Introduction

Between 2000 and 2008, the number of Americans taking 5 or more prescription medications doubled (Consumer Reports on Health, 2012). Among patients aged 65 or older, about 18% take at least 10 medications per week (Slone Epidemiology, 2006). The prevalence of chronic diseases increases with age, and so do the medications that are prescribed to manage them.

The medical management for these elderly patients is complicated by the fact that elders are less likely to obtain the same therapeutic benefit from drugs as younger patients, and they are more likely to be affected by adverse drug effects (Garfinkel and Mangin, 2010). These adverse events include delirium, falls, fractures, GI bleeding, drug-drug interactions and renal dependent dosing (AGS Beers Criteria 2015).
What Is Polypharmacy?

The term polypharmacy is frequently used interchangeably with “inappropriate drug use” (Bushardt et al., 2008). This is a misnomer. Polypharmacy literally means multiple medications, more than one.

A patient might have only one medication, but if that medication is inappropriate, it is one too many. Conversely a patient with many complex conditions might have 10 medications, but if upon examination they are all necessary and no good alternatives are available, then 10 medications are appropriate.

The term “Potentially Inappropriate Medications” (PIMs) may be a mouthful, but it is more precise. When identifying PIMs, medications are evaluated not by aggregate number but by whether each individual medication is appropriate. PIMs may be regarded as potential candidates for discontinuation, and as opportunities to reduce the elderly patient’s medication burden.

Graphic 1. Number of Medications per day age 65 and over

Adapted from Slone Epidemiology.
Is There a Magic Number?

There are journal articles and organizations stating that 5 or 6 or 9 is the number of prescriptions that identifies “polypharmacy” for elderly patients. The intention is not to issue a ban on prescribing more than this number, but to track medication practices for populations and report it as a quality measure, as the Centers for Medicare and Medicaid Services (CMS) does for nursing home patients.

Another use of a benchmark number is to serve as a cue or prompt to review the patient’s medication list in order to identify any that may be reduced in dose, replaced by a safer alternative, or discontinued.

The purpose of this monograph is to assist the physician in conducting that medication review and to recognize opportunities to shorten the elderly patient’s medication list. It will provide:

- Tools for evaluating medication lists for elderly patients
- The updated Beers Criteria for Potentially Inappropriate Medications for the elderly
- Additional classes of drugs that should be reconsidered based on new evidence
- Strategies for coordinating with others who prescribe for your patient
- Benefits and precautions to consider when discontinuing medications
- Other risk management suggestions for the prescribing physician

Potentially Inappropriate Medications (PIMs) for Elderly Patients

In 1991, Beers and colleagues published a PIMs list for nursing home residents called the Beers Criteria. It was updated and adapted to all settings in 1997, 2003 and 2012.

In 2015, the American Geriatric Society (AGS) partnered with an expert interdisciplinary panel to update the Beers Criteria, incorporate new evidence, drug-drug interactions, renal adjustments, and appropriate exceptions. They reviewed the literature and studies intensively. They rated the quality of evidence High, Moderate or Low, and they made recommendations ranked as Strong, Weak, or Insufficient.

Physicians need evidence-based criteria and tools to assist them in wading through the published studies. The Beers Criteria/PIMs List is one such tool. It has been adopted as a quality measure by many organizations including CMS, the National Committee for Quality Assurance (NCQA), and the Pharmacy Quality Alliance.
The updated AGS Beers Criteria reviewed 53 medications or classes and defined lists of:

- Medications to avoid in older adults
- Medications to avoid in older adults with specific diseases and syndromes
- Medications to be used with caution in older adults
- Drug-drug interactions
- PIMs use based on kidney function

The full report also describes medications that have been added or removed from the earlier Beers criteria, and rationales for each. The studies assembled demonstrated a strong link between PIMs and poor patient outcomes (i.e., adverse drug events, hospitalizations and mortality).


This link and the subsequent links cited here are repeated in the Bibliography at the end of this monograph.

Are the Beers Criteria a Mandate? Are They the Standard of Care?

No. PIMs stands for "Potentially Inappropriate Medications." The key word is "Potentially." Clinicians may find that a medication on the PIMs list may in fact be the best option for the patient or one that is well tolerated. As the Criteria state, “Potentially inappropriate medications are just that—potentially inappropriate. They merit special scrutiny but should not be misconstrued as universally unacceptable in all cases or for all people.”

The Beers Criteria is a tool, a guideline. Like all guidelines it is intended as an aid to the physician’s decision-making, not as a substitute for it. As the Criteria state, “The AGS Beers Criteria should never solely dictate prescribing protocols, nor should they serve as a justification for restricting health coverage. This tool works best as a starting point to address a person's full medication regimen.”

Nevertheless, CMS has attached significant penalties to the use of these products in patients served by Medicare. The NCQA, accreditor of Medicare Advantage plans, published a HEDIS measure (NCQA, HEDIS 2014 Final NDC Lists) that generally follows the PIMs list. If a health plan has a certain percentage of members prescribed a drug to be avoided in the elderly (DAE), that health plan will incur penalties regardless of the
appropriateness of the DAE in any given patient. As government payors move away from a fee-for-service and toward a population health management, or "pay-for-performance" method, those penalties might be extended to individual providers.

**2015 AGS Beers Criteria Report Format**

The PIMs report format is in columns as follows:

- Organ System/Therapeutic Category/Drugs
- Rationale for use
- Recommendation
- Quality of Evidence
- Strength of Recommendation

The information provided for Potentially Clinically Important Drug-Drug Interactions is

- Object Drug and Class
- Interacting Drug and Class
- Risk Rationale
- Recommendation
- Quality of Evidence
- Strength of Recommendation

The report for medication affected by renal function is as follows:

- Medication Class and Medication
- Creatinine Clearance Value at Which Action is Required
- Rationale
- Recommendation
- Quality of Evidence
- Strength of Recommendation
Risks and Recommendations for Selected PIMs/AGS Beers Criteria

Anticholinergics:

The 2015 AGS Beers criteria recommend avoiding this class of medications in the elderly. The recommendation is based on evidence that drug clearance is reduced with age, and that tolerance develops when these drugs are used as hypnotics. Anticholinergic drugs are also associated with a greater risk of confusion, blurred vision, dry mouth, constipation, and toxicity. A current study has linked anticholinergics with cognitive decline in the elderly (Fox, Richardson et al., 2011). Note that many over-the-counter (OTC) sleep agents and cough/cold medications have anticholinergic properties, including diphenhydramine and other sedating antihistamines. However, utilization of diphenhydramine in special situations such as acute treatment of severe allergic reaction may be appropriate (AGS Beers, 2015).

Antispasmodics:

These drugs have been shown to have uncertain effectiveness, and exhibit harmful anticholinergic effects. Therefore, they are deemed inappropriate for long-term use in elderly patients (AGS Beers, 2015).

Antipsychotics:

These medications are associated with an increased risk of stroke and mortality in patients with dementia (AGS Beers, 2012). Another report indicated that the prevalence of antipsychotic medications is increasing among the elderly population; that this practice is associated with higher overall antipsychotic doses; and that antipsychotic pharmacy is being utilized significantly earlier than guidelines recommend (Lopez de Torre et al., 2012). The authors of this study suggest that careful choices must be made when making decisions regarding antipsychotic polypharmacy in elderly patients; patient consent should be considered; and that patients taking these medications should be monitored carefully for efficacy and potential harmful effects associated with their use.

Barbiturates:

The AGS Beers criteria recommend avoiding this class of medications for the elderly due to its association with high rates of physical dependence, tolerance to sleep benefits, and risk of overdose even at low doses.
Benzodiazepines:

Elderly patients have increased sensitivity to benzodiazepines and slower metabolism of long-acting agents. In general, all benzodiazepines increase risk of cognitive impairment, delirium, falls, fractures, and motor vehicle accidents in the elderly. However, the AGS states that these drugs may be appropriate for seizure disorders, rapid eye movement sleep disorders, benzodiazepine withdrawal, ethanol withdrawal, severe generalized anxiety disorder, peri-procedural anesthesia, and end-of-life care.

Pain medications:

Non-COX-selective oral NSAIDS are associated with increased risk of gastrointestinal bleeding and peptic ulcer disease in high-risk groups (AGS Beers 2015). The high-risk groups include those 75 years of age or older or those taking oral or parenteral corticosteroids, anticoagulants, or antiplatelet agents. The AGS/Beers recommendation is to avoid chronic use unless other alternatives are not effective and the patient is able to take a gastroprotective agent. It is also recommended to avoid prescribing meperidine for the elderly because it is ineffective at the oral doses in common use and may cause neurotoxicity. Safer alternatives are available.

Cholinesterase inhibitors:

These drugs are commonly used for the treatment of dementia and Alzheimer’s Disease. It is important to note that the small benefit found in the use of these drugs is in the early stages of the disease—when it is least likely to be prescribed. A population-based cohort study conducted by Gill et al. (2009) found their use is associated with increased rates of syncope, hip fracture, bradycardia and pacemaker insertion—particularly disastrous consequences for patients with advanced dementia. The authors concluded, “The risk of these previously under-recognized serious adverse events must be weighed carefully against the drugs’ generally modest benefits.”

Noteworthy changes in the 2015 Update:

- The renal function restriction for nitrofurantoin was relaxed.
- Antiarrhythmic drug therapy had several changes.
- Nonbenzodiazepine, benzodiazepine receptor antagonists, and hypnotics were added to the list.
- Proton pump inhibitor use beyond eight weeks without justification was added.
- Desmopressin use was added.
Beyond Beers: Other Cautionary Medication Classes

Bisphosphonates:

The use of bisphosphonates has been associated with osteonecrosis of the jaw, cardiac arrhythmias, esophageal cancer and sub-trochanteric femur fractures (Abrahamsen B et al., 2009, and FDA warning of 10/13/2010). The Abrahamsen study examined 310 cases of this rare type of fracture and found that 90% of the patients were on bisphosphonates. Caution is advisable, and long-term use in particular is high risk.

Cholesterol-reducing medications:

The FDA announced a new safety alert for cholesterol-reducing drugs, or statins (FDA February, 2012). This alert was made in response to reports of cognitive impairment effects, hyperglycemia and type 2 diabetes risks, and muscle injury risk in patients taking statins. Health care professionals should be aware of these changes to the safety information of these drugs, and inform their patients about these risks.

Assessment Tools for Multiple Medications in the Elderly:
START, STOPP, ARMOR

Several assessment tools are available to assist clinicians in making decisions regarding the medication lists of elderly patients under their care. The most commonly used strategies are described below.

1. Screening Tool to Alert doctors to the Right Treatment (START)

START is an evidence-based screening tool designed to detect prescribing omissions in elderly patients. In the initial report, the use of the START tool identified that approximately 57% of older adults admitted to a teaching hospital had at least one appropriate medication omitted. Older female adults were significantly more likely not to have appropriate medication prescribed (Barry et al., 2007).

This tool is available at http://ageing.oxfordjournals.org/content/36/6/632.full.pdf

2. Screening Tool of Older Person’s Potentially Inappropriate Prescriptions (STopp)

STOPP is a screening tool that identifies potentially inappropriate medications for elderly individuals, similarly to the Beers criteria. Interestingly, a study by Gallagher and O’Mahony (2008) demonstrated that the STOPP criteria identified a significantly
higher proportion of patients requiring hospitalization as a result of potentially inappropriate medication-related adverse events than the Beers criteria. This screening tool may be particularly useful in the hospital setting.

A randomized controlled trial conducted by Gallagher et al (2011) showed that the use of START/STOPP criteria in elderly patients resulted in significant reductions in 1) unnecessary medications, 2) the use of drugs at incorrect doses, and 3) potential drug-drug and drug-disease interactions. These improvements were sustained at the time of 6-month follow-up. These data underscore the utility of these criteria for managing multiple medications in elderly patients.

STOPP tool is available at http://ageing.oxfordjournals.org/content/37/6/673.full.pdf

3. The Assess, Review, Minimize, Optimize, Reassess (ARMOR) tool:

ARMOR is a tool designed to consolidate the previously described recommendations into a single interactive tool. It takes into account the clinical profile and functional status of the patient, and aims to balance evidence-based practice with the altered physiology of the elderly population.

Functional status, restoring function and maintaining it are the primary goals. This tool also emphasizes quality of life as a key factor for making decisions on changing or discontinuing medications. Use of a certain medication is weighed against its impact on primary biological functions such as bladder, bowel, and appetite (Haque, 2009).

This tool can be accessed at http://www.champ-program.org/static/ARMOR tool_Haque.pdf

The Brown Bag Medication Review

It is a good idea for primary care physicians to periodically review the elderly patient’s current medications, regardless of the number taken. The patient may be instructed to bring a bag of all his or her medications—from all prescribers and all sources, including nonprescription medications, supplements, vitamins, and herbals.

One example of the benefits of reviewing all medications including over the counter pills is to identify patients taking mega-doses of vitamins such as A, C, and E. These have been shown not to have additional health benefits, and they may cause side effects.

It is a good idea to instruct patients to obtain all medications from a single pharmacy. In some cases, requesting a medication profile for your patient from the pharmacy may be in order.
The contents of the brown bag may first be reconciled with your medication list for the patient. Look for discrepancies: unintentional duplications, medications continued that were intended to be discontinued, and medications prescribed but not being taken (prescription not filled or filled but not taken). Check for drug-drug interactions. If compliance is a significant issue for a particular patient, look for opportunities to substitute combination medications or once-daily dosing medications.

Next, check the list against available resources: the Beers Criteria, START, STOPP, ARMOR, or another validated tool. Look for PIMs that have safer alternatives, even non-pharmaceutical alternatives. Look for higher doses that can be safely lowered. Look for medications that may be safely discontinued.

Office staff may assist in the medication count and reconciliation, but only the prescribing physician is qualified to determine if any changes or corrections are to be made.

Tool Box for Brown Bag Medication Reviews and Reducing Medications


START  [http://ageing.oxfordjournals.org/content/36/6/632.full.pdf](http://ageing.oxfordjournals.org/content/36/6/632.full.pdf)

STOPP  [http://ageing.oxfordjournals.org/content/37/6/673.full.pdf](http://ageing.oxfordjournals.org/content/37/6/673.full.pdf)

ARMOR  [http://www.champ-program.org/static/ARMOR%20tool_Haque.pdf](http://www.champ-program.org/static/ARMOR%20tool_Haque.pdf)

Coordinating With Others Who Prescribe to Your Patient

If you are the primary care physician, it’s a good idea to advise the patient that you are in charge of overseeing all prescriptions from all practitioners. Consider providing a medication list to all consulting physicians. You may request reports from consulting physicians and specialists. You may instruct the patient to carry a current medication list at all times. Anticoagulant therapy is just one example of a type of medication that patients should be instructed to notify all their healthcare providers about, including dentists and podiatrists.

If you are a specialist or consulting physician, find out if the patient has a primary care physician. If there is none, encourage the patient to establish care with a PCP. If you are a specialist acting as the primary care physician, be aware that you may be held to the same practice standards as a primary care physician in managing all the patient’s conditions.
Precautions and Benefits of Discontinuing Unnecessary Medications

Once an unnecessary medication has been identified, it may require caution in discontinuing. Some of the previously described classes of drugs may require careful monitoring and tapering to avoid potential harmful withdrawal effects, disease exacerbation, and potential hospitalization. It may be beneficial to taper and discontinue one drug at a time (Bushardt et al., 2008).

There is a tool for assisting the physician in safely discontinuing PIMs. The Good Palliative-Geriatric Practice algorithm (GP-GP), originally created for nursing home patients in Israel, was tested on community-dwelling elderly (Garfinkel and Magin, 2010) and was also reported in *Consumer Reports on Health* (March 2012).

Use of the algorithm was highly effective in discontinuing multiple medications for elderly patients. Of the 70 enrolled patients, the mean age was 82 (range 67-102). Six did not need any medications discontinued according to the GP-GP Tool.

At the baseline, participants had a mean number of 7.7 medications each (Range 0 – 16). A mean of 4.9 medications per patient were recommended for discontinuation. After consultation with the primary care physician and consent of patient and family, **256 of the 311 drugs (82%)** were recommended for discontinuation.

**Graphic 2. Results of discontinuing 311 medications in 64 patients.**

Results of Discontinuing 311 Medications in 64 Patients

<table>
<thead>
<tr>
<th>% successfully stopped</th>
<th>% requiring restart (2%)</th>
<th>% signif side effect (Zero)</th>
</tr>
</thead>
<tbody>
<tr>
<td>90%</td>
<td>10%</td>
<td>0%</td>
</tr>
</tbody>
</table>

Adapted from Garfinkel D, Magin D, *Arch Int Med* 2010.
There was a systematic attempt to reduce the number of antihypertensives each patient was prescribed (as many as 4 per individual), stopping one medication at a time. Nitrates were discontinued for patients with no chest pain for the last 6 months. PPI’s and H2 blockers were discontinued for patients without GI bleeding or dyspepsia for one year. Virtually all benzodiazepines and NSAIDs were discontinued. Considered for discontinuation were: oral hypoglycemics, statins, antidepressants and antipsychotics, levodopa, digoxin, diuretics, anticoagulants, aspirin, dipyridamole, vitamins and supplements.

There was close coordination with primary care physicians, and monitoring was conducted with specific parameters such as keeping blood pressure below 140/90. Depression and mental status were assessed as well as patient/family assessments of global health. This study was limited to a small population in Israel, however prescribing practices and comorbidities were similar to the US.

**Additional Recommendations**

1. Start with the lowest starting dose.
2. Use one drug to treat 2 clinical conditions (PAT and HBP, or HBP and angina).
3. Clinically assess the patient after each medication or dosing change.
4. Maximize compliance with no more than once or twice daily dosing.
5. Monitor renal function where any renal-dependent drug is used.
6. Make use of drug -drug interaction checkers (e.g., Epocrates, clinical decision support tools).
7. Review medications at each visit with patient and family member if possible.
8. Discontinue unnecessary drugs and taper psychotropic drugs when possible.
9. Consider genotype testing to evaluate for enzyme metabolizer status.
Summary

- As the number of medications for elderly patients increases, so does the incidence of adverse events (hospital admissions/readmissions, falls, hip fractures, functional and cognitive decline, nursing home admissions, deaths).
- Elderly patients benefit from a periodic medication review by the primary care physician for the purpose of reducing the dose or discontinuing Potentially Inappropriate Medications (PIMs) or using safer alternatives.
- The 2015 AGS Beers Criteria includes a validated list of PIMs to avoid or minimize in the elderly, including anticholinergics, anti-spasmodics, anxiolytics, antipsychotics, barbiturates, benzodiazepines, non-steroidal pain medications, antiarrhythmics and other drugs.
- START, STOPP, and ARMOR are additional tools available to the physician conducting medication reviews.
- The Good Palliative-Geriatric Practice (GP-GP) algorithm is a tool to assist in successfully discontinuing unnecessary medications in the elderly.
- Primary care and consulting or specialist physicians as well as podiatrists and dentists should have access to the elder patient’s current and complete medication list.
- Communication between all healthcare providers will reduce the risk of uncoordinated care.
- Guidelines are an aid to the physician's decision-making, not a substitute for it. Let the record reflect that you were aware of applicable guidelines; that you took into account the individual patient’s circumstances and preferences in prescribing; and that you did what was best for your patient.
Bibliography - Polypharmacy and the Elderly: Managing Multiple Medications in the Senior Population

Note: Web links can change over time. If link no longer works, web-search the article by title.

Quick Links To Tools
- START  http://ageing.oxfordjournals.org/content/36/6/632.full.pdf
- STOPP  http://ageing.oxfordjournals.org/content/37/6/673.full.pdf
- ARMOR  http://www.champ-program.org/static/ARMOR%20tool_Haque.pdf
- Note: A Pocket Card summarizing the 2015 Beers Criteria is in development and may be purchased at http://geriatricscareonline.org/ProductAbstract/beers-pocket-card/PC004

Additional Reading

References


