International Journal of Pharmaceutical Research and Applications
Volume 7, Issue 6 Nov-Dec 2022, pp: 464-470 www.ijprajournal.com ISSN: 2456-4494

Beer's Criteria: A More Comprehensive Guide to Medication Safety in an Acutely Ill Population of Geriatrics

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Submitted: 01-11-2022 Accepted: 12-11-2022

ABSTRACT:
In 1991 , Dr.Mark H.Beers,MD developed the first set of beers criteria for inappropriate drug use and he defined that inappropriate prescribing as , where the potential risk of the medication overlies the potential benefits of the medication .Beers criteria is based on evidence based medicine developed by recognized experts in geriatric care, clinical pharmacology and psychopharmacology in the USA for older adults >65 .The main intention of the AGS Beers Criteria is to improve medication selection , educate clinicians and patients; reduce adverse drug events and serve as a tool for evaluating quality of care, cost, and patterns of drug use of older adults. For older adults, pharmacokinetics and pharmacodynamics must be considered when prescribing. The AGS Beers Criteria are to be used in the care of older adults >65 years of age in all ambulatory, acute, and institutional care settings and it is important to educate interprofessionals, older adults, and caregivers, while preventing unintended harms, such as use of potentially inappropriate medications and adverse drug events. There are seven key principles that should be used to guide optimal use of the beers criteria and application of key principles suggests how patients, clinicians, and health systems and payors can apply the key principles to improve pharmaceutical care of older adults. In conclusion the beers criteria is an comprehensive guide for identifying drugs to potentially avoid in older adults, to reduce adverse drug events and drug-related problems, and to improve medication selection and overall medication safety in older adults.

KEYWORDS: Beers criteria, Inappropriate prescribing, Evidence based medicine, Geriatric care, Pharmacokinetics and pharmacodynamics, Seven key principles, Comprehensive guide.

I. INTRODUCTION:

The first set of explicit criteria for inappropriate drug use was developed by gerontologist Dr. Mark H. Beers, MD, while a junior faculty at the University of California, Los Angeles and colleagues was published in 1991. He defined that inappropriate prescribing as, where the potential risk of the medication overlies the potential benefits of the medication. [1]

These criteria were initially intended for older adults particularly in nursing homes receiving care in long-term care setting. Since then, the Centers for Medicare & Medicaid Services (CMS) for nursing home regulation adopted the beers criteria and it is applied for all older adults, including those receiving care in outpatient settings, but excluding those receiving palliative or hospice care; In research for studying prescribing patterns it is widely utilized and outcomes in older adult populations; and incorporated into national quality measures. [2]

A 13 member expert panel of the beers criteria was part of a two stage Delphi survey in which 30 therapeutic classes/medications whose use should be avoided in elderly residing in nursing homes is consensus of opinion. In 2003, using 12 member of expert panel to establish consensus on 48 medications/classes of "drugs-to-avoid" and 20 drug-disease interactions. [1]

During the review process, the panel determined whether new criteria should be added or if existing criteria should be removed or changed. The aim was to provide an update using a comprehensive, systematic review and grading of the evidence on drug-related problems and adverse events in older adults. After Beers' death in 2009, the revisions and updates of the criteria began to undertaken by the American Geriatrics Society (AGS) in 2011. For every 3 years, the AGS has provided updates to the criteria. [3]

BEERS CRITERIA:

The Beers criteria are guidelines based on expert consensus developed through an extensive literature review by recognized experts in geriatric care, clinical pharmacology, and psychopharmacology in the USA for older adults >65 .Beers criteria have undergone a major

International Journal of Pharmaceutical Research and Applications
Volume 7, Issue 6 Nov-Dec 2022, pp: 464-470 www.ijprajournal.com ISSN: 2456-4494

reformation in 2012 by the American Geriatrics Society based on evidence-based recommendations as compared with the previous version of 2003 [4]. Beers criteria is an "warning light" to point out medications that have an unfavorable balance of benefits and harms in many older adults. [5]

Potentially inappropriate medications (PIMs) are defined as "medications that should be avoided due to their risk which outweighs their benefit and when there are equally or more effective but lower risk alternatives are available" [6]. PIM has become an increasingly common problem in older adults; hence the American Geriatric Society updated Beers criteria; the most crucial strategy to check its use/misuse [7]. The AGS Beers criteria is not a list of medications that older adults cannot take, rather it is a guide for potentially inappropriate medications (PIM). [8] In a study demonstrates that 32% of acutely ill elderly patients, who required admission to hospital from the community, were regularly receiving at least one potentially inappropriate medication prior to admission, as determined by Beers' Criteria. [9]

These criteria, though widely used, have been controversial because of their adoption by nursing home regulators and have been criticized at times as too simplistic and limiting the freedom of physicians to prescribe.[10]

The American Geriatrics Society (AGS) to provide guidance regarding medications that should be avoided in older patients or in certain situations. The goals are to improve medication selection, educate physicians and patients, avoid adverse effects, and help evaluate care quality and medication use trends for older adults.[11]

The Beers Criteria places drugs into five categories:
(a)Avoided by most older people in all healthcare settings, except hospice and palliative care,
(b) Avoided by older people with specific health conditions;
(c) Avoided in combination with other treatments because of the risk for harmful drug-drug interaction;
(d) Used with caution because of potentially harmful side effects; and
(e) Dosed differently or avoided among people with de creased renal function.[12]

INTENDED USE OF BEERS CRITERIA :

•The AGS Beers Criteria are intended for use in all ambulatory and institutional settings of care for populations aged 65 and older in the United States.The goal of the AGS Beers Criteria is to improve care of older adults by reducing their exposure to PIMs.
•Prescribing decisions are not always clear cut, and clinicians must consider multiple factors. Quality measures must be clearly defined, easily applied, and measured with limited information. The panel considered both roles during deliberations.[13]
•The intention of the AGS Beers Criteria is to improve medication selection educate clinicians and patients; reduce adverse drug events and serve as a tool for evaluating quality of care, cost, and patterns of drug use of older adults.
•The AGS Beers Criteria as both an educational tool and a quality measure-two uses that are not always in agreement and the panel considered and vigorously deliberated both.[14]
•This should be viewed as a guideline for identifying medications for which the risks of their use in older adults outweigh the benefits.
•These criteria are not meant to be applied in a punitive manner.
•This list is not meant to supersede clinical judgment or an individual patient's values and needs. Prescribing and managing disease conditions should be individualized and involve shared decision-making.
•These criteria also underscore the importance of using a team approach to prescribing and the use of non-pharmacological approaches and of having economic and organizational incentives for this type of model.
•Two companion pieces were developed for the 2015 update. The fi rst addresses the best way for patients, providers, and health systems to use (and not use) the 2015 AGS Beers Criteria. T he second is a list of alternative medications included in the current use of High-Risk Medications in the Elderly and Potentially Harmful Drug-Disease Interactions in the Elderly quality measures. Both pieces can be found on geriatricscareonline.org.[15]

AGING EFFECT:

The natural process of aging - accompanied or not by the changes resulting from diseases of higher prevalence among the elderly - represents a potential for interference on the pharmacokinetics and pharmacodynamics of the human body with a significant number of medications.[16]

Simply defined, pharmacokinetics is the body's effect on the drug, and pharmacodynamics is the drug's effect on the body. For older adults, pharmacokinetics and pharmacodynamics must be considered when prescribing. Normal physiologic changes of aging affect absorption, distribution, metabolism, and elimination of drugs, thereby altering pharmacokinetics. Pharmacokinetics may

International Journal of Pharmaceutical Research and Applications
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also be affected by comorbid disease and the method of administration.[17]

Pharmacokinetics Changes in Older Adults:
Absorption

In the older adults, drug absorption altered with the decrease in gastric emptying, decrease in gastrointestinal blood flow, and reduced gastric acidity. Inhibition in first-pass metabolism is already reported for drugs such as propranolol, nitrates, and verapamil.

Distribution

The distribution of drugs in the body mainly depends on plasma and tissue binding characteristics of the drug.

Age-related structural and composition changes are also observed in the older patient, and they can affect the disposition of the drug in many different ways. Increase in body fat and decrease in lean body mass are the most critical structural and composition changes that occur in older adults.

The volume of distribution for water-soluble drugs such as ethanol, lithium, and digoxin decreased with alteration in body mass and body fat. Alteration in these factors may also lead to an increased volume of distribution of lipid-soluble drugs such as a long-acting benzodiazepine. Drugs dosing in these patients should be carefully designed and monitored as these drugs have the potential to cause adverse effects by increasing the plasma concentration of a drug.

Metabolism

Several age-dependent changes such as the reduction in hepatic size and hepatic blood flow also lead to decreased levels of drug-metabolizing enzymes. Cytochrome 450, one of the most essential metabolizing enzymes, generally declines with aging. Most important factor is to recognize the drug-drug interaction especially involving these enzymes, for example, some drugs which have a first-pass effect in the liver such as beta-blockers, nitrates, and tricyclic antidepressant were found to be effective even at lower doses. Besides, certain drugs and foods cause induction of liver enzymes resulting in faster metabolism of some other drugs. In contrast, some of the drugs may reduce the action of the liver enzymes and hence resulting in slow metabolism of some other categories of drugs such as enzyme inhibitors. This factor is a crucial factor that plays a vital role in older adults taking multiple medications at the same time.

Excretion

Kidney is mainly involved in the elimination of most of the drugs from the body. The aging causes a decrease in the size of the kidneys in older adults. Aging process cause a significant decrease in renal plasma flow and glomerular filtration rate.Other age-related factors are the loss of tubular function and diminished reabsorptive capacity. Renal blood flow and the glomerular filtration rate decreases on an average of 35% in older adults having an age 70 years. In such a position, the older adults considered to be at high risk of adverse renal effects due to consumption of NSAIDs. Furthermore, renal vasodilator prostaglandins such as NSAIDs may result in further nephrotoxicity.[7]

Pharmacodynamic Changes in Older Adults :

Pharmacodynamics involves the interaction of the medication with the body, particularly cellular receptors. In older adults, changes in the numbers of receptors or the sensitivity of receptors can affect the outcome of the medication. For example, older adults are generally more sensitive to the central nervous system (CNS) effects of medications. This can be explained though pharmacodynamics changes.[18]

TARGET POPULATION :

The aging population is increasing worldwide with longer life expectancy and many eldedly affected from the co-existence of various chronic health conditions (multimorbidity). Therapeutic management is complicated in older adults with comorbidities (e.g., diabetes, hypertension, degenerative diseases, frailty, cognitive dysfunction) contribute to the health burden .usage of several medications to treat each condition (polypharmacy).[12]

Polypharmacy is defined as the presence of six or more concurrent medications.[19] Polypharmacy is associated with adverse patients outcomes including mortality, falls, adverse drug reactions,poor health outcomes among elders increased length of hospitalization and readmission to hospital soon after discharge.[12]

The risk of adverse effects and harm increases with potentially inappropriate medications (PIMs) or Unnecessary prescription of drugs and the multitude of factors such as drug-drug interactions and drug-disease interactions is due to harm .[20] PIMs increases the healthcare utilization and costs due to extended hospitalization . [21]

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Volume 7, Issue 6 Nov-Dec 2022, pp: 464-470 www.ijprajournal.com ISSN: 2456-4494

In older patients , the adverse effects are at high risk due to decreased renal and hepatic function, lower lean body mass, reduced hearing,vision, cognition and mobility.[20]

Older patients should be screened and evaluated for suitability of current prescriptions, considering the risk-benefit ratio and patients current state of physiological functioning ,eventhoughPolypharmacy may be potentially appropriate . [12]

The AGS Beers Criteria are to be used in the care of older adults >65 years of age in all ambulatory, acute, and institutional care settings. The overall intent is to improve outcomes, such as medication selection and education of interprofessionals, older adults, and caregivers, while preventing unintended harms, such as use of potentially inappropriate medications and adverse drug events.[22]

SEVEN KEY PRINCIPLES TO GUIDE INTENDED USE OF THE 2015 AGS BEERS CRITERIA:

Seven key principles that should be used to guide optimal use of the criteria are explained here.

Key Principle 1: Medications in the AGS 2015 Beers Criteria are potentially inappropriate, not definitely inappropriate

There is a common misperception that any use of a medication in the Beers Criteria is considered inappropriate. This is not correct. The Beers Criteria comprise medications that have an unfavorable balance of benefits and harms for many older adults, particularly in light of available pharmacological and non pharmacological alternatives. In some cases the drug is almost always a poor choice. However, there are some older adults in whom use of these medications is appropriate. Thus, Beers Criteria medications are "potentially inappropriate" and merit special scrutiny but are not universally inappropriate in all patients.

Key Principle 2: Read the rationale and recommendations statements for each criterion. The caveats and guidance listed there are important

Many medications are considered potentially inappropriate only in certain circumstances or in most circumstances but with some exceptions. These distinctions are highlighted in the rationale and recommendations statements for each criterion and are vital for proper interpretation and use of the criteria. As in all prescribing decisions, clinical judgment is required. As noted in Key Principle 1, a drug that the criteria consider "potentially inappropriate" may not always be a bad choice. Conversely, just because a medication is subject to an exemption (or not included in the criteria at all) does not automatically mean it is a good choice.

Key Principle 3: Understand why medications are included in the AGS 2015 Beers Criteria and adjust your approach to those medications accordingly

It is important not only to know that a medication is included on the Beers list, but also to know why it is included on the list. This information is provided in the rationale statement for each drug and should be used to guide decision-making. The risks of AGS 2015 Beers Criteria medications vary with the situation of each individual, and the importance of avoiding a given medication varies accordingly. For example, a Beers Criteria medication that increases risk of falls may be especially unsafe in an individual already at high risk of falls and less risky although not insignificant in an older adult with low fall risk.

Key Principle 4: Optimal application of the AGS 2015 Beers Criteria involves identifying potentially inappropriate medications and where appropriate offering safer nonpharmacological and pharmacological therapies

Prior versions of the Beers Criteria have not offered alternatives to potentially inappropriate medications (PIMs). Often the best therapeutic alternatives involve nonpharmacological strategies, including counseling and lifestyle changes. Implementation of the AGS 2015 Beers Criteria with clinician education and clinical decision support systems could be improved by educating clinicians about safer, more-effective therapies for the conditions for which Beers Criteria medications are commonly prescribed. The AGS and AGS 2015 Beers Criteria Expert Panel are working on developing these lists of alternative therapies.

Key Principle 5: The AGS 2015 Beers Criteria should be a starting point for a comprehensive process of identifying and improving medication appropriateness and safety

The AGS 2015 Beers Criteria capture only a small percentage of the total burden of medication-related problems in older adults. The criteria work best when used as a starting point to review and discuss an individual's entire medication regimen. This includes individualized inquiry into and assessment of medication

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indication, effectiveness, adverse effects, cost, and adherence, and concordance of the medication regimen with an individual's abilities and goals of care.

Key Principle 6: Access to medications included in the AGS 2015 Beers Criteria should not be excessively restricted by prior authorization and/or health plan coverage policies

Encouraging judicious use of AGS 2015 Beers Criteria medications through insurance design can be reasonable. For certain medications, severe restrictions can be warranted. However, onerous restrictions on the many medications in the criteria that have appropriate uses can hinder good clinical care and create the perception that the Beers Criteria are a punitive tool, undercutting their educational function. Programs that restrict access to Beers Criteria medications should be carefully targeted and give the prescribing clinician, who is in the best position to evaluate the appropriateness of medications for individual patients, the opportunity to provide a valid clinical rationale that permits coverage.

Key Principle 7: The AGS 2015 Beers Criteria are not equally applicable to all countries

The AGS 2015 Beers Criteria were developed principally based on medications available in the United States. Medications may be available in other countries that are potentially inappropriate but are not included in the list.Prior versions of the Beers Criteria have been adapted for several countries. In the absence of country-specific adaptations of the Beers Criteria, in most cases it is reasonable to use broad-based categories included in the criteria to identify PIMs, for example benzodiazepines and strongly anticholinergic drugs.

APPLICATION OF KEY PRINCIPLES:

The following section suggests how patients, clinicians, and health systems and payors can apply the key principles to improve pharmaceutical care of older adults. These are summarized here,

APPLICATION OF KEY PRINCIPLES FOR PATIENTS

If you are taking a Beers Criteria medication, talk with your clinician(s) before stopping the medication. Ask your clinician(s) whether there are safer or more-effective therapies, including nonpharmacological therapies.

Review indications and adverse effects of all your medications from a trusted source (e.g., Medline Plus, http://www.nlm.nih.gov/medlineplus/druginformation.html)

Talk with your clinicians (prescribers and pharmacists) about your medications. Discuss whether your medications are effective for the purpose for which they are prescribed and whether any symptoms you are having could be adverse effects (side effects) of your medications. Keep in mind that any given symptom may or may not be a drug side effect.

APPLICATION OF KEY PRINCIPLES FOR CLINICIANS

Think of the AGS 2015 Beers Criteria as a "warning light" that should prompt close review and monitoring of a medication.

Closely assess patients for potential adverse effects of Beers list medications, keeping in mind that many effects may be subtle yet important.

Use the AGS 2015 Beers Criteria as an entrée into a larger review and discussion of medication prescribing quality.

Do not automatically defer to a colleague who prescribed an AGS 2015 Beers Criteria medication. Use the criteria as a tool to stimulate dialogue between clinicians as to whether a drug is really warranted.

When stopping AGS 2015 Beers Criteria medications, be sure to slowly taper down the dose rather than abruptly stop medications whose discontinuation may prompt a withdrawal reaction.

A variety of healthcare professionals, including nurses, can play an important role in addressing management of AGS 2015 Beers Criteria medications.

APPLICATION OF KEY PRINCIPLES FOR HEALTH SYSTEMS AND PAYORS

The AGS 2015 Beers Criteria are well suited to clinical decision support systems. These work best when suggestions for alternative therapies accompany alerts about AGS 2015 Beers Criteria medications.

The AGS 2015 Beers Criteria are reasonable to use for performance measurement across large groups of patients and providers but should not be used to judge care for any individual. Care should be taken that performance measures based on the AGS 2015 Beers Criteria do not distract clinicians from attending to other important aspects of pharmaceutical care in older adults.

There is a reasonable role in health plan design for AGS 2015 Beers Criteria medications to be flagged for extra attention, but the criteria should not be used as the sole standard for health

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plan coverage determination or prior authorization. [5]

II. CONCLUSION:

The AGS Beers criteria - is an proven criteria helpful in identifying drugs to potentially avoid in older adults, to reduce adverse drug events and drug-related problems, and to improve medication selection and overall medication safety in older adults.[23][24]

Beers Criteria provided by American Geriatrics Society (AGS) is a strong guarantee for improving medication safety, rationality and efficiency of drug therapy in multimorbid elderly patients.[25][26]

We agree strongly. Rather, the role of the Beers Criteria should be to inform clinical decision-making, research, training, and policy to improve the quality and safety of prescribing medications for older adults. [27] Beers criteria may enable the development of pharmaceutical competencies for the care of geriatric patients with unquestionable benefit for patient safety. [28]

In conclusion the Beers Criteria could strongly contribute to the reduction of inappropriate drug prescription and improve the quality of life among the seniors if nurses closely monitor both the impacts of the drugs used and the complaints of the seniors, and share this information with other members of health care team (physicians, pharmacologists etc.).[29]Finding the best fit safe, effective medications is the role of all members of the health care team. [30]

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