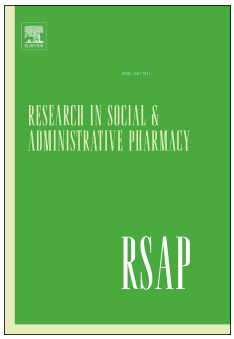

The Development, Validity and Applicability to Practice of Pharmacy-related Competency Frameworks: A Systematic Review

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Andreia Bruno-Tomé - Conceptualisation, methodology, validation, writing review and editing

Desak Ketut Ernawati - Methodology, validation, writing review and editing

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None declared

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Abstract

Background: Global reforms in the education of health workers has culminated in the implementation of competency-based education and training (CBET). In line with the CBET model, competency frameworks are now commonplace in the health professions. In pharmacy, these frameworks are used to regulate career entry, benchmark standards of practice and facilitate expertise development.

Objective: This systematic review assessed the development, validity and applicability to practice of pharmacy-related competency frameworks.

Method: PubMed/Medline, CINAHL, Embase, ERIC, Scopus and PsycINFO electronic databases were searched to identify relevant literature. Additional searching included Google Scholar, electronic sources of grey literature, and the Member Organisation websites of the International Pharmaceutical Federation (FIP). The findings of this review were synthesised and reported narratively. The review protocol is registered on PROSPERO with reference number CRD42018096580.

Results: In total, 53 pharmacy-related frameworks were identified. The majority (n=39, 74%) were from high income countries in Europe and the Western Pacific region, with only three each from countries in South East Asia (SEA) and Africa. The identified frameworks were developed through a variety of methods that included expert group consultation used alone, or in combination with a literature review, job/role evaluation, or needs assessment. Profession wide surveys and consensus via a nominal group, Delphi, or modified Delphi technique were the primary methods used in framework validation. The competencies in the respective frameworks were generally ranked relevant to practice, thereby confirming validity and applicability. However, variations in competency-related terminologies and descriptors were observed. Disparities on perception of relevance also existed in relation to area of practice, length of experience, and level of competence. For example, pharmaceutical care competencies were typically ranked high in relevance in the frameworks, compared to others such as the research-related competencies.

Conclusion: The validity and applicability to practice of pharmacy-related frameworks highlights their importance in competency-based education and training (CBET). However, the observed disparities in framework terminologies and development methods suggest the need for harmonisation.

Keywords: Competency-based education, competency frameworks, health professions, professional development, pharmacy

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Introduction

Strengthening workforce capacity via education and training is a key strategy for ensuring a health workforce that is competent, continuously fit for purpose and adaptable to population health needs.[1–3] In line with this, the education and training of health workers has undergone a number of reforms in recent decades, including the implementation of competency-based education and training (CBET). [3] In accordance with the CBET model, the identification of the competencies that are essential for professional practice, and the use of competency frameworks to benchmark practice standards are now commonplace in the health professions, including pharmacy. [4–6]

Competency and developmental frameworks exist in pharmacy for the purposes of workforce development. Despite the paucity of evidence on the overall effectiveness of CBET [7]; research demonstrate the usefulness of competency frameworks for the development of the pharmaceutical workforce. [8,9] Studies show that when the competencies that are essential for professional performance are identified, compiled to form a framework, and used alongside standards of practice; it facilitates the attainment of competence and aids improvement in professional performance in pharmacy. [9] Studies also show that the use of competency frameworks assures consistency of practice, fosters continuous professional development and aids expertise development in pharmacy. [10–14]

Frameworks designed for individual, organisational and/or institutional use exist in the pharmacy literature. These have included global, national, role-related and specialty-specific frameworks developed in recent years. [15–22] However, the methods used in the development of these frameworks, and the validity and relevance to practice of the respective framework components remain unclear in the literature. Although the first published frameworks in pharmacy appeared around 15 years ago, [23] the increasing use of similar frameworks worldwide has accelerated in the more recent five to eight years. What has distinguished this latter period has been less evidence of impact and utility associated with this proliferation in pharmacy. The overarching goal of this review is to understand the landscape fully and ensure that energies invested in workforce development mechanisms provide impact and direction for education and training. Specifically, this review will aim to:

63 • Identify existing pharmacy-related competency frameworks published in the literature
64 • Determine the methodological processes used in their development and validation
65 • Assess the validity and applicability to practice of the identified frameworks, and
66 • Determine assessment methods involved in the use of the frameworks.
67
68

Methods

This was a systematic review of pharmacy-related competency frameworks. The population of interest was the pharmacy workforce.

Search strategy

PubMed/Medline, Embase, Scopus, PsycINFO, ProQuest, ERIC and CINAHL electronic databases were searched to identify relevant literature. The search on the Medline database was conducted via the OvidSP platform which also provided access to literature from the Joanna Briggs Institute of Evidence Based Practice database, the Database of Abstracts of Reviews of Effects (DARE), and other evidence based medicine (EBM) electronic databases (full list provided in Appendix 1). Additional searching included Google Scholar, four electronic sources of grey literature (Scirus, Mednar, CiteSeerX and OpenGrey), and the International Pharmaceutical Federation (FIP) Member Organisation websites. The website search was directed by the outcome of a 2015 global survey on the availability of practitioner and skills development tools in pharmacy. [24,25] Pharmacy-related journals (list provided in Appendix 1) and bibliographies of identified literature were also searched. The database searches involved a combination of the following search terms: “competency”, “credential”, “framework”, “standards”, “competency-based education”, “practice development”, “expertise development”, “CPD”, “pharmacist”, “pharmacy technicians” and “pharmacy”. The search terms were combined using the Boolean operators “OR” & “AND”. The literature search also included the use of key word truncation (for example, competenc$, pharmac$ and credential$) on Medline to ensure inclusion of relevant Medical Subject Headings (MeSH) terms. Details of the Medline database search are presented in Appendix 1.

Databases were searched from inception with the output updated monthly until July 2020. Non-English articles identified from the search were translated using the freely available Google Translate software [26]. There was no limit imposed on the search output in relation to language, year of publication, geography, or study design. This review is the first of a two -part series on competency frameworks in pharmacy and its protocol is registered on PROSPERO with reference number CRD42018096580.

Inclusion criteria

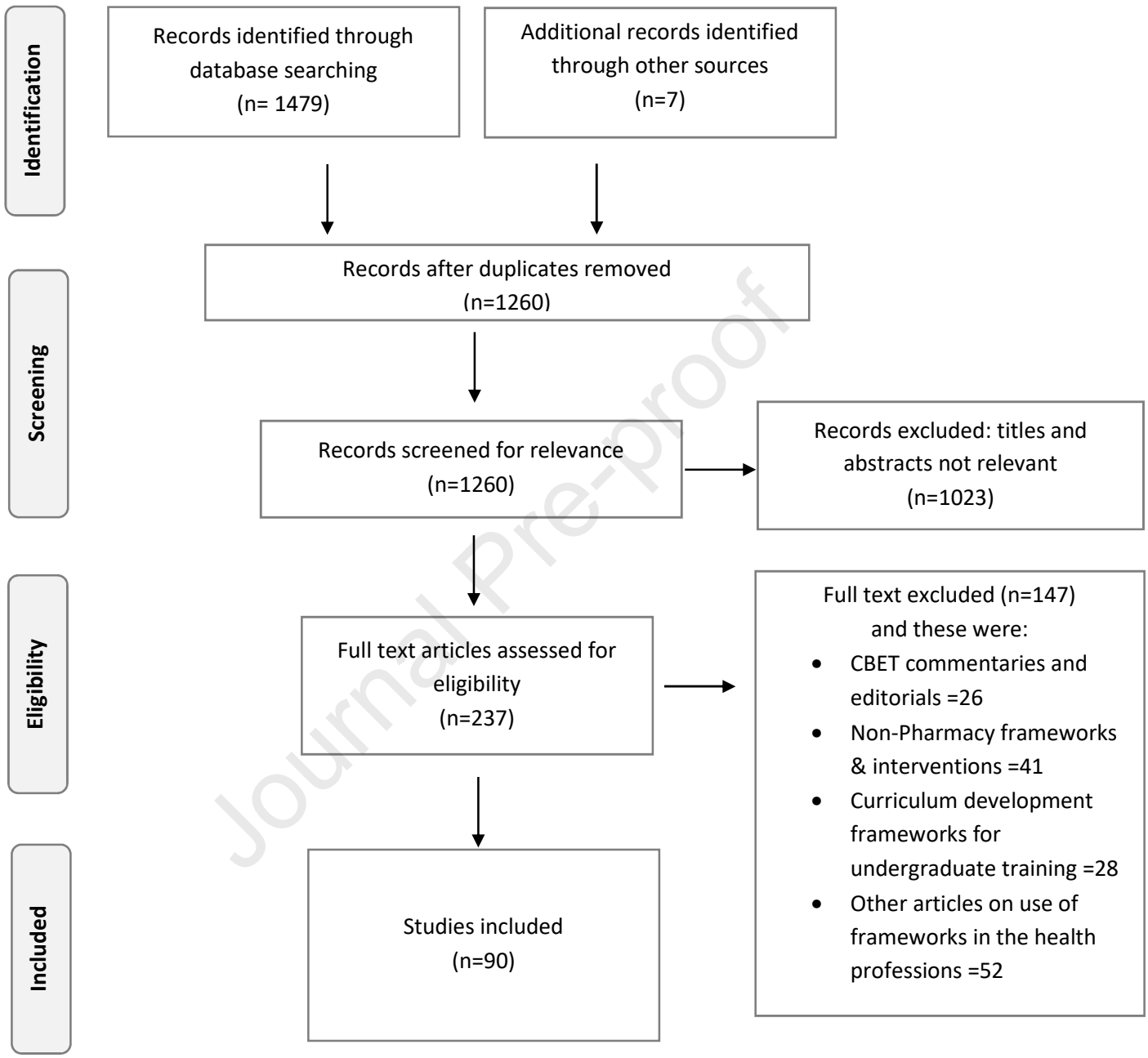
Primary research articles on competency frameworks in pharmacy and supplementary articles that reported the methodological processes used in the development and validation of these frameworks were all included. Published articles that reported the validity or applicability to practice of a pharmacy-related competency framework were also included. Editorials and commentaries on

competency-based education, curriculum development frameworks for undergraduate and post-graduate education, and other publications that did not meet the pre-defined inclusion criteria were excluded.

Study selection, data extraction and analysis

Two authors independently screened titles and abstracts for relevance with respect to subject and population of interest. Full paper screen was then conducted against the inclusion and exclusion criteria. The outcome of screening was thereafter compared for consistency with discrepancies resolved via consensus. A schematic of the literature selection process is presented in Figure 1 using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA). [27] Data were extracted from the selected literature under the following heading: title, author, country, type, description and reported uses. The findings in the selected literature were summarised narratively with respect to the review objectives and in line with published guidance for undertaking systematic reviews. [27,28] Specifically, published articles on pharmacy-related competency frameworks were identified from the search output. The number of articles identified per year was then plotted to provide a broad overview of the proliferation of publications in this area. Thereafter, the articles selected for this review were categorised broadly into two groups: published frameworks and related articles. The published frameworks were reviewed individually to identify the author or publisher, the competencies and components described therein, the scope of the framework, the developmental processes, and reported uses respectively. Where these details were not included in a specific framework, published methodological articles identified in the search output were consulted. Each framework was summarised with respect to whether these were generic, role-related or specialty specific. Where the scope or type of framework was unclear from the available publication, the authors were contacted directly and asked to provide this information. Information on the validity and applicability to practice of the respective frameworks as well as the assessment methods utilised were also summarised from the literature selected for this review. The findings of the included literature are described textually and where appropriate, also presented graphically and in table format in this review.

Figure 1: Schematic of literature selection process using the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) [27]



Results

Characteristics of the selected literature

In total, 1479 published articles were identified from the literature searches conducted for this review. On deduplication, these included 1253 articles from the electronic databases and 7 from the manual search of FIP member organisation websites. After screening titles and abstract for relevance, 1023 articles were excluded. The full text of 237 papers were then further screened against the review inclusion and exclusion criteria. At the end of the literature search and selection process, 90 articles were selected for review (Figure 1). The number of articles published per year and the correlation of this proliferation was plotted graphically and presented in Figures 2 and 3. The figures showed a strong correlation between the year of publication and increase in number of publications on pharmacy-related competency frameworks ($R^2 = 0.481$, $P < 0.001$).

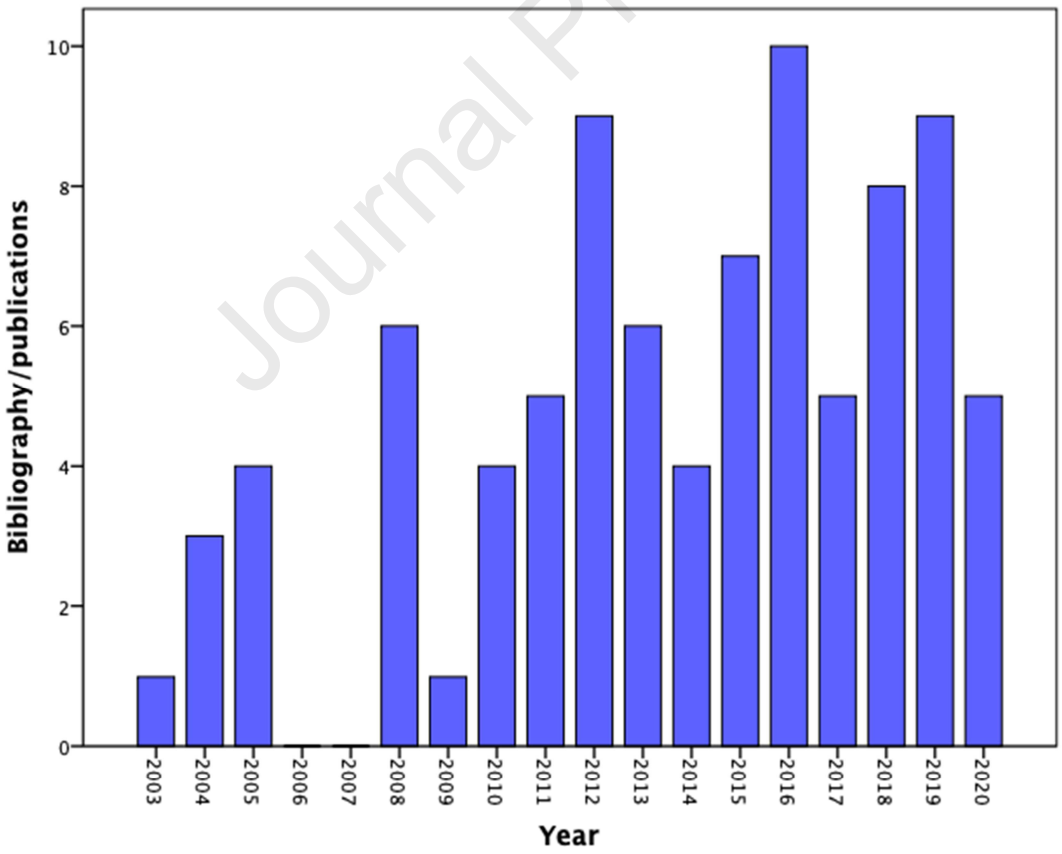


Figure 2: Publications per year on pharmacy-related competency development frameworks

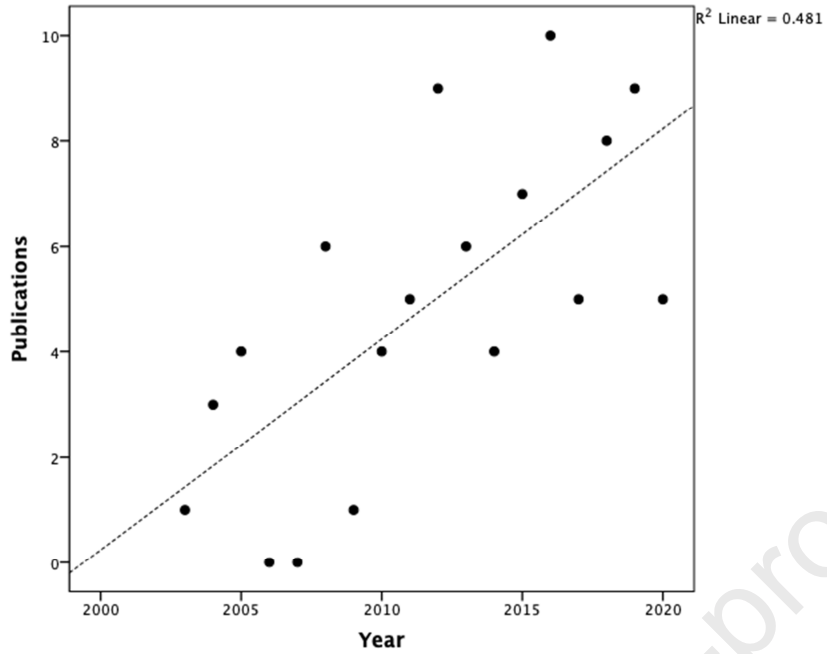


Figure 3: Correlation of publication year with number of articles on pharmacy-related competency frameworks

Overall, the selected literature included 53 frameworks and a summary of their category and distribution is presented in Table 1 and 2. Most of the frameworks identified in this review were from high income countries in Europe, the Americas and the Western Pacific (n=38, 72%) with only three each from countries in South East Asia (SEA) and Africa. About 57% (n=30) of the identified frameworks contained generic competencies for pharmacy practice while the remaining were sector/role-related or specialty-specific (Table 1 and 2).

I. The generic frameworks included:
   - Two global frameworks for foundation [16] and advanced [22] pharmacy practice;
   - Twenty-one national frameworks for pharmacists in Australia, [19,29] Canada, [30] Croatia, [31] Cuba, [32] New Zealand, [33] Netherlands, [34] Ireland, [20] Indonesia, [35,36] Portugal, [37] the Pacific Island Countries, [38] Serbia, [39] Singapore, [40,41] South Africa, [42] Thailand, [43] and United Kingdom. [23,44–46] This also included a set of competencies developed for the training of intern pharmacists in Nigeria (although these are yet to be formally published into a framework);[47]

- Five national frameworks for pharmacy technicians in Canada, [48] Singapore, [49] Netherlands [50] and United Kingdom; [51,52] and
- One institutional framework developed by Qatar University for entry-level practitioners. [53]

II. The sector/role-related frameworks Included:

- One global framework for humanitarian assistance [54]
- Two regional frameworks for hospital practice [55] and quality assurance in pharmacy education and training [15] specific for Europe;
- Eleven other national frameworks specific for community practice, [56] hospital pharmacy, [57] pharmacy leadership, [58] primary care, [59,60] assessment leads, [61] preceptors, [62] education and practice supervisors, [63] educators in the workplace, [64] and clinical pharmacy; [65,66] and
- Two country-region frameworks for community pharmacy, [67] and district and sub-district practice in primary care. [68]

III. The specialty-specific frameworks included:

- One institutional framework for cancer services; [69] and
- Six other national frameworks specific for heart failure, [70] diabetes, [71]pharmacists with special interest, [72] medicines information, [73] critical care, [74] and medicines use review and prescribing intervention services. [75]

Also included in this review were 22 studies that evaluated validity and/or applicability to practice of a competency framework in pharmacy [9,76–94] (this was in addition to the articles by Kennie-Kaulbach et al [59] and Carrington et al [69] that also reported the validation results of their respective frameworks) (Table 3). Of the 22 studies, the majority (n=10, 45%) were articles that evaluated the validity/applicability of a generic, sector/role-related, or specialty-specific framework in United Kingdom [76,80–82,88], Croatia [9,93], and other countries in Europe [83,86,94] (Table 3); Others were studies conducted in Australia [69,78,84,91] (Western Pacific); Japan [90], Kuwait [89] (Eastern Mediterranean); USA [87], Canada [59] (the Americas); Thailand [79] (South East Asia); and Africa (included Ghana, Kenya, Nigeria, South Africa and ten other countries in the region)[85] (Table 3). One other literature evaluated the FIP global framework in 64 countries [77], while another evaluated the transnational applicability of two generic national frameworks [92] (Table 3). In addition, 13 articles that provided details of the methodological processes used in developing the identified frameworks [14,15,17,44,62,76,95–101], and two other studies that reported pharmacists' perceptions and preferred method of competence assessment [102,103] were also included in this review.

Development of pharmacy-related competency frameworks

The frameworks identified in this review contained competencies grouped under broad headings and subdivided into base elements. However, the terminology used in describing framework components differed. Whilst some authors grouped the competencies into clusters, [16,23,64,68,75,101] others used the terms "domains", [50,54,58] "dimensions" [32] or "competency areas" [35,73] to describe these categorisation. "Sub-clusters", [67] "competency unit", [57] "behavioural statements", [16,73] "descriptors", [72] "performance indicators" [62] were the various terms used to describe the baseline components of the frameworks. For consistency in this review, the terms domains and behaviours are used to summarise the components in the identified frameworks in Table 2. Although the competencies in a few of the frameworks were identified via expert group consultation alone, [32,59,67,73,99] others mainly combined this with a literature review or framework mapping, [16,17,39,70,72,74,75,101] job and/or role evaluation, [23,30,45,48,62,76] as well as country, region or role-specific needs assessment. [15,20,38,68,94] The competencies were further evaluated via focus group or semi-structured interviews [38,54,67,68] with consensus developed through a nominal group, Delphi or modified Delphi technique. [14,15,17,44,50,59,62,69,77,83,96]

Most of the frameworks aligned with national and international competencies, standards, or guidelines in pharmacy, medicine and other allied health professions. For example, frameworks identified in Ireland, [20] Croatia, [31] Serbia [39] and Pacific Island Countries [38] aligned with the FIP Global Competency Framework (GbCFv1)[16] and the CoDEG General Level Framework. [23] The advanced pharmacy frameworks in Australia, [19] Singapore [100] and Indonesia [36] linked with the CoDEG Advanced to Consultant Level Framework [45] and the FIP Global Advanced Development Framework [22]. Generic pharmacy frameworks in Netherlands [34] and Canada [59] also mapped against the national standards for medical education and the CanMEDs competency framework. [34] Other specialty-specific and role-related frameworks also mapped against generic national frameworks developed in the medical [58,70–72,74] and non-medical professions. [62] Details of the development of the competency frameworks identified in this review are presented in Table 2.

Validity and applicability to practice of pharmacy-related competency frameworks

Framework validation mainly aimed to evaluate perception of applicability to practice of the identified competencies. This primarily involved profession-wide consultation conducted via online (web-based [15,20,77,83,85,89–91] and email [76]) or postal [79,82] surveys, as well as qualitative interviews. [54,81] Ranking of the identified competencies and qualitative comments by practitioners were proxy measures of applicability to practice for most of the frameworks. [59,69,77,79,83,85,94] In general, competencies in the frameworks were ranked relevant to practice, however, disparities in weighting of relevance existed with respondents ranking the pharmaceutical care competencies high in relevance while others such as the research-related competencies were ranked relatively lower. [59,69,77,79,85,86] The weighting of relevance also differed in relation to respondents' area of practice, [77,79,82,86] patient-facing involvement, [77,85,87] length of practice, [77,82,85] and level of competence (for example, students vs. pharmacy practitioners, [86] consultant vs non-consultant pharmacists) [82] (Table 3). The authors also evaluated framework validity by assessing usefulness in identifying competency level and learning and development needs. [9,76,82,92] Overall, the studies showed applicability to practice of competency frameworks in clarifying expectations of practice and aiding identification of learning and development needs. [9,76,82,92] However, two of the included studies showed that pharmacists tended to underestimate their competence during self-assessment and expressed doubts about their research skills capabilities. [82,92] In other studies, pharmacists' expressed concerns about the feasibility of demonstrating the framework behaviours within the limit of the practice environment. [69,81,82] Table 3 gives a summary of the published studies that evaluated validity or applicability of a specific competency framework in pharmacy.

Competency assessment methods in pharmacy

Competence evaluation was mainly conducted via self-assessment, [59,69,76,80,82,92] peer assessment, [9,78] or retrospective workplace assessment and feedback. [78] Peer assessment of competence involved the evaluation of pharmacists' performance through direct observation of procedural skills while self-assessment were carried out by individual practitioners at a single, [82] or two time points. [92] Two other studies that evaluated pharmacists' perceptions and preferred method of competence assessment showed preference for self-, peer- and workplace assessment with multisource feedback. [102,103] Objective Structured Clinical Examination (OSCEs) and multiple-choice question examinations were the least preferred methods for demonstrating competence .[102,103]

Discussion

The pharmacy workforce is crucial in the drive for universal health coverage and equitable access to essential health care services. The existence of a validated set of competencies that maps the expectations of practice is imperative for the availability of a skilled and competent pharmacy workforce capable of meeting the needs of the community served. [4] From a leadership perspective, this will facilitate the articulation of standards of practice that can become aspirational for pharmacists at an individual level, and for national leadership bodies at an organisational level. [22] In turn, this will assist the global quality assurance process through promoting transnational comparability of pharmacy practice, and in so doing foster parity in health care and aid skill mobility. [4,92]

In total, 53 competency frameworks containing generic, sector/role-related or specialty-specific competencies in pharmacy were identified in this review. The distribution of the identified frameworks suggests that majority of the low- and middle-income countries in SEA and Africa are lacking in skills development tools for pharmacy. The finding that several frameworks identified in this review aligned with national standards that mapped against other country-specific guidelines and competency frameworks, highlights the existence of a common set of competencies with transnational applicability. For example, the FIP global frameworks for foundation and advanced pharmacy practice that map the expectations of practice for the global pharmacy workforce, have been respectively validated for use in several countries around the world .[16,22] The ongoing validation of the two frameworks demonstrate that they provide a blueprint that can be adapted to national context including in African and SEA countries. [16,77,85,100]

This review showed that competency frameworks in pharmacy are developed through a variety of methods. Given the importance of competency frameworks in facilitating expertise development and skills escalation, the process by which these tools are developed at country or organisational level need to be better described for pharmacy. Even though the framework development methods reported in this review are established and pragmatic approaches that are common in pharmacy practice research, the evidence was not always clear on how these were conducted, or how subsequent frameworks were developed for most of the studies. For example, only 13 studies in this review provided details of the methodological processes employed in developing and validating the frameworks with most authors providing only a vague summary. Further, the disparity in the CBET terminologies used in the identified frameworks, indicate the need to establish consensus definitions of these terms, as suggested in existing literature from other healthcare professions. [5,6] Consensus definitions of these terms will facilitate the attainment of a well-articulated CBET goal that can be communicated to educators and stakeholders in the health professions, including pharmacy.

The finding that pharmacists generally ranked the research-related competencies in the frameworks as low in relevance, suggests the need for further research in this area. This is important given that this finding was reported in several of the studies that were conducted in high and low -income countries, and that involved pharmacists in diverse practice areas. [59,79,80,82,85,92] Only two studies in this review assessed pharmacists' perceptions and preferred method of competence assessment. [102,103] Although self- and peer assessment were the methods mainly employed in the use of competency frameworks; evidence from the included studies suggests the need to train practitioners on reflective practice [76,82,92] and on how to carry out individual assessment of knowledge gaps and learning needs. This will ensure that pharmacists are continuously self-aware of their capabilities and in turn, promote self-directed learning that can facilitate continuous professional development.

Limitations

This review had some limitations. Most of the identified frameworks were developed for pharmacists, with only a few (n=5) for pharmacy technicians and none for other support staff. This shows the need to scale up framework development efforts for these groups. Although Ghana and Zimbabwe reported the existence of a framework for pharmacy, these could not be accessed online or through the respective national pharmacy organisations websites in the two countries. Similarly, frameworks from eight other countries including Finland, Slovenia, Peru, Costa Rica, Republic of Korea, Switzerland, Israel and Germany could not be accessed even though the respective national pharmacy organisations reported their existence. [24,25] This was also the case for three NHS Education for Scotland frameworks developed for foundation training, general practice and pharmacy technicians. Although only a few studies reported on framework development methodology; it is possible that these reports may not have been published in the literature but exist in other forms within the respective organisations.

Conclusion

The validity and transnational applicability to practice of the competency frameworks identified in this review highlights their importance in the training and development of the pharmacy workforce. However, the disparity in the methods used in the development and evaluation of such frameworks indicate the need for harmonisation. In addition, the differences in framework terminologies as reported by the various authors indicate the need for consensus on the definition and description of

framework components as suggested in the other health professions. This is essential in order to promote a shared understanding of competency-related terms in pharmacy. The findings in this review also highlight the need to scale up framework development activities for pharmacy practice in countries in SEA and Africa. This will ensure the availability of skills development tools that will support practitioners in identifying learning and knowledge gaps.

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676 Table 1: Framework Categorisation and Distribution (N=53)

Category	**Distribution n (%)**	
Workforce group	Pharmacists	48 (90.6)
	Pharmacy technicians	5 (9.4)
Framework distribution across the WHO regions	Africa	3 (5.7)
	Americas	8 (15.1)
	South East Asia	3 (5.7)
	Europe	25 (47)
	Eastern Mediterranean	1 (1.9)
	Western Pacific	10 (18.9)
	Not applicable	3 (5.7)
Type of framework specified	Global	3 (5.7)
	World region	2 (3.8)
	National	44 (83)
	Institutional	2 (3.8)
	Country region	2 (3.8)
Scope of framework	Generic	30 (56.6)
	Sector/role-specific	16 (30.2)
	Specialty-specific	7 (13.2)

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Table 2: Competency Frameworks in Pharmacy

Framework	Author/Affiliation (Year)	Country	Scope (Type)	Description	Development Process	Reported Uses
Generic Competency Frameworks						
Standard Criteria for Pharmacy Practitioners	Thai Pharmacy Council (2002)[43]	Thailand	Generic (National)	Delineates competencies required for pharmacy practice in Thailand. Comprise 8 domains and 46 competencies. The domains are knowledge in pharmaceutical manufacturing processes, conduct community health problem & drug needs assessment, prepare extemporaneous pharmaceuticals, conduct basic health evaluation for appropriate patient counselling including referral as necessary, provide rational drug use planning for each patient including drug usage evaluation by focusing on patient involvement, follow-up, prevent & resolve drug-related problems in a patient and community, report to appropriate organisations, provide up-to-date & reliable information, possess knowledge in pharmacy-related laws)	Literature review, expert group and profession-wide consultation	To design training and development curriculum. To identify learning needs and gaps in practice.
General Level Framework	Competency Development and Evaluation Group (CoDEG) (2003, revised 2007)[23]	United Kingdom	Generic (National)	Defines the foundation practice competencies for pharmacists working in hospital, community and primary care pharmacy. Also defines assessment criteria for included competencies. Comprise four domains, 26 competencies and 86 behaviours. The domains include delivery of Patient Care, personal, problem solving, management and organisation.	Literature review, expert and stakeholder's consultation, consensus, profession wide consultation	Used by individual pharmacists to identify training and development needs, and to facilitate CPD. Used by employers to guide service delivery, performance appraisals as well as to support recruitment. Also used by regulators to benchmark & monitor standards of practice, and for accreditation
Advanced to Consultant Level Framework (AcLF)	Competency Development and Evaluation Group (CoDEG) (2003, revised & renamed in 2009) [45]	United Kingdom	Generic (National)	Delineates the competencies for development of pharmacists progressing to advanced levels of practice. Comprise six domains and 40 competencies described across three levels of practice (foundation, excellence and mastery). The domains include expert professional practice, collaborative working relationships, leadership, management, education, training and development, and research & evaluation.	Job evaluation and qualitative analysis, expert group and stakeholder's consultation, consensus, profession wide consultation	Used to support portfolio development, identify learning needs & knowledge gaps, and to facilitate CPD. Used to define the scope of practice for consultant pharmacists in United Kingdom's National Health Service. Used as a mapping tool to develop country specific frameworks for advanced practitioners.

The National Competency Standards for Pharmacists in Australia	Pharmaceutical Society of Australia (2010, revised in 2016) [29]	Australia	Generic (National)	Delineate performance criteria expected at initial registration and revalidation of pharmacists in Australia. Includes 5 domains, 26 competencies and 106 behaviours. The domains include professionalism & ethics, communication & collaboration, medicines management & patient care, leadership & management, education and research.	Literature review, expert panel, framework mapping, and profession-wide consultation. Aligned with existing national standards and pharmacy related frameworks from United Kingdom.	To develop education & training curricular. To aid CPD and credentialing for provision of specified services. Used by employers to define job description, support recruitment, develop assessment tools and aid performance appraisals.

Framework	**Author/Affiliation (Year)**	**Country**	**Scope (Type)**	**Description**	**Development Process**	**Reported Uses**
Professional Competencies for Qatar Pharmacists at Entry to Practice	Qatar University (2010) [53]	Qatar	Generic (Institutional)	Defines pharmacy practice competencies expected at entry to practice in Qatar. Comprise 7 competency domains 38 competencies and 122 behaviours. The domains include patient care, professional collaboration & teamwork, ethical, legal & professional responsibilities, drug, therapeutic & practice information, communication & education, drug distribution, understanding of management principles.	Framework mapping and adaptation. Aligned to the Canadian national framework and standards for pharmacists at entry to practice	To define expectations at entry to pharmacy practice in Qatar. Used to design undergraduate education and training curriculum.
FIP Global Competency Framework v1	The International Pharmaceutical Federation (FIP) (2010) [16]	Global	Generic (Global)	Delineates core competencies for global foundation level pharmacy practice. Comprises 4 domains (pharmaceutical public health, pharmaceutical care, organisation & management, personal & professional domain), 20 competencies and 100 behaviours.	Literature review, framework mapping, expert group consultation, consensus, and profession-wide consultation	To define expectation of practice for the global pharmacy workforce at entry to practice. Used as a mapping tool to develop country-specific frameworks and to design and develop training curriculum
Competency Standards for Pharmacists in Singapore (entry to practice)	Singapore Pharmacy Council (2011) [40]	Singapore	Generic (National)	Describes the competencies essential for entry to pharmacy practice in Singapore. Includes 9 domains, 26 competencies and 216 behaviours. The domains include promote optimal use of drugs, dispense medicines, compound pharmaceutical products, provide drug information & education, provide primary healthcare, manage drug distribution & supply, apply organisational skills in the practice of pharmacy, practice in a professional & ethical manner, manage work issues & interpersonal relationships	Literature review, framework mapping, expert panel, and stakeholder consultation. Aligned with the competency standards for entry to practice pharmacists in Australia	Used by practitioners to identify learning gaps and training needs, facilitate pre-registration training programmes, develop assessment tools and to aid performance appraisal. Used by employers to support recruitment and conduct induction.

Competence Standards for the Pharmacy Profession	The Pharmacy Council of New Zealand (2011, revised in 2015) [33]	New Zealand	Generic (National)	Delineates the competency standards for pharmacy practice in New Zealand. Comprises 2 mandatory (professionalism, communication & collaboration) and four optional (health and medicines management, public healthcare, medicines supply, leadership & organisational management) competency domains. Also contains a total of 27 competencies (11 of which are mandatory) and 142 behaviours (53 of which are mandatory).	Literature & expert review focus group and profession-wide consultation via online survey.	Used to inform undergraduate and intern training curriculum and to define the learning outcomes. Used by individual pharmacist to self-assess and evaluate competence, identify learning needs & knowledge gaps, and to facilitate CPD.

Framework	Author/Affiliation (Year)	Country	Scope (Type)	Description	Development Process	Reported Uses
Pharmacy Competency Framework for the Pacific Island Countries	Brown et al (2012) [38]	Pacific Island Countries	Generic (Regional)	Delineates competencies required for pharmaceutical service delivery in the Pacific Island Countries. Includes 4 domains (organisation & management, professional & personal, pharmaceutical public health, & pharmaceutical care domain), 23 competencies and 113 behaviours.	Service and needs-based assessment, literature review, expert and stakeholders' consultation, face-to-face interviews, and focus group.	Used to support and aid staff training as well as to evaluate performance.
The Advanced Pharmacy Practice Framework	The Pharmaceutical Society of Australia [19,96] (2012, revised in 2016 and embedded within The National Competency Standards for Pharmacists in Australia [29])	Australia	Generic (National)	Defines the professional practice profile of advanced pharmacy practitioners in Australia. Includes 5 domains, 30 competencies and 114 behaviours. Domains include promote and contribute to optimal use of medicines, communication, collaboration & teamwork, leadership & management, professional & ethical practice, critical analysis, research & evaluation domain.	Framework mapping, stakeholder consultation, consensus via expert group, and profession-wide consultation. Aligned with the national standards for pharmacists in Australia and the United Kingdom Advanced Pharmacy Framework	Defines the professional practice profile of an advanced pharmacy practitioner in Australia. Used to benchmark the specific competencies required for advanced pharmacy practice. To self-assess competence, identify learning needs and facilitate CPD.
The RPS Advanced Level Framework	The Royal Pharmaceutical Society (2013) [18,44]	United Kingdom	Generic (National)	Defined the competencies for advanced pharmacy practice in United Kingdom. Comprise 6 domains (expert professional practice, collaborative working relationships, leadership, management, education, training and development, and research & evaluation domain), 34 competencies and 123 behaviours	Literature review, consensus via expert panel, profession wide consultation.	Used by practitioners to self-assess competence, support portfolio development, identify learning needs & knowledge gaps, and to facilitate CPD. Used to support credentialing processes and by employers to develop assessment tools.
The Core Competency Framework for Pharmacists	Pharmaceutical Society of Ireland (2013) [20]	Ireland	Generic (National)	Defines competencies essential for early career pharmacy practice in Ireland. Includes 6 domains (professional practice, personal skills, supply of medicines, safe & rational use of medicines, public health, and organisation & management skills domain), 25 competencies and 160 behaviours	Literature review, country-specific needs assessment, framework mapping, expert review and profession-wide consultation. Aligned with national standards and mapped against the FIP Global Competency Framework (GbCFv1)	Used to identify knowledge gaps & learning need, plan & facilitate CPD, and to develop assessment programmes for evaluation of pre-registration pharmacy graduates seeking entry into the pharmacy register.
National Framework for the Assessment of Pharmaceutical Competencies	The Pharmaceutical Chamber of Serbia (2014) [39]	Serbia	Generic (National)	Defines the competencies for pharmacy practice in Serbia. Comprised three domains (professional, organisation & management, personal and professional) 20 competencies and 96 behaviours. Also delineates the	Expert group review and framework mapping. Aligned with the United Kingdom national framework for foundation pharmacy practice and the FIP global competency	Used by pharmacist for self-assessment. Used by employers for performance appraisal, and to guide training & development

		required performance level for each competency based on years of experience	framework

Framework	Author/Affiliation (Year)	Country	Scope (Type)	Description	Development Process	Reported Uses
Framework of Competences for Pharmacy Practice in the European Union	Atkinson et al (2014) [15,86]	European Union	Generic (Regional)	Describes the competencies for pharmacy practice in the European Union. Comprise three domains (patient care, personal, and management & organizational), 27 competencies and 68 behaviours.	Expert group review, consensus via Delphi technique, and profession-wide consultation. Aligned with frameworks developed for medicine and dentistry in the European Union, and the national frameworks for foundation and advanced pharmacy practice in United Kingdom.	To inform the quality assurance processes for pharmacy education and training in the European Union.
Ordem dos Farmacêutico	Pharmaceutical Competence Model (2014) [37]	Portugal	Generic (National)	Defines competencies for pharmacy practice in Portugal. Competencies delineated according to area of practice. Comprise 14 domains for community practice, 6 for regulatory affairs, 9 for hospital pharmacy, and 26 for industrial pharmacy. Framework also defines the competence acquisition processes and assessment methods	Expert group, literature review, profession wide consultation	Used to define expectation of practice. To identify learning needs and plan CPD activities
RPS Foundation Level Framework	Royal Pharmaceutical Society (2014, revised in 2019) [46]	United Kingdom	Generic (National)	Defines the core competencies for foundation pharmacy practice in United Kingdom. Comprise 9 domains and 62 behaviours. The domains include applying clinical knowledge & skills, professional accountability, evidenced-informed decision making, person-centred care, collaborative working, communication & consultation skills, leadership and management, education, research and evaluation, and resilience and adaptability	Literature review, interviews, focus groups and profession-wide consultation via survey.	To inform national syllabus and curricula for foundation pharmacy training. To design assessment activities and work-based training programmes. Used by individual pharmacist to identify knowledge gaps and demonstrate the requirements for service delivery. By employers to aid recruitment and appraisal processes
Professional competencies for Canadian Pharmacists at Entry to Practice	National Association of Pharmacy Regulatory Authorities (2014) [30]	Canada	Generic (National)	Defines competencies required for entry to pharmacy practice in Canada. Contains 9 domains (ethical, legal & professional responsibilities, patient care, product distribution, practice setting, health promotion, knowledge & research application, communication & education, intra- & inter-professional collaboration, quality & safety), 34 competencies and 130 behaviours	Practice & job evaluation, stakeholders' consultation, expert group review.	Used by regulator to assess competence at point of licensure. Used by individual pharmacist to identify learning needs and facilitate CPD.

Standar Kompetensi Apoteker Indonesia	Ikatan Apoteker Indonesia (IAI, 2016) [35]	Indonesia	Generic (National)	Defines the competencies expected of pharmacists at entry to practice in Indonesia. Comprise 10 domains, 43 competencies and 321 behaviours. The domains include pharmaceutical practices in a professional and ethical manner, optimizing the use of pharmaceutical preparations, dispensing pharmaceutical preparations and medical devices, provision of information on pharmaceutical preparations and medical devices, formulation and production of pharmaceutical preparations, preventive and promoting public health efforts, management of pharmaceutical preparations and medical devices, effective communication, organizational skills and interpersonal relationships and increased self-competence.	Literature review, needs based assessment and expert group consultation	To design education curriculum and develop training activities for pre- and in-service pharmacists. Used by employers to support and facilitate performance appraisal processes.
Competencies expected of Intern Pharmacists in Nigeria	Pharmacists Council of Nigeria (2016) [47]	Nigeria	Generic (National)	Describes the competencies for intern pharmacists undergoing the mandatory one-year internship training in Nigeria. Also delineates the learning outcomes expected of the training. Comprise six domains, 27 competencies and 37 behaviours. The domains include pharmaceutical care, supply of medicines, public health, organisation & management, professional & personal management, drug production & quality assurance	Development process unclear (not described)	To design internship training activities and curriculum for pharmacists in Nigeria. To elucidate learning objectives and training outcomes
Pharmacist Competency Framework	Royal Dutch Pharmacists Association (2016) [34]	Netherlands	Generic (National)	Defines the competencies of pharmacists in Netherlands. Comprises 7 domains (pharmaceutical expertise, communication, collaboration, knowledge & science, professionalism, health advocacy and social responsibility, leadership & organisation) and 37 competencies. Intended for pharmacists working in primary and secondary care.	Literature review, framework mapping, expert group review. Aligned to competency for medical education in Netherlands and the CanMEDs framework of Canada	To define the national standards for training of pharmacists in Netherlands. To define learning outcomes at different levels of pharmacy practice. To guide competence assessment and curriculum development
Competency Framework for Pharmacists	Croatian Chamber of Pharmacists (2016) [17,31]	Croatia	Generic (National)	Defines the competencies at pharmacist at entry to practice in Croatia. Tailored mainly for hospital and community pharmacists. Comprises four domains (pharmaceutical public health, pharmaceutical care, organisation and management, and personal and professional competencies) and 96 behaviours	Framework mapping, consensus development via expert panel, professional-wide consultation. Aligned with the FIP Global Competency Framework (GbCFv1)	For undergraduate curriculum development and facilitate pharmacy training in community and hospital settings. Provide a foundation for CPD and guide workforce development

Framework	Author/Affiliation (Year)	Country	Scope (Type)	Description	Development Process	Reported Uses
Competency Standards for Pharmacists in Advanced Practice	Ministry of Health, Singapore (2017) [41]	Singapore	Generic (National)	Delineates the competencies essential for advanced pharmacy practice in Singapore. Describe advanced practice across three performance levels: intermediate, advanced, and expert. Comprise 6 domains (expert professional practice; building working relationships, leadership, management, education, training and development, dispense medicines, compound pharmaceutical products, research & evaluation) and 25 competencies	Literature review, framework mapping and expert panel. Aligned with the United Kingdom's Advanced Pharmacy Framework	Used by employers to design training activities and to guide the development of training programmes for the advanced pharmacy workforce in Singapore. Used by pharmacists for self-assessment and to craft individual development plan for career progression.
Criteria of Competencies for the Pharmaceutical Professionals	Lopez et al (2017) [32]	Cuba	Generic (National)	Defines core competencies expected of pharmaceutical professionals in hospital and community practice in Cuba. Comprise four domains (patient, family & community, organisation & management of pharmaceutical services, research, training, information & knowledge management, and professional performance) 20 competencies and 113 behaviours	Literature review, workshop and expert group review	To evaluate competence and performance level of practitioners providing community and hospital Pharmacy services in Cuba.
Competency Standards for Pharmacists in South Africa	The South African Pharmacy Council (2018) [42]	South Africa	Generic (National)	Defines competencies and behaviours essential for pharmacy practice in South Africa. Comprise of 6 domains (public health, safe and rational use of medicines & medical devices, supply of medicines & medical devices, organisation and management skills, professional & personal practice, education, critical analysis & research) and 43 behaviours. The framework defines standards of practice across three levels: entry level into practice, intermediate practice, advanced practice.	Needs assessment, literature review, framework mapping, expert panel and profession-wide consultation. Aligned to existing pharmacy frameworks from Ireland, New Zealand, Australia, EU, Singapore, Canada and USA	Used to define scope of practice, influence education and practice standards, guide curriculum development, as well as to inform pre-registration policy for interns. Also used for performance evaluation, to identify learning needs, and design education & training programmes
Indonesia Advanced Level Framework	Ikatan Apoteker Indonesia (IAI, 2019) [36]	Indonesia	Generic (National)	Describes the competencies expected of advanced pharmacy practitioners in Indonesia. Comprise six domains (expert professional practice; building working relationships, leadership, management, education, training and development, dispense medicines, compound pharmaceutical products, research & evaluation	Framework mapping and adaptation to local context, expert group review and profession-wide consultation. Aligned with the CoDEG Advanced Level Framework of the United Kingdom.	Used by individual pharmacists to identify gaps in practice and facilitate CPD. Used by employers and higher education providers to map provisions of education and training.

The FIP Global Advanced Development Framework	The International Pharmaceutical Federation (FIP) (2019) [22]	Global	Generic (Global)	Defines the core competencies for global advanced pharmacy practice. Comprise six domains (expert professional practice, working with others, leadership, management, education, training and development, research and evaluation) and 34 competencies described across three stages of advancement: advanced stage 1, advanced stage 2, advanced stage 3	Framework adaptation and adoption, expert group review, ongoing profession wide consultation.	Used by leadership organisation to progress and advance medicines related practice at national and institutional levels. By individuals to plan their professional development activities and develop their personal portfolio/career pathway. As a mapping tool for development of country specific frameworks for advanced pharmacy practice

Framework	Author/Affiliation (Year)	Country	Scope (Type)	Description	Development Process	Reported Uses
Sector and Role-related Competency Frameworks						
Competency Framework for Primary Care and Community Pharmacists	Mills et al (2005) [14]	United Kingdom	Role-related (National)	Describes the competencies expected of pharmacists practicing in primary care and community pharmacy. Comprise 4 competency domains (delivery of patient care, personal, problem-solving, management and organisation) and 104 behaviours.	Literature review, consensus development via expert panel, and framework mapping via content analysis. Aligned with policy documents, standards and national frameworks developed for pharmacy in United Kingdom	For use as a performance and skill escalation tool for pharmacists. Used by employers to describe expectation of practice and by individual pharmacist to identify learning needs
A Professional Development Framework for Pharmacy Staff involved in Education, Training and Workforce Development in the Workplace	The NHS Pharmacy Education and Development Committee, UKCPA Education and Training (E&T) Group (2008) [64,101]	United Kingdom	Role-related (National)	Defines the competencies required for pharmacists involved pharmacy staff involved in education, training and workforce development in United Kingdom. Comprise six domains (expert professional role, building working relationship, leadership, management, education, training & development, research and evaluation) and 34 competencies	Literature review, expert panel consultation and consensus via Delphi technique. Aligned with the Advanced to Consultant Level Framework, and national standards on learning & development in United Kingdom	Used to guide professional development. Used by individual as a skill escalator tool to become expert practitioners in pharmacy education, training and workforce development. Provides a structure for career development
Competency Framework for Community Pharmacists	Maximo et al, Baguio-Benguet Pharmacists Association (2010) [67]	Philippines	Role-related (country region)	Describes the competencies expected of community pharmacists practicing in Baguio-Benguet, Philippines. Comprised 4 domains (management and organisational skills; information, communication and education on healthcare and medicines, dispensing and ensuring optimal use of medicines, and ethical, legal and professional responsibility), 12 competencies and 134 behaviours	Literature & expert review, focus group interview and profession-wide consultation via survey	To self-assess competence level, identify learning needs and guide professional development
Leadership Competency Framework for Pharmacy Professionals	Royal Pharmaceutical Society (2011) [58]	United Kingdom	Role-related (National)	Describes core leadership competencies for pharmacists and pharmacy technicians in United Kingdom. Comprises 5 domains (demonstrating personal qualities, working with others, managing services, improving services, setting direction), 20 competencies and 80 behavioural statements. The framework also describes a range of pharmacy-based examples in practice as well as learning and development opportunities that will help pharmacy professionals acquire and demonstrate the required competence	Literature review, expert group, and consensus. Aligned with the United Kingdom Medical Leadership Competency Framework, Clinical Leadership Competency Framework, and the NHS Leadership Framework.	Used by individual pharmaceutical professionals for personal development planning and career progression. Used by employers and regulators to design of training curricula and development programmes. Also used for performance appraisal to highlight individual strengths and development areas through self-assessment and structured feedback from colleagues

Competencies for Pharmacists provision of Primary Healthcare	Kennie-Kaulbach et al (2012) [59]	Canada	Role-related (National)	Defines the competencies for pharmacists in primary health care. Comprise 7 domains (advocate, health care provider, collaborator, communicator, manager, professional, and scholar), 34 competencies and 153 behaviours.	Consensus via Delphi technique and expert group consultation. Aligned with the CanMeds framework developed for medicine as well as the national framework for Canadian pharmacists	To develop measures for assessing the professional performance of pharmacists providing primary care services as well as the impact of these services.
A Competency Framework for Pharmacy Education and Practice Supervisors	Developing Education and Practice Supervisors (DEPS) Group (2012) [63]	United Kingdom	Role-specific (National)	Describes the competencies required for three workplace educator roles in pharmacy, namely: practice supervisor, educational supervisor and educational programme director. Comprised 6 core domains (expert professional practice, learning relationships, assessment and monitoring of learning, managing learning programmes, teaching and learning practice, academic leadership), 27 competencies for practice supervisors, 39 competencies for educational supervisors and 36 competencies for educational programme directors	Role evaluation workshop, literature review, consensus	Used as a training curriculum development tool for workplace educators in pharmacy and as a career progression tool. Used by employers for quality assurance. Used by individuals as a skill escalator tool to transition from practice supervisors, to educational supervisor, and educational programme director.

Framework	Author/Affiliation (Year)	Country	Scope (Type)	Description	Development Process	Reported Uses
Entry-level Competencies needed for Community Pharmacy Practice	National Community Pharmacists Association, National Association of Chain Drug Stores, and Accreditation Council for Pharmacy Education (2012) [56]	USA	Role-related (National)	Defines expectations of practice for community pharmacists in USA. Comprises 7 domains (pharmacist-delivered patient care, public health, communication skills, dispensing systems management, business management, leadership abilities, and legal consideration domain), and 35 competencies	Literature review, profession-wide consultation, expert review and consensus.	Used to design training curriculum to prepare students for community pharmacy practice. Used to evaluate and assess performance in community pharmacy.
Clinical Competency Assessment Tool (shpaclinCAT version 2)	Society of Hospital Pharmacists of Australia (2013) [57]	Australia	Role-related (National)	Delineates the competencies for general level hospital pharmacy practice in Australia. Comprise two domains (delivery of patient care, and personal & professional qualities), 14 competencies and 74 behaviours.	Framework mapping, stakeholders and profession-wide consultation. Aligned with national frameworks in Australia and the CoDEG General Level Framework of the United Kingdom	Used to identify knowledge and skills gaps. Used to support continuous professional development and as a peer assessment tool. Used to design training curricular.
Competencies of District and Sub-district Pharmacists	Bradley et al (2015) [68]	South Africa	Role-related (country region)	Describes the competencies of district and sub-district pharmacists for improving accessibility and appropriate use of medicines at the primary care level in Cape Town, South Africa. Competencies defined across five domains (professional pharmacy practice; health system and public health; management; leadership; and personal, interpersonal and cognitive competencies)	Literature review, workshops, semi-structured interviews, focus groups. Aligned with two frameworks for primary care and advanced practice pharmacy in United Kingdom and a national framework for district mangers in South Africa	To design formal education & training curricular. Used by employers to develop in-service training activities including mentoring and coaching. To define expectation of practice for individual pharmacists
Competencies for Assessment Leads	Janke et al (2016) [61]	USA	Role-related (National)	Delineates the core competencies expected of assessment leads in colleges and schools of pharmacy in United States. Comprises 12 competencies grouped into three areas: context for assessment, managing the process of assessment, and leadership of assessment activities.	Consensus development via modified Delphi technique. Aligned with two national assessment-specific competency frameworks designed for programme evaluators, student affairs practitioners and scholars in USA	Used by individuals to self-assess areas for professional development. Used by employer and administrators in selecting, developing and supporting designated assessment leads.
Core Competencies for Clinical Pharmacists in Norway	Trapnes et al, Norwegian Association of Hospital Pharmacists (2017) [66,99]	Norway	Role-related (National)	Describes the clinical pharmacy competencies required of pharmacists carrying out integrated medicines management in Norwegian hospitals. Comprise 25 competencies delineated across four domains (medicines reconciliation, medicines review, patient counselling, and discharge service). The framework also defines the key learning objectives and the educational activities required to attain each	Expert group review and consultation, consensus	Used to develop pharmacy training curricular in Norwegian Universities. Used to define learning needs and competency expectation of pharmacists in clinical roles within hospitals

				competency including the suggested timeframe		
Clinical Pharmacist Competencies	American College of Clinical Pharmacy (ACCP 2008, revised in 2017) [65]	USA	Role-related (National)	Delineates core knowledge and skills essential for clinical pharmacy practice in the USA. Comprised of 6 domains (direct patient care, pharmacotherapy knowledge, Systems-based care and population health, communication, professionalism, continuing professional development) and 31 competencies.	Literature review, framework mapping against the ACCP competency standards, consensus via nominal group. Aligned with physicians' competencies in USA as defined by the Council for Graduate Medical Education	Used to self-assess practice & define CPD needs and to develop clinical pharmacy assessment tools.
EAHP Framework for Hospital Pharmacy	European Association of Hospital Pharmacists (2017) [55]	Europe	Role-related (Regional)	Describes the core competencies required of hospital pharmacists in Europe. Comprise 4 competency domains (patient care and clinical pharmacy skills, Medicines and their use related, management, professional), 24 competencies and 136 behaviours. The framework also describes knowledge items required for hospital pharmacists.	Expert group consultation and review, consensus via Delphi technique. Aligned with national frameworks and national pharmacy standards in Europe	Used to direct the quality assurance and accreditation processes for pharmacy higher education providers in Europe. To inform the design and development of training activities for hospital pharmacists and to support appraisal processes.
Skills and Core Competencies of Pharmacists in Humanitarian Assistance	World Association of Disaster and Emergency Medicine (2018) [54]	N/A	Role-related (Global)	Describes the core competencies for pharmacists working in humanitarian assistance programmes. Comprise four competency domains (technical knowledge specific to administration and management of pharmaceutical services, technical knowledge specific to essential health services, management skills, and personal skills) and 23 behaviours.	Literature review and semi-structured interviews with key experts	To guide the design of specialised competency-based training programmes for pharmacists working in humanitarian assistance. Used to guide professional development activities for newly assigned pharmacists and for peer review. Used to develop job description for pharmacists' roles in humanitarian organisations
A Preceptor Competency Framework for Pharmacists	Walter et al (2018) [62]	Canada	Role-related (National)	Describes competencies and corresponding performance indicators for pharmacists undertaking preceptor roles. Comprises 9 competencies (commitment to teaching, create practice-based learning, engage in CPD, communication, professional relationships, adapt to students learning needs, model best practices, facilitate student development, assess performance) and 42 behaviours	Literature review, job role evaluation, framework mapping, and expert group consultation. Aligned with national standards & two Canadian competency frameworks in pharmacy and interprofessional education	Used to develop training curricula for national preceptor development programme. Used as a tool that can be integrated within the continuous professional development (CPD) process, and preceptor evaluation. Can be used to as a recruitment guide for employers

Framework	Author/Affiliation (Year)	Country	Scope (Type)	Description	Development Process	Reported Uses
Specialty-specific Competency Frameworks						
A Competency Framework for Medicines Information	United Kingdom Medicines Information Pharmacist Group (2001) [73]	United Kingdom	Specialty-specific (National)	Defines the core competencies required of pharmacists working in medicines information. Comprise four competency domains (delivering the MI Service, working with people, working with information, seeing the wider context), 13 competencies, and 26 behaviours described across two levels of practice: level 1 and level 2	Expert group review, profession wide consultation	Used by medicines information pharmacists to facilitate CPD, identify ongoing training and development needs and by employers to support recruitment and appraisal processes
Competency Framework for the Assessment of Pharmacists Providing a Medicine Use Review and Prescription Intervention (PI) Service	Department of Health (2005) [75]	United Kingdom	Specialty-specific (National)	Delineates the core competencies expected of pharmacists providing medicines use review and prescription intervention service in the United Kingdom. Comprises 3 domains (clinical and pharmaceutical Knowledge, accessing and applying information, documentation and referral), 5 competencies and 18 behaviours	Literature review, stakeholder consultation via expert group	Used by higher education providers to design education and training curricula for MUR and Prescribing intervention services. Used by employers to assess performance and as a learning and development tool. Used by individual pharmacist to self-assess competence, define and identify learning needs, plan continuing professional development activities and undertake self-directed learning
A National Framework for Pharmacists with Special Interests	Department of Health (2005) [72]	United Kingdom	Specialty-specific (National)	Describes competencies expected of pharmacists with special interest. Comprise four mandatory (expert professional practice, collaborative working relationships, leadership, management) and two optional domains (education, training and development, and research & evaluation), 22 competencies and 44 behaviours described across cadres: practitioner and pharmacists with special interest	Expert group review and stakeholder consultation. Aligned with framework and standards for GPs with special interest in United Kingdom	To support the accreditation process for pharmacists with special interest in United Kingdom and to clarify their level of specialist practice. By individual practitioners to identify their development needs if they wish to become a PhwSI in the future
A Competency Framework for Pharmacists Providing Cancer Services	Carrington et al (2011) [69]	Australia	Speciality-specific (Institutional)	Delineates the set of competencies required for the pharmaceutical delivery of cancer care. Comprised three domains (patient care, knowledge and advanced level) and 13 competencies described across three levels of practice: foundation, senior/advanced, and consultant practitioner	Literature review, framework mapping, consensus. Aligned with national standards & guidelines in Australia and frameworks from United Kingdom and USA	Used to define expectation of practice and by individual pharmacists to self-assess level of competence. Used as a curriculum development and planning tool, and to design formal education programmes

The Integrated Career and Competency Framework for Pharmacists in Diabetes	Ruszala et al, The UK Clinical Pharmacy Association (2018) [71,98]	United Kingdom	Speciality-specific (National)	Describes the core competencies expected of pharmacists providing diabetes care services in United Kingdom. Comprises 5 domains (general management, managing diabetes in hospital, pregnancy, diabetes complication, role dependent special environment) and 24 competencies described across three levels of practice: foundation, advanced stage 1, advanced stage 2, and mastery	Literature review, expert group consultation and framework mapping aligned closely with the national frameworks in pharmacy, nursing and primary care	Used as a tool to develop a portfolio that demonstrates specialist skills and knowledge in diabetes care. Used by individuals to self-assess practice, define learning needs and plan CPD activities. Used by commissioners to define the appropriate level of staff needed to meet population health needs in relation to diabetic care
Specialist Competencies for Clinical Pharmacy Practice in Critical Care	Department of Health, United Kingdom Clinical Pharmacy Association (2005, revised 2014) [74]	United Kingdom	Specialty-specific (National)	Describes the competencies and core clinical knowledge for pharmacists working in critical care in United Kingdom. Comprise six domains (expert professional practice, building working relationships, leadership, management, education, training and development, and research & evaluation) and 34 competencies described across three levels of practice (advanced stage I, advanced stage II and mastery)	Expert group consultation and framework mapping. Aligned with national standards for critical care and national the framework for advanced pharmacy practice in United Kingdom, and frameworks in critical care medicine and nursing	To provide a structure for further professional role development. To define national standards for pharmacy practitioners in critical care. To design education & training curriculum and support credentialing processes in United Kingdom
A Competency Framework for Clinical Pharmacists and Heart Failure	Forsyth et al (2019) [70]	United Kingdom	Speciality-specific (National)	Delineates the minimum competencies required for clinical pharmacists involved in management of patients with heart failure and split into four stages of specialty (stage 1, 2, 3 and 4). Comprises four domains (knowledge & skills, multidisciplinary working, teaching & education, research & development)	Literature review, expert group consultation, framework mapping. Aligned to national, international and speciality-specific heart failure frameworks in nursing and medicines, and consensus development	Used to define the expectation of practice for pharmacists involved in management of heart failure patients. Used as a skill escalation tool for specialisation in heart failure management and to identify and plan CPD activities

Competency Frameworks for Pharmacy Technicians

Framework	Author/Affiliation (Year)	Country	Scope (Type)	Description	Development Process	Reported Uses
A Professional Development Framework for Pharmacy Technicians in Medicines Management	Competency Development & Evaluation Group (2010) [51]	United Kingdom	Generic (National)	Defines medicines management competencies for pharmacy technicians in United Kingdom. Comprise four competency domains (delivery of patient care, personal, problem solving, management and organisation, 27 competencies and 94 behaviours. Aligned with the General Level Framework of the United Kingdom	Expert group review, framework mapping and consultation wide consultation. Aligned with the General Level Framework of the United Kingdom	Used by individual technicians to demonstrate requirements of service delivery, identify learning needs and plan CPD activities. Used by regulators to define standards and monitor service provision. By employers to aid performance appraisal and support recruitment processes.
Professional Competencies for Canadian Pharmacy Technicians at Entry to Practice	National Association of Pharmacy Regulatory Authorities (2013) [48]	Canada	Generic (National)	Defines core competencies for pharmacy technicians in Canada. Comprise nine competency domains (ethical, legal &professional responsibilities, patient care, product distribution, practice setting, health promotion, knowledge and research application, communication & education, intra-inter professional collaboration, quality & safety) 31 competencies and 113 behaviours	Practice & job evaluation, stakeholders' consultation, expert group consultation.	Used by regulators to assess competence at point of licensure. Used by individual pharmacy technicians to identify learning needs and facilitate CPD.
National Competency Standards for Pharmacy Technicians (Entry Level)	Ministry of Health, Singapore (2015) [49]	Singapore	Generic (National)	Defines pharmacy technicians' competencies for Singapore. Comprise seven competency domains (support optimal use of drugs, dispense medications, compound pharmaceutical products, drug distribution & supply, workplace safety & health, professionalism, ethics & teamwork, communication & education), and 17 competencies	Literature review, framework analysis and expert panel. Aligned with national competency for pharmacist in Singapore, New Zealand & Australia and pharmacy technicians' frameworks from United Kingdom and Canada	Used by employers to design training programmes for the pharmacy technicians in Singapore. Used by individual for self-assessment and plan CPD activities for career progression.
Nationally Recognised Competency Framework for Pharmacy Technicians	NHS Pharmacy Education & Development Committee (2016) [52]	United Kingdom	Generic (National)	Defines the competencies expected of pharmacy technicians involved in medicines management within the United Kingdom's National Health Service (NHS). Comprise three domains (supply of medicines to individual patients, assessment of patients' own drugs, medicines reconciliation), 13 competencies and 40 behaviours. Also defines the key learning outcomes and objectives against which competencies can be assessed	Expert group review and framework mapping. Aligned with the CoDEG Framework for Pharmacy Technicians in the United Kingdom	To design training & assessment modules for pharmacy technicians in United Kingdom. To support quality assurance processes for medicines management programmes. Used by individual technicians to promote professional development and provide a means for demonstrating level of competence

Pharmacy Technician Competency Framework	Koehler et al (2019) [50]	Netherlands	Generic (National)	Describes the competencies expected of pharmacy technicians in Netherlands. Comprise six competency domains (communication in patient care, interdisciplinary collaboration, pharmaceutical expertise, organization of care practice, collaborative leadership and personal development) and 26 competencies	Literature review, focus group interview, consensus via modified Delphi technique	For curriculum development and design of training programmes for pharmacy technicians in Netherlands. To define expectation and scope of practice and by individuals to identify learning needs

Table 3: Applicability and Validity of Competency Frameworks in Pharmacy

Author (Country)	Method	Summary
Meadows et al., 2004 (United Kingdom) [80]	Online survey (via email), expert panel	Practitioners (n=28) evaluated usability of the Advance to Consultant Level Framework (CoDEG AcLF) via self-assessment of practice. At the end of the study, all the practitioners were able to map their practice against the competencies in the framework. Practitioners however ranked their practice comparatively higher for two of the six clusters. These were the 'expert practice' and 'building working relationships' clusters while the research cluster competencies received relatively lower ranking
Maitreemit et al., 2008 (Thailand) [79]	Postal survey	Evaluated pharmacists' perceptions of the competencies in the Standard Criteria for Pharmacy Practitioners in Thailand framework. Study participants (n=574) used a 5-point Likert scale to rank relevance to practice. Final results showed all the identified competencies were relevant to practice, however, there were specific inter-practice differences in weighting of relevance. For example, community pharmacists ranked the management skills competencies higher in relevance than hospital pharmacists while industrial pharmacists ranked the pharmaceutical care competencies lower in relevance than hospital and community practitioners
Obiols, 2008 (United Kingdom) [82]	Postal survey	Evaluated the applicability of the AcLF competencies to pharmacy practice. The study also aimed to define the practice profile of consultant pharmacists using the framework. Advanced pharmacists in United Kingdom (n=390) self-assessed their practice using the framework. Final results showed the participants were able to map their practice against the framework. The results also aided the identification of the practice profile of consultant and non-consultant level practitioners and provided information on the types of evidence needed to support assessment. Qualitative interviews (n=12) indicated practitioners generally found the framework to be applicable to their practice. Practitioners also indicated that the framework clarified expectations of practice and aided identification of knowledge gaps and learning needs. They however reported that they found the framework lengthy and time consuming to complete

Meštrović et a., 2011 (Croatia) [9]	Modified Delphi technique (via email), and peer assessment	Evaluate the applicability of a modified GLF to community pharmacy practice in Croatia. Ten panel members ranked the relevance of the framework behaviours to community practice in Croatia with the mean score of each calculated. All the behaviours (n=26) were ranked relevant with minor changes in formatting recommended. Thereafter, the framework was used to assess the patient care competencies of 90 community pharmacists as well as to define their learning and developmental needs. Pharmacists performed highly in competency areas related to drug-specific issues and drug supply but variably in monitoring of drug therapy outcomes. The study demonstrated the feasibility of identifying training needs using the modified GLF in a community practice setting
Bruno, 2011 (Global) [77]	Online survey	Evaluated pharmacists' perception of the 100 behaviours and 20 competencies contained in the FIP Global Competency Framework (GbCF v1). Respondents (n=470) from 64 countries ranked the GbCF v1 competencies on a 4-point Likert scale. The results showed that respondents ranked 90% of the GbCF v1 behaviours as essential for practice. The weighting of relevance differed with respect to area of practice. The pharmaceutical care competencies were ranked least relevant by industrial and academic pharmacy respondents
Kennie-Kaulbach et al., 2012 (Canada) [59]	Modified Delphi technique, online survey (via email)	Evaluated applicability of the 34 competencies identified for primary care pharmacy practice in Canada. Respondents (n=21) ranked the competencies using a 6-point Likert scale. Results showed that all the competencies were essential for practice. However, the weighting of relevance differed with the pharmaceutical care competencies ranked higher in relevance than the research- and education-related competencies which were ranked least
Carrington et al., 2012 (Australia) [69]	Online survey	Practitioners (n=35) mapped their practice against the competency framework developed for cancer services in Australia. Study participants self-assessed their practice and ranked the competencies according to relevance to practice. Respondents indicated the competencies were essential to practice but suggested the competencies represented 'ideal' requirements that may not always be demonstrated in practice, particularly in view of time constrains and workload

Jones et al., 2012 (United Kingdom) [76]	Online survey (via email)	Practitioners self-assessed their practice using the Competency Framework for Pharmacy Educational and Practice Supervisors in United Kingdom. Final results indicated the participants (n=10) were able to map their practice against the competencies in the framework. Participants however expressed difficulties with understanding some of the terminologies used in the framework. They also reported the framework was lengthy and time consuming to complete
Wright and Morgan, 2012 (United Kingdom) [81]	Qualitative interviews	Evaluated pharmacists' perceptions of the CoDEG AcLF competencies. Participants (n=136) generally found the framework useful for practice and reported that the AcLF provided a structure for practice advancement. They however expressed scepticism with regards to the feasibility of demonstrating all the competencies within the limits of the practice environment
Costello et al., 2013 (Australia) [78]	Thematic analysis approach	A retrospective and comparative evaluation of learning needs identified via a competency framework and its correlation with the objectives of an employer-led up-skilling workshop. The objectives of the up-skilling workshop were designed based on the results of a prior peer-evaluation involving 30 early career practitioners. The researchers reviewed 220 peer evaluations that identified learning needs and made CPD recommendations with the aid of a modified General Level Framework. These evaluations were compared with the objectives of the up-skilling training workshop. The results showed the identified learning needs correlated with the learning objectives of the workshop. It also showed the GLF was useful for identifying learning needs and designing training workshop learning objectives
Boyle et al., 2013 (USA & Canada) [87]	Online Survey	To determine preceptor vs non-preceptor (n=2,958) ranking of the 43 competency statements for entry-level practitioners in USA and the extent to which pharmacy degree, practice setting, and experience influenced these rankings. The 43 competency statements determine the content on the North American Pharmacist Licensure Examination (NAPLEX) of the USA. Although pharmacists with a PharmD ranked the competencies higher than did those with a BPharm degree, the respondents generally exhibited agreement in their expectations for the competence of entry-level practitioners and this was independent of their practice sites and professional roles

Atkinson et al., 2015 and 2016 (Europe) [86,94]	Two staged modified Delphi technique	Evaluated practitioners' and students' perceptions of the 68 competencies in the Quality Assurance in European Pharmacy Education and Training (PHAR-QA) framework. Respondents (n=1245) used a 4-point Likert scale to rate the relevance to practice of the identified competencies. About 70% of the identified competencies were ranked essential to practice. However, the weighting of relevance varied with some competencies ranked higher than others. For example, pharmaceutical care competencies were ranked highest while the competencies related to research, and production of medicine received the least ranking. The weighting of relevance also differed with respect to area of practice and cadre. For example, community practitioners ranked 22 competencies higher in relevance than industrial pharmacist while licensed practitioners generally ranked the competencies higher than the student respondents
Stacey et al., 2015 (Australia) [84]	Retrospective performance evaluation	Aimed to assess the applicability to practice of the CoDEG GLF in paediatric pharmacy. Used the framework to identify the strengths, training and development needs for paediatric hospital pharmacists (n=50). The framework aided the identification of priority training needs that was similar to those identified in the evaluation. The study demonstrated the validity of a generic skill development tool such as the GLF and its usefulness in a specialist area such as paediatrics
Atkinson et al., 2016 (Europe) [83]	Modified Delphi technique	Evaluated community and hospital pharmacists' perceptions of the 68 competencies in the Quality Assurance in European Pharmacy Education and Training (PHAR-QA) framework. Both groups generally ranked the competencies as relevant to practice. However, the hospital pharmacists (n= 152) ranked the science related and drug production competencies higher in relevance compared to the community pharmacists (n=258). On the other hand, the community pharmacists ranked the entrepreneurship competencies high in relevance while the hospital pharmacists ranked these relatively lower
Ali et al., 2016 (Australia) [91]	Mixed methods (cross sectional survey and	Aimed to evaluate pharmacists' perceptions and self-perceived level of practice using the Advanced Pharmacy Practice Framework of Australia. Pharmacists were generally able to define and map their practice to a specific level using the framework. At the end of the study, pharmacists who identified as

	interviews)	working at an advanced level were largely able to provide justification and evidence to support their assessment. However, those at entry, transition and consolidation levels required further guidance developing their practice in line with the framework
Udoh et al., 2018 (African countries) [85]	Online Survey	Evaluated perceptions of relevance to practice of the competencies contained in the FIP Global Competency Framework (GbCFv1) and involved pharmacists in 14 African countries. Participants (n=469) generally ranked the framework competencies as relevant to practice with consensus in 90% of the competencies. However, there were disparities in weighting of relevance in relation to area of practice, patient-facing component and country group, although this was related to "degree of relevance", (for example, low relevance vs high relevance). The 'pharmaceutical care' and 'pharmaceutical public health' clusters were ranked higher in relevance compared to the research-related competencies which had the lowest
Udoh et al., 2018 (Australia & UK) [92]	Cross-over study design	Evaluated the transnational applicability of two national framework for advanced pharmacy practice. Forty-two advanced level pharmacists from four countries carried out two self-assessment of practice at two time points. The participants carried out an initial self-assessment at baseline using either the RPS Advanced Pharmacy Framework (RPS-APF, UK) or the Advanced Pharmacy Practice Framework for Australia (APPF). After a three months washout period, the practitioners carried out a second self-assessment using the other framework. The study showed directly observed within-subject agreement per advanced practice competency ($k \geq 0.21$; $P \leq 0.05$) for 87% of the competencies in the two frameworks suggesting transnational applicability of the two frameworks.
Držaić et al., 2018 (Croatia) [93]	Online survey	Aimed to evaluate self-assessed competencies and identify learning needs of community pharmacist-preceptors (n=260) using the Croatian Competency Framework (CCF). Pharmacists rated themselves higher in the organisation and management competencies (M=3.64, SD=0.34) compared to the pharmaceutical public health competencies (M=2.75, SD=0.77). The framework facilitated the identification of learning gaps areas where pharmacists required further training.

Rueben et al., 2019 (Scotland) [88]	Online survey	Aimed to evaluate self-assessed competence of pharmacists working across six hospital sites within NHS Glasgow and Clyde. Participants (n=20) mapped their practice against the RPS Advanced Pharmacy Framework of United Kingdom and gave qualitative feedback. Pharmacists reported high levels of competence within expert professional practice, collaborative working relationships, and education, training and development domains of the framework. The however indicated they will require further training and support in developing their competence within the leadership, management and research domains of the framework.
Arakawa et al., 2020 (Japan) [90]	Online survey	Aimed to assess relevance of the GbCFv1 competencies to pharmacy practice in Japan. The survey included 604 pharmacists. The findings showed that approximately two-thirds of the competencies in the five competency domains of the framework were ranked as relevant to practice. however, weighting of relevance was generally higher for the pharmaceutical public health and pharmaceutical care competencies while the organisation, management and professional/personal competencies were weighted comparatively lower (89.6%, 82.5%, 59.6%, and 67.9%, respectively). The study also showed minimal engagement with the framework by academic pharmacists compared to the industrial pharmacists
Al-Haqan et al., 2020 (Kuwait) [89]	Mixed method (survey, focus group and consensus development)	Aimed to develop a foundation competency framework from the FIP Global Competency Framework via an adopt and adapt approach. Bilingual translation and subsequent national survey (n=226) identified 70 behaviours in the GbCF that were “highly relevant” or “relevant” to practitioners in Kuwait. Further consensus panel validation with national pharmacy experts and focus groups resulted in an adapted framework containing 98 behaviours applicable for practice in Kuwait

Appendix 1. Search strategy example – OvidSP Platform

Databases:

Ovid MEDLINE(R) and Epub Ahead of Print; In-Process & Other Non-Indexed Citations, Daily and Versions(R) (1946 to July 17, 2020); Journals@Ovid Database; Joanna Briggs Institute EBP Database – (Current to July 15, 2020); Cochrane Database of Systematic Reviews (2005 to July 16, 2020); ACP Journal Club (1991 to June 2020); Database of Abstracts of Reviews of Effects; Cochrane Clinical Answers (June 2020); Cochrane Central Register of Controlled Trials (June 2020)

Search

1. (Pharmac$ Competenc$ Framework$)
2. (Competenc Pharmac$ Standard$)
3. (Pharmac$ Credential$ Standard$)
4. 1 AND 2 AND 3
5. (Pharmac$ train$ standard$) OR (competenc$ pharmac$)
6. 4 OR 5
7. (Pharmac$ competenc$ train$) OR (pharmac$ competenc$ Educat$)
8. (Pharmac$ competenc$ framework$) OR (pharmac$ framework$) OR (develop$ framework$ pharmac$) OR (practic$ develop$ framework$)
9. (Experti$ pharmac$).
10. (CPD framework$) OR (pharmac$ CPD framework$) OR (CPD develop$ framework$) OR (pharmac$ credential$)
11. 6 OR 7 OR 8 OR 9 OR 10
12. deduplicate from 11
13. 12 AND (Pharmac$ or pharmac$ technici$)
14. deduplicate 13

Search terms

- competenc$
- pharmac$
- cpd
- develop$
- framework$

- credential$
- experti$
- framework
- educat$
- train$
- standard$
- practic$
- profession$
- standard$
- Pharmaci$
- Pharmacy$
- pharmac$ technici$

Pharmacy Related Journals Manually Searched for Relevant Articles

- American Journal of Pharmacy Education (ACPE)
- Research in Social and Administrative Pharmacy (RASP)
- Pharmacy Education Journal (PEJ)
- International Journal of Pharmacy Practice (IJPP)
- Journal of Pharmacy Practice and Research (JPPR)
- Journal of Pharmacy Practice (JPP)
- Currents in Pharmacy Teaching and Learning (CPTL)
- The Pharmaceutical Journal (PJOnline)
- Journal of Pharmacy (JP)