



Published in final edited form as:

Expert Opin Drug Saf. 2022 November ; 21(11): 1357–1364. doi:10.1080/14740338.2022.2147923.

Defining and enhancing collaboration between community pharmacists and primary care providers to improve medication safety

Annesha White^a, Kimberly G. Fulda^b, Rachel Blythe^a, Michelle A. Chui^c, Emily Reeve^{d,e}, Richard Young^f, Anna Espinoza^b, Noah Hendrix^g, Yan Xiao^g

^aDepartment of Pharmacotherapy, University of North Texas Health Science Center College of Pharmacy, Fort Worth, TX, USA

^bUniversity of North Texas Health Science Center, Department of Family Medicine and Osteopathic Manipulative Medicine, North Texas Primary Care Practice-Based Research Network (NorTex), Texas College of Osteopathic Medicine, Fort Worth, TX, USA

^cSocial and Administrative Sciences Division, University of Wisconsin – Madison School of Pharmacy, Madison, WI, USA

^dQuality Use of Medicines and Pharmacy Research Centre, School of Pharmacy and Medical Science, University of South Australia, Adelaide, Australia

^eCentre for Medicine Use and Safety, Faculty of Pharmacy and Pharmaceutical Sciences, Monash University, Parkville, Australia

^fJPS Hospital, Department of Family Medicine, Residency Program, Fort Worth, TX, USA

^gUniversity of Texas at Arlington, Arlington, TX, USA

Abstract

Introduction: Over 4 billion prescriptions are dispensed each year to patients in the United States, with the number of prescriptions continuing to increase. There is a growing recognition of pharmacists' potential in improving medication safety in community settings, in collaboration with primary care providers (PCPs). However, the nature of collaboration has not been well defined, and barriers and strategies are not articulated.

CONTACT Annesha White Annesha.white@unthsc.edu, Department of Pharmacotherapy, University of North Texas Health Science Center College of Pharmacy, 3500 Camp Bowie Blvd, IREB 211, Fort Worth, TX 76107, USA.

Author contribution

A White contributed to: Project Administration, Supervision, Conceptualization, Data Curation, Formal Analysis, Methodology, Validation, Visualization, Writing – Original Draft Preparation, Writing – Review and Editing; K Fulda contributed to: Writing – Conceptualization, Data Curation, Formal Analysis, Methodology, Validation, Visualization, Writing – Original Draft Preparation, Review and Editing; R Blythe contributed to: Data Curation, Formal Analysis, Methodology, Validation, Visualization, Writing – Original Draft Preparation, Writing – Review and Editing; M Chui contributed to: Writing – Conceptualization, Data Curation, Methodology, Validation, Writing – Original Draft Preparation, Writing – Review and Editing; E Reeve contributed to: Conceptualization, Methodology, Validation, Writing – Original Draft Preparation, Writing – Review and Editing; R Young contributed to: Conceptualization, Data Curation, Methodology, Validation, Writing – Original Draft Preparation, Writing – Review and Editing; A Espinoza contributed to: Conceptualization, Methodology, Validation, Writing – Original Draft Preparation, Writing – Review and Editing; N Hendrix contributed to: Writing – Conceptualization, Review and Editing; Y Xiao contributed to: Funding Acquisition, Project Administration, Supervision, Resources, Conceptualization, Data Curation, Formal Analysis, Methodology, Validation, Visualization Writing – Original Draft Preparation, Writing – Review and Editing.

Area covered: For this narrative review, published studies were retrieved from PubMed between January 2000 and December 2020. Search terms included “patient safety,” “medication safety,” “collaboration,” “primary care physician,” and “community pharmacy.” Resulting articles were categorized as follows: defining collaboration, types of collaboration, and barriers and solutions to collaboration.

Expert opinion: It is important to understand the factors within a community pharmacy setting that limit or facilitate community pharmacists’ participation in medication safety activities. Strategies such as medication review are a common form of collaboration. Barriers to collaboration include misconceptions regarding roles and differences in access to clinical information and community pharmacy practice variability. Future recommendations include increasing training and utilization of pharmacists/PCP teams, increasing community pharmacists’ practice in emerging roles, and expanding the community pharmacist role in transitions of care from the hospital to the community.

Keywords

Medication safety; older adults; community pharmacists; primary care physicians; collaboration

1. Introduction

Adverse drug events (ADEs), defined as “harm experienced by a patient as a result of exposure to a medication,” account for 700,000 emergency department visits and 100,000 hospitalizations each year [1]. Annually, in the United States (U.S), 4.5 million ambulatory visits are the result of ADEs [2], with disproportional impact on older adults. Older adults are especially vulnerable to ADEs due to changes in pharmacokinetics and pharmacodynamics, increased number of medications, and ability to manage medications safely [3]. Older adults living in the community are taking a growing number of medications [4] dispensed through community pharmacies, making community pharmacists a key player in the efforts to reduce ADE-related patient harms.

Community pharmacists are highly accessible as 90% of people within the U.S. live within 5 miles of a community pharmacy [5]. In this review, we refer to community pharmacies who do not typically have access to an electronic health record and tend not to have affiliation with health systems or clinics, such as traditional drug stores, supermarkets, and mass merchants with pharmacies. Community pharmacists’ roles in medication safety in dispensing are well adopted among pharmacists, ensuring the right dose of the right medicine reaches the right patient at the right time by the right route [6]. Beyond dispensing-related safety roles, studies have shown that community pharmacists are under-utilized in reducing ADEs such as through improving prescribing decision-making, inpatient education, in disease state monitoring, and in functioning as a safety net [7]. Due to their proximity to patients and frequency of interactions, a wider view of community pharmacist in patient care has been recognized. For example, more comprehensive lists of roles include evaluating medication appropriateness, improving medication adherence, providing health and wellness services, performing medication management services, assessing patients’ health status, and coordinating care transition [7].

While the primary role of the community pharmacist may be thought of as mostly a dispensing role, there is an expanding scope of clinical services that can be provided at, or through, community pharmacies. The pharmacist's evolving role has demonstrated the demand for enhanced collaboration with physicians, advanced practice registered nurses, and physician associates, referred to as a group as primary care providers (PCPs). The community pharmacists serve as the "gatekeepers" for prescription drugs since they are the last individual to verify a medication order before it gets to the patient. Pharmacists are in a unique position as medication experts to support the role of physicians to achieve the best outcomes for patients. Therefore, both community pharmacists and PCPs serve significant roles regarding medication safety. Successful PCP-pharmacist collaboration could help improve patient outcomes and reduce medication errors.

Improving medication safety in the community will rely on effective collaboration between community pharmacists and primary care providers. Collaboration among health-care professionals (HCPs) is fundamental to all healthcare. Previous studies have shown that interventions, which focus on enhancing the collaboration between PCPs and pharmacists, can lead to improved health outcomes for patients. However, these interventions generally focus on instituting new care models, such as having a pharmacist embedded within a primary care clinic [8,9]. Where pharmacists and the PCPs are not co-located nor involved in a regular dyad or team (i.e. a pharmacist working in the community would likely deal with prescriptions and patients from multiple PCP and clinics), the models and potential benefits of collaboration are less clear [10].

Furthermore, collaborative practice models, such as embedded pharmacists in clinics versus community pharmacists, are effective in improving patient care by helping patients achieve therapeutic goals [11–13]. PCPs and pharmacists in these studies worked within organizational settings that facilitated collaboration. Co-location and formal pathways of communication foster collaboration in an ambulatory care setting. However, the formation of a collaborative working relationship between a PCP and a pharmacist in a community pharmacy environment presents more challenges because of the lack of organizational support structures.

Collaboration between community pharmacists and PCPs regarding medication safety has not been well studied. Therefore, we conducted a narrative review to understand the issues and gaps in collaboration between community pharmacists and PCPs in relation to optimizing medication safety in community settings. Our focus was on defining collaborations to identify types of collaboration, types of collaborative activities, and desired areas for overcoming barriers to collaboration and collaboration strategies that improve medication safety. We used the definition of medication safety as "freedom from accidental injury due to medical care or medical errors during the medication-use process" [14,15].

2. Methods

We chose a narrative review methodology to cover a broad variety of article types and to address the lack of standard terms related to medication safety and collaboration. Our narrative review allowed the searching and synthesis to be iterative and to support

additional literature searching on emerging concepts such as possible solutions to identified barriers to collaboration. An initial search was conducted to confirm no systematic reviews already existed on the topic of community pharmacist–PCP collaboration. Our initial search was conducted using PubMed. Search terms included the following keywords (and variations): “patient safety,” “medication safety,” “collaboration,” and “community pharmacy.” Subsequent searches were conducted using PubMed and Google Scholar to iteratively identify relevant articles on barriers and solutions. Reference lists and citation searches were also utilized. English-only published studies were retrieved between January 2000 and December 2020; this date limit was applied for relevance as the practice of community pharmacy has evolved significantly over the past 20 years. We included studies of any article type, which focused on the perspectives of PCPs and/or pharmacists about barriers to collaboration and potential solutions within the community pharmacy setting to improve medication safety. Three reviewers (A.W., R.B., and Y.X.) independently read all publications used to inform the review and synthesized the findings into a list of topics related to collaboration. The barriers and solutions were subsequently discussed and developed by the research team (K.F., M.C., E.R., R.Y., A.E., and N.H.).

3. Results

We ultimately selected 28 publications for this narrative review. We first focused on manuscripts that defined collaboration between PCPs and community pharmacists and drew upon manuscripts that provided both in-depth examples of activities that facilitated and hindered collaboration.

3.1. Defining collaboration to identify types of collaboration

Collaboration between PCPs and community pharmacists as different professional groups is defined as “working together to positively impact healthcare” [16] and “assuming complementary roles and cooperatively working together, sharing responsibility for problem-solving and making decisions to formulate and carry out plans for patient care” [17]. Collaboration can involve synchronous and/or asynchronous efforts. Beyond working on specific patient care tasks, collaboration includes establishing relationships between PCPs and community pharmacists, such as trust, interdependence, perceptions, and expectations of each party toward the other, interest in collaborative practice, and role definition [18].

Cited common goals through PCP–pharmacist collaboration include improved medication adherence, prevention of drug therapy problems, and controlled substance monitoring [10,19]. PCPs may, in contrast to pharmacists, be more interested in learning from pharmacists about patients that are not adherent, rather than expecting pharmacists to improve adherence. Another goal for collaboration is improved patients’ knowledge of their medications. Improved prescribing is not usually viewed by PCPs as a collaboration goal [10], especially when compared with when pharmacists are in a special pharmacy service arrangement with prescribers [20].

3.2. Types of collaborative activities

There are a variety of different PCP–pharmacist collaborative activities and models that are currently in practice and/or research. We have summarized these into main types to illustrate the range of collaborative activities (Table 1).

3.2.1 Drug safety management—Drug safety management is a type of common collaborative activity between PCPs who prescribe and community pharmacists who dispense [21]. The PCP collaborates by transferring a prescription (by either the patient or other means) to the pharmacist. Both community pharmacists and providers conduct medication reviews. The provider exercises the medical expertise in medication safety (diagnosis, drug, and dose selection within the context of the whole patient), and the community pharmacist exercises the expertise in identifying drug–drug interactions, duplications, and other potential safety issues, particularly with non-prescription drugs or drugs prescribed by other providers [22]. Community pharmacists may have direct information on patient adherence to PCP’s prescriptions (e.g. whether ongoing medications are obtained from the pharmacy in a manner that reflects it is being taken according to the prescription) and are, thus, in the position to inform PCPs of adherence-related safety concerns [21]. Where a potential prescribing error or other concerns are identified by the pharmacist, escalated collaboration activities often take the form of reaching out to the provider to determine if the prescription needs to be changed [23]. The rapid adoption of electronic prescribing has not eliminated errors in prescribing, and community pharmacists have played a vital role in identifying prescribing errors, such as incorrect drugs and incorrect strengths [24]. Standing orders or approval for changes can also be used, without the need for checking with the provider each time for generic substitution and cost savings [19,22].

3.2.2. Patient education—Communicating with patients by educating them is another type of collaborative activity with PCPs and pharmacists each delivering complementary education, or pharmacists confirming and affirming the patient’s understanding of the education provided by PCPs [25]. These activities include educating on appropriate use of medications and non-pharmacological treatment, such as lifestyle modifications [21]. Community pharmacists can ensure adequate understanding of patients’ prescribed medications and may sometimes improve their knowledge on their disease states.

3.2.3. Medication therapy review—Medication therapy review (also known as medication therapy management (MTM)) in the U.S.A. is a service provided by pharmacists that optimizes patient therapeutic outcomes and consists of five elements: a comprehensive or targeted medication therapy review that may occur by telephone or in person; creation or formulation of a personal medication record; development of a medication-related action plan; implementation of the action plan through interventions and referrals; and documentation and follow-up [11]. Pharmacists also make recommendations to PCPs regarding safety concerns, gaps in care, vaccinations, dose adjustments, and medication initiation according to guidelines. A community pharmacist can address an identified drug therapy problem immediately during the patient interview or in discussion with the provider

[10]. Similar services and programs exist internationally, such as the Home Medicines Reviews in Australia and Medicine Use Reviews in the United Kingdom [26].

3.2.4. Patient care plans—The development of a patient care plan is a type of more structured collaborative activity, as such activities require organizational arrangements [20,21]. Compared to MTM, this type of activity is less episodic and more continuous. In this type of collaboration, the pharmacist reviews all medications with the patient and makes appropriate medication adjustments and recommendations to the PCP. The PCP will then make the decision to approve the pharmacist's intervention and incorporate the adjustments to the patient care plan. In addition, individualized care plans have been developed for patients that achieve the goals of therapy established through collaboration with providers [21].

3.2.5. Disease management and monitoring—Disease management and monitoring is a collaborative model in which the community pharmacist is part of a multidisciplinary team with the PCP to be responsible for chronic disease management outcomes [20,21]. As a team, the community pharmacist and PCP collaborated to implement risk reduction strategies for chronic disease states, such as diabetes, chronic obstructive pulmonary disease (COPD), hypertension, and dyslipidemia. This type of collaboration aims to achieve goals of desired therapeutic outcomes such as improved medication adherence for patients. The pharmacist provides counseling on medications, diseases, lifestyle modifications, and other non-pharmacological interventions [10,11].

3.3 Desired Areas for Overcoming Barriers to Collaboration and Collaboration Strategies that Improved Medication Safety

3.3.1. Primary care provider's perspective—There are a number of barriers for community pharmacists and PCPs to collaborate (Table 2). From the providers' perspectives, their negative past experience can often make them reluctant to collaborate, such as pharmacists contradicting PCPs in communicating with patients [27], inexperienced pharmacists providing low relevance alerts [28], and pharmacists making changes without consulting with PCPs [29]. PCPs may also view community pharmacists as profit-driven business people and not peer HCPs [27,28,30]. Difficulties in accessing community pharmacists (e.g. inability to contact) combined with infrequent professional interactions make it even more challenging for PCPs to build relationships with community pharmacists [27,31]. In a survey of family providers in Ontario, respondents reported that they only talked with community pharmacists five or less times in any week, and only 84% said that they took phone calls from community pharmacists on a regular basis [32]. In addition, many PCPs are unsure of the training of community pharmacists and their competencies [22,30,31,33]. Some PCPs assume that the role of safety checks by community pharmacists is optional [30], especially with the use of clinical decision support systems [28]. Role specification is also a barrier, as PCPs may perceive pharmacists to have no real responsibilities for patient outcomes and are only bound by rules and regulations [28,30]. Additionally, some PCPs may fear being criticized or judged when interacting with pharmacists [22]. Last but not least, PCPs may judge calls from community pharmacists as too long [28] or some of the calls as unnecessary [22].

3.3.2. Pharmacist's Perspective—From a pharmacist's perspective, one barrier to collaboration is inadequate clinical information available to community pharmacists. Community pharmacists reported that a barrier to adequately assessing medication safety was lack of accessibility to patient's clinical records (ISMP, 2009). Pharmacists usually do not have clinical informations such as laboratory testing data and medical conditions necessary to assess medication safety, and physicians usually do not provide feedback on pharmacist recommendations directly [12]. The information access barrier limits the ability to monitor the patient's progress as part of necessary follow-up activities. Community pharmacists' lack of time has also been identified as a barrier in establishing a collaborative partnership with the PCP [21]. Pharmacists have reported that providers have a lack of awareness and acceptance of pharmacist expertise, which represents another challenge impeding a working collaborative relationship among pharmacists and providers [11]. Lack of agreement on role specification and inability to communicate effectively their value to patient care services is a barrier [10]. Interviews of rural and urban PCPs and community pharmacists revealed that one of the reported reasons for negative communication stems from pharmacists being cautious about questioning PCPs, as some pharmacists do not want to be perceived as questioning a PCP's judgment [34]. Pharmacists also found it challenging to communicate with PCPs directly and PCPs were not as responsive and were more likely to be the one to initiate communication [34]. For example, pharmacists have a difficult time getting a phone call with PCPs and getting an answer to their questions [28]. There is also a lack of a systematic approach to incorporate pharmacist recommendations, such as in medication therapy management programs [35]. Variabilities are a barrier in terms of differences among the pharmacies' processes, steps, technology, and frequency to communicate with PCPs through the use of tools, such as telephones and faxes [22,35]. Some pharmacies and clinics use faxes, which are checked regularly on each end, while others do not and so have to rely on phone calls.

3.3.3. Both Pharmacist's and PCP's Perspectives—From both pharmacists' and PCPs' perspectives, barriers reported are professional boundaries, lack of ability to adapt to new technologies for communication, and lack of direct face-to-face communication (in a mixed-methods study) [19]. Barriers in real-time communication include going through time-consuming phone trees [19]. Both pharmacists and PCPs reported a tendency to avoid direct interactions [25] and a lack of common preferences or standards on methods of communication [22,29].

3.3.4. Strategies for Improvement—Several strategies have been proposed for improving pharmacist and PCP collaboration. One strategy includes providing pharmacists with full access to patients' clinical records [12]. Through access to clinical records, pharmacists can see the full picture for patient care such as diagnosis and indications for prescriptions, especially when community pharmacists perform clinical activities such as MTM services. Gaps in PCP knowledge and awareness of clinical training of community pharmacists suggest that raising awareness may improve collaboration [33]. Regular communications focused on clinical issues may be intentionally directed toward open, honest, bilateral communication [27]. Exposure to interprofessional teams and mutual recognition of roles through interprofessional education are also recognized as solutions to

improve collaboration [27]. Awareness of pharmacists' role may build upon existing PCPs' recognition that pharmacists have knowledge about new medications and alternatives in case of shortages [30].

Ways to improve relationships and build trust have been recognized as strategies to improve PCP–pharmacist collaboration [36]. These strategies include pharmacists initiating relationships with face-to-face visits, which can result in PCPs recognizing in these pharmacists a commitment to improved patient care. Another strategy suggested was to hold community pharmacists and PCP face-to-face meetings to dispel assumptions and build trust [19]. Leveraging geographic proximity may also be a way to build up relationships [31,37]. Periodic face-to-face interactions may be arranged [29], preferably by third parties [22]. Although not always feasible, proximity to each other geographically and in the same healthcare system can promote positive communication [34]. This promotes ease of communication and closer relationships. A previous study has found that, pharmacists employed in rural areas (which have close communities) report less negative experiences trying to communicate or contact general practitioners in their community and more professional, collaborative relationships based on trust [28].

Demonstrating trustworthiness can also be an important way to establish pharmacists making consistent contributions care that improved patient health outcomes over time [10]. Role specification was shown to have the most influence on the development of collaborative relationships between PCPs and pharmacists [38]. Other strategies to lower the burden of collaboration are through implicit means, such as blanket orders for substituting drugs within the same class to find the cheapest alternative or for converting 30-day to 90-day supplies or pill-splitting [19].

3.3.5. Conclusions—Many barriers to PCP-community pharmacist collaboration exist and this may hinder medication safety activities in the community pharmacy setting. Our review highlights potential solutions, such as increasing pharmacist access to clinical records and building relationships through face-to-face clinical interactions. Defining collaboration may enable both PCPs and pharmacists to work together to achieve a common purpose to improve patient health outcomes. The issues surrounding medication safety collaboration between community pharmacists and PCPs are complex, multifactorial, and require further research.

4. Expert opinion

4.1. Who is ultimately responsible for medication safety?

This review adds to the current literature on collaboration between PCPs and community pharmacists. These two types of professionals do not usually work within the same organizations and infrequently communicate directly, yet they play critical roles in medication safety for patients living in community settings. Collaboration has been defined broadly as *'cooperation among health care professionals in working together to solve problems with shared responsibility and decision making to ensure quality patient care'* [17]. This overarching definition focuses on end results in patient care while covering a large variety of collaborative activities through different means of coordination and

communication. This definition also highlights key concepts that are related to the barriers that we identified, that is, shared responsibility and decision-making. Lack of explicit role specifications and the gap in awareness of shared responsibility for medication safety between community pharmacists and PCPs were identified as barriers to collaboration. Although medication safety is a shared responsibility between PCPs and community pharmacists, opportunities to learn about the expertise and responsibilities of the other profession are often limited. Interprofessional education is believed to enable future ability to work within an interdisciplinary team, which in turn optimizes care and improves health outcomes [39]. Further research is needed to explore whether interdisciplinary training with community pharmacists and PCPs could lead to optimizing medication safety activities.

There are different perceptions of respective roles in medication safety between community pharmacists and PCPs and what constitutes collaborative activities in different practice settings. We found that the literature has few studies on variability among practical settings, such as rural versus urban settings. In rural areas, community pharmacists and primary care providers may have a broader scope of practice. Availability of technology and other structural components of communication may be different. Additionally, the broader community context may influence relationships. In a smaller community, it may be easier to create more trusting relationships based on personal interactions and knowledge of each other, which may result in better communication and collaboration [40]. Furthermore, lacking are studies to understand the variability among different community pharmacies, such as those within supermarkets, large chains, or independent pharmacies, as unique operations and policies can impose additional constraints or opportunities for collaboration.

4.2. The lack of electronic health record meaningful use criteria in community pharmacies

To fully participate in collaborative activities, efficient means are needed to enable complete PCP–pharmacist clinical communications to support bidirectional information exchange [41]. Use of technology (synchronous or asynchronous) has been proposed to lower the burden of communication and, hence, enhance collaboration. However, implementing new technology requires time and resources and so both parties need to buy-in to any new tool. However, community PCP–community pharmacist dyads do not exist in isolation, and so to optimize adoption, the new technology would need to be accepted by multiple pharmacies and primary care offices in a geographical area.

4.3. Taking a patient-centered approach

Involving patients in improving PCP–community pharmacist collaboration may also be a solution in the fragmented healthcare environment. Patients may function as information conduits, as identified in a recent study [42], and they may be educated on how they could play a role in supporting PCP–pharmacist collaboration in medication safety. As a baseline, patient held medication lists may be able to facilitate communication across health-care settings, including primary care offices and pharmacies [43,44].

4.4. What is the new horizon?

Due to increased potential for ADEs with the aging population and increasing polypharmacy, we anticipate increased urgency to improve collaboration between community pharmacists and PCPs to improve medication safety. One study with a pre–post study design showed that wider use of practice management arrangements may support collaborative activities such as medical therapy review and chronic disease management [11]. Community pharmacists are well placed in the health-care system and will likely be leveraged more for their roles in optimizing drug therapies and adherence and in supporting patient self-management and monitoring [45].

Moving forward, it is likely that this field will focus on collaboration on emerging activities of community pharmacists. Pharmacist prescribing is an example of the expanding role of community pharmacists as clinicians in some states. For example, in a web-based survey distributed to licensed pharmacists in North Carolina, 83% of community pharmacists were shown to be more likely to prescribe hormonal contraception [46]. Certain U.S. states allow community pharmacists to prescribe medications to patients under collaborative practice agreements with supervising providers [46]. This role of pharmacists having prescriptive authority under an agreement with a provider is gaining popularity in the U.S., especially during the COVID-19 pandemic to help address PCP shortages. This type of collaboration could enhance trust and build relationships to support other medication safety activities.

Other emerging areas include telemedicine, stewardship, transitions to care, and deprescribing. Telemedicine, specifically telepharmacy, has become an emerging service that has taken off during the pandemic [21]. Telepharmacy provides remote prescription verification and live video counseling to patients. Telemedicine and telepharmacy provide new ways for patients and their health-care team to communicate and share information electronically. The community pharmacist could have a potential role in advocating for stewardship programs for example, antibiotic stewardships [45]. Transitions in care (such as from hospital to home) are high-risk points in care where medication errors are common. The involvement of the community pharmacist in transitions of care has demonstrated positive outcomes [12], and it may also facilitate more collaboration with the patient's PCP. Deprescribing is challenging [47] but studies have demonstrated the values of collaboration between primary care physicians and community pharmacists, such as through a pharmacist-led intervention whereby direct education was given to patients, and a “pharmaceutical opinion” was sent to primary care physicians [48]. Providing community pharmacists with access to informations such as prescribing indications and relevant laboratory test results may improve their abilities to make deprescribing recommendations [49]. Many of the barriers and strategies for collaboration in our review have been echoed in discussions about how to achieve collaboration in deprescribing [50]. The increasing demand for stronger collaboration between community pharmacists and PCPs will continue to progress with increasing demand for patient-centered care and safer care. Professionals will be challenged to ensure that they are working as a team to provide quality care to achieve the best possible patient health outcomes.

4.5. Improving collaboration through evidence

There are a few key challenges in advancing research in this area. Health-care systems vary widely internationally, and even within single countries, there are large variations in practice settings and the systems that pharmacists and physicians work within. So even if a successful collaboration strategy is developed within one setting/geographical area, there is no guarantee that it will be translatable to other settings. Patient heterogeneity is another factor that will limit the translatability of findings; barriers and solutions when caring for the general population may not be effective in multimorbid patients who have high numbers of prescription medications, are under the care of multiple providers, and are frequently hospitalized with higher risks of medication-related harms. Overall, more research is needed into how to optimize PCP–community pharmacist collaboration to improve medication safety.

Funding

This paper was supported by the Agency for HealthCare Research and Quality under Grant [R18HS027277] and by an Australian National Health and Medical Research Council (NHMRC) Investigator Grant [GNT1195460 to ER]. The content is solely the responsibility of the authors and does not necessarily represent the official views of the sponsors.

Declaration of interests

The authors have no relevant affiliations or financial involvement with any organization or entity with a financial interest in or financial conflict with the subject matter or materials discussed in the manuscript. This includes employment, consultancies, honoraria, stock ownership or options, expert testimony, grants or patents received or pending, or royalties.

References

Papers of special note have been highlighted as either of interest (•) or of considerable interest (••) to readers.

1. Shehab N, Lovegrove MC, Geller AI, et al. US emergency department visits for outpatient adverse drug events, 2013-2014. *Jama*. 2016 Nov 22 316(20):2115–2125. [PubMed: 27893129]
2. Sarkar U, Lopez A, Maselli JH, et al. Adverse drug events in U.S. adult ambulatory medical care. *Health Serv Res*. 2011 Oct;46(5):1517–1533. [PubMed: 21554271]
3. Budnitz DS, Shehab N, Lovegrove MC, et al. US emergency department visits attributed to medication harms, 2017-2019. *Jama*. 2021 Oct 5 326(13):1299–1309. [PubMed: 34609453]
4. Oktora MP, Denig P, Bos JHJ, et al. Trends in polypharmacy and dispensed drugs among adults in the Netherlands as compared to the United States. *PLoS one*. 2019;14(3):e0214240. [PubMed: 30901377]
5. National Center for Chronic Disease Prevention and Health Promotion. A program guide for public health; partnering with pharmacists in the prevention and control of chronic diseases [Pamphlet (or booklet)]. National Center for Chronic Disease Prevention and Health Promotion 2012 [2022 May 24]. Available from: <https://stacks.cdc.gov/view/cdc/12103>
6. American Pharmacists Association. Pharmacists' impact on patient safety 2022 [2022 May 24]. Available from: https://www.pharmacist.com/Portals/0/PDFS/Practice/PharmacistsImpactonPatientSafety_Web.pdf?ver=dYeAzwlN3-PG9eSkMMsV-A%3d%3d
7. Goode JV, Owen J, Page A, et al. Community-based pharmacy practice innovation and the role of the community-based pharmacist practitioner in the United States. *Pharmacy (Basel)*. 2019 Aug 4;7(3). 10.3390/pharmacy7030106.

8. Chisholm-Burns MA, Kim Lee J, Spivey CA, et al. US pharmacists' effect as team members on patient care: systematic review and meta-analyses. *Med Care*. 2010 Oct;48(10):923–933. [PubMed: 20720510]
9. Tan EC, Stewart K, Elliott RA, et al. Pharmacist services provided in general practice clinics: a systematic review and meta-analysis. *Res Social Adm Pharm*. 2014 Jul-Aug;10(4):608–622. [PubMed: 24161491]
10. Kucukarslan S, Lai S, Dong Y, et al. Physician beliefs and attitudes toward collaboration with community pharmacists. *Res Social Adm Pharm*. 2011 Sep;7(3):224–232. [PubMed: 21272527] •• Describing physician beliefs on collaboration
11. Johnson M, Jastrzab R, Tate J, et al. Evaluation of an academic-community partnership to implement MTM services in rural communities to improve pharmaceutical care for patients with diabetes and/or hypertension. *J Manag Care Spec Pharm*. 2018 Feb;24(2):132–141. [PubMed: 29384026]
12. Ensing HT, Koster ES, Dubero DJ, et al. Collaboration between hospital and community pharmacists to address drug-related problems: the HomeCoMe-program. *Res Social Adm Pharm*. 2019 Mar;15(3):267–278. [PubMed: 29773308]
13. Duncan P, Ridd MJ, McCahon D, et al. Barriers and enablers to collaborative working between GPs and pharmacists: a qualitative interview study. *Br J Gen Pract*. 2020 Mar;70(692):e155–e163. [PubMed: 32041767]
14. Larson C, Saine D. Medication safety officer's handbook. Bethesda, MD: American Society of Health-System Pharmacists; 2013.
15. U.S. Department of Health and Human Services Office of Disease Prevention and Health Promotion. National Action Plan for Adverse Drug Event Prevention. Washington DC: Author; 2014.
16. Zwarenstein M, Goldman J, Reeves S. Interprofessional collaboration: effects of practice-based interventions on professional practice and healthcare outcomes. *Cochrane Database Syst Rev*. 2009 Jul;8(3):CD000072. • Defining interprofessional collaboration
17. O'Daniel M, Rosenstein AH. Professional communication and team collaboration. In: Hughes RG, editor. Patient safety and quality: an evidence-based handbook for nurses. Rockville (MD): AHRQ Publication; 2008.
18. Bardet JD, Vo TH, Bedouch P, et al. Physicians and community pharmacists collaboration in primary care: a review of specific models. *Res Social Adm Pharm*. 2015 Sep-Oct;11(5):602–622. [PubMed: 25640887] • Defining roles of providers and community pharmacists
19. Chui MA, Stone JA, Odukoya OK, et al. Facilitating collaboration between pharmacists and physicians using an iterative interview process. *J Am Pharm Assoc*. 2014 Jan-Feb;54(1):35–41. •• Describing barriers for collaboration
20. Bankes DL, Schamp RO, Knowlton CH, et al. Prescriber-initiated engagement of pharmacists for information and intervention in programs of all-inclusive care for the elderly. *Pharmacy (Basel)*. 2020 Feb 21;8(1):24. doi:10.3390/pharmacy8010024. [PubMed: 32098064]
21. Omboni S, Caserini M. Effectiveness of pharmacist's intervention in the management of cardiovascular diseases. *Open Heart*. 2018;5(1):e000687. [PubMed: 29344376] •• Describing pharmacist activities in collaboration with providers
22. Weissenborn M, Haefeli WE, Peters-Klimm F, et al. Interprofessional communication between community pharmacists and general practitioners: a qualitative study. *Int J Clin Pharm*. 2017 Jun;39(3):495–506. [PubMed: 28315115]
23. Odukoya OK, Stone JA, Chui MA. Barriers and facilitators to recovering from e-prescribing errors in community pharmacies. *J Am Pharm Assoc*. 2015 Jan-Feb;55(1):52–58.
24. Hincapie AL, Alamer A, Sears J, et al. A quantitative and qualitative analysis of electronic prescribing incidents reported by community pharmacists. *Appl Clin Inform*. 2019 May;10(3):387–394. [PubMed: 31167250]
25. Zielinska-Tomczak L, Cerbin-Koczorowska M, Przymuszala P, et al. How to effectively promote interprofessional collaboration? - a qualitative study on physicians' and pharmacists' perspectives driven by the theory of planned behavior. *BMC Health Serv Res*. 2021 Sep 2 21(1):903. [PubMed: 34474676]

26. Chen TF. Pharmacist-led home medicines review and residential medication management review: the Australian model. *Drugs Aging*. 2016 Mar;33(3):199–204. [PubMed: 26961696]
27. Van C, Mitchell B, Krass I. General practitioner-pharmacist interactions in professional pharmacy services. *J Interprof Care*. 2011 Sep;25(5):366–372. [PubMed: 21657854]
28. Loffler C, Koudmani C, Bohmer F, et al. Perceptions of interprofessional collaboration of general practitioners and community pharmacists - a qualitative study. *BMC Health Serv Res*. 2017 Mar 21 17(1):224. [PubMed: 28327136]
29. Jove AM, Fernandez A, Hughes C, et al. Perceptions of collaboration between general practitioners and community pharmacists: findings from a qualitative study based in Spain. *J Interprof Care*. 2014 Jul;28(4):352–357. [PubMed: 24625196]
30. Rakvaag H, SO GE, Meland E, et al. Complementing or conflicting? How pharmacists and physicians position the community pharmacist. *Pharm Pract (Granada)*. 2020 Jul-Sep;18(3):2078. [PubMed: 33029263]
31. Bollen A, Harrison R, Aslani P, et al. Factors influencing interprofessional collaboration between community pharmacists and general practitioners-A systematic review. *Health Soc Care Community*. 2019 Jul;27(4):e189–e212. [PubMed: 30569475]
32. Pojskic N, Mackeigan L, Boon H, et al. Ontario family physician readiness to collaborate with community pharmacists on drug therapy management. *Res Social Adm Pharm*. 2011 Mar;7(1):39–50. [PubMed: 21397880]
33. Gordon C, Unni E, Montuoro J, et al. Community pharmacist-led clinical services: physician's understanding, perceptions and readiness to collaborate in a Midwestern state in the United States. *Int J Pharm Pract*. 2018 Oct;26(5):407–413. [PubMed: 29218803]
34. Curran GM, Freeman PR, Martin BC, et al. Communication between pharmacists and primary care physicians in the midst of a U.S. opioid crisis. *Res Social Adm Pharm*. 2019 Aug;15(8):974–985. [PubMed: 30170901]
35. Perera PN, Guy MC, Sweaney AM, et al. Evaluation of prescriber responses to pharmacist recommendations communicated by fax in a medication therapy management program (MTMP). *Journal of managed care pharmacy: JMCP*. 2011 Jun;17(5):345–354. [PubMed: 21657804]
36. Snyder ME, Zillich AJ, Primack BA, et al. Exploring successful community pharmacist-physician collaborative working relationships using mixed methods. *Res Social Adm Pharm*. 2010 Dec;6(4):307–323. [PubMed: 21111388]
37. Damiaens A, Fraeyman J, Fakroune S, et al. General practitioners and community pharmacists' collaboration in primary care: small steps for a major change. *Int J Integr Care*. 2021 Apr 23 21(2):10.
38. Zillich AJ, McDonough RP, Carter BL, et al. Influential characteristics of physician/pharmacist collaborative relationships. *Ann Pharmacother*. 2004 May;38(5):764–770. [PubMed: 15031418]
39. Keijsers CJPW, Dreher R, Tanner S, et al. Interprofessional education in geriatric medicine. *Eur Geriatric Med*. 2016 [2016 Jul 01];7(4):306–314.
40. Kooienga S, Singh RL. Pharmacy and primary care perspectives on e-prescribing in a rural community: a focused ethnography. *Res Social Adm Pharm*. 2017 Jul - Aug;13(4):820–830. [PubMed: 27624860]
41. Rupp MT. 10 ways to improve medication safety in community pharmacies. *J Am Pharm Assoc*. 2019 Jul - Aug;59(4):474–478.
42. Wust KL, Carayon P, Werner NE, et al. Older adult patients and care partners as knowledge brokers in fragmented health care. *Hum Factors*. 2022;13:187208221092847.
43. Garfield S, Furniss D, Husson F, et al. How can patient-held lists of medication enhance patient safety? A mixed-methods study with a focus on user experience. *BMJ Qual Saf*. 2020 Sep;29(9):764–773.
44. Chae SY, Chae MH, Isaacson N, et al. The patient medication list: can we get patients more involved in their medical care? *J Am Board Fam Med*. 2009 Nov-Dec;22(6):677–685. [PubMed: 19897697]
45. Bader L, Kusynova Z, Duggan C. FIP perspectives: realising global patient safety goals requires an integrated approach with pharmacy at the core. *Res Social Adm Pharm*. 2019 Jul;15(7):815–817. [PubMed: 30846369]

46. Seamon GJ, Burke A, Tak CR, et al. Role of pharmacists in hormonal contraceptive access: a survey of north carolina pharmacists. *Pharmacy (Basel)*. 2020 Oct 16 8(4):191. [PubMed: 33081094]
47. Reeve E, Thompson W, Farrell B. Deprescribing: a narrative review of the evidence and practical recommendations for recognizing opportunities and taking action. *Eur J Intern Med*. 2017 Mar;38:3–11. [PubMed: 28063660]
48. Martin P, Tamblyn R, Benedetti A, et al. Effect of a pharmacist-led educational intervention on inappropriate medication prescriptions in older adults: the D-PRESCRIBE randomized clinical trial. *Jama*. 2018 Nov 13 320(18):1889–1898. [PubMed: 30422193]
49. Korenvain C, MacKeigan LD, Dainty KN, et al. Exploring deprescribing opportunities for community pharmacists using the behaviour change wheel. *Res Social Adm Pharm*. 2020 Dec;16(12):1746–1753. [PubMed: 32094042]
50. Gerlach N, Michiels-Corsten M, Viniol A, et al. Professional roles of general practitioners, community pharmacists and specialist providers in collaborative medication deprescribing - a qualitative study. *BMC Fam Pract*. 2020 Sep 4 21(1):183. [PubMed: 32887551]

Article highlights

- Collaboration can involve synchronous and asynchronous efforts in working on specific patient care tasks and in establishing relationships between PCPs and community pharmacists, such as trust, interdependence, and perceptions and expectations of each party toward the other.
- This study highlights key examples of collaborative activities between PCPs and pharmacists, including medication review, drug safety management, and patient education.
- Top barriers to collaboration include lack of role specification, lack of direct face-to-face communication, tendency to avoid direct interactions, and lack of communication standards.
- More research is needed into how to optimize PCP–community pharmacist collaboration to improve medication safety.

Table 1.

Examples of Types of Collaborative Activities.

Types of Collaborative Activities	Examples
Drug Safety Management [21,22]	Pharmacists report any safety concerns to the physician
Patient Education [21,25]	Pharmacist counseling on medication, disease, non-pharmacologic treatment
Medication Therapy Review [10,11,26]	Pharmacists have telephonic medication reviews with patients Pharmacists make recommendations to physicians regarding safety concerns, gaps in care, vaccinations, dose adjustments, and medication initiation according to guidelines
Development of patient care plan [20,21]	Pharmacists review patient’s care plan and make medication adjustment recommendations to be shared and approved to the physician Individualized care plan for patients that achieves intended goals of therapy over time
Disease Management and Monitoring [10,11,20,21]	Pharmacists support physician action in order to improve medication adherence to achieve goals of desired therapeutic outcomes

Table 2.

Barriers to Collaboration.

Primary Care Providers' Perspective	Pharmacists' Perspective	Both Perspectives
Negative past experiences	Inadequate clinical information access	Lack of role specification
Difficulties to access community pharmacists	Lack of time	Inability to adapt to new technologies
Infrequent interactions	Expertise not being accepted by physicians	Lack of direct face to face communication
Perception of pharmacist as a business person and unsure of pharmacist competencies	Lack of systematic approach	Tendency to avoid direct interactions
Viewing pharmacists' safety checks as optional	Variability in communication	Lack of communication standards
Fear of being judged		