Australian Mental Health Outcomes and Classification Network

'Sharing Information to Improve Outcomes'

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Validation & Reporting ICD-10-AM diagnoses in the CMHC & the NOCC

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Validation & Reporting ICD-10-AM diagnoses in the CMHC & the NOCC

The purpose of this report is to inform discussions regarding the validation and reporting of diagnoses within the Community Mental Health Care (CMHC) National Minimum Data Set and the National Outcomes and Casemix Collection (NOCC). It first describes the mapping tables required for analysis and reporting of ICD-10-AM diagnosis codes. These mapping tables are then applied to the CMHC and NOCC materials over the 9-year reporting period 2007-08 through 2015-16.

The first set of analyses focusses on the integrity of diagnoses with a view to considering validation processes. These analyses consider all diagnoses (principal and additional) reported in all three NOCC service settings (i.e., inpatient, residential and ambulatory) as well as principal diagnoses reported for each service contact in the CMHC.

The second set of analyses focusses on alternative classifications for the reporting of diagnoses with a view to considering whether a uniform approach should be adopted for the CMHC and the NOCC. These analyses only focussed on principal diagnoses reported in ambulatory settings (i.e., NOCC inpatient and residential service settings are not further considered nor additional diagnoses reported in NOCC ambulatory settings).

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1. Development of mapping tables for the ICD-10-AM Electronic Code List (ECL)

The Independent Hospital Pricing Authority (IHPA) undertakes reviews and updates of existing classifications and is also responsible for introducing new classifications for those service categories without an existing classification. This includes the International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, Australian Modification (ICD-10-AM). In October 2016, IHPA released an Electronic Code List (ECL) for the ICD-10-AM this is an ASCII, comma delimited code list of First–Tenth Edition ICD-10-AM codes and their complete and abbreviated descriptors, age and sex edits.

As stated in the ECL User Guide-Tenth Edition-Diseases 2016:

> *The Electronic Code List (ECL) provides a historical list of ICD-10-AM codes and their full and abbreviated descriptors, including age and sex edits. This list includes First to Tenth Edition codes. Those codes not current in Tenth Edition are indicated by an 'inactive' date of 1/07/2000, 1/7/2002, 01/07/2004, 1/7/2006, 1/7/2008, 1/7/2010, 1/7/2013, 1/7/2015 or 1/7/2017 except in ICD-10-AM files where an inactive date may be superseded by a 'reactivated' date. Codes with a 'reactivated' date of 1/7/2002, 1/7/2004, 1/7/2006, 1/7/2008, 1/7/2010, 1/7/2013, 1/7/2015 or 1/7/2017 are current.*

The ECL "Disease codes" (disease.txt) is used here as the authoritative reference for ICD-10-AM codes. While there are 41,558 ICD-10-AM disease codes, the majority of these are likely less relevant for public sector specialised mental health services. There are 628 disease codes within ICD-10-AM Chapter V: Mental and Behavioural Disorders (suffix "F", also referred to also as "F" codes).

There are also 38 non-F ICD-10-AM codes which were identified in 2000-01 in the AIHW National Hospital Morbidity Database (NHMD) as "mental health related diagnoses" that are either clinically or statistically relevant to mental health. Post 2000-01, revisions to ICD-10-AM suggest 7 additional non-F ICD-10-AM codes meet the criterion of "mental health related diagnoses" and have been added to this list. It is important to note that of these "supplementary" ICD-10-AM codes, 3 from the original list and 4 from the later list are considered "unacceptable principal diagnosis".

The following additional fields were added to the ECL for each ICD-10-AM disease code:

(i) 3-character block codes and text descriptors for ICD-10-AM Chapter V: Mental and Behavioural Disorders – this is the proposed level of reporting for the CMHC;
(ii) The MH-CASC Diagnostic Groups – this is the current level of reporting for the NOCC;
(iii) Sex and age edits used in the CMHC Validator – these CMHC edit rules do not completely align with those in the ECL.

The workbook **ICD-10-AM MH Diagnosis maps.xls,** at Annex B, comprises 6 tabs:

(i) **ICD-10-AM Chapter V & NHMD** – this tab includes all 628 Chapter V "F-codes", the 38 NHMD "mental health related diagnosis" codes and the 7 additional candidate codes;
(ii) **ECL Notes** – this tab lists all of the 20 fields available on the ECL "disease.txt" ASCII file and where fields have been renamed in other tabs;
(iii) **Mapping Notes** – this tab defines other variables added to the primary **ICD-10-AM Chapter V & NHMD** tab;
(iv) **Classifications** – this tab shows the mapping of selected ICD-10-AM disease codes to various classifications used, or proposed, for reporting diagnosis in the CMHC and the NOCC;
(v) **Classification Notes** – this tab is a "data dictionary" for the **Classifications** tab;
(vi) **NHMD MH related codes** – this tab simply identifies the 38 codes considered as "mental health related diagnoses" as well as the 7 additional candidate codes.

2. Technical Specifications for diagnosis data in the CMHC and the NOCC

The ECL mapping tables were applied to the CMHC and the NOCC for the 9-year period 2007-08 through 2015-16.

It is important to note that the format and structure of diagnosis codes in the CMHC and the NOCC differ between the two collections and, for reporting purposes, differ from the ECL.

For the CMHC, the technical specification is for ICD-10-AM diagnosis codes to the supplied as a character string (maximum 6-wide) in the format ANN{.N[N)]} per METeOR # 514273: http://meteor.aihw.gov.au/content/index.phtml/itemId/514273. That is, the minimum requirement is for an alphanumeric character for the first character, numeric values for the 2nd and 3rd characters. The string within the curly braces (brackets) is optional in its entirety; the string within the square brackets is optional in any ordered combination.

The current (https://webval.validator.com.au/spec/CMHC/05.00/CON/DxPrinc) CMHC Technical Specifications state for Principal Diagnosis:

> *The diagnosis established after study to be chiefly responsible for occasioning the client's attendance at the health facility. The principal diagnosis must be a valid code from the International Statistical Classification of Diseases and Related Health Problems, 10th Revision, Australian Modification (ICD-10-AM) (9th Edition) or from the ICD-10-AM Mental Health Manual: An integrated classification and diagnostic tool for community based mental health services (1st Edition).*

Domain values for the CMHC are specified as: "Represented as ANN.NN".

For the NOCC, the technical specification is for ICD-10-AM diagnosis codes to be supplied as a character string (maximum 8-wide) in the format ANNNNNN. There is no METeOR reference.

The current (https://webval.validator.com.au/spec/NOCC/01.90/DIAG/Dx1) NOCC Technical Specifications state:

> *The Principal diagnosis is the diagnosis established after study to be chiefly responsible for occasioning the patient or client's care during the Period of Care preceding the Collection Occasion.*

Domain values for the NOCC are specified as: ICD-10-AM (current version).

Technical specifications for diagnosis have not changed over time (earliest published CMHC is V3.0; earliest NOCC is 1.50).

3. Fundamental issue: What is a "malformed" ICD-10-AM diagnosis code?

The CMHC Validator checks that diagnosis values are not "malformed" (i.e., must be in the format ANN{.N[N)]} and maximum 6-wide. It also checks the value is within the domain of valid ICD-10-AM codes per a "list" of "valid" ICD-10-AM disease codes.

The NOCC Validator also checks that diagnosis values are not malformed (i.e., must be in the format ANNNNNN and maximum 8-wide). While there is no further validation within the NOCC, ICD-10-AM codes are subsequently classified for analysis and reporting purposes.

In the process of preparing the CMHC and NOCC data sets for the purposes of analysis and reporting in this paper, a critical issue was identified regarding the format of the ICD-10-AM code. Specifically, we observed that, within the CMHC and NOCC, there were some anomalies with respect to reporting the "dot" where the ICD-10-AM diagnosis code reported was greater than 3 characters. These anomalies tend to be jurisdictional and reporting period specific and, while relatively infrequent, raise issues regarding the "validity" of ICD-10-AM codes.

We sought advice from IHPA on two specific matters: (i) 4-character wide codes whether the 4th character was a "dot"; and (ii) codes greater than 3-characters without a "dot". An example of the former is the reported code "F99." – which is likely valid if "F99"; an example of the latter is "F000" – which is likely valid if "F00.0"). IHPA advised:

> *Firstly, an ICD-10-AM code never ends on a dot. 'F99.' is not a valid code, 'F99' is the valid code.*
>
> *Secondly, if the 4th character in the string is numeric, this would indicate to me that the data submitter had omitted to enter the dot. An ICD-10-AM code greater than 3 characters has to have a dot after the third character.*

For analysis and reporting purposes, the CMHC and the NOCC vary from these formal requirements of the ICD-10-AM. Specifically, in processing CMHC materials, the dot is "stripped" from the ICD-10-AM code (e.g., the ICD-10-AM code "F00.0" is replaced with "F000"); and (ii) in processing NOCC materials, codes with and without the dot are treated as equivalent (e.g., "F00.0" and "F000" are considered identical).

Once dots are removed, there are no malformed ICD-10-AM diagnoses within the 9-year reporting of principal diagnosis in the CMHC and only 0.7% within the NOCC. Examples of "malformed" records in the NOCC include the use of "NS" and "NDX" (to presumably indicate "No diagnosis reported"), ICD-9 diagnosis codes, procedure codes and morphology codes. All "NOCC malformed" diagnosis codes occurred in 2007-08 and 2008-09.

While the NOCC Technical Specifications from inception have set the diagnoses field format as ANNNNNN (maximum length 8), in effect juridictions supply these data consistent with the diagnosis field format in the CMHC & RMHC (i.e., ANN{.N[N]} (maximum length 6).

The current requirements for the CMHC and NOCC are the 9th Edition of the ICD-10-AM; however, there have been no amendments (i.e., removal or addition) to Chapter V Mental and Behavioural Disorders ICD-10-AM codes for the 10th Edition. Accordingly, the 10th Edition of the ICD-10-AM ECL was applied to the finalised CMHC and NOCC materials over the 9-year period 2007-08 through 2015-16.

4. Preliminary considerations: CMHC principal diagnoses (2007-08 to 2015-16)

The unit of counting is a service contact. CMHC further differentiates registered vs. unregistered clients. Not shown, approximately 3% of all service contacts relate to "unregistered" clients.

CMHC only allows for a single principal diagnosis per service contact. The following table shows the overall percentage of non-missing ICD-10-AM principal diagnoses codes per service contact, separately for registered and unregistered clients. Approximately 92% of CMHC service contacts by "registered" clients have a valid principal diagnosis reported; this compares with approximately 71% by "unregistered" clients.

Table 4.1: Service contacts with missing vs. non-missing ICD-10-AM codes

Registered client service contact	Principal diagnosis codes (%)		
	Missing	Non-missing	Total
No	28.8	71.2	100
Yes	7.8	92.2	100
Total	**8.5**	**91.5**	**100**

Hereafter, analyses only consider ICD-10-AM codes reported for registered client service contacts.

Principal diagnoses are less likely to be reported for service contacts for younger consumers aged 17 years or less; the rate is similar for "adult" and "older persons".

Table 4.2: Registered client service contacts with missing vs. non-missing ICD-10-AM codes by age group

Registered client age group	Principal diagnosis codes (%)		
	Missing	Non-missing	Total
0-17 years	13.4	86.6	100
18-64 years	7.2	92.9	100
65-124 years	5.6	94.4	100

Victoria did not supply any CMHC data for 2011-12 nor 2012-13. Diagnosis reporting varies considerably among jurisdictions: QLD, SA & NTE are less likely to report diagnoses compared with other jurisdictions.

Table 4.3: Registered client service contacts with missing vs. non-missing ICD-10-AM codes by jurisdiction

Jurisdiction	Principal diagnosis codes (%)		
	Missing	Non-missing	Total
NSW	0.3	99.8	100
VIC	0.5	99.5	100
QLD	31.1	68.9	100
SAU	17.5	82.5	100
WAU	-	100.0	100
TAS	6.1	93.9	100
NTE	19.3	80.7	100
ACT	-	100.0	100

The proportion of missing diagnosis codes reported for CMHC service contacts has increased over time.

Table 4.4: Registered client service contacts with missing vs. non-missing ICD-10-AM codes by reporting period

Reporting period	Principal diagnosis codes (%)		
	Missing	Non-missing	Total
2007-08	5.7	94.3	100
2008-09	5.5	94.5	100
2009-10	3.7	96.3	100
2010-11	4.0	96.0	100
2011-12	8.2	91.8	100
2012-13	11.8	88.2	100
2013-14	9.5	90.5	100
2014-15	10.4	89.6	100
2015-16	10.0	90.0	100

5. Preliminary considerations: NOCC principal & additional diagnoses (2007-08 to 2015-16)

The unit of counting is a collection occasion. NOCC allows for a principal diagnosis and up to two additional diagnoses, that can be reported at review and discharge collection occasions, for all three NOCC age groups and service settings.

The following table shows the overall percentage of non-missing ICD-10-AM diagnoses for a given consumer within a service setting per collection occasion. Approximately 91% of NOCC collection occasions have at least one valid, non-missing ICD-10-AM diagnosis code: 56% only have principal diagnosis, 17% principal and one additional diagnoses and 18% principal and two additional diagnoses.

Table 5.1: NOCC collection occasions with principal and/or additional diagnoses

Overall	Principal Diagnosis only	Principal & 1 Additional Diagnosis	Principal & 2 Additional Diagnoses	Not reported / Invalid	Total
%	55.7	17.2	18.5	8.7	100
Cuml %	55.7	72.9	91.4	100.0	100

The following tables show the percentage of valid, non-missing diagnoses by collection occasion type, age group, service setting, jurisdiction and reporting period.

Valid, non-missing diagnoses are more likely to be reported at discharge collection occasions than at review, although the difference is relatively small.

Table 5.2: NOCC collection occasions with principal and/or additional diagnoses by collection occasion type

Collection occasion	Principal Diagnosis only	Principal & 1 Additional Diagnosis	Principal & 2 Additional Diagnoses	Not reported / Invalid	Total
Review (%)	52.9	17.3	19.0	10.8	100
Discharge (%)	59.1	17.0	17.8	6.0	100

Principal diagnoses are less likely to be reported for Child & Adolescent NOCC age groups; whereas the pattern of diagnosis codes is more or less identical for Adult and Older Persons.

Table 5.3: NOCC collection occasions with principal and/or additional diagnoses by NOCC age group

NOCC Age Group	Principal Diagnosis only	Principal & 1 Additional Diagnosis	Principal & 2 Additional Diagnoses	Not reported / Invalid	Total
Child & Adol. (%)	39.6	18.7	35.7	6.0	100
Adult (%)	59.0	16.6	15.0	9.4	100
Older Persons (%)	58.6	18.3	14.7	8.5	100

Approximately 79% of all review and discharge collection occasions (across all age groups) occur in ambulatory settings, 19% in inpatient settings and less than 2% in residential settings. Valid, non-missing diagnoses are somewhat less likely to be reported in residential settings; whereas the pattern of diagnosis codes is more or less identical in inpatient and ambulatory settings.

Table 5.4: NOCC collection occasions with principal and/or additional diagnoses by service setting

Setting	Principal Diagnosis only	Principal & 1 Additional Diagnosis	Principal & 2 Additional Diagnoses	Not reported / Invalid	Total
Inpatient (%)	59.6	16.8	16.7	6.9	100
Residential (%)	42.8	15.1	28.6	13.6	100
Ambulatory (%)	55.0	17.3	18.7	9.0	100

Victoria did not supply any NOCC data for 2011-12 nor 2012-13. The patterns of diagnosis reporting vary considerably among jurisdictions. For example: NSW, WA & QLD report fewer additional diagnoses compared with other jurisdiction; ACT, NTE, WA & VIC have greater proportions of invalid diagnosis codes.

Table 5.5: NOCC collection occasions with principal and/or additional diagnoses by jurisdiction

Jurisdiction	Principal Diagnosis only (%)	Principal & 1 Additional Diagnosis (%)	Principal & 2 Additional Diagnoses (%)	Not reported / Invalid (%)	Total (%)
NSW	73.5	17.4	6.0	3.1	100
VIC	22.0	16.4	42.2	19.5	100
QLD	63.4	22.3	14.3	0.0	100
SAU	54.7	15.3	30.0	0.0	100
WAU	66.5	11.6	1.9	20.0	100
TAS	44.9	12.0	38.5	4.5	100
NTE	54.8	5.8	4.7	34.7	100
ACT	25.9	12.5	5.7	55.9	100

The proportion of valid, non-missing diagnosis codes increases significantly over time.

Table 5.6: NOCC collection occasions with principal and/or additional diagnoses by reporting period

Reporting period	Principal Diagnosis only (%)	Principal & 1 Additional Diagnosis (%)	Principal & 2 Additional Diagnoses (%)	Not reported / Invalid (%)	Total (%)
2007-08	56.5	14.5	10.3	18.6	100
2008-09	50.0	13.9	11.2	25.0	100
2009-10	57.0	12.6	14.8	15.7	100
2010-11	57.0	13.8	17.2	12.0	100
2011-12	66.7	17.7	12.3	3.4	100
2012-13	66.0	20.2	10.7	3.2	100
2013-14	52.2	21.1	24.7	2.0	100
2014-15	51.9	19.6	27.4	1.2	100
2015-16	50.7	20.0	27.8	1.5	100

6. Data integrity issues common to CMHC & NOCC

The ICD-10-AM ECL includes several other criteria for assessing the integrity of disease codes including flags to indicate whether specific codes are: (i) "valid"; (ii) "unacceptable" as principal diagnoses; and (iii) "fatal" or "warnings" given a patient's sex and/or age.

6.1 "Valid" ICD-10-AM diagnosis codes

The ECL includes a field "valid" – "*Flag to indicate whether the code is valid or non-valid 0 = No, 1 = Yes"*. Prima facie, it was not clear why any ICD-10-AM codes would be deemed invalid – clarification was sought from IHPA who advised:

> *When a code is flagged as 'non-valid', it means that the more specific 4th or fifth character code underneath it is the 'valid' code which should be assigned. For example, F00 Dementia in Alzheimer's disease is not valid, and either F00.0, F00.1, F00.2 or F00.9 should be assigned. Most 3 character block codes in ICD-10-AM are not considered valid codes.*
>
> *If the record has a non-valid code as a PDx then it would fail the edit process for DRG assignment and go to an error DRG (which is not priced). If a non-valid code is assigned as an additional diagnosis it would not be recognised in the complexity weighting process (which determines whether an episode goes to an A or B DRG). In reality, in the admitted data sets these errors would be picked up in local and state edit checks and don't make it through to the national data which comes to IHPA.*

Our reading of this advice is that it pertains primarily to the use of ICD-10-AM codes in the mapping to Diagnosis Related Groups (DRGs), for which IHPA sets a "Nationally Efficient Price" (NEP). "Invalid" ICD-10-AM codes and DRGs have no NEP.

That consideration is less relevant to the current purpose of identifying best practice validation for classification reporting purposes. Moreover, DRGs are currently only applied to admitted patient episodes and "diagnosis" is not currently used in defining any of the classes within the Australian Mental Health Care Classification (AMHCC), Version 1.0.

For interest only, the overall percentage of "valid" ICD-10-AM ECL codes within the CMHC and the NOCC is shown in the following table.

Table 6.1.1: "Valid" ECL ICD-10-AM codes by CMHC & NOCC

NMDS/NOCC	Valid ECL ICD-10-AM code (%)		
	No	Yes	Total
CMHC Ambulatory	23.3	76.7	100
NOCC Ambulatory	17.5	82.6	100
NOCC Inpatient	23.4	76.6	100
NOCC Residential	13.3	86.7	100
Total	**23.1**	**76.9**	**100**

The following table shows the percentage of "valid ECL codes" by jurisdiction and data source/service setting. Stratifying by jurisdiction shows significant variation. Not shown, further analyses confirmed that reporting rates of 3-level ICD-10-AM codes was correlated with lower rates of "valid ECL codes" (e.g., 3-level reporting was approximately 50% of all NSW service contacts / collection occasions; less than 5% for QLD & WA).

Table 6.1.2: "Valid" ECL ICD-10-AM codes by CMHC & NOCC by jurisdiction

Jurisdiction	CMHC: Ambulatory (%)	NOCC: Ambulatory (%)	NOCC: Inpatient (%)	NOCC: Residential (%)
NSW	52.4	44.3	44.9	14.7
VIC	98.1	99.7	98.6	99.7
QLD	89.2	91.2	87.4	95.7
SAU	97.7	99.8	99.5	99.6
WAU	92.1	92.3	92.5	97.5
TAS	67.6	59.9	55.2	58.7
NTE	51.8	54.5	58.2	-
ACT	97.0	96.0	94.2	97.4

The following table shows the percentage of "valid ECL codes" by reporting period and data source/service setting. There is also considerable variation by reporting period, but most of this is likely accounted for by Victoria not reporting 2011-12 nor 2012-13 CMHC & NOCC data.

Table 6.1.3: "Valid" ECL ICD-10-AM codes by CMHC & NOCC by reporting period

Reporting period	CMHC: Ambulatory (%)	NOCC: Ambulatory (%)	NOCC: Inpatient (%)	NOCC: Residential (%)
2007-08	70.2	78.8	73.2	58.7
2008-09	78.4	78.1	73.0	53.1
2009-10	79.4	82.8	77.3	87.0
2010-11	79.9	82.5	78.6	85.7
2011-12	69.7	73.9	69.3	77.0
2012-13	71.3	73.4	64.9	77.4
2013-14	79.2	84.0	77.6	94.5
2014-15	79.1	87.6	82.2	95.7
2015-16	78.8	89.0	84.1	95.8

6.2 "Unacceptable" principal diagnoses

The ECL includes a field "UnacceptPDx" – "*An edit flag to indicate the code should not be assigned as principal diagnosis 0 = no, 1 = yes"*. Principal diagnosis codes for the CMHC and the NOCC were evaluated accordingly (i.e., for the CMHC service contact diagnoses are "principal"; for NOCC collection occasions, only the "principal" and not additional diagnoses were considered).

The following table shows that "unacceptable" principal diagnoses are rarely reported.

Table 6.2.1: "Unacceptable" ECL ICD-10-AM codes by CMHC & NOCC

NMDS/NOCC	"Unacceptable" principal diagnosis code (%)		
	No	Yes	Total
CMHC Ambulatory	99.7	0.3	100
NOCC Ambulatory	99.7	0.3	100
NOCC Inpatient	99.7	0.4	100
NOCC Residential	99.9	0.1	100
Total	99.7	0.3	100

The following table show the percentage of "unacceptable" principal diagnoses by jurisdiction.

Table 6.2.2: "Unacceptable" ECL ICD-10-AM codes by jurisdiction

Jurisdiction	CMHC: Ambulatory (%)	NOCC: Ambulatory (%)	NOCC: Inpatient (%)	NOCC: Residential (%)
NSW	0.3	0.3	0.4	-
VIC	0.2	0.2	-	-
QLD	0.6	0.6	0.6	0.3
SAU	-	-	-	-
WAU	0.2	0.1	0.1	-
TAS	0.3	0.3	1.5	0.2
NTE	0.3	0.3	0.5	-
ACT	1.0	0.9	0.9	-

The following table show the percentage of “unacceptable” principal diagnoses by reporting period.

Table 6.2.3: “Unacceptable” ECL ICD-10-AM codes by reporting period

Reporting period	CMHC: Ambulatory (%)	NOCC: Ambulatory (%)	NOCC: Inpatient (%)	NOCC: Residential (%)
2007-08	0.2	0.2	0.3	-
2008-09	0.2	0.3	0.3	-
2009-10	0.3	0.2	0.2	0.1
2010-11	0.2	0.3	0.3	-
2011-12	0.3	0.2	0.5	0.1
2012-13	0.5	0.5	0.4	0.3
2013-14	0.4	0.4	0.3	0.1
2014-15	0.4	0.3	0.4	-
2015-16	0.3	0.3	0.3	-

While the overall rate of "unacceptable" principal diagnoses is trivial, for interest the top 5 ICD-10-AM diagnoses per data source/service setting is shown in the table below.

Table 6.2.4: Five most frequent "unacceptable" ECL ICD-10-AM codes by CMHC & NOCC

NMDS/NOCC	ICD-10-AM	Abbreviated descriptor	% "unacceptable" by data source/setting
CMHC Ambulatory	X84	Intentional selfharm by unsp means	28.0
	Z81.8	Fmly h/o oth mental & behavioural disrd	10.9
	Z91.5	Personal history of selfharm	10.6
	Z72.0	Tobacco use current	4.9
	X61	Intent selfpoison antiep sed-hyp psytrp	4.5
NOCC Ambulatory	Z81.8	Fmly h/o oth mental & behavioural disrd	29.1
	X84	Intentional selfharm by unsp means	17.0
	Z91.5	Personal history of selfharm	6.0
	Z91.4	Persl h/o psychological trauma NEC	4.1
	X60	Intent self poisn anlgsc antipyr antirhm	3.9
NOCC Inpatient	X84	Intentional selfharm by unsp means	35.5
	Z72.1	Alcohol use	8.7
	X61	Intent selfpoison antiep sed-hyp psytrp	7.0
	X60	Intent self poisn anlgsc antipyr antirhm	6.9
	Z72.2	Drug use	4.4
NOCC Residential	Y20	Hanging strangltn suffn undet intent	72.2
	Z94.8	Oth transplanted organ and tissue status	5.6
	Z50.9	Care inv use of rehab procedure unsp	5.6
	Z72.1	Alcohol use	5.6
	Z86.42	Personal history of drug use disorder	5.6

6.3 Age (“warnings”) and Sex (“fatal”) error edit rules

The CMHC Validator has a number of age and/or sex edit rules (e.g., ICD-10-AM diagnoses related to the postnatal period are relevant only for females; diagnoses related to dementia are relevant only for persons aged 15 years or more). The CMHC edit rules are restricted to Chapter V ICD-10-AM diagnoses and a single ICD-10-AM code not in Chapter V (O99.3 - "*Mental disorders and diseases of the nervous system in pregnancy, childbirth and the puerperium*"). The ECL has age and/or sex edit rules that cover the full range of ICD-10-AM codes: approximately 6.5% of all codes have an edit rule.

There are, however, some inconsistencies in the specification of the ECL and CMHC rules for Chapter V. For example, the valid age range for ICD-10-AM depressive diagnoses in the postnatal period is set to between 15 & 55 years in the CMHC whereas the valid age range in the ECL is set to between 10 & 60 years. Inconsistent age-sex edit rules are shown in Table 6.3.2.

The ECL and the CMHC sex-age edit rules were applied to the NOCC and CMHC. Where either lower or upper ages were classified as “NS”, it was assumed that the valid lower age is 0 year and that the valid upper age is 124 years. In terms of diagnoses recorded for CMHC service contacts and NOCC collection occasions, approximately 1.25% and 2.5% respectively are subject to edit rules.

The following tables show the overall percentage of age and/or sex “warnings” and “errors” with respect to Chapter V ICD-10-AM and O99.3. Nearly all diagnoses recorded “pass” these rules.

The greater “failure” rate associated with ECL rules relative to CMHC rule (0.5% vs 0.1%) is primarily due to ECL age restrictions for ICD-10-AM *F32 - Depressive episodes related to the postnatal period* (ECL restricts to 10-60 years; there is no CMHC age rule for these diagnoses).

Table 6.3.1: ECL & CMHC age/sex edit rules by CMHC & NOCC: Pass/Fail (%)

Edit rules	Test	CMHC	NOCC
ECL age/sex edits	Pass	99.5	97.9
	Fail sex	-	1.5
	Fail age	0.5	0.7
CMHC Validator	Pass	99.9	98.4
	Fail sex	-	1.5
	Fail age	0.1	0.1

Table 6.3.2: ICD-10-AM codes with inconsistent ECL and CMHC age/sex edit rules

ICD-10-AM	Abbreviated descriptor	Inconsistency	ECL		CMHC	
			Low	High	Low	High
F00.0	Early dementia in Alzheimer's dis	No ECL age	NS	NS	15	124
F00.1	Late dementia in Alzheimer's dis	No ECL age	NS	NS	15	124
F00.2	Alzheimer's dementia atypic / mixed	No ECL age	NS	NS	15	124
F00.9	Alzheimer's dementia unsp	No ECL age	NS	NS	15	124
F32.01	Mild depres ep in postnatal period	No CMHC age	10	60	0	124
F32.11	Mod depres ep in postnatal period	No CMHC age	10	60	0	124
F32.21	Sev depres ep wo psych sym in postnatal	No CMHC age	10	60	0	124
F32.31	Sev depres ep w psych sym in postnatal	No CMHC age	10	60	0	124
F32.81	Other depres ep in postnatal period	No CMHC age	10	60	0	124
F32.91	Depres ep unsp in the postnatal period	No CMHC age	10	60	0	124
F52	Sexual dysf not dt organic disrd or dis	No ECL age	NS	NS	15	124
F52.0	Lack or loss of sexual desire	No ECL age	NS	NS	15	124
F52.1	Sexual aversion & lack sexual enjoyment	No ECL age	NS	NS	15	124
F52.2	Failure of genital response	No ECL age	NS	NS	15	124
F52.3	Orgasmic dysfunction	No ECL age	NS	NS	15	124
F52.7	Excessive sexual drive	No ECL age	NS	NS	15	124
F52.8	Oth sexual dysf not dt orgnc disrd / dis	No ECL age	NS	NS	15	124
F52.9	Unsp sex dysf nt caused orgaic disrd dis	No ECL age	NS	NS	15	124
F53	Ment & beh disrd ass w puerperium NEC	No ECL sex-age	NS	NS	15	55
F53.0	Mild ment & beh disrd ass w puerp NEC	Age anomaly	10	60	15	55
F53.1	Sev ment & beh disrd ass w puerp NEC	Age anomaly	10	60	15	55
F53.8	Oth ment & beh disrd ass w puerp NEC	Age anomaly	10	60	15	55
F53.9	Puerperal mental disorder unspecified	Age anomaly	10	60	15	55
F64.0	Transsexualism	No ECL age	NS	NS	15	124
F64.1	Dual-role transvestism	No ECL age	NS	NS	15	124
F64.2	Gender identity disorder of childhood	No ECL age	NS	NS	0	18
O99.3	Mental disrd dis nervous sys preg brth	No CMHC age	10	60	0	124

The following table shows the overall number of NOCC collection occasions and CMHC service contacts that "fail" either ECL and/or CMHC edit rules by jurisdiction.

Table 6.3.3: Number of service contacts / collection occasions that "fail" age/sex edit rules by jurisdiction

Jurisdiction	CMHC: Ambulatory	NOCC: Ambulatory	NOCC: Inpatient	NOCC: Residential
NSW	14	219	93	-
VIC	1397	223	38	-
QLD	170	141	80	-
SAU	886	143	41	6
WAU	38	315	56	-
TAS	1	89	11	1
NTE	-	-	-	-
ACT	648	56	21	-

The following table show the overall number of NOCC collection occasions and CMHC service contacts that "fail" either ECL and/or CMHC edit rules by reporting period.

Table 6.3.4: Number of service contacts / collection occasions that "fail" age/sex edit rules by reporting period

Reporting period	CMHC: Ambulatory	NOCC: Ambulatory	NOCC: Inpatient	NOCC: Residential
2007-08	98	130	42	-
2008-09	402	178	23	-
2009-10	832	226	91	-
2010-11	615	202	52	-
2011-12	192	107	37	2
2012-13	132	95	37	-
2013-14	270	114	27	2
2014-15	205	61	13	2
2015-16	408	73	18	1

7. ICD-10-AM disease code classifications

Hereafter, only non-missing, valid principal diagnoses are further analysed for CMHC service contacts and NOCC **ambulatory** collection occasions with a primary focus on different groupings of codes that can be used for reporting purposes.

7.1 Classification of Chapter V ICD-10-AM Mental and Behavioural Disorders codes

Initially, disease codes were grouped broadly into one of three categories: (i) Chapter V (F codes) Mental and Behavioural Disorders other than F99; (ii) F99 (Mental disorder, not otherwise specified); and (iii) any ICD-10-AM code other Chapter V.

The following table shows the distribution of these codes by data source (CMHC vs. NOCC). The majority of diagnosis codes reported are within ICD-10-AM Chapter V, however this is more marked for NOCC collection occasions compared with CMHC service contacts.

Table 7.1.1: Service contacts & collection occasions with principal diagnoses grouped by Chapter V ICD-10-AM code: Overall percentage

Ambulatory	F00-F98	F99	Not F range	Total
CMHC	75.9	7.7	16.5	100
NOCC	90.0	3.1	6.9	100

The following table shows significant variation in the distribution of Chapter V categories by jurisdiction.

Table 7.1.2: Service contacts & collection occasions with principal diagnoses grouped by Chapter V ICD-10-AM code: Overall percentage by jurisdiction

Jurisdiction	F00-F98	F99	Not F range	Total
NSW	63.6	6.8	29.6	100
VIC	89.0	2.1	8.9	100
QLD	93.7	0.4	5.9	100
SAU	85.7	11.4	2.9	100
WAU	68.4	19.8	11.9	100
TAS	89.1	6.3	4.6	100
NTE	89.7	0.7	9.6	100
ACT	65.7	32.0	2.3	100

The following table shows significant variation in the distribution of Chapter V categories by reporting period. Notable is the high percentage of ICD-10-AM "F99" codes in 2015-16.

Table 7.1.3: Service contacts & collection occasions with principal diagnoses grouped by Chapter V ICD-10-AM code: Overall percentage by reporting period

Reporting period	F00-F98	F99	Not F range	Total
2007-08	83.7	3.0	13.2	100
2008-09	81.0	4.8	14.2	100
2009-10	80.1	4.9	15.1	100
2010-11	78.3	5.1	16.6	100
2011-12	74.2	6.1	19.7	100
2012-13	69.7	6.4	23.9	100
2013-14	74.5	5.5	20.0	100
2014-15	75.4	5.3	19.3	100
2015-16	70.6	22.9	6.5	100

Further analysis of state and reporting period for this classification of ICD-10-AM Chapter V codes indicates a more complex pattern of reporting. Specifically, the increase in reporting of F99 codes in 2015-16 is almost entirely due to NSW – prior to 2015-16, NSW reported F99 diagnoses for less than 1% of CMHC service contacts and ~5% of NOCC collection occasions; on 2015-16 the respective percentages were 41% and 27%.

It is important also to consider variation in diagnosis profiles by consumer characteristics. It is well established that the incidence and prevalence of psychiatric morbidity varies by age (e.g., schizophrenia is less common among very young people, organic disorders more common among older people) and sex (e.g., substance use disorders more common among males; anxiety disorders more common among females). Only broad consumer age groupings are considered here.

The following table shows the relative percentage of the three category classification of Chapter V disorders for consumers aged 0-17 years, 18-64 years and 65 years and older, separately for CMHC service contacts and NOCC collection occasions. ICD-10-AM codes not within Chapter V are more likely to be reported for younger consumers aged 0-17 years for both the CMHC and the NOCC.

Table 7.1.4: Service contacts & collection occasions with principal diagnoses grouped by Chapter V ICD-10-AM code: Percentage by age group.

Ambulatory	Age group	F00-F98	F99	Not F range	Total
CMHC	0-17 years	65.7	11.2	23.1	100
NOCC	0-17 years	83.9	3.0	13.1	100
CMHC	18-64 years	77.2	7.1	15.7	100
NOCC	18-64 years	91.4	3.3	5.3	100
CMHC	65-124 years	78.5	7.4	14.1	100
NOCC	65-124 years	91.6	2.2	6.2	100

7.2 ICD-10-AM codes other than Chapter V Mental and Behavioural Disorders

While Chapter V Mental and Behavioural Disorders principal diagnoses account for the majority of all diagnoses recorded for CMHC service contacts (83%) and NOCC collection occasions (93%), it is of interest to note the distribution of other principal diagnoses. The following table shows the distribution of "Not F" ICD-10-AM codes for CMHC service contacts and NOCC collection occasions. Two codes (Z76.9 & Z00.4) account for approximately 75% and 58% of all "Not F" codes for CMHC service contacts and NOCC collection occasions respectively.

Table 7.2.1: Ten most frequent ICD-10-AM codes outside Chapter V by CMHC & NOCC

NMDS/NOCC	ICD-10-AM	Abbreviated descriptor	%
CMHC Ambulatory	Z769	Pers encntr hlth service unsp circumst	66.8
	Z004	General psychiatric examination NEC	7.7
	Z032	Obs suspected mental & behavioural disrd	7.3
	R4581	Suicidal ideation	3.7
	Z651	Imprisonment and other incarceration	1.6
	Z139	Special screening examination unsp	0.7
	Z133	Specl screen mental behavioural disrd	0.7
	Z631	Prob relationship w parents & in-laws	0.6
	X84	Intentional selfharm by unsp means	0.5
	Z638	Oth spec prob rel to prim support grp	0.4
NOCC Ambulatory	Z769	Pers encntr hlth service unsp circumst	45.2
	Z004	General psychiatric examination NEC	12.4
	R4581	Suicidal ideation	4.3
	Z032	Obs suspected mental & behavioural disrd	2.4
	Z638	Oth spec prob rel to prim support grp	2.1
	Z631	Prob relationship w parents & in-laws	2.1
	G301	Alzheimer's disease with late onset	1.8
	Z818	Fmly h/o oth mental & behavioural disrd	1.3
	G309	Alzheimer's disease unspecified	1.2
	Z711	Pers w feared complaint no dx made	1.1

7.3 Classification schema

Four different classification schema were used to classify ICD-10-AM codes:

1. 11-level classification of ICD-10-AM Chapter V Mental and Behavioural Disorders;
2. 16-level classification of codes per the MH-CASC groupings: this is the current schema for reporting diagnoses with the NOCC;
3. 31-level classification of codes per the lower level groupings of Chapter V: this is a schema for reporting diagnoses with the CMHC in **Mental health services in Australia** (e.g., *Table CMHC.15: Community mental health care service contacts, by principal diagnosis in ICD-10-AM groupings*; and ;
4. 78-level classification of codes per the lowest level groupings of Chapter V: this is a schema for reporting diagnoses with the CMHC in **Mental health services in Australia** (e.g., *Table CMHC.14: Community mental health care service contacts, by principal diagnosis*.

These four classification schema were applied to the principal diagnoses for the overall 9-year CMHC service contacts and NOCC collection occasions. They were also applied separately for each of the three broad consumer age groups (i.e., 0-17 years, 18-64 years and 65-124 years).

For the 11-level classification, tables are presented with cells colour coded: red to indicate that less than 5% of service contacts/collection occasions is reported for that level of ICD-10-AM grouping; yellow to indicate that between 5 and 10% of service contacts/collection occasions is reported for the grouping; and green to indicate that more than 10% is reported.

For the remaining 3 classification schema, the percentage of service contacts/collection occasions is less than 5%, the actual percentage estimate is not shown – the cell is simple coded red.

Further, other than the first schema, if a classification level had less than 5% of service contacts and less than 5% of collection occasions, that particular level is presented in the tables.

The last row of each table shows the overall sum of classification only including specific levels with at least 5% of service contacts/collection occasions.

7.3.1 ICD-10-AM Chapter V major groupings (11 levels)

The following table shows that approximately 55% of all diagnoses are recorded in the ICD-10-AM ranges F20-F29 (Schizophrenia and related disorders) or F30-F39 (Mood/affective disorders).

Table 7.3.1.1: ICD-10-AM Chapter V 11-level classification: Percentage of CMHC service contacts & NOCC collection occasions

Abbreviated ICD-10-AM descriptor: 11 levels	CMHC	NOCC
(F00-F09) Organic, including symptomatic, mental disorders	1.5	2.8
(F10-F19) Mental and behavioural disorders due to psychoactive substance use	3.5	2.9
(F20-F29) Schizophrenia, schizotypal and delusional disorders	34.6	35.1
(F30-F39) Mood (affective) disorders	19.2	23.4
(F40-F48) Neurotic, stress-related and somatoform disorders	8.5	14.4
(F50-F59) Behavioural syndromes associated with physiological disturbances and physical factors	1.3	1.2
(F60-F69) Disorders of adult personality and behaviour	4.0	3.3
(F70-F79) Mental retardation	0.3	0.4
(F80-F89) Disorders of psychological development	0.7	1.4
(F90-F98) Behavioural and emotional disorders with onset usually occurring in childhood and adolescence	2.3	5.1
(F99) Unspecified mental disorder	7.7	3.1
Other - Not Chapter V	16.5	6.9
Total >= 5%	**86.4**	**84.9**

Table 7.3.1.2: ICD-10-AM Chapter V 11-level classification: Percentage of CMHC service contacts & NOCC collection occasions by age group

The following table shows, however, that there is significant variation within broad age groups. As expected classification levels are age-specific (e.g., F00-F09, *Organic, including symptomatic, mental disorders*, prevalent for older people; F90-F98*, Behavioural and emotional disorders with onset usually occurring in childhood and adolescence*, prevalent for younger people.

Abbreviated ICD-10-AM descriptor: 11 levels	0-17 years		18-64 years		65-124 years	
	CMHC	NOCC	CMHC	NOCC	CMHC	NOCC
F00-F09	0.2	0.1	0.6	0.7	11.6	17.2
F10-F19	1.2	1.3	4.1	3.9	0.8	0.7
F20-F29	2.7	1.3	41.2	47.6	22.3	22.6
F30-F39	12.2	12.3	18.5	23.3	34.9	40.1
F40-F48	21.7	33.3	6.5	9.8	7.7	9.8
F50-F59	5.1	2.9	0.8	0.9	0.1	0.1
F60-F69	1.5	1.1	4.8	4.4	0.9	0.9
F70-F79	0.5	0.8	0.3	0.3	0.1	0.1
F80-F89	3.9	6.1	0.2	0.2	0.0	0.0
F90-F98	16.6	24.8	0.3	0.3	0.0	0.0
F99	11.2	3.0	7.1	3.3	7.4	2.2
Other	23.1	13.1	15.7	5.3	14.1	6.2
Total >= 5%	**89.9**	**89.5**	**88.9**	**85.9**	**90.6**	**95.9**

7.3.2 MH-CASC major groupings (16 levels)

Table 7.3.2.1: MH-CASC 16-level classification: Percentage of CMHC service contacts & NOCC collection occasions

Abbreviated MH-CASC descriptor: 16 levels	CMHC	NOCC
Schizophrenia, paranoia and acute psychotic disorders	35.1	35.8
Mood disorders	19.2	23.4
Anxiety disorders		6.4
Stress and Adjustment disorders		7.1
Disorders of childhood and adolescence		5.1
F99 (Other mental disorder)	7.7	
Other - Not Chapter V	16.5	6.9
Total >= 5%	**78.5**	**84.7**

Table 7.3.2.2: MH-CASC 16-level classification: Percentage of CMHC service contacts & NOCC collection occasions by age group

Abbreviated MH-CASC descriptor: 16 levels	0-17 years		18-64 years		65-124 years	
	CMHC	NOCC	CMHC	NOCC	NOCC	CMHC
Organic disorders					11.6	17.2
Schizophrenia, paranoia, & related			41.9	48.6	22.4	22.7
Mood disorders	12.2	12.3	18.5	23.3	34.9	40.1
Anxiety disorders	9.7	13.9				6.2
Stress and Adjustment disorders	10.4	17.5				
Disorders of psychological development		6.1				
Disorders of childhood and adolescence	16.6	24.8				
F99 (Other mental disorder)	11.2		7.1		7.4	
Other - Not Chapter V	23.1	13.1	15.7	5.3	14.1	6.2
Total >= 5%	**83.2**	**87.6**	**83.1**	**77.1**	**90.4**	**92.4**

7.3.3 Mental Health Service in Australia (MHSA) (31 levels)

Table 7.3.3.1: MHSA 31-level classification: Percentage of CMHC service contacts & NOCC collection occasions

Abbreviated MHSA descriptor: 31 levels	CMHC	NOCC
(F20) Schizophrenia	25.9	26.5
(F25) Schizoaffective disorders	5.2	
(F31) Bipolar affective disorders	5.7	7.1
(F32) Depressive episode	11.0	12.1
(F41) Other anxiety disorders		5.6
(F43) Reaction to severe stress and adjustment disorders		7.1
(F99) Mental disorder not otherwise specified	7.7	
Other - Not Chapter V	16.5	6.9
Total >= 5%	**72.0**	**65.3**

Table 7.3.3.2: MHSA 31-level classification: Percentage of CMHC service contacts & NOCC collection occasions by age group

Abbreviated MHSA descriptor: 31 levels	0-17 years		18-64 years		65-124 years	
	CMHC	NOCC	CMHC	NOCC	CMHC	NOCC
(F00-F03) Dementia in Alzheimer disease					9.5	14.5
(F20) Schizophrenia			31.2	36.5	15.2	15.1
(F25) Schizoaffective disorders			6.1	6.7		
(F31) Bipolar affective disorders			6.2	8.6	9.0	9.5
(F32) Depressive episode	9.6	9.4	10.1	10.8	20.4	22.5
(F33) Recurrent depressive disorders						6.8
(F41) Other anxiety disorders	8.2	12.2				6.0
(F43) Reaction to severe stress and adjustment disorders	10.4	17.5				
(F80-F89) Disorders of psychological development		6.1				
(F92-F98) Other and unspecified disorders with onset in childhood and adolescence	10.1	15.7				
(F99) Mental disorder not otherwise specified	11.2		7.1		7.4	
Other - Not Chapter V	23.1	13.1	15.7	5.3	14.1	6.2
Total >= 5%	**72.5**	**73.9**	**76.4**	**67.9**	**75.5**	**80.6**

7.3.4 Mental Health Service in Australia (MHSA) (78 levels)

Table 7.3.4.1: MHSA 78-level classification: Percentage of CMHC service contacts & NOCC collection occasions

Abbreviated AIHW descriptor: 78 levels	CMHC	NOCC
(F20) Schizophrenia	25.9	26.5
(F25) Schizoaffective disorders	5.2	
(F31) Bipolar affective disorder	5.7	7.1
(F32) Depressive episode	11.0	12.1
(F41) Other anxiety disorders		5.6
(F43) Reaction to severe stress, and adjustment disorders		7.1
(F99) Mental disorder, not otherwise specified	7.7	
Other - Not Chapter V	16.5	6.9
Total >= 5%	**72.0**	**65.3**

Table 7.3.4.2: MHSA 78-level classification: Percentage of CMHC service contacts & NOCC collection occasions by age group

Abbreviated AIHW descriptor: 78 levels	0-17 years		18-64 years		65-124 years	
	CMHC	NOCC	CMHC	NOCC	CMHC	NOCC
(F00) Dementia in Alzheimer disease						6.8
(F03) Unspecified dementia						5.2
(F20) Schizophrenia			31.2	36.5	15.2	15.1
(F25) Schizoaffective disorders			6.1	6.7		
(F31) Bipolar affective disorder			6.2	8.6	9.0	9.5
(F32) Depressive episode	9.6	9.4	10.1	10.8	20.4	22.5
(F33) Recurrent depressive disorder						6.8
(F41) Other anxiety disorders	8.2	12.2				6.0
(F43) Reaction to severe stress, and adjustment disorders	10.4	17.5				
(F50) Eating disorders	11.2		7.1		7.4	
(F99) Mental disorder, not otherwise specified	23.1	13.1	15.7	5.3	14.1	6.2
Other - Not Chapter V	24.1	13.1	16.1	5.3	14.5	6.2
Total >= 5%	**86.6**	**65.1**	**92.5**	**73.2**	**80.5**	**84.3**