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CLINICAL INVESTIGATION

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Preventive health therapy and behavior outcomes from a brown bag medication review for older adults

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Abstract

Background: Morbidity and mortality associated with preventable diseases can be reduced with the use of preventive health services. We evaluated the uptake and retention of preventive health behaviors and management of accidental medication poisonings in older adults after a health prevention educational component was combined with a brown bag medication review.

Methods: This study used a cohort design and was conducted in six urban senior centers and three independent senior living communities in Detroit, Michigan. Participants included 85 older adults (>60 years old) taking five or more medications with 63 participants returning follow up materials. Pharmacy personnel conducted brown bag medication reviews that were combined with a preventive health education component. Information was collected on medications, vaccinations, supplement use, and accidental medication poisoning management. Participants were given written recommendations on prescription medications and preventive health therapies to improve health and medication use. An investigator developed program satisfaction survey was administered immediately after the review. An investigator-developed follow-up preventive health implementation survey was conducted at least 3 months later to assess recommendation implementation.

Results: Participants' mean age was 75.9 ± 8.5 years. Fifty-six older adults had 124 recommendations in preventive health in total (1–5/participant). Eleven participants had no recommendations. Sixty-three participants (74%) returned follow-up preventive health surveys. Twenty-three percent of recommendations were already implemented with 34% planned to be done in the future. Poisoning management knowledge increased for 13 participants, reporting they would call the poison control center. The program was well received, with participants reporting high satisfaction scores (4.8 ± 0.7 out of 5).

Conclusions: Brown bag medication reviews can be an effective method to promote the uptake of preventive health behaviors among older adults, but additional accidental medication poisoning management education is still needed.

KEYWORDS
brown bag, medication review, older adults, poison control, preventive health services

INTRODUCTION

Preventable diseases are placing high financial and social demands on people and communities worldwide.[1] With an aging population, the prevalence of chronic preventable diseases is on the rise.[2] Preventive health services, such as vaccinations and aspirin prophylaxis, can reduce morbidity and mortality.[3] Patients who manage their chronic conditions are more likely to seek out, or be interested in, preventive health services.[4] With the optimal implementation of preventive care services, it is estimated that 42,600 deaths per year could be avoided for individuals under the age of 80 years.[5] Fifty-five percent of these preventable deaths would occur in older adults 65–80 years old.

Although older adults have access, many lack preventive health care. Only 25% of adults aged 50–64 years, and approximately 50% of adults aged 65 years or older, are up to date on their preventive health therapies (e.g., medications and vaccinations).[6] Preventive health therapies are highly recommended for older adults as age-related physical decline increases susceptibility to illness.[7,8] Preventive health services that are targeted to older adults include vaccinations against influenza and pneumonia, vitamin D for falls prevention, and screening for hypertension, hypercholesterolemia, and cancers.[9,10] Vaccinations, specifically influenza and pneumococcal, are among the most efficient methods for preventing infectious disease-related deaths.[11–13]

Death due to accidental poisoning, which has increased dramatically over recent years, is another preventable health issue.[14] In the last two decades, a fourfold increase in the age-adjusted accidental drug-poisoning death rate (per 100,000 people/year) has occurred in the United States. Although the factors driving this change remain unclear, a recent emphasis on the need to strengthen overdose prevention programs and policies has occurred.[15,16] Poison prevention education and the creation of appropriate action plans, such as contacting a Poison Control Center, can provide rapid, time-sensitive expertise for critical situations in underserved populations (e.g., older adults, low-income, and rural populations).[17] Time constraints on health care providers that inhibit poison prevention education could also be a contributing factor, creating a need for further patient education and the creation of poison preventive programs.[18]

One potential method that could aid in the delivery of preventive health services and patient education is a brown bag medication review. In a brown bag medication review, the entirety of the patient's medical history and current medications (including prescribed, herbal, and over-the-counter medications) is reviewed by a pharmacist using the information provided by the patient in a single appointment. This model is useful in community settings and health fairs where accesses to primary care providers and/or medical records are not available. Previous brown bag programs have minimized medication misadventures, corrected medication use, identified adherence issues, and assisted with patient education.[19–23] To date, brown bag medication reviews have not yet been evaluated for their potential use in the delivery of preventive health and management of accidental medication poisoning education. In this study, the effectiveness of a brown bag medication review to act as an education avenue for older adults to increase their preventive health behaviors and knowledge about correct treatment of accidental medication poisoning was evaluated.

Key points

- Adding a preventive health education component to a brown bag medication review increased preventive health behaviors practiced by older adults (e.g., calcium supplementation, tetanus vaccination, and medication bracelet).
- Adding poison prevention education to a brown bag medication review increased the number of older adults that knew how to manage accidental medication poisonings but further education is needed to increase the utilization of poison prevention centers.

Why does this paper matter?

Preventive health behaviors have been found to prevent or minimize the development of various medical conditions. This study demonstrated that during brown bag medication reviews, adding education on preventive health behaviors can increase patients utilizing proven health preventive therapies and practices, which could prevent health conditions and/or improve health outcomes after implementation. Knowing how to handle accidental medication poisoning could decrease emergency department visits and improve patient outcomes.

METHODS

Participants

This study was conducted in Detroit, Michigan, across six urban senior centers and three independent senior living communities (high-rises). Recruitment varied by site. Posters were placed in facilities, announcements were delivered at lunch programs, and social workers and staff identified older adults. About 2–12 brown bag reviews were conducted per month as part of pharmacy resident projects and introductory experiential education for student pharmacists. Participants were 60 years or older and were currently taking five or more medications. Only participants that provided written informed consent were included. Participant inclusion and exclusion criteria have been described elsewhere.[22] This study received institutional review board approval.

Brown bag medication review and preventive health education

Pharmacy residents (F.C., J.H., H.K.) received training on the study and initially conducted reviews with a preceptor (M.B.O., C.G.) until they mastered the verbal interview process. All care plans and recommendations were discussed initially with the preceptor until later into their ambulatory care residency year when deemed competent to be independent. Student pharmacists received training on the program and conducted all their brown bad reviews under the supervision of a pharmacist or pharmacy resident. All student pharmacist care plans and recommendations were approved by a preceptor or pharmacy resident. Participants were instructed to bring all their prescription and nonprescription medications (e.g., over-the-counter and herbal medications) to the brown bag medication review. This review was conducted by a pharmacist or student pharmacists with a pharmacist who reviewed how the participant was using each medication and identified medication-related problems, gaps in preventive health services (e.g., use of preventive medications), and suboptimal medication-taking behaviors. The participants were also asked to provide information regarding allergies, drug intolerances, lifestyle behaviors (e.g., diet, exercise, smoking, and alcohol use), and medication management (e.g., pillbox use, difficulties with medication administration, medication refills, and medication costs) (see Text S1: Patient Assessment Form). Participants were also questioned about their use of the following preventive therapies; aspirin, calcium, vitamin D, multivitamins, influenza, pneumococcal, and tetanus vaccination status (see Text S1: Patient Assessment Form). They were also asked about action plans in the case of accidental, medication-related poisoning and the use of medical jewelry for medication allergies (see Text S1: Patient Assessment Form). This review was conducted by a pharmacist or student pharmacists with a pharmacist using a standardized non-validated medication intake form (see Text S1: Patient Assessment Form). Questions asked were derived from standard practice with addedemphasis on comprehensive assessments and medication adherence in older adults. Based on the medication review, a list of recommendations on medication use, lifestyle measures, and prevention of secondary illness were provided.

After reviewing the participants' current medications and preventive health behaviors, the participants were then verbally educated on preventive health services. Preventive health behavior education was tailored to the patient, with only specific suggestions for the patient discussed based on needed and currently not performed behaviors. This education occurred at the time of the interview and during the follow-up visit. The participants were encouraged to integrate preventive health therapies and behaviors into their lifestyle, such as the use of calcium and vitamin D to decrease bone loss, vaccinations, and aspirin if appropriate. The participant was educated on how to manage accidental medical overdoses. Later, after the launch of the program, patients were given Poison Control Center stickers and/or magnets. When appropriate the importance of wearing medical jewelry for medication allergies was discussed.

All recommendations were provided in writing to the participant in person or discussed in a follow-up visit and then the written recommendations were mailed. All participants were encouraged to discuss the pharmacist recommendations and any medication-related problems with their primary care provider.

Patient surveys

To identify the primary reasons for participating in the medication review, and evaluate program satisfaction, the value of the brown bag review, and self-perceived learning, investigators developed a 22-item survey (initial survey, see Text S2: Patient Satisfaction Survey) which was given to all participants immediately after the brown bag review and an education component. This survey had 1 question regarding the reason for participating, 13 questions on the evaluation of the review (using 5-point Likert scales), and 8 questions on self-perceived learning (using 5-point Likert scales).

Participants were mailed a follow-up survey (see Text S3: Preventive Health Follow-up Survey) 3 months later that included five questions on preventive health, 1 question on medication-related problems, 1 question on how to manage an accidental medical overdose by a child, 1 question on program helpfulness and 1 question on recommendation implementation (4-point scale). All questions were developed by investigators. Non-responders were called for a phone interview by a pharmacy resident or assistant. Survey questions were the same regardless of the modality used (e.g., mailed, over-the-phone) with individual patient customization where appropriate. The preventive health questions evaluated any changes to calcium and vitamin D supplements, multivitamins, and vaccinations since the initial medication review. Aspirin use was not evaluated because it could be used for prevention or treatment of cardiovascular disease. In a few cases, implementation status differed between the recommendation follow-up implementation sheet and the post program survey (see Text S3: Preventive Health Follow-up Survey and Table S1: Medication Recommendation Follow-up Survey). In these cases, answers from the recommendation implementation sheet were used.

TABLE 1 Baseline characteristics

Characteristic	Value [*n* (%)]
Demographic characteristics	
60–74 years old	29 (46.0%)
75–84 years old	26 (41.3%)
85–94 years old	8 (12.7%)
Mean age (SD)	75.5 (7.7)
Female	55 (87.3%)
Black	54 (85.7%)
White	9 (14.3%)
Health-related characteristics	
Self-rating of physical health	
Fair	30 (47.6%)
Good	25 (39.7%)
Excellent	4 (6.3%)
Poor	4 (6.3%)
Number of medications (prescribed, over-the-counter, herbal products)	
Mean (SD)	10.2 (4.4) (range 5–24)
Number of medical conditions	
Mean (SD)	6.2 (3.2) (range 1–15)
Lifestyle characteristics	
Living Alone	44 (69.8%)
Living With family	10 (15.9%)
Living With spouse	5 (7.9%)
Other Living Situations	4 (6.3%)
Housing	
Other (e.g., residential facility)	34 (54.0%)
Own home	27 (42.9%)
Assisted living	1 (1.6%)
Family home	1 (1.6%)
Education (years)	
Mean (SD)	12.5 (3.3)

TABLE 2 Initial survey results

Reasons for attending brown bag program ($n = 64$)		
Reasons	**No. (%)**	**Primary reason for attending**
Learn more about medications	56 (88%)	20 (31%)
Learn more about staying healthy	44 (69%)	16 (25%)
Someone referred me	27 (42%)	10 (16%)
Health problem	25 (39%)	9 (14%)
Medication-related problem	15 (23%)	6 (9%)
Other	8 (13%)	3 (5%)
Amount of learning[a]		
Item		**Mean score (SD)**
Vaccines needed		4.4 (1.1)
Vitamins and calcium supplements needed		4.5 (1.0)
Poison prevention management		4.5 (1.1)
Program evaluation[b]		
Statement		**Mean (SD)**
I enjoyed the program.		4.8 (0.7)
I had enough time to ask questions.		4.9 (0.7)
The program met my needs.		4.8 (0.8)
I understood the answers to my questions.		4.8 (0.8)
I trust the answers from the pharmacist.		4.8 (0.7)
I found the poison prevention magnet and stickers helpful.[c]		4.9 (0.9)
I now know more about how to live healthier.		4.7 (0.8)

[a]Amount of learning was rated from very little (1) to lots (5).
[b]Responses ranged from strongly disagree (1) to strongly agree (5).
[c]Poison control magnets and stickers were added after the program had begun.

TABLE 3 Implementation of recommendations at follow-up

Preventive behaviors	Number of recommendations	Yes, it is done	Will do it in the future	Not sure, still thinking about it	Do not want to do
Vitamin D supplementation	28	8 (28.6%)	9 (32.1%)	5 (17.9%)	6 (21.4%)
Calcium supplementation	23	6 (26.1%)	8 (34.8%)	5 (21.7%)	4 (17.4%)
Multivitamin	20	5 (25.0%)	5 (25.0%)	3 (15.0%)	7 (35.0%)
Pneumococcal vaccination	15	1 (6.7%)	7 (46.7%)	2 (13.3%)	5 (33.3%)
Tetanus vaccination	11	1 (9.1%)	5 (45.5%)	3 (27.3%)	2 (18.2%)
Medication jewelry/MedicAlert	8	1 (12.5%)	5 (62.5%)	2 (25.0%)	0 (0%)
Influenza vaccination	6	3 (50.0%)	0 (0%)	1 (16.7%)	2 (33.3%)
Total	124	29 (23.4%)	42 (33.9%)	23 (18.5%)	30 (24.2%)

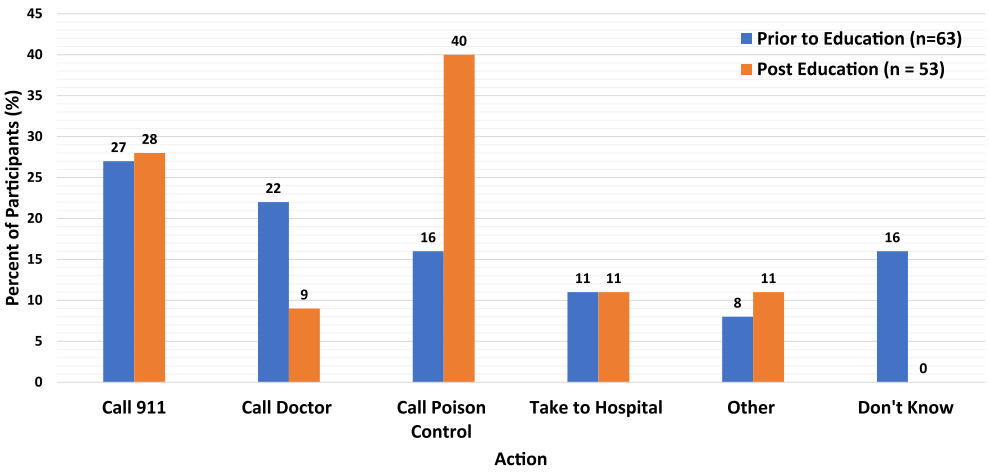

FIGURE 1 The effect of education on action plans for child with an accidental medication overdose ($n = 54$)

Statistical analysis

Descriptive statistics were conducted using SPSS version 27 (SPSS Inc., Chicago, IL).

RESULTS

Of the 85 participants enrolled, 64 completed the initial survey conducted immediately after the medication review (75%). The follow-up assessments were completed by 63 participants (74%); one participant died, three were lost to follow-up, 1 was too young, three had less than the required 5 medications, and 14 did not return 3-month follow-up data. Demographic, health-related, and lifestyle characteristics are listed in Table 1 and were captured during the patient intake interview.

Based on the initial survey, annual influenza vaccination and pneumococcal vaccination were the most common preventive health measures found among participants, present in 71.0% and 66.7% of participants, respectively. The primary reason for participating in the brown bag review was to learn more about medications (31%). Additional reasons are listed in Table 2. The participants found the program very informative and helpful (Table 2).

At the 3-month follow-up, 29 of the 124 recommendations were implemented with an additional 42 commitments to implement recommendations in the future (Table 3). In the case of an accidental medication overdose, the education program increased the number of participants willing to call the Poison Control Center; a 24% increase from baseline (Figure 1). Additionally, providing education encouraged all participants to select an action plan (Figure 1).

DISCUSSION

Based on the results of this study, a large portion of older adults are already undertaking at least one preventive health therapy such as annual influenza (71% of participants) and pneumococcal vaccinations (66.7% of participants). The follow-up data suggested that the brown bag

medication review combined with a preventive health education component can increase adherence to recommended preventive health guidelines in the areas of influenza and pneumococcal vaccinations, calcium, vitamin D, and multivitamin supplementation. Discussion on accidental medication poisoning also resulted in better action plans for participants, although continued reinforcement in this area will be helpful.

Very few studies have been conducted on brown bag medication reviews.[19–23] Yet, using brown bag medication review has become a common approach in community and public health efforts. To our knowledge, this is the first study to evaluate the implementation of preventive health recommendations as a structured component following a brown bag review. Efforts towards promoting up-to-date preventive care have demonstrated encouraging results. A previous study reported that a pharmacist-run osteoporosis service led to a significant improvement (59% increase) in short-term adherence with calcium and vitamin D supplementation in patients with osteoporosis.[24] In addition to pharmacist-run programs, organizations such as The Sickness Prevention Achieved through Regional Collaboration (SPARC) and the Vote & Vax initiative have successfully aided in the delivery of preventive health services such as vaccines.[25,26] The role of pharmacists providing preventive health care is advocated for by the United States Surgeon General, the American Public Health Association and the Centers for Disease Control.[27,28,29] An umbrella review of systematic reviews, narrative reviews, and meta-analyses supports effectiveness of pharmacist-provided preventive screening education, smoking cessation education, osteoporosis screening and education, immunization and provision of United States Preventive Services Task Force recommendations.[30] Incorporation of many such educational components into a brown bag medication review was a strength of our program.

Another strength of our program was the inclusion of accidental medication overdose education. According to one study, only 9% of pharmacists reported that they specifically counsel older adults about poison prevention, including accidental medication overdose. That same study estimated that childhood poisoning could be reduced by approximately one-third of all pharmacists providing specific poison prevention education to older adults.[31] Successful delivery of poison prevention education by pharmacists to a group of older adults attending a senior center has been described.[32] Our study uniquely describes systematically delivered one-on-one education about prevention and management of accidental medication overdose to older adults during brown bag medication review. By adding a few extra minutes to the medication review, we found the education increased participants' awareness of potential actions to take, and their willingness to contact poison control in the event of an accidental overdose. Our study highlights an opportunity for health care professionals to close a gap in delivery poison prevention education and improve older adults' knowledge of the management of medication poisoning.

Implementation of strategies aimed at improving medication use in older adults can be challenging. For instance, in a randomized control trial, a patient-centered approach including a brown bag medication review of home medications conducted by general practitioners did not decrease the number of medications used and had no impact on health-related quality of life.[33] A specific discussion on preventive health with patients was not part of the intervention. In our study of older adults undergoing brown bag medication review that included preventive health education, participants reported they had already or were planning to implement the recommendations (23.4% and 33.9%, respectively). A majority of participants (57.3%) had a positive response to preventive health recommendations demonstrating a favorable and impactful outcome of such efforts included in the brown bag medication review. As older adults have regular interactions with community pharmacists, with many building long-term trusting relationships, embedding specific preventive health education into pharmacist-conducted brown bag medication reviews could be an efficient way to decrease the risk of preventable diseases. Pharmacist-conducted medication reviews have also been shown to improve medication knowledge, implementation, storage, and adherence, and can help identify medication-related therapy problems.[34–36] As 20% of Americans will be 65 years or older in 2030, a greater demand on the medical system, particularly in primary care, will exist.[37] Preventive health education and promotion in community pharmacy practice could be an accessible way to help reduce the strain.

Some limitations are associated with this study. The voluntary enrollment process might have led to a sample with a higher level of interest in health and health maintenance. Because no control group was included, changes in preventive health behaviors could have resulted from other medical interventions or from patients reading and/or learning from others. Errors in patient recall and a lack of access to patient charts and/or laboratory test results could have contributed to suboptimal or missed opportunities. With regards to the follow-up survey, a 3-month timeframe might be too long to assess information recall. This timeframe also might not have provided enough time for the older adults to discuss recommendations with their primary care providers. We had no method of verifying that the participant, under the

guidance of their primary care provider, implemented the pharmacist's recommendations. Additionally, an overestimate of patient satisfaction might have occurred as older adults can be agreeable and unsatisfied participants might not have returned their survey data. Despite these challenges, this study adds valuable real-world data in a field with limited evidence and provides insights into implementation.

CONCLUSION

The pharmacist-led brown bag medication review program performed on older adults residing in the community resulted in increased use of preventive medications and vaccines. Participants reported an increase in knowledge and were receptive to pharmacist recommendations. This study highlights an opportunity to enhance public health initiatives, such as vaccinations and osteoporosis prevention supplements, as part of a medication review program. Although positive changes resulted, additional programs are warranted to further increase preventive health therapy use, promote positive lifestyle behaviors, and optimize response to accidental medication poisonings.

AUTHOR CONTRIBUTIONS

Feng Chang: study concept and design, acquisition of subjects and data, data analysis and interpretation, and review of the manuscript. **Mary Beth O'Connell**: study concept and design, acquisition of subjects and data, data analysis and interpretation, and preparation of manuscript. **Megan E. Mills, Hanan S. Khreizat**: acquisition of subjects and data, data analysis and interpretation, and review of manuscript. **Jamie M. Hwang, Candice L. Garwood**: acquisition of data, data analysis and interpretation, and review of manuscript. **Ashley Houser**: data analysis and interpretation, and preparation of manuscript.

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CONFLICT OF INTEREST

The authors have no conflict of interest.

SPONSOR'S ROLE

Not applicable.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

Text S1. Patient assessment form including patient demographic information, medical history, medication use, and preventive medication check.
Text S2. Patient satisfaction survey.
Text S3. Preventive health follow-up survey.
Table S1. Medication recommendation follow-up survey.

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