The impact of ICD coding standard changes for diabetes hospital morbidity data

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October 2003

Suggested citation

Australian Institute of Health and Welfare

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Acknowledgments

Glossary

Hospital separation The episode of care, which can be a total hospital stay (from admission to discharge, transfer or death), or a portion of a hospital stay beginning or ending in a change of type of care (for example from acute to rehabilitation). 'Separation' also means the process by which an admitted patient completes an episode of care by being discharged, dying, transferring to another hospital or changing type of care.

Ketoacidosis An accumulation of ketone bodies and acids in the body.

Neurological Pertaining to the nerves.

Ophthalmic Pertaining to the eye or near the eye.

Renal Pertaining to the kidneys.

Vascular Pertaining to blood vessels.

Introduction

The diagnostic information in the National Hospital Morbidity Database is coded according to the various versions and editions of the International Statistical Classification of Diseases and Related Health Problems (ICD) associated with morbidity. This classification system involves assigning codes to diagnostic notes in medical records made by hospital clinicians. The Australian Coding Standards are rules governing the assignment of ICD codes to each record. The rules can change when, for example, new research on the disease process becomes available.

This paper briefly outlines a change in classification and two changes in Australian Coding Standards that have affected hospital separation data for diabetes mellitus. Although not specific to diabetes the first change, implemented in July 1999, affects diabetes with or without complication, and exclusively as an additional diagnosis. Previously, diabetes was coded whenever it was identified with the hospital patient. The new standard directs that diabetes be coded only when it is specifically treated or involved in the reason for hospitalisation.

The second change, implemented in July 2000, applies exclusively to diabetes with a complication but as an additional or principal diagnosis. This change affects the interpretation of the ICD codes for diabetes complications. Before the change, a diabetes complication code implied that diabetes 'caused' the complication to develop. The new meaning is that diabetes exists 'with' the complication.

A complication can be defined as 'a secondary problem that arises from or occurs with a disease or its treatment, worsening the patent's condition and making treatment more complicated' (AIHW 2002: 436). Ophthalmic, neurological, vascular, and renal complications commonly occur in people with diabetes. The ICD system groups diabetes complications into broad categories such as these as well as ketoacidosis, other specified, and unspecified complications.

A single, diabetes ICD code carries information on the presence of diabetes, and the presence of a complication from one of the above categories. For example, using the second edition of the ICD-10-AM (Australian Modification) the highest level code signifying Type 1 diabetes is 'E10'. Other digits follow giving more specific information. The code of 'E10.2' is a broad code for Type 1 diabetes with a renal complication. Adding a fifth digit (E10.23) describes Type 1 diabetes with a complication of end-stage renal disease. End-stage renal disease is just one renal complication in this category. Table A1 in the Appendix lists the ICD codes for diabetes.

It is important to note that the scope of this paper is limited to the classification, and the two coding changes. Other changes to Australian Coding Standards and to ICD classifications have affected hospital data for diabetes but these are not described here. For example the transition from ICD-9-CM to ICD-10-AM (see. The National Centre for Classification in Health Internet site http://www2.fhs.usyd.edu.au/ncch and the *Australian Hospital Statistics* series of publications (AIHW 2003) contain more information on clinical coding and hospital data.

Change to the additional diagnosis: July 1999

The Australian Coding Standards (ACS) rule change applies to the additional diagnosis of all conditions and affects diabetes with and without complications. In hospital data, an additional diagnosis refers to 'a condition or complaints either coexisting with the principal diagnosis or arising during the episode of care' (National Health Data Committee 2003: 26). The ACS published with the ICD-10-AM First Edition, included the following direction regarding additional diagnoses:

> Certain conditions such as hypertension, Parkinson's disease and diabetes mellitus are examples of systemic diseases that ordinarily should be coded even in the absence of documented active intervention. (ICD-10-AM, First Edition, Australian Coding Standards 1998, volume 5, page 8)
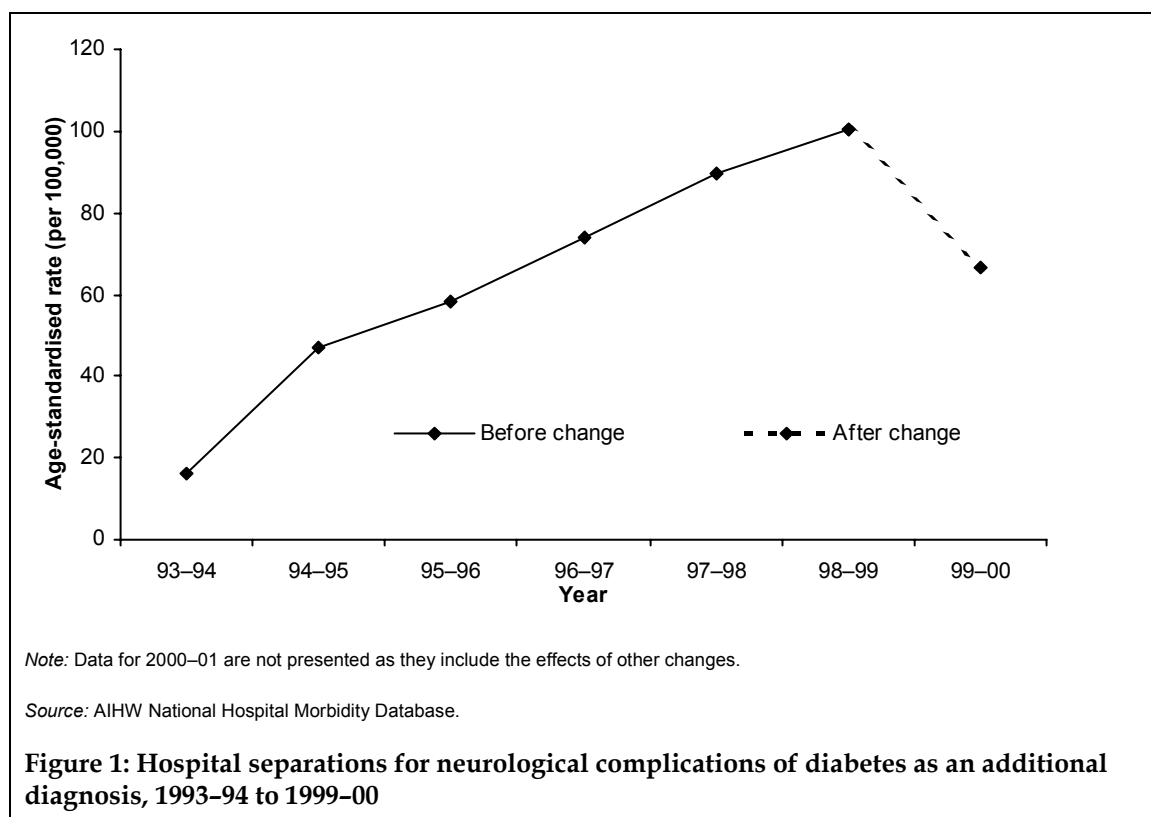
This resulted in diabetes, with or without complication, generally being coded whenever it became known. It was not possible to identify cases where the diabetes was unrelated to the reason for hospitalisation or was not treated.

In July 1999 erratum 6 to the Additional Diagnoses (ACS 0002) issued for the ICD-10-AM First Edition, no longer included the above statement. The wording that remained stated that 'for coding purposes, additional diagnoses should be interpreted as conditions that affect patient management in terms of requiring any of the following:

- therapeutic treatment
- diagnostic procedures
- increased nursing care and/or monitoring.'

The revised standard means that diabetes is only coded when it is specifically treated, or contributes to the reason for hospitalisation. Although it would be inappropriate to attribute any subsequent change in hospital data directly to the rule change, some unusual effects are discussed here.

Using neurological complications as an example, Figure 1 shows that the rate fell sharply in 1999–00 compared with 1998–99, interrupting the rising trend. Similar interruptions occur for ophthalmic and renal complications but not for diabetes without complication. As the numbers of separations for the latter are much larger than for any specific complication, the combined trend for diabetes as an additional diagnosis (Figure 3) masks the falls observed in specific complications like neurological, renal and ophthalmic. The message here is that the reduction may not necessarily indicate a drop in the total number of people with diabetes and/or a complication during 1999–00 compared with previous years. It could reflect the more selective coding procedure or another effect. What is more clear is that under the new coding rules it is no longer possible to track all people with diabetes who are hospitalised.

Note: Data for 2000–01 are not presented as they include the effects of other changes.

Source: AIHW National Hospital Morbidity Database.

Figure 1: Hospital separations for neurological complications of diabetes as an additional diagnosis, 1993–94 to 1999–00

Change to the interpretation of a diabetes complication: July 2000

This change applies only to ICD codes for diabetes with a complication, as both an additional or principal diagnosis. The principal diagnosis is defined as one that is established 'after study, to be chiefly responsible for the episode of care in hospital' (National Health Data Committee 2003: 483). Before July 2000, any diabetes complication code appearing in hospital data indicated that diabetes *caused* the complication. The clinician making the diagnosis had specifically noted a *causal relationship*. This changed with the introduction of the ICD-10-AM Second Edition, released in July 2000. A new coding standard (ACS 0401) changed the meaning of ICD diabetes complication codes in hospital data from one of causality to the complication *appearing with* the diabetes.

Subsequent effects in the data have been significant and while not all can be directly attributed to the standard change, much of it can. Following the change, there was a great increase in the number of separations with a diabetes complication as a principal diagnosis. Where the increase is attributable to the standard change, it comes from including cases not previously considered causal. Figure 2 shows that the apparent trend for hospital separations with a principal diagnosis of a diabetes complication has almost doubled.

Some complications associated with diabetes are also associated with other disorders or develop for other reasons. For example, renal failure can develop as a result of the high blood glucose levels that characterise diabetes or from other causes or diseases. Therefore, coding standards for ICD codes are flexible enough to accommodate variations in aetiology, risk factors, or other circumstances. In the ICD-10-AM First Edition, it was possible for two cases with identical conditions (at least as far as the data analyst is concerned) to be coded

differently. For example, a case of renal failure and diabetes in hospital data can appear as a diabetes complication (E10.2), or as a case of renal failure in a person with diabetes and no complication (N18 and E10.9 respectively). It is possible that some of the increase in diabetes complications as a principal diagnosis, shown in Figure 2, is drawn from the latter group.

Another possibility exists. In the first edition of ICD-10-AM, the order of coding provided information on causality with the principal (first) diagnosis suggesting the cause for the related additional diagnoses (second, third, etc). The ICD-10-AM First Edition details the workings of this 'dagger/asterisk' system. Since the removal of the need for a causal relationship, and the dropping of the dagger/asterisk convention, more diabetes codes are being assigned as the principal diagnosis instead of as additional diagnoses.

The increase shown in Figure 2 also includes the effects of introducing new ICD codes. The Second Edition of the ICD-10-AM (July 2000) increased the number of diabetes complications codes by introducing new categories such as periodontal complications (i.e. pertaining to tissue around a tooth). However, the new categories have not significantly affected numbers of principal or additional diagnoses in the hospital data because, as yet, relatively few numbers of cases appear under the new categories.

Source: AIHW National Hospital Morbidity Database

Figure 2: Hospital separations with a diabetes complication as a principal diagnosis, 1993–94 to 2000–01
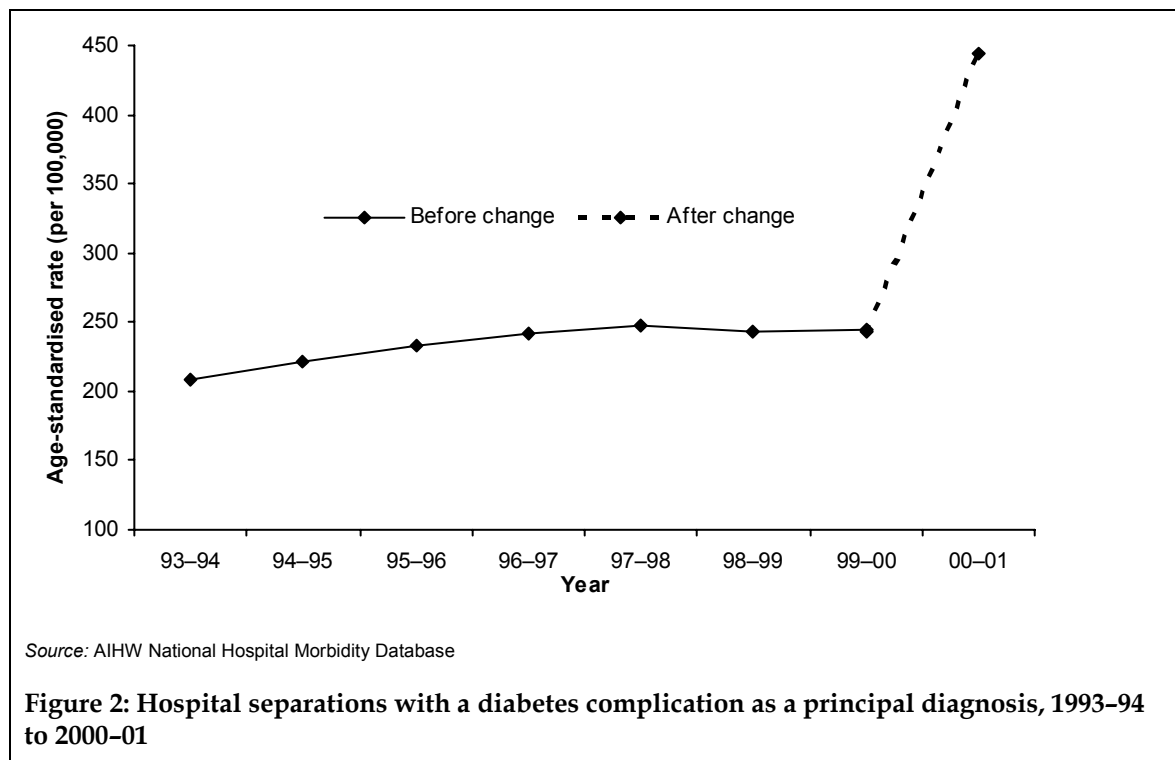
Combined effects

The coding changes have affected trend-lines for diabetes and its complications. Figure 3 shows apparent hospital separation trends from 1993–94 to 2000–01 involving diabetes or its complications. There is a steady rising trend for hospitalisations with an additional diagnosis of diabetes. The trend reverses slightly in 1999–00 before increasing again. The trend for diabetes as a principal diagnosis shows the rate almost doubled in 2000–01 compared to 1999–00. These variations do not necessarily reflect changes in hospitalisations or changes in

diabetes or its complications in the community. They are mostly consequences of the coding changes in 1999 and 2000 respectively.

The data examples presented in this paper refer to, and combine, all types of diabetes. The coding changes have not resulted in differential effects across types of diabetes. However, there have been some differential effects across complications.

Source: AIHW National Hospital Morbidity Database.

Figure 3: Apparent hospital separation trends for diabetes or its complications, 1993–94 to 2000–01
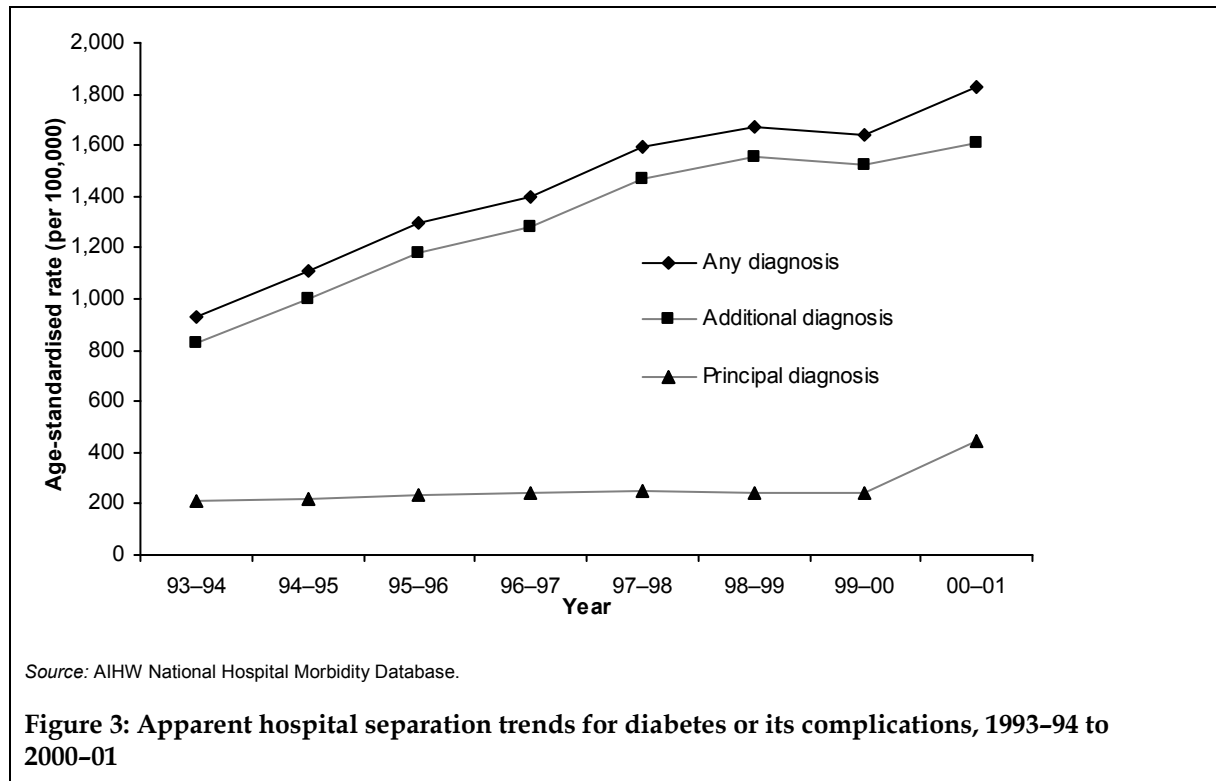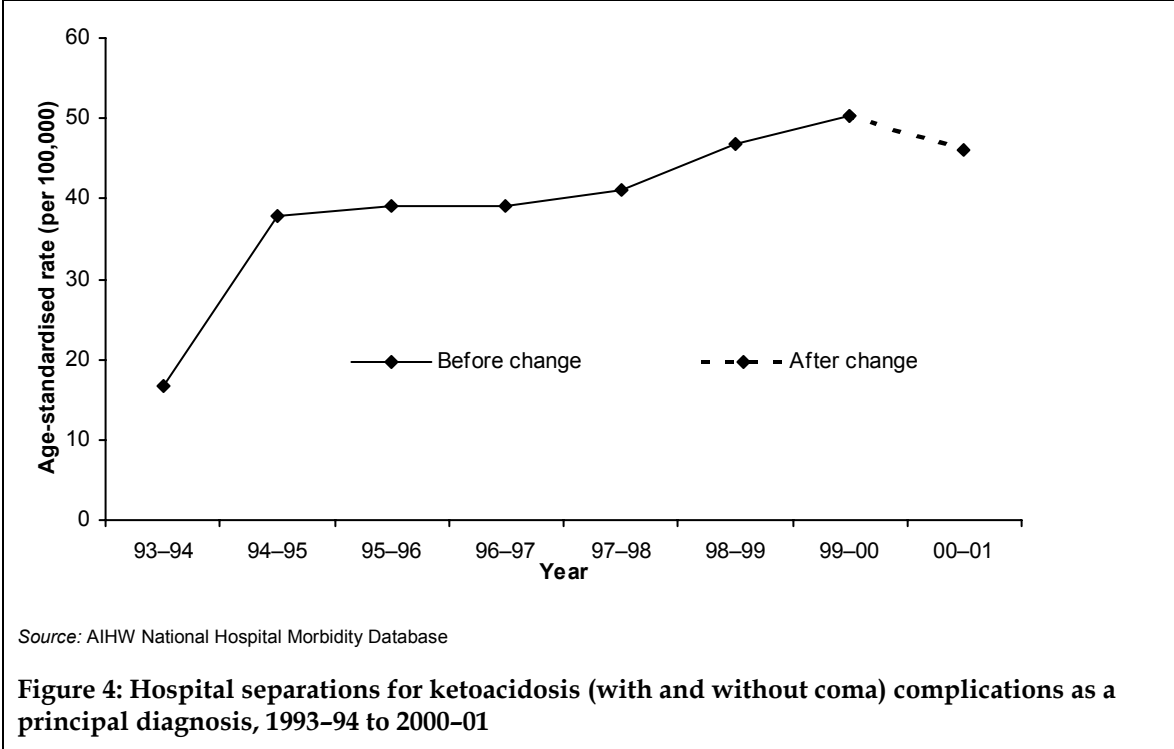
Differential effects across complications

The two changes discussed in this report (1999 and 2000) have generally produced consistent results across complications but there has been some variation. For example, rates for ketoacidosis complications have remained relatively stable (Figure 4) despite large changes in other complications. Ketoacidosis has been less affected possibly because of its strong relationship with Type 1 diabetes and its distinct causes that allow for a more definitive diagnosis compared to other complications. The 1999 change, for coding diabetes as an additional diagnosis, had little effect because ketoacidosis appears in the data four to five times more often as a principal diagnosis than as an additional diagnosis. The 2000 change that no longer included causality between diabetes and the complication had no discernible effect on ketoacidosis as the principal diagnosis because a causal link was always relatively easy for clinicians to identify. This led to most ketoacidosis cases being coded as a diabetes complication before July 2000, rather than in other ways, and therefore there were few not accounted for.

Although the changes have not significantly impacted on ketoacidosis rates, the interpretation has still changed and a comparison of data across 1999–00 still requires care. For example, a principal diagnosis of a ketoacidosis diabetes complication carries a causal

relationship between diabetes and complication before July 2000 and an adjacent relationship after July 2000.

Source: AIHW National Hospital Morbidity Database

Figure 4: Hospital separations for ketoacidosis (with and without coma) complications as a principal diagnosis, 1993–94 to 2000–01

Conclusions

Trend information on diabetes complications using hospital data cannot extend across 1999–00 and 2000–01 without consideration of the two coding changes and the classification change discussed in this paper. From July 1999, an additional diagnosis of diabetes or its complications appearing in hospital data indicates that the diabetes impacted on the episode of care or treatment rather than simply being present. From July 2000, any diagnosis of a diabetes complication in hospital data indicates that the diabetes co-exists with the complication without inference of causality.

The changes specified in this paper have had different effects on different diabetes complications but have not produced inconsistent effects across types of diabetes.

Appendix

Table A1: Diabetes mellitus codes, ICD-9-Clinical Modification and ICD-10-Australian Modification

ICD-9-Clinical Modification (US and Australian Versions) 1993–94 to 1997–98

Diabetes type		Diabetes complication	ICD code
Determined by the fifth digit		Diabetes without mention of complication	250.0_
Type 1 Diabetes	1 or 3	Diabetes with ketoacidosis	250.1_
Type 2 Diabetes	0 or 2	Diabetes with hyperosmolarity	250.2_
		Diabetes with other coma	250.3_
		Diabetes with renal complication	250.4_
		Diabetes with ophthalmic complication	250.5_
		Diabetes with neurological complication	250.6_
		Diabetes with peripheral circulatory disorders	250.7_
		Diabetes with other specified complications	250.8_
		Diabetes with unspecified complication	250.9_

ICD-10-Australian Modification First Edition 1998–99 to 1999–00

Diabetes type		Diabetes complication	ICD code
Determined by the prefix		Diabetes with coma	E1_.0_
Type 1 Diabetes	E10	Diabetes with ketoacidosis	E1_.1_
Type 2 Diabetes	E11	Diabetes with renal complications	E1_.2_
Other specified diabetes	E13	Diabetes with ophthalmic complications	E1_.3_
Unspecified diabetes	E14	Diabetes with neurological complications	E1_.4_
		Diabetes with peripheral circulatory complications	E1_.5_
Stated as controlled or uncontrolled determined by the fifth digit (0 or 1 respectively)		Diabetes with other specified complications	E1_.6_
		Diabetes with multiple complications	E1_.7_
		Diabetes with unspecified complications	E1_.8_
		Diabetes without complications	E1_.9_

ICD-10-Australian Modification Second Edition 2000–01

Diabetes type		Diabetes complication	ICD code
Determined by the prefix		Diabetes with ketoacidosis without coma	E1_.11
Type 1 Diabetes	E10	Diabetes with ketoacidosis with coma	E1_.12
Type 2 Diabetes	E11	Diabetes with lactic acidosis without coma	E1_.13
Other specified diabetes	E13	Diabetes with lactic acidosis with coma	E1_.14
Unspecified diabetes	E14	Diabetes with ketoacidosis, with lactic acidosis without coma	E1_.15
		Diabetes with ketoacidosis, with lactic acidosis with coma	E1_.16

(continued)

Table A1: (continued)Diabetes mellitus codes, ICD-9-Clinical Modification and ICD-10-Australian Modification

Diabetes with renal complication	E1_.2	
With renal complication, unspecified		E1_.20
With incipient diabetic nephropathy		E1_.21
With established diabetic nephropathy		E1_.22
With end-stage renal disease		E1_.23
With other specified renal complication		E1_.29
Diabetes with ophthalmic complication	E1_.3	
With ophthalmic complication, unspecified		E1_.30
With background retinopathy		E1_.31
With preproliferative retinopathy		E1_.32
With proliferative retinopathy		E1_.33
With other retinopathy		E1_.34
With advanced ophthalmic disease		E1_.35
With diabetic cataract		E1_.36
With other specified complication		E1_.39
Diabetes with neurological complication	E1_.4	
With neuropathy, unspecified		E1_.40
With diabetic mononeuropathy		E1_.41
With diabetic polyneuropathy		E1_.42
With diabetic autonomic neuropathy		E1_.43
With other specified neurological complication		E1_.49
Diabetes with circulatory complication	E1_.5	
With circulatory complication, unspecified		E1_.50
With peripheral angiopathy, without gangrene		E1_.51
With peripheral angiopathy, with gangrene		E1_.52
With other specified circulatory complication		E1_.59
Diabetes with other specified complication	E1_.6	
With diabetic musculoskeletal & connective tissue complication	E1_.61	
With skin and subcutaneous tissue complication		E1_.62
With periodontal complication		E1_.63
With hypoglycaemia		E1_.64
With other specified complication		E1_.69
Diabetes with multiple complications	E1_.7	
With multiple microvascular complications		E1_.71
With foot ulcer due to multiple sources		E1_.73
Diabetes with unspecified complications		E1_.8
Diabetes without complication		E1_.9

Notes:

1.   _ Signifies multiple possibilities exist.

2.   In all analyses mapped ICD-10-AM data are used in 1998–99 for South Australia, Queensland, Western Australia and Tasmania.

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