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A Comprehensive Systematic Review of Pharmacy Perspectives on Interprofessional Education and Collaborative Practice

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Running Head: Comprehensive systematic review of Pharmacy Perspectives on IPE and IPC

A Comprehensive Systematic Review of Pharmacy Perspectives on Interprofessional Education and Collaborative Practice

Abstract

Introduction: Pharmacists are key professionals in the collaborative working process and are integral members of the healthcare team. However, there is paucity of information regarding their perspectives towards interprofessional education (IPE) and collaborative practice.

Aims: The aim of this systematic review is to synthesize, summarise and evaluate the quality of the quantitative and qualitative literature related to the perspectives of pharmacy students, pharmacy faculty and practising pharmacists toward IPE and collaborative practice. The perspectives included their views, experiences and attitudes with a special focus on their perceived benefits and challenges in relation to IPE and collaborative practice.

Methods. An integrated mixed method systematic review was conducted. Four electronic databases were searched for articles published in English between 2000 – 2015. The Mixed Methods Appraisal Tool (MMAT) was used to assess the quality of the studies.

Results. Twenty-nine articles were identified meeting the selection criteria from the first initial search of 8512 articles. Seventeen articles (59%) targeted pharmacy students, 11 articles (38%) focused on practising pharmacists and 1 study (3%) was related to pharmacy faculty. The majority of studies were conducted in the United States (n=13), were published in the last five years (83%, n=24) and employed quantitative methods (52%, n=15). The two commonly used survey instruments to measure the perspectives were: different versions of the RIPLS (35%, n=6) and the IEPS scale (35%, n=6). Fourteen of the 29 studies were rated as low quality (MMAT= 25%), eight studies were rated as average quality (MMAT=50%), four were rated as high quality (MMAT 75%) and three were rated as very poor quality (MMAT 0%). No studies were rated with 100% MMAT quality. Overall, the findings suggest that pharmacy students, practicing pharmacists and faculty valued interprofessional education and collaborative practice and had positive attitudes towards it. Five main findings have been identified from this review: heterogeneity in reporting IPE research, traditional professional image of the pharmacist, lack of longitudinal follow-up, lack of IPE research on faculty and paucity in mixed method studies in terms of quality and numbers

Conclusions: These findings will provide an opportunity to stakeholders and policy makers to develop and implement IPE activities that are meaningful, comprehensive and unique. Sustained efforts are required not just in undergraduate curricula but also in healthcare settings to improve and promote an interprofessional culture at individual and organisational level.

Introduction

With the increased complexity of healthcare with patients having multiple pathologies, the demand for collaborative work between healthcare professionals from different backgrounds increases; therefore, healthcare professionals need to develop the knowledge and skills required to effectively work together in order to positively impact patient care. With this in mind, the World Health Organization (WHO) published a seminal document entitled, "Framework for Action on Interprofessional Education and Collaborative Practice" in 2010¹. In this framework, WHO strongly advocated the development and integration of Interprofessional Education (IPE) into healthcare curricula. They emphasised the importance of adapting team based collaborative models in all the different areas of healthcare to enhance the delivery of healthcare services. The most recognised used definition for IPE is the one by the Centre for the Advancement of Interprofessional Education (CAIPE) as 'two or more professions learning with, from and about each other to improve collaboration and the quality of care'^{2,3}. It can be argued that unless healthcare students are introduced to IPE during their undergraduate studies, they may be resistant to collaborative practice once they graduate. If collaborative practices are essential and healthcare schools are expected to graduate healthcare professionals with the ability to be part of a collaborative practice healthcare team, students need to be exposed to learning opportunities of IPE during their studies¹. Otherwise, healthcare students will continue learning unprofessionally, in traditional outdated static curricula, leading to ill-prepared graduates influenced by healthcare professional tribalism and hierarchical relationship⁴. Therefore, IPE should be rooted in the undergraduate curriculum so that future health workforces are 'collaborative practice ready' on graduation¹. The WHO defined collaborative practice in healthcare settings as occurring 'when multiple health workers from different professional backgrounds provide comprehensive services by working with patients, families, carers and communities to deliver the highest quality of care across settings'¹ p 13.

Healthcare is provided by a large number of different healthcare professionals including pharmacists who are key members of the healthcare team and important participants in the collaborative working process. With the expanding and evolving role of pharmacists as seen in the early nineties with the emergence of the pharmaceutical care concept by Hepler and Strand⁵, their shopkeeper image is diminishing. It is important that this advanced role is recognised and understood by other healthcare providers and healthcare students so that there is effective collaboration and teamwork. Equally, pharmacists need to recognise and understand other professionals' roles. Pharmacists are integral members of the interprofessional healthcare team, yet there is paucity of information regarding their perspectives towards interprofessional education and collaborative practice.

The term “perspectives” in this review is used as the umbrella term that includes experiences, attitudes, and views. Several systematic reviews focusing on IPE have been published since 1999 and have found that there is no rigorous research evidence on the effects of IPE⁶⁻¹⁶. A recent systematic review update on the effects of IPE, for the period between 2005-2014, reported increased positive outcomes resulting from IPE. Based on the included 46 articles, the review highlighted that students responded well to IPE with positive attitudes and perspectives with an enhancement in their interprofessional knowledge and skills¹³. However, the evidence relating to the impact of IPE on behaviour, practice, and patients is building up but is considered limited at the current time¹³. In the ‘Best Evidence Systematic Review of IPE’ that was published in 2007, most of the included studies evaluated IPE when delivered to healthcare students during their undergraduate studies. Most participants in these studies were from medicine, nursing, and physiotherapy, with lack of involvement of pharmacy students⁹. This finding was echoed in other reviews where medicine and nursing were the most represented professions, with less representations by other health care professions, including pharmacy^{10,13,17}. The pharmacy profession was represented in the primary literature reviewed, however its perspective and inclusion was not explicitly researched or highlighted. Understanding the pharmacy perspective towards IPE and collaborative practice is of paramount importance to ensure the incorporation of successful IPE negating adverse impacts and resistance and optimizing the chance of positive change in behaviour^{13,18}. Additionally, we cannot assume that the IPE model that is implemented in the medical and nursing curricula is easily transferable to other healthcare curricula as each has its own educational pedagogical approaches¹⁹. Hence, there is a need to conduct a systematic review to investigate literature specifically exploring the pharmacy perspective on IPE. Furthermore, to the authors’ knowledge no systematic review with a uniprofessional healthcare perspective on IPE has been undertaken. Therefore, this review is unique in that it is the first to investigate a single healthcare profession’s perspectives about IPE and collaborative practice and to highlight specific pharmacy perspectives.

Aim

The aim of this systematic review is to synthesize, summarise and evaluate the quality of the quantitative and qualitative literature related to the perspectives of pharmacy students, pharmacy faculty and practising pharmacists toward IPE and collaborative practice. The perspectives included their views, experiences and attitudes, with a special focus on their perceived benefits and challenges, in relation to IPE and collaborative practice.

Methods

A review protocol was developed for this systematic review based on the Joanna Briggs manual which has been approved and published in the JBI Database of Systematic Reviews and Implementation Reports ¹⁶. Any quantitative or qualitative studies published in English, between 2000 and 2015, and capturing explicitly the perspectives of pharmacy students (undergraduate and postgraduate), practising pharmacists (community, hospital, and primary healthcare) and pharmacy faculty (teaching in academic institutions) towards IPE and/or collaborative practice were included. Studies outside these dates, language, and context were excluded.

The following databases were systematically searched: Medline, Embase, CINAHL and Scopus. Medline and Embase are the most commonly used databases to identify studies related to health care interventions ²⁰ with Medline and CINAHL featuring the largest number of healthcare articles ²¹. However, not all pharmacy related literature can be captured in these databases and hence Scopus was also included to broaden the coverage of this review. In addition, this study used the Cochrane Database of systematic reviews and JBI Database of systematic reviews to broaden the IPE literature covered. The search strategy aimed to find both quantitative and qualitative published studies. A search using all identified keywords and index terms was undertaken across all included databases from 2000-2015.

- a) Interprofession* or Inter-profession* or Multidisciplin* or Multi-disciplin* or Multiprofession* or Multi-profession or *Shared learning or Team* or interdisciplin* or inter-disciplin* or Collaborative practice,
and
- b) Pharma*
and
- c) Perspectives or Attitudes or Experiences or Views or Opinion or Belief or Intention or Understanding or Knowledge

A data extraction form was developed by the principal researcher (AE) and reviewed by the research team (LD, MH and SJ). Two researcher pairs (23 articles AE and LD; 16 articles AE and SJ; 16 articles AE and MH) independently extracted data on year, country, pharmacy author lead, authors, title, main objectives, study setting, methods of data collection, duration of IPE activity where applicable, key findings regarding pharmacy perspectives, and limitations. The principal author was the common reviewer in all the pairs providing consistency for the reviewing process and therefore strengthening the reliability of

the review. Any disagreements arising between the reviewers were resolved through discussion to reach consensus, or with a third reviewer.

Quality assessment

For the quality assessment of the included studies, the Mixed Methods Appraisal Tool (MMAT) was used as it is the only available tool allowing for the critical appraisal of qualitative, quantitative and mixed methods studies²², and it has been used in various comprehensive mixed method systematic reviews²³⁻²⁹. The MMAT tool has also been validated for its content and tested for reliability^{30,31,32}. The tool is divided into three categories with different methodological quality criteria that are used depending on the study design and methods: qualitative, quantitative (categorised into: randomized controlled, nonrandomized, and descriptive), and mixed methods. Every criterion is rated as 'yes', 'no', 'partial' or 'cannot tell' for every applicable item. AE and LD assessed the included studies using the MMAT tool independently and then met to compare scores. Any disagreements were discussed and consensus was reached. The results led to an overall score on methodological quality with the score varying from 0% (no quality), 25% (low quality), 50% (moderate quality), 75% (considerable quality), and 100% (high quality). All studies were included and none was excluded based on quality assessment.

Results

Twenty nine studies were included in the review from the first initial search of 8512 articles as highlighted in the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) chart (Figure 1)

Characteristics of eligible studies

Characteristics of the included studies are highlighted in table 1. The majority were conducted in the United States (n=13). Most had been published in the last five years (83%, n=24) and employed quantitative methods (52%, n=15). Nearly a quarter of the studies included were published in the Journal of Interprofessional Care (23%, [n=7]) followed by the American Journal of Pharmaceutical Education (13%, n=4). A number of instruments were used to measure students' perspectives toward IPE and collaborative practice. In this review the three commonly used surveys were: different versions of the Readiness for Interprofessional Learning Scale (RIPLS) (35%, n=6), the Interdisciplinary Education Perception Scale (IEPS) (35%, n=6), and the Attitudes Toward Health Care Teams (ATHCT) (24%, n=4). Table 2, 3 and 4 provide a summary of the 29 included articles. Fourteen of the 29 articles were rated as low quality (MMAT 25%), eight were rated with moderate quality (MMAT 50%), four were rated with considerable quality (MMAT 75%) and three were rated with 0 MMAT quality. None were rated with high quality (MMAT 100%).

The focus of this paper was on both IPE and collaborative practice. The terms IPE and collaborative practice have been used interchangeably with many crossovers in the included articles which made separating the papers based on whether they targeted IPE or collaborative practice not possible. Therefore, the results are outlined as a detailed analysis based on the groups investigated: pharmacy students, pharmacy faculty and practising pharmacist as shown below.

Studies focusing on pharmacy student perceptions

Studies with no intervention

Five related studies were published measuring pharmacists' perceptions toward IPE: Horsburgh et al. (2001), New Zealand ³³; Curran et al. (2008), Canada ³⁴; Ahmad et al. (2013), Singapore ³⁵, Khan et al. (2015), Saudi Arabia ³⁶, and Wilbur et al. (2015), Qatar ³⁷. Four of these studies used quantitative survey study design except for Wilbur et al. who used qualitative descriptive study design with a semi-structured focus group.

The four quantitative studies reported positive pharmacist attitudes toward IPE ^{33-35,37}. The early study by Horsburgh et al. (2001) used the term 'shared learning' instead of IPE, which is understandable as this is before CAIPE published its 2002 definition. In this study pharmacy students believed strongly that one of the benefits of learning together is the development of more effective practices that can potentially enhance patient care and improve interprofessional working relationships. Pharmacy and nursing students in this study were more certain about what their professional role would be compared to the medical students ³³. Differences in attitudes between pharmacy and other healthcare students were mixed in the different reported studies. As an example, a study using RIPLS showed no important differences between the attitudes of the different professions ³³. However, another study using RIPLS highlighted significant differences among the various professions for overall attitudes ³⁵. Significantly less readiness was reported by pharmacy and dentistry students compared to medical students.

Mixed results were again reported with the attributes affecting positive attitudes in a study conducted in Singapore ³⁵. The overall RIPLS scores were not significantly different when compared with various demographic variables including age, gender, ethnicity, prior experiences interacting with other health professionals, and family members who are health professionals ³⁵. This is in contrast to an earlier study in Canada, which showed profession, gender (female), prior IPE experience, and year of study (senior) positively affected attitudes ³⁴. In this study, pharmacy and social work students had significantly higher positive attitudes towards interprofessional healthcare teams compared to medical and nursing students. A similar investigation in Saudi Arabia showed male students had higher interprofessional

perception scores than female students³⁶. Final-year students had better interprofessional perceptions than junior students. In addition, motivation to enter the pharmacy profession, participation in recent scientific conferences, and previous practice exposure were found to significantly affect the interprofessional perceptions of students³⁶. The perceptions of pharmacy students in Qatar who took part in a focus group were generally supportive of IPE. They highlighted a number of perceived benefits and challenges toward collaborative practice³⁷.

Studies with IPE intervention

Between 2012 and 2015, twelve studies were published highlighting pharmacy students' perceptions toward IPE and collaborative practice based on an IPE intervention. For the included articles focusing on students, the IPE sessions varied in their duration from *ad hoc* sessions (lasting between one and four hours) in the form of simulation^{38,39} or interactive case based discussion⁴⁰; or 2 IPE case based sessions over a month^{41,42}, to IPE activities spread over the semester⁴³⁻⁴⁵ or in one study over two years⁴⁶. Other studies was based on an IPE experiential learning experience⁴⁷⁻⁴⁹. The number of professions involved in these initiatives varied from two to six professions with the majority (more than 80%) having medical students in the IPE activity.

Perceived benefits

The results suggest pharmacy students had positive attitudes in relation to willingness and readiness to participate in IPE. Several factors influencing this positive attitude were reported in most of the included studies and can be categorized into the following themes: overall experience; improved interprofessional working relationship; roles and responsibilities; and belief of its impact on patient care.

Perceptions regarding the students' overall IPE experience were positive and well received. The different IPE initiatives, have been regarded as unique⁴⁷, beneficial for their future practice^{38,46,50}, enhanced overall university experience⁴⁶, had an impact on their attitudes, knowledge and ability to work with other professionals⁴¹, and high student satisfaction with the experience^{39,45}.

Perceived benefits of IPE included: enhanced understanding of professional role identity⁴⁵⁻⁴⁷, exploration of professional boundaries⁴⁷, excellent teamwork^{38,42,46}, improvement in the quality of patient care³⁸, willingness to participate in more IPE activities^{38,42}, enhancement of learning and knowledge gained^{41,42}, respect^{38,50}, trust⁵⁰, appreciation of other healthcare professions⁵⁰, and a shared goal for patient-centred care⁵⁰. Another perceived benefit of IPE is valuing collaborative practice and interprofessional teams^{43,45,50}. A case control study investigating the effect of peer teacher-led problem based seminars on pharmacy and

medical students' perceptions toward IPE reported that pharmacy and medical students participating in these seminars perceived a significantly higher need for cooperation in comparison to those who did not participate⁴³. Furthermore, in this study, pharmacy students perceived a significantly higher need for professional cooperation and interdependence than medical students did⁴³. Following an interprofessional standardized patient exercise, there was consensus among pharmacy students that they have learned more about their role in an interprofessional team and the activity increased their comfort level and confidence in dealing with other healthcare students in an interprofessional environment³⁹.

Longitudinal IPE activities showed significant improvement in attitudes towards interprofessionalism. Pharmacy students in the United States undertaking an advanced pharmacy practice experience (APPE) focusing on solid organ transplant showed significant increased interprofessionalism in 17 out of 22 items from a pre- and post-APPE survey⁴⁸. A similar result was observed in another clinical assessment course where nine IPE activities were integrated in this course over a semester⁴⁴. Similarly, pharmacy students showed significant improvement in their perceptions of interprofessional collaboration on 16 of 18 pre- and post- The Interdisciplinary Education Perception Scale (IEPS) surveys. The highest positive changes in perceptions were noted in competence and autonomy⁴⁴. Another study in the United States showed significant improvement in all programmes, including pharmacy, in attitudes from baseline to the end of year 2 health mentor longitudinal programme on a pre- and post- Attitudes Toward Health Care Teams Scale (ATHCT) scale. The other scale used in this study was the IEPS, but no significant difference was noted taking into consideration that student perceptions at the start of the activity were already high⁴⁶.

Perceived challenges

Challenges to IPE as perceived by students varied between studies but revolved around logistical issues, professional status, confidence, and capability

Logistical issues

Scheduling conflicts^{42,45,46}, available physical space⁵⁰, available time in a heavy curriculum, managing the time^{43,46}, and travel time⁴⁶ were some of the logistical challenges encountered by students. Lack of time to participate in IPE was identified as the main barrier by 52.3% (n=57) of students in a study in the United States focusing on peer-led problem-based learning in IPE⁴³. Similarly, evaluation of student focus groups in another study in the United States investigating IPE in health mentors programmes over three years highlighted that scheduling and travel time were significant burdens on the students⁴⁶.

Professional status, confidence, and capability

Students' perceptions regarding pharmacists' status and professional identity were discussed in various studies^{38,39,46,50}. The lack of confidence to deal with other healthcare students or being with students who are much more advanced than their level has been reported as a challenge by students⁵⁰. First year students described situations where they felt uncomfortable with their limitations in knowledge and skills and felt unprepared to be in such situations⁵⁰. Furthermore, students found it challenging to inform and teach others about their role when they were uncertain of what their own role entailed⁴⁶. The same was reported in a study involving a simulation IPE activity. Pharmacy students had less experience with simulation compared to medical students who had experienced this several time before. As a result, pharmacy students were less favourable to the idea that the respondents worked well together³⁸. Another reason for this difference was that pharmacy students were not comfortable and ready to share their views with others³⁸. The lack of direct patient care experience by pharmacy students, in comparison to medical students, has been echoed as a challenge in another study following an interprofessional standardised patient exercise³⁹. This was in contrast to another study where the nature of topic was directly related to the pharmacist's role and as a result the pharmacy students had the highest mean RIPLS score pre-test and post-test in comparison to the other professions involved in this IPE activity focusing on higher reliability error prevention⁴⁰.

Additionally, in focus groups with third year pharmacy students during their primary care internship, students discussed how pharmacists felt 'undervalued and disenfranchised'⁴⁷. This was attributed to three main factors: entry-level requirements to study pharmacy has been lowered; the shopkeeper image of pharmacists resulting in poor public image, unacceptance of pharmacists as a key professional member in the healthcare team; and the undermining of their role by government policies.

Pharmacy students discussed how full participation within an interprofessional team was limited due to the power play between doctors and pharmacists⁴⁷. They believed that the doctors are usually the perceived leaders of the interprofessional team and although the pharmacists' suggestions and advice were generally accepted, some more mature and experienced doctors were unwilling to accept their recommendation. The pharmacists did not want to overstep their boundaries⁴⁷ or serve as intermediaries with doctors³⁷.

Studies focusing on pharmacy faculty perceptions

Only one of the included studies focused on the pharmacy faculty perceptions of IPE and perceived challenges of implementing it in an American university⁵¹. Faculty from three different healthcare programs were part of this study including 34 faculty from the College of Pharmacy from a total of 62 faculty members. In this study, all faculty were less enthusiastic

to serve as IPE preceptors but expressed the need for more IPE faculty development. The top five preferred IPE activities specified by faculty from the College of Pharmacy were students from different disciplines taking courses together (58.8%), clinical rotations (55.9%), student competitions (52.9%), case reviews together (52.9%), and faculty members from other disciplines teaching a course (52.9%). Overall, all faculty members from the different disciplines responded positively to the potential benefits of IPE and believed implementation of IPE was feasible. Faculty from the pharmacy and physician assistant programmes responded more positively than the medical programme. They believed IPE advocates for team based learning and enhances patient care efficiency. Additionally, they significantly showed more enthusiasm towards emphasising the importance of IPE to their students, the greater college community, and preference for more IPE opportunities in their colleges.

Studies focusing on practising pharmacists' perceptions

Eleven related studies were published between 2003 and 2015. Countries of included studies included Australia (4 studies), Canada (2 studies), Germany (1 study), Northern Ireland (1 study), Spain (2 studies) and the United States (1 study). None of these focused specifically on IPE but on interprofessional collaboration. More than 50% (n=6) of these articles focused primarily on the relationship between community pharmacists and general practitioners⁵²⁻⁵⁷. Only one article focused on an inpatient setting⁵⁸ and the remaining four articles had pharmacists from different settings⁵⁹⁻⁶². The perspectives of practising pharmacists in the papers included in this review related to four main themes: benefits of collaborative practice; challenges to collaborative practice; facilitators to promoting collaborative practice; predictors of collaborations; and recent graduates' reflection on the IPE experience.

Benefits of collaborative practice

Only one of the above articles focused on an inpatient medical setting⁵⁸. One was based on a postgraduate clinical pharmacy programme at a university setting⁶⁰. The remaining three focused on the collaboration between community pharmacists and general practitioners^{52,56,57}. Pharmacists in five of the included studies identified positive outcomes for participating in collaborative practice in terms of:

- improved health system: continuity of care⁵⁸, provision of integrated care leading to enhanced efficiency of the healthcare system⁵⁶.
- interprofessional team process: increased awareness of healthcare professional roles^{56,58}, developing trusting interprofessional relationships⁵⁸ leading to more collaboration⁶⁰.

- benefits to healthcare professionals: enhanced confidence and capabilities⁶⁰, increased professional fulfilment⁵², greater job satisfaction^{56,58,60}, improved professional image^{52,56,60}
- enhanced quality of patient care and outcomes^{52,56-58}.

In a qualitative analysis of pharmacist reflections completed following a module on interprofessional communication in Australia, pharmacists expressed how this learning experience enhanced their professional identity and strengthened their recognition and credibility as key players in the healthcare team⁶⁰. Additionally, it changed their perceptions of the importance and benefits of interprofessional communication⁶⁰. Another study, assessing pharmacists and general practitioners' perceptions about collaborative practice, showed 94.8% of pharmacists collaborating with general practitioners (GPs) to improve patient outcomes⁵⁷. The vast majority, 99.5%, of pharmacists believed collaboration between pharmacists and GPs improved patient outcomes and 99.8% of pharmacists agreed that collaboration with healthcare professionals improved patient outcomes⁵⁷. Pharmacists from Spain believed in coordinated working between community pharmacists and GPs. Moreover, giving consistent messages to patients could lead to a reduction in any potential conflicts and improving the patient journey in the healthcare system and eventually improving their safety⁵⁶.

Challenges to collaborative practice

Numerous challenges to collaborative practice as perceived by practising pharmacists exist. These revolved around the followings themes:

- Professional image^{52,55,57,58};
- Pharmacists' confidence and capability⁵²;
- Limited collaboration^{52,53,57};
- Organisation and practice structure⁵⁸.

Other challenges were lack of remuneration^{52,57}, GP attitudes⁵², inaccessibility⁵², patient⁵², lack of time^{52,57,63}, and composition of the interprofessional team⁵⁸.

Professional image

In an early qualitative study, in 2003, exploring perceived challenges between general practitioners and community pharmacists in Northern Ireland, the shopkeeper image of community pharmacists, associated with the commercial side, was the main emerging theme discussed in this study, with awareness, hierarchy, and access as subthemes⁵⁵. Pharmacists also believed that any professional advancement to their role would be perceived as 'encroachment of GP activity' and reported lack of awareness and

misconceptions from GPs about the pharmacist's role. They felt undervalued by the GPs who did not consider them as a member of the primary healthcare team ⁵⁵.

The lack of awareness of the pharmacist's clinical role and the shopkeeper image was echoed in another study investigating collaboration between pharmacists, physicians, and nurses in an inpatient setting in Canada in 2009 ⁵⁸. Pharmacists were concerned that even with advancement in the clinical pharmacist's responsibilities, healthcare professionals still linked their roles to dispensing functions. This was more evident in GPs whose main interactions were with community pharmacists and were not aware of the clinical pharmacist's roles and responsibilities. Additionally, teamwork between healthcare professionals was affected when the roles and expectations of the pharmacist responsibilities were not clearly defined ⁵⁸.

Pharmacists' confidence and capability

Some pharmacists felt anxious and apprehensive at the thought of discussing and making recommendations to physicians, attributing this to a lack of confidence in their own professional competency, lack of acceptance by physicians, and the fear of losing credibility ⁶⁰. Others reflected being self-conscious when dealing with GPs and struggled with GPs who did not view them as equal partners and were unwilling to accept their recommendation ⁵². They further emphasised the boundary encroachment perceived by the GPs and how GPs feel threatened by the advancement of the pharmacist's role with an evident element of territorialism ⁵².

Limited collaboration

Limited collaboration was reported in several studies. An Australian study investigating collaboration between pharmacists and GPs in managing chronic illnesses in a primary care setting highlighted that although pharmacists have good working relationships with GPs, actual collaboration was limited. Again this was attributed due to a lack of understanding of each other's professional role ⁵². Another study highlighted that one quarter of community pharmacists have never or rarely practised collaboratively and only 3% have reported always collaborating with doctors. The greatest perceived barrier was having to deal with multiple healthcare professionals with many believing that the involvement of multiple healthcare providers can lead to fragmentation of care. Additionally, pharmacists reported the lack of face-to-face collaboration as a barrier and preferred face-to-face and telephone communication to fax or paper communication⁵⁷. Furthermore, in another study conducted in Spain, pharmacists expressed no interest in collaborating with GPs as they assumed GPs perceived no benefit from collaboration and hence did not want to pursue this further ⁵⁶.

Organisation and practice structure

One of the major factors contributing to this theme from pharmacists' perspective is their perception of their significant workload. Although they wanted to be systematic in their approach to patient care this was not possible in many instances⁵⁸. Moreover, the pharmacists hoped that pharmacy departments would allow for flexibility in their working schedule and provide them with support to function collaboratively with other healthcare professionals⁵⁸.

Predictors of collaborations

Three of the included studies addressed predictors of collaboration as perceived by practising pharmacists^{53,54,59}. Two of these studies explored predictors of collaboration and identified these as trustworthiness and role specification in both studies^{53,59}. In addition to professional interactions⁵⁹, relationship initiation was identified in a study investigating cooperation between community pharmacists and GPs in Germany⁵³. They found that pharmacists' item mean for relationship initiation was 15.3 ± 3.7 (72.9%) in comparison to GPs, who had a mean of 12.9 ± 4.4 (61.6%). Wüstmann et al. attributed this to the pharmacists' inclination to view themselves as relationship initiators⁵³.

The third study addressing this was a descriptive exploratory qualitative study employing semi – structured interviews with pharmacists who had previous experience in collaborations with other healthcare professionals⁵⁴. Factors affecting collaborations differed based on previous experiences of collaboration and whether it is prior to collaboration or during collaboration. Predictors of collaborations prior to starting the collaboration were generally positive. Participating pharmacists cited usefulness, interest from the primary care manager, positive attitudes towards other healthcare professionals, closer geographical proximity, and financial remuneration. During collaboration, predictors influencing continued collaboration changed and these included having mechanisms in place to ensure achievement of shared objectives and having a supporting management team.

Facilitators to teamwork

Joint training at undergraduate and postgraduate levels has been suggested as a way to overcome barriers and increase awareness about other healthcare professions⁵⁵. At an organisational level, focused attention is needed to ensure effective processes and supports are in place to facilitate teamwork and enable a successful implementation of collaborative practice⁵⁸. Pharmacists have hoped for more frequent interactions and collaborations^{53,57}. Ongoing professional development including interprofessional working and communication has also been endorsed as needed to promote teamwork^{56,58,60}. In one study, community pharmacists from Australia articulated the importance of accessibility, style and nature of communication, particularly face-to-face communication as ways to facilitate collaboration

with other healthcare professionals, specifically GPs⁵². Financial remuneration as an incentive was also mentioned⁵².

Reflection from recent graduates on their experiences of IPE

Studies based on recent graduates' reflection

Two studies focused on the same cohort of pharmacy, medical, and nursing graduates from three different Australian states^{61,62}. The participants had been working in an interprofessional environment for at least 6 months and no longer than 24 months⁶². In total, 68 graduates, of whom 23 were pharmacists, participated in focus groups to explore their IPE experiences during their undergraduate education^{61,62}. Many reflected on the value of the IPE experiences they had and the importance of these as part of undergraduate curriculum⁶¹. The graduates were familiar and grasped the concepts of interprofessional meaning from a theoretical perspective⁶¹. Pharmacy graduates aligned their professional identity to doctors and believed they were equal partners with them⁶².

Several perceived challenges were discussed. IPE learning activities were scarce, mainly didactic, unstructured, focused more on shared learning experiences. Consequently, graduates felt they were unprepared to work as an effective member of the interprofessional team^{61,62}. Additionally, there were a number of missed opportunities during clinical placement that could have been easily structured as IPE initiatives. A silo mentality and minimal social interaction between the healthcare professions were another emerging challenges from the focus group with few attempts from the universities to break down these perceptions. Another challenge faced by graduates was the dissonance between the theory of interprofessional working and current working practices⁶¹.

Pharmacy graduates voiced their concerns that limited collaboration between healthcare professionals exist in practice⁶². Pharmacists expressed lack of professional respect and felt undervalued by other healthcare professionals with lack of awareness and understanding of their roles and responsibilities. They believed that a hierarchy exists in the health system with doctors being superior⁶². Pharmacy graduates acknowledged that their level of respect toward doctors is more than their level of respect for nurses⁶².

Recommendations from recent graduates to improve IPE

Graduates made several recommendations and offered suggestions for enhancing the IPE experiences at undergraduate levels^{61,62}:

1. Developing structured IPE learning activities with specific objectives and learning outcomes;
2. Encouraging informal social interaction;

3. Establishing interactive IPE initiatives and use of innovative IPE initiatives such as simulation and case discussions;
4. Integrating IPE into the undergraduate healthcare curriculum rather than on *ad hoc* basis;
5. Learning about the roles of others and their own limitations;
6. Maximising IPE learning opportunities during clinical placements;
7. Increasing the emphasis on interprofessional communications;
8. Ensuring understanding and confidence in own role should be a prerequisite to understanding other's roles.

Discussion

The present review provides an insight into the perspectives, attitudes, views, and experiences of pharmacy students, pharmacy faculty, and practising pharmacists towards IPE and collaborative practice. Overall, the findings suggest that pharmacy students, practising pharmacists, and faculty valued IPE and collaborative practice. These groups had positive attitudes towards IPE, and there was a significant increase in IPE publications (n=24, 83%) in the last five years. Pharmacy students and recent graduates also perceived the need to incorporate IPE in the undergraduate curriculum. However, possible barriers to implementation within pharmacy schools have been discussed, in addition to challenges to collaborative practice in the healthcare setting. Students and pharmacists provided many insightful reflections about these challenges. The reporting of the challenges is much more explicit in the included article, of this systematic review, than what the facilitators offered. Overall, the challenges and barriers were reported more explicitly than enablers and facilitators offered.

The strength of this review is that it is the first systematic review exploring pharmacy perspectives toward IPE and collaborative practice using both quantitative, qualitative and mixed method literature. It is also the first to investigate the phenomenon from a uniprofessional perspective. It examined pharmacy perspectives towards IPE and collaborative practice across three key groups: pharmacy students, pharmacy faculty and practising pharmacists. With the advances seen in the evolving role of the pharmacist, the researchers believed this systematic review has provided additional information on the current pharmacy perspectives towards IPE and collaborative practice, and how it is structured and influenced. This highlighted areas that need to be taken into consideration to ensure effective pharmacy collaboration and engagement within the interprofessional teams

in the practice and with other healthcare students during their pre-qualifying education. Another major strength of this review is that it included international data and summarized facilitators and barriers for the key groups. Furthermore, the protocol for this study was peer reviewed and published prior to starting it¹⁶. This systematic review is also based on 29 studies published between 2000 and 2015. The diversity in the type of IPE initiatives employed is a strength and points to great potentials in utilising effective IPE strategies. The search terms accounted for some of the interchangeable terms used to describe IPE and collaborative practice, in addition to interchangeable terms for perceptions, as shown earlier in the search terms. The included papers originated from ten different countries with diverse educational and healthcare settings. Nevertheless, themes were consistent across the spectrum. The included studies were based on a comprehensive search strategy, a rigorous systematic review methodology applied for data extraction and synthesis and robustly assessing for methodological quality. The tools that were most commonly used to measure perspective were summarised.

In line with previous IPE literature, the following findings have been identified from this review:

1. Heterogeneity in reporting IPE research
2. Traditional professional image of the pharmacist;
3. Lack of longitudinal follow-up;
4. Lack of IPE research on faculty;
5. Paucity in mixed method studies in terms of quality and numbers.

Heterogeneity in in reporting IPE research

Heterogeneity in the included studies and the different research designs used limited the opportunities for comparison between studies. It may have also accounted for some of the inconsistencies in the findings. Participant recruitment for most studies was voluntary and the characteristics of those not included were not reported. More than half of the included studies (n=15, 52%) were quantitative and used surveys. However, these varied from using different versions of validated instruments to ones developed based on the literature with no indication of validity of these instruments. Although, surveys provided data for statistical analysis, they focused on a single outcome measure: student readiness³⁵. Additionally, it was difficult to detect statistical differences in pre- and post-studies as many of the respondents already had a high level of readiness for IPE^{42,44,45}. It is possible that the scales used are not sensitive to detect changes after educational intervention, or IPE activities were of short duration lessening the impact of these activities on attitudes⁴². Unfortunately, it is still not possible to determine if improved pharmacist perceptions are linked to behavioural

change or better patient outcomes once they start practising⁴⁴. Further research is needed to develop a clear and consistent scale that is sensitive enough to measure change in attitudes .

There were also mixed results related to attributes that affect pharmacy and other healthcare students' positive attitudes. Discrepancies in attitudes identified in the literature highlight the need for control group studies. Additionally, the methodological rigour was an issue for most of the included studies, with many of the studies (n=25) having scores on the MMAT tool ranging from 0-50%. In a recent Best Evidence Medical Education (BEME) systematic review, out of 258 papers that were quality assessed, less than 10% (n=25) were deemed of high quality¹³.

Traditional professional image of the pharmacist

One notable finding from this review is the perception of the professional image of the pharmacists. Pharmacy practice is rapidly evolving with pharmacists pursuing a much more advanced therapeutic role and collaboration with other healthcare professionals. Being an integral part of the health team is essential to ensure that optimal quality of care is delivered to patients. Despite the advances in the scope of pharmacists' practice in the recent years, the perception of pharmacists as feeling undervalued persists with a lack of awareness and a lack of respect from other healthcare professionals, especially doctors. Concepts such as power play; territorialism, hierarchy, stereotype, and professional identity were perceived as obstacles to collaborative practice. Some pharmacists reported not wanting to cross boundaries and perceiving that doctors are threatened by the advancement of the pharmacists' role. Pharmacists in many of the reviewed studies admitted confidence and courage to collaborate with other healthcare professionals, especially physicians. However, findings of this review indicate that some pharmacists were still not interested in collaboration. Those pharmacists had no previous experience of collaboration, believed that there was no need to pursue this further, and perceived other healthcare professionals to be uninterested in pursuing this further.

The findings of the professional image, and the feeling of being undervalued by other healthcare professionals particularly doctors have been mentioned by both students and practising pharmacists. These findings are important to curriculum developers and practice leaders. The lack of confidence by pharmacy students in certain IPE activities, especially those with other healthcare students with more advanced experiences need to be explored. It is crucial to ensure the IPE exercise is appropriate and relevant to each participating profession^{42,46} in addition to ensuring authenticity of the case³⁹.

Lack of longitudinal follow-up

Most of the included IPE studies tended to focus on short term improvements which aligns with other IPE literature^{19,64}. Many of the included studies focusing on student perceptions were of short duration, focused on one cohort, and lacking longitudinal follow-ups to measure meaningful outcomes in terms of perception or patient and system outcomes⁶⁴. The effect of IPE educational interventions on attitudes varied. Longitudinal IPE activities showed significant improvement in positive attitudes^{43-46,48}. However, understanding the reasons for this significant improvement is limited. Future work must include longitudinal evaluation focusing on intrinsic and extrinsic factors that may affect perception and to allow for tracking changes, in perception, during time.

Lack of IPE research on faculty

The review found a clear absence of research on faculty perception towards IPE^{51,65,66} with only one of the included studies focusing on pharmacy faculty perception. In this review, lack of faculty development has affected student experiences and was sensed by students⁵⁰. Therefore, research in this area would be valuable and provide richness of data.

Paucity in mixed method studies in terms of quality and numbers.

Although the mixed method approach has been advocated for IPE research and is viewed as the most effective design to gain in-depth insight of behavioural attitude and views, less than a quarter of the included studies employed mixed method approaches (n=4, 13%)^{39,45-47}. However, only two of these (7%) were based on mixed method methodology (sequential mixed method design)^{46,47}. These studies were of very low quality. It has been recommended that IPE research would benefit from rigorous mixed method studies that employ both quantitative and qualitative research methodology to provide detailed insights of how IPE can have an impact and an effect on both patient outcomes and the health care process⁶⁷. There is a need for more mixed method approaches in exploring IPE and collaborative practice to allow further understanding of the complexities of perceptions and behaviours.

Limitations

This systematic review has several limitations. Studies included were limited to those written in English, so some relevant studies not published in English may have been missed. There is the potential of publication bias, as only full text articles were included and grey literature was not searched. This review was based on 29 articles where the focus on pharmacy perspectives was the primary focus of these studies. However, despite best efforts to

systematically search the four databases and include articles that fit with the research objective, some may have been missed unintentionally. Although at the beginning of this systematic review, there were plans to consider the IPE definition as a criterion for including the studies. However, after starting the search and screening processes, it was noted that many of the included studies did not clearly state the definition of IPE/ IPC. Therefore, the researchers opted out not to use this definition as an inclusion criterion for the study.

Challenges and enablers discussed were considered in some studies but not all should be viewed as possible influencing factors, bearing in mind the strength of these themes have not been reported by all of the included studies and were varied and inconsistent. Additionally, many included studies only focused on two health disciplines: pharmacists and doctors. They did not explore the relationship with other healthcare professionals. Further study is needed to examine other stakeholders' perspectives. These include other healthcare professionals, policy makers, administrators, and governmental officials. Many of the included studies focused on single events, single programmes, or single institutions, thus limiting the generalisability of the findings.

Studies included in this review also shared some important limitations that could be taken into consideration in future studies. Many studies involving an IPE intervention did not have a pre and post study design to measure the change in attitudes following the intervention³⁸. In some of the included activities, some participants were graded on their participation or submitted a reflection assignment and hence they could have acted and responded differently as a result^{38,60}. Low response rate could be due to coding errors or participants not completing the post-survey^{48,53}. All the included studies relied on self-reporting and with voluntary participation, so those who have participated may have a pre-established interest in the topic and were highly motivated with an element of social desirability resulting in bias toward more positive experiences and attitudes^{43,56,60}. Another limitation is the small scale nature of the studies and the absence of controlled studies. Participants are from a single geographical location, so findings cannot be generalised to other similar populations. Finally, it was not possible to compare and contrast pharmacist perspectives with other healthcare professional perspectives, as there are no other systematic reviews that target other healthcare professional perspectives. It would be useful to conduct similar systematic reviews exploring the uniprofessional perspectives of other healthcare professionals towards IPE and collaborative practice.

Conclusion

This review was the first to provide insights into pharmacy perspectives of IPE and collaborative practice. It is crucial to ensure that the positive attitudes of pharmacy students,

practising pharmacists, and faculty are extended and built upon. Appropriate training and support on interprofessional communication is needed to increase pharmacist confidence when dealing with other healthcare professionals. These findings will provide potential opportunities to stakeholders to develop and implement IPE activities that are meaningful and unique. Additionally, more IPE collaboration at the undergraduate and practice level need to be developed and built into the curricula to accommodate for the enhanced IPE expectations of today's health professions providers and the need for the existence of collaborative practice environment.

Sustained efforts are required not just in undergraduate curricula but also in healthcare settings to improve and promote an interprofessional culture at the individual and organisational level. More IPE collaboration at the undergraduate and practice level should be developed. It is likely that through structured integration of IPE into the undergraduate curricula, more faculty development and increased collaboration in healthcare settings will have a positive effect on attitudes and, ultimately, greater patient outcomes. Despite any limitations, this review adds knowledge to existing IPE research and literature. It is important to look beyond the challenges and obstacles and look for ways to facilitate integrating IPE into the curriculum and promoting more collaborative working in practice.

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Tables and Figures

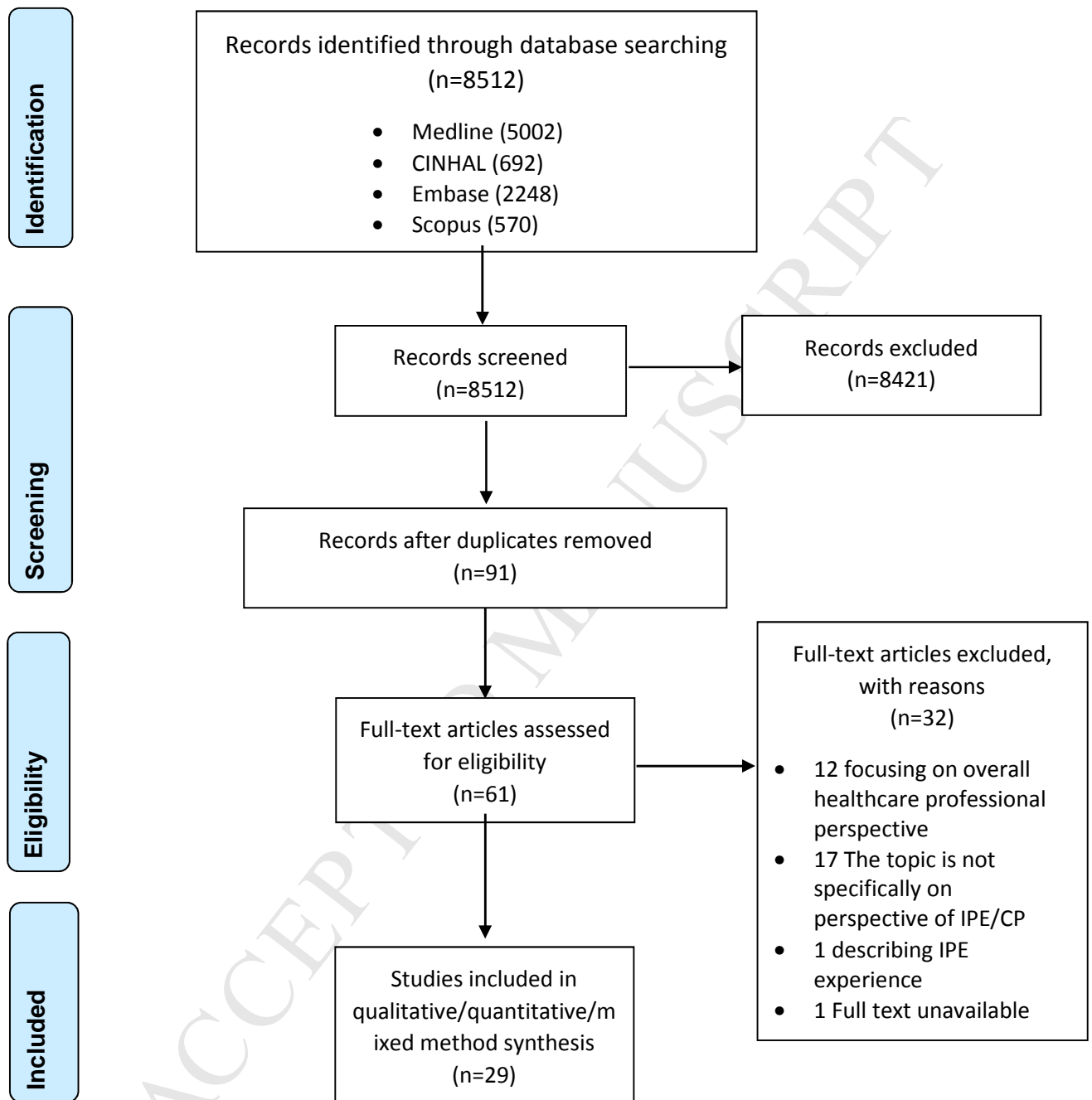


Figure 1: PRISMA Chart for Paper Selection Process

Table 1: Characteristics of the Articles Selected

Journal		Country		Date of Publication	
Journal of Interprofessional Care	7	USA	13	2000-2005	3
American Journal of Pharmaceutical Education	4	Australia	4	2006-2010	2
Currents in Pharmacy Teaching and Learning	3	Canada	3	2011-2015	24
International Journal of Clinical Pharmacy	2	UK & Northern Ireland	2		
BMC Medical Education	2	Spain	2		
Research in Social and Administrative Pharmacy	1	Germany	1		
British Journal of General Practice	1	New Zealand	1		
Canadian Pharmacists Journal	1	Singapore	1		
Education in Primary Care	1	Qatar	1		
Medical Education Online	1	Saudi Arabia	1		
Nurse Education Practice	1				
International Journal of Nursing Sciences	1	Methodology			
International Journal of Pharmacy Practice	1	Quantitative only	15		
BMC Health Services Research	1	Qualitative only	10		
Learning in Health and Social Care	1	Mixed	4		
Medical Education	1				

Table 2: Data Extraction for Study Focusing on Students

Year, Country	Authors Title	Main objectives	Participants, Study Setting	Methods of Data Collection Duration	Key findings regarding Pharmacy Perspectives	MMAT Score*
2001, New Zealand	Horsburgh et al. Multiprofessional learning: the attitudes of medical, nursing and pharmacy students to shared learning	To quantify: <ul style="list-style-type: none"> the attitudes of first-year medical, nursing and pharmacy students' towards interprofessional learning, at course commencement. 	1st year: <ul style="list-style-type: none"> Medicine (n=79) Nursing (n=49) Pharmacy (n=52) 	Survey RIPLS Within 4 weeks of the commencement of their studies	Perceived Benefits of IPE and collaborative practice: <ul style="list-style-type: none"> Positive attitudes towards shared learning. Better patient care Improve professional working relationships. More effective team working. Enhance relationships with other professionals. Differences: <ul style="list-style-type: none"> No important differences between the attitudes of the three groups. More certain about what their professional role would be than were the medical students. The term interprofessional and shared learning have been mixed. Students at the beginning of their careers and did not yet have a professional identity 	50%
2008, Canada	Curran et al. Attitudes of health sciences students towards interprofessional teamwork and education	To examine: <ul style="list-style-type: none"> the attitudes of health sciences students towards interprofessional teams and IPE. To identify: <ul style="list-style-type: none"> specific attributes of students which might influence these attitudes. 	Medicine (n = 195) Nursing (n=762) Pharmacy (n=113) Social Work (n = 109)	Survey A 14-item Likert scale adapted from Heinemann, Schmitt & Farrell A 15-item Likert scale RIPLS	Perceived Benefits of IPE: <ul style="list-style-type: none"> Positive attitude toward the concept of interprofessional healthcare teamwork. Differences: <ul style="list-style-type: none"> Significant differences in attitude between different professions exist. Significantly more positive attitude was noted in pharmacy and social work students in comparison to Medicine and nursing students. Attributes significantly affecting positive attitudes: <ul style="list-style-type: none"> Profession, gender (female), prior IPE experience and year of study (senior). 	25%
2012, UK	Layzell et al. Evaluation of the learning experiences	To evaluate: <ul style="list-style-type: none"> a multiprofessional learning environment in which 	Survey: Pharmacy, 3rd (n=27) 2 x Focus	Mixed methods study, using a sequential	Benefits of IPE and collaborative practice: <ul style="list-style-type: none"> Unique learning experiences. Opportunities to practise professional roles. Interrogation of professional boundaries. 	25%

	afforded through multipractice learning in primary care: a project in the development of a multiprofessional learning organisation	undergraduate pharmacy students were attached to general practices to learn alongside general practice specialist trainees.	group: <ul style="list-style-type: none"> (n=14) & (n=13) 	explanatory approach'. (surveys followed by focus groups.) 2 parts: learners view and Interdisciplinary Education Perception Scale	<ul style="list-style-type: none"> Better understanding of the organisation of primary care. Pharmacist perceived by physicians as an expert resource regarding medicines. Increase in understanding the values of others. Challenges to collaborative practice: <ul style="list-style-type: none"> Pharmacists' perceived low status, undervalued and disenfranchised. Interactions of power play between doctors and other team members. Perceived differences in professional standing. Physicians were trained diagnosticians, naturally leading the multiprofessional team. Older doctors unwilling to accept Pharmacist opinions. Primary care doctors difficult to access. Deprofessionalisation: lowering academic standards at entrance to university, Poor public image (shopkeeper) and not accepted by the general public as important members of the healthcare team, erosion of pharmacist role by successive government policies. Need to increase the breadth of their professional roles, promote their profession and closer interprofessional working. Potential conflict of interest Make-up of the interprofessional team 	
2012, USA	Wamsley et al. The impact of an interprofessional standardized patient exercise on attitudes toward working in interprofessional teams	To describe and evaluate: <ul style="list-style-type: none"> an interprofessional standardized patient exercise (ISPE) and its impact on students' attitudes toward working in interprofessional teams. 	Case: <ul style="list-style-type: none"> Dentistry (n=23) Medicine (n=26) Nursing (n=21) Pharmacy (n=24) Physical therapy 	Quasi-experimental design pre- and post-ISPE & Satisfaction survey, focus group 20 items survey on	Benefits of IPE and collaborative practice: <ul style="list-style-type: none"> Significant improvement on the team value and team efficiency but not physician's shared role on teams. High satisfaction with the activity from faculty and students. Learnt more about their own roles and about the roles of other healthcare professionals in an interprofessional team. Foster collaboration in interprofessional teams. Greater appreciation of other professions. 	0%

			<p>(n=7)</p> <p>Control:</p> <ul style="list-style-type: none"> • Dentistry (n=19) • Medicine (n=47) • Nursing (n=27) • Pharmacy (n=50) • Physical therapy (n=9) <p>Focus group:</p> <ul style="list-style-type: none"> • Pharmacy (n=6) • Medicine (n=5) • Nursing (n=4) • Dentistry (n=2) • Physical therapy (n=6) <p>Clinical Skills Centre</p>	<p>attitudes toward health care teams (ATHCT) survey, a validated survey containing representing 4-hour simulation exercise</p>	<ul style="list-style-type: none"> • Increased their confidence and comfort in interacting with other healthcare professionals. <p>Challenges to IPE:</p> <ul style="list-style-type: none"> • Limited clinical experience of the pharmacy students <p>Differences:</p> <ul style="list-style-type: none"> • Significant differences in attitudes toward team based care by profession. 	
2013, USA	Bottenberg et al. Assessment of interprofessional perceptions and attitudes of health professional students in a simulation laboratory setting	<p>To describe:</p> <ul style="list-style-type: none"> • the interprofessional experience of medical, pharmacy, and nursing students involved in a private medical school's simulation laboratory. <p>To evaluate:</p> <ul style="list-style-type: none"> • descriptive data 	<ol style="list-style-type: none"> 1. Medicine (n=118) 2. Pharmacy (n=45) 	<p>Post assessment survey</p> <p>A 24-item survey based on the Index of Interdisciplinary Collaboration</p>	<p>Benefits of the IPE:</p> <ul style="list-style-type: none"> • Beneficial experience • Positive attitude toward the IPE simulation experience. • Positive perception toward each other and multidisciplinary training. • High level of respect and willingness to participate in multidisciplinary patient care exercises. • Teams worked well together and improved the 	25%

		gathered from Perceptions and Attitudes survey entitled.		, ATHCT Scale, the RIPLS tool, and the Inter-disciplinary Education Perception Scale simulation laboratory, located in a medical school 20-30 min simulation activity 30-60 min discussion session	quality of patient care. Challenges to IPE: <ul style="list-style-type: none"> Less favourable to the idea that the participants worked well together (Pharmacy students not used to simulation as medical students). Differences: <ul style="list-style-type: none"> Statistically significant differences noted with medicine being more positive than pharmacy. 	
2013, USA	Maldonado et al. Impact of Participation on a Solid Organ Transplant Team on Student Pharmacists' Perceptions of Interprofessional Roles	To examine: <ul style="list-style-type: none"> student pharmacists' perceptions of interprofessional roles before and after completing an advanced pharmacy practice experience on solid organ transplantation. the impact of IPE during experiential learning. To explore: <ul style="list-style-type: none"> possible factors which may have contributed to student pharmacists' opinions 	<ul style="list-style-type: none"> Pharmacy (n=37) Other professions involved: Nursing, Medicine, Dentistry, Allied Health and others Solid organ transplant programme	Online pre- and post-APPE survey instrument based on: <ul style="list-style-type: none"> items used by Dobson and colleagues in their study on quality improvement to promote IPC among 	Benefits of IPE: <ul style="list-style-type: none"> Positive changes in interprofessional perceptions in the areas of roles and responsibilities, interprofessional communication, teams and teamwork. Positive impact of the experience. Experiential learning impacted on the improved positive perspective. 	25%

		regarding interprofessional collaboration.		health professions students <ul style="list-style-type: none"> Clark's Interdisciplinary Team Weekly Inventory Solid organ transplant internship		
2013, USA	Shrader et al. An Interprofessional Geriatric Medication Activity within A Senior Mentor Program	To evaluate: <ul style="list-style-type: none"> the impact of participation in the geriatric medication activity on pharmacy and medical students' attitudes toward interprofessional collaboration. To determine: <ul style="list-style-type: none"> student satisfaction with the experience. 	<ul style="list-style-type: none"> pharmacy students (n=55) medical students (n=101) university	pre- and post-activity survey design & collaborative team essay, satisfaction survey. The Scale of Attitudes Toward Physician-Pharmacist Collaboration IPE activity over a semester in a senior mentor programme	Benefits of IPE: <ul style="list-style-type: none"> Positive attitudes regarding interprofessional relationships maintained or significantly improved. Enhanced their geriatric training and increased their understanding of an interprofessional team. Value collaborative practice and interprofessional teams. Satisfaction with the interprofessional learning experience. Challenges to IPE: <ul style="list-style-type: none"> Scheduling conflicts. Integrating pharmacy students into the senior mentor programme earlier so that more interprofessional activities would be possible. 	75%
2013, Singapore	Ahmad et al. Are first-year healthcare undergraduates at	To examine: <ul style="list-style-type: none"> the readiness of first-year medical, nursing, pharmacy and 	freshmen orientation week: <ul style="list-style-type: none"> dentistry 	A quantitative comparative descriptive design	Perceived benefits to IPE <ul style="list-style-type: none"> High readiness to IPE on entry. Differences: <ul style="list-style-type: none"> No significant differences noted when the 	50%

	an Asian university ready for interprofessional education?	dentistry students' toward IPE prior to undertaking IPE activities and at course commencement.	(n=41) <ul style="list-style-type: none"> • medicine (n=226) • nursing (n=75) • pharmacy (n=118) 	29-item modified version of the Readiness for Interprofessional Learning Scale (RIPLS) freshmen orientation week	overall RIPLS scores were compared with different demographic variables, which include gender, age, ethnicity, prior experiences interacting with other health professional and family members who are health professionals. <ul style="list-style-type: none"> • Highly significant differences among the different professions for overall attitudes. • Significantly less readiness was reported by pharmacy and dentistry students when compared to medical students. 	
2014, USA	Wilhelm et al. Interprofessional ethics learning between schools of pharmacy and dental medicine	To examine: <ul style="list-style-type: none"> • student perceptions and knowledge of interprofessional ethical decision-making processes. 	1. Pharmacy (n=82) Dental students (n=51) University	pre-post intervention quasi-experimental research design RIPLS, pre-/post-individual ethics knowledge quiz, pre-team ethics knowledge quiz and post-student perception survey A case based IPE ethics activity (two 2hrs sessions that are three weeks apart)	Benefits of IPE: <ul style="list-style-type: none"> • Favourable attitude with high readiness prior to session. • Enjoyed the experience and desired to have more IPE. • Case discussions, teamwork and getting to know the other professional students. • Enhancement of knowledge gained. Challenges to IPE: <ul style="list-style-type: none"> • IPE cases (need to be more varied and apply for all participating profession). • Scheduling. • Not same knowledge base for students. Differences: <ul style="list-style-type: none"> • No statistically significant differences between dental and pharmacy students at baseline and post sessions. 	0%

2014, USA	Shrader et al. Multiple Interprofessional Education Activities Delivered Longitudinally Within a Required Clinical Assessment Course	To determine: <ul style="list-style-type: none"> if the incorporation of multiple IPE activities delivered as a longitudinal curriculum within a required clinical assessment course changed pharmacy students' perceptions regarding interprofessional collaboration. 	Pharmacy, 3rd year (n=71) Other profession	Pre- and post-survey 18-item validated survey instrument, Interdisciplinary Education Perception Scale (IEPS) Clinical Assessment (3-credit-hour applications-based course): Nine separate IPE activities over the semester (20min-3hrs).	Benefits of IPE: <ul style="list-style-type: none"> Students had positive perceptions prior to session. Significant improvement in pharmacy students' perceptions regarding IPC following longitudinal IPE activities with most positive changes in perception noted in competence and autonomy. 	25%
2015, USA	Liu et al. Design and evaluation of interprofessional cross cultural communication sessions	To evaluate: <ul style="list-style-type: none"> the perceived effectiveness of IPE sessions designed to improve culturally competent communication among pharmacy and nursing students. 	Pharmacy students (n=80) Nursing students (n=80) University	Pre-test–post-test survey Clinical Cultural Competency Questionnaire (CCCQ), a knowledge quiz and a perception survey at the end. 2 IPE sessions with one month apart.	Benefits of the IPE: <ul style="list-style-type: none"> Positive impact on their attitude, knowledge and ability related to working with other healthcare professionals and serving diverse patients. Differences: <ul style="list-style-type: none"> No differences were observed between the two professions in their perceptions 	75%

<p>2015, USA</p>	<p>Rotz et al. Exploring first-year pharmacy and medical students' experiences during a longitudinal interprofessional education program</p>	<p>To explore:</p> <ul style="list-style-type: none"> student-reported experiences relating to IPE core competencies within our combined IPE courses. <p>To identify:</p> <ul style="list-style-type: none"> key emergent themes related to the overall student experience. 	<p>Pharmacy students (n=9) Medical students (n=9)</p>	<p>Focus group x 3</p> <p>Student run clinic 24 week ambulatory clerkship</p>	<p>Benefits of IPE:</p> <ul style="list-style-type: none"> Positive and beneficial experience. Positive attitude. Respect, trust and appreciation of other healthcare professions. Cooperation in interprofessional settings. Share goal for patient centred care. Learnt more about their advanced pharmacists' role. <p>Challenges to IPE:</p> <ul style="list-style-type: none"> Lack of consistency in preceptors' understanding of IPE. Lack of communication due to patient scheduling and physical space in patient rooms during internships. Disconnect between student expectations and actual experiences. Not prepared for the experience and uncomfortable with the limitations in their knowledge and skills. 	<p>25%</p>
<p>2015, USA</p>	<p>Judge et al. Evaluation of students' receptiveness and response to an interprofessional learning activity across health care disciplines: An approach toward team development in healthcare</p>	<p>To explore:</p> <ul style="list-style-type: none"> if an interdisciplinary educational activity improves student readiness for interprofessional learning. 	<ol style="list-style-type: none"> Dental (n=42) Medicine (n=79) Physical therapy (n=62) Nursing (n=77) Pharmacy (n=27) Dietetics (n=18) 	<p>A pre-test post-test design Readiness for Interprofessional Learning Scale (RIPLS): 19-item Likert scale survey 4h interdisciplinary educational programme</p>	<p>Benefits of the IPE:</p> <ul style="list-style-type: none"> Positive attitude but not significant improvement in RIPLS score post IPE activity for the entire cohort including pharmacy. <p>Differences:</p> <ul style="list-style-type: none"> Pharmacists had the highest mean RIPLS score pre-test and post-test score in comparison to other profession involved. This could be due to IPE activity topic covered which relates directly to the role of pharmacy students. 	<p>50%</p>

<p>2015, USA</p>	<p>Lehrer et al. Peer-led problem-based learning in interprofessional education of health professions students</p>	<p>To determine:</p> <ul style="list-style-type: none"> if peer-teacher-led problem-based seminars can influence medical and pharmacy students' perceptions of IPE. 	<p>Case: 1. Medicine (n=19) 2. Pharmacy (n=10) Control: 1. Medicine (n=43) 2. Pharmacy (n=29) University</p>	<p>Case control study design Interdisciplinary Education Perception Scale (IEPS): 18-item likert scale survey & Barrier survey one-hour problem-based learning seminars held over the course of 16 weeks</p>	<p>Benefits of IPE: <ul style="list-style-type: none"> Higher perception of professional cooperation. Challenges to IPE: <ul style="list-style-type: none"> Lack of awareness of IPE programme. Lack of time to participate. Differences: <ul style="list-style-type: none"> Pharmacy students perceived a significantly higher need for professional cooperation and interdependence when compared to medical students. </p>	<p>25%</p>
<p>2015, Saudi Arabia</p>	<p>Khan et al. Study investigating pharmacy students' interprofessional perceptions toward the pharmacy profession in Saudi Arabia</p>	<p>To assess:</p> <ul style="list-style-type: none"> Doctor of Pharmacy (PharmD) students' interprofessional perceptions about the pharmacy profession in Saudi Arabia. 	<p>Pharmacy (n=218) University</p>	<p>Survey 26 item survey (Interdisciplinary Education Perception Scale (IEPS)) No IPE activity</p>	<p>Perceived benefits of IPE: <ul style="list-style-type: none"> Improve pharmacists' cooperation with other healthcare professionals. Perceived challenges to IPE: <ul style="list-style-type: none"> Pharmacists' work is not well acknowledged by other health care professionals. Pharmacists have a lower status than other health care professionals. Attributes affecting attitudes: <ul style="list-style-type: none"> Gender (male). Age group (senior students). Previous job experience. Attendance at a workshop. Hospital/community pharmacy training in the last six months. </p>	<p>75%</p>

<p>2015, USA</p>	<p>Arenson et al.</p> <p>The health mentors program: three years experience with longitudinal, patient-centred interprofessional education</p>	<p>To describe</p> <ul style="list-style-type: none"> the implementation of a required longitudinal IPE programme relying on lay persons as educators. <p>To identify:</p> <ul style="list-style-type: none"> short-term process outcomes for continuous curriculum improvement. <p>To evaluate:</p> <ul style="list-style-type: none"> mid-range longitudinal evaluation of impact on student attitudes toward chronic illness care and IPE, understanding of the roles of professional team members and patient-centred care. 	<ul style="list-style-type: none"> Medicine Nursing OT Pharmacy PT CFT (couple and family therapy) 	<p>Sequential mixed-methods design</p> <ul style="list-style-type: none"> student focus groups Quantitative survey: ATHCT & IEPS scale student reflection papers 2 years' experience 	<p>Benefits of IPE:</p> <ul style="list-style-type: none"> Benefit for future practice Significant improvements in attitudes from baseline to the end of year two in each programme (including pharmacy) Mean IEPS scores at baseline were high/positive on the scale and were maintained by programme end. Skills of teamwork Understanding roles of other health professionals Enhanced overall university experience. <p>Challenges to IPE:</p> <ul style="list-style-type: none"> Logistical challenges of the programme (schedules, time management, travel time). Uncertain about own role. Curriculum goals need to be clear and relevant to each profession. Difficult to teach others. <p>Differences:</p> <ul style="list-style-type: none"> For IEPS, there was no significant differences by profession from baseline to the end of the programme. 	<p>0%</p>
<p>2015 Qatar</p>	<p>Wilbur et al.</p> <p>Interprofessional impressions among nursing and pharmacy students: a qualitative study to inform interprofessional education initiatives</p>	<p>To explore:</p> <ul style="list-style-type: none"> undergraduate pharmacy and nursing student attitudes and perceptions of each other's roles in advance of the country's first multidisciplinary learning activity. 	<ul style="list-style-type: none"> Pharmacy (n=10) Nursing (n=9) <p>include junior (first or second professional year) and senior (third or final professional year) students</p>	<p>A qualitative descriptive study design using semi structured focus group 4 focus group No intervention</p>	<p>Perceived benefits of IPE and collaborative practice:</p> <ul style="list-style-type: none"> Supportive attitude. Developing greater mutual understanding in patient care roles. Learn from one another. Positive impact on patient care Close interprofessional communication with the nurses. <p>Perceived challenges to collaborative practice:</p> <ul style="list-style-type: none"> Pharmacists' and nurses' perception as one another's intermediaries with physicians. Basic understanding of one another's role. Tend to follow traditional roles and responsibilities. 	<p>50%</p>

					<ul style="list-style-type: none">• Pharmacists new expanded role overlap with some of the nurses' roles and responsibilities with nurses.	*
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* MMAT Methodological *Quality Assessment*

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Table 3: Data Extraction for Studies Focusing on Practising Pharmacists

Year, Country	Authors Title	Main objectives	Participants, Study Setting	Methods of Data Collection Duration	Key findings regarding Pharmacy Perspectives	MMAT Score*
2003, Northern Ireland	Hughes et al. Perceived interprofessional barriers between community pharmacists and general practitioners: a qualitative assessment	To identify and explore: <ul style="list-style-type: none"> perceived (or otherwise) barriers between general practitioners (GPs) and community pharmacists in relation to interprofessional working and the extension of prescribing rights to pharmacists. 	GP (n=22) Community pharmacists (n=31) GP and Community Pharmacies	Qualitative study Uniprofessional focus groups	Challenges to collaborative practice: <ul style="list-style-type: none"> The 'shopkeeper' image of community pharmacy with the following subthemes (focusing on barriers): access, hierarchy, and lack of awareness. Facilitators to teamwork: <ul style="list-style-type: none"> Joint interprofessional training between healthcare professions. 	25%
2005, USA	Doucette et al. Factors affecting collaborative care between pharmacists and physicians	To identify: <ul style="list-style-type: none"> significant influences on collaborative care between pharmacists and physicians, from the perspective of pharmacists. 	Pharmacists (n=166) Pharmacists in different settings	A cross-sectional mail survey design Professional interaction scale, personality assessment, 14 item Physician/Pharmacist Collaboration Instrument.	Predictors of interprofessional collaboration: <ul style="list-style-type: none"> Three variables from the collaborative working relationships model were significantly associated with collaborative care: trustworthiness, role specification, and professional interaction Relationship initiation was not a significant predictor of collaboration among participants. 	25%
2009, Canada	Makowsky et al. Collaboration between pharmacists, physicians and nurse	To explore: <ul style="list-style-type: none"> the integration process of a clinical pharmacist within a health care team. pharmacist, 	Pharmacists (n=2) Physicians (n=13) Nurse (n=2)	Phenomenological approach Mixed methods including	Benefits of collaborative practice : <ul style="list-style-type: none"> Team processes: role clarity and relationships development built on mutual respect and trust facilitated teamwork. Making positive contributions to patient care and patient safety. 	25%

	practitioners: A qualitative investigation of working relationships in the inpatient medical setting	physician, and nurse practitioner experiences around working as a team.	Tertiary care teaching hospitals	reflective journaling and key informant interviews.	<ul style="list-style-type: none"> Improving team decision making. Continuity of care. Increased awareness of healthcare professionals' roles. Regular professional interaction facilitated teamwork. Better job satisfaction. <p>Challenges to collaborative practice :</p> <ul style="list-style-type: none"> Lack of awareness of pharmacist clinical role by primary care healthcare professionals: GP and nurses (mainly they deal with community pharmacists) Not well defined roles. Makeup of the interprofessional team. Health care professionals placing a greater value on pharmacists dispensing function. Organisational and practice structure: heavy workload and inflexible work schedule by pharmacy department <p>Facilitators to teamwork:</p> <ul style="list-style-type: none"> Processes are in place at team and organisational level. Ongoing professional development, support, mentorship and learning about how teams function. 	
2011, Australia	Dey et al. Collaboration in chronic care: unpacking the relationship of pharmacists and general medical practitioners in primary care	To gain: <ul style="list-style-type: none"> deeper understanding of the expectations, experiences and perceptions of Australian general medication practitioners (GPs) and pharmacists around collaboration in chronic illness (asthma) management in the 	Pharmacists (n=18) GPs (n=7) GP and Community Pharmacies	A qualitative research approach Semi-structured interview	<p>Benefits of collaborative practice :</p> <ul style="list-style-type: none"> Benefits to healthcare professionals and patients. Favourable attitude towards one another. Existence of good working relationship. <p>Challenges to collaborative practice :</p> <ul style="list-style-type: none"> Limited to basic minimal relationship. Lack of role understanding. Lack of confidence in interacting with physicians. Time and poor/lack of communication, GP attitudes, inaccessibility, lack of familiarity, motivation to interact, GP feeling threatened by 	25%

		primary care setting.			<p>pharmacist involvement and the patient.</p> <p>Facilitators to teamwork:</p> <ul style="list-style-type: none"> Professional needs: accessibility, style and nature of communication. Face-to-face communication. Financial remuneration. 	
2012, Spain	Rubio-Valera et al. Factors affecting collaboration between general practitioners and community pharmacists: a qualitative study	<p>To identify and analyse:</p> <ul style="list-style-type: none"> barriers and facilitators in collaboration between GPs and CPs in Spain. <p>To explore:</p> <ul style="list-style-type: none"> whether differences exist between GPs and CPs based on the geographical region where they work and previous experience of collaboration. 	<p>GP (n=18) Community pharmacists (n=19)</p> <p>GP and Community Pharmacies</p>	Phenomenological approach A descriptive-exploratory qualitative study using face-to face, semi-structured interviews	<p>Predictors of interprofessional collaborations:</p> <ul style="list-style-type: none"> Prior to collaboration: perception of usefulness, managers interest, attitude, and geography and legislation. During collaboration: achievement of common objectives, management stability. Factors related to economic issues, management and practitioners' attitudes and perceptions might be crucial for triggering collaboration. 	50%
2013, Germany	Wüstmann et al. Cooperation between community pharmacists and general practitioners in eastern Germany: attitudes and needs	<p>To determine:</p> <ul style="list-style-type: none"> attitudes of general practitioners and community pharmacists towards collaboration with each other. 	<p>GP (n=145) Community pharmacists (n=84) GP and Community Pharmacies</p>	Cross-sectional survey	<p>Predictors of interprofessional collaborations:</p> <ul style="list-style-type: none"> Trustworthiness, role specification and relationship initiation as meaningful predictors of collaboration. <p>Challenges to collaborative practice :</p> <ul style="list-style-type: none"> Cooperation is insufficient. Facilitators to teamwork More frequent interactions. 	50%
2013, Canada	Kelly et al. Pharmacist and physician views on collaborative practice: Findings from	<p>To capture:</p> <ul style="list-style-type: none"> the opinions of family physicians and community pharmacists in Newfoundland and 	<p>Community pharmacists (n=407) GP (n=33)</p> <p>GP and</p>	<p>Survey</p> <p>Developed based on literature and interest of</p>	<p>Perceived benefits of collaborative practice :</p> <ul style="list-style-type: none"> Improved health outcomes for patients. <p>Challenges to collaborative practice :</p> <ul style="list-style-type: none"> Not a routine part of their practice. Limited experience working collaboratively. Limited direct communication with physicians. 	50%

	the community pharmaceutical care project	Labrador (NL) regarding collaborative practice.	Community Pharmacies	research team.	<ul style="list-style-type: none"> Pharmacists' perception of areas for further collaboration differ significantly from a physician's perception. Lack of compensation. Required to collaborate with multiple physicians/pharmacists to provide care for patients. Involvement of multiple healthcare providers resulting in fragmentation of care. Time consuming. <p>Facilitators to teamwork</p> <ul style="list-style-type: none"> More collaboration to improve patient adherence. Pharmacists wants to collaborate more in areas related to their clinical roles. 	
2014, Spain	Jove et al. Perceptions of collaboration between general practitioners and community pharmacists: findings from a qualitative study based in Spain	To assess: <ul style="list-style-type: none"> the perceptions of GP-CP collaboration from these professionals' perspectives. 	Community pharmacists (n=19) GP (n=18)	Qualitative research methodology Semi-structured interviews	<p>Perceived benefits of collaborative practice :</p> <ul style="list-style-type: none"> The health system: provision of integrated care and increased efficiency of the system, share patients' clinical information and results, facilitated the provision of integrated care, increased the number of services offered and the efficiency of the health system, reduced the number of problems related to medication and promoted the rational use of medications. The physician and pharmacist: increase in their job satisfaction, professional image and patient loyalty. The patients: improved outcomes and safety and reduction in number of hospital visits. <p>Challenges to collaborative practice :</p> <ul style="list-style-type: none"> Conflict generation. Negative perception from those with no IPC experience. GPs did not perceive the usefulness of collaboration and therefore pharmacists had no interest in collaborating. <p>Facilitators to teamwork:</p> <ul style="list-style-type: none"> Need for prior education and collaboration. 	75%

<p>2014, Australia</p>	<p>Gilligan et al. Recommendations from recent graduates in medicine, nursing and pharmacy on improving interprofessional education in university programs: a qualitative study</p>	<p>To explore:</p> <ul style="list-style-type: none"> the reflections of graduates on the IPE experiences they had during their undergraduate education and training. 	<p>nursing graduates (n=28) medical graduates (n=17) pharmacy graduates (n=23) Recent graduates working in health services settings including hospitals</p>	<p>Interpretive research design Focus groups</p>	<p>New graduates reflection on their IPE experiences:</p> <ul style="list-style-type: none"> Experiences of IPE at University: valued the IPE experience in their programme, positive IPE experiences but valued interactive and authentic activities, mainly didactic experiences, no interaction and very few structured IPE experiences and missed opportunities on clinical placements. University rarely included attempts to break down the professional silos and limited social interaction. Dissonance between theory and practice. <p>Facilitators to teamwork</p> <ul style="list-style-type: none"> Graduates' recommendations to improve IPE: more opportunities for interaction, incorporate IPE into programme rather than standalone activities, deep understanding of other healthcare professionals' role, more innovative approaches for IPE, increased practical IPE experiences and more focus in interprofessional communication. 	<p>50%</p>
<p>2014, Australia</p>	<p>Ebert et al. 'They have no idea of what we do or what we know': Australian graduates' perceptions of working in a health care team</p>	<p>To explore:</p> <ul style="list-style-type: none"> the experiences of newly graduated health professionals and their understandings of 'knowing about' and 'working with' other health care professionals, as well as their preparedness for working as part of an interprofessional health care team. 	<p>nursing graduates (n=28) medical graduates (n=17) pharmacy graduates (n=23)</p>	<p>Interpretive research design Focus groups</p>	<p>Challenges to collaborative practice :</p> <ul style="list-style-type: none"> Limited understanding of the roles of other health professionals. Professional isolation, competition, professional tribalism and lack of mutual respect which varied depending on profession. Not guaranteed benefits of IPE. IPE experiences being intermittent, largely optional, non-assessable, and of little value in relation to their roles, responsibilities, and practice as graduate health professionals <p>Facilitators to teamwork</p> <ul style="list-style-type: none"> IPE need to be integrated into undergraduate health programmes. 	<p>25%</p>

2015, Australia	Luetsch et al. Interprofessional communication training: benefits to practising pharmacists	To explore: <ul style="list-style-type: none"> pharmacists' experiences and reflections after completing a learning and practice module which introduced them to a framework for successful interprofessional communication. 	Pharmacists (n=55)	Inductive approach on written reflections.	Perceived benefits of collaborative practice : <ul style="list-style-type: none"> Enhanced their interprofessional communication skills. Enhanced their professional identity, credibility and their ability to work collaboratively with other healthcare professionals. Better satisfaction. Challenges to collaborative practice : <ul style="list-style-type: none"> Lack of pharmacists confidence and capability. Fear of losing credibility. Facilitators to teamwork: <ul style="list-style-type: none"> Training. 	25%
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* MMAT Methodological Quality Assessment

Table 4: Data Extraction for Study Focusing on Faculty

Year, Country	Authors Title	Main objectives	Participants, Study Setting	Methods of Data Collection Duration	Key findings regarding Pharmacy Perspectives	MMAT score*
2014, USA	Lash et al. Perceived Benefits and Challenges of Interprofessional Education Based on a Multidisciplinary Faculty Member Survey	To identify: <ul style="list-style-type: none"> differences among faculty members in various health professional training programmes in perceived benefits and challenges of implementing IPE. 	<ul style="list-style-type: none"> Osteopathic Medicine (n=21) Pharmacy (n=34) Physician Assistant (n=7) Multi-college university 	Survey A 19-item survey created.	Perceived benefits of IPE and collaborative practice: <ul style="list-style-type: none"> Positive attitude. Implementation of IPE was feasible. Benefits on patient outcomes Improves care efficiency and promotes team-based learning. 	25%

* MMAT Methodological Quality Assessment