Improving Medication Use and Outcomes with Clinical Decision Support:
A Step-by-Step Guide [1]

Edited by Jerome A. Osheroff, MD, FACP, FACMI

Excerpt from Chapter 5: Configure CDS Interventions to Address Specific Targets

pgs. 143-145 - Ensuring Safe Medication Use and Dosing in the Elderly Population

Due to physiologic and other changes that accompany aging, elderly patients often respond differently to medications. In addition, adverse drug effects have significant medical and safety consequences for older adults. As a result, certain drugs should not be used in this population or should be prescribed differently—such as with lower starting and maintenance doses.

Elderly Use Highlights

- Ensure appropriate initial dosing via suggestions based on age or use an alert for out-of-range dosing.

- Use order sets and other upstream interventions, with alerts as a safety net, to prevent prescribing potentially inappropriate medications in elderly patients.

- When using an alert, make sure it describes the patient risk and allows alternative medications or dosing to be prescribed directly from the alert.

- Consider producing and addressing a periodic follow-up list of elderly patients on inappropriate medications as a complement or alternative approach to alerting.

CDS content vendors that supply commonly used knowledge bases to support drug interaction checking and the like, often provide age-based dosing guidelines as well. The recommendations in these sources tend to be conservative.

When using separate rule sets to support renal and age-based dosing, there are several potential ways to configure the system to respond when both a patient's age and kidney function trigger dose adjustment notifications. The system might use the most conservative recommended dose, usually the one based on renal function. Alternatively, it might display some notification flag along with the respective dosing recommendations, and require the user to specify a dose based on this information. Another approach—when pertinent, solid clinical evidence is available—is to provide individual rules that address both age and renal function dimensions and present one appropriate dose or range. Close collaboration between the medication safety and CDS experts in your organization can be helpful in developing and executing a strategy for dealing with dosing CDS that addresses both age and kidney function, if this is a priority for your organization.

For drugs that should be avoided altogether in the elderly population, the Beers criteria and the Canadian criteria[40,41,42,43] are commonly referenced. In addition, warfarin, insulin, and digoxin are drugs commonly used in the elderly population and may require dose adjustment and careful monitoring. These drugs may cause many more ED visits in elderly patients than Beers criteria drugs.[44] Inappropriate medication use in older adults may be at least as problematic in inpatient as in outpatient settings[45] and a potentially important intervention target.[46]

The following are points to consider in developing CDS to avoid potentially inappropriate medication use in elderly patients.

- As always, consider alerts as a safety net, and try to use CDS delivered "upstream" to support correct prescribing decisions. For example, condition management information available at the medication selection stage—for example, via infobuttons—can offer guidance regarding appropriate drug selection and dosing in the elderly population. Similarly, order sets can include such imbedded or linked guidance.
- When alerts are used and triggered on order entry, they should suggest an appropriate alternative that can be directly ordered from the alert. Construct the alert so the

"reason to avoid use" is prominent. For example, "Caution in older patients: Has a long half-life in the elderly, producing prolonged sedation and increasing the risk for falls and fractures. Alternative medications are preferred; [list of medications with option to order directly]."

- An alternative "downstream" method to alerts in the inpatient setting is producing a report listing patients who are receiving potentially contraindicated medications; this list can then be reviewed by pharmacists or a geriatrics consult service. Analogous reports, handled through appropriate channels, may be of value in outpatient settings as well.

A study examining CDS effects in reducing prescriptions for potentially contraindicated drugs in elderly outpatients found alerts to be effective.[47] The study focused on a relatively few contraindicated medications and offered an alternative medication in the alert, as listed in Table 5-7.

Table 5-7: Medications Triggering Alerts in Elderly Patients and Suggested Alternatives, in a CDS Study[47]

Medications Triggering Alerts	Suggested Alternatives
Long-acting Benzodiazepines Diazepam Flurazepam Triazolam Chlordiazepoxide	**Shorter acting Benzodiazepines** Oxazepam Temazepam
Tertiary Amine Tricyclic Antidepressants Imipramine Amitriptyline Doxepin	**Secondary Amine Tricyclic Antidepressants or others** Nortiptyline Desipramine Buspirone Trazadone Paroxetine

Although the alerts were not entirely successful in eliminating prescriptions for these medications in elderly patients, a trend toward decreased prescribing was evident. Because the Beers criteria list is extensive, it may be advisable to start with a few contraindicated drugs that are prescribed relatively frequently. This approach may make it easier to provide alternatives in the alert, which may have been a significant factor in the success of the study just discussed—that is, by making it easy for the prescriber to take the appropriate action.

Another study focusing on similar medications that may provide useful background for local efforts to decrease inappropriate drug prescribing in ambulatory elderly patients[48] showed modest reductions by using a computerized pharmacy alerting system in conjunction with collaboration between physicians and pharmacists.

References

[40] Beers MH, Ouslander JG, Rollingher I, et al. Explicit criteria for determining inappropriate medication use in nursing home residents. UCLA Division of Geriatric Medicine. *Arch Intern Med.* 1991 Sep; 151(9):1825-1832.

[41] Beers MH. Explicit criteria for determining potentially inappropriate medication use by the elderly. An update. *Arch Intern Med.* 1997; 157(14):1531-1536.

[42] McLeod PJ, Huang AR, Tamblyn RM, et al. Defining inappropriate practices in prescribing for elderly people: a national consensus panel. *CMAJ.* 1997; 156(3):385-391.

[43] Fick DM, Cooper JW, Wade WE, et al. Updating the Beers criteria for potentially inappropriate medication use in older adults: results of a U.S. consensus panel of experts. *Arch Intern Med.* 2003; 163(22):2716-2724.

[44] Budnitz DS, Shehab N, Kegler SR, et al. Medication use leading to emergency department visits for adverse drug events in older adults. *Ann Intern Med.* 2007; 147(11):755-765.

[45] Rothberg MB, Pekow PS, Liu F, et al. Potentially inappropriate medication use in hospitalized elders. *J Hosp Med.* 2008; 3(2):91-102.

[46] Budnitz DS. Inappropriate medication use in hospitalized older adults – is it time for interventions? *J Hosp Med.* 2008; 3 (2):87-90.

[47] Smith DH, Perrin N, Feldstein A, et al. The impact of prescribing safety alerts for elderly persons in an electronic medical record: an interrupted time series evaluation. *Arch Intern Med.* 2006; 166(10):1098-1104.

[48] Raebel MA, Charles J, Dugan J, et al. Randomized trial to improve prescribing safety in ambulatory elderly patients. *J Am Geriatr Soc.* 2007; 55(7):977-985.