion of a certain number of CE hours in order to satisfy registration requirements; others use a more structural model with pharmacists required to submit practice portfolios for evaluation.

Participation and engagement of pharmacists in professional development activities (either CE or CPD) require them to identify practice-related education that aims to improve and maintain high-quality care when delivering professional practice. Despite an increase in the availability of CE activities and existence of mandatory requirements, evidence has shown that pharmacists' participation in such activities remains low.[14, 15] Moreover, based on self-report methods for CPD, Power et al. found that there were significant differences between the number of CPD hours attended by community pharmacists compared to hospital pharmacists, respectively, a mean of 40 hours against 66 hours per year ($p<0.05$).[16] At the time of this review, the authors could not find a comprehensive global review of the factors that influence participation in professional development activities (either CE or CPD). This literature review will focus on the global factors that influence pharmacists' participation and influences in professional development (CE and CPD) activities to allow for the development of pharmacy workforce development strategies.

Methods

Relevant literature was identified through a systematic search using the following databases: EMBASE, Cumulative Index to Nursing and Allied Health Literature (CINAHL Plus), SCOPUS, PsysINFO, PubMed, Australian Education Index (AEI) and British Education Index (BEI). The

following search terms were used: pharmacy, continuing professional development, CPD, continuing education, CE, needs assessment, leaning needs, and educational needs. No time limit restrictions were imposed when conducting the search; all databases were searched from time of inception until February 2020.

The literature search retrieved articles investigating pharmacists' perspectives towards CE as well as CPD. Although concepts of CE and CPD differ, both terms were frequently used in the literature depending on the country where each study was conducted. Articles were included in this review if they were published in English and discussed pharmacists' perceptions of and engagement in CPD or CE activities. Reference lists for all included articles were reviewed to determine other papers that met the inclusion criteria. Studies were excluded if the focus was on health professionals other than pharmacists or if pharmacy pre-service student cohorts were included. In addition, papers were excluded if the focus was purely on subsets of skills usually associated with CPD, such as reflective learning. Reviews, notes, editorials, book chapters, thesis, and conference papers were also excluded from the review. The search retrieved 287 articles and 32 articles are included in this review (Figure 1). Themes were identified from the review of articles included.

Results

Retrieved studies were from the United States (n=9),[17-25] Australia (n=5),[26-30] United Kingdom (n=5),[31-35] Canada (n=3),[36-38] Lebanon (n=2),[39, 40] Belgium (n=2),[41, 42] Ethiopia (n=1),[43] Spain (n=1),[44] Malaysia (n=1),[45] United Arab Emirates (n=1),[46] Qatar (n=1),[15] and Egypt (n=1).[47] A summary of the included articles can be found in table 1.

Reviewing the retrieved studies identified four factors that may influence pharmacists' participation in professional development activities. Factors identified comprised: attitudes, access to needs-based education, support, and policy.

Factor 1: Pharmacists' Attitudes Towards CE/CPD

Regardless of mandatory requirements, pharmacists showed positive perceptions in relation to attending professional development activities as it is essential to keep them updated and enables personal gaps in knowledge to be filled.[22, 26, 29-31, 39, 41, 43, 45] Pharmacists also believed that CPD would increase job and personal satisfaction, enable them to implement new skills into daily practice, and help them to meet the challenges of their changing role.[32]

The literature indicated that pharmacists were often confused about the differences between CPD and CE with uncertainty about how a CPD model should, or could, affect their day-to-day professional life.[17, 31-33, 35, 38] This confusion was linked to the pharmacists' uncertainty about what is expected in CPD, the usefulness of a written learning plan, and the lack of a clear process of self-appraisal and needs identification and evaluation.[17, 38] This was evident in studies that were assessing pharmacists' perceptions before implementation of a mandatory CPD systems; in the early stages of adopting the CPD concept, and before making it mandatory, evidence showed that pharmacists tend to focus on actions rather than on other stages of the CPD cycle.[31, 35] Pharmacists were also found to have difficulties in identifying their training and learning needs or evaluating their participation in CPD activities.[31, 32, 34, 43] The process of identifying learning needs and implementing new knowledge in improving practice and patient care could be considered unfamiliar territory for many pharmacists.[34, 38] Studies have also shown that pharmacists have expressed frustrations about the CPD process as well, mostly related to documentation associated with the CPD portfolio and stated that it needs to be concise and manageable over time.[18, 20, 22]

Mandatory requirements were also found to affect pharmacists' perception towards their professional development. Where there was a current lack of obligatory requirements, pharmacists were found to be in favour of making CE/CPD mandatory.[17, 31-33, 43, 47] Mandatory requirements were seen as important to improve the standards in pharmacy practice, act as an enabler to demand study leave and

present a better case for adequate remuneration, and improve the perceptions of both public and other healthcare professionals.[31, 32] In countries where there was early implementation of obligatory requirements, pharmacists reported that mandating attendance at professional activities is a form of external pressure and a necessary driving force for participation.[26, 28, 41, 45]

Other studies reported evidence suggesting that pharmacists' perspectives towards CPD may change over time due to changes in registration requirements. In a 2002 study that investigated Northern Ireland (NI) pharmacists' perception of CPD before it became mandatory (response rate 25.6%) showed that they perceived that it was essential for all practising pharmacists to engage in CPD, as it is an excellent means by which they can continually update their professional knowledge and skills.[32] They also believed that the implementation of mandatory CPD would ensure a higher quality of patient care and would make pharmacists more confident in their approach to patients and to other healthcare professionals. A further study was completed in NI in 2004 during the pilot period of the CPD system, prior to the introduction of mandatory CPD (response rate 41.1%), and showed that the responses of pharmacists in NI regarding CPD differed significantly from those in the first study.[33] Respondents in the later study were less likely to strongly agree/agree with some of the positive statements that were included in the earlier study. They were significantly less likely to agree with the following statements: 'CPD is a beneficial use of pharmacists' time' (2001 study 91.5%, and 2004 study 79.8%, $P<0.001$) , 'The implementation of CPD would ensure a higher quality of patient care' (2001 study 84.6%, and 2004 study 69.1%, $P<0.001$), 'CPD is an excellent means by which pharmacists can update their professional knowledge and skills' (2001 study 92.1%, and 2004 study 81.3%, $P<0.001$) and 'Engaging in CPD will make pharmacists more confident and professional in their approach to patients' (2001 study: 78.3%, and 2004 study: 63.1%, $P<0.001$). The significant changes were explained by the fact that the majority of the respondents (52.9%) continued to engage in CE as opposed to the more rigorous CPD.[33]

Studies that investigated pharmacists' perceptions related to CPD before it became mandatory showed that community pharmacists were less likely to adopt the concept of CPD than pharmacists working in hospital or primary care (an initial contact point of care provided by a medical professional such as a general practitioner) sectors.[26, 32, 47] The reason proposed for this difference in opinions was that the hospital pharmacy sector was quicker to adopt the concept of clinical governance and CPD in order to encourage pharmacists to move towards such a model of practice to ensure excellence in the delivery of services to patients. Hospital pharmacists reported having a supportive working environment and being less isolated than those working in community pharmacies where pharmacists often work alone and have little time to devote for CPD.[32]

Moreover, pharmacists working in community pharmacies were found to have attended fewer live (face-to-face) CE/CPD events compared to pharmacists working in hospital settings.[26, 32, 35, 47] Pharmacists practising in rural areas, however, felt disadvantaged as they might not be able to freely access CE/CPD activities, but they did not find it difficult to meet mandatory requirements.[24, 26]

Factor 2: Access to Needs-Based Education

Pharmacists reported different characteristics for preferred educational opportunities. Henkel and Arvanova[25] reported that pharmacists' selection of a professional development activity may be influenced by their desire to maintain licensure, personal interest, and self-improvement. Community or population needs, including business growth and development, were seen as less important influential features.[25] It was also found that pharmacists are more motivated to participate in educational activities when they are continuous, learner-driven, and fulfil personal and practice needs.[38]

Selection of professional development activities was reported to be influenced by topic, timing and mode of delivery. With regard to topic preference, pharmacists reported that topics of CE and/or CPD

activities should be interesting and relevant to their practice. Topics preferred ranged between those related to therapeutics and pharmaceutical care (e.g. pharmacotherapy in disease management), clinical skills topics (e.g. communication, pharmacokinetic monitoring and identification of drug-related problems), and management topics (e.g. human resource management, budgeting, and strategic planning).[14, 15, 24, 30, 37, 39, 42, 44, 47] In addition, the healthcare needs of society were also reported as an important topic to include in a CE and/or CPD activity.[44] Pharmacists also expressed a preference for topics related to innovations in disease management and pharmacy practice.[39, 45, 46] This diversity in preferred topics could be partly linked to years of experience or length of practice. Raymond and Woloschuk reported that younger or less experienced pharmacists (e.g. pharmacy residents or early career pharmacists) expressed a higher need for specific patient care topics, while older and more experienced pharmacists expressed a higher need for managerial and technical topics.[37]

Timing of a CE/CPD activity was shown to be an important factor that would encourage pharmacists to attend an activity.[28, 40, 44, 45, 47] As pharmacists in different countries may have slightly different duty schedules, CE/CPD activities need to be planned in a flexible manner to fit within their busy daily schedules.

Preferred mode of delivery for educational opportunities varied. Pharmacists expressed preferences for live professional development activities, such as presentations/lectures and workshops, in interactive formats such as small group discussion.[15, 17, 19, 26, 28, 30, 35, 38, 42-47] Pharmacists were believed to favour structured learning activities such as expert-led workshop or lectures because of the opportunity to actually interact with their peers, rather than for the content or expert delivery.[29, 30, 38, 42] Moreover, pharmacists believed that the content of a professional development activity needs to be more clinical or contain hands-on tasks and problem solving, the content and context of which has greater temporal relevance.[28]

The use of video-recorded lectures, distance learning and internet-based programmes was reported as a less preferred mode of delivery for professional development activities compared to interactive workshops.[28, 42, 43] Although all previous mentioned studies have been conducted in an era in which the use of information technology has been established, this has not translated into a clear interest with digital-assisted learning. On the other hand, one recent study has reported anticipation that advances in digital technology would become a more preferred mode for delivery of educational activities in the future, being more convenient and better able to provide illustration.[39] Austin et al identified that the most effective technology-based learning is the one that includes communication (E-conversation) with peers.[38] Although 'distance learning' using online programmes has the advantage of being able to access the learning materials at a convenient time and place, especially for those working in rural areas,[24, 26, 38] it also has the challenge of self-study or self-directiveness, which pharmacists may find difficult.[41]

Factor 3: Support

Pharmacists highlighted the need for support in utilising a CPD model according to a number of studies. In a number of countries, the availability of a support system was a component of concerns in relation to CPD becoming mandatory.[15, 35, 45] Other studies also reported that a need existed to re-educate pharmacists regarding why a CPD model is important and to develop systems for support and help such as meeting with other pharmacists to share information and ideas, guidance on how to develop personal objectives, and easier access to information through providing access to the internet in the workplace.[31, 43]

With regard to practice settings, support for adopting a CPD model was more accessible for hospital and primary care pharmacists compared to pharmacists working in community settings.[32, 34, 35] As previously mentioned, hospital pharmacists usually have more support from their employers and colleagues as well as access to in-house training and resources and are, therefore, less isolated than

209 those working in community environments.[32, 34] Pharmacists working in primary care organisations
210 would also have managerial and collegial support systems in addition to ready access to learning
211 resources.[32, 35]

212 A supportive work environment was also highlighted as an important factor to pharmacist's
213 professional development. The ability to apply what has been learnt after attending CE to the real-
214 world practice could be a challenge to many pharmacists.[14, 33, 34, 38] Pharmacists emphasised the impact
215 of their personal working environment on their motivation to learn and the applicability of CPD.[15, 29,
216 33]

217 Randomised controlled studies showed that with consistent support and follow-up, pharmacists can
218 develop the knowledge and skills to adopt a CPD approach to their lifelong learning and professional
219 development, including the creation and maintenance of a personal CPD portfolio.[18, 20, 22] McConnell
220 et al. conducted a nonblinded RCT to assess the effect of CPD, compared with that of traditional CE,
221 on perceptions of factors related to pharmacy practice[22] and learning behaviours.[20] Participants were
222 randomized to the intervention (n=49) or control group (n=51). The control group was instructed to
223 continue with traditional CE. The intervention group participants completed 3 CPD workshops and
224 were instructed to utilize the CPD approach for their learning needs. The outcome measures were
225 comparisons on follow-up and changes from baseline to follow-up in responses to the study
226 questionnaire. McConnell et al. found that pharmacists who participated in CPD more often reported
227 that various aspects of their practice (e.g. their professional knowledge, skills and attitudes) improved
228 as a result of their education activities compared to the control group. [22] Significant changes in
229 learning behaviour/activities (plan, act, evaluate) from baseline to follow-up between intervention and
230 control groups were also reported.[20] The intervention group were found to be able to identify specific
231 learning objectives, select education activities to achieve a specific learning objective, document their
232 learning plan, use work and project-related stimuli for participation in educational activities, and

review their education activities to evaluate impact/outcomes of their learning.[20] However, findings from this trial were limited by the fact that all participants were employees of a single health facility and had access to internal professional development activities during work hours. Another limitation was the small final number of participants in the intervention and control arms (44 and 47, respectively), with a larger number of intervention participants being lost to follow-up compared with control participants.

Another randomised controlled study was conducted by Dopp et al. and aimed to determine whether pharmacists who adopted a CPD approach (as demonstrated by participation in a structured certificate programme to develop the knowledge and skills deemed necessary) were more or less likely to assess and identify their professional learning needs, develop and implement a personal learning plan, evaluate their learning outcomes, and document each of these elements compared to pharmacists who utilised a traditional approach to CE without a structured intervention. [18] Participants were recruited from five different states in the US and were randomly assigned into either the study group (n=127) or the control group (n=105). The study group began an ACPE-accredited certificate programme and were required to complete: (1) online baseline survey and CPD course; (2) home study and self-assessment; (3) initial workshop; (4) two follow-up workshops; and (5) online post-study survey. The control group did not have any intervention or follow-up until the end of the study, when they were asked to complete the same post-intervention online survey as those in the study group. Dopp et al. found that pharmacists in the study group were more likely to use a structured self-assessment tool to help identify practice strengths and areas for improvement, identify and develop specific, measurable, achievable, relevant, and time sensitive (SMART) learning or professional development objectives, review and reconsider their learning objectives and personal learning plan after some period of time, and maintain a record of their professional practice activities compared to pharmacists in the control group ($p<0.01$). [18] Similar to McConnell et al.,[20, 22] participant attrition was a definite limitation of this trial. The final number of participants in the intervention and control arms were 57 and 34,

respectively, with a larger number of intervention participants being lost to follow-up compared with control participants.

Factor 4: Policy

Internal or local policies that regulate pharmacists' professional development were seen as an important asset to overcome many barriers that were reported by pharmacists. Studies reported that policies that mandate engagement with professional development activities and clarify the mechanism for assessing CPD portfolios may help provide the needed incentives and overcome barriers to participation in professional development activities.[28, 38]

Some reported barriers to participation in either CE or CPD were found to be similar across the literature such as lack of time, poor timing of a professional development activity and lack of financial remuneration.[14, 15, 26, 28, 31, 32, 42, 43, 46] Pharmacists highlighted that the demands of work and family and other commitments create conflicting priorities as well as additional strain on already overworked pharmacists, as sometimes they found it difficult to get away from work and find replacement staff.[14, 28, 39, 43, 45] Pharmacists found that incorporating professional development activity attendance with vacation time was of assistance, but not always possible to arrange.[28] Table 2 summarises reported barriers and incentives related to CE and CPD.

Discussion

This literature review has explored factors affecting pharmacists' perspectives on, and engagement with, CE and CPD in a global context. One immediate finding from this review suggests, perhaps not surprisingly, that career-based professional development in pharmacy is a multi-faceted and complex experience.

What are the key influences on pharmacist participation in professional development activities? Individual perceptions and attitudes related to professional development activities vary depending on the model adopted, the nomenclature being used (for example, CE versus CPD), mandatory or regulatory requirements, and practice settings (contextual factors). However, the retrieved studies did not tend to illustrate how pharmacists' attitudes and perceptions can be translated into better engagement with the adopted models.

An additional identified factor was access to a needs-based education model that has competency development as a principal factor for pharmacy professional development. Findings from this review showed that, for pharmacists to fully participate in learning and training activities, education needs to be continuous, learner-driven, and fulfil personal and practice needs – these latter being essentially work-driven and, hence, linked to competency development. Learning opportunities which fulfil practice and learner needs will better enable pharmacists to implement developed skills into quotidian practice and additionally support the evolving challenges of their parallel evolving roles. However, the findings in this literature review showed that pharmacists reported difficulties in the identification of learning needs, which can be seen as similar difficulties in identifying competencies for development. Although identifying pharmacists' learning needs may help educators and professional bodies to strategically outline workforce development plans and deliver learning activities that are assumed to be relevant to pharmacists, there is a paucity of data on what strategies could be used to identify pharmacists' CE/CPD needs effectively with more orthodox delivery mechanisms; one could conclude that needs-based CE or CPD strategies should start with identification of competency-based development (linked with scope of practice) in the first instance.

A third identified factor in this review was the availability and accessibility of support for professional development, which will affect pharmacists' perspectives and engagement in relation to CE and CPD. Pharmacists (and all healthcare professionals, one could argue) need accessible and

useful learning and development support in order to improve their practice, to evolve personally and professionally, and to provide foundations for the introduction of new pharmaceutical services. Support may come from managers, educators, professional bodies, peers and work environment (e.g. availability of resources). Mostly, when individual pharmacists can readily access the support they need (the realisation of the latter being key), this will bridge the gap between initiating learning and application of learning.

A final factor that has been identified in this review relates to systems: strategic policies and national regulations can be both a barrier to, and an incentive for, participation in CE and CPD activities. Reported regulatory barriers to participation in CE and CPD activities may shed light on the strategies needed to adopt flexible CE and CPD models. However, the results of reported studies should be examined in relation to the context and practice environment rather than in isolation. For example, adopting a system or a model that helps pharmacists to overcome these barriers may facilitate a better understanding of the importance of the CPD concept and motivate practitioners to adopt such a model in practice. Leaders and policymakers need to work collaboratively to activate internal/local regulation that support pharmacists' professional development. Regulation and policy formation should be based on workforce intelligence – which is completely absent from the literature reviewed and has been a missing feature of professional development policy in pharmacy. Policies that endorse competency-based education and training of the workforce, and which are linked to scope of practice, need to feature more in strategic approaches to national infrastructure for CPD and CE. Policies and regulatory statements are the umbrella that ensures the advancement of the profession. Static policies may hinder the required development of practitioners and may even act as an obstacle to the improvement of pharmaceutical healthcare services. Therefore, any policy should be updated regularly and must be aligned with national and international healthcare needs. Investments in the health workforce are needed now more than ever, and putting forward strategies to guide and facilitate workforce development is a necessity.

Limitations

There are some limitations to this review. First, potentially relevant articles were limited to the databases and search terms selected for this review. Searching other databases and using other inclusion criteria and search terms may have identified additional studies. Second, several quantitative studies included in this review were limited and included a low response rate. Respondents of these studies may be more interested in CE/CPD than non-respondents and, therefore, results should be interpreted with caution. On the other hand, all retrieved qualitative studies followed a thematic analysis method for data analysis, but none went into a deeper level of data analysis through an interpretive analysis in order to provide a conceptual account of the data. Finally, although this review provided a global perspective on pharmacists' participation in professional development activities, most studies were conducted in North America, Australia, and the UK, with a paucity of data related to CE/CPD in the other regions such as African, South-East Asia, and Eastern Mediterranean regions. Future research is needed to explore these aspects further.

Conclusion

In conclusion, this review has identified the factors affecting pharmacists' participation in professional development activities such as CE and CPD. Gaining an in-depth understanding of the connection between needs-based educations, support for professional development, and policies could help leaders and policymakers to make more informed decisions with regard to pharmacy workforce education and development.

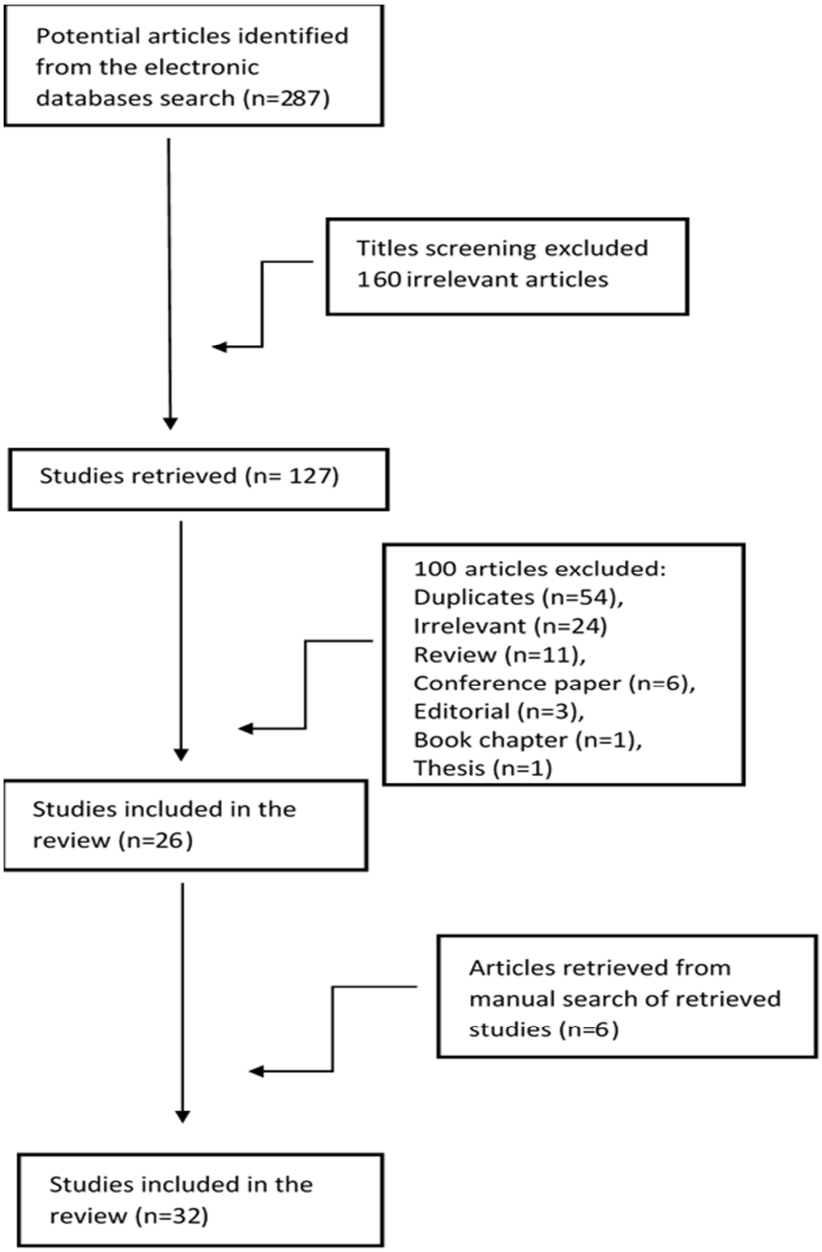

Figure 1: PRISMA diagram of included and excluded studies for a review of factors affecting pharmacists' engagement in professional development activities globally

1

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Table 1. Literature review summary

Author/Country	Country CE/CPD requirements at the time of study	Methodology/Methods	Sample size	Practice Setting	Aim
Annable (2004)/ Canada	Not reported	Quantitative/Cross-sectional electronic survey	80 pharmacists (Response rate was 64%)	Hospital	To perform a needs assessment to determine the specific oncology pharmacy education priorities for the hospitals and to develop a pilot project of at least one CE module based on the results of the needs assessment
Attewell et al. (2005)/ UK	Pre-compulsory CPD in the UK	Qualitative/semi-structured interviews	21 pharmacists	Community	To investigate community pharmacists' perceptions and ideas about what constitutes CPD and to establish the types and amount of CPD undertaken
Austin et al. (2005)/ Canada	Mandatory Learning portfolio as a means of documentation of CPD	Qualitative/ Focus group interviews	11 Focus group interviews (n=42)	Mixed (hospital, community, and other settings)	To examine pharmacists' attitudes, behaviour and preference regarding their own CPD
Bell et al. (2002)/ UK	Mandatory 30 hours of CE annually "Pre-compulsory CPD in the UK"	Quantitative/Cross-sectional postal survey	1689 pharmacists (Response rate was 25.6%)	Mixed (hospital, community, and other settings)	To determine the extent of understanding and implementation of CPD and to gain insight into pharmacists' attitudes towards the concept and the introduction of mandatory CPD
Bellanger and Shank (2010)/ USA	Mandatory CE (number of required hours not reported)	Quantitative/Cross-sectional electronic survey	4954 pharmacists (Response rate was 9.5%)	Mixed (hospital, community, and other settings)	To assess the knowledge and attitudes of Texas pharmacists regarding the concept of CPD
Chambers et al. (2013)/ Australia	Mandatory 40 CPD points annually	Quantitative/Cross-sectional online and paper survey	177 pharmacists (Response rate was 40%)	Mixed (hospital, community, and other settings)	To investigate what motivates Northern Territory pharmacists when choosing CPD activities To investigate if these choices are meeting their learning requirements

Cordero et al. (2004)/ Spain	Not reported	Quantitative/Cross-sectional survey Pre-post questionnaire (immediately before and 4 weeks after a refresher course)	109 pharmacists (Response rate was 88% and 82.5% respectively)	Community	To determine the opinion of community pharmacists related to the specific issue of continuing education
Dopp et al. (2010)/ USA	Mandatory CE (number of required hours not reported)	Randomised controlled study	(n= 28 intervention, n= 29 control)	Pharmacists from 5 states Mixed (hospital, community, and other settings)	To determine whether a structured educational intervention would support pharmacists' utilisation of a CPD model compared to pharmacist control subjects
Driesen et al. (2005)/ Belgium	CE not mandatory	Quantitative/Cross-sectional postal survey	1691 pharmacists (Response rate was 62.8%)	Community	To assess community pharmacists' opinion on CE-related issues in order to develop more tailored CE programmes
Driesen et al. (2007)/ Belgium	CE not mandatory	Qualitative/ Focus groups	6 focus groups (n=39)	Community	To examine how current continuing education courses can be optimised. To examine how much interest pharmacists have in distance learning and to examine how pharmacists think about mandatory continuing education
Elsayed et al. (2015) / Malaysia	Mandatory 30 CPD points annually	Quantitative/Cross-sectional postal survey	1375 pharmacists (Response rate was 18.7%)	Community	To assess the community pharmacists' knowledge and perceptions of current CPD requirements and their involvement in the process
Gelayee et al. (2018)/ Ethiopia	Mandatory CPD	Quantitative/ Structured interviewing questionnaire	46 pharmacists	Community	To identify the pattern of CPD practice, attitude, preferences and barriers to engagement on CPD of community pharmacists
Hasan (2009)/ UAE	CE mandatory (20 hours)/non-mandatory mix	Quantitative/Cross-sectional paper survey	350 pharmacists (Response rate was 46%)	Mixed (hospital, community, and other settings)	To explore issues of CE in the UAE and to determine the type and format of CE pharmacists prefer to attend and consider most effective in enhancing their competence
Haughey et al. (2007) /	The pilot period of the CPD system, prior to the	Quantitative/ Cross-sectional postal survey	1821 pharmacists (Response rate was	Mixed (hospital, community, and	To determine the extent of pharmacists' understanding of CPD.

UK	introduction of mandatory CPD		41.1%)	other settings)	To gain insight into pharmacists' attitudes towards the concept and the introduction of a mandatory CPD system
Henkel and Marvanova (2018)/ USA	CE requirement varies from state to state	Quantitative/Cross-sectional e-mail and postal survey	1239 respondents from five states	Mixed (hospital, community, and other settings)	To assess, describe and understand factors of importance in selection and CE credit hours among registered pharmacists in the Upper Midwest
Hussainy et al. (2006) / Australia	Not reported	Quantitative/Cross-sectional postal survey	500 pharmacists (Response rate was 10.3%)	Community	To determine the educational needs of community pharmacists in Australia related to palliative cancer care
Iskandar et al. (2018) Lebanon	Mandatory CE (45 credits in a 3-year cycle)	Quantitative/Cross-sectional paper survey	200 pharmacists (response rate was 53.5%)	Hospital	To assess the perception and views of Lebanese hospital pharmacists towards the current CE programs
Maio et al. (2003)/ USA	Mandatory CE (number of required hours not reported)	Quantitative/Cross-sectional Web-based survey	2000 pharmacists (Response rate was 19%)	Hospital and community	To determine which CE programme formats pharmacists find most valuable and to what extent pharmacists believe that CE programmes contribute to their knowledge and affect their clinical practice behaviour.
Marriott et al. (2007) / Australia	CE not mandatory	Qualitative/ Focus groups	4 focus group teleconferences (n=15)	Community	To identify the barriers to participation of Australian pharmacists in CE
Mc Namara et al. (2007) / Australia	CE not mandatory	Qualitative/ Focus groups	4 focus group teleconferences (n=15)	Community	To explore how different aspects of the professional environment for Australian community pharmacists are perceived to be influencing the effectiveness of CE models in improving practice
McConnell et al. (2010)/ USA	Mandatory CE (number of required hours not reported)	Randomised controlled study	(n= 44 intervention, n= 47 control)	Hospital	To assess the effect of CPD on perceptions of learning behaviours compared with traditional CE.
McConnell et al. (2010)/ USA	Mandatory CE (number of required hours not reported)	Randomised controlled study	(n= 44 intervention, n= 47 control)	Hospital	To assess the effect of CPD, compared with that of CE, on perceptions of factors related to

					pharmacy practice
McConnell et al. (2009) / USA	Mandatory CE (24 hours every 2 years)	Programme development	775 pharmacy staff	Hospital	To develop and implement a CE programme based on needs assessment
Mohamed Ibrahim (2012) / Egypt	CE not mandatory	Quantitative/Cross-sectional paper Survey	400 pharmacists (Response rate was 89.75%)	Hospital and community	To determine CE preferences of pharmacists in Egypt
Namara et al. (2009)/ Australia	Not reported	Qualitative/ Focus groups	4 telephone focus group (n=15)	Community	To identify learning preferences of community pharmacists for CE To identify issues with the integration of these into contemporary models of CE delivery
Power et al. (2011)/ UK	Mandatory CPD (nine entries of CPD activities annually)	A retrospective principle component analysis of questionnaires	552 pharmacists (Response rate was 22.8%)	Hospital, community and primary care	To explore factors associated with Scottish pharmacists' views on and attitudes to CPD
Raymond and Woloschuk (2011)/ Canada	Not reported	Quantitative/Cross-sectional survey	54 pharmacists (Response rate was 100%, 61% and 100% for Pharmacy residents, experienced pharmacists, and pharmacy technician respectively	Hospital	To describe the development of tools to identify learning needs among experienced pharmacists with supervisory or clinical roles; pharmacists entering a pharmacy practice residency programme; and experienced pharmacy technicians
Sacre et al. (2019)/ Lebanon	Mandatory CE (45 credits in a 3-year cycle)	Review of CE record, Cross-sectional survey, and focus group	Questionnaire: 750 pharmacists (response rate was 83.73%) Focus groups: 30 pharmacists	Mixed (hospital, community, and other settings)	To assess the overall adherence to the mandatory CE program To assess pharmacists' preferences related to CE To assess barriers to adherence to CE
Saenz et al. (2010)/ USA	Mandatory CE (number of required hours not reported)	Quantitative/Cross-sectional online survey	27 pharmacists (Response rate not reported)	Hospital	To describe an educational programme for pharmacists in a multifacility healthcare setting.
Scott (2010) / USA	Not reported	Quantitative/Crosse-sectional postal survey	686 pharmacists (Response rate was 58.5%)	Mixed (hospital, community, and other settings)	To assess North Dakota pharmacists' practice setting, perceived level of patient care competencies, and the need for professional development in urban and rural areas.

Swainson and Silcock (2004)/ UK	Mandatory 30 hours of CE annually "Pre-compulsory CPD in UK"	Quantitative/Cross-sectional paper survey	219 pharmacists (Response rate was 40%)	Hospital and community	To provide managers with information about current CPD practice and employees' views about the help that they will need in the future.
Wilbur (2010)/ Qatar	CE not mandatory	Quantitative/Cross-sectional Web-based survey	523 pharmacists (Response rate was 25%)	Hospital and community	To determine pharmacists' specific CE needs, preferences and attitudes.

CPD=Continuing professional development
CE=continuing education

1

Table 2: A summary of reported barriers and incentives related to CE and CPD

	Barriers	Incentives
CPD	-Lack of time -Poor timing -Lack of systematic educational opportunities on critical skills such as self-assessment -Lack of financial remuneration -Inability to share learning between colleagues within the same practice site -Lack of information and understanding of the concept of CPD -Difficulties in identification of learning needs and evaluation of one's own learning -Lack of role models in pharmacy field	-Consistent training, and follow-up on CPD through workshops and seminars -Peer support -Mentorship -Guidance on documentation -Financial incentive -Support from employer - Clear mechanism for assessing CPD portfolios
CE	-Lack of time -Poor timing -Lack of locally available face-to-face activities -Distance to location -Lack of free and easy-to-receive print material -Lack of financial remuneration	-Financial incentive -Support from employer

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