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Rationality of Prescribing Diabetes Mellitus Drugs Using*Beers Criteria* for Geriatric Patients in Outpatient Installations dr. Iskak Hospital

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ABSTRACT

Diabetes mellitus (DM) is se group of metabolic disorders with symptom hyperglycemia Which happen caused because abnormality secretion insulin and insulin action or both . Diabetes mellitus (DM) is a global problem in which 20% of sufferers are geriatrics. Treatment of DM in geriatrics has the potential to occurirrationally due to the complexity of health problems in geriatrics. Irrational prescribing has a negative impact on health care facilities, patients, and society. One method of assessing rational prescribing is the Beers criteria, developed by *the American Geriatrics Society Beers Criteria 2* 019. The purpose of this study was to determine the rationality of prescribing DM drugs using the Beers criteria for geriatric patients at the outpatient installation at RSUD dr. Iskak Tulungagung.This research is a descriptive observational study with a cross sectional design. Retrospective data collection on 275 medical record documents of geriatric patients with a diagnosis of DM at the outpatient installation of RSUD dr. Iskak – Tulungagung in the 2021 period. Samples were analyzed using *the American Geriatrics Society Beers Criteria* 2019 guidelines . The results of the study DM drugs in the Sulfonylurea class were most widely used (13.1%) and 41,3 % identified *potentially inappropriate medications* (PIMs). The use of potentially inappropriate drugs is 7,32 %, the use of drugs that interact with disease is 3,8%, the drugs that must be used with caution, 6,4%, the drugs that have the potentialto interact clinically 0,3%, and the use of drugs that must be avoided or reduced dose related to renal function 0,3%.

Keywords : Beers Criteria, Diabetes Mellitus, Geriatrics

INTRODUCTION

Diabetes mellitus (DM) is se group of metabolic disorders with symptom hyperglycemia Which happen caused because abnormality secretion insulin and insulin action or both of them. (Perkeni, 2021) . It is said Diabetes mellitus when experiencing a serious condition in the long term or commonly called chronic. Where occurs when blood glucose levels rise because their bodies can't produce one or enough of the hormone insulin and insulin obtained from the body does notcan be effective. Insulin itself is an essential hormone that is produced in pancreasand this removes glucose from the bloodstream enter body cells While the glucoseis converted be energy. Insulin is important for fat and protein metabolism . High levels of sugar in the blood (hyperglycemia) are caused by a lack of insulin or the inability of cells to respond to it (*International diabetes federation*, 2021).

Diabetes mellitus is characterized by symptoms (*polyphagia*), (*polydipsia*), weight loss and (*polyuria*) due to the failure of sugar to enter thecells to be processed as energy due to the inability of the pancreas to produceeffective insulin. Risk factors for Diabetes Mellitus is a lifestyle such as food,physical activity such as exercise, blood sugar monitoring, obesity, hypertension,frequent smoking, unhealthy and unbalanced

diet (high in calories) so that thesugar level is not stable (Perkeni, 2021).

Diabetes mellitus patient many are found with co-morbidities which are complications of diabetes mellitus itself and other diseases as a result of whichmore drugs are used. The use of these drugs in addition to treating diabetesmellitus , is also a drug for overcome comorbid disease. Matter here it is thatcause patient accept polypharmacy wrong only one could potentially causeinteraction occurs drug. When patient gets polypharmacy various interactions possibility happen in these patients, between other pharmaceutical interactions,

pharmacodynamics and pharmacokinetic (Dobric a , 2019).

Geriatric patients are more susceptible to drug side effects than other groups of adult patients because they experience various physical and psychological changes that can affect drug side effects. Therefore, geriatric patients with cases of diabetes mellitus need special monitoring regarding drug prescribing to avoid potential drug inaccuracies which will pose a risk of drugside effects and could be a risk of death (Permenkes, 2014). Based on *the American Geriatric Society* one of the guidelines used to evaluate drug prescribing for geriatric patients is *Beers criteria* (*American Geriatric Society,* 2019).

The Beers criteria are guidelines used to identify and evaluate the potential for obvious drug use and prescription inaccuracies in geriatric patients orelderly patients, with methods of measuring appropriate outcomes and drug inaccuracies from the *American Geriatric Society* (AGS). The advantages are that the application is simple , easy to follow, the data obtained is reproducible,inexpensive, can clearly identify treatment inaccuracies and has strong evidence (*American Geriatric Society,* 2019).

Medication evaluation is identify the inappropriate use of drugs with a diagnosis of diabetes mellitus in geriatric patients based on the guidelines of *the American Geriatics Society Beers criteria* 2019 by analyzing 5 types of drug categories, namely the use of drugs that are potentially inappropriate for geriatrics,the use of drugs that are potentially inappropriate due to interactions with diseasesthat can exacerbate the disease, drugs that must be used with caution in geriatrics, potential clinical drug-drug interactions to be avoided in geriatrics, drugs to be avoided or reduced in dose with the level of renal function in geriatrics arepresented as percentages *(American Geriatric Society*, 2019*).*

The research was conducted at Sultan Syarif Mohammad AlkadrieHospital based on the 2019 *Beers Criteria method*. Of 138 prescriptions forelderly patients, 117 prescriptions for elderly patients experienced PotentiallyInappropriate Medication (PIM)(84,78%). The conclusion from this study is thatthe elderly are at risk for receiving inappropriate drug prescriptions. (Astuti, 2020)

The purpose of this research is to find out rationality of prescribingdiabetes mee litus using beers criteria *in* geriatric patients at the outpatient installation of RSUD dr. Iskak Tulungagung period 2021.

METHODS

This research is an observational descriptive research with *Cross- sectional* study design and retrospective sampling method in outpatient geriatric patients diagnosed with diabetes mellitus at RSUD dr. Iskak Tulungagung. Data collection was carried out retrospectively, so that the variables in this study weremeasured through medical records. Inappropriate use of drugs seen by *the American Geriatic Society Beers Criteria* 2019.

The sample of this study were patients aged $\geq$ 65 years with a diagnosisof Diabetes Mellitus in the outpatient installation of RSUD dr. IskakTulungagung in July - December 2021. The sampling technique in this study was *random sampling* . The samples taken were Diabetes Mellitus patients with one treatment in the period July – December 2021. Patient data was not

repeatedfor the same medical record.

RESULTS AND DISCUSSION

The number of geriatric patients in the outpatient installation at RSUD dr. Iskak Tulungagung for the 2021 period July – December 2021 which included 275 patients who met the inclusion criteria. The class of drugs most often used are sulfonylureas as much as 13,1 %. The results of the analysis showed that of the 275 geriatric patients at the Outpatient Installation of RSUD dr. In Iskak Tulungagung who met the inclusion criteria, there were 114 patients(41,3 %) identified as *Potentially Inappropriate Medications* (PIMs).

PIMs analysis includes 5 categories, namely the use category which medicine potentially No appropriate on patient geriatrics as much as 7,32 % , category The use of potentially inappropriate drugs in geriatrics due to interactions with disease is 3,8%, category The use of drugs that must be used with caution in geriatric patients is 6,4%, category the use of potentially clinical interacting drugs that should be avoided in geriatric patients as much as 0,3%, category The use of drugs that should be avoided or reduced in dose with various levels of kidney function in geriatric patients is 0,3% .

Table 1 Treatment profile of Diabetes mellitus patients in geriatric patients

No	Class	Frequency	(%)
1	*Sulfonylureas*	185	13,1
2	*Insulin*	173	12,2
3	*Angiotensin II Receptor Blockers (ARBs)*	97	6,9
4	*Anti Consulvant*	95	6,8
5	*Calcium Channel Blocker (CCB)*	89	6,2
6	*Vitamins & Minerals*	83	5,9
7	*Biguanids*	83	5,9
8	*Alpha Glucosidase Inhibitors*	78	5,5
9	*Statins*	57	4,1
10	*Proton Pump Inhibitors*	46	3,2
11	Etc	427	30,2
	Total	1,413	100

Based on table 1 Sulfonylureas are used to control hyperglycemia in patients with diabetes mellitus who cannot achieve adequate control with diet alone. In all patients, food restriction was continued important for maximizing the efficacy of sulfonylureas . Heart - liver is used in elderly patients and in patients with mild to moderate impaired liver and kidney function because ofthe danger of hypoglycemia (Widyawati, 2020).

Table 2 Category use drug Which potentially No appropriate on patient geriatricswith a diagnosis of Diabetes Mellitus (*American Geriatric Society,* 2019) .

Medicine name	Frequency	(%)
Glimepiride	32	2,2
Aspart insulin	22	1,5
Insulin Lispro protamine	17	1,2
Meloxicam	15	1,0
Insulin Protamine Aspart	10	0,7
Insulin Glylisine	5	0,3
Diclofenac sodium	4	0,2
Mefenamic acid	2	0,1
Digoxin	1	0,06
Metoclopramide	1	0,06
Total	109	7,32

Based on table 2, the use of glimepiride is because glimepiride has a longer half-life, stronger effect, good postprandial insulin response, mild andrare side effects, hyperinsulinemia & less incidence of hypoglycemia. In addition, Glimepiride has advantages such as a longer duration of action, faster onset of action, complete drug absorption, practical use because it is administered 1x/day, and the price is also affordable (Erliansyahputra, 2021).

According to *the American Geriatrics Society* (AGS) of 2019 g limepiride belongs to the sulfonylurea group who are at higher risk of prolongedsevere hypoglycemia in geriatric patients so that when using sulfonylurea drugs,monitoring or monitoring of drug side effects should still be carried out. Drug side effects are often also associated with the duration of drug use (*American Geriatric Society,* 2019).

Table 3 Categories use drug Which potentially No appropriate on geriatricsbecause of interactions with diseases that can exacerbate the disease
(*American Geriatric Society,* 2019).

Medicine name	Main diagnosis	Freq	(%)
Diazepam	*NIDDM without complications*	1	0,3
	NIDDM with neurogical complications	2	0,7
Alprazolam	*NIDDM with neurogical complications*	2	0,7
Codeine	*NIDDM with neurogical complications*	2	0,7
	Pneumonia	1	0,3
	NIDDM without complications	3	1,1
	Total	11	3,8

Based on table 3, the use of drugs in the Opioid Analgesic class , namely codeine. Pharmacological effects occur when codeine bindsagonistically to opioid receptors at various sites in the central nervous system . Codeine is an antitussive that acts on the central nervous system by depressing the cough center. According to In 2019 *the American Geriatrics Society (AGS) used the* Opioid Analgesic class in patients with a history of falls or fractures asa sedative/hypnotic to reduce the risk of falling (*American Geriatric Society,* 2019).

Table 4 Categories of drugs that should be used with cautionin geriatric patients with a diagnosis of diabetes mellitus
(*American Geriatric Society,* 2019).

Medicine name	Frequency	(%)
Furosemide	17	6,1
Spironolactone	1	0.3
Total	18	6,4

Based on table 4, the use of Furosemide and Spironolactone drugs which belong to the diuretic group, where the class the drug according to *the American Geriatrics Society* (AGS) of 2019 may exacerbate or causehyponatremia . So it is recommended to monitor or monitor sodium levels when starting or changing the dose of diuretics k for geriatric patients. (*American Geriatric Society,* 2019) Most people with diabetes mellitus experience electrolyte disturbances or heponatremia. (Tahir. et al, 2020).

Table 5 Categories of potential clinical drug-drug interactions that should beavoided in geriatric patients with a diagnosis of diabetes mellitus
(*American Geriatric Society,* 2019).

Medicine name	Interaction	Frequency	(%)
Codeine	Diazepam	1	0,3
Total		1	0,3

Based on table 5 the use of codeine which is a class of opioid analgesics . Opioids are a type of narcotic that are depressants, with the functionof reducing the body's functional activities. Opioids have a calming, quiet effect,and even induce sleep and unconsciousness . In medicine, opioids are used as analgesics . Effect side from opioids is factor Which often limiting use opioids. Race, age And type sex is factor which can cause side effects. The sedative effects of opioids can be exacerbated by the use of other drugs such as benzodiazepines, antiemetics, tricyclics and the presence of renal dysfunction. kidney And heart from patient (Lestari, 2020).

On *Beers Criteria* 2019 it was also mentioned that the use of opioids and benzodiazepines can increase the overdose so it is recommended to avoid using these drug combinations (*American Geriatric Society,* 2019).

Diazepam belongs to the class of benzodiazepines which can cause dependence and is often abused together with opioid drugs. Althoughbenzodiazepines are often misused, the government is still obliged to ensure availability for medical use in all health care facilities. Benzodiazepines are used medically as sedatives and antianxiety. Apart from being used as an anti- anesthetic, diazepam is also used as a hypnotic, anti-convulsant, muscle relaxant, and induction of anesthesia (Katzung, 2012).

In this study, it was found that diazepam was prescribed for geriatric patients. However, the administration is limited to short-term therapy and monitoring of drug side effects is carried out. Benzodiazepines are commonly used in the treatment of anxiety, depression, and insomnia

in geriatric patients. If absolutely necessary, the benzodiazepine dose can be reduced to half of the usual dose. The use of benzodiazepine drugs must still be monitored for drug side effects (*American Geriatric Society,* 2019).

Table 6 Categories of drugs to be avoided or reduced in dosage

with the level of kidney function in geriatric patients with diabetes mellitusdiagnosis (*American Geriatric Society,* 2019).

Medicine name	**freq**	**%**	**Dosage used**	**Accompanying diagnosis**	**Information**
Spironolactone	1	0,3	25 mg/24 hours	*Hypertensive renal disease with renal failure Chronic kidney disease*	Avoid
Total	1	0,3			

Based on table 6 the use of Spironolactone is a class of potassium- sparing diuretic drugs that must be used with caution because it can cause hyperkalemia (Ponticelli et al., 2015). Diuretic therapy in chronic renal failure It is used to control extracellular fluid expansion and also for its blood pressure lowering effect . Spironolactone on CrCl < 30 ml/min use drug This should be avoided or at reduced doses for geriatric patients because it can increase potassium (*American Geriatrics Society,* 2019*).*

Table 7 Description of the use of *Potentially Inappropriate Medications* (PIMs) in geriatric patients with a diagnosis of diabetes mellitus

Number of PIMs	**Number of Patients**	**%**
1 kind	108	39,2
2 kinds	5	1,8
3 kinds	1	0.3
4 kinds	0	0
Total	114	41,3

Based on table 7 The results of this study indicate that the prevalenceof PIMs in geriatrics with a diagnosis of diabetes mellitus in the outpatient installation of RSUD dr. Iskak Tulungagung by 41.3% with the most use of 1 type of drug by 39.2% with the use of the right drug by 58.7%. The prescription given is in accordance with the needs of the patient. Given the expected therapeutic achievements are in accordance with the needs of geriatric patients themselves.

Geriatric patients undergoing outpatient at dr. Iskak Tulungagung mostly because disease chronic generally obtain prescription drug Which more Lots because in addition to the main diagnosis the patient also has comorbidities sorisky increase drug interactions and drug side effects . Therefore preventing inappropriate treatment for geriatric patients must still be considered .

CONCLUSIONS

Based on research results from Rationality Prescribing Diabetes Mellitus Drugs in Geriatric Patients at the Outpatient Installation of RSUD dr . Iskak Tulungagung with patient treatment p profile consisting of drug class, number and type of drug, it was found that the class of drug that was given the most was the sulfonylurea group as much as 13,1%.

An overview of the use of *Potentially Inappropriate Medications* (PIMs) in geriatric patients with a diagnosis of diabetes mellitus in geriatric patients in the outpatient installation of RSUD dr. Iskak Tulungagung who got the correct use of the drug was 58,7% while the inaccuracy of the use of the drug was 41,3% . Assessment of drug use based on the 2019 *Beers criteria* , namely: Categories of drug use that are potentially inappropriate for geriatrics, namely as many as 7,32%, the category of potentially inappropriate drug use in geriatrics due to interactions with diseases that can exacerbate the disease is as much as 3,8 % , the category of drugs that must be used with caution in geriatricpatients is as much 6,4 % , the category of clinically potential drug-drug interactions that should be avoided in geriatric patients is as much as 0,3 % , the category of drugs that should be avoided or reduced in dose with various levels of kidney function in geriatrics, namely as much as 0,3 %.

The strategy that can be used to avoid inappropriate treatment in geriatric patients is through *screening* of prescriptions given to them geriatrics. Prescription *screening* includes administrative *screening* , pharmaceutical *screening* , *screening* clinical . (Permenkes, 2016) After that , you can determinewhether there are drug-related interaction problems and make professional decisions if there are discrepancies that can be communicated with doctor. So that the side effects of drug use can be monitored directly on the patient.

REFERENCES

Astuti. et al., 2020. Detection of inappropriate drug prescribing in elderlyoutpatients at the internal medicine clinic of Dr. Sultan Syarif Hospital. Pontianak

Beers Criteria 2019. *American Geriatrics* Society . 2019. Updated *AGS Beers Criteria® for Potentially Inappropriate Medication Use in Older Adults. Journal of the American Geriatrics Society*

Dobric a , EC *et al.* , 2019 *Polypharmacy in type 2 diabetes mellitus* : *Insights from an internal medicine department', Medicina*

Eliansyah Putra.. (2021). Pattern of use of glimepiride in type 2 diabetesmellitus patients at dr. Mohamad Hoesin Palembang period June – 2019 – 30 June 2020. Faculty of Medicine, Sriwijaya University, Palembang.

International Diabetes Federation., 2021. IDF Diabetes Atlas

Katzung, BG., Masters, SB., Trevor, AJ. 2012. Basic & Clinical Pharmacology, edition 12. Mc Grow-Hill Medical. New York: 373-38

Lestari.DA, 2020. Evaluation of Medication Prescribing in Geriatric Patients with Prenal Disorders at Panembahan Senopati Hospital, Bantul. Yogyakarta.

Ponticelli, C., Sala, G., and Glassock, RJ 2015. Drug Management in theElderly Adult With Chronic Kidney Disease: a Review for the Primary Care Physician. Mayo Clinic Proceedings, 90: 633–645.

Regulation of the Minister of Health of the Republic of Indonesia No. 72., 2016., Pharmaceutical Service Standards for Hospital Services., Indonesia.

Society of Endocrinology Indonesia., 2021. Guidelines Management And Prevention of Type 2 Diabetes Mellitus., Indonesia.

Thahir.S., Ukaka AS. DY., 2020. Description of Electrolyte (Sodium- Calium) Values in Patients with Diabetes Mellitus at Tourism Hospital, East Indonesia University, Makassar.

Widiawati., 2020. Study of the Use of Sulfonylurea Group Drugs in Type 2 Diabetes Mellitus at Outpatient Clinics, Sumedang General Hospital. Facultyof Pharmacy, Bhakti Kencana University, Bandung.