IJTI | INTERNATIONAL JOURNAL OF THERAPEUTIC INNOVATION

Research article

Patterns of antidiabetic medication use among inpatients with type 2 diabetes mellitus and impaired renal function at Can Tho Central General Hospital in 2024

Thi-Ngoc-Giau Truong*[1], Van-Dung Thach[2]

[1] Tay Do University, 68 Tran Chien Street, Can Tho, Vietnam
[2] Can Tho University of Medicine and Pharmacy, Nguyen Van Cu Street, Can Tho, Vietnam

Corresponding author: Thi-Ngoc-Giau Truong, ✉ ngocgiaupharmacy@gmail.com, Van-Dung Thach, ✉ tvdung@ctump.edu.vn **Orcid Id**: https://orcid.org/0009-0006- 2882-9197

Received - 12-02-2025**, Revised** - 20-04-2025, **Accepted** - 10-05-2026 **(DD-MM-YYYY)**

Refer this article

Thi-Ngoc-Giau Truong, Van-Dung Thach, Patterns of antidiabetic medication use among inpatients with type 2 diabetes mellitus and impaired renal function at Can Tho Central General Hospital in 2024. International Journal of Therapeutic Innovation, May-June 2026, V4 – I3, Pages - 01 – 08. Doi: https://doi.org/10.55522/ijti.v4i3.0155.

ABSTRACT

Type 2 diabetes mellitus is a common chronic metabolic disorder and is frequently complicated by impaired renal function. In patients with renal impairment, the use of antidiabetic medications requires careful consideration because reduced kidney function may limit the use of several oral glucose-lowering agents and increase the risk of adverse events. Evaluating real-world antidiabetic medication use in this population is necessary to support appropriate clinical management. This study aimed to determine the proportions of antidiabetic medications used among inpatients with type 2 diabetes mellitus and impaired renal function at Can Tho Central General Hospital in 2024. A retrospective cross-sectional study was conducted using medical records of patients with type 2 diabetes mellitus and renal impairment treated at the Nephrology and Endocrinology Departments of Can Tho Central General Hospital from January to August 2024. A total of 310 eligible medical records were included. Data on demographic characteristics, comorbidities, renal disease status, antidiabetic medication groups, insulin types, and active ingredients were extracted and analyzed using descriptive statistics. Among 310 patients, most were aged ≥60 years (68.4%), female (70.6%), and mainly homemakers (35.5%) or retired individuals (29.0%). Chronic kidney disease accounted for 95.8% of cases, whereas acute kidney disease accounted for 4.2%. Among patients with chronic kidney disease, stage 5 was the most common stage (60.9%), followed by stage 4 (22.2%), stage 3 (12.8%), and stage 2 (4.0%). Regarding antidiabetic medication use, insulin was prescribed in 309 patients (99.7%), while metformin was used in only one patient (0.3%). Among insulin users, rapid- or short-acting insulin was the most frequently used type (54.4%), followed by long-acting insulin (26.2%) and premixed insulin (19.4%). Human insulin 1000 IU/10 mL was the most commonly used active ingredient (42.1%), followed by insulin glargine 100 IU/mL (26.2%). Rapid- or short-acting insulin was the most common insulin type in both chronic kidney disease and acute kidney disease groups. Among chronic kidney disease patients, its use increased from 33.3% in stage 2 to 56.9% in stage 5. Insulin was the dominant antidiabetic medication used among inpatients with type 2 diabetes mellitus and impaired renal function, while metformin use was very limited. Rapid- or short-acting insulin was the most commonly prescribed insulin type, particularly among patients with advanced chronic kidney disease. These findings emphasize the importance of individualized antidiabetic therapy in patients with renal impairment.

Keywords: Type 2 diabetes mellitus, Impaired renal function, Chronic kidney disease, Insulin, Metformin, Antidiabetic medication.

INTRODUCTION

Type 2 diabetes mellitus (T2DM) is a chronic metabolic disorder characterized by persistent hyperglycemia resulting from insulin deficiency, impaired insulin action, or a combination of both mechanisms. Prolonged hyperglycemia affects the metabolism of carbohydrates, lipids, and proteins, and may lead to progressive damage to multiple organs, particularly the kidneys, eyes, nerves, heart, and blood vessels [1–3]. In recent decades, diabetes has become one of the most rapidly increasing non-communicable diseases worldwide. According to the International Diabetes Federation, approximately 537 million people were living with diabetes globally, and this number is projected to increase to 643 million by 2030. In Southeast Asia, around 90 million people were affected by diabetes, with the number expected to rise substantially in the coming decades [4]. In Vietnam, the prevalence of T2DM has also

increased markedly, from 2.7% in 2002 to 6.0% in 2017, reflecting the growing impact of lifestyle changes, population ageing, and metabolic risk factors [4,5]. These epidemiological trends show that T2DM is becoming an increasingly important public health problem, requiring effective long-term management and appropriate pharmacological treatment strategies.

Among the chronic complications of T2DM, renal impairment is one of the most serious and clinically challenging conditions. Diabetic kidney disease is a common microvascular complication and an important cause of chronic kidney disease and end-stage renal disease. The development of renal impairment in patients with T2DM is associated with increased morbidity, higher mortality, reduced quality of life, and greater economic burden for both patients and healthcare systems [6–8]. Previous evidence has shown that patients with T2DM have a two- to four-fold higher risk of renal failure compared with individuals without diabetes. In addition, the presence of proteinuria and declining renal function indicates more advanced disease progression and is associated with poorer prognosis. Therefore, early recognition of renal impairment and appropriate treatment selection are essential to slow disease progression and reduce complications.

Pharmacological management of T2DM in patients with impaired renal function differs from that in patients with preserved kidney function. Several oral antidiabetic agents require dose adjustment or may be restricted when renal function declines. Metformin, although widely recommended as a first-line medication for T2DM because of its glucose-lowering efficacy and low risk of hypoglycemia, is limited in patients with significant renal impairment due to the risk of lactic acidosis [8]. Sulfonylureas may also increase the risk of hypoglycemia in renal impairment because of altered drug clearance and metabolite accumulation [9,10]. For patients with a glomerular filtration rate below 60 mL/min/1.73 m², treatment guidelines recommend that glucose-lowering medications should be selected and adjusted according to renal function, dialysis status, nutritional condition, and the risk of adverse drug reactions. These considerations make medication selection particularly complex in hospitalized patients with T2DM and impaired renal function.

In this clinical context, insulin is frequently used as the main glucose-lowering therapy, especially in patients with advanced chronic kidney disease or unstable inpatient conditions. Insulin can be used across different stages of renal impairment and allows flexible dose adjustment according to blood glucose levels and clinical status. However, insulin therapy also requires careful monitoring because reduced renal insulin clearance, poor nutritional intake, and dialysis-related glucose fluctuations may increase the risk of hypoglycemia [11]. Therefore, understanding the actual pattern of insulin use, including insulin type and active ingredient, is important for evaluating current treatment practice and identifying whether medication use is consistent with the clinical characteristics of patients with renal impairment.

Previous studies in Vietnam have reported a high rate of insulin use among T2DM patients with impaired renal function. Nguyen Thi Huynh Mai et al. found that insulin monotherapy accounted for 95.02% of treatment regimens in patients with T2DM and renal impairment, whereas oral antidiabetic therapy was used in only a small proportion of patients. Similarly, Nguyen Thi Hong Diep et al. reported that insulin monotherapy was the predominant treatment regimen among T2DM patients with renal impairment treated at Can Tho Central General Hospital. These findings suggest that insulin plays a central role in the management of T2DM complicated by renal dysfunction in Vietnamese hospital settings. However, medication-use patterns may vary according to hospital characteristics, disease severity, renal stage, and available treatment options. Therefore, updated local data are needed to describe current prescribing practices in this specific patient population.

Can Tho Central General Hospital is a major referral hospital in the Mekong Delta region, receiving many patients with T2DM and renal impairment from Can Tho and neighbouring provinces. In hospitalized patients, renal impairment is often accompanied by advanced age, multiple comorbidities, and severe chronic kidney disease, all of which may influence the choice of antidiabetic therapy. For this reason, investigating the proportions of antidiabetic medications used in this population is clinically meaningful. The findings may provide practical evidence for optimising treatment regimens, improving medication safety, and supporting individualised diabetes management in patients with impaired renal function.

Therefore, this study was conducted to determine the proportions of antidiabetic medications used among inpatients with type 2 diabetes mellitus and impaired renal function treated at Can Tho Central General Hospital in 2024. Specifically, the study focused on identifying the distribution of medication groups, insulin types by duration of action, active ingredients, and insulin-use patterns according to renal disease status and chronic kidney disease stage. This objective provides the basis for evaluating current pharmacological treatment practice in a high-risk inpatient population.

MATERIALS AND METHODS

Study design and setting

This was a retrospective cross-sectional descriptive study based on medical records. The study was conducted at the Nephrology and Endocrinology Departments of Can Tho Central General Hospital, Vietnam. Medical records of inpatients treated from January 1, 2024, to August 30, 2024, were reviewed. The study focused on describing the pattern of antidiabetic medication use among patients with type 2 diabetes mellitus and impaired renal function.

Study population

The study population included medical records of inpatients aged 18 years or older who were diagnosed with type 2 diabetes mellitus according to the criteria of the Vietnamese Ministry of Health and had impaired renal function. Renal impairment included chronic kidney disease from stage 1 to stage 5 according to the Vietnamese Ministry of Health classification or acute kidney injury diagnosed according to KDIGO 2012 criteria, including acute kidney injury superimposed on chronic kidney disease [14,15]. Medical records were included if patients were hospitalized during the study period and had sufficient information for data extraction. Records were excluded if they were damaged, incomplete, missing essential data, belonged to patients who escaped from hospital or were transferred to another hospital, or belonged to pregnant or breastfeeding women.

Sample size and sampling method

The sample size was calculated using the formula for estimating a single population proportion. With a 95% confidence level, Z = 1.96, an accepted margin of error of d = 0.06, and p = 0.52 based on the study by Nguyen Thi Huynh Mai reporting that 52.0% of patients achieved target HbA1c [8], the minimum required sample size was 267 medical records. After adding 15% to account for incomplete records, the required sample size was 307 and was rounded to 310. During the study period, there were 930 inpatient treatment records of patients with type 2 diabetes mellitus and renal impairment. Systematic random sampling was applied with a sampling interval of k = 930/310 = 3. All eligible records were numbered from 1 to 930; the first record was randomly selected from numbers 1 to 3, and every third record was then selected until 310 medical records were obtained.

Study variables

The study collected variables directly related to the use of antidiabetic medications. The main outcome variables were antidiabetic medication group, insulin type, active ingredient, insulin use according to kidney disease status, and insulin use according to chronic kidney disease stage. Antidiabetic medication groups were classified as insulin or metformin. Insulin was classified by duration of action into rapid- or short-acting insulin, long-acting insulin, and premixed insulin. Active ingredients recorded from medical records included 30% soluble insulin and 70% isophane insulin, soluble insulin aspart protamine-crystallised insulin aspart, insulin glargine 100 IU/mL, human insulin 1000 IU/10 mL, and human insulin combined with insulin glargine 300 IU. To support interpretation of medication use, selected patient and clinical characteristics were also collected, including age group, sex, occupation, residence, type of kidney disease, chronic kidney disease stage, comorbidities, number of comorbidities, and duration of hospitalisation.

Data collection

Data were extracted from medical records using a structured data collection form. The form focused on demographic characteristics, renal disease status, comorbidities, hospitalization duration, and antidiabetic medication information. Medication information included drug name, active ingredient, medication group, strength, route of administration, and dose. Each medical record was reviewed according to the inclusion and exclusion criteria before data extraction. The collected data were checked against the original medical records to reduce missing or inconsistent information, then coded for analysis.

Statistical analysis

Data were entered and managed using Microsoft Excel and analyzed using SPSS version 25.0. Descriptive statistics were used to summarize the study variables. Categorical variables were presented as frequencies and percentages, including antidiabetic medication group, insulin type, active ingredient, insulin distribution by kidney disease status, and insulin distribution by chronic kidney disease stage. Continuous variables, including age and duration of hospitalization, were presented as mean, standard deviation, minimum, and maximum values where appropriate.

Ethical considerations

This study used retrospective data from archived medical records at Can Tho Central General Hospital. The study was approved by the hospital's Board of Directors and Scientific Council. All patient information was coded and kept confidential. Data were used only for scientific research purposes, and no personal identifying information was presented in the study.

RESULTS

General characteristics of the study population

A total of 310 medical records of inpatients with type 2 diabetes mellitus and impaired renal function were included in the study. The mean age was 64.3 ± 11.9 years, ranging from 26 to 94 years. Most patients were aged 60 years or older, accounting for 68.4%, followed by the 40–<60-year age group at 28.4%, while patients younger than 40 years accounted for only 3.2%. Female patients made up the majority of the sample, with 219 cases, accounting for 70.6%, whereas male patients accounted for 29.4%.

Table 1: Demographic characteristics of the study population

Characteristic	Frequency	Percentage (%)
Age group		
<40 years	10	3.2
40–<60 years	88	28.4
≥60 years	212	68.4
Sex		
Male	91	29.4
Female	219	70.6
Occupation		
Homemaker	110	35.5
Farmer	66	21.3
Business	18	5.8
Worker/public employee	6	1.9
Retired	90	29.0
Other	20	6.5

Regarding occupation, homemakers represented the largest proportion, accounting for 35.5%, followed by retired patients at 29.0% and farmers at 21.3%. Other occupational groups accounted for smaller proportions. In terms of residence, patients mainly came from Hau Giang and Can Tho, accounting for 25.5%

and 24.5%, respectively. Other provinces included Vinh Long, Soc Trang, Dong Thap, Bac Lieu, Ca Mau, An Giang, Kien Giang, and other localities.

Clinical characteristics related to renal impairment and comorbidities

Most patients had chronic kidney disease, accounting for 95.8%, while acute kidney disease accounted for 4.2%. Among 297 patients with chronic kidney disease, stage 5 was the most common stage, accounting for 60.9%, followed by stage 4 at 22.2%, stage 3 at 12.8%, and stage 2 at 4.0%.

Comorbidities were common in the study population. The most frequently recorded comorbid diseases were hypertension, cardiovascular disease, and digestive disease, accounting for 87.4%, 80.6%, and 61.9%, respectively. Regarding the number of comorbidities, patients most commonly had four comorbid diseases, accounting for 29.7%, followed by five comorbid diseases at 24.8%, three comorbid diseases at 19.7%, and six comorbid diseases at 18.1%.

The mean duration of hospitalization was 7.7 ± 5.3 days, ranging from 1 to 41 days. Most patients were hospitalized for 3–7 days, accounting for 53.9%. Patients treated for 8–10 days and more than 10 days accounted for 19.0% and 19.7%, respectively, while those hospitalized for fewer than 3 days accounted for 7.4%.

Table 2: Renal disease status and hospitalization duration

Characteristic	Frequency	Percentage (%)
Type of kidney disease, n=310		
Acute kidney disease	13	4.2
Chronic kidney disease	297	95.8
Chronic kidney disease stage, n=297		
Stage 2	12	4.0
Stage 3	38	12.8
Stage 4	66	22.2
Stage 5	181	60.9
Duration of hospitalization, n=310		
<3 days	23	7.4
3–7 days	167	53.9
8–10 days	59	19.0
>10 days	61	19.7

Proportions of antidiabetic medication groups

Among 310 patients, insulin was used in 309 patients, accounting for 99.7%. Metformin was used in only one patient, accounting for 0.3%. No other oral antidiabetic medication groups were recorded in the analyzed treatment data.

Table 3: Proportions of antidiabetic medication groups

Medication group	Frequency	Percentage (%)
Insulin	309	99.7
Metformin	1	0.3
Total	310	100.0

Classification of insulin by duration of action

Among 309 patients treated with insulin, rapid- or short-acting insulin was the most commonly used type, with 168 cases, accounting for 54.4%. Long-acting insulin was used in 81 patients, accounting for 26.2%, while premixed insulin was used in 60 patients, accounting for 19.4%.

Table 4: Classification of insulin by duration of action

Type of insulin	Frequency	Percentage (%)
Rapid- or short-acting insulin	168	54.4
Long-acting insulin	81	26.2
Premixed insulin	60	19.4
Total	309	100.0

Active ingredients of antidiabetic medications

The most frequently used active ingredient was human insulin 1000 IU/10 mL, recorded in 130 patients, accounting for 42.1%. Insulin glargine 100 IU/mL was used in 81 patients, accounting for 26.2%. Soluble insulin aspart combined with protamine-crystallised insulin aspart was used in 31 patients, accounting for 10.0%, while 30% soluble insulin and 70% isophane insulin were used in 29 patients, accounting for 9.4%. Human insulin combined with insulin glargine 300 IU was recorded in one patient, accounting for 0.3%.

Table 5: Active ingredients of antidiabetic medications

Active ingredient	Frequency	Percentage (%)
30% soluble insulin and 70% isophane insulin	29	9.4
Soluble insulin aspart and protamine-crystallised insulin aspart	31	10.0
Insulin glargine 100 IU/mL	81	26.2
Human insulin 1000 IU/10 mL	130	42.1
Human insulin plus insulin glargine 300 IU	1	0.3
Total	309	100.0

Insulin use according to kidney disease status

Among patients with chronic kidney disease, rapid- or short-acting insulin was used in 161 patients, accounting for 54.2%; long-acting insulin was used in 80 patients, accounting for 26.9%; and premixed insulin was used in 56 patients, accounting for 18.9%.

Among patients with acute kidney disease, rapid- or short-acting insulin was also the most commonly used type, recorded in 7 patients, accounting for 58.3%. Premixed insulin was used in 4 patients, accounting for 33.3%, while long-acting insulin was used in one patient, accounting for 8.3%.

Table 6: Insulin type according to kidney disease status

Type of insulin	Chronic kidney disease n (%)	Acute kidney disease n (%)	Total n (%)
Rapid- or short-acting insulin	161 (54.2)	7 (58.3)	168 (54.4)
Long-acting insulin	80 (26.9)	1 (8.3)	81 (26.2)
Premixed insulin	56 (18.9)	4 (33.3)	60 (19.4)
Total	297 (100.0)	12 (100.0)	309 (100.0)

Insulin use according to chronic kidney disease stage

Among patients with chronic kidney disease, rapid- or short-acting insulin was the most frequently used insulin type in stages 3, 4, and 5. Its proportion increased from 33.3% in stage 2 to 52.6% in stage 3, 51.5% in stage 4, and 56.9% in stage 5. Long-acting insulin was most common in stage 2, accounting for 50.0%, but accounted for 18.4% in stage 3, 25.8% in stage 4, and 27.6% in stage 5. Premixed insulin accounted for 16.7% in stage 2, 29.0% in stage 3, 22.7% in stage 4, and 15.5% in stage 5.

Overall, insulin was the predominant antidiabetic medication used in this inpatient population, with rapid- or short-acting insulin being the most common insulin type. Human insulin 1000 IU/10 mL was the most frequently recorded active ingredient.

Rapid- or short-acting insulin was also the leading insulin type among patients with chronic kidney disease, particularly in those with stage 5 disease [9, 10].

Table 7: Insulin type according to chronic kidney disease stage

Type of insulin	Stage 2 n (%)	Stage 3 n (%)	Stage 4 n (%)	Stage 5 n (%)
Rapid- or short-acting insulin	4 (33.3)	20 (52.6)	34 (51.5)	103 (56.9)
Long-acting insulin	6 (50.0)	7 (18.4)	17 (25.8)	50 (27.6)
Premixed insulin	2 (16.7)	11 (29.0)	15 (22.7)	28 (15.5)
Total	12 (100.0)	38 (100.0)	66 (100.0)	181 (100.0)

DISCUSSION

The present study described the pattern of antidiabetic medication use among inpatients with type 2 diabetes mellitus and impaired renal function at Can Tho Central General Hospital in 2024. The most prominent finding was that insulin was used in almost all patients, accounting for 99.7%, while metformin was recorded in only 0.3%. This pattern reflects the clinical characteristics of the study population, in which most patients had chronic kidney disease and a large proportion were in advanced renal stages. Specifically, chronic kidney disease accounted for 95.8% of cases, and among these patients, stage 5 accounted for 60.9%. Therefore, the predominance of insulin use is clinically understandable because advanced renal impairment limits the use of several oral antidiabetic agents and requires more flexible glucose-lowering therapy.

Metformin is widely considered an important first-line medication for type 2 diabetes mellitus because of its glucose-lowering efficacy, low risk of hypoglycemia, and favourable metabolic effects. However, its use becomes restricted when renal function declines because metformin is eliminated mainly through the kidneys and may increase the risk of lactic acidosis in patients with significant renal impairment. In the present study, only one patient received metformin, accounting for 0.3%. This extremely low proportion is consistent with the high prevalence of advanced chronic kidney disease in the study sample. According to recommendations for diabetic kidney disease, metformin should not be initiated or should be avoided in patients with markedly reduced glomerular filtration rate, particularly in advanced stages of chronic kidney disease [11]. Therefore, the low use of metformin in this study appears consistent with the clinical condition of the patients.

The very high rate of insulin use in this study is also consistent with previous Vietnamese studies conducted among patients with type 2 diabetes mellitus and impaired renal function. Nguyen Thi Huynh Mai et al. reported that insulin monotherapy accounted for 95.02% among patients with type 2 diabetes mellitus and impaired renal function, while oral antidiabetic therapy was used in only a small proportion of patients. Similarly, Nguyen Thi Hong Diep et al. found that insulin monotherapy was the predominant treatment regimen among patients with type 2 diabetes mellitus and renal impairment treated at Can Tho Central General Hospital. These findings, together with the results of the present study, suggest that insulin remains the principal antidiabetic therapy for hospitalized patients with type 2 diabetes mellitus and renal impairment in this clinical setting.

Among insulin users, rapid- or short-acting insulin was the most commonly prescribed type, accounting for 54.4%, followed by long-acting insulin at 26.2% and premixed insulin at 19.4%. The predominance of rapid- or short-acting insulin may be explained by the inpatient treatment context. Hospitalized patients often experience fluctuating blood glucose levels due to acute illness, reduced oral intake, changes in diet, dialysis-related glucose variation, infection, or other comorbidities. Rapid- or short-acting insulin allows clinicians to adjust doses more flexibly according to current glucose values and clinical condition. This is particularly important in patients with impaired renal function because reduced renal clearance may alter insulin metabolism and increase the risk of hypoglycemia.

Long-acting insulin accounted for 26.2% of insulin use. This type of insulin is usually used to provide basal glucose control over a longer period. In patients with type 2 diabetes mellitus and renal impairment, long-acting insulin may help maintain stable background glycemic control. However, dose adjustment must be careful because insulin degradation decreases as renal function worsens, which may increase the risk of prolonged hypoglycemia. Premixed insulin accounted for 19.4%. Although premixed insulin provides both basal and prandial coverage, it may be less flexible than separate rapid-acting or basal insulin regimens. This may partly explain why premixed insulin was used less frequently than rapid- or short-acting insulin in this inpatient population.

Regarding active ingredients, human insulin 1000 IU/10 mL was the most frequently used preparation, accounting for 42.1%, followed by insulin glargine 100 IU/mL at 26.2%. This result indicates that both conventional human insulin and long-acting insulin analogues were used in clinical practice. Human insulin may be commonly used because of its availability, familiarity in hospital practice, and its suitability for dose adjustment in inpatient care. Insulin glargine, as a long-acting insulin analogue, was also used in a considerable proportion of patients, reflecting the need for basal glycemic control in selected cases.

When insulin use was analysed according to kidney disease status, rapid- or short-acting insulin remained the most common insulin type in both chronic kidney disease and acute kidney disease groups. Among patients with chronic kidney disease, rapid- or short-acting insulin accounted for 54.2%, while among patients with acute kidney disease, it accounted for 58.3%. However, the number of patients with acute kidney disease was small compared with the chronic kidney disease group. Therefore, the interpretation of insulin distribution in acute kidney disease should

be cautious. Nevertheless, the result suggests that rapid- or short-acting insulin was preferred in both renal disease categories, likely because of its flexibility in managing blood glucose during hospitalization.

The analysis by chronic kidney disease stage further showed that rapid- or short-acting insulin was the most frequently used insulin type in stages 3, 4, and 5. Its use was highest in stage 5, accounting for 56.9%. This finding is important because stage 5 chronic kidney disease represents the most advanced stage of renal impairment, in which oral antidiabetic options are often limited and insulin therapy becomes a major treatment choice. Previous studies have also reported that insulin use tends to increase as chronic kidney disease progresses, while oral antidiabetic medication use decreases. Nguyen Xuan Hung reported that the proportion of insulin monotherapy increased progressively across chronic kidney disease stages and reached 100% in stage 5. Similarly, Wu et al. found that insulin use increased from early to advanced chronic kidney disease stages, while oral medication use declined. These findings are consistent with the pattern observed in the present study.

The high proportion of patients with multiple comorbidities may also have influenced antidiabetic medication selection. Hypertension and cardiovascular disease were very common in this study, accounting for 87.4% and 80.6%, respectively. Patients with multiple comorbidities often require complex treatment regimens, and clinicians must consider drug interactions, renal safety, and hypoglycemia risk. In such cases, insulin may be preferred because it can be adjusted according to clinical response and does not depend on renal excretion in the same way as many oral antidiabetic drugs. However, insulin use in patients with renal impairment still requires close monitoring due to the risk of hypoglycemia.

Overall, the findings show that the antidiabetic treatment pattern in this inpatient population was highly insulin-centred. This pattern is appropriate for a group of patients with advanced renal impairment, high comorbidity burden, and inpatient treatment needs. However, the predominance of insulin also indicates the need for careful clinical monitoring, individualized dosing, and regular assessment of renal function and nutritional status. Future studies should further evaluate whether insulin regimens are appropriately adjusted according to renal function, blood glucose levels, dietary intake, dialysis status, and hypoglycemia risk [11].

CONCLUSION

In this study of 310 inpatients with type 2 diabetes mellitus and impaired renal function at Can Tho Central General Hospital in 2024, insulin was the dominant antidiabetic medication, used in 99.7% of patients. Metformin was used in only 0.3% of patients. Among insulin users, rapid- or short-acting insulin was the most commonly used type, accounting for 54.4%, followed by long-acting insulin at 26.2% and premixed insulin at 19.4%.

Human insulin 1000 IU/10 mL was the most frequently used active ingredient, accounting for 42.1%, followed by insulin glargine 100 IU/mL at 26.2%. Rapid- or short-acting insulin was the most common insulin type in both chronic and acute kidney disease groups. Among patients with chronic kidney disease, rapid- or short-acting insulin was most frequently used in stage 5, accounting for 56.9%.

These findings indicate that insulin, particularly rapid- or short-acting insulin, was the main glucose-lowering therapy among hospitalized patients with type 2 diabetes mellitus and impaired renal function. The low use of metformin and the predominance of insulin reflect the advanced renal impairment of the study population. Antidiabetic therapy in this group should be individualized according to renal function, clinical status, nutritional condition, and hypoglycemia risk.

Recommendations

Based on the study findings, insulin therapy should continue to be carefully individualized for patients with type 2 diabetes mellitus and impaired renal function, especially those with advanced chronic kidney disease. Clinicians should regularly assess renal function, blood glucose levels, nutritional intake, and comorbidities before selecting and adjusting antidiabetic medications. For patients receiving insulin, dose adjustment and close monitoring are necessary to reduce the risk of hypoglycemia.

Hospitals should strengthen clinical pharmacy activities in reviewing antidiabetic medication use among patients with renal impairment. Particular attention should be paid to the appropriateness of insulin type, insulin dose, and the safety of oral antidiabetic agents. Future studies should evaluate not only the proportion of medication use but also dose appropriateness, treatment effectiveness, hypoglycemic events, and medication-related problems in this high-risk population.

Author's Commitment Statement

The author confirms that this manuscript is based on truthful and accurate research data collected from medical records at Can Tho Central General Hospital in 2024. The manuscript has not been previously published and is not under consideration by any other journal.

REFERENCES

1. American Diabetes Association. Standards of Medical Care in Diabetes—2008. Diabetes Care. 31(Suppl 1), Pages S12-S54. Doi:10.2337/dc08-S012.

2. Tahrani AA, Barnett AH, Bailey CJ, 2016. Pharmacology and therapeutic implications of current drugs for type 2 diabetes mellitus. Nature Reviews Endocrinology. 12, Pages 566-592. Doi:10.1038/nrendo.2016.86.

3. Ngoc NB, Lin ZL, Ahmed W, 2020. Diabetes: What challenges lie ahead for Vietnam? Annals of Global Health. 86(1), Page 1. Doi: 10.5334/aogh.2526.

4. Janina M Herold, Simon Wiegrebe, Jana Nano, et al, 2024. Population-based reference values for kidney function and kidney function decline in 25- to 95-year-old Germans without

and with diabetes. Kidney International. 106(4), Pages 699-711. Doi: 10.1016/j.kint.2024.06.024.

5. Adler AI, Stevens RJ, Manley SE, et al, 2003. Holman RR; UKPDS Group. Development and progression of nephropathy in type 2 diabetes: The United Kingdom Prospective Diabetes Study (UKPDS 64). Kidney International. 63(1), Pages 225-232. Doi: 10.1046/j.1523-1755.2003.00712.x.

6. Aquilante CL, 2010. Sulfonylurea pharmacogenomics in type 2 diabetes: the influence of drug target and diabetes risk polymorphisms. Expert Review of Cardiovascular Therapy. 8(3), Pages 359-372. Doi: 10.1586/erc.09.154.

7. Krentz AJ, Bailey CJ, 2005. Oral antidiabetic agents: current role in type 2 diabetes mellitus. Drugs. 65 Pages 385-411. Doi: 10.2165/00003495-200565030-00005.

8. Mottl AK, Nicholas SB, 2024. KDOQI commentary on the KDIGO 2022 update to the clinical practice guideline for diabetes management in chronic kidney disease. American Journal of Kidney Diseases. 83(3), Pages 277-287. Doi: 10.1053/j.ajkd.2023.09.003.

9. Khwaja A, 2012. KDIGO clinical practice guidelines for acute kidney injury. Nephron Clinical Practice. 120(4), Pages c179-c184. Doi:10.1159/000339789.

10. Lamine F, Lalubin F, Pitteloud N, et al, 2016. Chronic kidney disease in type 2 diabetic patients followed-up by primary care physicians in Switzerland: prevalence and prescription of antidiabetic drugs. Swiss Medical Weekly. 146, Page w14282. Doi: 10.4414/smw.2016.14282.

11. Wu B, Bell K, Stanford A, et al, 2016. Understanding chronic kidney disease among patients with type 2 diabetes mellitus: prevalence, temporal trends, and treatment patterns—NHANES 2007–2012. BMJ Open Diabetes Research & Care. 4(1), Page e000154. Doi:10.1136/bmjdrc-2015-000154.