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Pharmacy stakeholders' views and experiences of the credentialing of advanced or specialist pharmacist practice: A mixed methods systematic review

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ABSTRACT

Background: Credentialing of advanced and specialist pharmacist practice (ASPP) provides essential quality assurance for ASPP, which is significantly different to entry-level practice and is developing worldwide. Several credentialing models are in place or under development internationally. Synthesis of the views and experiences of pharmacists and other relevant stakeholders on credentialing is an important research gap.
Objective(s): To determine pharmacy stakeholders' views and experiences of ASPP credentialing and to explore facilitators and barriers to credentialing implementation and uptake.
Methods: The Joanna Briggs Institute convergent integrated approach for mixed methods systematic reviews was followed. The review protocol was pre-registered with PROSPERO. Five electronic databases (Medline, CINAHL, Embase, Web of Science, Google Scholar) were searched from inception to August 2022 for qualitative, quantitative, or mixed methods studies that reported the views and experiences of pharmacy stakeholders on ASPP credentialing. The Mixed Methods Appraisal Tool was used to quality appraise included studies. Thematic synthesis was undertaken to analyse and integrate data from included studies. All screening and data analysis steps were performed by two reviewers independently, with additional author input where required.
Results: Sixty studies were included, after screening titles and abstracts (n = 9055) and full texts (n = 228). Studies represented the views of pharmacists, pharmacy managers/employers and professional/representative bodies in hospital, community pharmacy, general practice/primary care, and academic sectors, from 40 countries. Four analytical themes were generated describing the factors, including facilitators and barriers, to be considered when developing or optimising ASPP credentialing: I. Drivers of credentialing, II. Developing ASPP competence, III. Optimising credentialing implementation, and IV. Enhancing credentialing uptake.
Conclusions: This systematic review is the first to synthesise pharmacy stakeholders' views and experiences of ASPP credentialing. A conceptual framework highlights contextual factors, facilitators, barriers, and interrelationships which should be considered by pharmacists, policymakers, and other key stakeholders when implementing ASPP credentialing.

1. Introduction

Advanced clinical practice roles for pharmacy, nursing, and other healthcare professionals have been introduced and continue to evolve to meet workforce skill-mix needs for healthcare delivery.[1,2] A global survey found that advanced and specialist pharmacist practice (ASPP) is developing worldwide, although with variation in systems, roles, terminology, definitions, professional recognition mechanisms, and benefits.[2,3] The International Pharmaceutical Federation (FIP) defines 'advanced practice' as "*a stage of pharmaceutical practice that is significantly enhanced compared with initial practice at registration*" and "*underpinned by continued education, training and experiential development*", the scope of which may be broad/advanced or narrow/specialist.[4]

Credentialing of ASPP is considered essential to provide public and

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professional assurance of competency and capability.[3,5,6] Credentialing is developing internationally alongside ASPP, albeit with varying mechanisms and terminology (e.g. credentialing, professional recognition, and certification). Bates et al. found ASPP professional recognition in 23 of 48 (48 %) countries and territories surveyed worldwide.[2] Arising from the same survey, Bader et al. identified a variety of credentialing mechanisms in 11 of 17 country case studies – Argentina, Australia, Japan, New Zealand, Portugal, Singapore, South Africa, Spain, Switzerland, United Kingdom (UK), and United States of America (US).[7] Furthermore, in countries with ASPP credentialing, pharmacist uptake is increasing.[8–11]

Implementation of ASPP credentialing is known to be challenging. Seneviratne et al. described challenges to developing the pharmacist critical care advanced practice workforce in the UK, despite existing UK supports and frameworks.[12] Galbraith et al. described poor uptake by pharmacists for a credentialing program of advanced practice recognition in Australia.[13] However, little is known about actual credentialing implementation and the experiences of credentialed pharmacists.[13,14] Despite the importance of knowing these perspectives to help inform credentialing implementation and uptake, a synthesis of pharmacy stakeholders' views and experiences of the credentialing of advanced and specialist practice has not been reported. This systematic review therefore aimed to investigate pharmacy stakeholders' views and experiences of ASPP credentialing. We also aimed to explore facilitators of and barriers to credentialing implementation and uptake by pharmacists, and to consider how and why credentialing mechanisms and their subsequent uptake vary across contexts.

2. Methods

A mixed methods systematic review was undertaken to ensure the full breadth of study type addressing the research questions was included. To fully explore contextual factors in addition to innovation factors, the PerSPEcTiF tool was utilised during research question development to accommodate context and perspective within a complex system perspective.[15] Via the use of PerSPEcTiF, pharmacy stakeholders views (Perspective), multiple settings including hospital, community, academia, general practice (Setting), ASPP credentialing (Phenomenon of interest/Findings), facilitators to credentialing implementation and uptake (Environment), and no limitation on study date (Time) were included in the research questions/objectives. The review questions are available in Supplementary Table 4, item 7.

A protocol was developed following the Joanna Briggs Institute (JBI) convergent integrated approach for mixed methods systematic reviews,[16] and registered in advance with PROSPERO:
https://www.crd.york.ac.uk/prospero/display_record.php?RecordID=328137

The JBI guidance for the reporting of mixed methods systematic reviews and the PRISMA 2020 guidance for systematic review reporting were followed in reporting this review.[16,17] See Supplementary Table 1 for PRISMA 2020 checklist.

2.1. Search strategy

Five electronic databases (Ovid Medline, CINAHL, Embase, Web of Science Core Collection, and Google Scholar) were searched from inception to August 2022, using search strategies developed, adapted, and applied to each database (see Supplementary Table 2). The original electronic database search was not re-run given the large number of studies identified and to ensure timeliness of review completion. Further eligible articles were sought via hand-searching of the reference lists and citation searching of included full-text studies in August 2023.

2.2. Inclusion and exclusion criteria

Published primary research studies (quantitative, qualitative, and mixed methods) were included where they described views or experiences of ASPP from pharmacy stakeholders (e.g. pharmacists, pharmacy support workforce, pharmacy managers, pharmacy employers, pharmacy associations, leadership bodies, and regulators) and where the pharmacy setting was patient facing (i.e. hospital, community, general practice/primary care) or academia. With considerable international variability in the use of ASPP and credentialing terminology, Supplementary Table 3 lists the definitions agreed and applied by the research team, including those for ‘credentialing components’, ‘privileging’ and ‘collaborative practice agreements’. Studies of credentialing components (e.g. prescribing course or residency) were included if described in the context of leading to ASPP credentialing. English language studies or those that could be reliably translated to English using an online translation application were eligible. Supplementary Table 4 gives the full inclusion/exclusion flowchart applied by the review team.

2.3. Study selection

All identified references were transported into EndNote and duplicates removed. All titles and abstracts were screened independently by two researchers (ED, AS) for inclusion, as were full texts. Differences were resolved through discussion and, where necessary, discussion with a third researcher (KD).

2.4. Quality assessment

Quality assessment was undertaken using the Mixed Methods Appraisal Tool (MMAT).[18] After grading 12 studies and agreeing a shared approach to MMAT appraisal, ED and AS independently assessed studies' quality, with agreement via discussion. Qualitative studies were appraised using the MMAT qualitative criteria. For case studies, the qualitative quality criteria were adapted based on appraisal guidance from Crowe et al.[19] Quantitative studies, including surveys, were graded using the MMAT quantitative descriptive criteria. Mixed methods studies, including consensus studies with multiple phases, were assessed using the relevant MMAT quality criteria, quantitative descriptive and/or qualitative plus the MMAT mixed methods criteria. For consensus studies, the MMAT quality criteria were adapted based on van Zuuren et al.[20] If a study had more than one qualitative phase or more than one quantitative phase, the appropriate quality criteria were applied once only to all study phases. An overall MMAT score was calculated for each study based on the number of quality criteria met. For studies which were graded using more than one set of quality criteria, the overall score assigned was the lowest individual quality score. All studies were included in the review regardless of their methodological quality as it was anticipated that all studies could contain useful views and experiences. However, the contribution of weaker studies was assessed via a sensitivity analysis as described in the 'Confidence in the body of evidence for review findings' section.

2.5. Data extraction

Study characteristics were extracted to Microsoft® Excel 13, following the JBI convergent integrated approach to data extraction. Qualitative data from qualitative or mixed methods studies, including themes and subthemes relevant to the research questions together with illustrations (quotations, observations, or supporting data), were extracted to NVivo®12. Quantitative data from quantitative or mixed methods studies, including data-based outcomes relevant to the review questions, were extracted to NVivo®12 and transformed into ‘qualitised’ textual descriptions or narrative interpretations.[16] Data were extracted only from studies' results sections, except where findings clearly attributable to pharmacy stakeholders were identified in other sections, i.e. in two discussion sections,[21,22] and in case studies[23,24] due to their non-standard layouts.

2.6. Data synthesis

Thematic synthesis[25] was chosen as the synthesis method as it is specifically designed for systematic reviews, its critical realist approach works with a range of methods across positivism and interpretivism,[26,27] and JBI recommend this robust synthesis method as suitable for integrating qualitative and 'qualitised' data.[16] Thematic synthesis is also considered a useful qualitative synthesis method when exploring whether "*types of participants and their context*" explain differences in perspectives,[26] so it was an appropriate method to address the contextual elements of this review's research questions.

Following data familiarisation, ED undertook line-by-line coding, discussing the coding with AS to gradually build a coding frame which was applied independently by ED and AS to all studies, with discussion to reach coding agreement. These codes were extracted to NVivo®12 together with axial coding – which captured study context, including publication date, country, credentialing model, advanced/specialist practice, pharmacy stakeholders, and implementation phase. Related codes were grouped together and labelled to form descriptive themes by ED and AS, and then refined by ED-AS discussion, with repeated cross-checking of the original studies to ensure the codes and descriptive themes were grounded in the data. All authors worked together to group the descriptive themes and, by using the descriptive themes to address the review research questions, undertook an interpretation process which led to the generation of analytical themes and a conceptual framework.

2.7. Confidence in the body of evidence for review findings

As per JBI recommendations, the certainty of the evidence using the GRADE or ConQual approaches was not undertaken.[16] Instead, the following approaches were taken as per thematic synthesis and MMAT guidance. The contribution of studies to the synthesis was mapped (Supplementary Table 5) to confirm that the removal of 1–2 studies would not change the study findings, and a sensitivity analysis was undertaken to assess the contribution of studies with lower methodological quality to the overall synthesis.[28,29]

2.8. Rigour and reflexivity

Multiple steps were taken to ensure rigour and minimise bias throughout. An audit trail was created via memoing, NVivo®, and Microsoft® Excel records. Researcher reflexivity was considered and it was expected that researcher experiences, beliefs, and assumptions could affect the research process. This was addressed by having a pre-registered protocol and an independent second reviewer at all stages of study selection, extraction, and synthesis. The review team reflected on the strengths and biases their pharmacy practice and research experience brought to the review, and aimed through regular discussions and meetings to leverage review team strengths and mitigate individual biases.

3. Results

3.1. Search results

The database search yielded 11,686 papers, with an additional six from reference lists and citation searching after initial full-text review. Fig. 1 shows the flow of studies, with 60 studies included in the review. Supplementary Table 6 cites studies which might have appeared to meet the inclusion criteria but were excluded and the reasons why.

3.2. Characteristics of included studies

The included studies' characteristics are reported in Table 1. Study designs were survey ($n = 33$), prevalence study and survey ($n = 2$), interview ($n = 8$), interview and focus group ($n = 2$), focus group ($n = 1$), case study ($n = 2$), case study synthesis ($n = 1$), consensus ($n = 5$), and

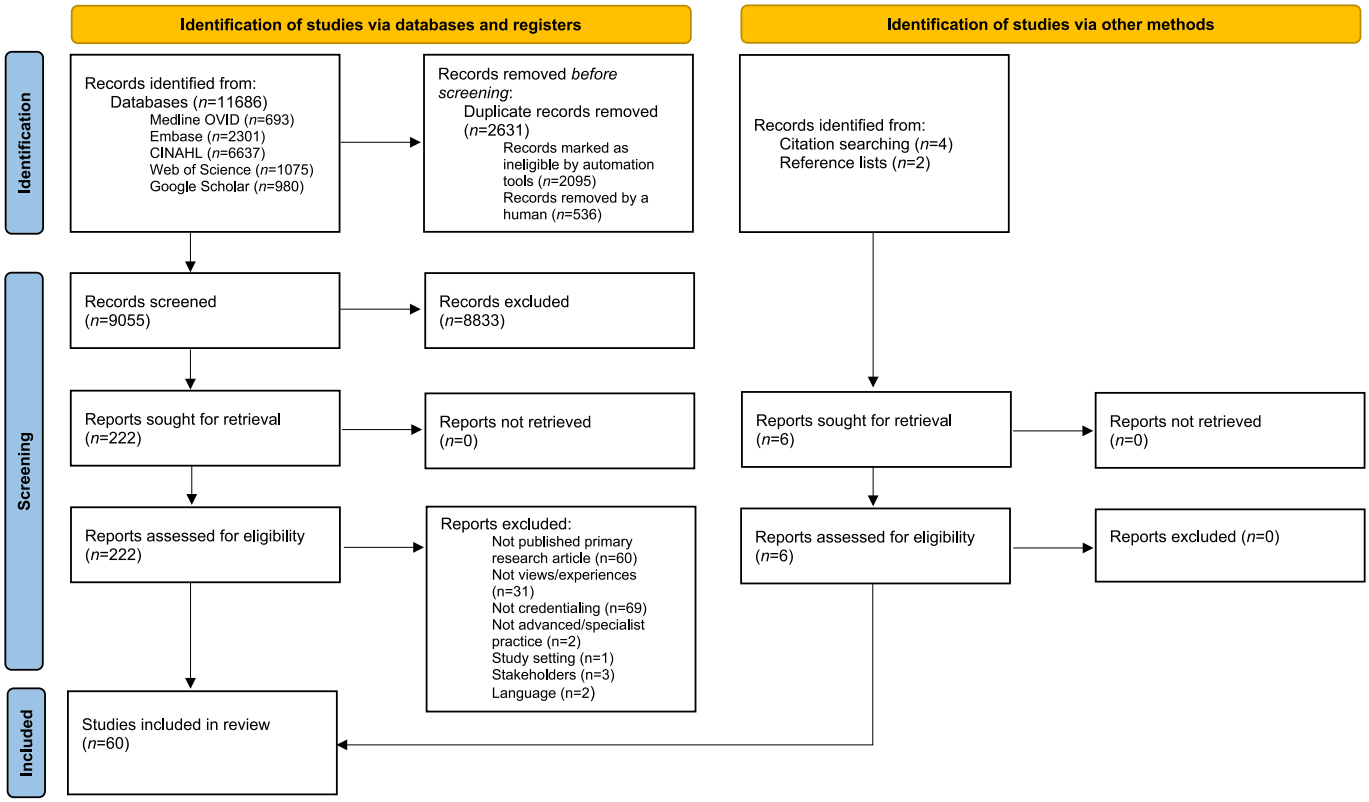

Fig. 1. PRISMA flow diagram.

Table 1
Characteristics of included studies.*

Author, Year of Publication, Country (+/− region)	Aim(s)/Objective(s)	Pharmacy sector	Credentialing model	Advanced/ Specialist pharmacist practice	Phase	Pharmacy Stakeholders (sample size)	Study Design
Adam 2022,[35] UK	To explore acceptability and feasibility of potential inclusion of mental health pharmacists as non-medical approved clinicians in the future.	Hospital, community clinics.	UK Mental Health Approved Clinician.	Mental health	Pre	Pharmacists ($n = 6$). Note pharmacist views were extractable versus other HCPs.	Semi-structured interviews. Thematic analysis.
Ali 2016,[36] Australia	To explore how Australian pharmacists self-perceived being advanced in practice and how they related their level of practice to the Australian Advanced Pharmacy Practice Framework.	Community, hospital and academia (for >90 % of stakeholders).	Multiple credentials including Australian Advanced Pharmacy Practice Framework.	Not reported	Peri	Pharmacists: survey ($n = 72$), interviews ($n = 10$).	Mixed methods. Semi-structured interviews, thematic analysis. Cross-sectional electronic survey, quantitative descriptive and free-text analysis.
Alqahtani 2020,[37] Saudi Arabia	To measure self-reported knowledge and attitude to BPS certification.	Hospital.	US BPS certification.	Multiple specialities	Pre	Pharmacists ($n = 103$). Note sections were extracted only where pharmacist views were extractable versus those of pharmacy students.	Cross-sectional survey. Quantitative descriptive and inferential analysis.
Bader 2020,[7] Argentina, Australia, Canada, China, India, Ireland, Japan, Malaysia, New Zealand, Philippines, Portugal, Singapore, South Africa, Spain, Switzerland, UK, US (California and North Carolina).	To identify current models of advanced practice and specialisation in pharmacy, illustrate trends and identify drivers and barriers in policy development.	All settings, with focus on patient care.	Models in 11 countries including US BPS, UK RPS.	Multiple specialties	Pre, Peri, Post	Pharmacy professional organisations ($n = 17$).	Synthesis of country case studies.
Baker 2019,[38] Australia	To explore the perceptions of Australian accredited pharmacists and pharmacists already working in general practices about current roles, facilitators and barriers, and remuneration expectations of practice pharmacists.	General practice.	Multiple credentials including Asthma/ Diabetes Educator, Australian Association of Consultant Pharmacy Accreditation.	General Practice	Pre	Pharmacists: survey ($n = 65$), interviews ($n = 20$).	Mixed methods. Electronic survey, quantitative descriptive analysis. Telephone interviews, thematic analysis.
Barnett 1992,[39] US	To survey nuclear pharmacists' personal characteristics, nuclear pharmacy training, employment characteristics, level of satisfaction with present positions and personality characteristics.	Chain nuclear pharmacies.	US BPS certification.	Nuclear pharmacy	Post	Pharmacists ($n = 31$).	Postal survey. Quantitative descriptive analysis.
Beks 2021,[14] Australia	To explore the experiences of pharmacists and key informants involved in delivering or participating in the Partnered Pharmacist Medication Charting (PPMC) credentialing program and examine perceptions of how the	Hospital.	PPMC credentialing program.	General medical	Peri	Directors of pharmacy ($n = 5$). Pharmacists ($n = 64$). Note director of pharmacy views were extractable versus other stakeholder views.	Interviews and focus groups. Thematic analysis.

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Table 1 (*continued*)

Author, Year of Publication, Country (+/− region)	Aim(s)/Objective(s)	Pharmacy sector	Credentialing model	Advanced/ Specialist pharmacist practice	Phase	Pharmacy Stakeholders (sample size)	Study Design
	objectives of the program were met.						
Chang 2020,[40] Malaysia	To explore hospital pharmacists' views on career planning and advancement.	Hospital.	Special merit-based pathway and positions in the Malaysian public sector for subject matter experts in pharmacotherapy.	Infection and anticoagulation specialities	Peri	Pharmacists (n = 11).	Semi-structured interviews. Thematic analysis.
Claxton 2006,[23] US	To design and implement a credentialing model for three ambulatory specialty pharmacy services.	Ambulatory care clinics.	Credentialing and privileging in three ambulatory specialty services in the Metro region of Aurora Health Care.	Anticoagulation, anticonvulsant and pain management ambulatory clinics	Peri	Pharmacists (n = 7).	Case study.
Costa 2012,[41] UK	To evaluate the impact of a prototype credentialing process, for pharmacists in advanced levels of practice, by assessing the practitioner candidates' feedback on the overall experience and the impact it had on their professional roles and career perspectives.	Hospital.	UKCPA Critical Care Group credentialing process pilot.	Critical care	Peri	Pharmacists (n = 17).	Electronic survey. Matrix qualitative analysis.
Dang 2020,[42] US	To determine the attitudes of pharmacy resident program participants regarding Postgraduate Year 3 (PGY3) pharmacy training compared to other avenues of career advancement.	Hospital, academia, community.	PGY3 Residency versus US BPS Certification.	Multiple specialities	Pre, Post	Residency directors (n = 566). Pharmacist preceptors (n = 143). Pharmacy residents (n = 95). Residency coordinators (n = 24). Other residency program participants (n = 17).	Electronic survey. Quantitative descriptive and inferential analysis.
Daugherty 2007,[43] US	To survey residency program directors (RPDs) to identify the extent of their BPS certification and their motivations and incentives to obtain certification, to determine the number of RPDs who meet the new ASHP post-graduate year 2 (PGY2) residency standard for board certification, and to investigate the relationships between RPDs' characteristics and BPS certification.	Hospital, academia.	US BPS certification.	Multiple specialities	Post	Residency program directors (n = 327).	Electronic survey. Quantitative descriptive and inferential analysis.
Ebiasah 2002,[44] US	To describe the activities of nutrition support pharmacists, determine the benefits and barriers to board certification, and assess the current system of certification.	Home healthcare, hospital, academia.	US BPS certification.	Nutrition support	Post	Pharmacists (n = 210).	Postal survey. Quantitative descriptive analysis.
Forsyth 2022,[45] UK	To understand the self-reported consultant-level practice development needs of UK pharmacists.	Hospital, primary care, community, academia.	UK RPS Consultant Pharmacist.	Multiple specialties	Post	Pharmacists (n = 944).	Cross-sectional electronic survey. Quantitative descriptive and regression analysis.
Freeman 2014,[46] Australia	To characterise pharmacists practising in the Australian general practice setting and to describe attributes, role, frequency of services,	General practice.	Proposed credentialing process.	General Practice	Pre	Pharmacists (n = 26).	Electronic survey. Quantitative descriptive and free-text analysis.

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Table 1 (*continued*)

Author, Year of Publication, Country (+/− region)	Aim(s)/Objective(s)	Pharmacy sector	Credentialing model	Advanced/ Specialist pharmacist practice	Phase	Pharmacy Stakeholders (sample size)	Study Design
	remuneration and perceived required attributes.						
Goldenshteyn 2020,[47] US	To report employer preferences for board certification.	Hospital, academia.	US BPS certification.	Multiple specialities	Post	Pharmacy employers ($n = 506$).	Two phase. Job listings analysis. Electronic questionnaire. Quantitative descriptive and inferential analysis.
Gonzalvo 2016,[48] US (Indiana)	To characterise the current attitudes and perceptions of community pharmacists regarding advanced diabetes credentials.	Community.	Advanced Diabetes credentials (Certified Diabetes Educator credential, Board certified Advanced Diabetes Management certification, Indiana state diabetes educator licensure).	Diabetes	Peri, Post	Pharmacists ($n =$ 907).	Telephone survey. Quantitative descriptive and inferential analysis.
Hager 2017,[24] US	To detail steps taken by a large health system to require certification for all pharmacists in direct patient care roles.	Hospital.	US BPS certification and other "rigorous" certifications.	Multiple specialities	Peri	Pharmacists ($n =$ 101). Pharmacy Managers ($n =$ not reported).	Case study.
Hale 2013,[49] US (North Carolina)	To describe the successes and challenges reported by active and inactive Clinical pharmacist practitioners (CPPs) and to determine the reasons why inactive CPPs discontinued advanced practice.	Not reported.	CPP Licensure by North Carolina Boards of Pharmacy and Medicine.	Not reported	Post	Pharmacists ($n =$ 76).	Electronic survey. Quantitative descriptive and free-text analysis.
Hall 2015,[50] Canada	To capture pharmacist views on major changes in pharmacist practice occurring in Canada e. g. expanded scope of practice.	Hospital.	Context is extended scope of pharmacist practice.	Not reported	Pre	Pharmacists ($n =$ 680).	Electronic survey. Quantitative descriptive analysis.
Ignoffo 2016,[21] US	To estimate the supply of BPS–certified oncology pharmacists and their potential contribution to the care of patients with cancer through 2020.	Hospital.	US BPS certification.	Oncology	Post	Pharmacists ($n =$ 13).	Multiple phase consensus methodology. Delphi Panel.
Jackson 2015,[51] Australia	To gauge the perspectives of the Australian pharmacy profession relating to advanced practice, to inform the design of an advanced practice recognition model.	Hospital, community, academia, primary care, general practice (for >90 % of stakeholders).	Proposed Australian Advanced Practice Recognition Model.	Multiple specialities	Pre	Pharmacists ($n =$ 173).	Electronic survey. Quantitative descriptive analysis.
Jorgenson 2017,[52] Canada	To determine the extent to which Canadian community pharmacists support the development of a certification system for specialty practice.	Community.	Proposed Canadian certification for specialty practice.	Multiple specialities	Pre	Pharmacists ($n =$ 770).	Cross-sectional electronic survey. Quantitative descriptive and regression analysis.
Kamarudin 2013,[53] Australia	To explore pharmacy stakeholders' views on developing a postgraduate course to prepare hospital pharmacists for collaborative prescribing in Australia.	Hospital, academia, professional bodies.	Credentialing component: Proposed prescribing course as preparation for advanced pharmacy practice model.	Not reported	Pre	Pharmacists ($n =$ 25): of which, clinical hospital pharmacists ($n =$ 10), university-based pharmacy educators ($n = 9$), professional body pharmacists ($n = 6$).	Interviews. Thematic analysis.
Karattuthodi 2022,[31] India, Saudi Arabia,	To assess the level of awareness and attitude toward BPS board	Hospital, community, academia.	US BPS certification.	Not reported	Pre, Peri	Pharmacists ($n =$ 216).	Cross-sectional electronic survey. Quantitative

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Table 1 (*continued*)

Author, Year of Publication, Country (+/− region)	Aim(s)/Objective(s)	Pharmacy sector	Credentialing model	Advanced/ Specialist pharmacist practice	Phase	Pharmacy Stakeholders (sample size)	Study Design
United Arab Emirates, Oman, Qatar, Bahrain.	certification among Indian pharmacists working in India and in Gulf States.						descriptive and inferential analysis.
Lee 2019,[54] US	To assess pharmacists' views and perceptions on credentialing with respect to (1) familiarity and perceived importance of credentialing; (2) satisfaction with current credentialing tracking systems; and (3) challenges in adopting a centralised credentialing platform.	Community, hospital inpatients and outpatients, academia (for >85 % of stakeholders).	US Credentials.	Not reported	Post	Pharmacists (n = 466).	Cross-sectional electronic survey. Quantitative descriptive and free-text (content) analysis.
Lee 2022,[55] US*	To confirm the attribute statements and supporting justifications for a best practice model for outpatient psychiatric pharmacists providing direct patient care.	Hospital outpatients.	US BPS certification Psychiatric Pharmacy.	Mental health/ Psychiatry	Peri	Pharmacists: Phase 5 (n = 74).	Consensus methodology, 5 phases (survey and summit approach), phase 5 reported in this study.
Lomanto 2021,[56] US (California)	To determine the change in Advanced Practice Pharmacist (APP) scope of practice since obtaining the licence and assess their opinion on licensure.	Hospital, ambulatory care, outpatient and community (for >85 % of stakeholders).	Californian APP Licensure.	Advanced Practice Pharmacist	Post	Pharmacists (n = 96).	Cross-sectional electronic survey. Quantitative descriptive and inferential analysis.
McArtor 1996,[57] US	To measure the tangible and intangible benefits of BPS certification to pharmacists.	Hospital, community, home healthcare, academia.	US BPS certification.	Nuclear pharmacy, Nutrition support, Pharmacotherapy specialists	Post	Pharmacists (n = 466).	Postal survey. Quantitative descriptive and inferential analysis.
McKenzie 2011,[22] UK	To establish a robust and credible evidence-led system to evaluate and recognise advanced practice in critical care settings as an example of a process of practitioner credentialing.	Hospital.	Proposed UK Credential for Critical Care Advanced Practice (UKCPA).	Critical care	Peri	Pharmacists (n = 10). Credentialing panel evaluators (n = not reported).	Case study.
McLaughlin 2018,[58] US	To ascertain the reasons for, benefits of, and barriers to pursuing the American Academy of HIV Medicine HIV Pharmacist (AAHIVP) credential.	Ambulatory care, community, academia, hospital and primary care (for >90 % of stakeholders).	AAHIVP credential.	HIV	Post	Pharmacists (n = 404).	Cross-sectional electronic survey. Quantitative descriptive analysis.
Meilianti 2022,[59] Indonesia	To explore perceptions from practising pharmacists regarding their interests, perceived benefits and methods of a professional recognition system.	Hospital, community, academia and primary care (for >85 % of stakeholders).	Proposed Indonesian professional recognition system for advanced practice.	Not reported	Pre	Pharmacists (n = 43).	Interviews and focus groups. Thematic analysis.
Meilianti 2023,[30] Algeria, Argentina, Australia, Canada, Croatia, Germany, Ghana, India, Indonesia, Japan, Jordan, Kuwait, Malawi, Netherland, New Zealand, Nigeria, Norway, Pakistan,	To describe the development and validation of a global advanced practice framework as a tool to advance the pharmacy profession globally.	Hospital, academia, professional bodies, primary care.	Credentialing component: FIP Global advanced development framework.	Not reported	Pre	Stage 2: Pharmacy experts (n = 21). Stage 3: Pharmacy stakeholders from academia, practice, professional organisations and other (n = 29). Stage 4: Pharmacy case studies: individual (pharmacists, n = 7), institutional	Four stages. Stage 1: framework - content and cultural validation. Stage 2: consensus, transnational modified Delphi. Stage 3: transnational external engagement survey with qualitative

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Author, Year of Publication, Country (+/− region)	Aim(s)/Objective(s)	Pharmacy sector	Credentialing model	Advanced/ Specialist pharmacist practice	Phase	Pharmacy Stakeholders (sample size)	Study Design
Portugal, Rwanda, Qatar, Singapore, South Africa, Sudan, Switzerland, Syria, United Arab Emirates, UK, US, Zambia, Zimbabwe.						(academia, $n = 2$), national ($n = 5$).	analysis. Stage 4: case study with qualitative analysis.
Murawski 2011,[60] US (New Mexico and North Carolina)	To assess the practice settings, clinical activities and reimbursement experiences of pharmacists with advanced-practice designations (Pharmacist Clinician or Clinical Pharmacist Practitioners).	Hospital, community and other direct patient care.	Pharmacist Clinician (New Mexico) and Clinical Pharmacist Practitioner (North Carolina) Designations.	Multiple specialities	Post	Pharmacists ($n = 64$).	Postal survey. Quantitative and free-text (thematic) analysis.
Penm 2016,[61] Canada	To analyse hospital pharmacists' perceptions regarding a formal recognition and certification process for pharmacist specialties in Canada.	Hospital.	Proposed Canadian certification for specialty practice.	Multiple specialties	Pre	Pharmacists ($n = 635$).	Electronic survey (secondary analysis). Quantitative descriptive, regression and free-text (thematic) analysis.
Pollack 2020,[62] US	To describe the evolving role of pharmacists as well as the barriers and facilitators to engaging pharmacists as part of the direct patient care team.	Pharmacy organisations.	Operating at top of licence and at top of qualifications.	Not reported	Pre, Peri, Post	Executive leaders in national pharmacy organisations ($n = 10$).	Interviews. Thematic analysis.
Ponto 1989,[63] US	To explore whether board-certified nuclear pharmacists are satisfied with the specialised competency recognition that certification gives and their perception of the impact of certification on their practice.	Centralised, hospital, academia.	US BPS certification.	Nuclear Pharmacy	Post	Pharmacists ($n = 54$).	Postal survey. Quantitative descriptive and inferential analysis.
Rafie 2022,[32] Canada, US	To characterise the demographics and practice models of pharmacists with the North American Menopause Society Certified Menopause Practitioner (NCMP) credential and to determine future opportunities for pharmacists in menopause care.	Community, hospital, general practice.	NCMP Credential.	Menopause care	Post	Pharmacists ($n = 26$).	Electronic survey. Quantitative descriptive analysis.
Roberts 2020,[64] US	To identify PGY2 pharmacy residents' perceptions of pursuing board certification during residency training.	Hospital.	US BPS certification.	Multiple specialities	Post	Pharmacy residents ($n = 116$).	Electronic survey. Quantitative descriptive analysis.
Romanelli 2004,[65] US*	To describe and measure the effect of BPS certification in academia as perceived by deans of colleges of pharmacy.	Academia.	US BPS certification.	Colleges of Pharmacy	Post	Colleges of Pharmacy Deans or Department Chairs ($n = 35$).	Electronic survey. Quantitative descriptive analysis.
Rudd 2022,[66] US	To understand the candidate-level perceived barriers and	Not reported.	US National Certification Board of Anticoagulation	Anticoagulation	Post	Pharmacists ($n =$ 206). Pharmacist views were	Electronic survey. Quantitative

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Table 1 (*continued*)

Author, Year of Publication, Country (+/− region)	Aim(s)/Objective(s)	Pharmacy sector	Credentialing model	Advanced/ Specialist pharmacist practice	Phase	Pharmacy Stakeholders (sample size)	Study Design
	incentives in obtaining and maintaining board certification as a means to ensure ongoing competency and expertise in the field of anticoagulation.		Providers Certification as an Anticoagulation Care Provider.			extractable versus nurse views.	descriptive and free-text analysis.
Rueben 2020,[67] UK (Scotland)	To measure the self-reported competence of pharmacists against a relevant framework and to determine what support was required to enable further professional development.	Hospital.	UK RPS Advanced Practice Framework.	Not reported	Pre	Pharmacists (n = 20).	Cross-sectional electronic survey. Quantitative and free-text analysis.
Rushworth 2022,[68] UK (Scotland)	To explore potential behavioural determinants influencing the implementation of skills gained from Advanced Clinical Examination and Assessment Courses by General Practice clinical pharmacists.	General practice.	Credentialing component: Advanced Clinical Examination and Assessment Courses.	General Practice	Post	Pharmacists (n = 14).	Interviews. Framework analysis.
Ryan 2005,[69] US*	To determine factors which influenced the percentage of BPS-certified faculty at US colleges of pharmacy.	Academia.	US BPS certification.	Colleges of Pharmacy	Post	Colleges of Pharmacy Deans or Department Chairs (n = 26).	Electronic survey. Quantitative descriptive and regression analysis.
Schindel 2019,[70] Canada	To identify pharmacists' professional learning needs in order to support expanded roles in practice.	Hospital, community, primary care network or home care.	Canadian proposed and existing credentials.	Not reported	Pre, Peri	Focus groups: pharmacists (n = 15), note pharmacist views were extractable versus student views. Survey: pharmacists (n = 416).	Mixed methods: Focus Groups, Qualitative descriptive analysis. Electronic survey, Quantitative descriptive and inferential analysis.
Seneviratne 2017,[12] UK	To identify the strategies, barriers and challenges to achieving Advanced Level Practice by learning from the experiences of advanced level critical care pharmacists within the UK.	Hospital.	UKCPA Critical Care Group Advanced Level Practice Credentialing (superseded by RPS Credentialing).	Critical care	Post	Pharmacists (n = 8).	Semi-structured interviews. Thematic analysis.
Shane-McWhorter 2002,[71] US	To determine characteristics of pharmacist certified diabetes educators regarding their training, professional organisation memberships, work activities, work sites, motives for certification and impact of certification.	Ambulatory care clinics, community, hospital and home health care (for >90 % of stakeholders).	Advanced Diabetes credentials (Certified Diabetes Educator credential, Board certified Advanced Diabetes Management certification).	Diabetes	Post	Pharmacists (n = 233).	Postal survey. Quantitative descriptive analysis.
Silvia 2022,[72] US*	To develop and obtain consensus on attribute statements for a best practice model for outpatient psychiatric pharmacists providing direct patient care.	Hospital outpatients.	US BPS certification Psychiatric Pharmacy.	Mental health/ Psychiatry	Peri	Pharmacists: Phase 1 (n = 21), Phase 2 (n = 10), Phase 3 (n = 42), Phase 4 (n = 10 plus external stakeholder feedback).	Consensus methodology, 5 phases (survey and summit approach). Phases 1–4 reported in this study.
Smith 2010,[73] US	To assess the current attitudes toward BPS certification in an array of hospital practice settings as perceived by directors of pharmacy	Hospital.	US BPS Certification.	Not reported	Post	Directors of pharmacy (n = 85).	Electronic survey. Quantitative descriptive, inferential and regression analysis.

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Table 1 (*continued*)

Author, Year of Publication, Country (+/− region)	Aim(s)/Objective(s)	Pharmacy sector	Credentialing model	Advanced/ Specialist pharmacist practice	Phase	Pharmacy Stakeholders (sample size)	Study Design
	and to identify incentives available to pharmacists to become board certified.						
Stacey 2015,[74] Australia	To explore perceptions and attitudes of Australian paediatric pharmacists about advanced pharmacy practice and to identify suitable methods of assessment for this level of practice.	Hospital.	Proposed Australian advanced pharmacy practice assessment.	Paediatric	Pre	Pharmacists (n = 31), of which Directors of Pharmacy (n = 2).	Focus Groups. Thematic analysis.
Toussaint 2013,[75] US	To determine the prevalence of and explore motivators and barriers to board certification among pharmacy practice faculty at United States colleges and schools of pharmacy.	Academia.	US BPS Certification.	Colleges of Pharmacy	Post	College of Pharmacy Faculty Members (n = 308).	Phase 1. Prevalence. Phase 2. Cross-sectional electronic survey. Quantitative descriptive and inferential analysis.
Udoh 2018,[33] Australia, New Zealand, UK, Ireland.	To evaluate the transnational comparability of the UK RPS Advanced Pharmacy Framework and the Advanced Pharmacy Practice Framework for Australia and to obtain preliminary data on the transnational applicability of the developmental competencies contained in the two frameworks.	Hospital, community, primary care, academia.	Credentialing component: UK and Australian advanced practice development frameworks.	Not reported	Peri	Pharmacists: Mapping (n = 42), Qualitative (n = 17).	Two phase. Crossover mapping, descriptive and inferential analysis. Interviews, thematic analysis.
Uema 2022,[76] Argentina	To analyse difficulties perceived by pharmacists in obtaining the Hospital Pharmacist Specialist title.	Hospital.	Hospital Pharmacy Specialisation.	Not reported	Peri	Pharmacists (n = 34).	Single phase consensus methodology, nominal group technique.
Vest 2022,[77] US (North Carolina)	To explain a state affiliate's survey of constituent hospitals on their current status with regard to ASHP Practice Advancement Initiative (PAI) 2030 recommendations.	Hospital.	Credentialing and privileging as per ASHP PAI 2030 recommendations.	Not reported	Peri, Post	Survey: Hospital pharmacy representatives (n = 19). Prioritisation session: Hospital pharmacy leaders including directors of pharmacy, managers and pharmacists (n = not reported).	Multiple phase consensus methodology. Questionnaire and summit.
Vitor 2019,[78] UK	To understand graduates' perceptions about an advanced education programme for pharmacist practitioners and how the programme supports developmental progress toward an advanced practice level.	Clinical, academia.	Credentialing component: How University College London MSc in Advanced Practice supports progression toward an advanced practice level.	Advanced pharmacy practice (clinical and academic)	Post	Pharmacists (n = 15).	Semi-structured interviews. Qualitative analysis (matrix coding approach).
Wagner 1993,[34] US, Canada.	To assess the incentives offered for pharmacy practice faculty to become board-certified pharmacotherapy specialists.	Academia.	US BPS certification.	Colleges of Pharmacy	Post	Colleges of Pharmacy Deans or Department Chairs (n = 75).	Telephone survey. Quantitative descriptive, inferential and regression analysis.
Warin 2016,[79] UK	To describe the views of UK critical care pharmacists on the	Hospital.	UK RPS Advanced Level Practice.	Critical care	Peri, Post	Pharmacists (n = 166).	Electronic survey. Quantitative

(*continued on next page*)

Table 1 (*continued*)

Author, Year of Publication, Country (+/− region)	Aim(s)/Objective(s)	Pharmacy sector	Credentialing model	Advanced/ Specialist pharmacist practice	Phase	Pharmacy Stakeholders (sample size)	Study Design
	current provision of Advanced Level Practice education and accreditation.						descriptive and inferential analysis.
Weber 2020,[80] US	To present the current state of, and frontline advice on, the implementation of successful credentialing and privileging processes for practicing pharmacists in the US.	Hospital, community, primary care, other patient care.	US Credentialing and Privileging.	Ambulatory care	Post	Pharmacists (n = 144).	Electronic survey. Quantitative and free-text (thematic) analysis.
Wu 2021,[81] Taiwan	To explore how pharmacist-managed clinics (PMCs) were established and to discuss implementation issues of PMCs in Taiwan.	Hospital.	Hospital Credentialing mechanisms. Certifications (diabetes educators, asthma educators, home care).	Multiple specialties	Pre, Peri, Post	Pharmacists (n = 12). Pharmacy administrators (n = 5). Note views were extractable versus physician views.	Semi-structured interviews. Thematic analysis.
Yeung 2022,[82] US (California)	To quantify and characterise how board certification is integrated in hospital pharmacy departments across California.	Hospital.	US BPS Certification.	Not reported	Post	Hospital pharmacy directors (n = 134).	Cross-sectional electronic survey. Quantitative descriptive, inferential and regression analysis.

ASHP: American Society of Health-System Pharmacists; BPS: Board of Pharmacy Specialties; CPPs: Clinical pharmacist practitioners; FIP: International Pharmaceutical Federation; HCP(s): Health care professional(s); PGY2: Residency post-graduate year 2; PGY3: Residency post-graduate year 3; RPDs: Residency program directors; RPS: Royal Pharmaceutical Society; UKCPA: UK Clinical Pharmacy Association.

* Lee 2022 and Silvia 2022 are linked studies; Romanelli 2004 and Ryan 2005 are linked studies.

mixed-methods studies (n = 5). The publication date range was 2020–3 (n = 26), 2010–9 (n = 24), 2000–9 (n = 6), 1990–9 (n = 3), and 1980–9 (n = 1). Stakeholders from 40 countries were represented, with the US (n = 32) the most frequently represented, followed by the UK (n = 11), Australia (n = 9), Canada (n = 7), India (n = 4), and Argentina (n = 3). Stakeholders from the remaining countries were each represented in one or two studies. Most studies (n = 54) included stakeholders' views from a single country, with the remainder including stakeholders from 31,[30] 17,[7] 6,[31] and 2 countries[32–34] respectively. Studies primarily had pharmacists as stakeholders (n = 49), together with hospital pharmacy managers (n = 7), college deans/residency directors/college faculty (n = 6), pharmacy organisation leaders (n = 4), pharmacy employers (n = 2), preceptors/evaluators (n = 2), and pharmacy residents (n = 2).

Studies were from single (n = 33) or multiple (n = 25) pharmacy sectors and represented hospital (n = 45), academia (n = 21), community pharmacy (n = 19), general practice/primary care (n = 13), and other pharmacy organisations (n = 4). The credentialing implementation phase was pre (n = 13), *peri* (n = 11), post (n = 27), or a combination thereof (n = 9). The most common credentialing model in studies was US Board of Pharmacy Specialties (BPS) Certification (n = 17), followed by framework-portfolio-peer assessor approaches (n = 7, such as UK Royal Pharmaceutical Society [RPS] Advanced Practice and Consultant Level models or Australian Advanced Pharmacy Practice Framework), privileging and licensing (n = 7), credentialing components including advanced practice or prescribing courses and frameworks (n = 6), and other (n = 8) or multiple (n = 4) credentials. The most frequently reported advanced/specialist practice was multiple specialties (n = 20), followed by critical care (n = 4), mental health (n = 3), and ambulatory care (n = 3).

3.3. Quality of included studies

The MMAT quality assessment is reported in Supplementary Table 7. The quality criteria applied were quantitative descriptive (n = 34), qualitative (n = 17), and mixed methods (n = 9). Most studies were assessed to be of high quality, meeting 100 % (n = 35), 80 % (n = 14), 60 % (n = 9), 40 % (n = 1) and 0 % (n = 1) of the quality criteria. Issues noted for quantitative descriptive studies included unpiloted questionnaires and non-response bias not being adequately addressed.

Supplementary Table 5 tabulates the contribution of each study to the descriptive themes. It demonstrates that the removal of 1–2 studies would not change the study findings. A sensitivity analysis showed that weaker studies did not contribute significantly to the descriptive themes.

3.4. Pharmacy stakeholders' views and experiences of the credentialing of advanced or specialist pharmacist practice

Four overarching analytical themes (I-IV) were generated, based on pharmacy stakeholders' views, describing the factors to be considered when implementing or optimising ASPP credentialing: I: Drivers of credentialing, II: Developing ASPP capability, III: Optimising credentialing implementation and IV: Enhancing credentialing uptake. Fourteen descriptive themes (1–14) were developed in response to the research questions and grouped to create the analytical themes. Table 2 provides illustrative quotations for each descriptive theme. A conceptual framework (Table 3) was created from the review authors' interpretation of the analytical and descriptive themes in light of the review subquestions to generate theory about contextual factors, facilitators, barriers, and inter-relationships between themes. The conceptual framework has three contextual domains (environment, pharmacist, and credentialing model) and three credentialing implementation stages (readiness, implementation, and uptake) with credentialing readiness combining the first two analytical themes.

I. Drivers of credentialing

1. Quality assurance of ASPP, patient care, and safety

A major driver of ASPP credentialing was building credibility and assuring patients, employers, and other healthcare professionals of the

Table 2
Descriptive Themes – Summaries and Illustrative Quotations.

Descriptive Theme	Theme Summary	Illustrative Quotation
Analytical Theme I: Drivers of credentialing		
1. Quality assurance of ASPP, patient care, and safety	Building credibility and assuring patients, employers, and other healthcare professionals of ASPP quality were major credentialing drivers.	*"98 % of employers who prefer board certification and 79 % of employers who require board certification believe credentialing verifies competence in a specialty practice (p = 0.03) and ensures acquisition of knowledge and skills within the specialised field (p = 0.03)."* (Goldenshteyn 2020,[47] study authors)
2. Healthcare professional skill-mix	Optimising healthcare professional skill-mix was a driver of ASPP credentialing, as credentialing enabled expanded scope of practice for pharmacists.	*"Our mental health services are traditionally structured with a consultant in the team generally taking the lead and being the lead for all the people under the care of that—either ward or community—team. So, increasing the scope for other professionals, actually, to allow a bit more for restructuring mental health services potentially."* (Adam 2022,[35] pharmacist stakeholder)
3. Legislative and funding alignment	Legislative alignment together with ASPP remuneration and career progression were essential factors in successful credentialing implementation.	*"In addition to national funding strategies that support the advanced practice and specialisation of pharmacists, laws and regulations play a key role in progressing these avenues in pharmacy."* (Bader 2020,[7] study authors)
4. Stakeholder support	Pharmacists, pharmacy managers, and pharmacy organisation leaders supported ASPP credentialing. Engagement will build awareness of the value of ASPP and credentialing among employers, patients, and other healthcare professionals.	*"The [Royal Pharmaceutical Society] RPS advanced practice and consultant practice frameworks are coming along so that can be hopefully utilised to help grow that image […] There are lots of people out there that didn't really know what a pharmacist can do."* (Rushworth 2022,[68] pharmacist stakeholder)
Analytical Theme II: Developing ASPP capability		
5. Competency strengths and development needs	Among prospective advanced and specialist practitioners, competency strengths included patient-centred care and teamwork. Development needs included physical assessment, leadership, management, and research skills.	*"The proportion of participants who self-reported being 'really confident' or 'confident' in all the outcomes within a single curriculum domain varied: 638 (67.6 %) in domain 1 (Patient-Centred Care and Collaboration); 309 (32.7 %) in domain 2 (Professional Practice); 287 (30.4 %) in domain 3 (Leadership and Management); 356 (37.7 %) in domain 4 (Education); and 148 (15.7 %) in domain 5 (Research);"* (Forsyth 2022,[45] study authors)
6. Experiential development routes	Experiential learning – via specialist and multidisciplinary experience, teaching, research, reflection on developmental frameworks, and peer tutoring, – was a vital enabler of ASPP. The advantage of dedicated training pathways, such as those for medical practitioners, was flagged.	*"I had a lot of support from the critical care pharmacy team, the senior pharmacists, were always available for patient reviews, reviewing charts or going through problems. So from a clinical practice point of view they were there on day-to-day basis to support what I was doing."* (Seneviratne 2017,[12] pharmacist stakeholder)
7. Formal learning routes	Formal postgraduate qualifications helped build ASPP capability in areas such as autonomous clinical decision-making, management and research.	*"..it [the MSc in Advanced Pharmacy Practice] fitted well with the skills that I had or that I needed to develop to continue doing my job in an effective way"* (Vitor 2019,[78] pharmacist stakeholder)
Analytical Theme III: Optimising credentialing implementation		
8. Rollout engagement and resource planning	Successful credentialing implementation required an iterative gradual journey and inclusive stakeholder engagement. Resource planning was needed for ASPP remuneration and credentialing model delivery.	*"Although respondents supported the creation of a formal certification and credentialing process for pharmacist specialisation in Canada, they identified several barriers to developing such a system, including lack of reimbursement models for specialty clinical services in Canada, the time and cost required to become formally certified, and a lack of public awareness of the need for and role of pharmacist specialties."* (Penm 2016,[61] study authors)
9. Credentialing model components	Desirable credentialing components included postgraduate qualifications, formal training programmes, prior experience recognition, peer review and professional portfolios; there were mixed views expressed about examinations.	*"The responses showed 'submission of a professional portfolio' as the most preferred assessment method, with a majority of respondents also supporting 'recognition of prior qualification' and 'workplace assessment'. A 'written examination' had a low level of support and in relation to an 'oral examination by a panel' respondents showed a marked preference for a panel of multidisciplinary health professionals over a panel of pharmacists."* (Jackson 2015,[51] study authors)
10. Other credentialing model factors	Other suggested credentialing model factors included national and cross-organisational recognition, an independent credentialing body, a valid rigorous process, and credential availability for all specialties. Support for mandatory or voluntary credentialing was mixed.	*"The majority of participants (84.8 %, 653/770) supported the creation of a national certification system for pharmacist specialisation in Canada. Furthermore, 68.5 % (447/653) of those who supported this system agreed that formal certification should be mandatory if a pharmacist wants to practise in a specialty area in which a certification process becomes available in Canada."* (Jorgenson 2017,[52] study authors)
Analytical Theme IV: Enhancing credentialing uptake		
11. Employment-related motivators and restraints	While career progression, enhanced remuneration, job security and job requirement were seen as credentialing uptake motivators, they were rarely experienced as credentialing benefits. Credentialing cost reimbursement and protected study/examination time were uptake motivators when present or restraints when absent.	*"A total of 33 (39 %) DOP [directors of pharmacy] perceived their institutions' value of board certification as high* (i.e. *4 or 5) regardless of institution type. These institutions were much more likely to provide at least one incentive for board certification (97 %* vs *3 %, P < 0.001) as well as multiple incentives (60 %* vs *40 %, P < 0.001). These institutions also had a higher number of board-certified pharmacists* versus *institutions with a lower perceived value (10.5* vs *6, P = 0.027)."* (Smith 2010,[73] study authors)
12. Advanced practice opportunities	Enhanced autonomy and scope of practice were incentives for credentialing and for advanced roles but expanded professional opportunities were often described as a barrier.	*"Participants also described a need for more opportunities (5 participants and 13 quotes). Participants often expressed concern about not being able to develop their practice through lack of opportunity or the constraints of the current service limiting access to opportunities."* (Rueben 2020,[67] study authors)
13. Personal motivators and restraints	Improved knowledge, skills, competence, peer recognition and acceptance, personal growth, self-worth, and marketability of professional services motivated credentialing uptake, while fear of failure was a restraint.	*"Professional and personal development were highly ranked motivations for pursuing BPS certification, including maintenance of clinical skills and knowledge (161 of 203 BPS-certified RPDs [residency program directors] [79 %]), professional recognition (152 [75 %]), and increased self-worth (110 [54 %])."* (Daugherty 2007,[43] study authors)
14. Credentialing model motivators and restraints	Uptake interest was mostly strong across credentialing model types and study contexts. Credentialing cost and preparation time were commonly reported as credentialing uptake barriers.	*"There were 3 common feedback themes: the initial timeline proposed was too short, the costs to obtain and maintain certification would be prohibitive, and the time required to prepare for the initial certification and maintain certification would negatively impact a healthy work-life balance."* (Hager 2017,[24] study authors)

Table 3
Conceptual Framework of Credentialing Implementation and Uptake Facilitators (+), Barriers (−), and Inter-relationships (subscripted letters).

	Credentialing Readiness I. Drivers of Credentialing (1–4) and II. Developing ASPP Capability (5–7)	III. Optimising Credentialing Implementation	IV. Enhancing Credentialing Uptake
Environment	1. **Quality assurance of ASPP, patient care and safety** $_{a, d}$ 2. **Healthcare professional skill-mix** $_{a}$ 3. **National ASPP legislative and funding alignment** $_{a, b, c, e}$ Legislation (+/−) Political backing (−) Remuneration (+) Career progression mechanisms (+/−) 4. **Stakeholder support** $_{a, b, c}$	8. **Roll-out engagement and resource planning** $_{a, b, e}$ Iterative journey (+) Stakeholder engagement (+) Reimbursement and remuneration $(+)_c$ Human resources and logistical capacity (−) Budget for credentialing costs (−)	11. **Employment motivators or restraints** $_{a}$ Career progression $(-)_c$ Remuneration $(-)_c$ Job security (−) Job requirement (+/−) Credentialing cost reimbursement $(+/-)_f$ Study time $(+/-)_f$ Billing and reimbursement for services $(-)_c$ Manager support (+) 12. **Advanced practice opportunities (+/−)** $_{a}$
Pharmacist	5. **Competency strengths and development needs** $_{a, d}$ Patient-centred care (+) Expert skills and knowledge (+) Physical assessment skills (−) Diagnostic and prescribing skills (−) Teamwork (+) and communication (+/−) Management and leadership (−) Education and training (+/−) Research (−)		13. **Personal motivators or restraints** Enhance patient care $(+)_d$ Recognition $(+)_b$ Knowledge, skills and competence $(+)_d$ Self-worth and confidence (+) Role model (+) Fear of failure (−)
Credentialing Model	6. **Experiential development routes** $_{a, e}$ Specialist and multidisciplinary experience (+) Continuous professional development (+) Peer tutoring (+) Developmental frameworks (+) Strategic plan (−) Dedicated training pathways (−) 7. **Formal learning routes** $_{e}$ Advanced practice postgraduate courses (+) Credentialing models (+)	9. **Credentialing model components** $_{e}$ Postgraduate qualifications (+) Peer review of portfolio (+) Experience (+) Specialist residencies/formal training (+) Examination (+/−) 10. **Other credentialing model factors** $_{e}$ National standardisation and recognition $(+)_b$ Independent certification body (+) Rigorous and valid (+) Available for all specialties (−) Mandatory or voluntary Credentialing definitions $(+)_b$ Centralised online platform (+)	14. **Credentialing model motivators or restraints** Uptake interest $(+)_d$ Cost $(-)_f$ Preparation time $(-)_f$ No suitable credentialing option $(-)_e$ Recredentialing requirement (−)

Key inter-relationships between descriptive themes are denoted in the table by subscripts $_{a, b}$ **etc. where** *a. Recognise the co-dependence between the implementation of ASPP and ASPP credentialing. b. Aim for national recognition mechanisms. c. Optimise ASPP remuneration and career progression. d. Leverage pharmacist ASPP competence and credentialing interest to optimise patient care. e. Resource the training and credentialing model. f. Support pharmacists with credentialing cost and study time.*

quality of ASPP.[23,24,32,35,47,52,59,62,74] The drive toward ASPP credentialing needs to be based on improvements to the quality of patient care.[7,52] Employers' reasons for preferring board-certified practitioners included that certification verifies competency and acquisition of knowledge and skills.[47] Working at the top of their licence and with expanded scope of practice enables pharmacists to meet the growing patient and multidisciplinary team demand for specialised pharmacist skills, and result in better patient outcomes.[21,52,62,77] Supporting pharmacists' roles in patient safety was a driver of advanced competency framework development.[30] Improvement in patient care was a success cited by credentialed practitioners.[44,49,60,66] Stakeholders recommended metrics and outcome studies to justify ASPP and its credentialing.[30,53,60,81]

2. Healthcare professional skill-mix

Stakeholders flagged the unique value of pharmacists' skillset, clinical knowledge, and medication expertise when working within the multidisciplinary team to optimise patient care.[35,62] Expanded scope of practice for pharmacists was a major motivator or benefit of ASPP credentialing.[14,49,52,56,77] A shortage of medical staff was a driver of integrating non-medical approved clinicians into mental health services,[35] but a shortage of pharmacists and pharmacist advanced practitioners was also a manpower limitation to specialist service development.[67,68,81] Credentialing is an enabler of a progressive, collaborative team-working model,[35,52] while team-working is also an enabler of pharmacists working at the top of their licence.[62]

3. Legislative and funding alignment

National ASPP legislative and funding alignment was advocated for the successful implementation of ASPP credentialing. Legislative support was described as an important enabler[7,62] or barrier[60] to ASPP, while lack of political and legislative backing was described as a barrier to pharmacist prescribing models.[32,53,81] Remuneration and reimbursement models for ASPP were considered essential in successful implementation and uptake of ASPP credentialing.[7,35,52,54,55,60–62] Related to this, the importance of career progression mechanisms was noted in several studies.[7,30,35,41] In some countries, certain posts require a specialised and/or advanced credential and these posts attract a higher salary scale.[7] If individual organisations are left to advocate for or decide on remuneration or career progression mechanisms, it can be challenging and result in inconsistency.[35,41]

4. Stakeholder support

Pharmacists supported ASPP credentialing,[23,24,36,38,46,50,52,54,55,59,61,72,74,77,80,81] as did pharmacy managers/leaders,[24,77,81] and pharmacy organisation leaders.[62] The pivotal role of professional body support for ASPP credentialing was noted.[7] Professional recognition mechanisms assist professional bodies in developing the pharmacy profession[59] and influence the implementation of advanced roles by growing the image of what pharmacists can do among external stakeholders, including government and health boards.[68] Education providers were suggested as key stakeholders in underpinning ASPP.[7,70] Mixed views were reported about whether employers preferred credentialed practitioners or understood their value.[31,47,52,61] Concern was expressed about the lack of patient awareness of the value of ASPP or credentialing,[37,52,60,61,74] although supportive patients were also found to act as advocates for new pharmacist roles.[68] Pharmacy stakeholders worried that other healthcare professionals did not support or were unaware of the value of ASPP credentialing[49,52,61,68,70] and favoured building interprofessional collaboration and understanding to optimise the full value of credentialing.[7,23,68,70]

II. Developing ASPP capability

5. Competency strengths and development needs

Stakeholders addressed ASPP capability among prospective practitioners. Expert professional practice competencies reported as strengths included patient-centred care and planning[45,70] and expert skills and knowledge,[67] while competencies needing development included physical assessment skills,[70] diagnostic and prescribing skills,[35,53,70] and decision-making skills.[36] Teamwork was considered a strength,[36,67] whilst communication was a strength[38,67] or moderate development need.[36,45] Leadership and management competencies required development, e.g. strategic planning, planning change, project management and managing resources and implementing national priorities.[45,67,78] Strengths were identified in delivering education and training to individuals[67] but also development needs, e.g. in education policy, strategic workforce planning, and the professional development of teams.[45,67] Research and evaluation competencies were flagged as needing development by stakeholders in several learning contexts, when self-assessing against competency frameworks,[36,41,45,67] undertaking advanced practice postgraduate courses[76,78] and preparing for board certification examination.[64]

6. Experiential development routes

Specialist[12,36] and multidisciplinary experience[12,35,79] were recommended for the development of ASPP, as was teaching or precepting,[38,70] research,[38] and national leadership.[36,42] Continuous professional development via journal clubs, local and regional learning groups, conferences, and short courses provided useful learning.[12,38,59,70,79] Self-reflection on ASPP developmental frameworks was recommended and found to help practitioners develop ASPP.[12,30,33,35,41,51,74] Peer tutoring was a valued learning mechanism for ASPP development.[12,14,41,67,68,70,79] A strategic plan was advocated to deliver workplace professional development for advanced practice.[67] Seneviratne et al. reported that lone practitioners needed access to critical care pharmacists in other sites to enable practice development and noted the lack of a support structure within the pharmacy profession and the deficit of suitably trained pharmacists to support the development of others.[12] The advantage of dedicated training pathways,[35] such as those available to medical practitioners,[12] was flagged.

7. Formal learning routes

Formal ASPP training was considered advantageous as not every centre had established advanced practitioners to train others.[41] The strongest predictors of confidence across the RPS consultant pharmacist curriculum included an advanced clinical practitioner qualification and a postgraduate research qualification.[45] Positive learning outcomes in preparation for advanced practice were noted from postgraduate advanced practice courses.[68,78] An advanced clinical skills course allowed participants build on prescribing course skills and build capability in autonomous clinical decision-making.[68] Stakeholders' views on a proposed additional postgraduate year 3 (PGY3) residency after year 1 and 2 residencies were mixed; reported benefits included job specialisation, additional training, and development of research and management skills, while limitations included personal finances and overspecialisation. The three highest rated alternatives to PGY3 for career advancement were board certification, scholarly activity, and pharmacy organisation leadership.[42] Positive learning outcomes from credentialing models themselves are described in '*9. Credentialing model and components*'.

III. Optimising credentialing implementation

The factors ranked in two Canadian studies[52,61] as the most important during credentialing implementation are described under '*10. Other credentialing model factors*', rather than split between descriptive themes

in this section.

8. Rollout engagement and resource planning

An iterative, gradual journey was necessary to successfully implement credentialing.[24,35,80] Inclusive stakeholder engagement was recommended with pharmacy associations, leadership bodies, regulators, government agencies, educational providers, other healthcare professions, public and private sector employers, pharmacists, and the pharmacy support workforce to deliver both ASPP and credentialing.[7,59] Reimbursement and remuneration for advanced practice should be addressed in tandem with credentialing implementation.[52,54,60–62] Lack of human resources and logistical capacity posed a barrier to credentialing implementation, hence the need to consider the personnel required to deliver the credential, such as administrators and peer reviewers.[7,14,22,60] Credentialing costs to be financed included credentialing process administration and pharmacist credentialing reimbursement.[24,52,61] As developing a new university course was costly, it required sufficient pharmacist student numbers to make it worthwhile.[53]

9. Credentialing model components

International credentialing models and component requirements vary across and within countries, but usually combine multiple experiential and formal learning and assessment requirements.[7] Postgraduate qualifications,[38,46,51,74] formal training programmes,[35,41,52,61,79] and recognition of prior experience[38,46,52,61,74] were desirable credentialing components. One pre-implementation study showed a strong preference for submission of a professional portfolio and recognition of a prior qualification, moderate preference for workplace assessment, 360-degree feedback, and moderate to low preference for oral, written, or objective structured clinical examinations.[51] Other pre-implementation studies favoured a mix of methods,[59,74] although stakeholders cautioned that exams were a more suitable method to assess knowledge than skills.[59] With respect to recredentialing options, there was mixed support for examinations[52,61,66] and positive opinions for recredentialing via continuing education.[23,66]

The two most common credentialing models reported in this review were BPS certification, which requires work experience, specialty residence, and examination and peer-assessment of a professional practice portfolio based on an advanced practice curriculum or framework. Positive learning outcomes and competency improvements were reported in peri- and post-implementation studies of BPS certification,[64] practice portfolio,[12,41,79] and other credentialing programmes.[14,49] One US study preferred board certification as the gold standard credential relative to other US credentials, as it is validated and rigorous, and widely recognised by payers, patients, providers, and pharmacists.[24] International BPS certification was encouraged for pharmacists in Canada, Australia, and Philippines, and mandatory for those in Singapore.[7] Credentialing via peer assessment of a professional practice portfolio, which included peer assessment via 360-degree feedback, was considered fair and robust, although the need for guidance for pharmacists preparing portfolios and for training for peer assessors was noted.[22,41]

10. Other credentialing model factors.

Other credentialing model factors favoured during implementation included a national standardised credentialing model with recognition across organisations[14,23,35,52,61] and an independent credentialing body.[7,52,61] Credentialing bodies varied internationally from specialist professional groups and societies to pharmacy professional bodies, pharmacy regulatory bodies, government agencies, or combinations.[7] A valid and rigorous credentialing process was advocated.[22,24,41] Credential availability for all specialties was desirable.[24,40,43,52] Gaining an additional qualification was preferred to the process being solely competency based.[67] Mixed views were expressed on whether credentialing should be mandatory or voluntary.[24,52,54,59,61] Consistent credentialing definitions should be agreed during the implementation process, given the range of and potential for misunderstanding of credentialing terms.[7,30,52,61] A centralised online credentialing platform was recommended.[54,59] Credentials should avoid language, venue, or travel constraints.[37,52]

Two pre-implementation Canadian papers which explored an optimal pharmacists' specialty certification process for hospital and community pharmacists ranked the following factors as the most important: reimbursement for specialty services, consistent recognition of pharmacist specialty practice across Canada, consistent definition of pharmacy specialty practice, low cost for certification, formal preparatory education and training requirements, set training/experience hours, and voluntary certification. The highest ranked barriers were lack of reimbursement models for specialty clinical services, the time required to become certified, lack of public awareness of pharmacist specialties, and costs associated with becoming certified.[52,61]

IV. Enhancing credentialing uptake

In considering how and why credentialing uptake varies across contexts: unless otherwise stated, the findings for descriptive themes 11–14 were consistent across qualitative and quantitative study designs and contexts including credential model, country, pharmacy sector, year of publication, advanced and specialist pharmacist practice and credentialing status.

11. Employment-related motivators and restraints

Employment-related factors described by pharmacist employees as credentialing uptake motivators included career progression (e.g. promotion or improved ability to gain employment),[31,35,39,41,43,57,58,71] enhanced remuneration (e.g. income increase or one-time bonus),[21,31,35,38,43,44,48,56–58,63,64,66,71,75] job security,[44,57,63,64,75] and a job requirement for credentialing.[21,43,44,48,58,66,71,75] However, employees rated these factors as lowly-ranked credentialing uptake motivators and as rarely experienced credentialing benefits.[31,43,44,48,49,57,58,63,64,66,71,75] Employers echoed these findings, with career progression occurring sometimes or rarely and salary increase rarely.[34,65,73,82] BPS certification was not a job requirement in early academic studies[34,65,69]; in studies since the 2020s, about half of hospital and academic pharmacist employers preferred board certification when hiring.[47,82] In the academic context, highly-ranked motivators differed for uncredentialed versus credentialed residency program directors and pharmacy practice staff, with job requirement, salary increase, and change in clinical responsibilities as highly-ranked motivators for uncredentialed, but personal factors highly ranked motivators for credentialed pharmacists.[43,75]

Credentialing cost reimbursement[31,32,43,44,48,52,57,58,61] or protected study and examination time[35,43,48] were reported by pharmacist employees as uptake motivators or restraints when absent. Employees ranked lack of credentialing cost reimbursement as a moderate barrier in quantitative descriptive studies[31,44,48,58] and reported mixed experiences of credentialing cost reimbursement ranging through high to low reimbursement for BPS certification and moderate to very low reimbursement for disease-specific credentials (non-BPS).[32,43,52,57,58,61] Employers reported moderate reimbursement of BPS credentialing costs in hospital and academic settings.[34,65,73,82]

Credentialing uptake correlations showed that a supportive employment environment was helpful. Two hospital studies found higher BPS certification uptake in teaching institutions and where directors were supportive or board certified.[73,82] Another hospital reported that a strong support programme including messaging about certification importance, study groups, and reimbursement mechanisms grew the proportion of certified pharmacists from 12.6 % to 59.3 % over

a 5-year period; uptake was subsequently further increased by the introduction of a mandatory certification requirement.[24] One study of BPS certification uptake in the academic setting showed higher uptake (but not statistically significant) in schools with promotion, tenure, or reimbursement incentives[34]; another academic study showed uptake related to salary increases and not tenure or promotion considerations, but noted that salary increases only explained a small proportion of the variance, so other factors may be more motivating.[69] Residency program directors were more likely to be certified if critical care specialists versus other specialties, if directing year 2 versus year 1 programmes and if their practice setting was academic, and less likely to be certified if management was their focus of practice versus non-management.[43]

12. Advanced practice opportunities

Mixed findings were reported about advanced practice opportunities as credentialing motivators or restraints. Enhanced autonomy and scope of practice were seen as incentives for credentialing and for advanced roles and licences,[14,32,35,49,56,60] but expanded professional opportunities were lowly ranked as a motivator and benefit or highly ranked as a barrier in multiple studies and contexts.[32,43,57,58,63,64] Organisational resources and support were required so that pharmacists can contribute their ASPP expertise and skills to the care of each patient.[55,67] Underutilisation of advanced practice credentials by employers was reported[38]; contrastingly, in another study, almost 80 % of respondents' organisations had a program in place that made use of their status as an advanced practitioner.[60] Reported constraints to advanced practice included limited time in general practice,[38] insufficient patient contact time,[48] lack of specialty pharmacist services,[31,74] understaffing,[67,68] and workload balance issues such as having to continue existing practice alongside a new role.[49,56,60]

In general, '*no perceived benefit*' from credentialing was a lowly ranked barrier in credentialed pharmacists; among uncredentialed and previously credentialed pharmacists, certification not being important to their role and no perceived credentialing benefit were highly ranked uptake barriers.[43,44,48,75]

Billing and third party reimbursement for services were highlighted as a significant challenge for advanced practice delivery, particularly in US studies with strong community, outpatient, or general practice pharmacist representation. Hence, pharmacy employees in this context mentioned reimbursement for advanced services as a potential credential incentive.[32,49,54–56,58,60,71]

13. Personal motivators and restraints

Personal factors described by pharmacists as credentialing motivators or benefits to pharmacists included enhancing patient care,[31,32,48,49,66] increased marketability of pharmacy services,[44,52,57,63,64] increased knowledge, skills, and competence,[14,31,32,35,41,43,48,57–60,63,64,66,70,71,75] competence assessment,[23,41,44,57] increased confidence, self-worth or personal growth,[14,32,43,48,57,63,64,66,67,70,71,75] and being a role model.[58,75] Improved knowledge, skills, and competence, peer recognition and acceptance, personal growth, self-worth, recognition as an expert, and marketability of professional services were highly ranked uptake motivators and benefits in quantitative descriptive studies.[32,43,44,56–58,63,64,66,71,75] Employers and senior credentialing pharmacists agreed that competence assessment was a valuable credentialing element to identify knowledge gaps, improve practice, and verify competence.[14,41,47] Fear of failure was reported as a restraint to credentialing uptake.[24,34,58,66,75]

Recognition for advanced practice from patients[32,39,43,56,59,60,71] and colleagues[31,32,35,39,43,44,56–60,63,65,67,70,71,75] was also described as a credentialing motivator or benefit. However, recognition by patients and colleagues was not universally reported as a benefit e.g.:

- limited patient demand for specialty certification was noted in Canadian pre-implementation studies,[52,61]
- patient and peer recognition were relatively lowly-ranked incentives to Anticoagulation Board certification,[66]
- few community pharmacist generalists thought diabetes credentials would lead to increased respect from other healthcare providers,[48] and
- greater acceptance by other healthcare professionals was not a strongly ranked benefit for BPS certification undertaken during specialist residency.

14. Credentialing model motivators and restraints

Uptake interest in all credentialing models was similar across credentialing model types and study contexts. Strong credentialing or recredentialing interest was reported for BPS certification across a range of US specialties and settings,[43,57,63,64] portfolio-peer review models among UK critical care pharmacists (with more early adopters among teaching hospital practitioners),[79] consultant level practice in UK advanced practitioners,[45] HIV, menopause and diabetes disease-specific credentials (non-BPS),[32,58,71] and advanced practice pharmacist licence renewal in California.[56] Lower uptake interest in diabetes credentials was identified in non-specialist community pharmacists.[48] Canadian hospital and community specialist pharmacists expressed strong future interest in specialty credentialing if a national Canadian process were introduced.[50,52,61] Lack of familiarity was an issue for newly introduced or proposed credentials, from a Malaysian subject matter expert advancement pathway, to US advanced diabetes management certification, and UK portfolio-peer review.[40,71,79] Moderate familiarity with and interest in overseas BPS certification was identified among Indian and Saudi Arabian pharmacists, not specifically specialists.[31,37]

Two credentialing model factors which were commonly reported as credentialing uptake barriers were credentialing cost and preparation time.[24,31,32,43,44,48,52,58,59,61,64,66,75,76,79] These two factors together with credentialing costs not being covered by employers were highly ranked uptake barriers in quantitative descriptive studies.[31,43,44,48,52,58,64,66,75,79] Other barriers included the lack of a BPS credential in their specialist area,[34,43] lack of formal specialisation recognition,[52,61] and requirement to recredential.[43,44,66]

4. Discussion

4.1. Main findings

This systematic review uniquely synthesised pharmacy stakeholders' views and experiences of ASPP credentialing. The four analytical themes generated were I: drivers of ASPP credentialing, II: developing ASPP capability, III: optimising credentialing implementation, and IV: enhancing credentialing uptake. The conceptual framework should be considered by pharmacists, policymakers, and other key stakeholders when developing or optimising ASPP credentialing in future.

4.2. Comparison with existing literature

The two most common pharmacy-specific credentialing mechanisms in review studies were the US BPS certification, based on examination, experience and formal postgraduate requirements, and credentialing via framework-portfolio-peer assessor approaches in the UK or Australia; however, multiple national, state, and local credentialing and regulation models, at different stages of implementation, were included. Likewise, large international pharmacy and nursing surveys described varying levels of credentialing implementation worldwide and lack of international consistency around advanced practice credentialing models and regulation.[2,3,83]

The complexity and co-dependence of advanced practice and credentialing implementation highlighted in the conceptual framework is

in line with recent pharmacy workforce research, which also stressed the importance of alignment with national health strategies and health system organisation, funding models for specialty services and communication and engagement strategies,[7,84] and which identified that country-level practice advancement concepts which advance the pharmacy workforce include professional recognition availability, specialisation and advanced practice definition, regulator responsibility for recognition, a formal academic pathway, and post nominal for advanced or specialist practitioners.[85] A recent UK scoping review of the outcomes, impacts, and implementation challenges for advanced clinical practitioner roles (including nursing, pharmacy, radiography and physiotherapy) likewise identified a perceived lack of role integration into wider workforce plans, the need for a clear career pathway, greater funding and strategic planning for role sustainability, and the importance of raising public awareness about such roles and the safety and quality of care that they provide.[1]

The finding that patient safety and public recognition were central drivers of ASPP credentialing is supported by international pharmacy and nursing literature, which underlines credentialing importance in meeting employers' and the public's need for accountability and quality.[3,5,6,83] Understanding absence as well as presence is important when researching change over time,[27] so consideration was given to the fact that some studies were excluded because stakeholders only mentioned the need for pharmacist education for ASPP but did not flag a need for credentialing.[86–90] Credentialing not being mentioned in these excluded studies, typically earlier dated and related to local rather than national ASPP implementation, may not indicate a lack of support for credentialing, but a lack of focus on the value of credentialing for public and professional recognition and acceptance of ASPP.

Research, leadership, management and prescribing were identified as common advanced practice competency weaknesses, which could potentially be successfully addressed by combined experiential and formal advanced practice learning strategies and courses. A rapid review of the educational preparedness of advanced clinical practitioners, mainly nurses, also stressed the need for consolidation, bridging the theory to practice gap, competency assessment and mentoring.[91] Our study also recommended an independent credentialing body, a sustainable credentialing funding model, and the reimbursement of pharmacist costs. The financial viability of the US BPS certification process is linked to the large numbers of pharmacists credentialing via this system.[61]

The finding that credentialing uptake was influenced by personal motivators, such as improved patient care and competence, and by environmental factors, such as employer support and advanced practice opportunities, is in line with recognition and reward theory that employees are motivated by intrinsic and extrinsic factors.[92] Poor uptake of the Australian National Credentialing of Advanced Practice Pharmacists program was attributed to the challenge of encouraging pharmacists to seek recognition of advanced pharmacy practice without perceived tangible benefits.[13]

The similarities in findings between this synthesis and pharmacy, nursing, and other advanced practitioner literature,[1,83,91] suggests that the conceptual framework may be applicable not only to pharmacy, but also other HCPs with advanced practice.

4.3. Implications for practice and research

This study provides useful evidence for those implementing ASPP and credentialing. It fills a research gap by synthesising the views and experiences of pharmacists and other relevant stakeholders on credentialing stages from readiness to implementation and uptake. Users of the conceptual framework will find that its three credentialing stages and three contextual domains illustrate the complexity and co-dependence of ASPP and credentialing implementation, and highlight barriers, facilitators, and important inter-relationships to be considered. For example, ASPP remuneration appears in all three implementation stages of the framework, as a facilitator of credentialing readiness, an implementation consideration, and an uptake barrier.

Evidence gaps were identified which merit further research. No qualitative study of credentialing implementation using an implementation framework was found. Few views and experiences on why credentialing mechanisms vary were identified. This review flagged the need for justification metrics and patient outcome studies to justify the implementation of ASPP credentialing, and this is supported by pharmacy and nursing literature which also call for research into the impact of credentialing on healthcare outcomes for patients, healthcare professionals, and organisations.[93,94] One such study found that hospitals where pharmacists had additional cardiology qualifications performed better on process of care measures, although these improvements did not translate into improved 30-day clinical outcomes.[95] The difficulty of accurately deconstructing the value of board certification, residency training, and practice experience on the professional competence of advanced practitioners and the challenges in research design to evaluate advanced practice and credentialing outcomes have been noted.[5,94,96] Nonetheless, rigorous qualitative and observational studies to evaluate the impact of credentialing on practice, to compare learning outcomes from different credentialing mechanisms, and to evaluate credentialing implementation would be of value.

4.4. Strengths and limitations

Study strengths include the use of a range of robust research methods. Thematic synthesis generated theory to inform practice based on the research questions.[25] The convergent integrated mixed methods approach[16] enabled the review to draw on the breadth of sixty studies and integrate the richness of qualitative findings with qualitised quantitative descriptive findings (such as rankings and correlations). For example, highly and lowly ranked credentialing uptake determinants in quantitative descriptive studies were remarkably consistent across pharmacy contexts and gave useful additional insights into implementation drivers, restraints, and inter-relationships over those from qualitative studies alone. Although many studies were in the hospital sector, which is in line with other research that notes slower uptake of advanced practice in community pharmacy and primary care,[97] emerging advanced practice sectors were included. Despite non-pharmacy stakeholders being excluded, a wide range of pharmacy stakeholders' views comprised insights about patient and other healthcare professional views of ASPP credentialing. Furthermore, these views and experiences were from a wide range of patient-facing pharmacy sectors, countries, implementation phases, and allowed the identification of facilitators and barriers and the generation of a conceptual framework that could be relevant to any pharmacy setting.

A limitation related to application of exclusion criteria: for example, including only primary research studies or those containing views and experiences led to potentially informative descriptive studies and expert opinions being excluded. Credentialing component studies were excluded unless described as leading to ASPP credentialing, so useful general perspectives on credentialing components (e.g. prescribing courses, residencies, or developmental frameworks) may have been missed. Although care was taken to agree and carefully apply ASPP and credentialing definitions, international variability in use of terminology may have led to inconsistent inclusion and exclusion of studies.

5. Conclusion

This systematic review is the first to synthesise pharmacy stakeholders' views and experiences of ASPP credentialing and situate them within the implementation of ASPP. Research gaps and opportunities for further research in this area are highlighted. A conceptual framework highlights barriers, facilitators, and interlinking factors which should be considered by pharmacists, policymakers, and other key stakeholders when implementing or optimising ASPP credentialing in the future.

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CRediT authorship contribution statement

Evelyn Deasy: Writing – review & editing, Writing – original draft, Visualization, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Anna Seoighe:** Writing – review & editing, Writing – original draft, Visualization, Investigation, Formal analysis, Data curation. **Cristín Ryan:** Writing – review & editing, Writing – original draft, Visualization, Supervision, Methodology, Formal analysis. **Stephen Byrne:** Writing – original draft, Visualization, Supervision, Methodology, Formal analysis, Conceptualization. **Kieran Dalton:** Writing – review & editing, Writing – original draft, Visualization, Supervision, Methodology, Investigation, Formal analysis, Data curation, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supplementary data

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