



MONGOLIA BEERS CRITERIA EVALUATION STUDY ON THE TREATMENT OF PYELONEPHRITIS

Nuraiym Nurbyek¹, Maralmaa Lkhagvasuren¹, Saingerel Mendgerel¹, Ider Sarantuya¹, Tserenchunt Ganbold¹, Munkhdelger Baasan¹, Batkhuyag Purevjav², Lkhagvasuren Tsolmon^{1*}

¹Department of Biomedicine, Mongolian University of Pharmaceutical Sciences, Ulaanbaatar, Mongolia

²Department of Pharmacology and Clinical Pharmacy, Mongolian University of Pharmaceutical Sciences, Ulaanbaatar, Mongolia

KEYWORDS

Pyelonephritis; the elderly; Beers criteria; PIM

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ABSTRACT

Background: Globally, 10.5-25.9 million cases of pyelonephritis have been reported, and the nature of the disease is changing over time. In Mongolia, as of 2022 diseases of the genitourinary system has increased from the average of the last 10 years, and account for 9% of all diseases. The incidence rate by age group increased in all age groups in 2022 compared to 2013, with the largest increase in the age group over 65 with 2,104 cases. The basis of this study is to determine the use of PIM drugs based on the Beers criteria for the treatment of patients diagnosed with Pyelonephritis in our country. To study the use of drugs by inpatients diagnosed with pyelonephritis (N10), (N11) in referral hospitals and the use of PIM drugs used in the treatment of elderly people. **Methods:** A retrospective descriptive study was conducted on the medical history of a total of 150 patients diagnosed with Pyelonephritis (year 2023) at The State Secondary Central Hospital, The State Third Central Hospital, and Hovd Regional Medical

Centers. **Results:** Among the 150 inpatients who participated in our study, 14.3% (n=18) of 126 types of drugs were used for the treatment of pyelonephritis, and 85.7% (n=108) for the treatment of multimorbidity and supportive treatment. Inpatients used 11 types of PIM drugs according to Beers criteria. Nitrofurantoin 39% was used the most and amitriptyline 9.8% were the most used drugs affecting the central nervous system. **Conclusion:** 11 types of drugs included in the inappropriate category for use in the elderly are risky and should not be selected. Among them, nitrofurantoin 39%, from NSAIDs ketoprofen 19.5%, ibuprofen 7.3% were most used. PIM drugs used for treatment in 2014 are still used in 2024, indicating the need for improved drug monitoring in the elderly.

In Mongolia, medical treatment services are improving, but we need to pay attention to a major issue that needs to be changed by identifying the high use of risky drugs in referral hospitals.

*Corresponding author: Department of Biomedicine, Mongolian University of Pharmaceutical Sciences, Songolon's road 4/A, Songinokhairkhan District 20th khoroo, Ulaanbaatar, Mongolia;

E-mail address: lkhagvasuren.ts@monos.mn; (Lkhagvasuren Tsolmon)

INTRODUCTION

Globally, 10.5-25.9 million cases of Pyelonephritis have been reported, and the nature of the disease is changing over time.

In 2018, the prevalence of UTI by age group was determined to be approximately 11% among the general population and approximately 20% among women over 65.

In Mongolia, as of 2022 diseases of the genitourinary system has increased from the average of the last 10 years, and account for 9% of all diseases. The incidence rate by age group increased in all age groups in 2022 compared to 2013, with the largest increase in the age group over 65 with 2,104 cases. According to the statistics of 2023, 10% of the world's population is over 65 years old, and many medicines are needed to treat chronic diseases in the elderly. Due to age-related organ system changes and chronic diseases, the elderly are at higher risk of adverse drug reactions compared to the general population. Due to aging, kidney function decreases and affects the excretion of medicinal substances. Kidney mass declines by 20% to 25% between ages 30 and 80, and glomerular filtration rate [GFR] decreases by approximately 10% over the decade after age 30. Normal glomerular filtration rate (eGFR) in adults is greater than 99 mL/min/1.75 m², and eGFR also decreases with age in individuals without renal disease¹.

The American Geriatrics Society Beers Criteria® for Potentially Inappropriate Medication Use in Older Adults is a list of medication guidelines that help healthcare providers safely prescribe medications for adults over age 65².

As a result of the study to evaluate the drug use of patients over 65 years old with a diagnosis of chronic ischemic heart disease in some referral hospitals of Ulaanbaatar city, it was found that 438 elderly people used 3534 drugs, 686 of which were PIM. It is visible that there are currently no lists and recommendations

for the treatment of the elderly in Mongolia, and the elderly are more likely to experience changes in the pharmacokinetics and pharmacodynamics of drugs compared to younger people. In addition, it is important to choose the proper medicine and adjust the dose to reduce complications and mortality in the elderly. This study was conducted to contribute on the improvement of the safe use of drugs used in the treatment of pyelonephritis in the elderly in Mongolia.

MATERIALS AND METHODS

A retrospective descriptive study was conducted on the medical history of a total of 150 patients diagnosed with pyelonephritis (year 2023) at The State Secondary Central Hospital, The State Third Central Hospital, and Hovd Regional Medical Centers. Information such as patient's age, sex, bed days, disease information, types of drugs used, dose, single dose of treatment, daily dose, days of drug use, and cost of drug treatment were sampled from the medical history and drug treatment pages. Medication use in patients over 65 years of age was assessed using the 2023 Beers criteria.

THE RESULTS OF STUDY

Among the 150 inpatients who participated in our study, 14.3% (n=18) of 126 types of drugs were used for the treatment of pyelonephritis, and 85.7% (n=108) were used for the treatment of multimorbidity and supportive treatment. Medicines such as metronidazole, nitrofurantoin, gentamicin, cefotaxime, and ceftriaxone are widely used in the treatment of pyelonephritis. In 2019, a total of 75 elderly patients hospitalized with urinary tract infection were evaluated according to Beers' criteria, and nitrofurantoin was 22.7%, ibuprofen 2.7%, and ketoprofen 2.7%. As a result of our research, nitrofurantoin 39%, ibuprofen 7.3%, and ketoprofen 19.5% are at risk. Total used drugs assessed by Beers criteria, according to the criteria, 11 potentially inappropriate medicines were used in the elderly.

Table 1. PIM by Beers criteria

Drug category	Drug	P	Total	
			N	Percent
NSAIDs	Ibuprofen	0.019	3	7.3
	Ketoprofen		8	19.5
	Diclofenac		2	4.9
Anti-infective	Nitrofurantoin		16	39.0
CNS Agents	Amitriptyline		4	9.8
Diuretics	Sprinolactone	0.019	1	2.4
Antiemetics	Metoclopramide		3	7.3
Calcium blockators	Nifedipine		2	4.9
Antihistamines	Diphenhydramine		2	4.9
PPI	Pantoprazole		1	2.4
	Omeprazole		3	7.3
Total		0.019	45	100.00

* Tables may have a footer.

Formatting of Chemical Compounds

Reaction equations and chemical formulas are written using programs such as Chem draw.

DISCUSSION

In 1991, Mark Beers developed criteria for predicting adverse reactions to medicines used in the treatment of older people. In 2003 the criteria were revised, and every three years since 2010 the American Geriatrics Society has been updating these criteria³.

345 patients (mean age 71.48 years) were included in a 2023 retrospective study comparing US, European Union, and Germany PIM screening lists in the elderly in India. According to the Beers criteria, EU (7) and PRISCUS, 311 (11.26%), 272 (9.85%), and 105 (3.80%) PIM were used in patients. The total number of prescriptions containing at least one PIM according to the Beers criteria 183 (52.04%), EU (7) 174 (50.43%), and PRISCUS 88 (25.5%). The most PIM were defined by the Beers criteria, and the least PIM by the PRISCUS criteria⁴.

According to the Beers criteria, the use of inappropriate drugs among the elderly in the South Korea is higher compared to the results of the study among the elderly in the United States⁵.

In 2019, Iran, 76.7% of 258 inpatients used PIM,

which are in the list according to Beers criteria. In particular, proton pump inhibitors and benzodiazepines have been used a lot⁶.

The result of the study that performed research between 420 inpatients in the Arab Emirates, 81.43% were PIM, 70.11% were medications inappropriate in patients with certain diseases (of which 52.99% were proton pump inhibitors), and 19.55% were medications to be used with caution (91.43% of which were diuretics) of all drugs⁷.

In 2014, Mongolia, the use of drugs among hospitalized elderly patients with a diagnosis of chronic heart ischemia was studied and assessed according to Beers criteria.

Prevalence of PIM drugs evaluated according to the Beers criteria in 75 elderly people who were hospitalized with chronic kidney diseases and nitrofurantoin 22.7%, ibuprofen 2.7%, and ketoprofen 2.7% were used in 2019. As a result of our research, the use of PIM increased by 39%, by 7.3%, and by 19.5%, respectively, of nitrofurantoin, ibuprofen, and ketoprofen.

REFERENCES

1. Batsukh.A, Ganbold.D. Potentially Inappropriate Medications in Hospitalized Elderly Patients with Kidney Disease. CAJMS.2019;
2. Heather Slaney, Stacey MacAulay. Application of the Beers Criteria to Alternate Level of Care Patients in Hospital Inpatient Units. Can J Hosp Pharm. 2015, May-Jun; 68(3): 218-225;
3. American Geriatrics Society; 2023; <https://pubmed.ncbi.nlm.nih.gov/37139824/>
4. Shikha.S. Shaping geriatric practice: evaluating Beers, PRISCUS, and European Union (7) criteria for optimal patient care. PAGEPress. 2023; Vol.9 No.2;
5. Kim GJ, Lee KH, Kim JH. South Korean geriatrics on Beers Criteria medications at risk of adverse drug events. PLoS ONE; 2018; 13(3);
6. Potentially inappropriate medication prescribing based on 2019 Beers criteria and the impact of pharmacist intervention in elderly patients with kidney diseases: A report from Iran. Health Sci Rep. Nader Babaei Y. 2024 Feb 28;7(3):e1894. doi: 10.1002/hsr2.1894. PMID: 38435445; PMCID: PMC10901788. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10901788/>
7. Prabahar K, Alhawiti MS, Yosef AM, Alqarni RS, Sayd FY. Potentially Inappropriate Medications in Hospitalized Older Patients in Tabuk, Saudi Arabia Using 2023 Beers Criteria: A Retrospective Multi-Centric Study; J Multidiscip Healthc; 2024 May 1;17:1971-1979. doi: 10.2147/JMDH.S461180. PMID: 38706504; PMCID: PMC11070160. <https://pubmed.ncbi.nlm.nih.gov/38706504/>