

# IT-based approach to increasing utility of Beers' and STOPP-START criteria in reducing inappropriate prescribing of geriatric patient medications

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## Background

Geriatric patients are at increased risk of adverse drug events (ADEs) along with dangerous drug-drug and drug-disease interactions due to frequent polypharmacy combined with age-related degenerative health problems, rendering them particularly vulnerable to medical complications associated with potentially inappropriate prescribing (PIP) [1,2]. Dependency on caregivers and cognitive impairment constrains their ability to recognize and report symptoms they may be experiencing [3]. Health consequences arising from PIP results in increased morbidity and expenditure of medical resources [4].

Various sets of criteria have been developed to identify potentially inappropriate medicines (PIMs) for elderly patients. The most commonly cited set of guidelines is that of Beers' Criteria, originally published by Dr. Mark H. Beers in 1991 and subsequently updated about every six years to incorporate new prescribing indicators [5-7]. Beers' Criteria includes two lists: one list indicates medications that should be avoided regardless of diagnosis due to toxicity of the agent, too-frequent doses, or too-large accumulative daily doses and a second list with medications that may or may not be recommended based on diagnosis, as they may present risk of drug-disease interactions [8]. Beers' Criteria has been applied in many studies to successfully identify PIMs for elderly patients. However, several studies have revealed two primary flaws in Beers' Criteria: 1) it includes many drugs irrelevant to European countries and 2) it fails to address problems associated with the under usage of beneficial medications [9]. Thus, in 2008, guidelines, entitled Screening Tool of Older People's Prescriptions (STOPP) - Screening Tool to Alert to Right Treatment (START) were introduced. Cited advantages of STOPP-START over Beers' Criteria include organization by physiological system, inclusion of medications more relevant to European nations, and consideration of inappropriate omission of well-indicated medications for geriatric patients [10]. STOPP-START Criteria have since been accepted by the European Union Geriatric Medicine Society [11]. Despite addressing the weaknesses of Beers' Criteria, studies fail to consistently demonstrate a statistically significant difference in change in number of PIMs from baseline between STOPP and Beers' criteria [12]. Additionally, although both criteria have proved successful in reducing PIMs for geriatric patient populations, they are criticized for being too difficult for physicians and pharmacists to quickly reference when prescribing or dispensing medications. Thus, there is reason to believe neither set of criteria has achieved its optimal utility [12].

This study introduces an IT system into the UVA Electronic Health Record (EHR) System, Epic, that allows physicians to insert a list of medications into a search bar that then returns the associated recommendations from Beers' and STOPP-START Criteria. The system addresses the two primary problems cited in literature with the current guidelines. First, it overcomes any disagreement as to which set of guidelines is superior by incorporating both into a unified pool of information. Second, it provides for an efficient method to reference both documents simultaneously. In addition, the system will use patient data within Epic to alert physicians of PIP. This new mechanism is ultimately intended to replace the current means of referencing the documentation, which consists of tediously reviewing the lengthy PDF files with information for each medication dispersed across multiple pages and tables. The system will be introduced as a new tool within UVA Internal Medicine in a prospective study, to test whether physicians with access to the system more frequently reference Beers' and STOPP-START Criteria when prescribing medications to geriatric patients than those without access.

## Methods

The information from Beers' and STOPP-START Criteria were organized into individual pools, each of which correlating with one medication. Medication lists can be copied and pasted into a search bar and the designated pool for each medication is returned. For medications not referenced in either Beers' or STOPP-START Criteria, a response of "*(Medication Name) was not found*" is returned in red text. The search engine can interpret both the generic and brand-name of each medication with limited spelling errors. Figure 1 displays a screen shot of the system interface. The study will include two groups of physicians that treat geriatric patients, the experimental group will have access to the system while the control group will rely on the current means of referencing the criteria in PDF form. Physicians in the control group will document each time they reference either Beers' or STOPP-START Criteria. The system will monitor the frequency at which physicians in the experimental group reference the criteria, based on the search history within their designated accounts.

**Figure 1.**

Review Medication Lists		<a href="#">Home</a>	<a href="#">About</a>	<a href="#">Contact</a>
Enter medications:	Select related body system(s):			
Vistariil, videx, ciprofloxacinaztreonam				
Results:				
<ol style="list-style-type: none"> <li>1. "Videx" was not found.</li> <li>2. "Ciprofloxacinaztreonam" was not found.</li> </ol>				

Medication	Beers Criteria		STOPP Criteria	START Criteria
	Recommendation	Rationale		
Hydroxyzine (Vistaril)  Class: Anticholinergic	Avoid  Quality of evidence: Moderate Strength of recommendation: Strong	Highly anticholinergic; clearance reduced with advanced age, and tolerance develops when used as hypnotic; risk of confusion, dry mouth, constipation, and other anticholinergic effects or toxicity Use of diphenhydramine in situations such as acute treatment of severe allergic reaction may be appropriate.	Section D: Central Nervous System and Psychotropic Drugs  Anticholinergics/antimuscarinics in patients with delirium or dementia (risk of exacerbation of cognitive impairment).	No START Criteria for Anticholinergics
	Avoid in older adults with delirium  Quality of evidence: Moderate Strength of recommendation: Strong	Avoid in older adults with or at high risk of delirium because of the potential of inducing or worsening delirium.	Section F: Gastrointestinal System  Drugs likely to cause constipation (e.g. antimuscarinic/anticholinergic drugs, oral iron, opioids, verapamil, aluminium antacids) in patients with chronic constipation where non-constipating alternatives are available (risk of exacerbation of constipation).	
	Avoid in older adults with dementia or cognitive impairment  Quality of evidence: Moderate Strength of recommendation: Strong	Avoid because of adverse CNS effects.	Section N: Antimuscarinic/Anticholinergic Drug Burden  Concomitant use of two or more drugs with antimuscarinic/anticholinergic properties (e.g. bladder antispasmodics, intestinal antispasmodics, tricyclic antidepressants, first generation antihistamines) (risk of increased antimuscarinic/anticholinergic toxicity)	
	Avoid in older men with lower urinary symptoms, benign prostatic hyperplasia  Quality of evidence: Moderate Strength of recommendation: Strong	May decrease urinary flow and cause urinary retention		
	Avoid if the patient is taking an anticholinergic medication  Minimize number of anticholinergic drugs  Quality of evidence: Moderate Strength of recommendation: Strong	Increased risk of cognitive decline		

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