

Abstract

Over-the-counter (OTC) medications are products that have been made easily accessible to allow patients to treat common ailments without a prescription and cost a doctor's visit. These medications are generally considered safe, however, there is still a potential for these medications to lead to adverse health outcomes. Older adults (ages 50+) are especially susceptible to these adverse health outcomes, due to age-related physiological changes, a higher prevalence of comorbidities, and prescription medication use. Many OTC medications are sold in pharmacies, which provides pharmacists and technicians with the opportunity to help guide safe selection and use for these medications. Therefore, community pharmacies are the ideal setting for OTC medication safety interventions. This narrative review summarizes the findings of pharmacy-involved interventions that promote safe OTC medication use for older adults.

Key Points

- Older adults use OTC medications without pharmacist or physician guidance and are at an increased risk of OTC misuse
- Previous studies that have been able to address OTC misuse were done on a small scale and have not yet proven to be sustainable
- More studies must be done within the naturalistic pharmacy environment to prove sustainability without negatively impacting pharmacy staff

1. Introduction

Over-the-counter (OTC) medications can be defined broadly as any product obtained without a prescription and used for the purpose of managing health ailments. It is estimated that 36 million people use OTC pain medications on a daily basis [1,2]. The Consumer Healthcare Products Association (CHPA) makes a strong case for the use of OTC medications, claiming that OTC medications save the U.S. healthcare system \$167B annually [3], 82% of consumers would have seen their doctor instead if OTC medications weren't available [4], and that for every dollar spent on OTC medications, the U.S. healthcare system saves \$7.33 [5]. OTCs are commonly used by patients when they want to avoid a visit to their general practitioner (GP), unsure that their ailments are severe enough for GP advice, unable to obtain a GP appointment, able to access a community pharmacy, or recommended a product by a pharmacist [6]. OTC medications are considered safe by up to 75.5% of older adults, and are often purchased without oversight by the medical profession or pharmacists [7–9]. However, health literacy is generally low and almost one third of older adults cannot identify the maximum daily dose in medication information leaflets and are unaware of contraindications [10,11]. If people have previously used a certain OTC medication, they are generally more likely to perceive those OTC medications as less risky than those who have not used it previously [8]. The potential hazards of OTC use complicate the selection and use of these medications.

We define OTC medication misuse as: 1) drug – age misuse (use of a medication that is discouraged for older adults based on for example Beers Criteria), 2) drug-drug misuse (use of two or more medications that interact), 3) drug – disease misuse (use of a medication that is contraindicated due to a current health condition), 4) drug-label misuse (deviation from label instructions) [12].

Older adults have increased risk of drug misuse with OTCs, due to changes in their age, cognition, and health conditions. For example, sleep patterns tend to change over time and older adults may have difficulty falling asleep and staying asleep; hence, they are prone to use either diphenhydramine or doxylamine. These products should not be used chronically and their safety and efficacy has not been established [13], especially for older adults. Common side effects of these OTCs include daytime sedation, cognitive impairment, and falls and should be avoided by older adults [14]. Some of the most effective interventions for chronic insomnia, including nonpharmacological approaches like cognitive behavioral therapy, are underutilized [15]. A recent systematic review of the efficacy and safety of OTC medications in older adults found that both melatonin and diphenhydramine had positive impact on sleep measures and that melatonin has fewer safety issues [16].

There are several reasons that older adults are more susceptible to adverse effects of both prescription and OTC medications. Both changes in pharmacokinetics and pharmacodynamics are impacting with age. Distribution of drugs is impacted by a person's changing body composition. We see an increase in body fat which results in an increase in volume of distribution. Drugs that have higher protein binding effects typically result in higher unbound drug concentrations due to an increase in body fat. Age-related physiological changes such as decreased renal function, decreased hepatic function, and decreased cardiac output may produce clinical alterations in drug disposition and may require dose adjustments with change in disease states for patients [17]. These physiological changes that we see occur with age ultimately impact the kinetics of how some of these medications function in the body. Absorption of medications may be decreased with delayed gastric emptying and decreased gastrointestinal emptying.

Pharmacodynamics is defined as the relationship between drug concentration at the site of action/organ and the resulting therapeutic response or potential adverse effect of medications. One of the more impactful pharmacodynamic changes experienced by older adults is that of a decreased blood-brain barrier causing older adults to be more susceptible to central nervous system effects of

medications, especially that of anticholinergics and antihistamines [18]. Essentially, pharmacodynamic changes seen with age play a role in increasing drug sensitivity and increased of adverse event threshold effect that is not typically seen with younger cohorts of patients.

Many patients assume that if OTC medications do not require a prescription than they are considered safer for use. This can become very problematic in older adults with the change in the body chemistry making them more susceptible to potential side effects of medications. Also, the older patients are, the more co-morbidities they typically possess which leads to polypharmacy. The addition of OTC without the oversight of health care providers can result in drug-drug interactions that may be harmful for patients.

Community pharmacists have a crucial role to play in OTC medication safety. In the United States, 93% of consumers buy their OTC medications in a pharmacy [7]. Pharmacists consider OTC consultations to be a large part of their responsibility in the pharmacy. There is a positive association between job satisfaction and OTC medications counselling [19], and pharmacists who have enough time to provide OTC medications counselling have higher job satisfaction [20]. From the patient perspective, pharmacists consistently rank among the most trusted and approachable healthcare providers. Ninety percent of Americans live within 5 miles of a pharmacy, making them a highly accessible healthcare resource [21].

The goal of this paper is to highlight pharmacist-involved interventions that aim to elevate safe use of OTC medications in older adults. We have collated information about recent estimates of the prevalence of OTC medication use and misuse among older adults, older adults' decision-making skills in terms of OTC medication use, and finally an overview of pharmacy involved interventions and the barriers pharmacists face in helping older adults select safe OTC medications. Pharmacist-involved interventions are being utilized more frequently in research, and yet these interventions are still limited in their scope and sustainability.

For the purpose of this narrative review, a loose definition of pharmacy-led interventions among older adults requesting OTC medications was employed. It was not deemed necessary to undertake a systematic review or meta-analysis due to the heterogeneity of studies in this field. A health science librarian assisted with the search strategy for this narrative review. Both Medical Subject Headings terms and keywords were used and included nonprescription, over the counter, older age, and older adults, which can be found in Online Resource 1. The lead author (ECL) employed the search strategy in PubMed in January 2023 and reviewed all 2,674 retrieved titles for eligibility. Articles deemed outside of the scope of the review based on title, articles without full-text access or written in a language other than English were excluded (n=2,593).

Most of the identified articles did not meet our inclusion criteria of a pharmacy-led intervention to elevate safe OTC medication use in older adults. Nevertheless, many of those other articles have been summarized in brief here to provide recent estimates of the prevalence of OTC medication use, show the variety of approaches tested in this field, and to offer more nuanced recommendations to future interventions to address medication safety issues among older adults using OTC medications.

2. Recent estimates of the prevalence of OTC medications use by older adults

Measuring the prevalence of OTC medication use is challenging because sales data on OTC medications is not linked to individual patients. Many studies have used a cross-sectional design to estimate OTC medications usage but the definitions of usage and the age span of respondents differ, resulting in a large range of estimates [8,22–30]. Table 1 shows a sample of studies reporting the prevalence of OTC medication use published in the last 10 years.

Table 1. Recent studies reporting estimates of the prevalence of OTC medication use by older adults

Author, year	Country	Method	Sample size	Prevalence of OTC medication use	Unique study characteristics
Barrenberg, 2015 [8]	Germany	Online cross-sectional survey	300 adults, including 90 older adults over the age of 60	Overall prevalence of 46.3%. 11.1% were chronic users, 13.5% frequent users, 47.6% occasional users, 26.3% rare users and 1.4% never users. Higher prevalence in women (52.0%) compared to men (40.8%). Older adults reported lower levels of off-label use (9.3%) compared to younger people (22.0%)	7-day prevalence
Tran, 2022 [22]	France	Nationally representative cross-sectional survey	1,623 people aged 70-85 years	48.7% of respondents reported using an OTC medication. 2.8% were using OTC medications regularly whereas 45.9% only used OTC medications occasionally	Regular and occasional use
Hedenrud, 2019 [23]	Sweden	Online cross-sectional survey	2,898 adults, including 833 older adults over the age of 60	87.4% of respondents had used OTC medications in the last 6 months. 46.3% had used OTC medications less than once a month. 23.8% used OTC medications about every week.	Weekly, monthly, and 6-monthly prevalence
Sánchez-Sánchez, 2021 [24]	Spain	Online cross-sectional survey	727 adults, including 65 people ages 56 years and older	78.9% of respondents had taken or were currently taking OTC medications. 63.0% of people 56-70 years and 36.4% of people over the age of 71 were taking OTC medication	
Wójta-Kempa, 2016 [25]	Poland	Cross-sectional survey	386 adults	Of the 42 adults characterized as heavy users (use OTC more than several times a month), 21.4% were older adults (65+) and 38.1% were 55-64 years. Older adults also represented 11.0% of frequent (once a month) users (n=73) and 9.3% of urgent users (n=237).	OTC pain relievers
Masumoto, 2018 [26]	Japan	Cross-sectional survey	729 older adults (≥65 years) with chronic illness	32.5% of respondents were using OTC medication regularly, but less than one third (30.3%) would disclose their OTC medication use to their physician	

Błeszyńska-Marunowska, 2022 [27]	Poland	Cross-sectional survey	3,014 home-dwelling older adults (≥65 years)	44.2% used at least one OTC medication and 90.7% used at least one prescription only medication	2-week prevalence
Harris, 2022 [28]	Canada	Cross-sectional survey	2,039 adults aged 40-79 years	84.3% had taken or used OTC medications	In the past month
Chang, 2017 [29]	China	Longitudinal study between 2011 and 2013	23,699 adults over the age of 45	32.7% had used OTC and 15.0% prescription-only medicines	In the past month
Per, 2019 [30]	Australia	Face-to-face surveys from 2004 and 2008	567 young baby boomers (born 1956-1965), 494 old baby boomers (born 1946-1955) and 757 older adults (born before 1946)	11.7% of young baby boomers, 17.7% for old baby boomers and 32.8% of older adults had used OTC medications.	In the last year

Other studies have focused on the use of specific OTC medications. A national survey of community-dwelling older adults found that 67.7% of respondents had difficulty initiating sleep or early awakening and that 21.9% hence used a sleep OTC medication [31]. In a study focusing on OTC non-steroidal anti-inflammatory drugs (NSAID) use, 14% of people aged 60-70 years and 7% of those over the age of 70 reported using OTC NSAIDs [32]. Yet another method to estimate OTC medications use is by reviewing medication charts. Of 404 patients admitted to a tertiary medical center in the USA, 69.9% were found to be using OTC medications [33]. Compared to those not using OTC medications, users had more comorbidities and more prescription medications. Neither gender nor age influenced OTC use, but patients with atrial fibrillation, sleep apnea and gastro-esophageal reflux disease were more likely to use OTC medications [33]. This method may be unreliable as consumers of OTC medications may not disclose the use of OTC medications [26,34].

Some of the more commonly used OTC medications are analgesics including NSAIDs, products for cough and allergy, heartburn and indigestion, sleep products, acetylsalicylic acid as an antiplatelet agent, and laxatives, as well as other non-prescription products such as vitamins and minerals [7,22,26,32,33,35,36]. This is consistent with pharmacists' perception of which OTC medications they get most requests about, and feel most confident making recommendations about [20].

3. Prevalence of OTC medication misuse

The push by health authorities to promote self-care for minor health issues and decrease the expense of medical care, advertising of OTC medications, and reclassification of more prescription-only to OTC medications, has resulted in greater availability and usage of OTC medications. Greater availability of OTC medications has resulted in fewer outpatient visits for some symptoms, including migraine and dyspepsia, whereas symptoms of upper respiratory tract infections remain unchanged [37]. Individuals can now buy many OTC medications without consulting with a physician or pharmacist. Despite this, many OTC medications have the potential to interact with other OTC and/or prescription medications [38] and some of the most commonly used OTC medications are considered potentially **inappropriate**, especially for older adults, and should be avoided altogether, for chronic use, or used with caution as per Beers Criteria [39].

The proportion of older adults misusing OTC medications is high with up to 95% of them misusing an OTC [7,35,40–42]. Self-reported misuse includes using medicines after the expiration date (15% of respondents), consuming OTC medications more frequently than indicated on the drug label (14%), taking a higher or lower dose than indicated on the drug label (9%) or consuming OTC medications with alcohol (2%) [7]. When considering concurrent conditions and other medication, as many as 95% were at risk of a potential misuse problem when selecting an OTC medication for pain or sleep. Drug-drug and drug-age interactions were the most commonly identified potential misuse problems, affecting 60% and 65% of participants, respectively [40]. Customers in 14 different pharmacies were interviewed about their OTC and prescription only medication use. Of regular customers (with a pharmacy record of dispensed prescription medications), 15.9% were exposed to a potential drug interaction between the OTC medication they had purchased and their prescription only medication. Interestingly, 46.8% of customers were aware of potential drug interactions between their prescription only medications and OTC medications. Most (47.3%) had been informed of the potential interaction by their physicians and some (25.6%) by their pharmacist. Younger customers had greater awareness of potential drug interactions [44].

It is important to address OTC medications misuse as it has a direct effect on health-related quality of life [35]. Research findings suggest that older adults are at higher risk of OTC medication misuse than others, due to factors such as poor vision, low health literacy, and taking multiple prescription medicines [35,40,43]. However, these factors are rarely addressed in pharmacies. In terms of pharmacist's perspective, the greatest barriers to providing OTC medication counselling are time/prescription volume, insufficient staff to cover pharmacy, and physical space/access to OTC aisles [20].

4. Older adults' decision-making skills regarding OTC medications

OTC medications use is initiated and maintained in 82% of OTC medication users without first consulting a physician, and 8% report having developed a dependency on an OTC medication. Previous experience with the OTC medications was cited as the most important factor when making a purchase decision (57%) followed by advice from a physician or pharmacist (38%) [7].

Other factors that have been reported to influence older adults' OTC selection and reported use include personal beliefs and knowledge about OTC medications, assessment of the ailment and medical constraints [45]. Most older adults perceive high self-efficacy; when asked about five sequential steps in the treatment decision process, a total of 73% of the participants reported feeling very confident in their ability to recognize symptoms, 69% in their ability to locate OTC medications in the store, 77% in their ability to read the information on the OTC drug label, 69% in their ability to select their choice of OTC medications among several options, and 80% in their ability to treat symptoms with an OTC medication [7]. Despite this, few older adults read the dosage labels (22%) or side effects and warnings (19%) [46], which may contribute to the high proportion of misuse.

To better understand older adult (65+) decision making during OTC selection, a total of 87 older adults were recruited to select a medication for a hypothetical scenario concerning pain, sleep, or cough/cold/allergy symptoms [47]. They were followed by a researcher with a video recorder and asked to think aloud while shopping for an OTC medication in a pharmacy. In selecting an OTC medication, older adults consider quantity, cost, form, regimen, safety, strength, appropriateness of OTC safety, generic/brand name, past experiences, and ingredients. Following a systems redesign of the pharmacy layout, the factors considered by older adults were reduced by half, from on average 6.33 factors to 3.14.

It is evident in interviews and surveys of older adults that they perceive many OTC medications as safe to use, even during a prolonged period. Telephone interviews with 116 older adults who had used one OTC medications in the past 30 days revealed that 56% had been using a non-prescription sleep aid for over one year [46]. The most used sleep aids were antihistamine-only products (31%), melatonin (30%) and combinations of antihistamine and analgesics (29%). All antihistamine-only products used by these older adults contained diphenhydramine (75%) or doxylamine (25%), which should be avoided in older adults. Similarly, the combinations of antihistamine and analgesics included either diphenhydramine (97%) or chlorpheniramine (3%) in combination with acetaminophen, ibuprofen, or naproxen [46]. Ibuprofen and naproxen are NSAIDs that due to their increased risk of gastrointestinal bleeding should not be used long-term unless the patient is taking a gastroprotective agent such as a proton-pump inhibitor or misoprostol [39]. Despite the potential risk of misuse, older adults are reluctant to stop or lower the dose of their medicines, and when asked would only consider stopping 6% of their OTC medications [48].

To support older adults in their decision-making regarding OTC medications a formative study with 10 older adults were conducted to identify challenges and barriers to selecting appropriate OTC medications [49] and used to develop two prototypes; one to supplement information provided on

the OTC medication label and one where users could enter information about their medication and chronic illness and the system would customize information based on their input. Two brainstorming and review sessions with human-computer interaction researchers and design sessions with older adults (n=7, 65-75 years). 9 usability issues were identified. The prototype guided the older adults through the selection process, which they viewed as beneficial. The personalization/tailoring did not work and provided a limited degree of personalization. They trusted the system and would follow recommendations + wanted information on alternative medications. The language was consumer-friendly [50].

5. Interventions to improve OTC medication safety

5.1. Improving OTC medications labels and leaflets

Many individuals who read OTC medication labels or leaflets have difficulties understanding these, which could hamper safe use [51]; hence much research has been invested to design OTC medications labels that facilitate safe use. When consumers were asked to find the information about dosage, maximum daily dose, and contraindications information for two different OTC medications leaflets, as many as 60% could not locate the maximum duration of continued use in one of the leaflets [52]. Many different OTC medication labels including the US Drug Facts label, the Medicines Information label proposed by the Australian Therapeutic Goods Administration (TGA), the Medicine Facts label (proposed by consumers) and the Consumer Desires label (consumer informed) support consumers to find and understand key information [53]. However, consumers are positive towards standardization of OTC medications labels [54] and suggested improvements for making key information easier to find and understand on labels include increased font size, bolding/highlighting and using color [52]. Highlighting important information such as the active ingredient/s and warnings and positioning the information on the package's front increases attentional prioritization [55]. Consumer comprehension of a modified version of the FDA Drug Facts label with bigger font and information provided in different sections with prompts increased significantly as compared to the standard FDA label [56].

A national survey of 318 US pharmacists revealed that uses and purpose, active ingredient, warning, and directions for use were the most important sections of the drug facts label in reducing misuse at the time of purchase or use by older adults. The most important warnings in the warning section, according to pharmacists, were "Do not use" and "Ask a doctor or pharmacist" [57].

5.2. Enhanced pharmacist counseling

There have been several different intervention studies conducted in pharmacies to elevate the safe use of OTC medications generally, not just specifically for older adults. For example, a prospective, convenience sample study at three national supermarket chain pharmacies evaluated the potential outcomes of pharmacist intervention consisting of a pharmacist consult to assess the self-care complaint and make appropriate recommendations, on patient selection of OTCs and patient satisfaction. Most requests were about cough and cold (34%), allergies (15%) and pain (12%). The 42 patient consultations yielded 87 potential outcomes, the most common being reduced drug cost (n=30), avoided physician visit (n=21), corrected product use (n=15), and avoided new prescription (n=11). Patient satisfaction with the intervention was very high, and 100% would be willing to ask for help in the future. The mean time of the encounter was 6 minutes per patient [58].

Also, pharmacy students have been shown to provide effective counseling to customers wanting to buy OTC medications. For example, student pharmacists offered 559 OTC consultations in five community pharmacies over a period of one year. Of all counseling offers, 60.5% were accepted and resulted in significant cost savings to the customer [59].

Another approach to promote safety that has been tested is follow-up calls. Pharmacists or professional year 4 (PY4) advanced pharmacy practice experience students offered a follow-up call to customers who were seeking self-care advice in the pharmacy. Of the 207 customers that were approached, 83 (40.1%) accepted, 54 completed one follow-up call and 9 completed two calls. 14 (22.2%) of people who completed at least one phone call were 50 years or older. People who were called reported complete adherence to advice (85.2%-88.9%) and great symptom relief (75%-82.6%). Those who declined the follow-up call did so because they were not interested (44%), preferred to call their physician (19%), return to the pharmacy if further advice was needed (15%), too busy (11%), or other reasons (7%) [60].

5.3. Regulatory interventions

Another strategy used to reduce OTC medication misuse is to restrict access. There are several methods that can be used to restrict OTC access: 1) limit the amount (package size) available, 2) make OTC medications available only in pharmacies, 3) move OTC medications behind the counter that require customers to interact with pharmacy staff before purchase, 4) make OTC medication pharmacist only medications that require customer to interact with a pharmacist before purchase, 5) make OTC medications available only with prescription, and 6) delist a medication completely. Following reclassification of OTC codeine to pharmacist only medication/behind-the-counter in Ireland, codeine-related poisoning decreased by 53% [61], while similar efforts in Australia failed to curb codeine misuse [62]. However, acceptance rates of reclassifying OTC medications to prescription only medications appear low, even when there are clear safety benefits. Prior to the reclassification of OTC codeine in Australia in February 2018, the attitudes towards this were evaluated among 354 OTC codeine consumers, 220 pharmacists and 120 general practitioners [63]. A total of 83% of persons using codeine and 70% of pharmacists opposed the change from OTC to prescription only while 69% of general practitioners supported the initiative. Another cross-sectional study of pharmacists' views only months after the change occurred, found that 54% of pharmacists agreed/strongly agreed that restricting access would benefit patients and the advantages included increased pharmacist-patient engagement and better risk: benefit ratios. Commonly noted disadvantages included fewer OTC analgesic options and increased burden for patients, prescribers and the health care system [64]. Some pharmacists also support the restriction of codeine as it removes the potential of conflict that sometimes arise when engaging with customers wanting to buy these products [65]. About half (52%) of consumers agreed that OTC codeine had helped them alleviate pain symptoms and 43% felt that requiring a prescription for codeine had made it more difficult for them to manage their pain [66].

Another example of restricting access by moving an OTC medication behind the counter to limit potential misuse is pseudoephedrine. In 2006 an act was signed to ban over-the-counter sales of pseudoephedrine, ephedrine, and phenylpropanolamine in the US [67]. Individuals wanting to purchase products containing these ingredients must present a photo identification and the amount one can purchase each month is limited. In Australia, where similar legislation exists, a small but steady decline of requests was observed after reporting of pseudoephedrine product requests became mandatory [68].

5.4. Pharmacy involved interventions to elevate safe OTC use among older adults

One of the first published studies to inform a future intervention designed to elevate OTC medication safety in older adults used multiple methods including qualitative interviews, in situ shopping observations and laboratory-based simulated shopping tasks [69]. A total of 24 older adults (over the age of 65) were interviewed. Most claimed to be aware of medication-related adverse effects, however most older adults were unaware of the potential age-related risks with using OTC

medications with anticholinergic effects (to be avoided by older adults according to the Beers criteria). Both unobtrusive and inquiry observations were performed over 9 hours with a total of 39 adults. Several risky behaviors that could potentially lead to adverse drug events were observed during the observations including purchasing multiple ingredient medications that contain anticholinergic ingredients such as diphenhydramine and mainly examining the front of the product packaging and to a lesser extent the back or sides. Participants often weighed their decision on familiarity and past experiences vs. price. Lastly, 21 older adults participated in shopping simulations and were instructed to select one or more products for either a hypothetical sleep problem or pain symptoms. Approximately 30% of older adults chose sleep medications and 20% chose pain medication with an anticholinergic ingredient. The think aloud process revealed that they prefer medications they are familiar with, perceive to be effective and are inexpensive. Most older adults were observed to be paying attention to warnings and usage information as well as marketing text such as “pain reliever” or “nighttime sleep aid” but many failed to read all the ingredients [69].

An intervention consisting of a curated section of medications generally considered safe for older adults to use for pain, sleep, cough/cold and allergy called the “Senior Section” [70] was developed in partnership with community-dwelling older adults and pharmacy staff [71], and evaluated in a pilot-study [72]. Cautionary signage was placed in the aisles of the pharmacy to indicate that some products for pain, sleep, cough/cold and allergies have higher risks for older adults and encourage older adults to visit the Senior Section instead. The Senior Section was located close to the prescription area to encourage dialogue between older adults and pharmacy staff and contained no medications with anticholinergic effects or multi-ingredient products. Pharmacy staff perceived the Senior Section to enhance medication safety, and they also found that its placement near the prescription area was convenient in that they had direct accessibility to engage with older adults. Despite a perceived increase in questions from and interactions with older adults, pharmacy staff perceived the consultations to be of better quality and more efficient following the implementation of the Senior Section, and well-integrated into their workflow. Before the Senior Section was implemented, pharmacy staff were asked to complete a 10-item questionnaire for each patient they interacted with over a week to document information about which topics were discussed, who initiated the encounter, and the time spent with the patient, among other things. This was repeated two weeks after the implementation of Senior Section. A total of 46 OTC forms were collected; 19 pre and 27 post intervention. The implementation of Senior Section increased staff engagement with patients, from 52.6% to 63.0% for pharmacists and from 68.4% to 77.8% for pharmacy technicians, while frequency of long encounters decreased from 15.8% to 3.7% [72]. After having expanded the intervention from one to four pharmacies, interviews with pharmacy staff confirmed the findings that the Senior Section improved pharmacy staff’s ability to engage with older adults to support OTC medication use. Pharmacists expressed confidence in their knowledge, training, and experience to provide OTC medication-related recommendations, and that the Senior Section was considered more private and facilitated conversations about OTC safety which led to safer medication selections. Designed for older adults, the Senior Section seemed to appeal to all age groups as the signage warnings addressed patients’ medication concerns and increased patients’ understanding about the importance of seeking information about an OTC [73].

To examine the Senior Section’s effectiveness of reducing medication misuse in older adults, a pre-posttest including 87 older adults from three pharmacies was conducted [12]. Participants were asked to choose a hypothetical scenario about either sleep, pain or cough/cold or allergy symptoms. Walking with a researcher, the participants entered the pharmacy to select a medication and answered questions about how they decided to pick that medication or what they were thinking about when deciding which medication to pick. Participants were also asked to describe how they

would use the medication at home, as well as provide a copy of their medication list. Using the 2015 Beers Criteria list, three pharmacists with geriatric clinical experience analyzed potential drug-age misuse. Drug-drug misuse was measured using Lexicomp to identify type C (monitor therapy), D (consider therapy modification) and X (avoid combination), whereas drug-disease misuse was determined using Beers Criteria, contraindication listed in product labeling, or clinical knowledge. Lastly, drug-label misuse was present when the patients' reported use exceeded the daily dosage, exceeded single dose, deviated from recommended dose timing/frequency, duration of use or for an inappropriate indication. Following the implementation of Senior Section, OTC medication misuse decreased for seven of eleven categories including drug-age, overall drug-drug, drug-drug type C and X, drug-disease, exceeds daily dosages, and exceeds single dosage [12]. A continuation of Senior Section involving an adaptation phase, an effectiveness phase and a sustainment phase is currently underway in conjunction with pharmacy leadership and staff of a regional Midwest integrated health system [74].

6. Community pharmacists' barriers to helping older adults select safe OTC medications

When making recommendations on OTC medications to older adults, community pharmacists share a mental model in terms of WHAT they are seeking to establish and WHEN they seek to establish it [75]. Before making a recommendation, pharmacists gathered information about the patient's medication profile, other health conditions, characteristics of the current problem, and past treatments. Pharmacists sometimes use mnemonics to gather important information before making recommendations. Examples of mnemonics that overlap with the mental model displayed by pharmacists include WWHAM, SCHOLAR, ENCORE, and ASMETHOD. WWHAM [76], for example, stands for Who is it for? What are the symptoms? How long have the symptoms been present? Any other medication being used at present? What Medications has been tried already?

Time and motion studies have been conducted to explore how community pharmacists spend their time, and to identify their capacity to expand services. Despite efforts to shift pharmacists towards patient-centered activities, pharmacists in the UK spent only 3.2% of their time providing pharmaceutical services [77]. The largest proportion of time (25.2%) was spent assembling and labelling products, followed by monitoring prescriptions for clinical appropriateness (10.6%), offering OTC medications advice (6.6%) and prescription medications counselling (3.8%). A small pilot study, conducted in three Australian community pharmacies, found that pharmacists spent most of their time counselling (23.9%), dispensing (23.9%) and on management activities (24.2%) [78]. These findings were confirmed in a larger time and motion study of 24 pharmacists in 15 pharmacies where dispensing (33.0%), indirect patient services such as ordering or organizing medication supply and delivery (16.6%) and counselling (15.0%), accounted for the majority of their time [79]. Most tasks were performed in locations where customer interactions were limited such as behind the desk in the dispensing or compounding area (51%) and the back office (6%) instead of at the sales desk (29%) or shop floor (17%) where customer interactions are more available. The median time for the four most common tasks was between 0.40 and 1.62 minutes [78], while the median duration of pharmacist-patient interactions in Portugal are 3.98 minutes [80]. In an exploratory study investigating what pharmacists engage with patients abouts found that older adults account for nearly half of all OTC medication encounters. The topics most frequently discussed in OTC medication encounters were the location of a product (85%), recommending a product (32%) and providing information about a specific OTC product (31%). Most of these encounters (85%) lasted less than three minutes [81].

Although time and motion studies are great in quantifying how much time is spent on different tasks, it provides no information about the quality of work. They do however indicate that interventions involving pharmacists to improve medication safety that take significantly longer than the current median interaction will be difficult to implement and sustain over time without additional support.

Discussion

Our narrative review is motivated by the practical need to understand how pharmacy-involved interventions have promoted safe OTC medication use for older adults. Given our aim to consolidate the current approaches that may offer more nuanced recommendations for future interventions, we used a systematic way to search and select relevant articles. Our full-text review of the articles highlighted that only a few studies were large enough to infer generalizability and even fewer have utilized a theory driven approach in designing, adapting, and testing pharmacy-involved interventions in a holistic way. Those studies paid particular attention to the naturalistic behaviors of older adults when they are purchasing OTC medications with/without the interventions implemented in the pharmacy and examined the interventions' effectiveness in reducing the older adults' OTC medications misuse.

In contrast to those studies, we found that many other studies focused on the singular aspects of OTC selection. The designs of OTC medication labels or leaflets were investigated to facilitate consumers' information comprehension and attention prioritization, which would ultimately lead to the safe use. The potential of counseling services provided by pharmacists and pharmacy students, either via in-store encounter or follow-up calls, was explored and proven to be effective in satisfying OTC medication customers. Additional studies involved regulatory interventions to restrict access to specific OTC medications by relocating them behind the counter or reclassifying them to be prescription only. Noteworthy, the roles of pharmacists and other pharmacy staff have been expanded or redefined to fit the different pharmacy-involved interventions. We found that time and motion studies were conducted to quantify how much time community pharmacists spend on different tasks, including OTC medications patient encounters.

Overall, the takeaway message would be that no single intervention can effectively prevent OTC misuse in all older adults. The studies reviewed in this paper can be marked as the valid and valuable attempts to engage both consumers and providers (e.g., older adults and pharmacy staff) in designing and testing the interventions tailored to specific settings for the time that the research team was working on. Yet their interventions and associated findings are limited in terms of generalizability across different settings and sustainability over long periods. Adopting and sustaining implementations are a complex undertaking that requires a solid understanding of diverse contexts and end user characteristics. Much work remains to be done to develop and generalize the knowledge about the modifications made to different interventions. As such, future research is warranted to investigate the effectiveness of interventions in terms of both their adoption and sustainment, while paying more holistic attention to the multiple facades of OTC medication used specifically for older adults.

Potentially relevant literature may have been missed due to this being a narrative review, not a systematic literature review. Also, the strict inclusion and exclusion criteria may have impacted the results since only literature published in English were included. However, only articles published in the last ten years were included, thus providing an up-to-date review of current knowledge in this field.

Conclusion

Pharmacy-led interventions are vital for improving older adult safe medication selection and reducing drug misuse. Many studies attempting to implement pharmacy-led interventions focus on singular aspects of OTC selection such as improving patient counseling, label, and instruction clarity, and relocating some medications to behind the counter. In short term studies, such as those led by pharmacy students, intervention outcomes are successful but have potential to decline once there are fewer researchers involved in maintaining the integrity of the intervention and safety of older adult patients. Likewise with programs that move product location in the pharmacy, there is limited evidence accounting for intervention drift one researchers have concluded their studies. Given older adult perceptions of having high self-efficacy when selecting and taking medications, the described interventions meet a critical need for pharmacies to maintain older adult autonomy while connecting them with pharmacy staff for necessary medication education.

Optimal pharmacy-led interventions need to be sustainable and effective beyond the time the research team is involved. Based on the reviewed interventions, it's crucial to have older adults and pharmacy staff involved in the design and implementation of interventions aiming to support older adult decision making. By including both perspectives, interventions are set up for success beyond of researcher involvement and tailored to support medication selection pitfalls faced by pharmacy staff in day-to-day encounters with older adults.

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