MEDICATION SAFETY IN COMMUNITY-DWELLING OLDER ADULTS

by

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DISSERTATION

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DEDICATION

I dedicate this work to my husband, Lamin Suso, for his unwavering support and to my two beautiful children, Fatima, and Omar. I am thankful for the faith my parents have put in me. I want to thank my brother, Jarga, and his wife, Leisel, for their continued love and support. I would not have completed this journey without the unending support of my family and friends, both near and far.

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ABSTRACT

MEDICATION SAFETY IN COMMUNITY-DWELLING OLDER ADULTS

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The University of Texas at Arlington, 2023

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This article-based thesis comprises two manuscripts on medication safety strategies in community-dwelling older adults. A phenomenological method was used to conduct semi-structured interviews with 28 community-dwelling older adults over 65 years who took five or more prescription medications daily. Caregivers were encouraged to participate in interviews. The objective of the first manuscript was to explore the roles of patients, pharmacists, and providers in medication safety from the perspective of community-dwelling older adults. Inductive thematic analysis revealed six themes indicating varying perceived roles of medication safety by older adults. In addition, results show that the provider and pharmacist roles overlap but are independent of the roles of older adults and their caregivers.

The second manuscript examined strategies used by older adults and compared those to the medication safety guidelines set by the Food and Drug Administration and the National Institute for Aging. We also compared the two agencies' guidelines. We found some gaps between the two agencies. We also found that older adults followed some of the guidelines, but there were also several areas of discordance. Understanding older adults' role expectations and safety strategies could shape the future of medication safety interventions in this population and improve health outcomes through enhanced patient-provider collaborative work.

TABLE OF CONTENTS

Medication Safety in Community-Dwelling Older Adults

CHAPTER 1

Introduction: Background and Significance

Medication safety is a significant health issue for community-dwelling older adults. Medication therapy management is a complex procedure that several older adults face daily. Therefore, we must understand the perceived roles of older adults and the medication safety strategies they employ at home. The literature focuses on the causes of adverse drug events (ADEs) within the inpatient and outpatient settings. However, no study examined older adults' perceptions of roles to improve medication safety. Moreover, there needs to be more literature regarding how older adults safely use medication at home or whether their use complies with safety guidelines.

Each year ADEs result in over 700,000 emergency department visits in the US (Budnitz et al., 2006). The cost of ADEs in the US is estimated to be between $871 million and $1.8 billion annually (Slight et al., 2018). The most common place for medication-related adverse events to occur is at home (Meyer-Massetti et al., 2018). Older adults who experience ADEs are mainly due to therapeutic medication use as opposed to drug misuse (Budnitz et al., 2019). To mitigate the issues surrounding medication harm in the outpatient setting, providers must collaborate with older adults and conduct a thorough review of medication safety strategies. Despite these facts, patient-centered medication therapy management is challenging for prescribers and pharmacists in busy time-pressured practices (Lyson et al., 2019).

Patients' views of their roles and professionals' roles in medication safety are not well-understood, even though patients and family caregivers play an essential role in medication

safety in community settings. Older adults and their caregivers perform challenging medication management tasks such as preparing complex regimen without medical supervision which could lead to safety hazards (Look & Stone, 2018). For example, insulin-related hypoglycemia accounts for nearly 97,648 emergency department visits each year due to improper administration (Geller et al., 2014). Safe medication use in ambulatory settings may be driven by how patients' view the benefits of medications and their fear of medication side effects (Meranius & Engstrom, 2015). Older adults' past experiences with managing their medications may also influence their perception of their abilities and preferences regarding their sources of trusted information (Shoemaker & Oliveira, 2008). For instance, researchers found that older adults may prefer to speak with pharmacists rather than primary care providers (PCPs) for advice about medications and drug safety information (Bulsara, 2013; Aimaurai et al., 2017).

Community-dwelling older adults do not have access to readily available health professionals for routine medication management, compared to those in skilled facilities or hospitals. Instead, medication management heavily relies on the patient and caregiver collaborating with providers and pharmacists. A common understanding of each person's role in medication safety is necessary for shared decision making among older adults and health providers (Elwyn et al., 2010; Phipps et al., 2018).

Community-dwelling older adults aged 65 years and older who take five or more prescribed medications are the population of interest in this study. Older adults are at greater risk for medication related harm than their younger counterparts (Budnitz et al., 2019). Older adults with comorbidities are at risk for polypharmacy, which is taking five or more prescribed medications concurrently (WHO, 2019). Polypharmacy increases the risk of medication related harm (Oktora et al., 2020). Therefore, this dissertation is focused on identifying medication

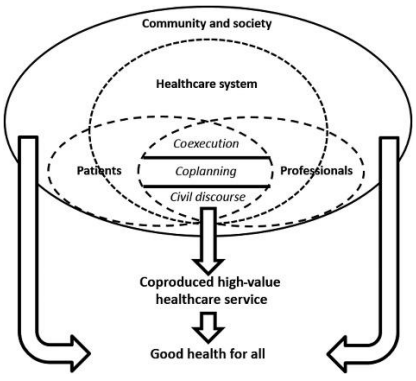
safety strategies older adults use at home. A second goal was to determine how older adults perceive the pharmacist, providers, and their roles in medication safety.

Theoretical Model

The proposed theoretical model of healthcare service coproduction shows that patients participate in civil discourse, co-planning, and co-execution during the health service delivery process (Batalden et al., 2015). Wagner's Chronic Care Model and the House of Care model influenced the development of this framework (Batalden et al., 2015). Researchers have used the coproduction of healthcare service model to examine clinicians' perceptions of the model (Holland-Hart et al., 2018). Other researchers have used it to explore how patients participate in healthcare delivery (Baim-Lance et al., 2018; Van Citters et al., 2021). The model was also used to explore the perception of refugees and immigrants in the coproduction of their healthcare services (Radl-Karimi et al., 2022).

Figure 1: Batalden et al. (2015)

Coproduction of Healthcare Service Framework



Key Concepts

This model has four main concepts: patient, professionals, healthcare system, and community and society (Batalden et al., 2015). In this framework, patients are viewed as partners in the coproduction of health services, not products. Patients and professionals interact as

participants in the healthcare system in this model (Batalden et al., 2015). The concentric circles show that patients and health professionals are partners in the healthcare system and the community (Batalden et al., 2015). The arrows illustrate that the primary outcome of coproduced healthcare service is good health for all. The dashed lines demonstrate blurred roles between patients, health professionals, and the healthcare system (Batalden et al., 2015). As patients and professionals interact, there are three levels of relationship: civil discourse, co-planning, and co-execution. In this model, *civil discourse* requires effective and clear communication between patients, providers, and pharmacists. The goal of *coplanning* is to respect individual values and expertise, such as patients' experiences with medications and the strategies they use at home. *Coexecution* mandates trust, shared goals, accountability, and responsibility between patients and health providers (Batalden et al., 2015).

Relationship of Concepts

According to the model, the interaction of patients, professionals, and healthcare systems in the coproduction of healthcare services impacts the outcome of good health for all (Batalden et al., 2015). The coproduction of health services blurs the roles of patients, professionals, and healthcare systems during healthcare service delivery. Community and society could either facilitate or hinder the coproduction of quality healthcare services (Batalden et al., 2015).

Rationale for Selecting the Framework

The constructs in this model could be used to evaluate medication safety practices in community-dwelling older adults. This holistic framework includes the patient, health system, health providers, and the community (Batalden et al., 2015). The framework is appropriate because the key constructs are the main stakeholders in maintaining medication safety in the

community setting. Understanding coproduction between older adults and health providers is crucial in delivering quality health services and promoting medication safety.

Rationale for Manuscript One

The US's cost of adverse drug events is estimated to be millions of dollars (Slight et al., 2018). Older adults are at a greater risk of ADEs. To mitigate the risks of medication-related events, we must understand individual role perception in medication safety. We also need to understand the role perception of caregivers because they have a significant role in medication safety at home. Unfortunately, researchers found that patients did not understand providers' roles, which could create miscommunication and health hazards (Wray et al., 2019). There were no published studies on older adults' perceived roles of providers and pharmacists in the community. The rationale for the first manuscript was to fill this gap and add to the literature on role perception. Clear delineation and understanding of roles could improve medication safety in community-dwelling older adults.

Manuscript One Research Questions

1. How do community-dwelling older adults and caregivers perceive their role in medication safety?
2. How do community-dwelling older adults perceive the role of pharmacists and providers in medication safety?

Rationale for Manuscript Two

Role perception is one key aspect of medication safety in community-dwelling older adults. However, this population faces daily medication management challenges with little professional oversight. Therefore, it is crucial to understand the strategies older adults use in the community to promote medication safety. There are medication safety guidelines specially

created for older adults to follow. However, little is known about how well older adults conform to these guidelines. Moreover, there were no published studies comparing these guidelines to what older adults do in the community. Therefore, manuscript two aims to identify the gaps within published guidelines and explore medication safety strategies older adults use at home.

Manuscript Two Research Questions

1. What are the medication safety strategies used by community-dwelling older adults?
2. Do the medication safety strategies used by community-dwelling older adults conform with the guidelines?
3. What are the areas of concordance and discordance in the medication safety guidelines created by the Food and Drug Administration and the National Institute of Aging?

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Medication Safety in Community-Dwelling Older Adults

CHAPTER 2 – Manuscript One

A multisite qualitative analysis of perceived roles in medication safety: older adults' perspectives

Jallow, F., Stehling, E., Sajwani-Merchant, Z., Daniel, K. M., Fulda, K. G., Espinoza, A. M., Gurses, A. P., Arbaje, A. I., & Xiao, Y. (2023). A multisite qualitative analysis of perceived roles in medication safety: Older adults' perspectives. *Journal of Patient Experience*, *10*, 237437352311588. https://doi.org/10.1177/23743735231158887

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A Multisite Qualitative Analysis of Perceived Roles in Medication Safety: Older Adults' Perspectives

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Abstract

Older adults and caregivers play an essential role in medication safety; however, self-perception of their and health professionals' roles in medication safety is not well-understood. The objective of our study was to identify the roles of patients, providers, and pharmacists in medication safety from the perspective of older adults. Semi-structured qualitative interviews were held with 28 community-dwelling older adults over 65 years who took five or more prescription medications daily. Results suggest that older adults' self-perceptions of their role in medication safety varied widely. Older adults perceived that self-learning about their medications and securing them are critical to avoiding medication-related harm. Primary care providers were perceived as coordinators between older adults and specialists. Older adults expected pharmacists to inform them of any changes in the characteristics of medications to ensure medications were taken correctly. Our findings provide an in-depth analysis of older adults' perceptions and expectations of their providers' specific roles in medication safety. Educating providers and pharmacists about the role expectations of this population with complex needs can ultimately improve medication safety.

Keywords

medical decision making, provider roles, pharmacist roles, medication therapy management, older adults, drug safety, patient expectations

Introduction

Older adults' views of their roles and professionals' roles in medication safety are not well-understood to reduce preventable medication-related harms, resulting in over 700,000 emergency department (ED) visits annually (1). Older adults are more likely to visit the ED for medication-related harm than any other age group (2). Researchers found that over 65% of older adults in one study used more than five prescribed medications, which increased their risks for medication-related harm in terms of drug–drug interactions and medication use challenges at home (3). For example, nearly 100,000 ED visits are attributed to insulin-related hypoglycemia and other diabetes management errors each year, commonly due to reduced food intake and improper insulin administration at home (4). Such studies highlighted the need to understand the critical roles of patients in preventing medication-related harms. One national retrospective

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study found significant variations in patient reports of the communication about medicines across U.S. hospitals by location and access to health information technology (5). However, the level of support for using patient evaluations to manage medication safely in outpatient and community settings is highly variable and very limited.

Older adults and caregivers play an essential role in medication safety in community settings compared to acute care settings. Picking up prescriptions, preparing pillboxes, reading drug instructions, and accurately taking medications are among the tasks older adults perform to self-manage medications (6). Medication safety in the outpatient setting may be driven by how older adults view their roles. Older adults may have strong views of their abilities to manage their medications based on their experiences (7). They may also have strong opinions on the roles of prescribers and pharmacists (8). Community-dwelling older adults may prefer to speak with pharmacists rather than primary care providers (PCPs) for medication advice and education (9, 10).

A shared understanding of each person's role in medication safety is necessary for shared decision-making among older adults and health providers (11, 12). Such knowledge is also essential to embody the "coproduction model" of health services, in which patients and health providers form a partnership during the production of health care (13). We set out to discover how community-dwelling older adults taking five or more prescription medications perceived their roles and those of pharmacists and providers in medication safety.

Methods

We used a phenomenological method to obtain perspectives of community-dwelling older adults by conducting semi-structured interviews (14). With Institutional Review Board approval, Spanish and English-speaking individuals 65 years or older were invited to participate with the following inclusion and exclusion criteria: reporting five or more prescription medications, living independently or with a caregiver in the community, and not self-identified as having impaired decision-making capacity. No cognitive screening tools were used. Recruitment occurred at three sites using purposive sampling: a retirement community (independent living) and two-family medicine clinics in an urban area. We also encouraged caregivers to join the interviews.

Recruitment

Recruitment flyers and a project video briefing on the internal residential television channel were used at the retirement community. To improve transferability of study results (14), we informed all retirement community residents (approximately 200 residents) about study participation opportunities through the community's closed-circuit television. At the two clinics, healthcare providers were encouraged to identify all potential older adults who fell into recruitment inclusion-exclusion criteria and permitted to be contacted by the study personnel. Prospective older adults were screened for eligibility and were contacted by study personnel for written consent and time preference for an interview.

Data Collection

The data were collected from a semi-structured interview guide with 12 questions (see Supplemental material). These questions were designed to explore perspectives and experiences on medication safety, including during COVID. To focus our analysis on perceived roles by older adults, we chose to analyze responses to question six; "What is your role in taking medicine safely? What is your pharmacist's role? What is your doctor's role?" In addition, we assessed the responses to other questions to ensure that authors did not miss any substantive responses on roles. Patient demographics (age and sex) and major health conditions (including medications, if participants could recall) were also obtained. A $10 gift card was provided at the end of the interview. Interviews were conducted in English and Spanish, and researchers kept interview notes. A native Spanish-speaking team member conducted all Spanish interviews and validated translated transcriptions. Interviews were halted upon data saturation when no new themes emerged.

Data Analysis

The interviews were transcribed and translated professionally. Transcripts were reviewed for accuracy by the interviewers. Six team members coded six of the initial transcripts to develop initial codes. Team members met weekly to compare and discuss codes. At least two team members used the final codebook to code the rest of the transcripts. Braun and Clarke's six stages of inductive thematic analysis were utilized to analyze the transcripts through iterative coding using NVivo Version 12 (QSR International) (15). Themes were identified based on occurrence and agreed upon by the team. The coproduction of healthcare service theoretical framework guided a deductive approach to data analysis (13). To ensure data credibility, skilled researchers conducted peer debriefings throughout the study.

Results

The study included nine residents from the retirement community and 19 patients from two clinics. Two participants were accompanied by their caregivers. The mean age of older adults in this study was 75 years (SD = 7.5). Majority were female (67.9%, $n = 19$). The average number of daily medications was 7.7 (SD = 2.5). More than half (54%) of the participants had a college education. All Spanish-speaking older adults ($n = 8$) were recruited from the two clinics. All residents of the retirement community had at least some college education. See Table 1 for more detailed demographic data. Primary

health conditions reported by participants were cardiovascular disease, diabetes, depression, kidney disease, osteoarthritis, glaucoma, neuropathy, urinary incontinence, chronic obstructive pulmonary disease, lymphoma, valve replacement, and back pain. Medications reported by older adults were insulin, citalopram, pregabalin, quinapril, oxybutynin chloride, atorvastatin, metoprolol, losartan, furosemide, clopidogrel, glucosamine, fluoxetine, warfarin, alprazolam, hydrocodone, and carvedilol.

We identified several themes that were grouped into three categories: (1) older adult's perception of the provider's role (themes: *prescribing safely, monitoring for safety, and keeping up with recalled medications*), (2) older adult's perception of the pharmacist's role (themes: *notification of changes, monitoring for safety, keeping up with recalled medications, and providing medication package inserts*), and (3) the perceived older adult's or caregiver's role (themes: *taking fewer medications, not missing doses, securing medications, and learning about medications)*. A deductive approach to data analysis using the coproduction model revealed several themes that directly fit into the framework (see Table 2). Adapting themes into the coproduction of healthcare service framework added new insight to our understanding of the perceived roles of older adults. The themes are discussed below.

Older Adults' Perception of the Providers' Role

Older adults acknowledged that providers have a considerable role in medication safety. This perception was rooted in the quality of the patient–provider relationship. These overarching themes of the provider's role are discussed below.

Table 1. Demographics Summary $n = 28$.[a]

Demographics	*n* (%)
Gender (male)	9 (32.1)
Language spoken	
English	20 (71.4)
Spanish	8 (28.6)
Education	
Master's Degree	1 (3.6)
Bachelor's Degree	3 (10.7)
Some College	11 (39.3)
High School	7 (25)
Elementary	2 (7.1)
Unknown	4 (14.3)
Setting	
Retirement Community (Independent living)	9 (32.1)
Private Clinic	10 (35.7)
Publicly Funded Healthcare System	9 (32.1)
	Mean (SD)
Age	75.2 (7.5)
Daily medications taken	7.7 (2.5

Notes: *SD, standard deviation.
[a]Percentages may not add up to 100 due to rounding.

Theme 1: Prescribing Safely

Older adults expected providers to have the necessary knowledge, skills, and qualifications to prescribe their medications safely. Providers were expected to initiate individualized care by knowing all medications older adults took at home. "They're supposed to know what's good for you and prescribe it when they feel like you need it" (OA6). Providers were expected to be knowledgeable about current medical practice guidelines and changes in healthcare. Providers were expected to have readily available resources to consult whenever necessary.

> "His job is to understand what medications I need, and if my labs show a problem, he knows immediately. And if he doesn't know immediately, he has references that he turns to and gets the information he needs." (OA4)

Subtheme: Coordinating care. PCPs were expected to coordinate care with other providers. Several older adults had specialists who prescribed medications for them. PCPs were expected to perform a comprehensive review of prescribed medicines by all providers seen by the patient: "… and the primary care is supposed to be the one that oversees and coordinates all of the specialists that I'm seeing" (OA2).

Subtheme: Communicating with older adults. Older adults stated that the time spent with providers varied, and some allowed more time for questions regarding medications. The provider was also expected to perform basic physical examinations and order blood tests to help older adults feel at ease. One older adult stated that the provider neither assessed her lungs nor ordered any labs during her visit. She felt that her assessment was inadequate, and she was concerned about the safe prescribing practices of the provider. Regarding shared decision-making, older adults mentioned deferring prescribing decisions to the provider: "I don't ask no questions because I figure the doctor knows what he's doing" (PT4).

Theme 2: Monitoring for Safety

This theme included referencing drug interactions and disease interactions. An older adult emphasized that health providers must consider safety for patients with preexisting conditions such as decreased kidney function before prescribing medications.

> "I expect him to know that I have a little bit of issue with kidney function, and he needs to make sure that he gives me what's going to be the safest for my kidneys and yet do the most for whatever he's trying to control." (OA3)

Providers were expected to monitor drug–drug interactions and avoid prescribing those medications. One older adult shared that they were "already taking so many medicines, so I don't know what will contradict with the other" (PT5).

Table 2. Coproduction of Healthcare Services Framework and Perceived Roles in Medication Safety.

Constructs from Coproduction Model	Definition of Construct	Corresponding Themes	Example Quotes
Civil discourse	Effective and clear communication	Communicating with older adults	"He explained what he was doing, when he was going to do it, how he was doing it. And I was very impressed because some of the older doctors don't do that. They just say take this and not give me a reason or anything." (OA10) "To let him [provider] know if there is a problem." (OA9)
		Notification of changes	"I should have notified the pharmacy and brought it to their attention that there was no warning letter to notify me or any patients of the changes, you know. I think it's a responsibility of the pharmacy to do that." (OA5)
Co-planning	Respecting values and ability	Perceived pharmacist's roles	"You know, they're very careful to mention get your flu shots, get your whatever. But you know, they never say prepare for emergencies. Get your, at least, three days of medicines stash bag, or get you a week's worth or something." (OA3)
Co-execution	Trust, accountability shared goals	Learning about medications	"Well, reading the label on the medicine when I'm putting them in my container. I don't want to get the wrong one in there. If I'm supposed to take it at night, I don't want it in the morning." (OA1) "Any patient needs to understand why it's important, what the benefits are, and what the possible side effects are. And then, you know, it's up to you. Nobody's going to force you, make you. It's up to you to be responsible and do it. And my thing is just to be responsible and do what I know is right and look for side effects, if any, and report them, to be careful to report them." (OA3)
		Prescribing safely	"That I don't have any reaction to what his prescription. If I don't have an adverse reaction, we assume that it's correct." (OA1) "Being friendly, having a good rapport is 90% of the service. If you feel put off by somebody, you're not going to feel free to as questions." (OA2)

Theme 3: Keeping Up with Recalled Medications

Older adults expected providers to keep up with recalled drugs and "to make sure that they're not giving…medicine that has been recalled" (OA9). In addition, they want to be notified when a replacement medication is prescribed for a previously recalled drug: "let me know that they are going to give me another prescription for the purpose of… the one that has been recalled" (OA9).

Older Adults' Perception of the Pharmacists' Role

Older adults acknowledged having a positive relationship with the pharmacy staff. Some of the perceived roles of pharmacists overlapped with the providers' roles.

Theme 1: Notification of Changes

Older adults mentioned that they relied on the appearance of medications to ensure they were taking them safely. Therefore, they expected the pharmacist to notify them of any changes to their medications' dosage, shape, size, or color.

> "I got a medication with no warning, and then I was to cut it in half. The one I was taking before, I didn't have to cut it in half. I took it one time, a full pill, but then I saw on the label that I'm supposed to cut it and only take half. So obviously, they changed the company. They didn't tell me that I needed to cut it in half." (OA5)

Theme 2: Monitoring for Safety

This theme was similar to the expected role of the provider. An older adult mentioned that their pharmacist had a list of all their medications; therefore, the pharmacist should also monitor potential drug interactions.

> "Pharmacists, they're supposed to be able to know if there's any conflict between any medications. They know what I'm taking and the local pharmacy also has the list that I get for my 90-day stuff, so they can look at any of that." (OA1)

Theme 3: Keeping Up with Recalled Medications

This theme was similar to the provider's expected role. Pharmacists were expected to function as a second layer of

security when dispensing prescribed medications, especially routinely ordered medications. Pharmacists were expected not to dispense expired or recalled drugs, even if the provider ordered them. Older adults also mentioned that the pharmacist's role was to notify them of replacement medications.

Theme 4: Providing Medication Package Inserts

Older adults preferred reading the medication package inserts for specific drug information. The inserts were essential to help older adults understand the medication and its side effects. "[The role of the pharmacists is] filling the prescription that's given [to] them and giving me a sheet of paper that tells me the side effects or any warning that's on it" (OA6). However, some older adults said they were hesitant to ask the pharmacist drug-related questions; they expected pertinent drug information from the provider.

Perceived Older Adults' and Caregivers' Role

Older adults recognized that their role in medication safety went beyond taking pills as prescribed.

Theme 1: Taking Fewer Medications

Although older adults acknowledged taking several medications, they also believed it was necessary. Older adults perceived their role in medication safety as taking fewer medications by "eating healthier" (PT8) so that they "don't need to take so many pills" (PT8). "In response to the question of "what is your role in taking medications safely?" one older adult commented, "take less and less, I don't like to take more than I have to, nobody wants to, unless they just like medicine, nobody wants to take any more than they have to" (OA6).

Theme 2: Not Missing Doses

Additionally, older adults perceived that it was their role to take medications and not miss any doses. This perceived role was similar to caregivers' perception as well: "to make sure she [patient] doesn't miss any, that she has all of them, that she has all the normal medication there at the house, to prepare it for her weekly" (PT3). However, several of the older adults reported forgetting to take their medications despite using tools such as pillboxes: "there have been days when I forget, and I'll know because I've checked the day before, and they're still there [in the pillbox]" (OA5).

Theme 3: Securing Medications

Older adults mentioned that some of the medications they took were controlled substances and had the potential for abuse. Consequently, another perceived role was locking away such medications to avoid them falling into the wrong hands. "They are locked up for one thing because occasionally I have to take hydrocodone, and my doctor told me to lock them up" (OA8). Older adults also expressed their awareness of the potential to abuse some of these drugs: "I don't like to take more than I have to. I don't want to get addicted to anything" (OA10). An older adult mentioned that her role was to ensure that medications were kept away from pets.

Theme 4: Learning About Medications

Older adults stated that asking questions was a crucial part of their role in learning about their medication. According to older adults, it was their role to read and follow prescription instructions. The medication inserts were used as a source of primary information, and the provider was consulted if there were further questions. "They'll send an information sheet and so I read that very thoroughly. And if I have any questions about it, I'll ask my doctor when I see him" (OA5).

Discussion

Our findings build upon the growing literature on medication safety by providing an in-depth analysis of older adults' perceptions and expectations of their providers' specific roles in medication safety. Pharmacists and providers were perceived to have some overlapping roles (see Figure 1). In contrast, older adults perceived their roles in medication safety as independent of health professionals' roles. Older adults assumed a passive role in shared decision-making surrounding safe prescribing due to trust in the provider's knowledge, skill, and expertise. The role of safe medication management was viewed as achieved by attending to the physical appearance of drugs. Hence, pharmacists were expected to notify older adults of any changes to the appearance of medications. By contrasting the roles of prescribers, pharmacists, and patients, our study provided new insights on gaps and misconceptions in the coproduction of medication safety in ambulatory settings. For instance, older adults in our study expected coordination of PCPs with specialists and pharmacists. Also, they expect PCPs to have complete knowledge of their medications. Our study on perceived roles may inform the implementation of strategies to engage patients in medication safety. For example, Sharma et al (2018) assessed several strategies, including self-monitoring and titrating of anticoagulants, but for such strategies to be effective, patients and professionals must address the differences in perceived roles in medication safety (16).

Similar to our findings, researchers found that older adults' trust in healthcare providers contributed to their reluctance to participate in decision-making (17). During clinical encounters, providers should be aware of such tendencies and create opportunities for patients to express desired health outcomes (18). Among older adults in our study,

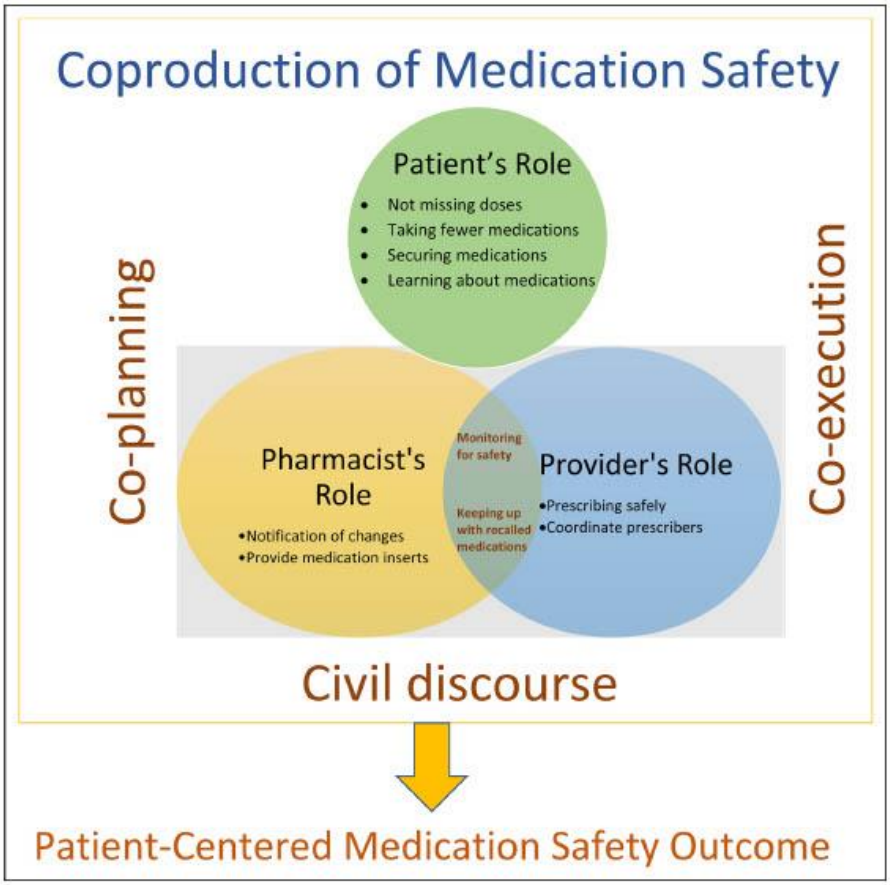

Figure 1. Coproduction of medication safety model: Older adults' perspective.

"learning about medications" was perceived as their responsibility. Therefore, providers should assess and encourage older adults' desire to learn about their medications. Individuals vary in how they view their role in medication management; thus, it is important to understand each individual's perceived role in medication safety (19).

Older adults in our study sample relied on the pharmacist for drug safety information, such as the medication inserts that came with their prescriptions. Besides providing medical advice without an appointment, the pharmacist could also be an intermediary between the patient and the provider (20). However, researchers found a lack of two-way communication between providers and pharmacists (21). Researchers also discovered that pharmacists' lack of access to patient medical records was a significant barrier to making recommendations to providers regarding patients' medications (22). Therefore, pharmacists need to have access to electronic medical records to make informed medication safety recommendations to clinicians (23).

In our sample, some older adults deferred prescribing decisions to the provider even though they would like to be "taking fewer medications." Providers should respect and be aware of older adults' desire to take fewer medications and assess for possible self-dosing practices. Viewed from the perspective of coproduction of health services, further education is needed to align perceived roles by older adults and caregivers regarding the long-term use of medication and the need to stop when necessary. Clinicians would agree that sometimes deprescribing medication is necessary; however, some older adults hesitate to stop their medications because they fear the consequences. Australian researchers also found that older adults were hesitant to participate in

deprescribing (20). A jointly made decision between the pharmacist, the provider, and the patient must be made regarding deprescribing (21). Although many older adults do not want to be "missing doses," they can sometimes be forgetful. Therefore, clinicians should assess cognitive barriers and access to tools to help mitigate risks.

Our findings confirm that older adults expected providers to be knowledgeable and maintain continuing education requirements (24). Older adults in our study also expected providers to review all their medications thoroughly during each visit due to concerns about drug interactions (17). These findings indicate that a comprehensive medication reconciliation should be the role of PCPs, who were also expected to coordinate and oversee the care patients received from other health specialists. Older adults in another study stated that medication reconciliation was one of the top five critical things to them during an annual wellness visit (25). Therefore, providers should incorporate an in-depth medication review during each visit. Unfortunately, the standard 15- to-25-minute office visits may not allow a thorough review of medications. Researchers found that a pharmacist spends an average of 34 minutes during a medication review session (22). Fast-paced clinic visits (26), lack of workflow integration (27), lack of privacy (28)' and limited support staff (29) create organizational barriers to comprehensive medication therapy management (MTM) within outpatient clinics. In addition, poor information sharing between prescribers (28) and lack of pharmacist reimbursement (30) was also found to be a barrier to MTM.

Healthcare services depend on the coproduction of all team members, such as patients, providers, and pharmacists (13). Researchers have used the coproduction model to analyze clinicians' perceptions of the model (31). Other researchers have used it to explore patients, refugees, and immigrants' perceptions of the coproduction of their healthcare services (32–34). In our study, coproduction between older adults, providers, and pharmacists was essential in ensuring medication safety. The theoretical model of coproduction of healthcare service proposes that patients participate in *civil discourse, co-planning*, and *co-execution* during health service production (13). This model is appropriate in our study because older adults are participants rather than just consumers of health services (see Table 2). *Civil discourse* requires effective and clear communication between patients, providers, and pharmacists. The goal of *co-planning* is to respect individual values and expertise, such as older adults' experiences and strategies used at home to improve medication safety. *Co-execution* mandates trust, shared goals, accountability, and responsibility between patients and health providers.(13) Providing this level of service increases trust in the provider-patient relationship and the provider's competence. Understanding and supporting coproduction between older adults and health providers are key to promoting medication safety.

Limitations

The study had limitations. We did not screen for cognitive impairment or frailty, and those with cognitive impairment may face different challenges regarding medication management at home. However, the issues raised by the participants are common issues experienced by other age groups, and thus we believe our findings are transferable to populations with complex medication needs. This study was also limited by the age range of 65–84 years of the recruited participants. Future studies should target the oldest-old (>85 years) to capture the possible varying needs of this population. Deductive thematic analysis was guided by the coproduction of healthcare service theoretical framework, which may have introduced biases. Future studies focusing exclusively on the framework should refine the proposed coproduction model of medication safety. For instance, a cost-based approach to medication safety might be explored.

The modality of data collection varied in this study. The interviews were conducted remotely due to COVID-19 protocols. Some interviews were via video, while most were conducted via voice calls. Some retirement community residents used mail-in pharmacy services primarily; consequently, their interactions with pharmacists differed from those who used community-based pharmacies. Qualitative research seeks to transfer rather than generalize findings. Despite our study limitations, our results are transferable to similar samples and could improve medication safety practices.

Conclusion

Understanding the specific medication safety-related role expectations between older adults and health providers could prevent medication-related harm. Our findings should encourage providers and pharmacists to create opportunities to involve older adults and caregivers in decision-making to facilitate the coproduction of quality healthcare services and a clear delineation of roles. The implications for organizations and policymakers are improving care delivery and allowing health providers to spend more time caring for older adults with complex needs. Future studies should examine providers' and pharmacists' perceptions of their roles and evaluate how to ensure all stakeholders understand their respective roles regarding medication safety.

Author Contributions

Study concept and design: YX, KD, APG, AIA. Data collection: FJ, AE, ES, ZSM, and KD. Data analysis and interpretation: FJ, ES, ZSM, AE, KD, KF, APG, AIA, and YX. Drafting of the manuscript: FJ, ES, ZSM, AE, KF, and KD. Critical review of manuscript: KD, YX, APG and AIA. Obtaining funding: YX. Supervision: YX, KD. All authors contributed to the critical revision of the manuscript's intellectual content and approved the final draft.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Ethical Approval

This study was approved by the University of Texas at Arlington's Institutional Review Board.

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Presentation

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  - Abstract Title: Perceived Roles in Medication Safety—Patients' Perspectives
- Abstract accepted for poster presentation at May 2022 Annual Meeting of the American Geriatrics Society:
  - Abstract title: Perceived Roles of Community Dwelling Multimorbid Older Adults in Medication Safety
- Select findings from this study were presented on a poster at the 2021 Annual Scientific Meeting of the Gerontological Society of America (GSA).
  - Abstract Title: Opportunities and Barriers to Medication Safety in Community-Dwelling Older Adults

Sponsor's Role

Sponsors had no role in the design, methods, recruitment, data collection, data analysis, and the development of this manuscript.

Statement of Human and Animal Rights

All procedures in this study were conducted in accordance with the University of Texas at Arlington's Institutional Review Board (IRB #: 2019-0439.17) approved protocol.

Statement of Informed Consent

Written informed consent was obtained from the patients for their anonymized information to be published in this article.

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Supplemental Material

Supplemental material for this article is available online.

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Medication Safety in Community-Dwelling Older Adults

CHAPTER 3 – Manuscript Two

Medication management strategies by community-dwelling older adults: a multisite qualitative analysis

MEDICATION MANAGEMENT STRATEGIES BY COMMUNITY-DWELLING OLDER ADULTS: A MULTISITE QUALITATIVE ANALYSIS

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Abstract

Objectives: Community-dwelling older adults taking five or more medications are at risk for medication-related harm. Managing multiple medications is a challenging task for patients and caregivers. Community-dwelling older adults self-manage their medications with minimal supervision from a health care professional. Although guidelines are often issued by organizations such as the Food and Drug Administration to ensure medication safety, how older adults understand and mitigate risk of harms from medication use in home environment is not well-understood.

Methods: We conducted semi-structured interviews with community-dwelling older adults 65 years of age and over who took five or more prescription medications to explore medication safety strategies they use at home. We also compared both organizations' (FDA & NIA) medication safety guidelines for areas of concordance and discordance.

Results: A total of 28 older adults were interviewed. Four overarching themes of medication management strategies emerged: collaborating with prescribers, collaborating with pharmacists, learning about medications, and safe practices at home. Study findings revealed that older adults followed recommended guidelines, although there were some areas of discord. Some of the strategies were used unintentionally against the recommended guidelines. Medication safety guidelines from both organizations generally agreed, but there were also some discordances.

Conclusion: Health professionals must understand how older adults and their caregivers manage medications to enhance drug safety. Patient-provider collaboration and positive patient outcomes can be enhanced by understanding and respecting strategies older adults use at home. Moreover,

organizations should consider older adults' current behaviors when developing medication safety guidelines.

Key terms: Management, medication therapy, drug safety, medication error, older adults, qualitative research.

1. Introduction

Community-dwelling older adults are often tasked with complex medication management with little to no professional oversight at home.[1] They may have difficulty understanding the medication's purpose and managing their prescription timing and refills. In addition, most older adults take over-the-counter medicines that have the potential to interact with their prescribed medications.[2] Aging and polypharmacy increase the risk of hospitalization for adverse drug events (ADEs)[3], which can be prevented in most cases.[4] ADEs contribute to over 700,000 emergency department (ED) visits annually.[5] Organizations such as the Food and Drug Administration (FDA) and the National Institute on Aging (NIA) have developed guidelines to help older adults safely manage their medications at home.[6,7] These guidelines are available online. However, it is unclear how older adults are made aware of these guidelines. The guidelines included recommendations about creating medication lists, not sharing, or splitting pills, and learning about potential drug interactions to name a few.[6,7] Additionally, the NIA outlines questions older adults can ask their providers to avoid polypharmacy and encourage deprescribing.[7] However, the basic strategies older adults already use at home need to be better understood.

Medication safety guidelines and tools such as the Beers criteria are set to mitigate medication safety issues. Though, we continue to see ADEs in inpatient and outpatient settings. In less than a decade, ED visits for ADEs increased from 25.6% to 34.5%, with older adults

having the highest hospitalization rates.[8] It is essential to learn what older adults do at home to reduce the risk of ADEs, such as whether they follow recommended guidelines or adopt other strategies. Additionally, we must understand the *work system* older adults use at home when managing their medications. A *work system* refers to tasks imposed on older adults by their health conditions, such as taking medications.[9] The Systems Engineering Initiative for Patient Safety (SEIPS) 2.0 model was adapted to identify various work systems older adults use to manage their medications at home.[9] The SEIPS 2.0, a human factor engineering model, offers a holistic view of the sociotechnical components of the medication management work system. It allows us to examine the elements' interactions and how they may impact healthcare processes and outcomes.

The SEIPS 2.0 model presents a *work system* structure with six interoperating components: (1) the *person(s) located* at the center, (2) performing *tasks* such as managing medications, (3) using *tools and technology*, (4) with a specific *organization* structure, (5) within their unique *internal* and (6) *external environment*.[9] The sociotechnical *work system* interacts to produce *processes* through *adaption* feedback loops influencing *outcomes*.[9] Researchers have used the model to study how processes and outcomes are affected by interactions between structural components of the various work system.[10-12] This study aimed to explore the strategies used by older adults to improve medication safety at home and compare those strategies to medication safety guidelines set by the FDA and NIA. We also compared both organizations' safety guidelines for areas of discordance and concordance.

2. Methods

We conducted semi-structured interviews with community-dwelling older adults to explore medication safety strategies they use at home. After institutional review board approval,

we recruited Spanish and English-speaking individuals 65 years of age and over who took five or more prescription medications. Purposive sampling was used to promote inclusion of both English and Spanish-speaking participants, thus providing detailed information about the phenomenon (medication safety strategies). Recruitment occurred at three sites: a retirement community for independent-living older adults and two-family medicine clinics in an urban area. Older adults from the independent-living facility do not receive medication management assistance from the facility. We recruited from the three sites to capture a more in-depth view of the phenomenon across sites. Caregivers were encouraged to join the interview sessions. We also compared the FDA medication safety guidelines to those set by the NIA.[6,7]

2.1 Recruitment

A recruitment flyer and a video presentation on the internal cable channel were distributed to the retirement community. Healthcare providers at the two clinics identified older adults who met the inclusion criteria and agreed to participate in this study. In addition to screening for eligibility, we contacted prospective interviewees for written consent and scheduling time preferences.

2.2 Data Collection

A semi-structured interview guide framed by the SEIPS 2.0 model was used with direct questions such as “What do you use to manage your medicines at home?” and “How is your experience with the tools you use?” (See supplemental material for complete guide). Researchers conducted interviews in both English and Spanish and recorded field notes. Each Spanish interview was conducted by a native Spanish-speaking team member who also validated the translation of transcriptions. Upon completion of the interview, participants received a $10 gift card. Interviews ended when no new themes were identified, and data saturation was reached.

The interviews were transcribed and translated professionally. Transcripts were reviewed for accuracy by the interviewers. After each interview, reflection notes were made by interviewers.

2.3 Data Analysis

Six members iteratively developed a codebook and jointly coded the six initial transcripts. Team members met weekly to compare and revise codes. Two members used the final codebook to code the rest of the transcripts. Braun and Clarke's (2006) six stages of inductive thematic analysis were utilized to analyze the transcripts.[13] NVivo Version 12 from QSR International was used to manage data. Interview reflection notes and photographs were referenced to supplement transcript coding. Inductive analysis was used to generate the initial themes. The SEIPS 2.0 framework guided deductive thematic analysis and organized themes within *work processes* of the model. Using comparative analysis, we compared our findings with the recommendations from the medication safety guidelines of the two US federal agencies (FDA and NIA).

3. Results

A total of nine residents from the retirement community and 19 patients from two clinics participated in the study. In addition, two participants attended with caregivers. The mean age of older adults in this study was 75 years (SD = 7.5). Most of the participants (67.9%, n=19) were females. The average number of medications taken daily was 7.7 (SD = 2.5). More than half (54%) of the participants had a college degree. All the retirement community residents had at least some college. There were eight Spanish-speaking older adults recruited from both clinics (n=8). Demographic data are provided in Table 1.

Thematic analysis revealed four overarching themes: *collaborating with prescribers, collaborating with pharmacists, learning about medications,* and *safe practices at home*. For comparison purposes, the guidelines from the two federal agencies were organized into the above

four themes in Table 2. Table 3 highlights examples of concordance and discordance of medication safety strategies older adults use at home.

3.1 Collaborative Professional-Patient Work

Collaborative work is when providers, pharmacists, and older adults actively engage in medication safety practices. However, results indicate that sometimes older adults overly trusted their providers, which was a barrier to collaboration.

3.1.1 Theme 1: Collaborating with Prescribers

Collaborating with prescribers identifies adhering to the recommended guidelines, such as asking specific medication-related questions, bringing medication lists to visits, and discussing other alternative treatments. Older adults collaborated with prescribers by asking specific questions related to medication use. “I prepared a medicine list, and I listed what I was concerned about health-wise for me [to ask the provider during visits]” OA10. Older adults assessed medications’ risks, benefits, and side effects. Others also asked questions about the efficacy of their drugs. Older adults also engaged providers by asking about switching to affordable medications due to insurance coverage.

> “If it something else that I can take that the insurance would cover, and it’s the same medicine, maybe a generic or something, then I will see if they will prescribe that one instead of the one I have to pay out of pocket for that’s more than what I can afford.” (PT16)

Discordance with guidelines

Areas of discordance illustrated the lack of collaboration with providers due to other knowledge sources or trust in the provider. Some older adults were reluctant to ask questions regarding their medications. This lack of participation was attributed to trusting the provider.

Some older adults thought the doctor knew it all; therefore, there was no need to ask further questions. "I don't ask no questions because I figure the doctor knows what he's doing" (PT4). "I feel very confident in my doctors, OA9." We also found that some older adults would instead "look it up" because time between visits was too long.

> "If I'm sitting here and I think of something, then I will look it up on the Internet because I don't see my doctor very often. So rather than write the question down and save it for him for whenever, I just look it up." (OA3)

3.1.2 Theme 2: Collaborating with Pharmacists

We found that older asks would ask pharmacists questions regarding their medications if it was a new prescription. Older adults also questioned pharmacists about possible drug-to-drug/disease interactions. "I ask them specifically, will this conflict with other medicines that's on my list? And the local pharmacy has that list, OA1." Effective collaboration was viewed by older adults as "feel free" to ask any questions they wanted.

> "If you feel put off by somebody, you're not going to feel free to ask questions or ask them to do something for you. But the one, the pharmacy I'm going to now, they are very good about talking to me about my medicines and will answer any question that I might have." (OA2)

Discordance with guidelines

Discordance was associated with the lack of pharmacy collaboration due to other sources of information to improve medication safety. Older adults mentioned that they did not ask the pharmacist questions because their doctor told them all they needed to know about their medications. "I don't ever ask the pharmacist. The doctor tells me everything I need to know, (PT18)."

3.2 Patient Work Factors

Patient work involves medication management tasks undertaken by older adults and their caregivers with little to no health professional supervision. As a result, some of these tasks were unintentionally against recommended safety guidelines.

3.2.1 Theme 3: Learning About Medications

This theme identifies the practices of self-education about medications. For example, many stated they learned about drugs from inserts with their prescriptions. Older adults referred to these inserts to learn about possible side effects and other safety measures. “They’ll send an information sheet, and so I read that very thoroughly. If I have any questions about it, I’ll ask my doctor when I see him, (OA5).” Some older adults asked prescribers medication-related questions during visits. One older adult in this study, a retired nurse, voiced using a “PDR” to look up medications.

Discordance with guidelines

Discordance in learning about medication is defined as alternative learning strategies initiated by older adults. We found that older adults learned about their medications by their characteristics, such as color, shape, or smell. If drugs appeared to have similar features, it was perceived as confusing. “I recognize them by smell, color, and shape. There are some that I get confused because they’re all plain white, (PT5).

Older adults used technology such as internet search engines to enhance their knowledge about medication therapy management.

> I read about them. I just google them. Any time I get a new medicine, like headache medicine, I google it, and I find out what it does, what you can take with it or what you can’t take with it. (PT10)

3.2.2 Theme 4: Safe Practices at Home

Examples of safe practices at home include the use of tools (pillboxes), technology (phones, alarms), organizing refills, and storing medications safely. Several older adults in our sample used pillboxes to aid with organizing medications. Older adults used strategic reminders such as placing morning medications in the kitchen and evening or bedtime medications in the bedroom or bathroom. The color of medications was often used as a guide to sort medication into the morning or evening slots of pillboxes. Leaving the pillbox open was a strategy used as a reminder of dose intake. “I will get it open and leave it open, and that’s the way I know I’ve taken it, (OA7).” Some older adults used electronic timers during meals to remind them to take their medications. “I have a timer that I set every time I finish my meal. And when that timer dings, then I take my medication, (OA4).” Older adults were also vigilant about securing prescribed controlled substances away from pets and other family members. “My role is to take it regularly and [make sure] she [cat, does not] get into my medicine. I have to keep it out of sight, OA2.”

Discordance with guidelines

Although many older adults followed recommended guidelines, there were unsafe practices that posed a serious risk to medication safety. For example, one older adult was found to cut or omit pills and took a lesser dose than prescribed. This practice was due to the pharmacy being far from home and served as a strategy to prolong the prescription supply until there was a way to get refills. “For a while, I thought I would just cut my pill in half, because I live away from the pharmacist, (OA7).” Some older adults stopped taking medications and practiced self-dosing due to their perceived health importance of the drug.

> There are some that I need which are not important enough to keep me alive, well, for erectile dysfunction. Too much for insurance to pay for it, so I do without. You know, 18 pills for 90 days, $64, that's kind of ridiculous. (PT19)

In an attempt to wean themselves off prescribed medications, one older adult broke their pills but suffered unwanted side effects.

> "I want to get off, reduce the Xanax that I'm taking, but that's for the stress and everything that I've just been through. So I haven't done that because I've tried like breaking the pill in half, and my stomach is just rolling. So I take the other half and it settles down. But eventually, I will get off of it." (OA10)

4. Discussion

The main findings highlight that community-dwelling older adults developed individual medication management strategies. Unfortunately, some of the strategies were unintentionally against the recommended guidelines. For example, older adults were advised not to discontinue medications without telling their providers; instead, some tried to wean themselves off medications. There was an immense agreement between the two organizations' (FDA & NIA) medication safety guidelines. However, we also found some gaps within those guidelines. For instance, both organizations recommended avoiding taking expired medications. But neither organization discussed recalled drugs which was a concern of our study participants: "make sure that they're not giving [me] medicine that has been recalled" (OA9).

Community-dwelling older adults in this study facilitated collaborative work during medication management with their providers by asking questions and bringing medication lists to clinic visits. Some older adults were reluctant to collaborate due to overconfidence in the provider. Older adults preferred asking providers drug-related questions rather than pharmacists.

Hence, trusting providers was a barrier to collaborating with pharmacists. The pharmacists were only engaged if the prescription was new.[14] Pharmacists should ask specific drug-related questions to older adults instead of asking open-ended questions.

Similar to the literature, older adults in this study split pills or omit doses for various reasons.[15,16] Identifying medication literacy gaps among community-dwelling older adults is essential to educate them about the implications of self-dosing, which could potentially be severe even if the effects are not recognized immediately. Researchers found that older adults do not often recognize ADEs and were often confused with disease-related symptoms.[17] Providers should continue to educate patients about medication safety even though older adults may feel they are experts in their care due to their experience. Our study also found that older adults emphasized medication characteristics when learning about drugs; therefore, safety guidelines should consider this.

From the SEIPS 2.0 model, medication management strategies could be significantly influenced at home by the person's knowledge, abilities, and cognitive issues.[9] Task complexity, such as the number of medications and drug risk, can also impact medication management. In addition, older adults were tasked with learning about their medications. However, they learn the characteristics of pills, which can change and complicate learning.[18] Furthermore, we found that tools such as pillboxes were widely used among community-dwelling older adults. Unfortunately, some of these tools are costly and may fail to serve their purpose due to patients' physical or mental limitations.[19] Electronic pillboxes increase patient satisfaction and quality of life.[20] Pillboxes with reminders could prevent missed doses due to forgetfulness and share pertinent usage data with providers. There is a need to expand treatment options and satisfaction

for older adults experiencing polypharmacy. Medicare should pay for *tools and technology* that promote safety for older adults taking five or more medications.

Home organization, such as living arrangements, work schedules, family roles, and social norms, can influence medication management, such as arranging for refills.[9] Medication therapy management occurs in an internal environment influenced by noise, light, pets, and storage areas.[9] Many homes lack appropriate storage areas for medications leading to multiple inappropriate storage places,[21] sometimes mixed with food items.[22] Older adults' storage strategies could affect the efficacy and stability of medications. For instance, some older adults kept all their medications by the window for ease of visibility or in the bathroom for convenience.[23] However, most medications must be kept in a cool, dry, and dark environment.

The external environment relates to insurance coverage. In our study, older adults collaborated with providers to change prescriptions if coverage was an issue. Others skipped taking their medications due to the high cost. "There are some that I need which are not important enough to keep me alive, well, for erectile dysfunction. Too much for insurance to pay for it, so I do without. Eighteen pills for 90 days, $64, that's ridiculous" (PT19). Providers should encourage older adults to discuss insurance issues to prevent jeopardizing their social life of older adults.

Most older adults will see their providers at least once a year. However, these visits are usually brief, less than 30 minutes. Expanding in-home annual wellness visit programs could identify medication safety gaps and improve patient outcomes. For example, researchers found that patients seen by a pharmacist at home reported more current active medications than those seen by a provider.[24] In-home visits could unveil other variables affecting medication safety strategies that this study could not.

5. Limitations

This study had some limitations. All interviews were conducted remotely to comply with the COVID-19 social distancing requirements, without some of the benefits of in-person interviews at the homes of older adults. However, we used video as much as possible to see how older adults stored and handled their medications. We did not target older adults with cognitive impairment or low health literacy. Older adults with cognitive deficits may face different medication management challenges. Our study participants were from three study sites, and all participants were under 86 years; thus, our findings may not be generalizable to other settings, such as nursing homes or different age groups. However, we included Spanish-speaking participants among the under-served population, and all participants were over the age of 65 years.

6. Conclusion

Older adults reported a variety of medication management strategies that were in contrast with those medication safety guidelines advocated by governmental and professional organizations. Our analysis indicated a need for increased professional-patient collaborative work. Our findings should encourage health organizations to consider older adults' medication safety strategies to guide opportunities to improve outcomes.

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Tables and figures

Table 1. *Demographics Summary n=28.*[a]

Demographics	n (%)
Gender (male)	9 (32.1)
Language spoken	
English	20 (71.4)
Spanish	8 (28.6)
Education	
Master's Degree	1 (3.6)
Bachelor's Degree	3 (10.7)
Some College	11 (39.3)
High School	7 (25)
Elementary	2 (7.1)
Unknown	4 (14.3)
Setting	
Retirement Community (Independent living)	9 (32.1)
Private Clinic	10 (35.7)
Publicly Funded Healthcare System	9 (32.1)
	Mean (SD)
Age	75.2 (7.5)
Daily medications taken	7.7 (2.5

Notes: *SD – Standard Deviation

[a] Percentages may not add up to 100 due to rounding.

Table 2. Comparison of The Food and Drug Administration and The National Institute on Aging Medication Safety Guidelines for Older Adults

Themes and Subthemes	Organizations	
	FDA	**NIA**
Collaborating with Prescribers		
Inform prescribers about allergies, alcohol, tobacco, or drug use	✓	✓
Notify prescribers of meds from all doctors, OTC, vitamins, and herbal supplements	✓	✓
Ask questions and discuss with provider e.g., med review, cost, alternatives.	✓	X
Review how long to take medications	X	✓
Collaborating with pharmacists		
Check meds when picking up e.g., correct med, bottle opens easily?	X	✓
Ask for proper label at pharmacy e.g., larger print	X	✓
Ask about medication use while travelling	X	✓
Ask about drug interactions	✓	X
Learning about medications		
Write the name and what it is for	X	✓
Know the side effects and risks	✓	✓
Know what to do for side-effects	✓	✓
Know when and how much to take	✓	✓
Check with provider before stopping	✓	✓
Safe practices at home		
Follow instructions & labels. Do not stop or skip without advice	✓	✓
Use an organizer	✓	✓
Use a reminder	✓	✓
Organize for refills	X	✓

Use fewer pharmacies	X	✓
Store meds safely, away from children	✓	✓
Do not store meds in bathroom	✓	X
Do not take meds not prescribed to you. Do not share	✓	✓
Do not take expired meds	✓	✓

Table 3. Four Overarching Themes with Sample Quotes on Areas of Guidelines Concordance and
Discordance in Medication Safety Strategies by Older Adults

Themes	**Areas of Guidelines Concordance**	**Areas of Guidelines Discordance**
Collaborating with prescribers	"I look at the side effects to make sure. You know, if it's worth taking this medication, I'll ask the doctor." OA5 "I also ask them questions about how she's been doing from the last time she went to the moment that she's there." PT5	"I tell the doctor that my back hurts He says, okay, take this. I say, wha it for? He says, it helps with the pai I say, okay, thank you. I take the medicine [ask no further questions] PT18
Collaborating with pharmacists	"Like when it's a new medication, I do ask the pharmacist questions." PT9	"I don't ever ask the pharmacist." PT18
Learning about medications	"When I pick up the prescription, I'll do like any normal person, I'll read the instructions for taking the medication. When you get the medication, they tell you all about it. They give you a sheet." PT8	"I have an idea of what each shape know my water pill is a little, pink My blood pressure, is a long blue p PT18 "There are some that are small, others that are bigger. That metform is white. The losartan is yellow." P
Safe practices at home	"I keep them in the bottle, and I keep them in order. I have them in my drawer in order of how I take them." PT18	"The ones she takes between 12:00 and 3:00,I wrap them up in aluminu foil, and she knows she has to take those during the day. But the ones s has to take with a glass of milk, I wrap that up with saran wrap, and s takes that one with a glass of milk. And then the ones she takes in the morning, well, she knows she has t take those with a meal." PT5

Supplemental material – Interview guide

IRB #2019-0439.17

Partnership in Resilience for Medication Safety Interview Guide – Older Adults (and/or Home Caregivers over 18 Years Old)

Thank you for agreeing to participate in this study. As a reminder, this interview is recorded. You may stop the interview at any time. Please try to avoid mentioning specific names or individually identifiable information.

- Present: □ Older adult only □ Caregiver only □ Both
- For older adult: Age: _____ Gender: Male / Female a. Race:
    b. Ethnicity:
    c. Highest level of education:
    d. Employment status: Full Time / Part Time / Retired or Unemployed
    e. (Older Adult) Living Situation:
    f. What kind of Medicare/insurance do you have? Do you pay for Part D coverage?
    g. How many prescription medicines do you have?
    h. What are your major health conditions:
- For caregiver: Age: _____ Gender: Male / Female a. Race:
    b. Ethnicity:
    c. Highest level of education:
    d. Employment status: Full/part/retired or unemployed
    e. Do you live with patient?
    f. Experience caring for this older adult: _____ years _____ months
    g. Relationship to older adult:
        □ Spouse/partner
        □ Child
        □ Friend
        □ Other, please specify:

_____

We would like to learn how you manage your medicines and work with your primary care doctor. Think about your recent visits with your primary care doctor.

1. Please walk me through your experiences before, during, and after these visits.

- Before the visit
  1a. What did you do to prepare for the visit? (e.g. a medicine list or brown bag)

1b. Did you worry about your medicines before the visit?

- The visit itself
  1c. What questions did you ask during the visit?
  1d. Did you discuss your medicines with your doctor?
  1e. What did you learn from the visit about your medicines?

- After the visit
  1f. What questions do you still have about your medicines?

- Is there anything else about this topic that you think is important for us to know?

2. What do you use to manage your medicines at home? Do you use any of the following?

- Medication lists
- Pill boxes
- Smart phone apps
- Calendars and alarms as reminders
- Taking medicines at the same time
- Phone calls
- Helpers
- Asking your pharmacist for help

2a. Do you use anything else that are not listed here?
2b. How is your experience with the tools you use?

3. Why do you take your medicines? Do you take them because you want to stay healthy, because the doctor prescribed them, because your family tells you to, or is there another reason?

    3a. How important are medicines for your health?

    3b. Are some medicines more important to you than others?

    3c. What other things are important for your health (e.g., diet, exercise, therapy, religion, etc.)?

4. What do you worry about when getting or taking medicines? Do you worry about:

    - Cost
    - Too many medicines
    - Side effects
    - Addiction

    4b. Is there anything else that you worry about?

5. Tell me about any problems you've had with your medicines:

    - Insurance coverage (If so, what type of coverage?)
    - Too many providers (if so, any examples?)
    - Not being educated about purposes and proper use of medicines
    - Difficulty getting medicines.
    - Forgetting to take medicines.
    - Lack of family or community support
    - Negative side effects

        5a. What other problems do you have?

    5b. What seems to have caused these problems?

6. What is your role in taking medicine safely? What is your doctor's (NP,PA) role? What is your pharmacist's role?

7. What keeps you from working well with your doctor and/or pharmacist? What helps you work well with them?

8. What is one thing that would make it easier for you to manage your medicines?

9. Do you feel you know enough about your medicines to take them safely?

    9a. What do you know about them (e.g., dose, reason for taking them, etc.)?

    9b. What else do you wish you knew?

10. Have you done any telemedicine visits? If yes:

    10a. Does telemedicine make it more or less difficult to schedule a visit?

    10b. Did you have any difficulties with technology?

    10c. Did your family attend telemedicine visits? Do they usually attend in-person visits?

    10d. Did you show your doctor your medicines within your home during the telemedicine visit?

    10c. Are there any other changes in how you communicate about your medicines with your doctors because of telemedicine?

11. Did the COVID-19 pandemic cause you to miss any doctor visits? If yes:

    11a. Why did you miss it?
    Was it because: -
    Office was closed?
    - Worry about catching the virus.
    - Lack of technology

    11b. Did you hear from the doctor's office about missed follow-up appointments?

11c. Did you have any medical issues because you were not able to be seen by the doctor? These issues may be increased blood pressure, high blood sugar, or depression.

11d. Did you have to visit the ER?

11e. Was there any other impact because of missed or delayed doctors' visits?

12. Any other comments or suggestions?

Medication Safety in Community-Dwelling Older Adults

CHAPTER 4

Conclusion

Medication safety remains to be a significant health risk in community-dwelling older adults. Several other work factors, such as the person's ability, organization, tools, and environment, affect the safe management of medications. Additionally, polypharmacy contributes to medication safety hazards; however, individual factors affecting their medication safety need to be identified through a comprehensive and individualized assessment. Therefore, the traditional medication reconciliation practice, which merely confirms what a patient takes, is insufficient to mitigate the risk of adverse drug events in this population.

In the first manuscript, the authors added to the literature that role expectations between older adults and their health providers are essential for medication safety practices. A clear delineation of roles could make medication management less challenging for older adults and their caregivers. In the second manuscript, the authors found that older adults employ unique strategies during medication self-management. Unfortunately, these strategies were only sometimes safe. These findings should enlighten health providers and encourage them to assess the varying needs of this population. Medicare should allocate more time and resources to addressing medication safety practices in community-dwelling older adults.

Limitations

1. There were different modalities of data collection. Some interviews were through video calls, and others were over voice calls. Due to covid restrictions, data collection was

conducted virtually. In-person data collection would have eliminated technical barriers and promoted a more conducive environment.

2. Only two caregivers participated in this study. Formal and informal caregivers are significant in medication therapy management in the outpatient setting.
3. Since this qualitative study relied on self-reports, the results may be biased.
4. No health literacy or cognitive deficit screening was performed. Both could influence medication safety practices.
5. By chance, all participants were younger than 85 years old; older adults over 85 years may have varying needs that we may have missed.

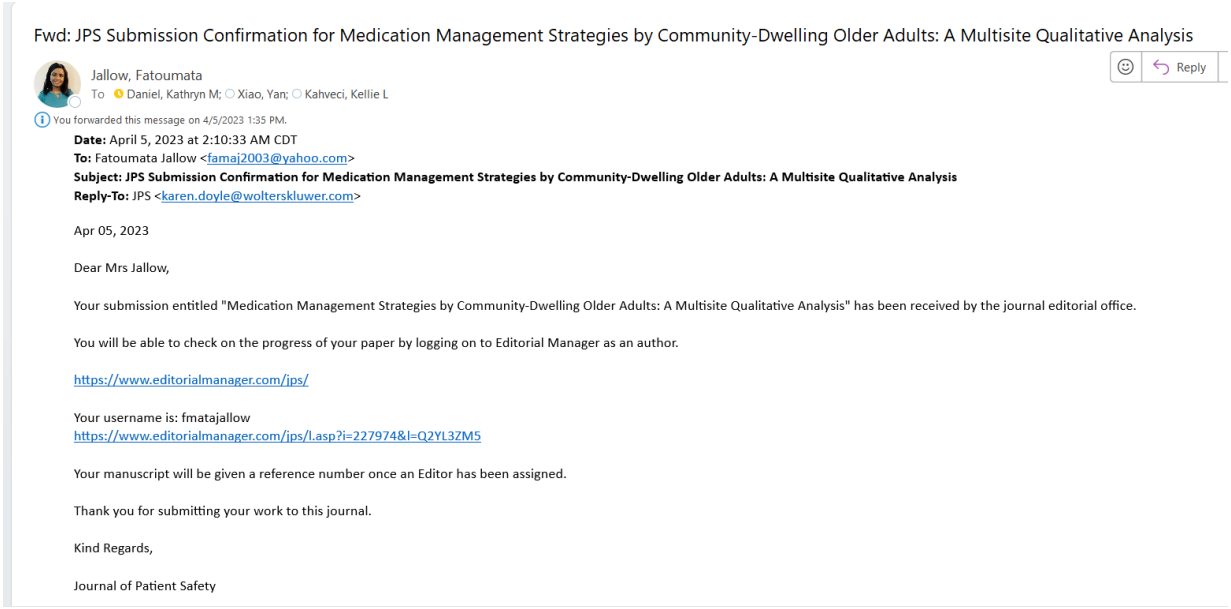
Implications for nursing practice and future research

The findings of this study added to the literature the growing need for an in-depth medication review for older adults in the outpatient setting. In clinics, nurses often take part in medication review processes. Therefore, more time should be allocated to them so they can adequately identify issues older adults may face with their medication management. Home risk assessment programs that use nurse practitioners (NPs) for medication reviews should be enhanced. Home-visiting nurse practitioners are more likely than clinic nurses to recognize some medication safety issues older adults face at home.

Future research should focus on role perception from health providers' perspectives. In this study, only two caregivers participated in the interviews. Future studies should encourage the participation of more caregivers. Furthermore, we only included older adults over 65 years. However, the average age of our participants was 75 years. Therefore, future studies should also have the old-old age group.

APPENDIX A

Manuscript Two Submission Letter



Fwd: JPS Submission Confirmation for Medication Management Strategies by Community-Dwelling Older Adults: A Multisite Qualitative Analysis

Jallow, Fatoumata
To Daniel, Kathryn M; Xiao, Yan; Kahveci, Kellie L

Reply

You forwarded this message on 4/5/2023 1:35 PM.

Date: April 5, 2023 at 2:10:33 AM CDT
To: Fatoumata Jallow <famaj2003@yahoo.com>
Subject: JPS Submission Confirmation for Medication Management Strategies by Community-Dwelling Older Adults: A Multisite Qualitative Analysis
Reply-To: JPS <karen.doyle@wolterskluwer.com>

Apr 05, 2023

Dear Mrs Jallow,

Your submission entitled "Medication Management Strategies by Community-Dwelling Older Adults: A Multisite Qualitative Analysis" has been received by the journal editorial office.

You will be able to check on the progress of your paper by logging on to Editorial Manager as an author.

https://www.editorialmanager.com/jps/

Your username is: fmatajallow
https://www.editorialmanager.com/jps/l.asp?i=227974&l=Q2YL3ZM5

Your manuscript will be given a reference number once an Editor has been assigned.

Thank you for submitting your work to this journal.

Kind Regards,

Journal of Patient Safety