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Material

Challenges in ICD-11 Coding of Diabetic Nephropathy

Kazumi UMEMOTO[*1], **Katsumi HONNO**[*2] **and Makoto ANAN**[*2]

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Abstract

This study analyzed the ICD-11 coding issues for diabetic nephropathy and compared the structural differences with ICD-10. ICD-11 allows for detailed pathological descriptions through postcoordination. However, a lack of clinical information in the published case reports used for this study hindered accurate coding. Analysis of 38 published cases confirmed the frequent use of unknown stage codes and inconsistencies in classification criteria. To ensure accurate and consistent use of ICD-11, it is essential to standardize the clinical information required for staging diabetic nephropathy, establish hospital-level coding rules, and provide continuous education for health information managers. Furthermore, developing guidelines that bridge domestic classification standards with ICD-11 is urgently needed to facilitate smooth implementation.

1. Background and objectives

In recent years, lifestyle-related diseases have been rapidly increasing due to changes in lifestyle habits such as the Westernization of diet, lack of exercise, and chronic stress. In particular, the incidence of diabetes has been increasing year by year, and various complications related to diabetes have also increased accordingly. Among them, diabetic nephropathy is one of the "three major complications" along with diabetic retinopathy and neuropathy, and as it progresses, it can cause chronic renal failure and is a major cause of dialysis, making it a major medical and social issue.

According to the Ministry of Health, Labor and Welfare e-Health Net, diabetic nephropathy develops when hyperglycemia damages the glomeruli of the kidneys, and in the early stages, it appears as "microalbuminuria," in which blood proteins (albumin) leak into the urine[1]. If this condition persists, the number of glomeruli decreases, and the kidney's ability to excrete waste products into the urine gradually decreases. If it progresses, it will progress to renal failure, which will significantly impair the patient's quality of life (QOL), so early detection and continuous monitoring and intervention for preventing progression are essential[1].

On June 18, 2018, the Ministry of Health, Labor and Welfare published the 11th revision of the International Classification of Diseases (ICD-11)[2]. The ICD is a tool for recording and tabulating diseases and causes of death using an internationally unified classification, and is widely used in medical statistics,

[*1] Health Information Management Section, Medical Information Department, Minami Osaka Hospital, Keigakukai Social Medical Corporation,
1-18-18 Higashikagaya, Suminoe-ku, Osaka-shi, Osaka, 559-0012, Japan
E-Mail: yamamoto.ij@minamiosaka.com
[*2] Department of Medical Informatics, Graduate School of Health and Welfare Services Administration, Kawasaki University of Health and Welfare

insurance claims, epidemiological surveys, and medical policies. The ICD-11 is the first major revision in about 30 years, and was constructed to reflect medical advances and changes in disease structure.

The greatest feature of the ICD-11 is that it allows for more flexible and detailed coding than the previous ICD-10. In particular, a new structure called "postcoordination" has been introduced, and by combining stem codes with extension codes, more multifaceted and precise disease expression has become possible.

The ICD-11 is structured on the premise of electronicization and internationalization, and is also notable for its high compatibility with information technology, such as the introduction of the "ICD-11 Browser"[3], which can be operated on a web browser, multilingual support, and hierarchical link structure. This not only makes the coding work of the health information managers and the medical record personnel more efficient, but also improves the consistency of global medical data. On the other hand, the new coding system of ICD-11 requires familiarity, and appropriate education and the establishment of operational rules are future issues.

In the coding of diabetic nephropathy in the ICD-10, the basic rule was to first use a code according to the type of diabetes (E10 to E14) and then add ".2" to indicate renal complications. For example, type 2 diabetes accompanied by nephropathy is coded as "E11.2". However, this code alone cannot express the specific disease name or severity of the renal disorder (for example, the stage of chronic kidney disease (CKD)), so it was necessary to use another code indicating renal disease, such as "N18.3 (CKD stage 3)". In this way, the basic structure of ICD-10 was to "combine" the underlying disease code for diabetes and the organ complication code.

Another characteristic of ICD-10 is the rule of writing the "dagger (†)" and "asterisk (*)" together. This is a method in which the underlying disease such as diabetes is set as the main code with a dagger (†) and complications such as nephropathy are described as supplementary with an asterisk (*), linking organ damage to its causative disease. However, this method is time-consuming in coding practice and has limitations in that it cannot reflect the progression of the disease in detail (for example, urinary albumin level or eGFR value). As a result, it is difficult to fully express the severity and clinical nuances of diabetic nephropathy in ICD-10, and there are also issues with consistency in coding.

On the other hand, ICD-11 introduces the aforementioned mechanism of "postcoordination" which allows more complex and detailed disease states to be expressed by combining stem codes with extension codes. For example, a case of type 2 diabetic nephropathy stage 3 in an adult patient (aged 18 or older) with chronic kidney disease stage G3a, defined by an estimated glomerular filtration rate (eGFR) of 45-59 mL/min/1.73m^2, can be recorded in ICD-11 using the following combination: "5A11 (type 2 diabetes)", "GB61.2 (CKD stage G3a)", and "XS00 (diabetic nephropathy stage 3)", resulting in the post-coordinated code "5A11/GB61.2&XS00". The extension code "Clinical Staging Scale Value" is used here to represent the stage of diabetic nephropathy. However, unlike conventional clinical staging systems in which higher stage numbers typically indicate more advanced or severe disease, the staging of diabetic nephropathy does not necessarily reflect a linear progression of severity. Therefore, an explanatory note should be included to clarify the meaning of the staging and prevent potential misinterpretation. This approach allows a series of disease states to be consistently expressed. ICD-11 is characterized by its ability to record the type of diabetes, severity of CKD, and stage of diabetic nephropathy in an integrated manner within a single coding structure, offering a significant advantage in enabling information collection and analysis that better reflects clinical practice.

However, the flexibility of ICD-11 does not necessarily lead directly to improved coding accuracy. Correct application of postcoordination requires advanced reading comprehension and judgment to extract appropriate information (type of diabetes, eGFR value, albuminuria level, etc.) from medical records. In addition, there is a discrepancy between Japan's unique disease stage classification (based on albuminuria)[4] and the GFR classification of CKD[5] for diabetic nephropathy, and the establishment of coding rules for which classification should be prioritized in ICD-11 is also an issue, and it has not yet been fully established in actual operation, and the actual situation of coding for complex diseases such as diabetic nephropathy has

Table 1 Diabetic nephropathy staging 2023 (Note 1)

Disease period	Urinary albumin-creatinine ratio (UACR, mg/g) or Urinary protein/creatinine ratio (UPCR, g/g)	Estimated glomerular filtration rate (eGFR, mL/min/1.73 m2) (Note 3)
Normal albuminuric stage (stage 1) (Note 2)	UACR less than 30	30 or more
Trace albuminuria phase (stage 2) (Note 4)	UACR 30 to 299	30 or more
Manifest albuminuria stage (stage 3) (Note 5)	UACR 300 or higher or UPCR 0.5 or higher	30 or more
Highly reduced GFR and end-stage renal failure (stage 4) (Note 6)	No question (Note 7)	Less than 30
Renal replacement therapy stage (stage 5) (Note 8)	On dialysis therapy or after renal transplantation	

Note 1: Diabetic nephropathy does not necessarily progress from stage 1 to stage 5 sequentially. In addition to the nephropathy stage, the severity of chronic kidney disease (CKD) should also be indicated in the evaluation, referring to the attached table.
Note 2: The normal albuminuria stage does not preclude the presence of diabetic nephropathy, and even in this stage, the patient may present with histological changes characteristic of diabetic nephropathy.
Note 3: Patients with eGFR less than 60 mL/min/1.73 m2 are considered to have CKD. Since CKD other than diabetic nephropathy may exist, differential diagnosis from other CKD is necessary. When a decrease in eGFR based on serum creatinine is observed, eGFR based on serum cystatin C may provide a more accurate assessment of renal function.
Note 4: Patients with microalbuminuria should be diagnosed as having microalbuminuria after differential diagnosis according to the criteria for early diagnosis of diabetic nephropathy (Diabetes 48: 757-759, 2005). Trace albuminuria is not only an essential biomarker for early diagnosis of diabetic nephropathy, but also a risk for progression to overt albuminuria and macrovasculardisease.
Note 5: In patients with manifest albuminuria, caution should be exercised because renal events (eGFR halving, dialysis induction) increase with decreasing GFR from less than eGFR 60 mL/min/1.73 m2.
Note 6: "Stage of renal failure" in the old classification was changed to "Stage of severely reduced GFR and end-stage renal failure" to match the wording of the CKD severity classification (Japan Society of Nephrology, 2012).
Note 7: Patients with GFR less than 30 mL/min/1.73 m2 are classified as having "severely reduced GFR and end-stage renal failure" regardless of UACR or UPCR. However, a differential diagnosis of CKD other than diabetic nephropathy is necessary, especially in cases of normal albuminuria or microalbuminuria.
Note 8: To match the wording of the CKD severity classification (Japan Society of Nephrology, 2012), the "dialysis therapy phase" of the old classification was changed to the "renal replacement therapy phase," including patients after renal transplantation.
Source: Joint Committee on Diabetic Nephropathy[4)]

not been fully examined.

Against this background, this study aims to assign ICD-11 codes based on published case reports of diabetic nephropathy and specifically clarify the differences and issues between the old and new classification systems through comparison with ICD-10.

Furthermore, by examining the impact that these structural differences have on actual coding practices and clearly identifying specific issues such as inconsistencies in staging classification, missing information, and variation in coding, the study aims to provide knowledge that will contribute to the development of future operational rules and educational systems.

2. Subjects and methods

2.1 Subjects and case selection

This study aimed to clarify the issues of ICD-11 coding for diabetic nephropathy without accessing

Table 2 Severity classification of CKD

Primary disease		Proteinuria category		A1	A2	A3
Diabetes		Urinary albumin determination (mg/day) Urine albumin/Cr ratio (mg/gCr)		Normal	Microalbuminuria	Overt albuminuria
				Less than 30	30 to 299	More than 300
High blood pressure Nephritis Polycystic kidney disease Kidney transplant Unknown Other		urine Protein determination (g/day) Protein/Cr ratio (g/gCr)		Normal	Oligoproteinuria	Hyperproteinuria
				Less than 0.15	0.15 to 0.49	More than 0.50
GFR classification (mL/min/1.73m^2)	G1	Normal or elevated	≧90	none	low	medium
	G2	Normal or slightly decreased	60～89	none	low	medium
	G3a	Light-weight to moderately low	45～59	low	medium	high
	G3b	Moderate to highly depressed	30～44	medium	high	high
	G4	Altitude loss	15～29	high	high	high
	G5	End-stage renal disease (ESKD)	＜15	high	high	high

The severity of CKD is assessed by combining the primary disease, GFR category, and proteinuria category, with the risk of death, end-stage renal failure, and cardiovascular death increasing with increasing stages in the order of "low," "medium," and 'high' based on the "none" stage.
Source: The Japanese Society of Nephrology[5]

personal information such as medical records, and the main method was a literature survey. Specifically, a literature search was conducted using the academic information database CiNii Articles for academic papers and case reports published from 2008 to 2022. The search keywords were "diabetes," "nephropathy," and "case report," and the target literature was narrowed down using an AND search. As a result, papers containing 38 cases[6-41] containing descriptions of diabetic nephropathy were selected as the target. The exclusion criteria were cases with an unclear relationship to diabetic nephropathy and literature in which the disease stage or diagnosis could not be identified.

2.2 Coding procedure

For each case, coding was performed using the ICD-11 browser (English version, Japanese translation version)[3] in the following procedure. 1) Type of diabetes (type 1, type 2, unspecified, pancreatic), 2) Severity of CKD (stage classification based on eGFR),[3] Stage of diabetic nephropathy (classification by urinary albumin level).

When coding, we made a judgment based on the diagnosis and test values (e.g. eGFR, albuminuria level) described in the literature as much as possible, and used a code such as "stage unknown (.Z)" when the description was insufficient.

In comparison with ICD-10, we organized the correspondence between the expressions of the diabetes codes E10 to E14 and the CKD codes of the N18 series (e.g. N18.3) in combination, and evaluated the differences in the coding structure and the amount of information that can be expressed.

2.3 Analysis method

We classified the ICD-11 code configuration pattern for the 38 cases[6-41] extracted and organized the distribution of the number of cases. In addition, a comparative analysis was conducted on the differences in the hierarchical structure, flexibility, and granularity of disease stage expression of information that can be expressed between ICD-10 and ICD-11, and the advantages and operational issues of ICD-11 were extracted. Based on Japan's unique disease stage classification (Diabetic Nephropathy Staging Classification 2023)[4], the stage of diabetic nephropathy will be unified as "Stage ○" and the severity of CKD will be unified as "Stage ○". Note that the ICD-11 extended code for diabetic nephropathy code is also written as "Stage ○", so it is

Table 3 Relationship between diabetic nephropathy staging 2023 and CKD severity classification

Albuminuria category			A1	A2	A3
			Normoalbuminuria	Microalbuminuria	Overt albuminuria
Urinary albumin-creatinine ratio (mg/g)			Less than 30	30 to 299	More than 300
Urinary protein/creatinine ratio (g/g)					More than 0.50
GFR classification (mL/ min/1.73m^2)	G1	≥90	Normal albuminuric stage (stage 1)	Microalbuminuria stage (stage 2)	Manifest albuminuria stage (stage 3)
	G2	60 to 89			
	G3a	45 to 59			
	G3b	30 to 44			
	G4	15 to 29	GFR severely reduced, end-stage renal failure (stage 4)		
	G5	<15			
On dialysis therapy or Post renal transplant			Renal replacement therapy stage (stage 5)		

Source: Joint Committee on Diabetic Nephropathy[4] important to use them appropriately.

3. Results

In this study, ICD-11 coding was performed on 38 cases of diabetic nephropathy, and the frequency and composition pattern of each code were organized (appendix). The most common code was "5A11/GB61.Z (type 2 diabetes/CKD stage unknown)," accounting for approximately 18% (7 cases) of the total. This was followed by "5A11/GB61.Z&XS9N (type 2 diabetes/CKD stage unknown, diabetic nephropathy stage 5)" for 5 cases (approximately 13%). This was followed by "5A11/GB61.Z&XS5S (type 2 diabetes/CKD stage unknown, stage 2)," "5A11/GB61.Z&XS00 (type 2 diabetes/CKD stage unknown, stage 3)," and "5A14/GB61.Z&XS9N (Diabetes mellitus, type unspecified/CKD stage unknown, stage 5)," with three cases each (approximately 8%). In approximately 55% of cases, the CKD stem code used was "GB61.Z" (CKD stage unknown), and in 31 of the total cases (approximately 82%), an extended code (XS00, XS5S, XS6G, XS9N, etc.) was assigned through postcoordination.

Table 4 shows the correspondence between ICD-11 codes and the number of cases, and Figure 1 visualizes the frequency distribution of the main codes in a pie chart. Furthermore, we used a representative example of stage 3 type 2 diabetic nephropathy and the unknown CKD stage (5A11/GB61.Z&XS00) to explain with annotation what clinical information was used to assign the code. For example, for a case with "stage 3 diabetic nephropathy" without "diagnosis of type 2 diabetes" or "eGFR", we selected 5A11 as the stem code, combined GB61.Z for CKD and XS00 (stage 3) for diabetic nephropathy stage, and coded it.

In comparison with ICD-10 in Table 5, it was necessary to write E11.2† N08.3* (renal complications due to type 2 diabetes) N18.9 (unknown CKD stage), whereas ICD-11 is characterized by the fact that it can be expressed in an integrated manner through postcoordination (Table 5 shows a comparison table of corresponding codes). In addition, the albuminuria classification (A2, A3) on the ICD-11 browser could not be applied to all cases, so we refrained from using it[3].

Overall, while the flexible structure of ICD-11 allows for detailed disease state description, it is highly dependent on the presence or absence of medical information and the judgement of the coder, and the frequent use of unknown stage codes (.Z) can lead to inconsistent data quality. These results indicate that it is essential to establish standards for the use of extension codes and standardize recorded information when implementing ICD-11 coding.

4. Discussion

In this study, ICD-11 coding was performed on 38 published cases of diabetic nephropathy to clarify the current situation and issues. As a result, the most frequently used code was "5A11/GB61.Z (type 2 diabetes/CKD stage unknown/diabetic nephropathy stage unknown)," which accounted for18% (7 cases) of the total. In addition, 31 cases (82% of the total) explicitly described the stage classification of diabetic nephropathy by using extension codes (XS00-XS9N, etc.), suggesting that the flexibility of ICD-11 postcoordination was partially utilized. The ICD-11 extension codes (clinical staging scale values) only provide stages 1 to 10, and the code corresponding to "stage unknown" cannot be expressed[3].

On the other hand, it was revealed that in approximately 55% of cases, "GB61.Z (stage unknown)" was selected as the stem code for CKD, and coding was being carried out without specifying the stage (Table 4). This is because there were many cases in which renal function indicators such as eGFR and urinary albumin concentration were not clearly stated in the literature, suggesting that the content of the medical information has a significant impact on the implementation of detailed disease stage expressions, which is a feature of ICD-11. In other words, the practical issue that the accuracy and precision of ICD-11 coding is heavily dependent on the completeness of the underlying clinical records was highlighted. The reason why approximately 55% of cases were classified as "GB61.Z (CKD stage unknown)" is because detailed test values related to eGFR were not described in the literature, which is a typical example of how a lack of recorded information affects coding accuracy (Table 4). In diabetic nephropathy, accurately assessing and recording

Table 4 ICD-11 Coding results: diabetic nephropathy

Disease name	Chord	Classification name (tentative translation)	Number of cases
Type 1 diabetic nephropathy stage 1	5A10/GB61.0&XS7A	Type 1 diabetes/chronic kidney disease, stage 1/stage 1	1
Type 1 diabetic nephropathy stage 2	5A10/GB61.1&XS5S	Type 1 diabetes/chronic kidney disease, stage 2/stage 2	1
	5A10/GB61.2&XS5S	Type 1 diabetes/chronic kidney disease stage 3a/stage 2	1
Type 2 diabetic nephropathy	5A11/GB61.Z	Type 2 diabetes/chronic kidney disease, stage unknown	7
Type 2 diabetic nephropathy stage 2	5A11/GB61.0&XS5S	Type 2 diabetes/chronic kidney disease, stage 1/stage 2	2
	5A11/GB61.1&XS5S	Type 2 diabetes/chronic kidney disease stage 2/stage 2	1
	5A11/GB61.Z&XS5S	Type 2 diabetes/chronic kidney disease, unknown stage/stage 2	3
Type 2 diabetic nephropathy stage 3	5A11/GB61.1&XS00	Type 2 diabetes/chronic kidney disease stage 2/stage 3	1
	5A11/GB61.2&XS00	Type 2 diabetes/chronic kidney disease stage 3a/stage 3	2
	5A11/GB61.3&XS00	Type 2 diabetes/chronic kidney disease stage 3b/stage 3	1
	5A11/GB61.Z&XS00	Type 2 diabetes/chronic kidney disease, stage unknown/stage 3	3
Type 2 diabetic nephropathy stage 4	5A11/GB61.4&XS6G	Type 2 diabetes/chronic kidney disease stage 4/stage 4	1
	5A11/GB61.5& XS6G	Type 2 diabetes/chronic kidney disease stage 5/stage 4	1
	5A11/GB61.Z&XS6G	Type 2 diabetes/chronic kidney disease, stage unknown/stage 4	1
Type 2 diabetic nephropathy stage 5	5A11/GB61.5&XS9N	Type 2 diabetes/chronic kidney disease stage 5/stage 5	2
	5A11/GB61.Z&XS9N	Type 2 diabetes/chronic kidney disease, stage unknown/stage 5	5
Pancreatic diabetic nephropathy stage 3	5A13.2/GB61.Z&XS00	Pancreatic diabetes/chronic kidney disease, stage unknown/stage 3	1
Diabetic nephropathy stage 2	5A14/GB61.Z&XS5S	Diabetes mellitus, type unspecified/chronic kidney disease, stage unknown/stage 2	1
Diabetic nephropathy stage 5	5A14/GB61.Z&XS9N	Diabetes mellitus, type unspecified/chronic kidney disease, stage unknown/stage 5	3
Total			38

※1 case of type 2 diabetic nephropathy stage 3A and 2 cases of stage 3B were counted in stage 3 (stage 3).

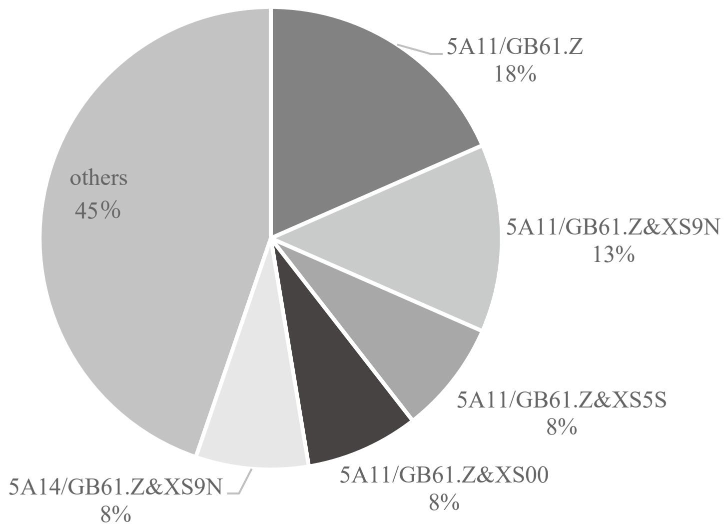

Figure 1 Frequency distribution of major ICD-11 codes for diabetic nephropathy. Percentages are shown. Case counts for each category are listed in Table 4.

Table 5 Comparison of ICD-10 and ICD-11

Pathological condition	ICD-10	ICD-11
Type 2 diabetic nephropathy stage 2 + CKD stage unknown	E11.2 † N08.3* N18.9	5A11/GB61.Z&XS5S
Type 2 diabetic nephropathy stage 3 + CKD stage unknown	E11.2 † N08.3* N18.9	5A11/GB61.Z&XS00
Type 2 diabetic nephropathy stage 5 + CKD stage unknown	E11.2 † N08.3* N18.9	5A11/GB61.Z&XS9N

the progression of the disease is extremely important for determining treatment plans and predicting prognosis. Nevertheless, in over half of the literature cases examined in this study, indicators of renal function such as eGFR values and urinary albumin levels were not explicitly stated, resulting in numerous instances where coding had to be performed without knowing the disease stage. This lack of information prevents the full use of the usefulness of postcoordination in ICD-11 and hinders detailed description of the pathology.

In addition, the albuminuria classification (A2 and A3) on the ICD-11 browser was not applicable to all cases, so we decided not to use it. This is because the current ICD-11 does not have a code equivalent to A1 (normal albuminuria), and we believe this is a problem with the structure of the ICD-11.

In addition, the Diabetic Nephropathy Staging Classification (2023 revision) is widely used to evaluate diabetic nephropathy in Japan, which has a stage structure based on a combination of factors such as albuminuria, serum creatinine, eGFR, the presence or absence of dialysis therapy, and post-kidney transplantation. On the other hand, the ICD-11 is centered on the GFR-based severity classification of chronic kidney disease (CKD), and there is a gap in the classification criteria between the two. Therefore, there are many cases where the evaluation indicators used in clinical practice are not directly linked to the ICD-11 classification structure, and in order to select the appropriate code, it is desirable for multiple evaluation axes to be written side by side on the medical record. If the stage classification is not sufficiently standardized, there is a risk of a decrease in accuracy at any stage of information recording, extraction, and coding. In this study, structural differences in the expression of pathology in diabetic nephropathy were also revealed through a comparison with ICD-10 (Table 5). In ICD-10, in addition to the code for diabetes (e.g., E11.2), the accompanying organ damage was written as a separate code (e.g., N18.3, etc.), and the cause and organ damage were linked using a system of dagger (†) and asterisk (*). On the other hand, ICD-11 makes it possible to comprehensively express the type of diabetes, severity of CKD, and stage of diabetic nephropathy using postcoordination, making it possible to describe the pathology more in line with the actual situation. For example, in the case of type 2 diabetes accompanied by unknown CKD stage, the ICD-11 allows the recording of complex pathology within a single code sequence with a structure such as "5A11/GB61.Z&XS00".

However, in previous studies, there are still few examples of diabetic nephropathy coding using ICD-11 postcoordination, and standardized operational rules have not been fully established. For example, overseas research[42] has reported that the name of CKD is not routinely recorded in the problem list. In Japan, the insufficient recording of disease names in medical records has not been reported in papers, but it is difficult for health information managers to refer to it. Such problems are one of the reasons why the expressive power of ICD-11 cannot be fully utilized, which may result in the frequent use of unknown stage codes (.Z) and in variations in coding interpretation.

In addition, it is necessary to be aware of the new concept of diabetic nephropathy (DKD). DKD is a concept that includes atypical kidney disease caused by diabetes-related conditions (hypertension, obesity, etc.) that are not accompanied by overt albuminuria and have a reduced GFR[43], and it is hoped that a classification for appropriate management will be established.

The flexible and sophisticated structure of ICD-11 has great potential to integrate and systematically express clinical information for diseases with multifaceted pathologies such as diabetic nephropathy. However, in order to maximize the benefits of this in practice, several prerequisites that affect the accuracy of coding must be established.

First, it is necessary to clearly record eGFR values, urinary albumin levels, and the severity of chronic kidney disease in medical records, that is, standardize the clinical information necessary for staging. This requires structural responses from the medical institution side, such as doctors' recording habits and the development of templates for electronic medical records.

Second, it is essential to strengthen the education system for coding personnel, including health information managers. In ICD-11, since the judgment of combining multiple codes is required by postcoordination, both understanding of the pathology and the ability to extract information are important, rather than simply memorizing the code table. Furthermore, if coding policies and operational rules within the hospital remain in place, there is a risk that different codes will be assigned to the same case by different personnel, which may affect the consistency of the data.

Third, it is urgent to develop a "domestic guideline" that clearly shows the correspondence between Japan's unique disease stage classification (such as the Diabetic Nephropathy Stage Classification 2023) and ICD-11 diabetic nephropathy-related codes (extension codes for diabetes type, CKD severity, and diabetic nephropathy stage). This makes it possible to ensure international statistical accuracy and compatibility without compromising the standards used in clinical practice. In order for ICD-11 to become established as a practical tool, it is essential to respond with both institutional support and on-site practice, and a medium- to long-term perspective is required for its future widespread use.

4.1 There are several limitations to this study.

First, this study is based on a literature survey using published case reports and papers, and coding was not performed by directly accessing actual medical records. Therefore, many cases with unknown disease stage classifications and clinical test values (eGFR, urinary albumin levels, etc.) were included, and it is possible that ICD-11 was not fully utilized. This is reflected in the frequent use of the CKD stage unknown code (GB61.Z), which is thought to have affected the accuracy of the study.

Second, the selection of cases was limited to CiNii Articles, and does not cover cases included in English literature or other databases. This may result in a lack of diversity in coding cases and an international perspective. In addition, coding work was performed by one person or a small number of people, and there were limitations in verifying the consistency and reproducibility of coding assignments. The results of this study show some of the actual conditions and issues in the field of ICD-11 coding. In the future, it is necessary to obtain more empirical and versatile knowledge by conducting multi-center joint studies using actual clinical data and examining the inter-rater agreement between health information managers.

Furthermore, it is difficult to say that the practical issues of ICD-11 coding were fully considered in this study. At present, the introduction of ICD-11 has only just begun, and the accumulation of operational experience among health information managers and in the medical field is limited. In particular, in the application of postcoordination, standard rules and judgment criteria have not been established, and it is largely dependent on the knowledge and experience of the coder. In this study, too, the accuracy of the Japanese translation of the ICD-11 browser and the operability of the interface may have had a significant impact on the selection of codes and the identification of disease stages.

In addition, in this study, it was necessary to read the disease stage and diagnosis contents from original papers when selecting a code, but this process included a certain amount of subjective interpretation, and it cannot be denied that there are limitations to the consistency and objectivity of the judgment. In order to ensure the reliability of research and statistics using ICD-11 in the future, it will be necessary to clearly define terminology and standards for applying the codes, and to develop practical guidelines for use domestically.

5. Conclusion

This study clarified current practical issues by carrying out ICD-11 coding for 38 cases of diabetic nephropathy and comparing and analyzing the structural differences with ICD-10, the recording status of disease stage classification, and the utilization status of extension codes. As a result, it was found that the CKD stage unknown code (GB61.Z) was frequently used and the utilization rate of extension codes was limited, indicating that the expressive power of ICD-11 is not being fully utilized due to insufficient contents of medical information and standardization.

ICD-11 enables multidimensional coding through postcoordination for diseases with complex pathology such as diabetic nephropathy, but its operation requires the quality of medical information, the judgment of the coder, and a systemic support system. This study suggests the importance of clear recording of renal function indicators in medical records and a common understanding of disease stage classification, and raises the need for on-site support during the introduction of ICD-11.

In order to smoothly utilize ICD-11 in the future, it is essential to standardize the clinical information required for staging diabetic nephropathy, establish coding rules within hospitals, provide ongoing education to health information managers, and create guidelines that bridge the gap between domestic classification standards and ICD-11. It is also expected that the findings of this study will help with practical and institutional developments toward the realization of more accurate medical statistics and international data sharing.

Note

All of the data used in this study were obtained from publicly available research papers, and we have confirmed that there are no concerns regarding compliance with the Personal Information Protection Act or research ethics guidelines.

Conflicts of interest

There are no conflicts of interest to disclose in this study.

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