



OLDER AMERICANS
Substance Abuse & Mental Health
Technical Assistance Center

Evidence-Based Practices for Preventing Substance Abuse and Mental Health Problems in Older Adults

Excerpt: Prevention of Substance Misuse
Problems: Medication Misuse

Prepared by:

**Frederic C. Blow,
Stephen J. Bartels,
Laurie M. Brockmann, and
Aricca D. Van Citters for the Older Americans Substance Abuse
and Mental Health Technical Assistance Center**

EXECUTIVE SUMMARY

The prevention of substance abuse and mental health problems within the aging population has been recognized as a national priority. The Substance Abuse and Mental Health Services Administration's *Older Americans Substance Abuse and Mental Health Technical Assistance Center* (TAC) is committed to serving as a leading resource for the prevention and early intervention of late-life substance use and mental health problems. Despite the substantial prevalence and adverse consequences of substance use and mental health problems in older persons and the considerable knowledge related to preventing these problems, evidence-based prevention and early intervention services are not widely available nor promoted for this at-risk population. Given financial restrictions facing many health care systems, guidance is needed to direct limited available resources toward the provision of programs that have proven effectiveness. To support this effort, the TAC has reviewed the best available evidence supporting programs that target the prevention and early intervention of substance abuse and mental health problems in older adults.

The purpose of this review is to highlight prevention and early intervention programs that have proven effectiveness. This report identifies the demographic imperative for addressing late-life substance use and mental health problems, describes the current terminology of prevention programs and practices, provides a comprehensive review of the published evidence base for the prevention and early intervention of geriatric substance abuse and mental health problems based on the empirical evidence, and describes dissemination and implementation issues that align with state needs and priorities.

Five specific areas are addressed. These include the prevention and early intervention of alcohol misuse, medication misuse, depression and anxiety, suicide, and co-occurring substance abuse and mental health problems among older adults. This review provides a comprehensive examination of prevention programs in these areas that have been published through September 2005.

Alcohol Misuse

- Brief interventions can reduce alcohol misuse and hazardous drinking among older adults. Specifically, structured brief interventions and brief advice in health care settings have shown to be effective at reducing alcohol consumption in this population.

- Little evidence is available regarding universal prevention programs targeted at the prevention or reduction of alcohol misuse among older adults. Some health education programs have demonstrated increased knowledge among older adults about hazardous alcohol use.
- Recently developed screening and assessment instruments show promise as useful tools to improve identification of older at-risk drinkers and enhance clinician interactions to prevent or reduce alcohol misuse.

Medication Misuse

- Computer-based health education tools designed for older adults have shown gains in knowledge and self-efficacy regarding potential drug interactions, as well as improvements in self-medication behaviors.
- Clinical trials on early interventions with older adults who are at increased risk for medication misuse have had mixed results. Nonetheless, interventions with patients prior to hospital discharge, interventions targeted at changing provider prescription patterns, and home-based medication reviews show some promise to prevent medication misuse.

Depression and Anxiety

- A moderate amount of evidence supports the effectiveness of problem solving therapy (PST) and exercise in preventing the onset or worsening of depression. In addition, targeted outreach is effective in engaging isolated and vulnerable older adults in mental health care.
- More research is needed to determine whether other potentially effective strategies are effective in preventing depression, including: life review, reminiscence therapy, educational classes for older adults and providers, and mind-body wellness.
- Minimal evidence supports prevention programs focused on late-life anxiety.

Suicide

- Supportive interventions that include screening for depression, psychoeducation, and group-based activities have been associated with reduced rates of completed suicide among older adults.
- Telephone-based supportive interventions have also been associated with a reduction in the rate of completed suicide.

- Protocol-driven treatment of depression delivered by a care manager has been associated with reduced suicidal ideation.

Co-occurring Disorders

- Concurrent treatment of substance abuse and depression may be effective in reducing alcohol use and improving depressive symptoms.
- The evaluation and treatment of co-occurring substance use and mental health problems among older adults is an under-studied area.

This report highlights the evidence base for the prevention and early intervention of substance use disorders and mental illness in older adults. Of note, the field of prevention is far less developed than our understanding of the diagnosis and treatment of substance abuse and mental disorders in late-life. In particular, comparatively few scientific efforts have focused on preventive measures, the early identification of and intervention with high-risk individuals, and the promotion of optimal health regarding substance abuse and mental health concerns in late adulthood. However, this summary of the current evidence base provides direction for both providers and consumers regarding substance abuse and mental health prevention and early intervention services. This information can be useful in planning and implementing effective programs and practices, while also underscoring future directions for research and evaluation.

PREVENTION OF SUBSTANCE MISUSE PROBLEMS

The following two sections highlight the current best evidence supporting prevention and early intervention programs targeting the reduction and elimination of two primary areas of substance use disorders among older adults: alcohol misuse and medication misuse. The misuse of alcohol, prescription drugs, and other substances among older adults is a sizeable and growing concern. Problem drinking among older adults in the community is estimated to range from 1-15 percent.¹⁻³ At-risk or problem drinking, as well as alcohol abuse or dependence, is notably higher among older adults seen in health care settings and residents of nursing homes.⁴⁻¹⁰ An estimated one in five older Americans (19%) may be affected by combined difficulties with alcohol and medication misuse.¹¹⁻¹⁴ Problems related to alcohol use are currently the largest class of substance use problems seen in older adults. The substances most commonly abused by older adults besides alcohol are nicotine and psychoactive prescription drugs. Co-occurring problems are frequent, as both nicotine and prescription drug abuse are much more prevalent among older adults who misuse alcohol than among the general older population.¹⁵⁻¹⁸

Older adults are uniquely vulnerable to substance use disorders due to a variety of biological, psychological, and social changes associated with aging. Older adults have an increased risk for misuse and abuse of medications, as they use a higher number of prescription and over-the-counter medications compared to younger adults. In contrast to younger persons with substance abuse problems who most often abuse illicit drugs, substance abuse problems among older individuals more typically occur from misuse of over-the-counter and prescription drugs. The rates of illegal drug abuse in the current older adult cohort are very low.^{19,20} The interactions between alcohol and medications are of notable concern for older populations. Negative interactions between alcohol and psychoactive medications, such as benzodiazepines, barbiturates, and antidepressants, are of particular importance. Alcohol use can interfere with the metabolism of many medications and is a leading risk factor for the development of adverse drug reactions.²¹⁻²³ Despite the risks, physical and mental health care practitioners fail to identify most older adults who consume alcohol at risky levels, including any consumption in hazardous combinations with medications, as at-risk or problem drinkers.⁴

The use of nicotine is a significant health problem for older adults. Although tobacco use declines with age, nearly 4 million older adults continue to smoke regularly.²⁴ In 1999, nearly 23 percent of adults ages 50 to 64 reported past month use of cigarettes. Among those age 65 and older, this figure was about 11 percent.²⁴ Consistent with younger populations, older women have lower smoking rates than older men.²⁵ Nicotine addiction often co-occurs with other substance use disorders, and can be a marker for other substance abuse. For example, smoking in older problem drinkers is more prevalent than in the

general older adult population. Some studies indicate that the prevalence of smoking among alcohol dependent individuals generally is above 80 percent;²⁶ an estimated 60 percent to 70 percent of older male alcohol users smoke a pack or more of cigarettes each day.²⁷ Smoking is a major risk factor for many of the leading causes of death among individuals age 60 and older,^{28,29} and is associated with increased risk of losing mobility³⁰ and premature death.³¹ Smoking also affects the performance of some prescription drugs. For example, smokers tend to require higher doses of benzodiazepines to achieve efficacy than nonsmokers.³²

As with other substance misuse among older adults, evidence of effective prevention strategies for smoking cessation with older populations is more limited than with younger populations. Many clinicians fail to counsel older patients about the health effects of smoking even though older adults are more likely to quit than younger smokers.³³ Selected strategies that have shown effectiveness in older adult populations include brief interventions. One study found a tailored brief intervention more than doubled 1-year “quit rates” for older adults.³⁴ A study of older smokers using transdermal nicotine patches found that 29 percent of the subjects quit smoking for 6 months.³⁵ In addition, there is little evidence that adults in recovery from alcohol problems relapse when they stop smoking. In summary, efforts to prevent substance abuse among older adults should include tobacco consumption as a key health behavior that often co-occurs with substance abuse and with other mental health problems.³⁶

Medication Misuse

Medication misuse is an important arena for prevention and early intervention among older adults. In contrast to drug abuse in young adults who often abuse illicit or illegally obtained prescription drugs, drug abuse problems among older adults more typically occur from misuse or abuse of prescription and/or over-the-counter medications, as well as herbal remedies. Relative to younger individuals, older adults use a high number of prescription and over-the-counter medications, which increases their risk for inappropriate use of medications. Studies report that older persons regularly consume on average between two and six prescription medications and between one to three over-the-counter medications.³⁷ Late-life medication misuse includes the overuse, underuse, and irregular use of both prescribed and over-the-counter (OTC) medications.

Medication misuse that involves particular types of medications or patterns of use may develop into drug abuse.^{38,39} For example, a subset of older adults is at risk of developing problems with physical dependence when prescribed narcotics, barbiturates, or benzodiazepines over long periods of time. Of particular concern is the combined use of specific prescription medications or OTC medications

with alcohol that are known to result in serious health problems. For example, concurrent use of alcohol with benzodiazepines or barbiturates can result in sedation, confusion, falls, delirium, and withdrawal seizures. Typically, abuse of psychoactive substances among older adults does not involve the use of these substances specifically to “get high” nor are they usually obtained illegally.⁴⁰ Instead, unsafe combinations or amounts of medications may be obtained by seeking prescriptions from multiple physicians (“doctor shopping”), by obtaining medications from family members or peers, or by stockpiling medications over time. Thus, medication abuse among individuals in late life is qualitatively and quantitatively different than it is for younger adults.

Several search engines were used to identify programs addressing the prevention of and early intervention with medication misuse among older adults. A number of EBM databases were searched, including the Cochrane Central Register of Controlled Trials (CCTR), Cochrane Database of Systematic Reviews, ACP Journal club, and Database of Abstracts of Review of Effects (DARE). PubMed, PsychInfo, CINAHL, Ageline, Social Services Abstracts, Social Work Abstracts, and ERIC databases were used to identify published literature and other resources using a combination of age-related terms (older, geriatric, elder, late-life, etc.) with the following search terms: medication, prescription, benzodiazepine, misuse, abuse, prevention, screening, assessment. Search techniques were also employed to follow promising search directions, such as the “Related Articles” feature in PubMed. Additional searches were performed using the Google search engine and federal agency and grant databases, such as the federal Computer Retrieval of Information on Scientific Projects (CRISP) and the NIH Clinical Trials database.

Universal Prevention

The evidence base for prevention of medication misuse/abuse among older adults indicates some promising advances. For example, prevention programs for late-life medication misuse have developed and tested computer-based health education tools as well as more traditional group-based health education programs with an individualized component. However, the development of assessment and screening tools for this problem area is limited. Please see Table 1 for further details regarding each study.

Health Education

Several programs have addressed medication misuse through the use of computer technology. Neafsey and colleagues have conducted two studies evaluating the use of touch-screen notebook computers that employ an interactive multimedia software program designed for the learning styles and psychomotor skills of older adults called the Personal Education Program (PEP). A randomized clinical trial found that older adults (age 60 and older) using the PEP software increased knowledge and improved self-efficacy regarding the potential drug interactions that can result from self-medication with OTC medications and alcohol, compared to controls and those receiving a conventional information booklet.⁴¹ PEP users also reported fewer adverse self-medication behaviors over time. Another study involving PEP consisted of a randomized pilot study with more limited content (drug interactions with OTC antacids, calcium supplements, and acid reducers).⁴² The group using PEP in this study also demonstrated increased gains in knowledge and self-efficacy compared to controls. These programs did not assess long-term knowledge retention, so it is unclear whether the immediate knowledge and self-efficacy gains were sustained over time. Alemagno and colleagues⁴³ conducted a pretest/posttest pilot evaluation of an interactive computer intervention to reduce risk of medication misuse, showing some promising results at the 2-month followup among older adults recruited from senior centers (mean age 76): 55 percent of participants used the computer-generated medication reminder checklist, 32 percent used the checklist to discuss problems with a physician, and 24 percent reported “real change” in the way they took medications.

Group health education in church settings combined with individual sessions with a pharmacist has been evaluated as an alternative approach to preventing medication misuse. Although this evaluation was not targeted specifically at geriatric populations, the mean age of the volunteer participants was 69.7. In this pretest/posttest evaluation study, Schommer and colleagues⁴⁴ found that participants reported taking fewer medications on a daily basis and had fewer medication-related problems 6 months after the intervention.

Assessment

The evidence base regarding comprehensive screening and assessment for geriatric medication misuse is narrow. DeBrew and colleagues⁴⁵ tested a standardized instrument to assess medical knowledge and practices among a small group (n=20) of older adults age 65 and older newly admitted to a home health care agency. This instrument showed promise as a useful tool for health care practitioners in home health care settings, but data were limited.

Medication Non-adherence

One aspect of medication misuse that has received extensive attention in the literature is medication non-adherence. Schlenk and colleagues⁴⁶ provide a review from a nursing perspective of factors associated with medication non-adherence among older adults (defined as age 50 and older), as well as a number of strategies and interventions that have potential for the prevention of medication misuse. In addition to the studies reviewed elsewhere in this section, other strategies include effective instruction formats for older adults (i.e., drug-taking instructions organized in lists rather than paragraphs, use of pictorial icons, etc.)⁴⁷⁻⁵⁰ and use of calendar blister packs compared to standard bottles or packets among older patients.⁵¹ Schlenk and colleagues⁴⁶ also review a variety of methods for assessment of medication non-adherence among older adults, including self-reports, pill counts, pharmacy records, biochemical measures, clinical judgment, therapeutic response, and electronic monitoring.

Indicated and Selective Prevention Strategies (Early Intervention)

Clinical trials for early intervention with older adults at risk for medication misuse have shown mixed results. To date, a number of randomized clinical trials have examined several types of early interventions, including interventions with older patients prior to hospital discharge, interventions targeted at provider prescription patterns, home-based medication review, and patient education. Please see Table 2 for more information regarding each study.

There is a growing evidence base regarding early interventions focused on pharmacy services to prevent or minimize drug-related problems in geriatric populations. Hanlon and colleagues⁵² recently reviewed the evidence from randomized controlled studies to determine whether drug-related problems and associated health outcomes can be modified by providing clinical pharmacy services for older adults in community-based settings. They found 14 randomized controlled studies assessing drug-related problems and health outcomes in individuals age 65 and older after pharmacist interventions in various settings, including home health settings (five studies), hospitals prior to discharge with home-based followup (three studies), clinics (three studies), a community pharmacy (one study), and long-term care facilities (two studies). The authors concluded that there was considerable evidence that clinical pharmacy interventions reduced the occurrence of drug-related problems but showed limited evidence that the interventions reduced morbidity, mortality, or health care costs. The study by Al-Rashed and colleagues⁵³ described below is an example of a pharmacist intervention study.

Hospital Discharge-based Programs

Several studies have explored strategies to improve medication compliance and reduce medication misuse among older adults upon hospital discharge. Al-Rashed and colleagues⁵³ found that patient knowledge and compliance to medication regimen was significantly better among patients (age 65 and older) receiving a 30-minute consultation with a pharmacist prior to hospital discharge compared to those receiving standard discharge procedures. Those patients receiving the pharmacist consultation also had significantly fewer unplanned trips to the doctor, hospital admissions, and personally altered their medications less than controls. Pereles and colleagues⁵⁴ evaluated the Self-Medication Program (SMP), a three-stage program in which geriatric patients (mean age 80) were given increasing responsibility for administering their own medications while still in the hospital. Compared to controls, the SMP patients had fewer medication errors, showed significant improvement in compliance, and had fewer serious medication errors at approximately 1 month after hospital discharge. A study by Lowe and colleagues⁵⁵ found comparable results in a study in which older patients (age range 57-96) who completed a three-stage self-medication program before discharge had significantly higher compliance scores and greater knowledge of purpose of medications 10 days after discharge compared to a control group receiving standard care. Rich and colleagues⁵⁶ found that patients (age 70 and older) who received a multidisciplinary intervention prior to discharge had significantly higher medication adherence compared to controls receiving standard care. The intervention included comprehensive patient education, dietary and social service consultations, medication review with a cardiologist, and intensive post-discharge followup. Esposito⁵⁷ evaluated the effects of four different types of medication education prior to discharge for patients aged 65 and older. Although those results should be interpreted cautiously due to small sample size, the groups with medication dosage schedules had decreased incidence of medication errors compared to groups without schedules.

Prescribing Guidelines for Providers

Decision support systems for prescribing have been proposed as one promising avenue to decrease inappropriate or excessive medication use and to prevent related adverse drug events among geriatric populations. In a quasi-experimental study, Peterson and colleagues⁵⁸ evaluated a computer-based system of guided dosing of psychotropic medications and selection guidelines for clinicians treating older inpatients (aged 65 and older). The intervention targeted three medication classes: benzodiazepines, opiates, and neuroleptics. The intervention increased the prescription of the recommended daily dose, reduced the incidence of 10-fold dosing, and reduced the prescription of nonrecommended drugs. Patients

in the intervention cohort had lower fall rates (in the hospital). No effects on length of stay or days of altered mental status were found.

A study among 41 general practitioners (GPs) in Queensland, Australia, found that “therapeutic flags” may improve appropriate prescribing behaviors.⁵⁹ The practitioners used a series of statements (therapeutic flags) applied to the medication lists of 727 older patients. These targeted instructional statements on quality prescribing resulted in changes in 14.5 percent of prescribed medications and the discontinuation of 6 percent of the medications. The process led to increased monitoring as well.

Medication Review: Home and Nursing Home Settings

A number of studies have examined the effectiveness of home-based medication review as an early intervention strategy to prevent medication misuse among older adults. The HOMER program was a large British clinical trial (n=872) in which a pharmacist reviewed medications, provided education, and addressed barriers to compliance (such as inability to open pill bottle tops) with adults age 80 and older in their homes 2 and 8 weeks after hospital discharge.⁶⁰ Surprisingly, the intervention group had significantly more emergency hospital readmissions and physician home visits than controls. The authors referenced three additional recent studies in the United Kingdom of community-based medication review among older adults in which two showed non-significant decreases in admissions^{61,62} and one showed a non-significant increase in admissions.⁶³ Finally, they conclude that the evidence remains mixed regarding community-based medication review, particularly in regards to outcomes such as hospital admissions.

In a randomized clinical trial involving a series of three home visits by pharmacists for all study participants, Lowe and colleagues⁶⁴ demonstrated increased compliance and understanding of purpose of medications among the group (aged 65 and older) that received additional pharmacist services during the first two home visits (an assessment of ability to use medications and appropriateness of prescribed medications during visit one; discussion and reminder chart during visit two). In a different three-arm clinical trial, a group (aged 60 and older) that received a home visit that included a 20-minute teaching session, provision of pill cassettes, and a followup telephone call 1-2 weeks after the home visit indicated significantly greater improvement in medication-taking behaviors than the group without the followup telephone call.⁶⁵ Both groups receiving the home visit teaching sessions had significantly higher medication-taking behavior scores compared to controls. In a study of older adults aged 65 and older receiving community nursing visits, Griffiths and colleagues⁶⁶ demonstrated knowledge increases after a

home-based medication review and individualized consultation by a nurse among a group identified with deficits in medication knowledge and/or self-management ability.

In a small study in an inner-city setting, two general practitioners made one comprehensive visit each to four randomly selected nursing homes to review the prescribing record of each patient and alter prescriptions if needed.⁶⁷ Among the 107 patients (aged 57-99, mean age 82.1) with “repeat” prescriptions reviewed, 65 percent had their prescriptions altered. Fifty-one percent had at least one item stopped, 26 percent had at least one item changed, and 7 percent had a new medication prescribed. One person had the medication dose increased. Benzodiazepines, antipsychotic drugs, antidepressant drugs, non-opioid analgesics, and laxatives were the medications most often stopped after review. Although the study is not generalizable, the authors concluded a single visit to a nursing home and a comprehensive review of prescriptions can greatly reduce the consumption of inappropriate medications.

Patient Education

A number of studies of variable quality have evaluated nursing-based education interventions. These studies have indicated mixed results in increasing knowledge and/or medication compliance among adults age 65 and older, particularly over time (studies are summarized here, but not included in Table 2). Fielo and Warren⁶⁸ found that a group with a teaching session and medication instruction sheet made fewer medication errors after 1 week compared to controls, but no differences between groups were sustained after 4 weeks. Harper⁶⁹ found that a group receiving oral instruction during four home visits demonstrated increased knowledge and compliance after 4 days compared to a control group receiving four home visits but no oral instruction, but again no differences were sustained after 4 weeks. Kim and Grier⁷⁰ found that among groups given taped medication instructions, the group receiving taped instructions at a slow pace demonstrated improved knowledge after 1 day compared to the groups receiving either no instruction or taped instructions at a normal pace. Taira⁷¹ found that clients demonstrated improved knowledge regarding medications 1 week after a teaching session (no control group). Finally, Wolfe and Schirm⁷² found that a group receiving medication counseling and a fact sheet demonstrated increased knowledge compared to controls after 3 weeks, but these differences were not sustained at 6 weeks. No differences in medication compliance were found between the two groups at 3 or 6 weeks.

Ongoing Prevention Programs Undergoing Evaluation and Research Directions

A search of the federal web sites did not identify any studies currently underway that address prevention of or early intervention with medication misuse among older adults. It is of note that many of the studies regarding medication misuse have originated internationally. A current NIAAA-funded study (described above in the Alcohol Misuse: Ongoing Prevention Program section) assessing a prevention intervention to reduce risks of alcohol use does include medication use among the risk factors addressed in the intervention.⁷³ However, a variety of guidelines and recommendations have been developed to assist providers and consumers in taking steps to minimize risks associated with medication misuse. An example of a set of basic recommendations aimed at prevention of medication misuse is provided by an interdisciplinary panel assembled by the nonprofit Alliance for Aging Research. This group issued recommendations for researchers, health care organizations, and public policymakers to address the issue of geriatric medication misuse in its 1998 publication, “When Medicine Hurts Instead of Helps: Preventing Medication Problems in Older Persons.”⁷⁴ The recommendations were as follows:

- Recommendation #1: Compile and disseminate a list of medications considered potentially inappropriate for use in older persons and mandate that the list be used as a screening tool.
- Recommendation #2: Provide geriatrics-relevant labeling information for over-the-counter medications.
- Recommendation #3: Fund and encourage research on medication-related problems in older persons to determine which medications are most troublesome and which patients are most at risk.
- Recommendation #4: Provide incentives to pharmaceutical manufacturers to better study medication effects in the frail elderly and oldest old in pre- and post-marketing clinical trials.
- Recommendation #5: Establish mechanisms for data collection, monitoring, and analysis of medication-related problems by age group.
- Recommendation #6: Encourage health care professionals’ competency in geriatric pharmacotherapy.
- Recommendation #7: Direct Medicare Graduate Medical Education dollars to training in geriatric pharmacotherapy.
- Recommendation #8: Fund and provide education and resources for caregivers providing medication assistance to older people.

Conclusions

Medication misuse is a serious and growing problem among older adults. Older adults can be particularly vulnerable to dangerous medication interactions and other problems related to medication misuse given age-related physical changes, cognitive changes, health problems with related numerous medications, and social isolation. Older adults with limited English language skills or low literacy skills can be at particular risk for not comprehending complex medication regimes and failure to recognize risky medication-taking behaviors. There is a growing body of research indicating that most medication-related problems are predictable and thus potentially preventable.⁷⁴ The evidence base for prevention programs to address medication misuse among older adults is limited and in its early stages. The studies described above have a variety of methodological limitations, such as selection of primary outcome measures (e.g., actual medication-taking behavior and health outcomes are not measured), lack of control groups, short followup time periods, and poor followup rates. As mentioned above in the section on Alcohol Misuse, the scarcity of research regarding prevention programs addressing late-life medication misuse is notable.

The evidence base for early interventions to address this problem is more substantial, but many questions remain unanswered. The exact mechanisms at work are unclear in the complex issue of medication misuse among older adults. For example, findings such as increased hospital admissions among older persons receiving home-based medication reviews point to the need for further research to illuminate the most effective types of interventions. In particular, new technologies are needed that are matched to the needs of specific groups of consumers in specific settings. Finally, risk and protective factors need to be identified that correspond to older adults with a range of health conditions, cognitive skills, assistance in the home, and complex medical regimens.

Table 1. Prevention and assessment of late-life medication misuse

Reference	Study Design	Model/Conditions	Age	Sample	Followup	Outcome Measures and Results	Limitations/Comments
DeBrew et al., 1998 ⁴⁵	Instrument Evaluation. Home Health Medication Assessment	Convenience sample of older adults administered instrument to assess medication knowledge and practices	65+ Mean: 72	20 older adults newly admitted to a home health agency	Same tool administered 1 week later (70% followup rate)	Interpreter reliability 82% Test-retest reliability 92%	Small sample size. Standardized instrument to assess med knowledge and practices shows promise for directed education with older adults.
Neafsey et al., 2001 ⁴²	Randomized Posttest only Pilot Test. Personal Education Program (PEP)	Participants recruited from local senior centers and divided randomly: Experimental: use pilot PEP (see below) Control: wait-list (PEP)	60+ Mean Exp: 68.8 ± 11.9 Mean Controls: 73 ± 7	60 recruited community-living senior center participants currently taking OTC calcium supplements, antacids, or acid reducers. Exp: 30 Controls: 30	Exp group tested for knowledge and self-efficacy immediately post-PEP use; controls tested before PEP use	PEP users had significantly greater knowledge of potential drug and alcohol/med interactions and significantly greater self-efficacy for avoiding interactions, compared to controls. No differences between groups in mean satisfaction scores and stated behavioral intentions.	Pilot test shows promise of computer-assisted education programs to increase knowledge and self-efficacy; no behavioral measures. This version of PEP limited to specific content of antacids, calcium supplements, and acid reducers.
Neafsey et al., 2002 ⁴¹	RCT. Personal Education Program (PEP)	Three arm study Interv 1: PEP info book Interv 2: Info book only Controls: No intervention Participants recruited from local senior centers to use interactive computer program designed to teach older adults about potential drug interactions from OTC meds and alcohol.	60+ Mean: 73.8 ± 6.5	85 recruited community-living senior center participants currently taking prescription antihypertensive or anticoagulants in conjunction with OTC calcium supplements, antacids, acid reducers or pain relievers. Interv 1: 30 Interv 2: 30 Controls: 25	Three time periods: immediately post-intervention, 2 and 4 weeks post-into. Followup rate 100%, but study omitted subjects who dropped out from reported sample.	PEP users had significantly greater knowledge and self-efficacy scores than info book only group and controls. Decrease in adverse self-medication behaviors for PEP group; self-medication behaviors did not change over time for other two groups. Satisfaction with program rated high by most participants.	No pretest. Fairly small sample size. Course content addresses OTC and alcohol combined with meds, but inclusion criteria only includes those taking OTC (not those actively consuming alcohol). Followup period very short.

Table 1. Prevention and assessment of late-life medication misuse (continued)

Reference	Study Design	Model/Conditions	Age	Sample	Followup	Outcome Measures and Results	Limitations/Comments
Schommer et al., 2002 ⁴⁴	Pretest/Post test Evaluation. Feasibility Evaluation	Participants recruited by parish nurses; attended group education presentation and Q & A, then 1-on-1 session with pharmacist or pharm intern, exit interview	All ages Mean 69.7 Range 26-94	200 male and female volunteer parishioners	Followup survey at 6 months, telephone or in-person (94% followup rate)	Participants reported taking fewer meds on daily basis (4.8 vs. 5.5) and had fewer med-related problems (39 vs 98); showed knowledge increases. No sig differences in % of participants who always took drugs as directed or sometimes forgot to take. Satisfaction with program rated high by most participants.	No controls. Participants self-selected. Individualized program, although not directed specifically at geriatric population.
Alemagno et al., 2004 ⁴³	Pretest/Post test Pilot Evaluation. Computer Intervention Feasibility Evaluation	Participants tested “talking” interactive computer intervention to reduce risk of med misuse: 30 min interaction w/ computer videos + checklist and pill box to take home	“Seniors” Mean: 76 Range: 59-97	412 community living seniors recruited from 9 senior centers	2-month followup (63% followup rate)	55% of participants reported using med reminder checklist. 32% took med checklist to doctor to discuss problem issues. 24% indicated “real change” in the way they took meds based on intervention. Participants responded positively to computer intervention.	No controls. Followup rate fair. Further research re: effectiveness of use of med reminder checklist to reduce misuse would be helpful. Feasible to replicate; may be cost-effective.

Table 2. Early intervention with late-life medication misuse

Reference	Study Design	Model/Conditions	Age	Sample	Followup	Outcome Measures and Results	Limitations/Comments
Cargill, 1992 ⁶⁵	RCT Home-based assessment of medication-taking routine	Three arm study Group 1: No intervention (home visit to assess meds/behavior) 2: Home visit with 20-min teaching sessions; pill cassette given 3: Same as group 2, plus followup telephone call 1-2 weeks after home visit	60+ Mean: 72 Range 62-97	70 patients in a VA general medicine clinic	4-6 weeks after first home visit (no followup rate reported).	Significantly greater improvement in medication-taking behavior in group 3 (teaching + telephone call) compared to group 2 (teaching only). Significant difference between control and int. groups in medication-taking behavior scores.	Study details sparse in some areas: difficult to assess quality of data.
Lowe et al., 1995 ⁵⁵	RCT. Self Medication Program	Int: Patients given education and increasing responsibility for administering own meds in hospital Controls: Standard care	“Elderly” Int: Mean 77 (57-96) Controls: Mean 79 (59-93)	88 consecutive patients admitted to 4 geriatric inpatient units who would be responsible for self-medication upon discharge Interv: 45 Controls: 43	Home visit 10 days after discharge (90% followup rate)	Compliance with and knowledge of the purpose of their medicines, including pill counts. Int group had significantly higher compliance scores (95%) compared with controls (83%). A significantly higher proportion of Int. group patients (90%) knew the purpose of their meds compared to controls (46%).	Very short followup period; longer term gains of intervention unknown.
Esposito, 1995 ⁵⁷	RCT. Discharge medication education	Four arm study. Patients received upon hospital discharge: Group 1: Med fact sheet 2: Med fact + 30 min verbal instruction 3: Med and dosage schedule, list of side effects 4: Med schedule + 30 min verbal instruction	65+ (Mean age by group next column)	42 patients hospitalized at least 24 hours Group 1: n =11 (mean age 74) 2: n=8 (mean age 79) 3: n=10 (mean age 75) 4: n=14 (mean age 76)	Followup home visits made 2 weeks, 1 month, and 2 months post-int.	Groups with medication schedule (3 & 4) had decreased incidence of medication error compared to groups without a schedule.	Small sample size, particularly for between group comparison.

Table 2. Early intervention with late-life medication misuse (continued)

Reference	Study Design	Model/Conditions	Age	Sample	Followup	Outcome Measures and Results	Limitations/Comments
Pereles et al., 1996 ⁵⁴	RCT. Evaluation of Self-Medication Program (SMP)	Int: SMP (3 stage program w/pt given for administering own meds in hospital while compliance is monitored; 20-min counseling by pharmacist 72 hours before discharge. Controls: Standard care (meds administered in hospital by nursing staff); 20-min counseling by pharmacist 72 hours before discharge.	“Geriatric” patients Mean: 80 ± 7	107 consecutive patients admitted to 2 inpatient geriatric units who would be responsible for self-medication upon discharge Interv: 51 Controls: 56	Med knowledge and morale (Philadelphia Morale Scale) assessed at adm, discharge and in home visit 40 days post-discharge (69% followup; most of those lost to followup discharged to long-term care). Pill count also assessed at home followup.	SMP group had fewer med errors, significant improvement in compliance, and fewer serious med errors, compared to controls. No significant differences between groups in ability to self-medicate upon discharge, morale, or medication knowledge, although both groups made significant gains in knowledge from adm to followup.	Rigorous study. Short followup period; longer term gains of intervention unknown.
Rich et al., 1996 ⁵⁶	RCT. Multi-disciplinary Intervention on Medication Compliance	Int: Comprehensive patient education, dietary and social service consults, med review, and intensive post-dx followup Controls: Standard care	70+ Mean 79.4 ± 6	156 patients hospitalized with congestive heart failure Interv: n=80 Controls: n=76	Home visit 30 days after discharge	Int. group compliance rate (87.9%) significantly higher compared to controls (81.1%). Int. group also achieved significantly higher compliance rate (85% reached ≥ 80 % compliance) compared to controls (69.7%).	Overall compliance rates high (85% for both groups); authors suggest number of factors.

Table 2. Early intervention with late-life medication misuse (continued)

Reference	Study Design	Model/Conditions	Age	Sample	Followup	Outcome Measures and Results	Limitations/Comments
Lowe et al., 2000 ⁶⁴	RCT. Medicine Review and Education Program	Two groups received 3 visits from a clinical pharmacist. Visit 1: Survey of meds for both; assessment of ability to use medications (open bottles, etc.) and appropriateness of meds for Int. group. Visit 2: 1 month supply meds to both; discussion and reminder chart for Int. group. Visit 3: Another 1 month supply (3 wks after visit 2), survey of meds, and pill count of both	65+ Int: Mean: 77.5 Range: 65-96 Controls: Mean: 75 Range: 65-88	161 patients from British general medicine practice taking 3 or more meds Interv: 77 Control: 84	Meds taken and understanding of purpose of meds assessed at visits 1 and 3 (94 % followup rate)	Compliance in Int. group 91.3% compared to controls 79.5% (P < 0.0001). Number of Int. group patients correctly understanding the purpose of meds increased from 58% to 88% compared with 67% to 70% in controls (P < 0.0005).	Study shows promise of home-based medication review and patient education by a clinical pharmacist. Followup period short.
Al-Rashed et al., 2002 ⁵³	RCT. Evaluation of Inpatient Pharmaceutical Counseling	Int: 30 min pre-discharge counseling w/pharmacist, plus standard discharge procedure (below) Controls: Standard discharge procedure, which included med info discharge summary and med reminder card	65+ Int: Mean 80.2 ± 5.7 Controls: 81.1 ± 5.8	99 patients from 2 British general inpatient units to be discharged with 4 or more meds Interv: 45 Controls: 44	Followup home visit ~ 3 weeks and 3 months post-discharge (84 % followup rate for both visits)	Knowledge and compliance significantly better in Int. group compared to controls at visit 1; compliance also had improved at visit 2 for the Int. group. Int. group had significantly fewer unplanned trips to doctor and hospital admissions (19 and 5, respectively) compared to controls (27 and 13). Fewer Int. group patients altered their own meds compared to controls.	One of few studies to measure utilization as outcome (doctor visits and hospital admissions). Randomization by unit increases chances of possible selection bias.

Table 2. Early intervention with late-life medication misuse (continued)

Reference	Study Design	Model/Conditions	Age	Sample	Followup	Outcome Measures and Results	Limitations/Comments
Peterson et al., 2005 ⁵⁸	Quasi-Experimental Evaluation Guided Psychotropic Dosing System	Int: 2 6-week periods of highlighted dosing and frequency of psychotropic meds in hospital computer Rx order system Controls: 2 6-week periods with usual computerized order entry	65+ Int: Mean 74.6 +/- 6.8 Controls: 74.8 +/- 6.9	3718 patients from tertiary care hospital whose admissions were contained within one of the 6-week study periods Interv: 1793 Controls: 1925	All assessments occurred during inpatient stay	Patients who received meds during intervention period had increased prescription of recommended daily dose (29% vs. 19%), decreased 10-fold dosing incidence (2.8% vs. 5.0%), reduced prescribing of non-recommended drugs (10.8% vs. 7.6% of total orders), and fewer in-hospital falls. No effects found for length of stay or days of altered mental status.	Intervention increased prescribing patterns in concurrence with expert guidelines; positive patient outcomes resulted. Physician unwillingness to accept computerized dosing guidance a factor. Not randomized.
Griffiths et al., 2004 ⁶⁶	Pretest/Posttest Evaluation. Nursing Intervention	Participants identified through survey assessment received community nursing medication review and individualized intervention	65+ Mean 76.7 ± 6.1	24 participants identified with demonstrated deficits in knowledge or self-management ability out of 111 assessed participants taking oral meds and receiving community nursing visits	Followup interview at 4 weeks	Participants demonstrated increase in knowledge, some alteration in compliance aids. No significant change in medication regime complexity.	Only 50% (24 of 48) subjects eligible for followup agreed to participate. Intervention not standardized. Small sample size.
Holland et al., 2005 ⁶⁰	RCT. HOMER	Int: Home-based medication review with pharmacist at 2 and 8 weeks post-discharge, including education, remove out of date drugs, obtain compliance aid Controls: Usual care	80+ Int: Mean 85.4 ± 4 Controls: Mean 85.5 ± 4	872 patients admitted as “emergency” to 10 UK community or acute care hospitals, to be discharged with 2 or more meds Interv: 429 Controls: 426	Outcomes assessed at 6 months (hospital-based data; 97% followup); telephone call with mailed quality of life survey at 3 and 6 months (~80% followup rate)	Significantly fewer emergency readmissions at 6 months for controls (178) compared to Int. group (234). Int. group (sub-sample) also had more home visits by GP doctors. Int. did not significantly improve quality of life or reduce deaths compared to controls.	Authors concluded further research needed to explain counterintuitive finding and identify more effective methods of med review. Med review visit (Int.) was voluntary and patient-initiated.

RESEARCH NEEDS AND FUTURE DIRECTIONS

Attention to the prevention and appropriate treatment of substance abuse and mental health problems was identified as a major priority for older adults by the President's New Freedom Commission on Mental Health.⁷⁵ As identified in this review, there is a need for organizing, disseminating, and understanding evidence-based prevention and early intervention programs for late-life substance abuse and mental illness. While progress has been made in understanding the effectiveness of these programs and practices for older adults, there are challenges to matching these models to different service settings and different subgroups of older adults.

The growth in the aging population will have a significant impact on the substance abuse and mental health service delivery systems.⁷⁶⁻⁷⁸ In anticipation of this growing problem, it is essential that substance abuse and mental health services meet the specific needs of older adults. For instance, cohorts of the young-old (e.g., baby boomers) and the old-old have different patterns of service utilization and different perceptions of stigma associated with receiving care for substance use or mental health disorders. Moreover, the prevalence of substance abuse, mental health disorders, and suicidal ideation vary across ethnic groups.⁷⁹⁻⁸⁵ Mental health services are infrequently utilized by older minority populations⁸⁶ and lower utilization rates may be associated with limited access, stigma, distrust of mental health providers, and limited availability of culturally-competent services.^{87,88} The lack of information on specific ethnic differences and culturally-appropriate service provision represents a limitation of the current evidence base. A greater understanding of cultural and ethnic differences is needed to enhance the ability to provide appropriate prevention and early intervention to older minorities with substance use and mental health disorders. For instance, social marketing associated with universal prevention interventions should be specifically tailored to cultural and language differences of ethnic groups. In addition, cultural competence should be enhanced across the full spectrum of prevention interventions.

This report provides a comprehensive review of the evidence for prevention and early intervention of alcohol abuse, medication misuse, depression and anxiety, suicide, and co-occurring disorders in older adults. As indicated by our findings, the development of preventive interventions associated with substance abuse surpasses that associated with mental health problems. However, the development and rigorous evaluation of programs that target both of these areas are sorely needed. In addition, there is a need to identify methods to appropriately translate information from clinical trials and research settings into the health care arenas where older adults most frequently receive care, and into social services settings where they receive other needed services. Likewise, population-based programs that target broad audiences of older adults may also offer hope for the universal prevention of substance use and mental health problems. In summary, substance use and mental health problems pose significant

risks for the functioning and well-being of older adults. Although several prevention and early intervention programs have been developed, there is a considerable need for dissemination and implementation of effective programs, as well as for further research aimed at the development and testing of novel programs.

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