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HEALTHCARE GROUP

Final Report

Identify, specify and group a national set of high-priority complications which occur in hospital for routine local review and to inform Joint Working Party consideration of appropriate potential approaches to ensuring safety and quality in the provision of health care services.

Australian Commission on Safety and Quality in Health Care

19 December 2013

Disclaimer

Inherent Limitations

This *Final Report* has been prepared as outlined in the Introduction Section. The services provided in connection with this engagement comprise an advisory engagement, which is not subject to assurance or other standards issued by the Australian Auditing and Assurance Standards Board and, consequently no opinions or conclusions intended to convey assurance have been expressed.

No warranty of completeness, accuracy or reliability is given in relation to the statements and representations made by, and the information and documentation provided by, the stakeholders consulted as part of the process.

KPMG have indicated within this *Final Report* the sources of the information provided. We have not sought to independently verify those sources unless otherwise noted within the report.

KPMG is under no obligation in any circumstance to update this *Final Report,* in either oral or written form, for events occurring after the *Final Report* has been issued in final form.

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Contents

Acronyms

Acronym	Name
ACS	Australian Coding Standards
AIHW	Australian Institute of Health and Welfare
AR-DRG	Australian Refined Diagnosis Related Group
CHA	Children's Healthcare Australasia
CHADx	Classification of Hospital Acquired Diagnoses
ANZICS	Australian and New Zealand Intensive Care Society
COF	Condition onset flag
CVVHD	Continuous veno-venous haemodialysis
DVT	Deep vein thrombosis
GI	Gastrointestinal
HAI	Healthcare associated infection
ICD-10-AM	International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, Australian Modification
ICU	Intensive Care Unit
IHPA	Independent Hospital Pricing Authority
MET	Medical Emergency Team
NCCH	National Centre for Classification in Health
NSTEMI	Non-ST elevation myocardial infarction
PE	Pulmonary embolism
PNMDS	Perinatal National Minimum Data Set
STEMI	ST elevation myocardial infarction
UTI	Urinary tract infection

Executive Summary

The Australian Commission on Safety and Quality in Health Care (the Commission) and the Independent Hospital Pricing Authority (IHPA) are working together to consider options for their respective governing bodies, on the most appropriate approaches within the national Pricing Framework, to safety and quality in the provision of health care services.

A Joint Working Party of individuals, nominated by both organisations, has been established to advise the Commission and IHPA on the options for consideration.

The Commission engaged KPMG, with the support of the National Centre for Classification in Health (NCCH), to undertake a clinician-driven process to identify, specify and group a national set of high-priority complications which occur in hospital for routine local reporting and review. The project will inform Joint Working Party consideration of appropriate potential approaches to ensuring safety and quality in the provision of health care services. For example, the set of complications will be used to inform a study in Australian hospitals to investigate how local reviewing and reporting from coded inpatient data can drive hospital-level improvement in safety and quality and reduce hospital-acquired diagnoses. For the study, clinicians will determine the type of information they need, and identify processes that are useful, to monitor high priority complications within their hospital.

The approach to this project comprised three key activities:

- **review of safety literature and summary incident reporting systems reports;**
- **clinician-driven, iterative identification of the high-priority complications; and**
- **analysis of identified complications using hospital inpatient morbidity data to support clinician identification of a set of complications.**

A clinical reference group was formed by the Commission to lead the development of the set of complications. The group convened at three points throughout the project. It comprised representatives from jurisdictions and a range of clinical disciplines, as well as a consumer representative and other experts in safety and quality. At each meeting, the clinical reference group assessed complications based on preventability; patient impact (severity); health service impact; and, clinical priority.

Table 1 specifies the high priority complications recommended by the clinical reference group.

Table 1: National set of high priority complications

Complication Group	Complication category(s)
Pressure injury	Unspecified decubitus ulcer and pressure area
	Stage I ulcer
	Stage II ulcer
	Stage III ulcer
	Stage IV ulcer
Falls resulting in fracture and intracranial injury	Intracranial injury
	Fractured neck of femur
	Other fractures
Healthcare associated infection	Urinary tract infection

Complication Group	Complication category(s)
	Surgical site infection
	Pneumonia
	Blood stream infection
	Central line and peripheral line associated blood stream infection
	Multi-resistant organism
	Prosthetic associated infection
	Gastrointestinal Infections
Surgical complications requiring unplanned return to theatre	Post-operative haemorrhage/haematoma requiring transfusion and/or return to theatre
	Surgical wound dehiscence
	Anastomotic leak
	Vascular graft failure
	Other surgical complications requiring unplanned return to theatre
Unplanned Intensive Care Unit (ICU) admission or Medical Emergency Team (MET) Call	Unplanned ICU admission or MET Call
Respiratory complications	Respiratory failure including acute respiratory distress syndrome requiring ventilation (invasive and/or non-invasive)
	Aspiration pneumonia
Venous thromboembolism	Pulmonary embolism
	Deep vein thrombosis
Renal failure	Renal failure requiring haemodialysis or continuous veno-venous haemodialysis
Gastrointestinal Bleeding	Gastrointestinal Bleeding
Medication complications	Drug related respiratory complications/depression
	Haemorrhagic disorder due to circulating anticoagulants
	Hypoglycaemia
Delirium	Delirium
Persistent incontinence	Urinary incontinence
Malnutrition	Malnutrition
Cardiac complications	Heart failure and pulmonary oedema
	Arrhythmias
	Cardiac arrest
	Acute coronary syndrome including unstable angina, STEMI and NSTEMI
Iatrogenic pneumothorax requiring intercostal catheter	Iatrogenic pneumothorax requiring intercostal catheter

Complications specific to other clinical domains

The clinical reference group identified sets of complications specific to four clinical domains that require advice from peak clinical groups for those domains to be further developed. For some of these areas, other existing health data collections may offer more appropriate mechanisms for routine monitoring of specific complications than the admitted patient datasets:

- **Mental health**: Identification and prioritisation of mental health complications for routine monitoring will be referred to the national mental health committees and relevant agency or agencies, by the Australian Commission on Safety and Quality in Health Care, for advice. Advice is being sought on what complications are already monitored for mental health patients in the acute care setting.
- **Obstetrics:** The set of complications relating to obstetrics identified as part of this project (maternal death; perineal tears; and post partum haemorrhage) will be referred to the Australian Commission on Safety and Quality in Health Care's Maternal Sentinel Event and Post Partum Haemorrhage Advisory Group for further advice. The Group is currently considering the national approach to specification and routine review of these adverse events. Jurisdictional perinatal data collections have a standard core set of elements, and may offer an appropriate mechanism for routine, local monitoring of complications.
- **Paediatrics:** The paediatric representative of Children's Healthcare Australasia (CHA) advised that the identified set of high priority complications was relevant to paediatrics, except for the complications 'persistent incontinence' and 'delirium'. Other complications specific to paediatrics are being considered by the paediatric representative and CHA. It was noted that the study should ideally include at least one paediatric hospital and another hospital with a paediatric unit to test the utility of the high priority complications for paediatric cohorts.
- **Healthcare associated infection:** The set of high priority complications relating to healthcare associated infections will be referred to the Australian Commission on Safety and Quality in Health Care's Healthcare Associated Infection (HAI) Advisory Committee for further advice regarding their relative priority. Advice will also be sought on the reliability, sensitivity and specificity of administrative datasets as a mechanism for HAI surveillance, as compared to existing jurisdictional systems.

Potential new data items for the National Hospital Morbidity Database collection

The clinical reference group identified a number of events that identify clinical deterioration which are not currently specified within admitted patient datasets:[1]

- Unplanned return to theatre
- Medical Emergency Team (MET) Call or Unplanned admission to the Intensive Care Unit.

As these events are currently not identifiable within hospital casemix datasets, there is an opportunity to consider the development of new national data items to capture these events. The clinical reference group recommended advice be sought from the Commission's advisory group for the Deteriorating Patient Project and ANZICS in relation to definitions for Unplanned Intensive Care Unit admission and MET Call, and their relative utility. Additionally, the clinical reference group recommended that advice be sought from surgical groups on unplanned return to theatre.

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[1] Standard national elements of admitted patient datasets are shown at http://www.aihw.gov.au/national-hospital-morbidity-database/

Guidance on the improvement of patient record documentation and coding for high priority complications

To support the monitoring of the national set of high priority complications, clear guidance is required for clinicians and coders regarding documentation and coding of each complication. This report recommends that draft documentation and coding guidelines be developed and tested in the study, with a view to revising the Australian Coding Standards[2] to better support capture and monitoring of the high priority complications.

In addition, enhanced guidance relating to the assignment of the condition onset flag (COF) is recommended, particularly for its assignment in relation to delirium and pressure injury.

Refinements of ICD-10-AM codes

The NCCH identified a number of complication categories where the specified ICD-10-AM codes could be further refined to enable more accurate identification of the set of high priority complications. These include:

- central and peripheral line infection;
- post-operative haemorrhage /haematoma requiring transfusion and/or return to theatre;
- anastomotic leak; and
- vascular graft failure.

Mitigating against high pre-disposition to a complication

The clinical reference group advised that some patient cases have a high predisposition to the onset of certain complications and that the inclusion of these cases in a set of potentially preventable complications would not be useful or warranted. To mitigate against the inclusion of such cases, opportunities exist to use the AR-DRG classification 'exclusion principle'. The 'exclusion principle' voids the inclusion of an additional diagnosis that might otherwise have been deemed a significant complication, where that additional (secondary) diagnosis is highly associated with a principal diagnosis. Consideration could be given to the development of an algorithm for the study that applies the exclusion list relevant to the high priority complications.

Recommendations

Recommendation 1: That the draft set of complications be supported as a national set of complications for local monitoring and review, subject to broader consultation and testing in a study of selected Australian hospitals. The pilot study should be a clinician-driven process with, for example, clinicians determining the type of information they need and the processes required to monitor high priority complications within their hospital.

Recommendation 2: That the Commission seek advice on priority complications and data sources in specific clinical domains from peak clinical organisations and groups in mental health, maternity, paediatrics, and healthcare-associated infection. Additionally, advice should be sought from the Commission's Deteriorating Patient Project Advisory Group and ANZICS regarding the inclusion of either 'MET Call' or 'Unplanned admission to ICU'.

[2] Australian Coding Standards for ICD-10-AM and ACHI. National Centre for Classification in Health.

Recommendation 3: That the Commission consider the development of the following new data items for inclusion in the Admitted Patient Care National Minimum Data Set:

- unplanned return to theatre; and
- unplanned admission to ICU, or MET Call.

Advice would be sought from IHPA, AIHW and NCCH as to whether new data items, or new ICD 10 AM codes, are more appropriate to achieve this.

Recommendation 4: That the Commission work with clinicians to develop national guidelines for documentation of the set of high priority complications in patient records.

Recommendation 5: That the Commission and IHPA work with the NCCH on a range of coding issues including:

i. seeking advice on refinements to relevant ICD-10-AM codes relating to the list of complications;

ii. seeking advice on possible requirements for revisions to the Australian Coding Standards for the set of high priority complications;

iii. reviewing the current guidelines for assignment of the COF in relation to pre-existing conditions based upon the results of the study;

iv. developing guidelines supporting the assignment of the COF for certain complications including delirium superimposed on dementia and pressure injury progression during an episode of care; and

v. developing a high-priority complications algorithm to effect the 'exclusion principle' in order to void the inclusion of certain additional (secondary) diagnoses that are considered to be highly associated with a principal diagnosis.

1. Introduction

Background

The Australian Commission on Safety and Quality in Health Care (the Commission) and the Independent Hospital Pricing Authority (IHPA) are working together to consider options for their respective governing bodies, on the most appropriate approaches within the national Pricing Framework, to safety and quality in the provision of health care services.

A Joint Working Party of individuals, nominated by both organisations, has been established to advise the Commission and IHPA on the options for consideration.

The Commission engaged KPMG to undertake a clinician-driven process to identify, specify and group a national set of high-priority complications which occur in hospital for routine local reporting and review and to inform Joint Working Party consideration of appropriate potential approaches to ensuring safety and quality in the provision of health care services. KPMG engaged the services of the National Centre for Classification in Health (NCCH) to support this project**.**

This project followed a series of studies and developments in monitoring patient safety in recent years:

- the introduction of the condition onset flag as part of the 6th edition of ICD-10-AM in July 2008;
- Victoria's addition to Australian Coding Standards 0048 which incorporates the complications flag, Prefix C – Complicating condition occurring after admission;
- studies examining the use of routinely coded hospital discharge data to identify illness and injury acquired in hospital and the costs of adverse events;[3] [4]
- the development of the *Classification of Hospital Acquired Diagnoses* (CHADx);[5] and
- a 2012 review by Queensland Health found that the CHADx offered a comprehensive classification of hospital-acquired diagnoses in ICD-10-AM and highlighted the opportunity to use casemix data to identify and monitor complications.[6]

This project sought to build on these developments and use a clinician-driven process for identifying a national set of high priority complications. A clinician-driven process was considered to optimise the accuracy, clinical relevance and methodological soundness of the results of the project.[7]

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[3] Jackson, T., Duckett, S., Shepheard, J., & Baxter, K. (2006) 'Measurement of adverse events using "Incidence flagged" diagnosis codes' *Journal of Health Services Research Policy*, 11, 21-25

[4] Ehsani, J. P., Jackson, T., & Duckett, S. J.(2006), 'The incidence and cost of adverse events in Victorian hospitals 2003-2004' *Medical Journal of Australia*, 184, 551-555

[5] Australian Commission on Safety and Quality in Health Care (2013) 'Classification of Hospital Acquired Diagnoses. Accessed 5 September 2013 from <http://www.safetyandquality.gov.au/our-work/information-strategy/health-information-standards/classification-of-hospital-acquired-diagnoses-chadx/>

[6] Ultz, M., Johnson, T. And Halech, R. A. (2012) ' A review of the Classification of Hospital-Acquired Diagnoses (CHADx)' Health Statistics Unit, Queensland Health

[7] Scobie S, Thomson R, McNeil J, Phillips P. (2006) 'Measurement of the safety and quality of health care'. *Medical Journal of Australia,* 184(10):S51–S55.

The purpose of the national set of high priority complications

The purpose of the national set of complications is to support routine local monitoring and review of high priority safety and quality conditions at a hospital level and to inform the Joint Working Party in its consideration of appropriate potential approaches to ensuring safety and quality in the provision of health care services.

At the hospital level, the national set of high-priority complications of care is intended to support local processes by enhancing monitoring, resulting in improved safety and quality.

The set of high priority complications is intended to reflect the safety and quality environment of the hospital as a whole rather than the practices of an individual clinician or sub-speciality group.

Pilot study

The identified set of complications will inform a subsequent study to be undertaken within selected Australian hospitals to investigate how local review and reporting of coded hospital casemix data can drive hospital-level improvement in safety and quality and reduce hospital-acquired diagnoses.

Report structure

This report documents the findings in undertaking the project.

This report is structured into the following sections:

Section 2	Provides a summary of the process for developing the set of high priority complications.
Section 3	Outlines the recommended set of high priority complications and details the specific complication categories, rationale for inclusion in the set of high priority complications, issues for further consideration and implications for the study.
Section 4	Lists matters for further consideration including enhancements of coding and documentation guidance, refinements to ICD-10-AM codes and other study design considerations.
Appendix 1	Provides a summary of the complications identified as part of the examination of safety literature and incident reporting systems.
Appendix 2	Outlines the complications that were identified by members of the clinical reference group.
Appendix 3	Details complications that were considered and ultimately excluded from the recommended set of complications including reasons for exclusion.
Appendix 4	Provides the specification of the set of high priority complications including the ICD-10-AM codes and comments for coder consideration and use during the study.
Appendix 5	Provides the indicative analytical outcomes of the set of high priority complications including frequency and excess days.
Appendix 6	Details the technical notes relating to the analysis of hospital inpatient morbidity data.
Appendix 7	Provides a reference list of documents reviewed as part of this project.

2. Process for development of the set of high-priority complications

This section provides a summary of the approach used to develop the set of high-priority complications.

2.1 Approach

The approach to this project comprised three key activities:

- **review of safety literature** and summary incident reporting systems reports;
- **clinician-driven development of the set of complications** including two teleconferences, a face-to-face workshop and continual refinement of a draft set of complications; and
- **analysis of identified complications using hospital inpatient morbidity data** to support clinician identification of a set of complications.

2.1.1 Review of safety literature and incident reports

An examination of patient safety literature and jurisdictional incident reporting was undertaken to identify complications which are preventable and have a material impact on either the patient or on hospital resource allocation. The examination comprised documents identified by the Commission and KPMG with searches of Google and the electronic database ProQuest. Primary search terms included: complications, conditions, diagnoses, post procedural, safety, hospital acquired, incidents, adverse events, sentinel events, iatrogenic injury, injury, infection, disease, disorder, harm, monitoring, reporting and condition onset flag.

A range of literature was reviewed including the *Quality in Australian Health Care Study* (Wilson et al, 1995), the *Setting priorities for patient safety* report (Runciman et al, 2002) and the *Incidence of adverse events and negligence in hospitalised patients: results of the Harvard Medical Practice Study* (Brennan et al 1991). In addition, hospital incident reports published by South Australia, Western Australia and Queensland were reviewed. A full list of references is contained in Appendix 8.

The examination identified an initial set of complications that were cited by articles and reports as having a material impact or being preventable. The initial set of complications identified by the articles and reports is provided in Appendix 2.

2.1.2 Clinician-driven development of the set of complications

A clinical reference group was formed by the Commission to lead the development of the set of complications. The clinical reference group met at three points throughout the project:

- an introductory teleconference (17 September 2013);
- a two day face to face workshop (24 and 25 September 2013); and
- a follow-up teleconference (3 October 2013).

The clinical reference group comprised clinicians from all Australian jurisdictions and from a range of clinical disciplines. A consumer representative and experts in safety and quality were also present.

The purpose of each of the meetings was for the clinical reference group to identify, discuss and refine the set of complications.

Clinicians were initially presented with the set of complications identified by the literature and the incident reporting systems as outlined in Appendix 2. Additionally, the clinical reference group were asked to identify their own clinically relevant complications for consideration. Complications identified by members of the clinical reference group are outlined in Appendix 3.

The set of complications was continually refined during each meeting, with subsequent iterations provided to the Group for consideration and review. The refinement of the complications was supported by analysis of the identified complications using hospital inpatient morbidity data as discussed below.

2.1.3 Analysis of identified complications using the hospital inpatient morbidity data

Analysis of identified complications using hospital inpatient morbidity data was used to assess the potential inclusion of conditions in the set of complications. Three years of acute admitted activity data was provided to KPMG by the Commission. This comprised separations for public and private hospitals in the three financial years commencing 2009-10.

The analysis presented to the clinical reference group to support the identification of complications involved:

- identifying the indicative frequency of separations with at least one secondary condition where the condition had been flagged as hospital onset;[8] and
- assessing the indicative 'impact' of these conditions on patient's stay in hospital and patient 'outcome' using a surrogate analysis of 'excess days'.

The majority of data analysis was undertaken using separations from public hospitals across the two financial years 2010-11 and 2011-12.[9] Admitted data for these two years comprised comparable ICD-10-AM seventh edition codes. Indicative rates for each of the high priority complications identified in this document are outlined in Appendix 6.

A detailed description of the analytical methods used is contained in Appendix 7.

Limitations of data

The acute admitted activity data includes diagnosis and procedure codes that have been assigned by a Health Information Manager or Clinical Coder following patient discharge. In order for a diagnosis code to be assigned there must be sufficient documentation of the diagnosis in the medical record to enable the coder to assign the code, including evidence that it meets relevant Australian Coding Standards relating to assignment of additional diagnoses. In addition, the code must be assigned a Condition Onset Flag (COF) 'value' to indicate whether the diagnosis was present prior to admission (COF value 2) or arose during the episode of care (COF value 1)[10]. Indicative data presented as part of this project used only diagnoses codes which had been

[8] 'Hospital onset' refers to conditions occurring after admission, during the episode of admitted patient care

[9] KPMG was also provided with data for 2009-10 which was not used for this analysis because it was based on a different version of the ICD-10-AM and would have created data compatibility issues given that the analysis was based on aggregated data.

[10] http://meteor.aihw.gov.au/content/index.phtml/itemId/355703

assigned COF variable of 1 (diagnosis occurring during the episode of care). The data analysis is therefore limited by:

- **The limitations of clinical documentation**. Diagnoses must be clearly documented in the medical record in order for a coder to assign a code. Diagnoses which were not clearly documented, and were therefore not captured in the hospital inpatient morbidity data, were not included in the data analysis undertaken for this project.
- **The accuracy of COF assignment**. The reporting of the COF was introduced as a national standard in 2008 however the implementation of the routine assignment of the COF is still under development in some Australian states and territories. Additionally, it was noted during the course of this project that, even in states where the COF has been in place for some time, the assignment of COF for conditions arising during the episode of admitted patient care is subject to error. This can be attributed to a range of factors including poor clinical documentation and the absence of the COF from traditional clinical coding audits undertaken by states and territories. Errors in assigning COF, however, primarily relate to incorrectly assigning a COF variable 2 for conditions that occurred during the admission, which should have been assigned a COF variable 1 (false-negative). Errors in assigning COF 1 for conditions that should have been assigned COF variable 2 are less prevalent (false-positives).[11]
- **The limitations of counting frequency.** The data analysis presented as part of this project included the frequency of complications. The frequency comprises the number of occurrences of all complication codes (ICD-10-AM) for the complication category in all separations. Where more than one code from the complication category occurs within the one separation, each code is counted. Similarly, where complication codes from more than one complication category occur within the same separation, each code is counted. There is therefore potential for over-estimating the number of hospital acquired complications (e.g. one separation may include multiple complication codes arising from one misadventure). Methods of classification such as CHADx have considered these challenges and have processes in place which clean data and prevent it from over-estimating false-positives.
- **General limitations of administrative data.** The limitations on the use of administrative data (coded inpatient data) are well described in the literature.[12] [13] [14] Such data have high proportions of false-positive and false-negative cases resulting from coding inaccuracies. Further, all adverse event types are not tracked, as codes are not usually adapted to capture diagnostic, system or management errors, which collectively account for about 30 per cent of adverse events.[15]

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[11] This is based on KPMG's auditing of hospital coded data undertaken across a large number of hospitals.

[12] Thomas EJ and Petersen LA, (2003) Measuring errors and adverse events in health care. *Journal of General Internal Medicine*, 18: 61-67.

[13] Pronovost P.J., Miller M.R., Wachter R.M. (2006) Tracking progress in patient safety: An elusive target. *Journal of the American Medical Association.* 296 (6) (pp 696-699)

[14] Naessens et al. (2009) A comparison of hospital adverse events identified by three widely used methods. Int J Qual Health Care

[15] Foster et al. (2012) Improving patient safety through the systematic evaluation of patient outcomes. *Can J Surg*, Vol. 55, No. 6,

2.2 Limitations of the project

The following limitations should be considered when interpreting the results of this project:

- **Data limitations**: these are discussed in the previous sub-section.
- **Analysis limitations**: the data presented in this report have not been fully risk adjusted, although the comparative data presented in Appendix 6 have been standardised for AR-DRG, patient age and hospital type (refer to Appendix 7 for further explanation of the standardisation method).
- **Potential over-estimation of frequency of hospital events that result in a complication**: the data presented in this report counts each occurrence of a complication code (for the high priority complications identified by the clinical reference group). It is possible that more than one complication code is recorded for the one event that led to the complication.
- **Accuracy of estimation of complications**: the accuracy of the condition onset flag is likely to under-estimate hospital onset complications (refer to discussion in previous sub-section) while association between multiple complications arising from the one hospital adverse event could over-estimate the frequency of complications.

3. Recommended set of high priority complications

At each of the meetings of the clinical reference group, the Group assessed proposed complications based on the following criteria:

- preventability;
- patient impact (severity);
- health service impact; and
- clinical priority.

The group recommended a draft set of high priority complication groups and categories.

Table 2 below sets out the recommended set of high priority complications as identified by the clinical reference group convened by the Commission.

Table 2: National set of high priority complications

Complication Group	Complication category(s)
Pressure injury	Unspecified decubitus ulcer and pressure area
	Stage I ulcer
	Stage II ulcer
	Stage III ulcer
	Stage IV ulcer
Falls resulting in fracture and intracranial injury	Intracranial injury
	Fractured neck of femur
	Other fractures
Healthcare associated infection	Urinary tract infection
	Surgical site infection
	Pneumonia
	Blood stream infection
	Central line and peripheral line associated blood stream infection
	Multi-resistant organism
	Prosthetic associated infection
	Gastrointestinal Infections
Surgical complications requiring unplanned return to theatre	Post-operative haemorrhage/haematoma requiring transfusion and/or return to theatre
	Surgical wound dehiscence
	Anastomotic leak
	Vascular graft failure
	Other surgical complications requiring unplanned return to theatre
Unplanned Intensive Care Unit (ICU) admission or Medical Emergency Team (MET) Call	Unplanned ICU admission MET Call

Complication Group	Complication category(s)
Respiratory complications	Respiratory failure including acute respiratory distress syndrome requiring ventilation (invasive and/or non-invasive)
	Aspiration pneumonia
Venous thromboembolism	Pulmonary embolism
	Deep vein thrombosis
Renal failure	Renal failure requiring haemodialysis or continuous veno-venous haemodialysis
Gastrointestinal Bleeding	Gastrointestinal Bleeding
Medication complications	Drug related respiratory complications/depression
	Haemorrhagic disorder due to circulating anticoagulants
	Hypoglycaemia
Delirium	Delirium
Persistent incontinence	Urinary incontinence
Malnutrition	Malnutrition
Cardiac complications	Heart failure and pulmonary oedema
	Arrhythmias
	Cardiac arrest
	Acute coronary syndrome including unstable angina, STEMI and NSTEMI
Iatrogenic pneumothorax requiring intercostal catheter	Iatrogenic pneumothorax requiring intercostal catheter

Recommendation 1:

That the draft set of complications be supported as a national set of complications for local monitoring and review, subject to broader consultation and testing in a study of selected Australian hospitals. The pilot study should be a clinician-driven process with for example, clinicians determining the type of information they need and the processes required to monitor high priority complications within their hospital.

The following section outlines the specific complication categories within each complication group, the rational for inclusion in the set of high priority complications, issues for further consideration and implications for the study.

Full specification of the set of high priority complications including the specified ICD-10-AM codes and any comments for consideration is outlined in Appendix 5.

3.1 Pressure injury

Complication categories	• Stage I ulcer • Stage II ulcer • Stage III ulcer • Stage IV ulcer • Unspecified decubitus ulcer and pressure area
Rationale for inclusion	Pressure injury satisfies the criteria for preventability, high patient and health service impact and clinical priority. Whilst Stage III and IV ulcers have a great impact on the patient, the clinical reference group identified that hospitals should monitor all four stages of pressure injury as it is important to monitor lower stages of pressure injury (i.e. Stages I and II) to prevent these from deteriorating the more severe levels (i.e. Stages III and IV). *Preventing and Managing Pressure Injuries* is standard 8 of the National Safety and Quality Health Service Standards, 2011.
Issues for further consideration	Coding guidelines for decubitus ulcers and pressure areas stipulate that if there are multiple ulcer sites of differing stages assign only one code to indicate the highest stage. If the patient presents with a pre-existing pressure ulcer and the ulcer progresses to a higher stage whilst in hospital there are currently no clear guidelines that this should be assigned to COF 1. Consideration should be given to revising the currently rules to the cases in which these should be assigned a COF 1 to more accurately reflect multiple pressure ulcers and to clarify if progression of an ulcer to a more severe stage during the episode of care should be assigned as COF 1.
Implication for study	The study should test the feasibility of reporting of progressions of pressure injury during an admitted episode of care. The utility of collecting the ICD-10-AM code for 'unspecified decubitis ulcer and pressure area' should also be further assessed during the study.

3.2 Falls resulting in fracture and intracranial injury

Complication categories	• Intracranial injury • Fractured neck of femur • Other fractures
Rationale for inclusion	Falls resulting in fracture and intracranial injury satisfies the criteria for preventability, high patient and health service impact and clinical priority. *Preventing Falls and Harm from Falls*, is standard 10 of the National Safety and Quality Health Service Standards.
Issues for further consideration	Further consideration of the codes assigned for intracranial injury is required to ensure there are no issues of double counting. Head injury codes may be coded in combination with a loss of consciousness code. These codes may also be assigned separately in their own right. Consideration should also be given to whether there are specific fractures within 'other fractures' that have a high clinical priority and require routine monitoring.
Implication for study	The study should consider the utility of collecting fracture or injury ICD-10-AM codes independently. Consideration should be given to monitoring of these codes when followed by a falls external cause code – as has been implemented by CHADx.

3.3 Healthcare associated infection (HAI)

Complication categories	• Urinary tract infection • Surgical site infection • Pneumonia • Blood stream infection • Central line and peripheral line associated blood stream infection • Multi-resistant organism • Prosthetic associated infection • Gastrointestinal Infections
Rationale for inclusion	Healthcare associated infection satisfies the criteria for preventability, high patient and health service impact and clinical priority. It is noted that hospitals have healthcare associated infection surveillance systems that are an alternative monitoring mechanism of this complication group. The clinical reference group retained healthcare associated infection in the set of high priority complications due to their high impact, clinical priority and preventability and the importance of monitoring and maintaining

	vigilance in this area. *Preventing and Controlling Health Care Associated Infection* is standard 3 of the National Safety and Quality Health Service Standards.
Issues for further consideration	Specification of this complication group is subject to feedback from Australian Commission on Safety and Quality in Health Care's Healthcare Associated Infection (HAI) Advisory Committee. If 'central line and peripheral line associated blood stream infection' is included in the recommended specification, consideration could be given to expanding the existing codes in order to separately classify central line and peripheral line infections. Further consideration of 'multi-resistant organisms' and 'blood stream infection' is required to ensure that there are no issues in double counting. Multi-resistant organisms and blood stream infections are coded as supplementary to an infection source such as UTI or surgical site infection. One option to reduce the instance of double counting is the approach used by CHADx in coding infections.
Implication for study	The study should seek to compare rates of healthcare associated infection in both the administrative and surveillance data to determine accuracy of reporting and ensure there are no issues of double counting through the administrative data.

3.4 Surgical complications requiring unplanned return to theatre

Complication categories	• Post-operative haemorrhage/haematoma requiring transfusion and/or return to theatre • Surgical wound dehiscence • Anastomotic leak • Vascular graft failure • Other surgical complications requiring unplanned return to theatre
Rationale for inclusion	Surgical complications that require return to theatre satisfies the criteria for preventability, high patient and health service impact and clinical priority. While the specified complication categories may occur, they may not require return to theatre in every case. Subsequently the clinical reference group noted that monitoring of the identified complications where they do result in return to theatre, identifies a high level of patient and health service impact, preventability and clinical priority.

Issues for further consideration	Through the application of administrative data, it is not currently possible to identify patients who had an unplanned return to theatre. However, it was noted that unplanned returns to theatre are currently monitored at a local hospital or departmental level. Consideration should be given to the creation of a new data item of 'unplanned return to theatre' for reporting as part of national hospital data collections. It is important to note that ICD-10-AM codes that have been used to undertake data analysis for this complication group only identify surgical complications. Clinician review of the specified ICD-10-AM codes is required, specifically for the combination of codes used to identify *Post-operative haemorrhage/haematoma requiring transfusion and/or return to theatre*, to ensure accuracy and relevance of reporting of the complication category.
Implication for study	There is a requirement that consideration is given to the approach to reporting this complication group during the study. The clinical reference group identified that frequency of this complication group should be presented as a proportion of surgical patient days rather than all patient days.

3.5 Unplanned ICU admission or MET Call

Complication categories	• Unplanned ICU admission or • MET Call
Rationale for inclusion	Unplanned ICU admission and MET call was considered by the clinical reference group as important in identifying incidences of deteriorating patients. It satisfies the criteria for preventability, high patient and health service impact and clinical priority. *Recognising and Responding to Clinical Deterioration in Acute Health Care* is standard 9 of the National Safety and Quality Health Service Standards.
Issues for further consideration	Data is currently not collected through the administrative dataset that enables the identification of unplanned admission to ICU or MET Calls. However, it is noted that unplanned admissions to ICU are frequently monitored at a local level by ICUs. Similarly MET Calls are also monitored at a local level. One option to identify these events includes the creation of new data items 'unplanned admission to ICU' or 'MET Call' for reporting as part of national hospital data collections.

	It was noted that any new data items for 'Unplanned ICU' should be consistent with current definitions used by ANZICS Centre for Outcome and Resource Evaluation (CORE). The definition for this new data item should also consider relevant exclusionary criteria (e.g. exclude unplanned admission to ICU from an emergency department or operating theatre). The clinical reference group sought further advice regarding this complication group from the Commission's advisory group for the Deteriorating Patient Project and with ANZICS.
Implication for study	Await advice from relevant groups to finalise the definition of this complication group.

3.6 Respiratory complications

Complication categories	• Respiratory failure including acute respiratory distress syndrome requiring ventilation (invasive and/or non-invasive) • Aspiration pneumonia
Rationale for inclusion	Respiratory complications, specifically those that require ventilation satisfies the criteria for preventability, high patient and health service impact and clinical priority. Ventilation was identified by the clinical reference group as a marker to identify the more severe cases of respiratory failure that have a significant impact on the patient and hospital. It was noted that this group may include patients who have contracted a health care associated infection resulting in respiratory failure.
Issues for further consideration	None identified
Implication for study	None identified

3.7 Venous thromboembolism

Complication categories	• Pulmonary embolism • Deep vein thrombosis
Rationale for inclusion	Venous thromboembolism satisfies the criteria for preventability, high patient and health service impact and clinical priority.
Issues for further consideration	Clinicians noted the unexpected low frequency of DVT relative to PE in the administrative data presented. This was considered in part as a result of the fact that DVT is typically identified post admission and managed in the community. Therefore, it is not captured in hospital administrative data. Consideration could be given to capturing readmissions for DVT where DVT is the Principal Diagnosis. The ICD-10-AM codes currently identifying DVT do not include DVT occurring in pregnancy, postpartum or following an abortion or ectopic pregnancy. Inclusion of these codes for the purpose of the study may wish to be considered.
Implication for study	The study should review utility of monitoring DVT using hospital administrative data.

3.8 Renal failure

Complication categories	• Renal failure requiring haemodialysis or continuous veno-venous haemodialysis
Rationale for inclusion	Renal failure requiring haemodialysis or continuous veno-venous haemodialysis satisfies the criteria for high patient and health service impact and clinical priority. Dialysis was identified by the clinical reference group as a marker to identify the more severe cases of renal failure that have a significant impact on the patient and hospital. It was considered that the broad category of renal failure could capture patients with elevated creatinine levels where there is no substantive impact (i.e. false positives).
Issues for further consideration	Explore whether there are other clinical characteristics for which there is an ICD-10-AM code associated with renal failure in addition to haemodialysis that would indicate a level of severity of renal failure. The clinical reference group noted that there were limitations in collecting data that only identified renal failure with dialysis. The reference group suggested that 'transfer for dialysis' could also be considered in order to capture renal failure requiring dialysis for patients in hospitals that do not provide dialysis. A further suggestion was made to consider mortality from renal failure in order to identify

	patients who die before receiving dialysis. Consideration should also be give to modifying coding rules so renal failure is only coded when there is a threshold impact (i.e. so that elevated levels of creatinine are not assigned as kidney failure).
Implication for study	The study should consider monitoring renal failure with and without dialysis and consider possible ICD-10-AM codes and/ or administrative data items for identifying 'renal failure with hospital transfer' and 'renal failure with death'

3.9 GI Bleeding

Complication categories	• Gastrointestinal Bleeding
Rationale for inclusion	GI Bleeding satisfies the criteria for high preventability, patient and health service impact and clinical priority.
Issues for further consideration	Clinician review of the specified ICD-10-AM codes under this complication is required to ensure accuracy and relevance of reporting of the complication.
Implication for study	Determine the utility of using administrative data in order to monitor this complication.

3.10 Medication complications

Complication categories	• Drug related respiratory complications/depression • Haemorrhagic disorder due to circulating anticoagulants • Hypoglycaemia
Rationale for inclusion	Medications complications satisfies the criteria for preventability, high patient and health service impact and clinical priority. It is noted that hospitals have incident management and reporting systems in order to identify any medication errors (in prescribing/dispensing/administration) and capture drug interactions. In addition, some health services will have a medication management plan in place for reducing harm associated with high risk medications. These lists often focus on the management of anticoagulants, opioids and narcotics, and hypoglycaemics. The clinical reference group retained medication complications in the set of high priority complications due to their high impact, clinical priority and preventability and the importance of monitoring and

	maintaining vigilance in this area. *Medication Safety* is standard 4 of the National Safety and Quality Health Service Standards.
Issues for further consideration	For the purposes of this project, this complication category has been analysed based upon ICD-10-AM additional diagnosis codes. There are a number of external cause codes that could be considered to expand the range of cases that would be considered in this complication group. In particular assignment of external cause codes relating to opioids, sedatives and narcotics secondary to respiratory complications/depression could be considered. Consideration could be given to the method used by CHADx.
Implication for study	The study could be used to test an expanded range of cases comprising additional diagnoses coupled with external cause codes. Refer to the matter discussed under 'Issues for further consideration' The study should seek to compare rates of medication complications in both the administrative and incident reporting system data to determine accuracy of reporting and ensure there are no issues of double counting through the administrative data.

3.11 Delirium

Complication categories	• Delirium
Rationale for inclusion	Delirium satisfies the criteria for high patient and health service impact and clinical priority and was considered to have a medium level preventability. The clinical reference group discussed the consequences of delirium on other complications including falls.
Issues for further consideration	Clinician review of the specified ICD-10-AM codes under this complication is required to ensure accuracy and relevance of reporting of the complication, specifically whether F05.1 *Delirium superimposed on dementia* where the delirium component occurs during hospital should be assigned a COF 1. Consideration should also be given to whether a documentation of confusion in hospital is synonymous with delirium. *Delirium* is classified to codes within the mental health chapter but *confusion* is classified within the signs and symptoms chapter. The indexing for confusion and delirium also needs refinement to support accurate assignment as they are currently ambiguously indexed.
Implication for study	The study should test utility and specificity of monitoring delirium using hospital administrative data.

3.12 Persistent incontinence

Complication categories	• Urinary incontinence
Rationale for inclusion	Persistent urinary incontinence satisfies the criteria for medium preventability, high patient and health service impact and clinical priority. In addition, the clinical reference group identified the impact that persistent urinary incontinence could have on other in –hospital complications including falls and urinary tract infections.
Issues for further consideration	Pre-existing conditions such as urinary incontinence will not usually have a COF 1 assigned. However, urinary incontinence that arises during an episode of care, that meets the specialty coding guidelines for assignment i.e. is present on discharge or persists for seven days or more may have COF 1 assigned. Consideration needs to be given to developing clear coding guidelines supporting the assignment of COF 1 for persistent urinary incontinence to ensure that it is captured as part of the set of high priority complications. Consideration should also be given to whether post procedural incontinence should be captured. This could be identified through the combination of a procedure code and incontinence code.
Implication for study	The study should test utility and specificity of monitoring persistent incontinence using hospital administrative data.

3.13 Malnutrition

Complication categories	• Malnutrition
Rationale for inclusion	Malnutrition satisfies the criteria for preventability, high patient and health service impact and clinical priority.
Issues for further consideration	Malnutrition occurring during the episode of admission will only be assigned if it is documented by a clinician (including dietitian) and will be assigned as hospital onset COF if documentation is explicit that it arose during the admission. Explicit documentation and coding guidelines would assist the capture of malnutrition occurring in hospital. Clinician review of the specified ICD-10-AM codes under this complication is required to ensure accuracy and relevance of reporting of the complication.

Implication for study	The study should determine the utility of reporting of this complication.

3.14 Cardiac complications

Complication categories	• Heart failure and pulmonary oedema • Arrhythmias • Cardiac arrest • Acute coronary syndrome including unstable angina, STEMI and NSTEMI
Rationale for inclusion	Complication categories within this group fall into high, medium and low levels of preventability. However the patient and health service impact is high with high clinical priority.
Issues for further consideration	The clinical reference group identified the potential risk that some patients may be predisposed to a complication because of prior cardiac history. This is in part addressed by the assignment of the COF. Currently the Australian Coding Standards stipulate that where a pre-existing condition is exacerbated during an episode of admitted patient care it is identified as a condition *not* noted as arising during the episode of patient care or occurring prior to admission (COF 2). Examples of this include atrial fibrillation and unstable angina. The assignment of COF is further discussed in Section 0. Another option is to address is this through the use of the exclusion principle used by the DRG classification system. This is further discussed in Section 4.5.
Implication for study	The study should determine the utility of reporting of this complication in the context of pre-existing complications and comorbidities.

3.15 Iatrogenic pneumothorax requiring intercostal catheter

Complication categories	• Iatrogenic pneumothorax requiring intercostal catheter
Rationale for inclusion	While this complication occurred in the activity data in low volumes it was retained by the reference group because of its extremely high preventability and significant impact on the patient. It is noted that this complication would likely also be reported locally through the health service incident reporting system.
Issues for further consideration	None identified
Implication for study	The study should determine the utility of using administrative date to monitor this complication in contrast to incident reporting systems.

4. Matters for further consideration

This section provides a brief discussion of the matters for further consideration that arose over the course of the project and outlines recommendations for consideration.

4.1 Complications specific to clinical domains

The following clinical domains were identified by the clinical reference group as requiring advice from specialty advisory groups:

- Mental health;
- Obstetrics;
- Paediatrics; and
- Healthcare associated infection (HAI).

Mental health

The clinical reference group recommended that the identification and prioritisation of mental health complications for routine monitoring should be referred to the relevant mental health committees by the Australian Commission on Safety and Quality in Health Care for advice.

There are a number of national mental health initiatives and expert committees that are currently considering national monitoring of mental health indicators including safety and quality indicators. These initiatives build on the *National Action Plan on Mental Health 2006-2011*.[16]

- The *Fourth National Mental Health Plan 2009-2014* which includes national quality and safety indicators to monitor health service performance on safety and quality indicators.[17]
- The *National Mental Health Commission* which was established in 2012 and publishes the *National Report Card on Mental Health and Suicide*, which specifically references the monitoring of seclusion and restraint.[18]
- The *National Mental Health Commission* also convened the Expert Reference Group to provide advice to the COAG Working Group on Mental Health Reform on the development on national indicators and targets to support ongoing mental health reform efforts. The final report released in September 2013 'National Targets and Indicators for Mental Health Reform', details a large number of indicators to support mental health reform including:
  - the rate of seclusion (in admitted patient settings) per 1,000 separations;
  - the rate of restraint (in admitted patient settings) per 1,000 separations; and

[16] COAG (2012) National Action Plan for Mental Health 2006-2011: Foruth progress report covering implementation to 2009-10. Canberra. Accessed 4 October 2013 from <http://www.coag.gov.au/sites/default/files/NAP%20on%20Mental%20Health%20-%20Fourth%20Progress%20Report.pdf>.

[17] Department of Health and Ageing (2009) 'Forth National Mental Health Plan', Accessed 4 October 2013 from <http://www.health.gov.au/internet/publications/publishing.nsf/Content/mental-pubs-f-plan09-toc>.

[18] Mental Health Commission (2013) 'Our Report Card' Accessed 4 October 2013 from: <http://www.mentalhealthcommission.gov.au/our-report-card.aspx>.

- the number of safety incidents involving severe harm or death of consumers in mental health related services.[19]

- The *National Health Performance Authority* (the Authority) was established in 2011 to monitor and report on comparable performance of Local Hospital Networks, public and private hospitals and primary health care organisations. The Authority has prepared the first Three-Year Rolling Data Plan for period 2013–2016. The Data Plan outlines data sets which are required by the Authority to report nationally comparable performance of health care organisations. Datasets include:
  - Mental Health Establishments National Minimum Data Set; and
  - Mental health data from the Admitted Patient Care National Minimum Data Set.[20]
- In addition to the above initiatives, the Mental Health Information Strategy Subcommittee, which reports to the Australian Health Ministers' Advisory Council, provides technical advice and makes recommendations on policy development to support efforts pertaining to information requirements related to the National Mental Health Strategy, including the development of the aforementioned *National Mental Health Plan*.[21]

Obstetrics

The clinical reference group recommended that the set of high priority complications relating to obstetrics identified as part of this project (maternal death; perineal tears; and post partum haemorrhage) should be referred to the Australian Commission on Safety and Quality in Health Care's Maternal Sentinel Event and Post Partum Haemorrhage Advisory Group for further advice. The Advisory Group is currently considering the national approach to specification and routine review of these adverse events.

Advice from the Advisory Group will also be sought on whether the Perinatal National Minimum Data Set (PNMDS) is a more suitable collection for monitoring high priority complications related to obstetrics. At present the PNMDS collects data items relating to the mother, including demographic characteristics and factors relating to the pregnancy, labour and birth, and data items relating to the baby, including birth status, sex and birth weight. Midwives or other birth attendants collect data using administrative and clinical records and these data are forwarded to the relevant state or territory health authority on a regular basis. Data for each year are provided to the Australian Institute of Health and Welfare (AIHW) National Perinatal Epidemiology and Statistics Unit for national collation, on an annual basis.[22]

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[19] Mental Health Commission (2013) 'National Targets and Indicators for mental health reform: Report to COAG Working Group on Mental Health Reform'. Accessed 3 October 2013 from <http://www.mentalhealthcommission.gov.au/our-work/expert-reference-group.aspx>.

[20] National Health Performance Authority (2013) 'Data Plan 2013-2016'. Accessed 3 October 2013 from <http://www.nhpa.gov.au/internet/nhpa/publishing.nsf/Content/Data-Plan-2013-16>.

[21] Australian Health ministers Advisor Council (2013) 'Mental Health Information Strategy Subcommittee' Accessed 4 October 2013 from < http://www.health.gov.au/internet/mhsc/publishing.nsf/Content/mhisc-1>.

[22] Donnolley N & Li Z (2012). *Perinatal National Minimum Data Set compliance evaluation 2006 to 2009.* (Perinatal statistics series no. 26. Cat. no. PER 54). Sydney: AIHW National Perinatal Epidemiology and Statistics Unit.

Paediatrics

The indicative tables in Appendix 6 of this document were produced for the paediatric population and forwarded to the paediatric representative for consultation with *Children's Healthcare Australasia*, to advise: which of the complications in the currently defined high priority set are relevant to paediatrics; and whether there are other complications not on this set that are high priority for paediatrics.

The paediatric representative identified that the identified set of high priority complications was relevant to paediatrics, except for the following complications:

- incontinence; and
- delirium.

Other complications specific to paediatrics are currently being considered by the paediatric representative and his colleagues.

It was highlighted that the study should ideally include at least one paediatric hospital and another hospital with a paediatric unit to test the utility of the high priority complications for paediatric cohorts.

Healthcare associated infection (HAI)

The clinical reference group recommended that the set of high priority complications relating to healthcare associated infections should be referred to the Australian Commission on Safety and Quality in Health Care's Healthcare Associated Infection (HAI) Advisory Committee for further advice.

The HAI Advisory Committee consists of experts and key stakeholders tasked with setting priorities for action, providing advice and assisting on issues related to the Commission's HAI program. Among other responsibilities, the HAI Advisory Committee recommends and monitors national standards and indicators for HAI. Developing routine surveillance of a number of HAIs is part of the Commission *Work Plan 2013-16*.[23]

Advice from the Advisory Committee will also be sought on whether other HAI surveillance systems may be more suitable than activity data for reporting of high priority health care associated infections.

Recommendation 2:

That the Commission seek advice on priority complications and data sources in specific clinical domains from peak clinical organisations and groups in mental health, maternity, paediatrics, and healthcare-associated infection. Additionally, advice should be sought from the Commission's Deteriorating Patient Project Advisory Group and ANZICS regarding the inclusion of either 'MET Call' or 'Unplanned admission to ICU'.

[23] Australian Commission on Safety and Quality in Health Care, Healthcare Associated Infection Advisory Committee, Accessed 3 October 2013 from < http://www.safetyandquality.gov.au/our-work/healthcare-associated-infection/national-hai-surveillance-initiative/hai-advisory-committee/>

4.2 Potential new data items for the *Admitted Patient Care National Minimum Data Set*

The clinical reference group identified that there were a number of events that identify clinical deterioration. Recognition and response to clinical deterioration in acute health care remains a high-priority safety and quality initiative and is the object of Standard 9 of the *National Safety and Quality Health Service Standard*s.

The events identified by the clinical reference group are:

- Medical Emergency Team (MET) Call; or
- Unplanned admission to the Intensive Care Unit; and
- Unplanned return to theatre.

These events are currently not specified within the *Admitted Patient Care National Minimum Data Set*.

One option to specify these events includes the creation of new data items 'unplanned admission to ICU' or 'MET Call' for reporting as part of national hospital data collections. The clinical reference group noted that any new data items for 'Unplanned ICU admission' should be consistent with current definitions used by ANZICS Centre for Outcome and Resource Evaluation (CORE). The definition for this new data item should also consider relevant exclusionary criteria, such as unplanned admission to ICU from an emergency department or operating theatre.

Collection of data items relating to unplanned return to theatre in combination with surgical complications as outlined in Section 3.4 would enable surgical complications with a significant patient and hospital impact and high clinical priority to be identified through administrative data.

The clinical reference group resolved to seek further advice regarding this complication group from the Commission's advisory group for the Deteriorating Patient Project and with ANZICS. Additionally, the clinical reference group recommended that advice be sought from surgical groups on unplanned return to theatre.

Recommendation 3:

That the Commission consider the development of the following new data items for inclusion in the Admitted Patient Care National Minimum Data Set:

- *unplanned return to theatre; and*
- *unplanned admission to ICU, or MET Call.*

Advice would be sought from IHPA, AIHW and NCCH as to whether new data items, or new ICD 10 AM codes, are more appropriate to achieve this.

4.3 Enhancement of documentation and coding guidance for high priority complications

The ability to accurately monitor and report the set of high priority complications is reliant of the quality of clinical documentation and ability of coders to assign the relevant ICD-10-AM codes.

To support the monitoring of the national set of high priority complications, clear guidance is required for clinicians and coders regarding the documentation and coding requirements for each complication. The clinical reference group advised that draft documentation and coding guidelines should be developed and used during the study and then revised and provided to the NCCH post study with a view to updating the Australian Coding Standards[24] to accommodate the recommended set of high priority complications.

In addition, guidance relating to the assignment of the condition onset flag (COF) is also required, particularly for its assignment in relation to delirium and pressure injury.

Note: Recommendations concerning coding are grouped together in Recommendation 5 at the end of Section 4.

Recommendation 4:

That the Commission work with clinicians to develop guidelines for documentation of the set of high priority complications in patient records.

[24] Australian Coding Standards for ICD-10-AM and ACHI, National Centre for Classification in Health.

4.3.1 Assignment of Condition Onset Flag

The project identified that there is potential for variation in assignment of the Condition Onset Flag (COF) for conditions arising during the episode of care (COF 1). This variation was considered particularly likely for chronic or pre-existing conditions that are exacerbated during admission and conditions where there are acute components of chronic conditions specified in one code. Box 1 details the current coding rules for assigning COF and demonstrates the complexity in assigning COF 1.

Box 1: Current coding rules regarding assignment of Condition Onset Flag

Pre-existing conditions[25]

A pre-existing condition that is exacerbated during an episode of admitted patient care is currently identified by the Australian Coding Standards (ACS) as a condition *not* noted as arising during the episode of patient care or occurring prior to admission (COF 2). The ACS define conditions that should be assigned a COF 2 as *'a condition previously existing or suspected on admission such as the presenting problem, a comorbidity or chronic disease'.* An example of an inclusion within this group as specified by the ACS is *'a previously existing condition that is exacerbated during the current episode of admitted patient care (e.g. atrial fibrillation, unstable angina)'.*

Should it not be possible to identify whether a condition was present at the beginning of the episode of patient care, the condition should be assigned as COF 2. For example where a patient is admitted with pneumonia and during admission, the patient is also diagnosed with UTI. If it cannot be determined whether the UTI arose during or prior to the admitted episode of care, the rule stipulates that both Pneumonia and UTI should be allocated a COF 2 as pre-existing conditions.

Acute components of chronic conditions

There have been recent changes to the coding rule for the assignment COF 1 for acute components of chronic conditions. Where two conditions are contained within a 'combination code', for example, *Type 2 diabetes with lactic acidosis, without coma*, or *Type 2 diabetes mellitus with hypoglycaemia*, the acute components contained in these codes are defined as occurring in hospital. In order to capture the acute component it is now acceptable to assign COF 1 to those 'combination' codes, as the COF 1 refers to the acute component of the chronic condition in that code.

The complexity of the assignment of COF 1 outlined in Box 1 above demonstrates the need for clear guidelines for assignment of COF for the set of high priority complications. The following section details complication groups for which specific clarification is required.

Delirium

The current specification for delirium includes the ICD-10-AM code *F05.1 Delirium superimposed on dementia*. Consideration should be given to whether the delirium component occurring during admission should have COF 1 assigned as an acute component of a chronic condition.

[25] Australian Coding Standards Eighth Edition of the (ACS), Coding Standard ACS 0048 Condition onset flag

The rules currently specify that COF 1 is not assigned to chronic conditions meaning that it would be unlikely to be assigned to *Delirium superimposed on dementia*. A coder's determination of whether this code has a COF 1 assigned will be based on whether *Delirium superimposed on dementia* is deemed an exacerbation of an existing condition or a 'combination code' specifying an acute component of a chronic disease.

Clarification of the approach to assigning the COF for *Delirium superimposed on dementia* is required to remove any ambiguity.

Pressure injury

Coding guidelines for decubitus ulcers and pressure areas advise that, if there are multiple ulcer sites of differing stages, one code only should be assigned to indicate the highest stage. If the patient presents with a pre-existing pressure ulcer and the ulcer progresses to a higher stage whilst in hospital there are currently no clear guidelines that this should be assigned to COF 1.

The rules could be revised to more accurately reflect multiple pressure ulcers and to clarify that progression of an ulcer to a more severe stage during the episode of care should be assigned as COF 1.

4.4 Refinements of ICD-10-AM codes

There are a number of specific complication categories where the specified ICD-10-AM codes could be further refined to enable more accurate identification of the set of high priority complications. Specific complication categories requiring refinement as identified by the NCCH are outlined below.

- **Central and peripheral line infection.** An expansion of T827 *Infection and inflammatory reaction due to other cardiac and vascular devices implants and grafts*, by adding a fifth character to the end of the current code, could be considered in the future to uniquely classify central and peripheral line infections.
- **Post-operative haemorrhage /haematoma requiring transfusion and/or return to theatre.** An expansion of T810 *Haemorrhage and haematoma complicating a procedure NEC*, again by including a fifth character at the end of the current code, could be considered in the future to distinguish haemorrhage from haematoma. Similarly T828, T838, T848, T858 could be expanded at the fifth character level to distinguish haemorrhage associated with prosthetic device from other complications such as embolism, fibrosis, pain, stenosis and thrombosis which are also currently classified to these codes.
- **Anastomotic leak.** There are currently multiple combinations of codes to determine anastomotic leaks. If deemed important, consideration should be given to either creating a new code (which may require approval from the World Health Organization) or expanding an existing code to distinguish anastomotic leaks in the classification.
- **Vascular graft failure.** There are currently multiple codes and concepts to classify within 'vascular graft failure.' There is a need to clearly define what is encompassed within 'vascular graft failure'. Subsequently, a determination is required as to whether it is necessary to expand existing codes to distinguish this complication more accurately.
- **Constipation.** This complication was not included in the recommended set of high priority complications as the ICD-10-AM code can be used regardless of the level of severity or persistence of the problem. The clinical reference group was concerned that the inclusion of this condition would not uniquely identify more severe cases (e.g. high priority complications).

The clinical reference group considered limiting this complication to faecal impaction (a unique ICD-10-AM code exists to identify this) however, the frequency of cases was considered too low. There may be an opportunity to develop a range of codes that differentiate levels of severity or to modify the coding guidelines to limit the use of this code for cases where the problem is persistent (as is the case with the coding guidelines for urinary incontinence).

4.5 Mitigating against pre-disposition to a complication

The clinical reference group advised that some patient cases have a high predisposition to the onset of certain complications and that the inclusion of these cases in a set of potentially preventable complications would not be useful or warranted. There were two scenarios identified in which this could occur:

1 where a patient has a pre-existing condition or comorbidity; and

2 where a patient is admitted with a principal diagnosis which has a high likelihood of an associated complication occurring during treatment/management of the patient.

The first case is addressed (with caveats noted in 4.3.1) by the rules surrounding assignment of the COF for pre-existing conditions.

To mitigate against the inclusion of cases in the second scenario, opportunities exist to use the AR-DRG classification 'exclusion principle'. The 'exclusion principle' voids the inclusion of an additional diagnosis that might otherwise have been deemed a significant complication, where that additional (secondary) diagnosis is highly associated with a principal diagnosis.[26] Consideration could be given to the development of an algorithm for the study that applies the exclusion list relevant to the high priority complications.

4.6 Other study design considerations

- **Refining the specified set of high priority complications:** The purpose of this project was to undertake a clinician-driven process to identify a national set of high priority complications for local monitoring and review. Additional work is required to further refine each of the complication groups and categories, including the individual ICD-10-AM codes assigned to each group (refer to Appendix 5 and Section 3 for specific details). More substantial clinician follow up is required to refine the set of complications. This could involve engaging relevant clinical subspecialty groups prior to the study to consider whether categories need to be further refined or the use of the CHADx to inform the use of relevant ICD-10-AM codes and combinations of codes.
- **Involvement of NCCH in study design:** The design of the study should involve input from the NCCH to ensure the study will provide insight into potential coding issues including the application of COF, particularly for pre-existing conditions.
- **Hospital selection for the study**: The pilot study should include a cross section of hospitals across peer groups and jurisdictions to test the recommended set of complications in multiple settings. The selection of hospitals for the pilot study should also include at least one paediatric hospital to test the utility of the high priority complications for paediatric cohorts.

[26] Australian Department of Health and Ageing (2000). Development of the Australian Refined Diagnosis Related Group (AR-DRG) Classification Version 4, Volume 3 Complications and comorbidities in AR-DRG classification Version 4.0. Commonwealth of Australia Canberra 2000.

- **Testing for sensitivity, specificity, feasibility and utility**: The study needs to be designed to test the following attributes:
  - ***Sensitivity:*** is the individual complication category sensitive to underlying quality and safety issues?
  - ***Specificity:*** is each complication category sufficiently specific to be clinically precise?
  - ***Feasibility:*** how feasible is it to collect data to monitor the complication, taking into account any changes to the complication that may need to be made arising from the experiences of the study?
  - ***Utility:*** is the complication category clinically useful, enabling clinicians to identify changes required to improve quality and safety?
- **Specific guidelines for clinical and coding community**: In order to support the study, specific guidelines for the clinical and coding community are required which specifically outline how health services should be collecting the national set of complications. This should include guidelines around clinician documentation in the medical record and coder assignment of complications, particularly the use of specific ICD-10-AM codes, data items and COF. Draft coding guidelines should be developed and used during the study and then revised and provided to the NCCH post study with a view to updating the Australian Coding Standards[27] to accommodate the recommended set of high priority complications.
- **Comparative data**: The study hospitals should be provided with comparative data to complement data that would be extracted from their own administrative data. This would assist in monitoring the incidence of high priority complications. The comparative data should take into account the speciality/role of the hospital (to compare like with like) and standardise for factors that could explain variation in rates that are not related to quality of care (e.g. severity of illness, complexity of surgery). For surgical complications reporting of frequency should be considered using separations as the denominator or time in theatre/procedural suite for this complication group rather than patient days as a whole.[28]
- **Use of surveillance data and incident reporting data**: Surveillance data collections and incident reporting systems are already capturing some of the complications identified as part of this project (e.g. healthcare associated infections and medication complications). The study should seek to compare rates generated by the administrative data with those of local system reports to determine the utility and accuracy of reporting for the set of high priority complications.
- **Involvement of NCCH in the assessment of study outcomes:** Following completion of the study the NCCH should be involved in the overall assessment of the study outcomes to enable any issues to be captured and included in updates to coding guidelines.

[27] Australian Coding Standards for ICD-10-AM and ACHI, National Centre for Classification in Health.

[28] Patient days has been used as the denominator as the longer the patient stay the higher the risk of a complication arising from inadequate patient care/management. Surgical complications are a consequence of inadequate pre-operative care and/or surgery and/or care during surgery and/or post operative management.

Recommendation 5: *That the Commission and IHPA work with the NCCH on a range of coding issues including:*

i. *seeking advice on refinements to relevant ICD-10-AM codes relating to the list of complications;*

ii. *seeking advice on possible requirements for revisions to the Australian Coding Standards for the set of high priority complications;*

iii. *reviewing the current guidelines for assignment of the COF in relation to pre-existing conditions based upon the results of the study;*

iv. *developing guidelines supporting the assignment of the COF for certain complications including delirium superimposed on dementia and pressure injury progression during an episode of care; and*

v. *developing a high priority complications algorithm to effect the 'exclusion principle' in order to void the inclusion of certain additional (secondary) diagnoses that are considered to be highly associated with a principal diagnosis.*

Appendix 1: Members of the clinical reference group

The table below outlines the members of the clinical reference group convened by the Commission. Please note that not all members of the group were able to attend all meetings.

Table 3: Members of the clinical reference group

Title	First name	Surname	Clinical group/Represents	State/Territory
Ms	Alison	McMillan	Nursing	VIC
Ms	Amber	Roberts	Pharmacy	TAS
Dr	Amanda	Ling	Medical Administration	WA
Dr	Amod	Karnik	Intensive Care Medicine	QLD
A/Prof	Andrew	Turner	Intensive Care Medicine	TAS
Dr	Bernard	Whitfield	Ear Nose and Throat Surgery/Injuries/Trauma	QLD
A/Prof	Brian	McCaughan	Cardiothoracic surgery	NSW
A/Prof	David	Storey	Upper Gastrointestinal surgery	NSW
Prof	Fiona	Wood	Plastic Surgery (Burns)	WA
Prof	Geoff	Donnan	Neurology	VIC
Mr	Graham	Reynolds	Paediatrics	ACT
Dr	Jonny	Taitz	Paediatrics	NSW
Dr	Jill	Newland	Rural Medicine	QLD
Prof	John	Turnidge	Infectious Diseases	SA
A/Prof	Liza	Heslop	Nursing/Pregnancy and Childbirth	VIC
A/Prof	Paul	Varghese	Geriatrics/ Rehabilitation	QLD
Dr	Philip	Hoyle	Medical Administration	SA
Mr	Peter	Hibbert	Safety and Quality	NSW
Mr	Russell	McGowan	Consumer	ACT
A/Prof	Sergio	Diez Alvarez	Critical Care	NSW
Ms	Sue	Davis	Nursing Stacey Roach - Ag EA	WA
Dr	Terri	Jackson	Medical Research	VIC
Ms	Jenny	Hargreaves	Australian Institute of Health and Welfare	AIHW
Mr	Dan	O'Halloran	National Health Performance Authority	NHPA

Appendix 2: Complications identified during examination of safety literature and incident reporting system reports

The table below documents the complications identified as part of the examination of safety literature and incident reporting system reports.

Table 4: Conditions identified as part of the examination of patient safety literature

Complication Group	Complication category(s)	Complication(s)
Pressure area	Decubitus ulcer	Unspecified decubitus ulcer and pressure area Stage I ulcer Stage II ulcer Stage III ulcer Stage IV ulcer
Infection	Urinary Tract Infection	Unspecified UTI
		Catheter related UTI
	Wound infection	Open wound with infection
		Traumatic wound infection
		Surgical site infection
		Obstetric wound infection
	Respiratory infection	Unspecified hospital acquired pneumonia
		Acute lower respiratory tract infection
	Sepsis	Nosocomial sepsis
		Post operative sepsis
		Septicaemia with shock
	Systemic inflammatory response syndrome (SIRS)	SIRS of infectious origin without acute organ failure
		SIRS of infectious origin with acute organ failure
	Device associated infection	Central Venous catheter infection
		Peripheral line infection
	Infusion related infection	Infections following infusion, transfusion and therapeutic injection
Inflammatory response	SIRS	SIRS of noninfectious origin without acute organ failure

Complication Group	Complication category(s)	Complication(s)
		SIRS of noninfectious origin with acute organ failure
Non infective pneumonia	Aspiration pneumonia	Pneumonitus due to food and vomit
		Inhalation of gastric contents
Venous thromboembolism	Pulmonary embolism	Pulmonary embolism (including post operative) with cor pulmonale
		Pulmonary embolism (including post operative) without cor pulmonale
	Deep vein thrombosis	Phlebitis and thrombophlebitis of other deep vessels of lower extremities
Deep wound complications (non infective)	Wound dehiscence	Surgical wound dehiscence
		Caesarean wound dehiscence
		Perineal obstetric wound dehiscence
Blood transfusion complications	Haemolytic blood transfusion incompatibility reactions	ABO incompatibility reaction
		Mismatched blood used in transfusion
	Transfusion attributable acute respiratory distress syndrome	Respiratory failure (type I and type II)
		Acute respiratory distress syndrome (ARDS)
Medication complications	Drug associated haemorrhage	Haemorrhagic disorder due to circulating anticoagulants,
		GI bleeding
		Bleeding from ENT
		Bleeding from respiratory tract
		Gingiva bleeding
		Genitourinary bleeding
		Unspecified haematuria, (PV bleeding),
	Drug related hypertension/hypotension	Hypotension
		Essential hypertension
	Drug related respiratory complications/depression	Respiratory failure
		Pulmonary collapse

Complication Group	Complication category(s)	Complication(s)
	Drug related GI complications	Constipation
		Nausea and vomiting
	Drug related reactions	Anaphylactic shock
Embolism	Intravascular gas embolism resulting in death or neurological damage	Air embolism following infusion, transfusion and therapeutic injection
		Obstetric air embolism
		Other effects of decompression and barotrauma
Falls	Fall resulting in non fracture injury	Intracranial injury
	Fall resulting in fracture	Fractured neck of femur
Nutritional complications	Malnutrition	Moderate protein-energy malnutrition
		Mild protein-energy malnutrition
		Unspecified protein-energy malnutrition
Device complication	Failed/blocked/ruptured/ aneurysm, vascular grafts	Aneurysm and dissection, Failed/blocked/ruptured grafts
		Mechanical complication of coronary artery bypass and valve grafts
		Mechanical complication of other vascular grafts
Obstetric Complications	Maternal death	Obstetric death of unspecified cause
		Death from any obstetric cause occurring more than 42 days but less than one year after delivery
		Death from sequelae of obstetric causes
	Obstetric trauma	1^{st} – 4^{th} degree perineal tears
	Post partum haemorrhage	(various classifications of severity)
Surgical complications	Retained instrument	Foreign body accidentally left in body cavity or operation wound following a procedure
		Acute reaction to foreign substance accidentally left during a procedure

Complication Group	Complication category(s)	Complication(s)
	Surgical trauma	Accidental puncture and laceration
	Inadequate reduction of a fracture/poor alignment / reset of fracture	Complications of internal orthopaedic prosthetic devices, implants and grafts for displaced/malposition due to orthopaedic prosthetic devices, implants
	Incorrect procedure	Surgery performed on incorrect patient, incorrect site, in correct side
	Post-operative complications	Post-operative nausea and vomiting
		Post-operative haemorrhage
		Post-operative haematoma
		Acute post-operative pain
		Incisional, parastomal hernia
		Postlaminectomy syndrome
Suicide	Suicide	In-patient suicide
		Community suicide of service client
Cardio-pulmonary failure	Cardiac complications	Heart failure
		Cardiac arrest with successful resuscitation
		Sudden cardiac death
		Acute myocardial infarction
	Respiratory complications	Respiratory failure (type I and II)
		ARDS
		Pulmonary collapse
		Pulmonary oedema
		pneumothorax

Appendix 3: Complications identified by individual members of the clinical reference group

The table below documents the complications identified through correspondence with individual members of the clinical reference group prior to the two day workshop.

Table 5: Complications identified by members of the clinical reference group

Complication Group	Complication category(s)	Complication(s)	Outcome
Complications common to all patients	Falls (including injury falls)		Included in the recommended set of complications
	Pressure area complications	Decubitus ulcers	Included in the recommended set of complications
	Hospital acquired infections	Pneumonia	Included in the recommended set of complications
		CLAB/ Peripherally inserted central catheter	Included in the recommended set of complications
		Urosepsis	Included in the recommended set of complications as 'Urinary Tract Infection'
		Cannula site	Included in the recommended set of complications as 'Central line and peripheral line associated blood stream infection'
		Wound	Included in the recommended set of complications
		Bacteremia / septicaemia / Bloodstream infection	Included in the recommended set of complications
	Thromboembolic complications	DVT	Included in the recommended set of complications
		PE	Included in the

Complication Group	Complication category(s)	Complication(s)	Outcome
			recommended set of complications
	Unplanned admission or readmission to ICU including respiratory failure necessitating ventilation +/- tracheostomy		Included in the recommended set of complications
	Major adverse drug reactions /medication errors (various)		Included in the recommended set of complications
	Cerebrovascular catastrophe		Not included in the recommended set of complications due to low preventability and low volume. Complications associated with circulating anticoagulants captured in medication safety complication.
	Cardiac complications / cardiogenic shock /major arrhythmias unrelated to principal diagnosis		Included in the recommended set of complications
	Renal failure requiring dialysis		Included in the recommended set of complications
	Mental state disturbances , particularly delirium		Included in the recommended set of complications as 'delirium'
Complications in patients having an operation or intervention :	Unplanned return to Operating Room for the specified complications:	Bleeding	Captured by 'Other surgical complications requiring unplanned return to theatre'
		Wound dehiscence	Included in the recommended set of complications
		Anastomotic breakdown	Included in the recommended set of

Complication Group	Complication category(s)	Complication(s)	Outcome
		(examples from many types of surgery)	complications
		Vascular graft failure	Included in the recommended set of complications
		Significant wound infection	Included in the recommended set of complications as 'Surgical site infection'
	Prosthesis failure including infection		Included in the recommended set of complications as 'Prosthetic associated infections'
	Postoperative complications as listed above for all patients		Captured by 'Other surgical complications requiring unplanned return to theatre'
Complications related to Obstetric / Neonatal patients			Obstetric complications will be referred to the to the Australian Commission on Safety and Quality in Health Care's Maternal Sentinel Event and Post Partum Haemorrhage Advisory Group for further advice
Delayed/failed diagnosis			Not included in the recommended set of complications due to difficulty in clearly defining this complication
Delayed treatments			Not included in the recommended set of complications due to difficulty in clearly defining this complication

Appendix 4: Complications that were considered and excluded from the recommended set

This appendix comprises complications that were excluded following their initial identification via:

- the literature review,
- correspondence with individual clinicians prior to the two day workshop or
- the clinical reference group over the course of the two day workshop.

Table 6 lists the complication group and categories and provides detail on reason for exclusion from the set of high priority complications

Table 6: Complications excluded from the initial combined list of suggested high priority complications

Complication Group	Complication category(s)	Reason for exclusion
Infection	Sepsis	Use of blood stream infection terminology more appropriate and would be captured in HAI surveillance systems.
Inflammatory response	Systemic inflammatory response syndrome (SIRS) (infective or non infective)	The volume was considered relatively low and high impact cases captured as part of HAI surveillance systems.
Blood transfusion complications	Haemolytic blood transfusion incompatibility reactions	Captured by sentinel event reporting and low volume.
Haemorrhage	Bleeding from ENT	Low volume.
	Bleeding from respiratory tract	Low volume.
	Gingiva bleeding	Low volume.
	Genitourinary bleeding	Low volume.
Medication complications	Drug related hypertension/hypotension	Low preventability, health service impact and clinical priority, and not specific enough to drive quality improvement activities.
	Drug related GI complications	Difficult to define.
	Anaphylaxis	Low preventability in cases, volume very low and would be captured through incident monitoring systems for patients with known allergies.
Embolism	Intravascular gas embolism resulting in death or neurological	Low volume and captured by sentinel event reporting.

Complication Group	Complication category(s)	Reason for exclusion
	damage	
Surgical complications requiring unplanned return to theatre	Retained instrument	Captured by sentinel event reporting.
	Surgical trauma	Difficult to define.
	Inadequate reduction of a fracture/poor alignment / reset of fracture	Difficult to define.
	Incorrect procedure	Captured by sentinel event reporting.
Suicide	In hospital suicide	Captured by sentinel event reporting, but should be discussed with Mental Health reference group for possible inclusion.
	Community suicide	Unable to be captured by admitted patient data.
Cerebrovascular events	Haemorrhagic stroke	Low preventability and low volume. Complications associated with circulating anticoagulants captured in medication safety complication.
	Ischaemic stroke	Low preventability and low volume.
Constipation	Constipation	Too broad to routinely report.
	Faecal impaction	Low volume and low level of utility in collecting this through administrative data.
Other	Nausea and Vomiting	Too broad to routinely report.
	Pain	Too broad to routinely report and difficult to define acute versus chronic pain. As a component of patient experience pain is captured in surveys and focus groups.

Appendix 5: Specification of the recommended set of high priority complications

This Appendix provides the in-depth specification of the set of high priority complications, including the relevant ICD-10-AM diagnosis codes, any associated procedure or external cause codes and comments for coder and clinician consideration. Some complication categories are defined by a combination of codes. These are identified by the 'Other associated codes' column.

Table 7: Specification of the recommended set of high priority complications

Complication Group	Complication category(s)	ICD-10-AM code and label (7th edition)	Other associated codes	Clinical coding guideline comments
Pressure area	Stage I decubitus ulcer & press area	L890 Stage I decubitus ulcer & press area		Coding guideline for decubitus ulcers and pressure areas advises that if there are multiple ulcer sites of differing stages assign only one code to indicate the highest stage. Consideration needs to be given to coding of multiple pressure injuries and pressure injuries that are present on admission and proceed to more severe stages during the episode of care.
	Stage II decubitus ulcer & press area	L891 Stage II decubitus ulcer & press area		
	Stage III decubitus ulcer & press area	L892 Stage III decubitus ulcer & press area		
	Stage IV decubitus ulcer & press area	L893 Stage IV decubitus ulcer & press area		
	Unspecified decubitus ulcer & press area	L899 Decubitus ulcer & press area unspecified		
Falls with fracture or intracranial injury	Intracranial injury	S0600 Concussion S0601 Loss of consciousness of unsp duration S0602 LOC brief dur [less than 30 minutes] S0603 LOC moderate duration [30 mins-24hrs] S0604 LOC prolong dur w return conscious lvl S0605 LOC prolong dur wo return		NB: Codes in the range S061-S069 will assign an additional code in the range S0601-S0605 to specify any loss of consciousness, however, these codes may also be assigned in their own right to specify concussion or loss of consciousness without further qualification. This

Complication Group	Complication category(s)	ICD-10-AM code and label (7th edition)	Other associated codes	Clinical coding guideline comments
		conscious lvl S061 Traumatic cerebral oedema S062 Diffuse brain injury S0620 Dfs cerebral cerebellar brain inj unsp S0621 Diffuse cerebral contusions S0622 Diffuse cerebellar contusions S0623 Mult intracerebral cerebellar haematomas S0628 Oth diffuse cerebral & cerebellar injury S063 Focal brain injury S0630 Focal cerebral & cerebellar injury unsp S0631 Focal cerebral contusion S0632 Focal cerebellar contusion S0633 Focal cerebral haematoma S0634 Focal cerebellar haematoma S0638 Oth focal cerebral and cerebellar injury S064 Epidural haemorrhage S065 Traumatic subdural haemorrhage S066 Traumatic subarachnoid haemorrhage S068 Other intracranial injuries S069 Intracranial injury unspecified		needs to be considered to eliminate double counting. Consider coupling the intracranial injury and fracture codes with an external cause code for falls.
	Fractured neck of femur	S7200 Fracture of neck femur part unsp S7201 Fracture intracapsular section femur S7202 Fx upp epiphysis (separation) femur S7203 Fracture of subcapital section of		Only neck of femur fractures are coded as part of this complication category. Other fractures to the femur are

Complication Group	Complication category(s)	ICD-10-AM code and label (7th edition)	Other associated codes	Clinical coding guideline comments
		femur S7204 Fracture of midcervical section of femur S7205 Fracture of base of neck of femur S7208 Fracture of other parts of neck of femur S721 Pertrochanteric fracture S7210 Fracture trochanteric section femur unsp S7211 Fracture intertrochanteric section femur S722 Subtrochanteric fracture		captured in 'other fractures'.
	Other fractures	S723 Fracture of shaft of femur S724 Fracture of lower end of femur S7240 Fracture of lower end femur part unsp S7241 Fracture of femoral condyle S7242 Fx low epiphysis (separation) femur S7243 Supracondylar fracture of femur S7244 Intercondylar fracture of femur S727 Multiple fractures of femur S728 Fractures of other parts of femur S729 Fracture of femur part unspecified S020 Fracture of vault of skull S021 Fracture of base of skull S022 Fracture of nasal bones S023 Fracture of orbital floor S024 Fracture of malar and maxillary bones		Excludes neck of femur fractures however includes fractures to other parts of the femur.

Complication Group	Complication category(s)	ICD-10-AM code and label (7th edition)	Other associated codes	Clinical coding guideline comments
		S025 Fracture of tooth S026 Fracture of mandible S0260 Fracture of mandible part unspecified S0261 Fracture of condylar process S0262 Subcondylar fracture S0263 Fracture of coronoid process S0264 Fracture of ramus unspecified S0265 Fracture of angle of jaw S0266 Fracture of symphysis of body S0267 Fracture of alveolar border of body S0268 Fx mandible body other & unsp parts S0269 Fracture of mandible multiple sites S120 Fracture of first cervical vertebra S121 Fracture of second cervical vertebra S122 Fracture of oth spec cervical vertebra S1221 Fracture of third cervical vertebra S1222 Fracture of fourth cervical vertebra S1223 Fracture of fifth cervical vertebra S1224 Fracture of sixth cervical vertebra S1225 Fracture of seventh cervical vertebra S127 Multiple fractures of cervical spine S128 Fracture of other parts of neck S129 Fracture of neck part unspecified S220 Fracture of thoracic vertebra		

Complication Group	Complication category(s)	ICD-10-AM code and label (7th edition)	Other associated codes	Clinical coding guideline comments
		S2200 Fracture of thoracic vertebra level unsp S2201 Fracture thoracic vertebra T1 & T2 level S2202 Fracture thoracic vertebra T3 & T4 level S2203 Fracture thoracic vertebra T5 & T6 level S2204 Fracture thoracic vertebra T7 & T8 level S2205 Fracture thoracic vertebra T9 T10 level S2206 Fracture thoracic vertebra T11 T12 level S221 Multiple fractures of thoracic spine S222 Fracture of sternum S223 Fracture of rib S2231 Fracture of first rib S2232 Fracture of one rib oth than first rib S320 Fracture of lumbar vertebra S3200 Fracture of lumbar vertebra level unsp S3201 Fracture of lumbar vertebra L1 level S3202 Fracture of lumbar vertebra L2 level S3203 Fracture of lumbar vertebra L3 level		

Complication Group	Complication category(s)	ICD-10-AM code and label (7th edition)	Other associated codes	Clinical coding guideline comments
		S3204 Fracture of lumbar vertebra L4 level S3205 Fracture of lumbar vertebra L5 level S321 Fracture of sacrum S322 Fracture of coccyx S323 Fracture of ilium S324 Fracture of acetabulum S325 Fracture of pubis S327 Multiple fractures lumbar spine w pelvis S328 Fx oth & unsp parts lumbar spine pelvis S3281 Fracture of ischium S3282 Fracture lumbosacral spine, part unsp S3283 Fracture of pelvis, part unspecified S3289 Other and multiple pelvic fractures S420 Fracture of clavicle S4200 Fracture of clavicle part unspecified S4201 Fracture of sternal end of clavicle S4202 Fracture of shaft of clavicle S4203 Fracture of acromial end of clavicle S4209 Multiple fractures of clavicle S421 Fracture of scapula S4210 Fracture of scapula part unspecified S4211 Fracture of body of scapula		

Complication Group	Complication category(s)	ICD-10-AM code and label (7th edition)	Other associated codes	Clinical coding guideline comments
		S4212 Fracture of acromial process S4213 Fracture of coracoid process S4214 Fracture glenoid cavity & neck scapula S4219 Multiple fractures of scapula S422 Fracture of upper end of humerus S4220 Fracture upper end humerus part unsp S4221 Fracture of head of humerus S4222 Fracture of surgical neck of humerus S4223 Fracture of anatomical neck of humerus S4224 Fracture greater tuberosity humerus S4229 Fracture oth mult part upper end humerus S423 Fracture of shaft of humerus S424 Fracture of lower end of humerus S4240 Fracture lower end humerus part unsp S4241 Supracondylar fracture of humerus S4242 Fracture of lateral condyle of humerus S4243 Fracture of medial condyle of humerus S4244 Fracture of condyle(s) of humerus unsp S4245 T-shaped fracture of distal		

Complication Group	Complication category(s)	ICD-10-AM code and label (7th edition)	Other associated codes	Clinical coding guideline comments
		humerus S4249 Oth multiple fractures lower end humerus S427 Mult fractures clavicle scapula humerus S428 Fracture oth parts shoulder & upper arm S429 Fracture of shoulder girdle part unsp S52 Fracture of forearm S520 Fracture of upper end of ulna S5200 Fracture of upper end of ulna part unsp S5201 Fracture of olecranon process of ulna S5202 Fracture of coronoid process of ulna S5209 Oth & multiple fractures upper end ulna S521 Fracture of upper end of radius S5210 Fx of upper end of radius part unsp S5211 Fracture of head of radius S5212 Fracture of neck of radius S5219 Oth multiple fractures upper end radius S522 Fracture of shaft of ulna S5220 Fracture of shaft of ulna part unsp S5221 Fx prx shaft ulna w disloc head		

Complication Group	Complication category(s)	ICD-10-AM code and label (7th edition)	Other associated codes	Clinical coding guideline comments
		radius S523 Fracture of shaft of radius S5230 Fracture shaft of radius part unsp S5231 Fx distal shaft radius, disloc head ulna S524 Fracture of shafts of both ulna & radius S525 Fracture of lower end of radius S5250 Fracture of lower end of radius unsp S5251 Fx low end radius w dorsal angulation S5252 Fx low end radius w volar angulation S5253 Fx low rds volar angl & intrartclr fx S5259 Oth multiple fractures lower end radius S526 Fracture lower end both ulna & radius S527 Multiple fractures of forearm S528 Fracture of other parts of forearm S529 Fracture of forearm part unspecified S620 Fracture navicular [scaphoid] bone hand S621 Fracture of other carpal bone(s) S6210 Fracture of carpal bone unspecified S6211 Fracture of lunate bone of wrist		

Complication Group	Complication category(s)	ICD-10-AM code and label (7th edition)	Other associated codes	Clinical coding guideline comments
		S6212 Fracture of triquetral bone of wrist S6213 Fracture of pisiform S6214 Fracture of trapezium bone S6215 Fracture of trapezoid bone S6216 Fracture of capitate bone S6217 Fracture of hamate bone S6219 Fracture of oth & multiple carpal bones S622 Fracture of first metacarpal bone S6220 Fracture first metacarpal bone part unsp S6221 Fracture of base first metacarpal bone S6222 Fracture of shaft first metacarpal bone S6223 Fracture of neck first metacarpal bone S6224 Fracture of head first metacarpal bone S623 Fracture of other metacarpal bone S6230 Fx oth metacarpal bone(s) part unsp S6231 Fracture base oth metacarpal bone(s) S6232 Fracture shaft oth metacarpal bone(s) S6233 Fracture neck oth metacarpal bone(s) S6234 Fracture head oth metacarpal		

Complication Group	Complication category(s)	ICD-10-AM code and label (7th edition)	Other associated codes	Clinical coding guideline comments
		bone(s) S624 Multiple fractures of metacarpal bones S625 Fracture of thumb S6250 Fracture of thumb part unspecified S6251 Fracture of proximal phalanx of thumb S6252 Fracture of distal phalanx of thumb S626 Fracture of other finger S6260 Fracture of phalanx part unspecified S6261 Fracture of proximal phalanx S6262 Fracture of middle phalanx S6263 Fracture of distal phalanx S627 Multiple fractures of fingers S628 Fracture oth & unsp parts wrist & hand S821 Fracture of upper end of tibia S8211 Fx upp end tibia w fx fibula (any part) S8218 Other fracture of upper end of tibia S822 Fracture of shaft of tibia S8221 Fx shaft tibia w fx fibula (any part) S8228 Other fracture of shaft of tibia S823 Fracture of lower end of tibia S8231 Oth fx low end tibia w # fibula S8238 Oth fracture of lower end of tibia		

Complication Group	Complication category(s)	ICD-10-AM code and label (7th edition)	Other associated codes	Clinical coding guideline comments
		S824 Fracture of fibula alone S8240 Fracture of fibula part unspecified S8241 Fracture of upper end of fibula S8242 Fracture of shaft of fibula S8249 Multiple fractures of fibula S825 Fracture of medial malleolus S826 Fracture of lateral malleolus S827 Multiple fractures of lower leg S828 Fractures of other parts of lower leg S8281 Bimalleolar fracture ankle S8282 Trimalleolar fracture ankle S8288 Fracture of other parts of lower leg S829 Fracture of lower leg part unspecified S92 Fracture of foot except ankle S920 Fracture of calcaneus S921 Fracture of talus S922 Fracture of other tarsal bone(s) S9220 Fracture of tarsal bone(s) unspecified S9221 Fracture of navicular [scaphoid] foot S9222 Fracture of cuboid foot S9223 Fracture of cuneiform foot S9228 Fracture of other part of tarsal bone S923 Fracture of metatarsal bone S924 Fracture of great toe		

Complication Group	Complication category(s)	ICD-10-AM code and label (7th edition)	Other associated codes	Clinical coding guideline comments
		S925 Fracture of other toe S927 Multiple fractures of foot S929 Fracture of foot unspecified		
Healthcare association infection	Urinary Tract Infection	N390 Urinary tract infection site not spec	N998 Other postprocedural disorders of genitourinary system	For catheter related UTI N998 and N390 assigned as a pair
	Surgical site infection	T8141 Wound infection following a procedure		Please note that infections relating to devices, implants and grafts are captured at 'prosthetic associated infection'.
	Pneumonia	J22 Unspecified acute lower respiratory infection J120 Adenoviral pneumonia J121 Respiratory syncytial virus pneumonia J122 Parainfluenza virus pneumonia J123 Human metapneumovirus pneumonia J128 Other viral pneumonia J129 Viral pneumonia, unspecified J13 Pneumonia due to Streptococcus pneumonia J14 Pneumonia due to Haemophilus inflenzae J14 Bacterial pneumonia, not elsewhere classified J150 Pneumonia due to Klebsiella pneumonia		The codes identified within this category require review and clinical confirmation of appropriateness.

Complication Group	Complication category(s)	ICD-10-AM code and label (7th edition)	Other associated codes	Clinical coding guideline comments
		J151 Pneumonia due to Pseudomonas J152 Pneumonia due to staphylococcus J153 Pneumonia due to streptococcus, group B J154 Pneumonia due to other streptococci J155 Pneumonia due to Escherichia coli J156 Pneumonia due to other Gram-negative bacteria J157 Pneumonia due to Mycoplasma pneumonia J158 Other bacterial pneumonia J159 Bacterial pneumonia, unspecified J160 Chlamydial pneumonia J168 Pneumonia due to other specified infectious organisms J180 Bronchopneumonia, unspecified J181 Lobar pneumonia, unspecified J182 Hypostatic pneumonia, unspecified J188 Other pneumonia, organism unspecified J189 Pneumonia unspecified		
	Blood Stream Infection	A40.0 Sepsis due to streptococcus, group A A40.1 Sepsis due to streptococcus, group B A40.2 Sepsis due to streptococcus, group D A40.3 Sepsis due to Streptococcus pneumoniae A40.8 Other streptococcal sepsis A40.9 Streptococcal sepsis, unspecified		The codes for bloodstream infection are the sepsis and bacteraemia codes. This is confirmed by the index entry for 'Infection, bloodstream' which has a cross reference to 'see Sepsis'. The codes identified within this

Complication Group	Complication category(s)	ICD-10-AM code and label (7th edition)	Other associated codes	Clinical coding guideline comments
		A41.0 Sepsis due to Staphylococcus aureus A41.1 Sepsis due to other specified staphylococcus A41.2 Sepsis due to unspecified staphylococcus A41.3 Sepsis due to Haemophilus influenzae A41.4 Sepsis due to anaerobes A41.5 Sepsis due to other and unspecified Gram-negative organisms A41.50 Sepsis due to unspecified Gram-negative organisms A41.51 Sepsis due to Escherichia coli [E. Coli] A41.52 Sepsis due to Pseudomonas A41.58 Sepsis due to other Gram-negative organisms A41.8 Other specified sepsis A41.9 Sepsis, unspecified A42.0 Pulmonary actinomycosis A42.1 Abdominal actinomycosis A42.2 Cervicofacial actinomycosis A42.7 Actinomycotic sepsis A42.8 Other forms of actinomycosis A42.9 Actinomycosis, unspecified A43.0 Pulmonary nocardiosis A43.1 Cutaneous nocardiosis A43.8 Other forms of nocardiosis A43.9 Nocardiosis, unspecified A44.0 Systemic bartonellosis A44.1 Cutaneous and mucocutaneous		category require review and clinical confirmation of appropriateness.

Complication Group	Complication category(s)	ICD-10-AM code and label (7th edition)	Other associated codes	Clinical coding guideline comments
		bartonellosis A44.8 Other forms of bartonellosis A44.9 Bartonellosis, unspecified A46 Erysipelas A48.0 Gas gangrene A48.1 Legionnaires' disease A48.2 Nonpneumonic Legionnaires' disease [Pontiac fever] A48.3 Toxic shock syndrome A48.4 Brazilian purpuric fever A48.8 Other specified bacterial diseases A49.00 Staphylococcal infection, unspecified site A49.01 Staphylococcus aureus infection, unspecified site A49.1 Streptococcal infection, unspecified site A49.2 Haemophilus influenzae infection, unspecified site A49.3 Mycoplasma infection, unspecified site A49.8 Other bacterial infections of unspecified site A49.9 Bacterial infection, unspecified		
	Central line and peripheral line associated blood stream infection	T827 Infection and inflammatory reaction due to other cardiac and vascular devices implants and grafts		NB: This code is also included within 'prosthetic associated infection' and does not uniquely classify central line infections It is not possible to separate central line and peripheral line

Complication Group	Complication category(s)	ICD-10-AM code and label (7th edition)	Other associated codes	Clinical coding guideline comments
				associated blood stream infection for the purposes of coding. Consideration could be given to separating central line from peripheral infections.
	Multi-resistant organism (MRO)	Z0631 Penicillin resistant agent Z0632 Methicillin resistant agent Z0639 Agent resistant to other penicllin-related antibiotic Z0641 Vancomycin resistant agent Z0649 Agent resistant to other vancomycin-related antibiotic Z068 Agent resistant to multiple antibiotics Z0690 Agent resistant to unspecified antibiotic Z0699 Agent resistant to other single specified antibiotic		NB: According to Seventh Edition Australian coding guidelines: • *MRSA – Methicillin Resistant or Multi-Resistant Staphylococcus aureus, traditionally the M refers to methicillin and this is still the commonest use of the term MRSA. It is also used to mean multi-resistant.* • *If the clinician has documented in the record that the organism causing an infection is resistant to an antibiotic, then the appropriate code from Z06.- Bacterial agents resistant to antibiotics should also be assigned.* • *This is assigned in an to the code for the infection etc.* NB: These codes were significantly

Complication Group	Complication category(s)	ICD-10-AM code and label (7th edition)	Other associated codes	Clinical coding guideline comments
				expanded for Eighth Edition ICD-10-AM to include codes for resistance to antibacterials, antifungals, antineoplastic drugs etc rather than just antibiotics. These codes are coded as supplementary codes so may be double counted with source infections such as UTI or surgical site infection.
	Prosthetic associated infection	T826 Infection and inflammatory reaction due to cardiac valve prosthesis T827 Infection and inflammatory reaction due to other cardiac and vascular devices implants and grafts T835 Infection and inflammatory reaction due to prosthetic device, implant and graft in urinary system T836 Infection and inflammatory reaction due to prosthetic device, implant and graft in genital tract T846 Infection and inflammatory reaction due to internal fixation device [any site] T847 Infection and inflammatory reaction due to other internal orthopaedic prosthetic devices, implants and grafts T8571 Infection and inflammatory reaction due to peritoneal dialysis catheter T8572 Infection and inflammatory		T827 is also included in 'Central line and peripheral line infection associated blood stream infection'

Complication Group	Complication category(s)	ICD-10-AM code and label (7th edition)	Other associated codes	Clinical coding guideline comments
		reaction due to nervous system device, implant and graft T8578 Infection and inflammatory reaction due to other internal prosthetic devices, implants and grafts T874 Infection of amputation stump		
	GI Infections	A040 Enteropathogenic E coli infection A041 Enterotoxigenic E coli infection A042 Enteroinvasive E coli infection A043 Enterohaemorrhagic E coli infection A044 Other E coli infection A045 Campylobacter enteritis A046 Enteritis due to Yersinia enterocolitica A047 Enterocolitis dt Clostridium difficile A048 Other spec bacterial intestinal infectn A049 Bacterial intestinal infection unsp A05 Other bact food-borne intoxications, NEC A050 Food-borne staphylococcal intoxication A051 Botulism A052 Food-borne intox dt C. perfringens A053 Food-borne intox dt Vib parahaemolyticus A054 Food-borne Bacillus cereus intoxication A058 Other spec bacterial food-borne intox A059 Bacterial food-borne intoxication		Excludes A099 - unspecified gastroenteritis and colitis The codes identified within this category require review and clinical confirmation of appropriateness, specifically whether bacterial food borne disease should be included within this category There is no ICD-10-AM code for Norovirus.

Complication Group	Complication category(s)	ICD-10-AM code and label (7th edition)	Other associated codes	Clinical coding guideline comments
		unsp A06 Amoebiasis A060 Acute amoebic dysentery A062 Amoebic nondysenteric colitis A063 Amoeboma of intestine A069 Amoebiasis unspecified A07 Other protozoal intestinal diseases A070 Balantidiasis A071 Giardiasis [lambliasis] A072 Cryptosporidiosis A073 Isosporiasis A078 Other spec protozoal intestinal diseases A079 Protozoal intestinal disease unsp A08 Viral & other spec intestinal infections A080 Rotaviral enteritis A081 Acute gastroenteropathy dt Norwalk agent A082 Adenoviral enteritis A083 Other viral enteritis A084 Viral intestinal infection unspecified A085 Other specified intestinal infections		
Surgical complications requiring unplanned return to theatre	Post-operative haemorrhage /haematoma requiring transfusion and/or return to theatre	T810 Haem & haematoma comp a procedure NEC	Transfusion codes: 13706-01 Administration of whole blood 13706-02 Administration of	Currently no data item or ICD code that allows the identification of patients that have an unplanned return to theatre. T810 does not include postoperative haemorrhage due to or associated with prosthetic

Complication Group	Complication category(s)	ICD-10-AM code and label (7th edition)	Other associated codes	Clinical coding guideline comments
			packed cells 13706-03 Administration of platelets 92060-00 Administration of autologous blood 92061-00 Administration of coagulation factors 92062-00 Administration of other serum 92063-00 Administration of blood expander 92064-00 Administration of other blood product 92206-00 Exchange transfusion	devices, implants and grafts (T828, T838, T848, T858). These additional codes however do not uniquely classify postoperative haemorrhage due to the device it also captures embolism, fibrosis, pain, stenosis and thrombosis. Transfusion codes, require clinical advice as to whether all identified transfusion codes should be included. It is noted that a patient could have multiple different types of blood transfusions in the one admission, but multiple administrations of the same blood product will be assigned only one code.
	Surgical wound dehiscence	T813 Disruption of operation wound NEC		

Complication Group	Complication category(s)	ICD-10-AM code and label (7th edition)	Other associated codes	Clinical coding guideline comments
	Anastomotic leak	K91.8 Other postprocedural disorders of digestive system, not elsewhere classified or N99.8 Other postprocedural disorders of genitourinary system	Y832 Anastomosis, bypass or graft as the cause of abnormal reaction of the patient, or of later complication, without mention of misadventure at the time of the procedure	Anastomotic complications of gastrointestinal and urinary tract are assigned to K918 and N998 respectively. Codes would be assigned in conjunction with external cause code Y832 - Surgical operation with anastomosis, bypass or graft. NB: Even though the external cause code specifies bypass or graft as well as anastomosis the leaks from bypass or graft should be assigned with a T code not K918 or N998.
	Other surgical complications unplanned return to theatre			Currently no ICD code
	Vascular graft failure	I720 Aneurysm and dissect of carotid artery I721 Aneurysm & dissect artery upper extrem I722 Aneurysm and dissect of renal artery I723 Aneurysm and dissection of iliac artery I724 Aneurysm & dissect artery lower extrem	I978 Oth postproc disrd circulatory sys NEC	Further clinical definition required about what is meant by vascular graft failure. Assign I978 and I720-I729 as a pair otherwise you get all vascular aneurysms dissections or just search for I720-I729 with a COF 1 T823 also includes the following as

Complication Group	Complication category(s)	ICD-10-AM code and label (7th edition)	Other associated codes	Clinical coding guideline comments
		I725 Aneurysm & dissect oth precereb arteries I728 Aneurysm & dissect oth spec arteries I729 Aneurysm & dissect of unsp site T822 Mech comp coron art bypass valve gft T823 Mechanical comp oth vascular grafts		part of mechanical complications • Breakdown (mechanical) • Displacement • Leakage • Malposition • Obstruction, mechanical • Perforation • Protrusion In order to include mechanical complication of coronary artery bypass and valve grafts and heart valve prostheses also include include T820 - Mechanical complication of heart valve prosthesis and T822 - Mechanical complication of other vascular grafts
Unplanned ICU and/ or MET Call	MET Calls Unplanned admission to ICU			Currently no ICD code
Respiratory complications	Respiratory failure including acute respiratory distress syndrome requiring ventilation (invasive and/or non-invasive)	J96 Respiratory failure NEC J960 Acute respiratory failure J961 Chronic respiratory failure J969 Respiratory failure unspecified	13882-00 Management of continuous ventilatory support,	

Complication Group	Complication category(s)	ICD-10-AM code and label (7th edition)	Other associated codes	Clinical coding guideline comments
		J80 Adult respiratory distress syndrome	<= 24 hours 13882-01 Management of continuous ventilatory support, > 24 and < 96 hours 13882-02 Management of continuous ventilatory support, >= 96 hours 92209-00 Management of noninvasive ventilatory support, <= 24 hours 92209-01 Management of noninvasive ventilatory support, > 24 and < 96 hours 92209-02 Management of noninvasive ventilatory support, >= 96 hours	

Complication Group	Complication category(s)	ICD-10-AM code and label (7th edition)	Other associated codes	Clinical coding guideline comments
	Aspiration pneumonia	J690 Pneumonitis due to food and vomit		
Venous thromboembolism	Pulmonary embolism	I260 Pulm embolism w acute cor pulmonale I269 Pulm embolism wo acute cor pulmonale	I979 Postproc disrd circulatory sys unsp	I979 and 1260 or 1269 should be assigned as a pair, to denote postoperative but if postoperative both I260 or I269 should have COF 1 and therefore should be unnecessary to search for the pair
	Deep vein thrombosis	I801 Phlebitis and thrombophlebitis of femoral vein I802 Phleb & thrombophleb oth deep vesl legs	I978 Oth postproc disrd circulatory sys NEC	If postoperative I978 would also be assigned. The codes would be assigned I978 followed by I801 or I802. These codes also do not capture DVT occurring in pregnancy or postpartum or following an abortion or ectopic pregnancy. Other options for inclusion are: • O087 Other venous complications following abortion and ectopic and molar pregnancy, • O223 Deep phlebothrombosis in pregnancy, • O871 Deep phlebothrombosis in the puerperium. DVTs may not be identified in the

Complication Group	Complication category(s)	ICD-10-AM code and label (7th edition)	Other associated codes	Clinical coding guideline comments
				original episode of care but as a result of readmission. Should this be the case then is likely the DVT codes will be the principal diagnosis and therefore will not attract a COF 1. NB: Consideration needs to be given to capturing readmissions for DVT. Commission to consider providing advice to NCCH on whether there should be rules to assign certain conditions in Principal Diagnosis position as COF 1 in the future.
Renal failure	Renal failure requiring haemodialysis or CVVHD	N170 Acute kidney failure w tubular necrosis N171 Ac kidney failure w ac cortical necrosis N172 Ac kidney failure w medullary necrosis N178 Other acute kidney failure N179 Acute kidney failure unspecified	13100-00 Haemodialysis 13100-02 Continuous haemofiltration 13100-04 Continuous haemodiafiltration	Do not count acute kidney failure codes in presence of: • N184 Chronic kidney disease, stage 4 and • N185 Chronic kidney disease, stage 5 Other haemodilayis procedure codes that have been excluded as they are typically used for treatment chronic kidney disease: • 13100-01 [1060] Intermittent

Complication Group	Complication category(s)	ICD-10-AM code and label (7th edition)	Other associated codes	Clinical coding guideline comments
				haemofiltration, • 13100-03 [1060] Intermittent haemodiafiltration, • 13100-03 [1060] Intermittent haemodiafiltration
GI bleeding	GI bleeding	K920 Haematemesis K921 Melaena K922 Gastrointestinal haemorrhage unsp K25 Gastric ulcer K250 Gastric ulcer acute with haemorrhage K251 Gastric ulcer acute with perforation K252 Acute gastric ulcer w haem & perforation K253 Acute gastric ulcer without haem or perf K254 Chronic or unsp gastric ulcer w haem K255 Chronic or unsp gastric ulcer w perf K256 Chr or unsp gastrc ulcer w haem & perf K257 Chronic gastric ulcer wo haem or perf K259 Gastrc ulcer ? ac / chr wo haem / perf K26 Duodenal ulcer K260 Duodenal ulcer acute with haemorrhage K261 Duodenal ulcer acute with perforation		The codes identified within this category require review and clinical confirmation of appropriateness, specifically whether ulcers remain in this category.

Complication Group	Complication category(s)	ICD-10-AM code and label (7th edition)	Other associated codes	Clinical coding guideline comments
		K262 Acute duodenal ulcer w haem & perf K263 Acute duodenal ulcer wo haem or perf K264 Chronic or unsp duodenal ulcer w haem K265 Chronic or unsp duodenal ulcer w perf K266 Duodenal ulcer chr / unsp w haem & perf K267 Chronic duodenal ulcer wo haem or perf K269 Duodenal ulcer unsp wo haem or perf K27 Peptic ulcer site unspecified K270 Peptic ulcer acute with haemorrhage K271 Peptic ulcer acute with perforation K272 Acute peptic ulcer with haem & perf K273 Acute peptic ulcer without haem or perf K274 Chronic or unsp peptic ulcer w haem K275 Chronic or unsp peptic ulcer w perf K276 Chr or unsp peptic ulcer w haem & perf K277 Chronic peptic ulcer wo haem or perf K279 Peptic ulcer ? ac / chr wo haem or perf K28 Gastrojejunal ulcer		

Complication Group	Complication category(s)	ICD-10-AM code and label (7th edition)	Other associated codes	Clinical coding guideline comments
		K280 Acute gastrojejunal ulcer w haemorrhage K281 Acute gastrojejunal ulcer w perforation K282 Acute gastrojejunal ulcer w haem & perf K283 Acute gastrojejunal ulcer wo haem / perf K284 Gastrojejunal ulcer chr or unsp w haem K285 Gastrojejunal ulcer chr or unsp w perf K286 Gastjejnl ulcer chr / unsp w haem & perf K287 Gastrojejunal ulcer chr wo haem or perf K289 Gastjejnl ulcr ? ac / chr wo haem / perf K290 Acute haemorrhagic gastritis		
Medication complications	Drug related respiratory complications/depression	J960 Acute respiratory failure J961 Chronic respiratory failure J969 Respiratory failure unspecified J981 Pulmonary collapse	External cause codes specific to opioids and sedatives include <u>Accidental</u> X41, X42 X43, X44 (requires clinical advice as to whether these should be included	Other external cause code for drugs could be added X40-X49 T36-T50 X40-X49, this range of external cause codes specifically denotes those poisonings by drugs etc. that were accidental (including accidental overdose of drug, wrong

Complication Group	Complication category(s)	ICD-10-AM code and label (7th edition)	Other associated codes	Clinical coding guideline comments
			<u>Undetermined event</u> (Codes from this category are designed for use when the intent is unspecified, unstated or cannot be determined. That is, the injuries are not specified as accidental (unintentional), self-inflicted with intent to self-harm, or assault.) Y11, Y12 <u>Adverse effect in therapeutic use</u> Y45.0, Y47.0-Y47.9	drug given or taken in error, and drug taken inadvertently, accidents in the use of drugs, medicaments and biological substances in medical and surgical procedures. Where the poisoning by drugs, medicaments etc is due the correct drug properly administered in therapeutic or prophylactic dosage the external cause code assigned with T36-T50 Poisoning by drugs, medicaments and biological substances is in the range Y40-Y59.
	Haemorrhagic disorder due to circulating anticoagulants	D683 Haemorrhagic disorder due to circulating anticoagulants		Classified to D683 are the following due to circulating anticoagulants: • unstable INR • over warfarinisation

Complication Group	Complication category(s)	ICD-10-AM code and label (7th edition)	Other associated codes	Clinical coding guideline comments
				• prolonged bleeding time • abnormal bleeding time etc.
	Hypoglycaemia	E1064 Type 1 diabetes mellitus w hypoglycaemia E1164 Type 2 diabetes mellitus w hypoglycaemia E1364 Other spec DM w hypoglycaemia E1464 Unsp DM w hypoglycaemia E160 Drug-induced hypoglycaemia without coma E161 Other hypoglycaemia E162 Hypoglycaemia, unspecified		To account for hypoglycaemic episodes occurring in diabetics in hospital from 1 July 2013 each of the codes should be captured with a COF 1. Prior to 1 July 2013 E1064, E1164, E1364 and E1464 should not have had COF 1 assigned.
Delirium	Delirium	F050 Delirium not superimposed on dementia F051 Delirium superimposed on dementia F058 Other delirium F059 Delirium unspecified R410 Disorientation unspecified		Restlessness and agitation have not been included F051 is unlikely to have a COF of 1 assigned Requires better documentation guidelines and clinical advice around use of 'confusion' in medical record. Improved coding guidelines and indexing would assist coders to more accurately code this complication.

Complication Group	Complication category(s)	ICD-10-AM code and label (7th edition)	Other associated codes	Clinical coding guideline comments
Persistent incontinence	Incontinence (urinary)	R32 Unspecified urinary incontinence		There is a coding guideline for the assignment of this code as follows: *R32 Unspecified urinary incontinence should be assigned only when the incontinence is persistent prior to admission, is present at discharge or persists for at least seven days.* Conditions coded under R32 that were pre-existing prior to admission should not have a COF 1 coded. Post procedural incontinence that could be identified through the combination of a procedure code and incontinence code
Malnutrition	Malnutrition	E40 Kwashiorkor E41 Nutritional marasmus E42 Marasmic kwashiorkor E43 Unspecified severe protein-energy malnutrition E440 Moderate protein-energy E441 Mild protein-energy malnutrition malnutrition E46 Unspecified protein-energy malnutrition		Need clinical confirmation as to which of these would be hospital onset. Requires documentation in the medical record of 'malnutrition' by either clinician or dietitian.

Complication Group	Complication category(s)	ICD-10-AM code and label (7th edition)	Other associated codes	Clinical coding guideline comments
Cardiac complications	Heart failure and pulmonary oedema	I500 Congestive heart failure I501 Left ventricular failure I509 Heart failure unspecified J81 Pulmonary oedema		
	Arrhythmias	I47 Paroxysmal tachycardia I470 Re-entry ventricular arrhythmia I471 Supraventricular tachycardia I472 Ventricular tachycardia I479 Paroxysmal tachycardia unspecified I48 Atrial fibrillation and flutter I49 Other cardiac arrhythmias I490 Ventricular fibrillation and flutter I491 Atrial premature depolarization I492 Junctional premature depolarization I493 Ventricular premature depolarization I494 Other & unsp premature depolarisation I495 Sick sinus syndrome I498 Other specified cardiac arrhythmias I499 Cardiac arrhythmia unspecified	I978 Oth postproc disrd circulatory sys NEC	Assign I978 and I720-I729 as a pair to identify post procedural complication or search on the above codes with a COF of 1

Complication Group	Complication category(s)	ICD-10-AM code and label (7th edition)	Other associated codes	Clinical coding guideline comments
	Cardiac arrest	I460 Cardiac arrest w success resuscitation 1469 Cardiac arrest, unspecified		
	Acute coronary syndrome including unstable angina, STEMI and NSTEMI	I200 Unstable angina I21.0 Acute transmural myocardial infarction of anterior wall I21.1 Acute transmural myocardial infarction of inferior wall I21.2 Acute transmural myocardial infarction of other sites I21.3 Acute transmural myocardial infarction of unspecified site I21.4 Acute subendocardial myocardial infarction I21.9 Acute myocardial infarction, unspecified I22.0 Subsequent myocardial infarction of anterior wall I22.1 Subsequent myocardial infarction of inferior wall I22.8 Subsequent myocardial infarction of other sites I22.9 Subsequent myocardial infarction of unspecified site		STEMI and NSTEMI infarctions are classified to myocardial infarction by site. Coding guidelines also state: *Acute coronary syndrome is a general term which includes conditions described as myocardial infarction, ST elevation myocardial infarction (STEMI), non-ST elevation myocardial infarction (NSTEMI) or unstable angina. Clinical coders should be guided by the documentation in the medical record and assign a code from category I21.- Acute myocardial infarction if an infarction is documented,* OR *assign I20.0 Unstable angina if 'acute coronary syndrome' is diagnosed with no documented myocardial infarction.*

Complication Group	Complication category(s)	ICD-10-AM code and label (7th edition)	Other associated codes	Clinical coding guideline comments
Iatrogenic pneumothorax requiring intercostal catheter	Iatrogenic pneumothorax requiring intercostal catheter	J938 Other pneumothorax J939 Pneumothorax unspecified	38806-00 Intercostal catheter	Does not include spontaneous pneumothorax.

Appendix 6: Indicative rates of high priority complications

The following section presents an array of statistics for each high priority complication group (with the exception of 'Unplanned ICU and/or Met Call') for two states in aggregate for separations from public hospitals during 2010-11 and 2011-12.[29] The first table presents the following statistics:

- **Total frequency**: the number of occurrences of all complication codes (ICD-10-AM) for the complication category in all separations. Where more than one code from the complication category occurs within the one separation, each code is counted. Similarly, where complication codes from more than one complication category occur within the same separation, each code is counted.
- **Frequency per 10,000 patient days**: is calculated from the total frequency divided by the total number of patient days for all separations regardless of whether or not the separation had an additional diagnosis defined as a high priority complication.
- **Excess days**: is the difference in total patient days for separations with a additional diagnosis code that relates to the complication category compared to all other separations standardises for AR-DRG, age and hospital category (refer to Appendix 6 for additional details).
- **Number of excess days per occurrence of complication**: is calculated from excess days divided by total frequency.

The figure that follows the table provides a scatter plot of rates per 10,000 patient days for each complication group by hospital category or peer group (A1, B, C and D) for public hospitals in two Australian states 2010-11 and 2011-12. The hospital categories are based on AIHW classification of peer group hospitals[30] as outlined below:

- A1 – Principal referral hospitals are major city hospitals with more than 20,000 and regional hospitals with more than 16,000 acute (casemix-adjusted) separations per year.
- B – Comprises hospitals from groups B1 and B2:
  - B1 - Large metropolitan hospitals are major city acute hospitals with more than 10,000 (casemix-adjusted) separations per year.
  - B2 - Large rural hospitals are regional acute hospitals with more than 8,000 and remote acute hospitals with more than 5,000 (casemix-adjusted) separations per year.
- C – Comprises hospitals from groups C1 and C2:
  - C1 - Medium acute hospitals in regional and major city areas treating between 5,000 and 10,000 acute (casemix-adjusted) separations per year.
  - C2 - Medium acute hospitals in regional and major city areas treating between 2,000 and 5,000 acute (casemix-adjusted) separations per year, and acute hospitals treating less than 2,000 (casemix-adjusted) separations per year but with more than 2,000 separations per year.

[29] The analysis of data was limited to the two states that have had substantial experience in the collection and use of COF data as the results are likely to be more reliable than if all states data had been used.

[30] http://www.ihpa.gov.au/internet/ihpa/publishing.nsf/Content/nhcdc-cost-rep-2010-2011.htm~4-appendixB

- D – Comprises D1 and D3 hospitals:
  - D1 - Small non-acute hospitals, treating less than 2,000 (casemix-adjusted) separations per year and with more than 40 per cent non-acute and outlier patient days of total patient days.
  - D3 - Small remote hospitals treating less than 5,000 acute (casemix-adjusted) separations but which are not multi-purpose and not small non-acute. Most have less than 2,000 separations per year.

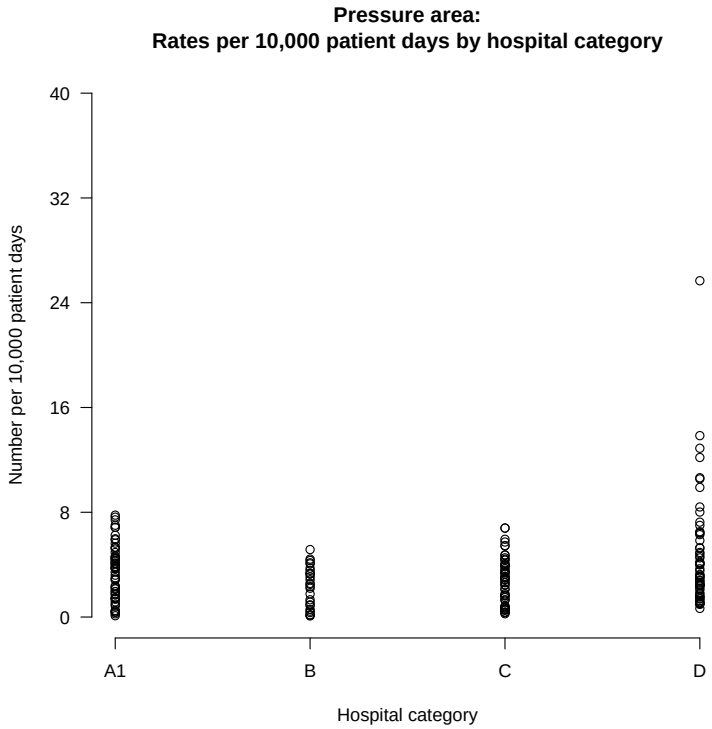
In addition to this information, indicative comparator rates, as identified by the literature and incident reporting system reports are provided where available.

Pressure injury

Table 8: Indicative data for pressure injury: all public hospitals two states 2010-11-2011-12

Complication category	Total Frequency	Frequency per 10,000 patient days for the specified complication public hospitals in two states				Excess days	Number of excess days per occurrence of complication
		Hospital category					
		A1	B	C	D		
Stage I decubitus ulcer & press area	3,507	1.59	0.85	0.88	0.68	27,663	7.89
Stage II decubitus ulcer & press area	4,004	1.92	0.98	0.81	0.70	45,037	11.25
Stage III decubitus ulcer & press area	500	0.26	0.14	0.08	0.08	7,930	15.86
Stage IV decubitus ulcer & press area	189	0.11	0.02	0.01	0.02	3,929	20.79
Decubitus ulcer & press area unspecified	2,258	0.96	0.54	0.63	0.76	19,274	8.54

Figure 1: Indicative frequency per 10,000 patient days for pressure injury: all public hospitals two states 2010-11-2011-12



Pressure injuries are the object of Standard 8 of the *National Safety and Quality Health Service Standards*, against which hospitals are accredited.

Comparator rates as identified by the literature

The reported prevalence of pressure ulcers in the acute setting ranges from 4.7% [31] to 25.1% [32].

[31] Graves. N, Birrell. F, & Whitby, M. (2005) Effect of pressure ulcers on length of hospital stay. Infection Control and Hospital Epidemiology, 26, 293-297.

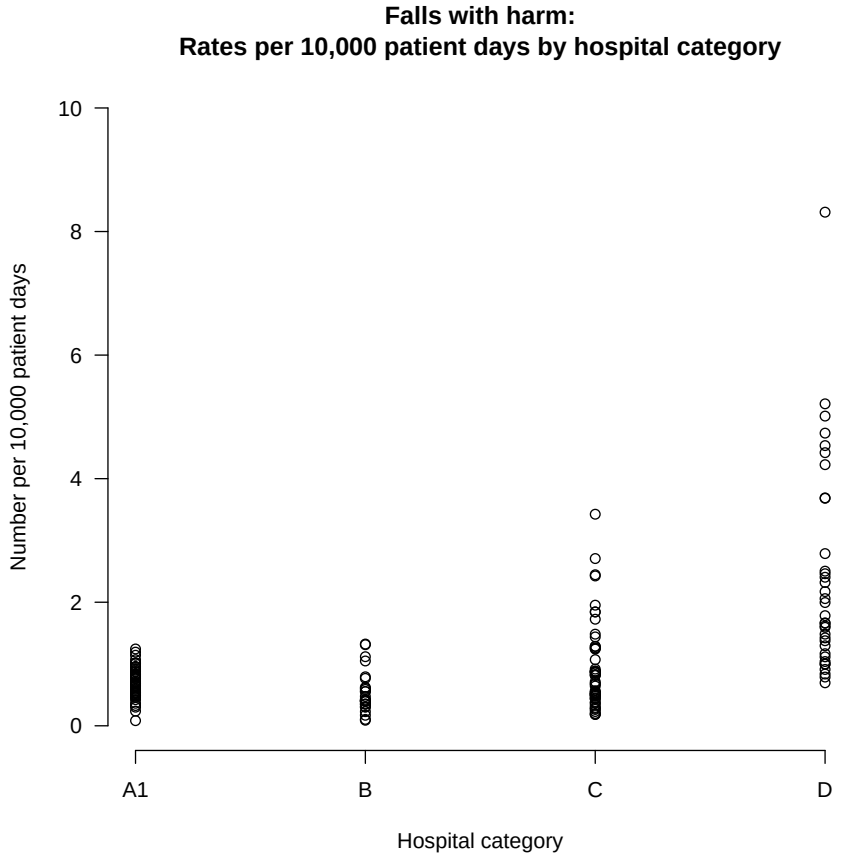
[32] Lahmann, N., Halfens, R.J.G., Dassen, T., (2006). Effect of non-response bias in pressure ulcer prevalence studies. *Journal of Advanced Nursing* 55 (2), 230–236.

Falls resulting in fracture and intracranial injury

Table 9: Indicative data for intracranial injury: all public hospitals two states 2010-11-2011-12

Complication category	Total Frequency	Frequency per 10,000 patient days for the specified complication public hospitals in two states				Excess days	Number of excess days per occurrence of complication
		Hospital category					
		A1	B	C	D		
Intracranial injury	538	0.25	0.10	0.09	0.13	3,286	6.11
Fractured neck of femur	335	0.13	0.12	0.16	0.17	2,923	8.73
Other fractures	941	0.39	0.25	0.49	0.28	10,564	11.23

Figure 2: Indicative frequency per 10,000 patient days for falls with harm: all public hospitals two states 2010-11-2011-12



Falls are the object of Standard 10 of the *National Safety and Quality Health Service Standards*.

Comparator rates

In 2009–10, there were approximately 20,000 separations for which a fall was recorded as occurring in a health service area in Australia: an overall rate of approximately 2.4 per 1,000 separations. The rate was higher in public hospitals than in private hospitals (3.1 and 1.3 per 1,000, respectively).'[33]

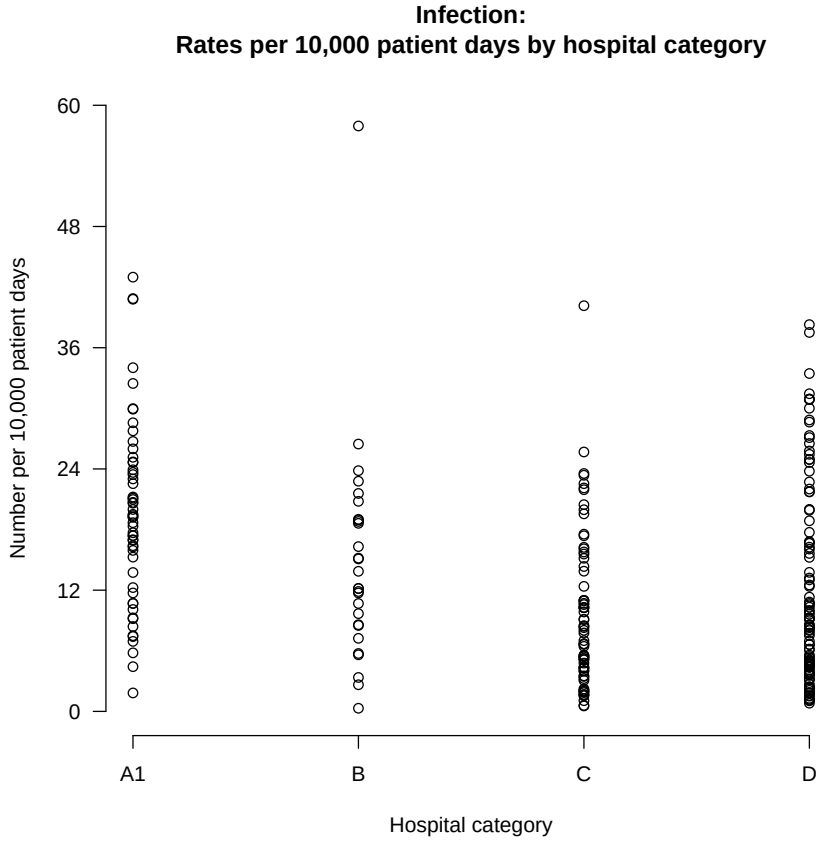
[33] Australian Institute of Health and Welfare (2011), *Hospital performance: falls resulting in patient harm in hospitals.* Retrieved September 26, 2013, from source http://www.aihw.gov.au/haag09-10/hospital-performance-patient-falls/

Healthcare associated infection (HAI)

Table 10: Indicative data for healthcare associated infection: all public hospitals two states 2010-11-2011-12

Complication category	Total Frequency	Frequency per 10,000 patient days for the specified complication public hospitals in two states				Excess days	Number of excess days per occurrence of complication
		Hospital category					
		A1	B	C	D		
Urinary Tract Infection	15,796	7.29	5.14	5.46	5.33	162,795	10.31
Surgical site infection	4,072	1.82	1.51	0.53	0.72	57,827	14.20
Pneumonia	13,541	6.41	3.78	2.37	2.39	137,204	10.13
Blood Stream Infection	7,452	3.64	2.27	0.80	0.57	109,251	14.39
Central line and peripheral line infection associated blood stream infection	4,790	2.25	1.86	0.68	0.53	48,676	10.16
Multi-resistant organism (MRO)	2,902	1.29	1.67	0.56	0.40	55,865	19.25
Prosthetic associated infection	1,927	0.89	0.69	0.50	0.21	32,543	16.89
GI Infections	1,843	0.72	0.52	0.23	0.09	29,226	15.86

Figure 3: Indicative frequency per 10,000 patient days for hospital associated infection: all public hospitals two states 2010-11-2011-12



Preventing and controlling healthcare associated infection is the object of Standard 3 of the *National Safety and Quality Health Service Standard*s.

Comparator rates

A study of five Australian hospitals reported rates of health care associated hospital-onset Bloodstream Infections between 4.8 and 10.6 cases per 1,000 hospital discharges annually.[34]

In 2011–12 all states and territories had rates of Staphylococcus aureus bacteraemia (SAB) below the national benchmark of 2.0 cases per 10,000 patient days. The national rate in 2011-12 was reported 0.9 cases per 10, 000 patient days. Western Australia recorded the lowest rates at 0.7 per 10,000 patient days, conversely Northern Territory reported a rate at 1.3. Overall in Australian public hospitals there were 1,734 cases of SAB reported in 2011-12. [35]

[34] Cruickshank M, Ferguson J.(2008) *Reducing Harm to Patients from Health Care Associated Infection: The Role of Surveillance:* Australian Commission on Safety and Quality in Health Care. Sydney.

[35] Australian Institute of Health and Welfare (2013). Australian hospital statistics 2011–12: Staphylococcus aureus bacteraemia in Australian public hospitals. Health services series no. 47. Cat. no. HSE 129. Canberra: AIHW. Available from: http://www.aihw.gov.au/WorkArea/DownloadAsset.aspx?id=60129542613

Surgical complications requiring unplanned return to theatre

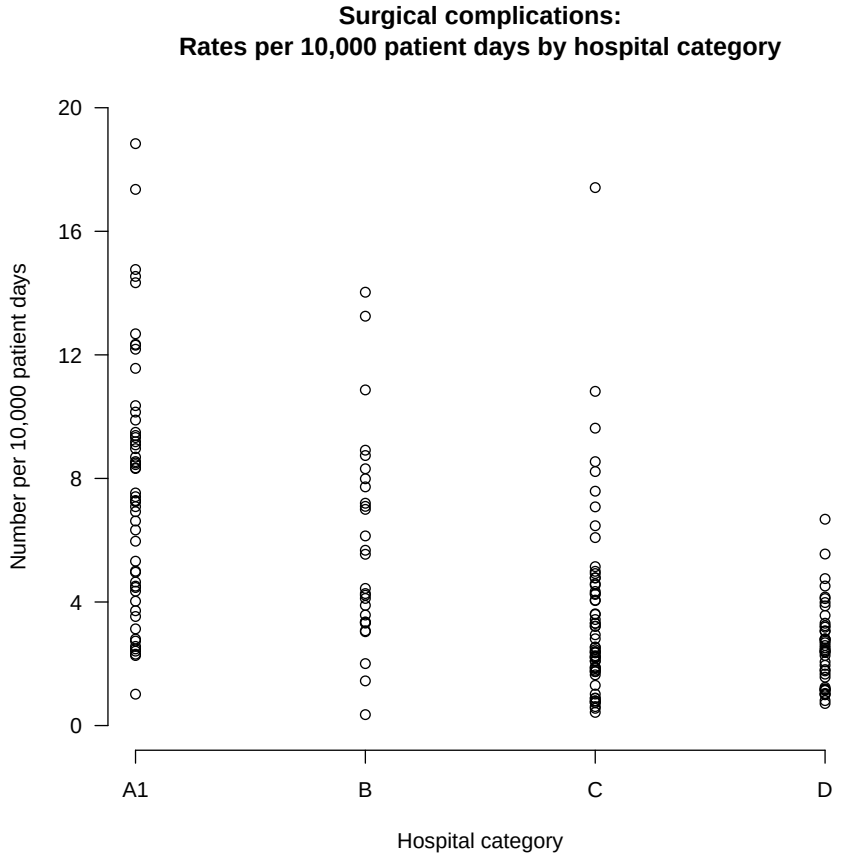
Rates outlined below reflect only surgical complications. Rates do not reflect unplanned return to theatre.

Table 11: Indicative data for surgical complications: all public hospitals two states 2010-11-2011-12

Complication category	Total Frequency	Frequency per 10,000 patient days for the specified complication public hospitals in two states				Excess days	Number of excess days per occurrence of complication
		Hospital category					
		A1	B	C	D		
Post-operative haemorrhage /haematoma requiring transfusion and/or return to theatre	13,119	6.19	3.68	2.37	0.49	50,035	3.81
Surgical wound dehiscence	2,792	1.29	1.03	0.31	0.19	51,071	18.29
Anastomotic leak	3,122	1.26	1.56	1.13	0.27	21,551	6.90
Vascular graft failure	631	0.36	0.03	0.03	0.00	3,620	5.74
Other surgical complications requiring unplanned return to theatre[36]	N/A	N/A	N/A	N/A	N/A	N/A	N/A

[36] Not available. Hospitals administrative data collections do not collect data that allows reporting of unplanned return to theatre

Figure 4: Indicative frequency per 10,000 patient days for surgical complication: all public hospitals two states 2010-11-2011-12



Comparator rates

A 1998 New South Wales two-year Hospital Infection Standardised Surveillance study revealed aggregated SSI rates of 1.7% for coronary artery bypass graft (CABG) of the chest and leg, 2.1% for CABG of the chest only, 7.1% for vascular surgery, 1.3% for hip prosthesis, 6.1% for knee prosthesis and 12.5% for colorectal surgery.[37]

[37] Cruickshank M, Ferguson J. (2008) *Reducing Harm to Patients from Health Care Associated Infection: The Role of Surveillance.* Australian Commission on Safety and Quality in Health Care. Sydney.

Unplanned ICU and/or MET Call

No data is available using activity data for this complication group.

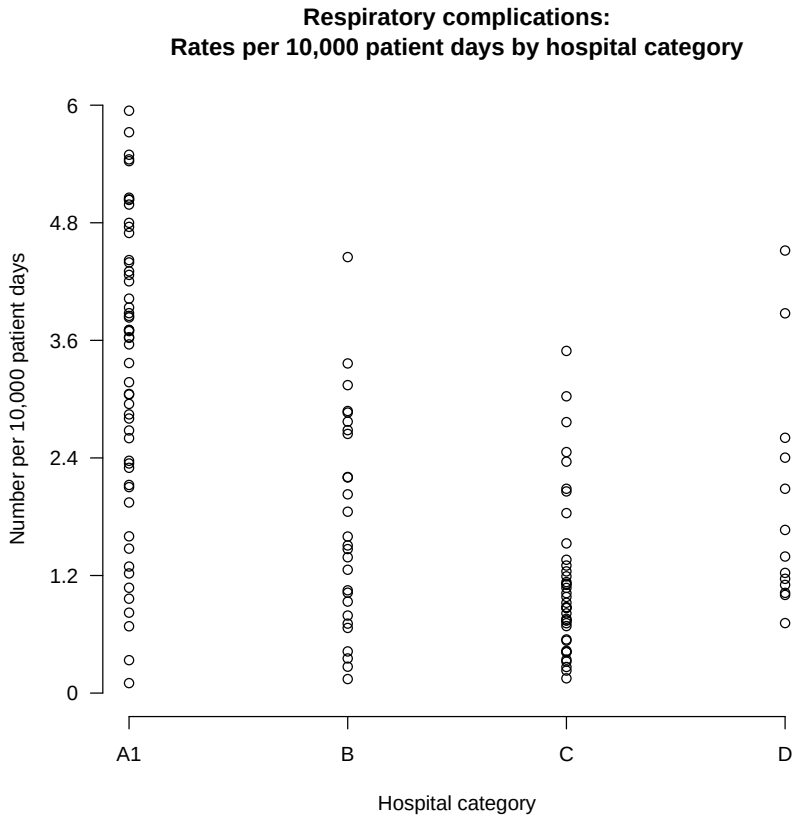
Recognising and responding to clinical deterioration in acute health care is the object of Standard 9 of the *National Safety and Quality Health Service Standard*s.

Respiratory complications

Table 12: Indicative data for respiratory complications: all public hospitals two states 2010-11-2011-12

Complication category	Total Frequency	Frequency per 10,000 patient days for the specified complication public hospitals in two states				Excess days	Number of excess days per occurrence of complication
		Hospital category					
		A1	B	C	D		
Respiratory failure including ARDS requiring ventilation (invasive and/or non-invasive)	3,008	1.60	0.55	0.13	0.00	32,581	10.83
Aspiration pneumonia	4,410	2.27	1.31	0.62	0.15	40,809	9.25

Figure 5: Indicative frequency per 10,000 patient days for respiratory complication: all public hospitals two states 2010-11-2011-12

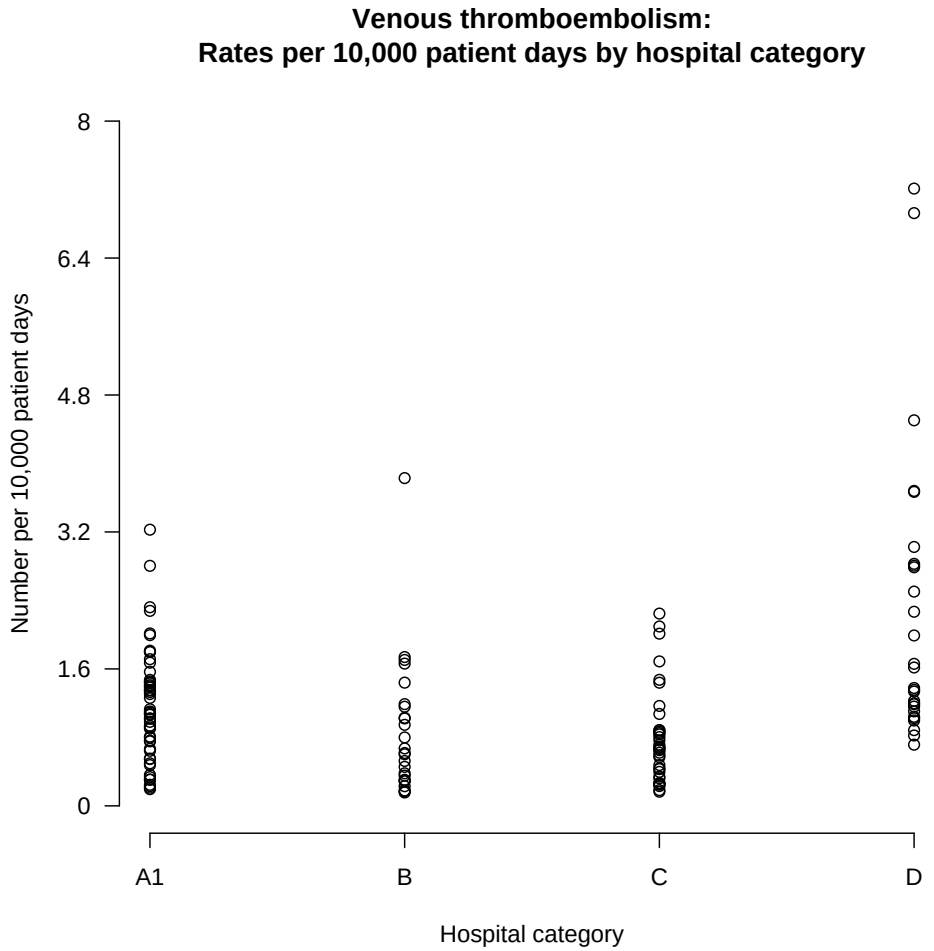


Venous thromboembolism

Table 13: Indicative data for venous thromboembolism: all public hospitals two states 2010-11-2011-12

Complication category	Total Frequency	Frequency per 10,000 patient days for the specified complication public hospitals in two states				Excess days	Number of excess days per occurrence of complication
		Hospital category					
		A1	B	C	D		
Pulmonary embolism	1,612	0.82	0.45	0.21	0.19	18,886	11.72
Deep vein thrombosis	1,375	0.64	0.52	0.29	0.30	19,491	14.18

Figure 6: Indicative frequency per 10,000 patient days for venous thromboembolism: all public hospitals two states 2010-11-2011-12

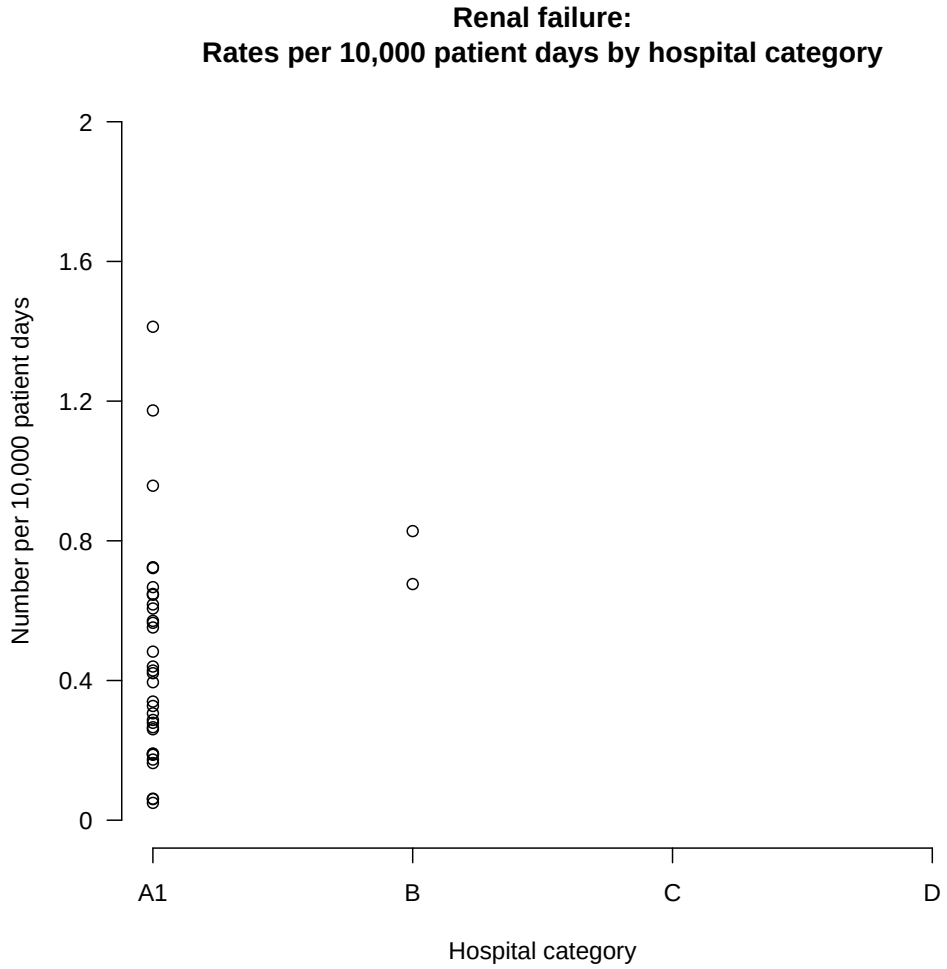


Renal failure

Table 14: Indicative data for renal failure: all public hospitals two states 2010-11-2011-12

Complication category	Total Frequency	Frequency per 10,000 patient days for the specified complication public hospitals in two states				Excess days	Number of excess days per occurrence of complication
		Hospital category					
		A1	B	C	D		
Renal failure requiring haemodialysis or CVVHD	786	0.43	0.09	0.00	0.00	10,426	13.26

Figure 7: Indicative frequency per 10,000 patient days for renal failure: all public hospitals two states 2010-11-2011-12

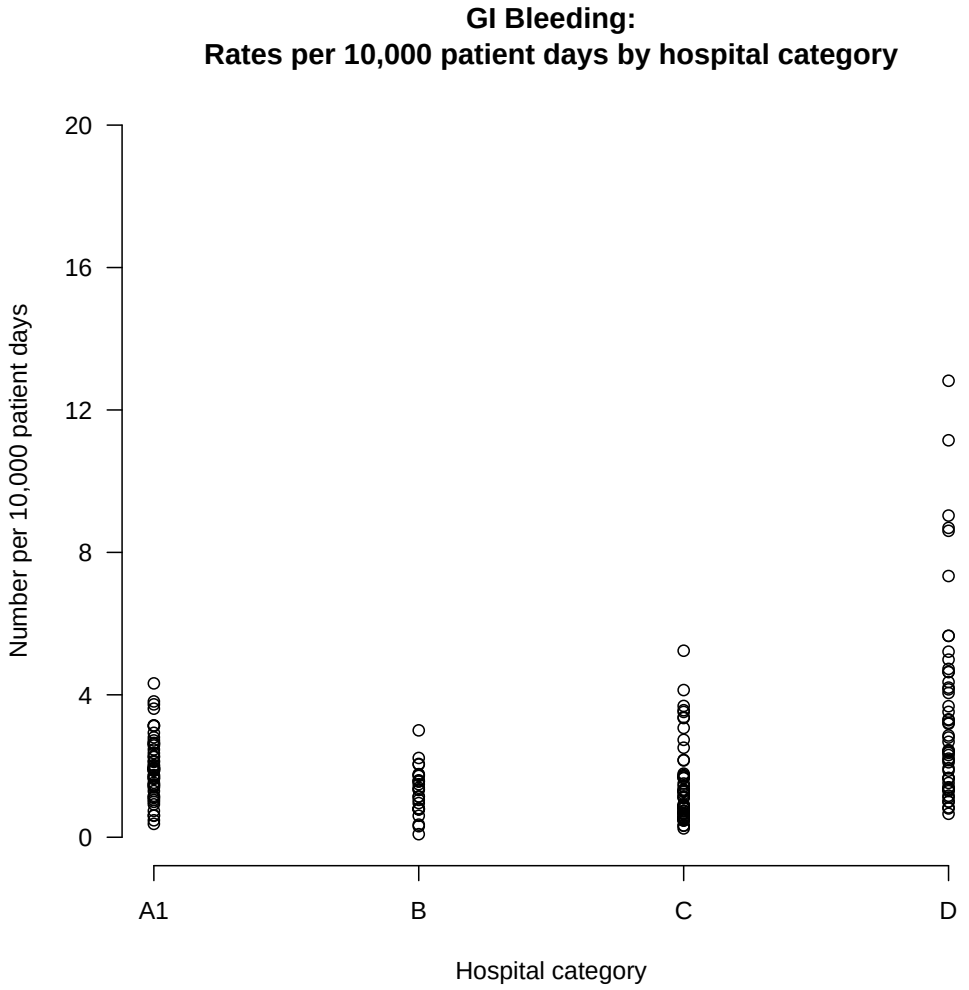


GI Bleeding

Table 15: Indicative data for GI bleeding: all public hospitals two states 2010-11-2011-12

Complication category	Total Frequency	Frequency per 10,000 patient days for the specified complication public hospitals in two states				Excess days	Number of excess days per occurrence of complication
		Hospital category					
		A1	B	C	D		
GI bleeding	5,177	2.38	1.36	1.35	1.42	47,742	9.23

Figure 8: Indicative frequency per 10,000 patient days for GI bleeding: all public hospitals two states 2010-11-2011-12

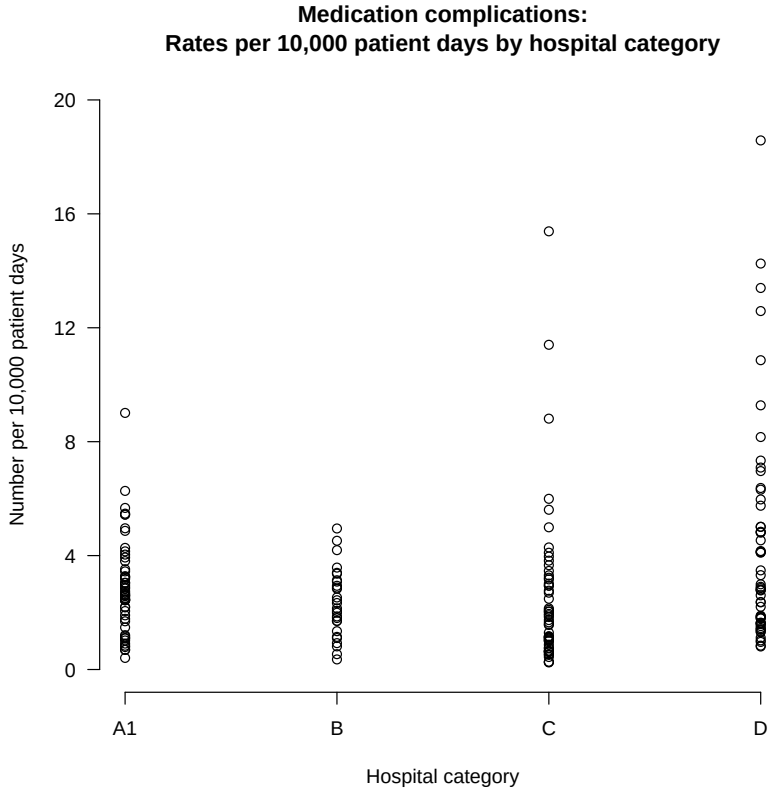


Medication complications

Table 16: Indicative data for medication complications: all public hospitals two states 2010-11-2011-12

Complication category	Total Frequency	Frequency per 10,000 patient days for the specified complication public hospitals in two states				Excess days	Number of excess days per occurrence of complication
		Hospital category					
		A1	B	C	D		
Drug related respiratory complications/depression[38]	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Haemorrhagic disorder due to circulating anticoagulants	3,432	1.54	1.27	1.06	0.80	25,725	7.50
Hypoglycaemia	3,442	1.54	0.98	0.65	1.25	21,424	6.22

Figure 9: Indicative frequency per 10,000 patient days for medication complication: all public hospitals two states 2010-11-2011-12



Medication safety is the object of Standard 4 of the *National Safety and Quality Health Service Standards*.

[38] Not captured at time of analysis as requires pairing of respiratory complications/ depression with drug related external cause codes

Comparator rates

Medication administration errors vary with the type of system in place. When errors of timing were excluded, it was found the clinical administration error rate was between 5% and 8% of medication administrations where individual patient supply systems were in use, and rose to 15% to 18% of medication administrations when ward stock systems were in place.[39]

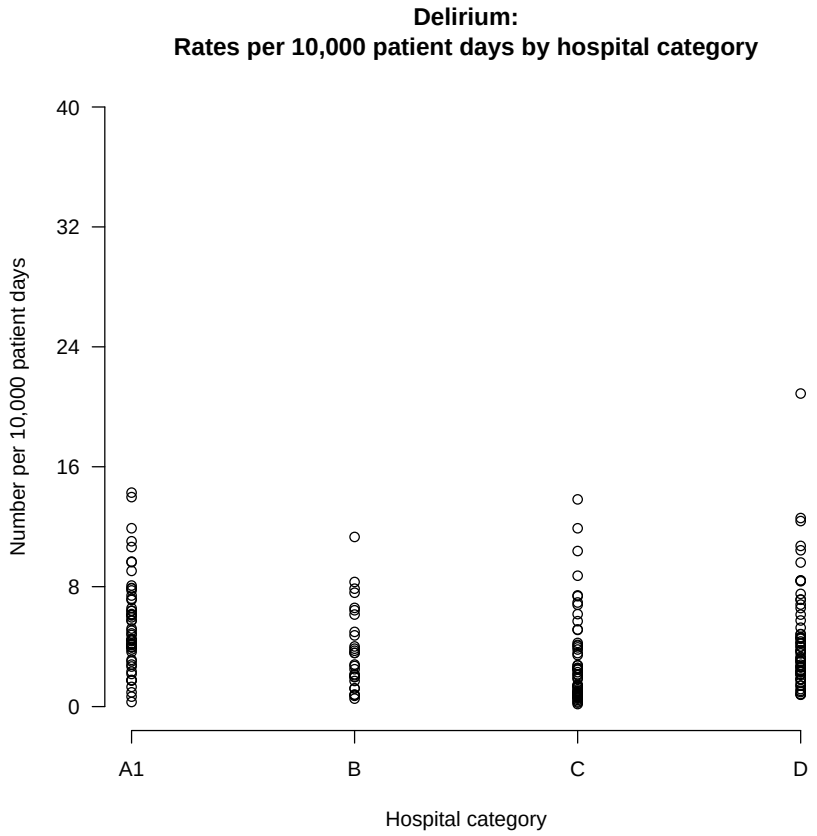
[39] Roughead, L., Semple, S. & Rosenfeld, E. (2013). *Literature Review: Medication in Australia*. Samson Institute: Prepared for the Australian Commission on Safety and Quality in Healthcare.

Delirium

Table 17: Indicative data for delirium: all public hospitals two states 2010-11-2011-12

Complication category	Total Frequency	Frequency per 10,000 patient days for the specified complication public hospitals in two states				Excess days	Number of excess days per occurrence of complication
		Hospital category					
		A1	B	C	D		
Delirium	15,074	7.21	4.19	2.63	2.09	119,228	7.91

Figure 10: Indicative frequency per 10,000 patient days for delirium: all public hospitals two states 2010-11-2011-12



Comparator rates

It has been reported that between 3-29% of older patients (aged 65 years and older) develop delirium during hospital admission. Rates as high as 47-53% have also been observed in older surgical patients. [40]

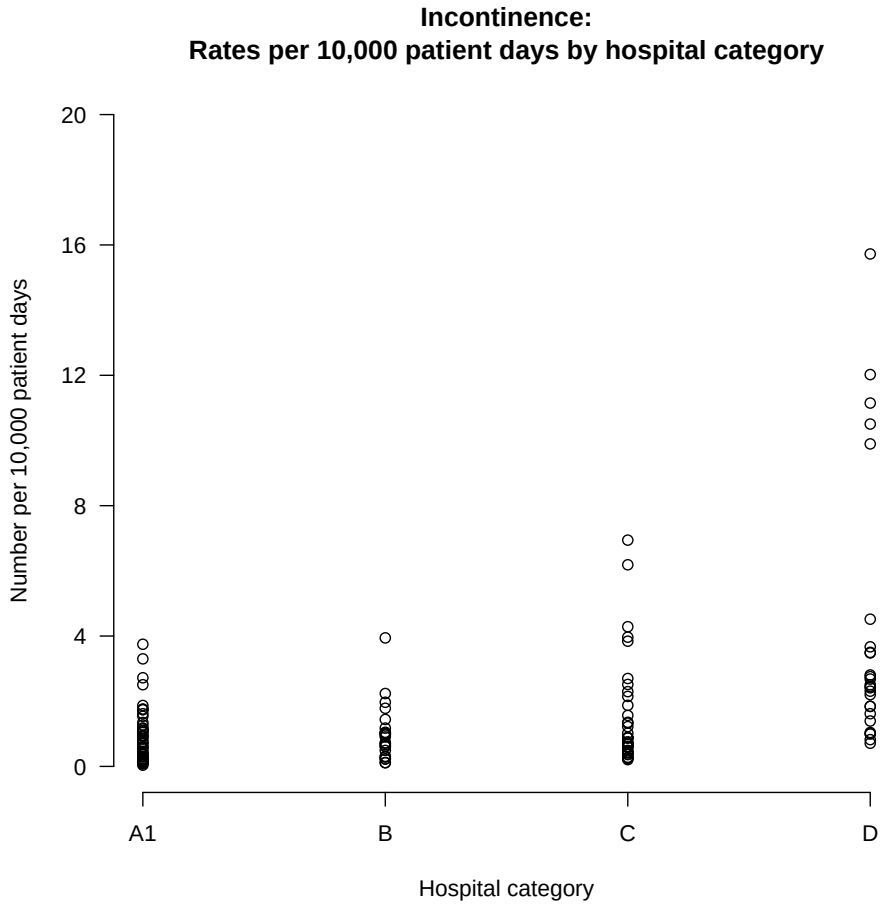
[40] Travers. C, Gray. L, Martin-Khan, M. & Hubbard, R. (2013) Rapid Review: Evidence for the safety and quality issues associated with the care of patients with cognitive impairment in acute care settings: Draft Report.

Persistent incontinence

Table 18: Indicative data for persistent incontinence: all public hospitals two states 2010-11-2011-12

Complication category	Total Frequency	Frequency per 10,000 patient days for the specified complication public hospitals in two states				Excess days	Number of excess days per occurrence of complication
		Hospital category					
		A1	B	C	D		
Incontinence (urinary)[41]	2,880	1.25	1.04	1.06	0.85	32,153	11.16

Figure 11: Indicative frequency per 10,000 patient days for incontinence: all public hospitals two states 2010-11-2011-12



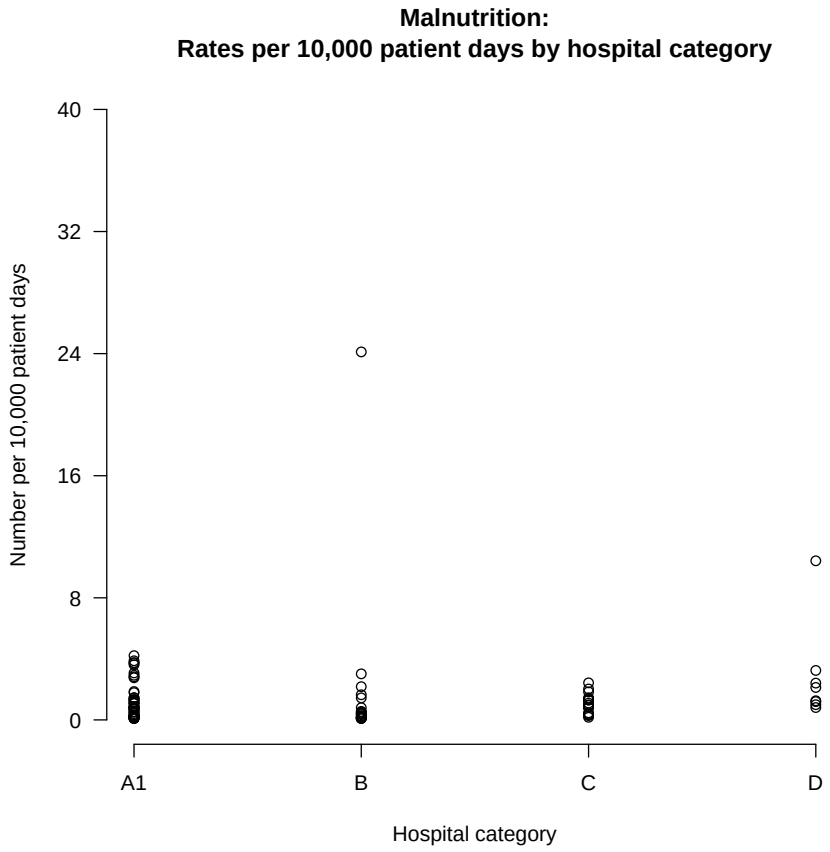
[41] This includes code N394 – Other specified urinary incontinence which relates to overflow and urge incontinece. This code has been removed from the final specification.

Malnutrition

Table 19: Indicative data for malnutrition: all public hospitals two states 2010-11-2011-12

Complication category	Total Frequency	Frequency per 10,000 patient days for the specified complication public hospitals in two states				Excess days	Number of excess days per occurrence of complication
		Hospital category					
		A1	B	C	D		
Malnutrition	3,870	1.77	2.25	0.55	0.25	53,141	13.73

Figure 12: Indicative frequency per 10,000 patient days for malnutrition: all public hospitals two states 2010-11-2011-12

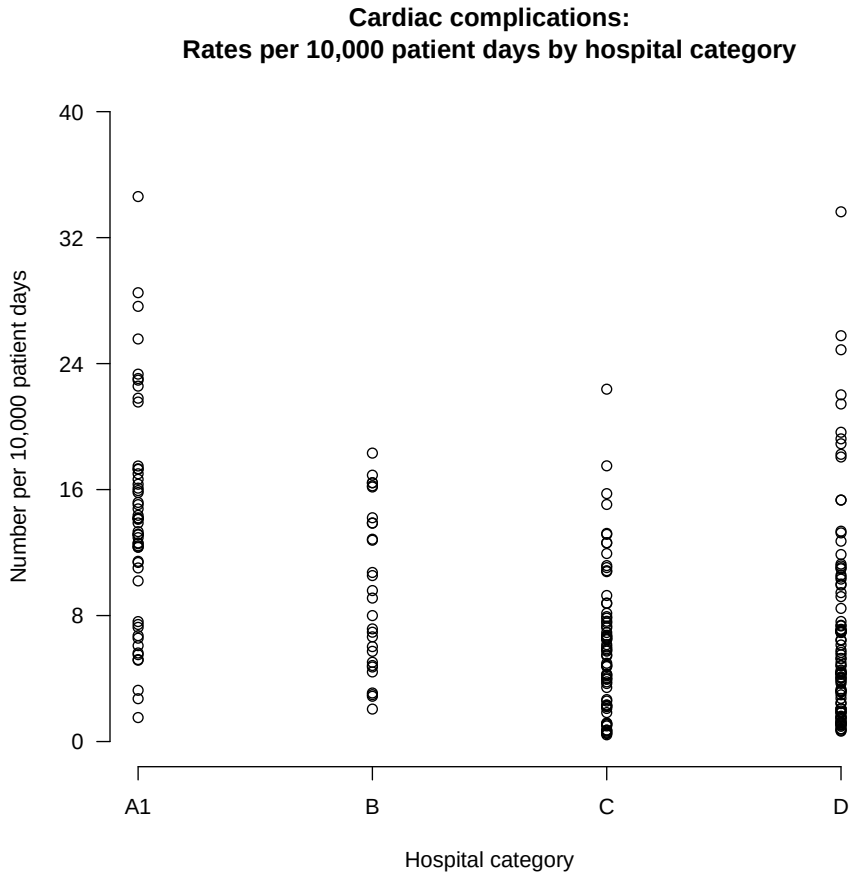


Cardiac complications

Table 20: Indicative data for cardiac complications: all public hospitals two states 2010-11-2011-12

Complication category	Total Frequency	Frequency per 10,000 patient days for the specified complication public hospitals in two states				Excess days	Number of excess days per occurrence of complication
		Hospital category					
		A1	B	C	D		
Heart failure and pulmonary oedema	7,202	3.55	2.34	1.35	0.93	58,384	8.11
Arrhythmias	18,972	9.31	5.64	3.03	2.01	91,004	4.80
Cardiac arrest	2,379	1.16	0.50	0.38	0.28	8,051	3.38
Acute coronary syndrome including unstable angina, STEMI and NSTEMI	7,514	3.68	2.51	2.01	1.21	42,576	5.66

Figure 13: Indicative frequency per 10,000 patient days for cardiac complication: all public hospitals two states 2010-11-2011-12

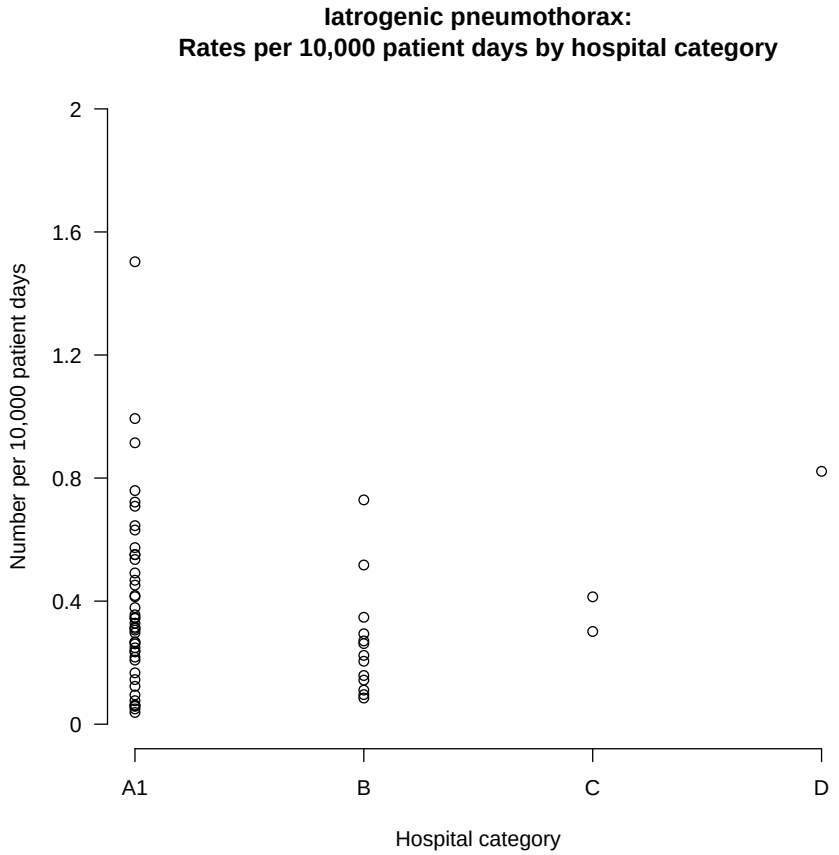


Iatrogenic pneumothorax requiring intercostal catheter

Table 21: Indicative data for iatrogenic pneumothorax: all public hospitals two states 2010-11-2011-12

Complication category	Total Frequency	Frequency per 10,000 patient days for the specified complication public hospitals in two states				Excess days	Number of excess days per occurrence of complication
		Hospital category					
		A1	B	C	D		
Iatrogenic pneumothorax requiring intercostal catheter	828	0.39	0.12	0.00	0.02	6,128	7.4

Figure 14: Indicative frequency per 10,000 patient days for iatrogenic pneumothorax requiring intercostals catheter: all public hospitals two states 2010-11-2011-12



Appendix 7: Technical notes

This appendix details the approach to undertaking the analysis of hospital inpatient morbidity data.

1) Analysis of the morbidity data was based upon acute episodes of care in public hospitals comprising the following care types:
   - 1.0 Acute care;
   - 7.1 Qualified newborn; and
   - 7.2 Qualified newborn (some days qualified and some days unqualified).
2) Calculations were made to determine the potential impact of arising conditions on:-
   - **Excess Days:** Difference between length of stay and expected length of stay.

     The expected number is based on the average number arising amongst cases with no codes reported as conditions arising during care and standardised for confounding factors including hospital type, age (70+) and DRG. The 'excess days' is not able to determine the extent to which any observed difference is attributable to the hospital onset condition.
3) Length of stay was provided as an integer variable within the data. To stop distortions from small numbers of very long stays length of stay was capped at 90 days.
4) Other variables were set at either 1 (true) or 0 (false). Values were initially set at 0 and changed when:-
   - the same day variable was set to 1 when the admission date equalled the discharge date;
   - the hospital transfer record was set at 1 if the mode of separation was '1';
   - the nursing home transfer record was set at 1 if the mode of separation was '2'; and
   - the hospital death record was set at 1 if the mode of separation was '8';
5) All records were allocated to a DRG6x/Age/Hospital group category. Age was counted as either below 7 years old of 70 or more years old. Hospitals were allocated into Public Type A (Principal Referral and Specialist Public Hospital), Other Public Hospitals and Private hospitals
6) The data were separated into two separate files, one containing records with at least one onset flag indicating that the diagnosis arose during the patients care and the other where no diagnoses arose during care.
7) The average values were calculated for each variable using the data with no conditions arising during care. Where averages were based upon fewer than 50 cases categories were aggregated to the next level and the combined average was used. This means that in DRG/Age/Hospital cohorts with fewer than 50 cases over the three years that the same average value based upon the Hospital/Age grouping was used for all hospital groups. Similarly where there were fewer than 50 cases over the three years at the DRG/Age level the DRG average was used for all cohorts within the DRG.
8) The cohort averages for patients with no conditions arising during care were used as expected values for episodes with conditions arising during care within the same DRG/Age/Hospital category. Total actual values and the total expected can then be compared for any subgroup of patients. The difference between these totals represents the potential impact of conditions arising on the statistics.

9) It should be noted that this does not imply causation, especially where many episodes report multiple conditions arising. In these cases, the relative effects of individual diagnoses cannot be disentangled. Traditionally this is done using regression techniques, however given the large number of potential diagnosis codes, this type of analysis is not sensible with the number of cases available.

Appendix 8: Reference list

Australian Commission on Safety and Quality in Health Care (2011) *National Safety and Quality Health Service Standards*.

Australian Commission on Safety and Quality in Health Care (2013) 'Classification of Hospital Acquired Diagnoses. Accessed 5 September 2013 from http://www.safetyandquality.gov.au/our-work/information-strategy/health-information-standards/classification-of-hospital-acquired-diagnoses-chadx/

Thomas EJ and Petersen LA. (2003) Measuring errors and adverse events in health care. *Journal of General Internal Medicine*, 18: 61-67.

Australian Institute of Health and Welfare (2013). Australian hospital statistics 2011–12: Staphylococcus aureus bacteraemia in Australian public hospitals. Health services series no. 47. Cat. no. HSE 129. Canberra: AIHW.

Australian Institute of Health and Welfare (2011), Australia's hospitals 2009-10 at a glance, Health services series no. 39. Cat. no. HSE 106. Canberra: AIHW

Australian Institute of Health and Welfare and Australian Commission on Safety and Quality in Health Care (2007) *Sentinel events in Australian public hospitals 2004–05*. Cat. no. HSE. 51, AIHW, Canberra.

Brennan T., Leape L., Laird N., Hebert, L., Localio A. Lawthers A., Newhouse J, Weiler P, and Hiatt H. (1991), Incidence of adverse events and negligence in hospitalised patients: results of the Harvard Medical Practice Study I. *New England Journal of Medicine,* 324: 370-376.

Centres for Medicare and Medicaid Services (2012). *Hospital-acquired Conditions (HAC) in acute Inpatient Prospective Payment System (IPPS) hospitals.* Department of Health and Human Services USA, Baltimore.

Change, A., Schyve, P. Croteau, R. O'leary, D. Loeb, J (2005) The JCAHO patient safety event taxonomy: a standardized terminology and classification schema for near misses and adverse events. International Journal for *Quality in Health Care, 17* (2), 95–105.

Clinical Excellence Commission (2011) *Caring for patients by continuing to enhance the health system, Annual report 2010-11.* Queensland Health, Brisbane.

Cruickshank M, Ferguson J.(2008) *Reducing Harm to Patients from Health Care Associated Infection: The Role of Surveillance:* Australian Commission on Safety and Quality in Health Care. Sydney.

de Almeida, M., Heffernan, H., Dervan, A., Bakker, S., Freeman, J., Bhally, H., and Roberts, S. (2013). Severe clostridium difficile infection in New Zealand associated with an emerging strain, PCR-ribotype 244. *The New Zealand Medical Journal (Online), 126*(1380) 9-14.

Department of Health (2000) *An organisation with a memory. Report of an expert group on learning from adverse events in the NHS chaired by the Chief Medical Officer.* The Stationery Office, London.

Department of Health. (2001) *Doing less harm.* Department of Health, London.

Department of Health (2011) *Multiple Chemical Sensitivity: A Guide for Victorian hospitals.* Department of Health, Melbourne.

Department of Health (2011). *The "never events' list 2011-12: Policy framework for use in the NHS*. NHS, London.

Department of Health (2012) *Supporting patient safety: Sentinel event program annual report 2010–11.* Department of Health, Melbourne.

Department of Health (2012) W*estern Australia. Clinical Incident Management Policy.* Patient Safety Surveillance Unit, Performance Activity and Quality Division, Perth.

Ehsani, J. P., Jackson, T., and Duckett, S. J. (2006). The incidence and cost of adverse events in victorian hospitals 2003-04. *Medical Journal of Australia, 184* (11), 551-5.

Feasey, N., and Molyneux, E. (2011). Keep it clean: Hospital-acquired infections in children. *The Lancet, 378*(9808), 1982-3.

Forster, A. J., Taljaard, M., Bennett, C., and Walraven, C. v. (2012). Reliability of the peer-review process for adverse event rating. *PLoS One, 7*(7) 1-7.

Foster et al. (2012) Improving patient safety through the systematic evaluation of patient outcomes. *Can J Surg,* Vol. 55, No. 6.

Fuller RL, McCullough EC, Bao MZ, Averill RF. (2009) Estimating the Costs of Potentially Preventable Hospital-acquired Complications. *Health Care Financing Review 30*(4), 17-32.

Giles, S. J., Cook, G. A., Jones, M. A., Todd, B., and al, e. (2005). Evaluating the effectiveness of a multi-professionally agreed list of adverse events for clinical incident reporting in trauma and orthopaedics: A follow-up study. *Clinical Governance, 10*(3), 217-230.

Giles, S. J., Cook, G. A., Jones, M. A., Todd, B., Mason, M., and Walshe, K. (2004). Developing a multi-professionally agreed list of adverse events for clinical incident reporting in trauma and orthopaedics. *Clinical Governance, 9*(4), 225-231.

Government of Western Australia (2011) *Learning from Clinical Incidents: A Snapshot of Patient Safety in Western Australia 2010-2011.* Government of Western Australia, Perth.

Government of Western Australia (2012) *Your Safety in Our Hands in Hospital An Integrated Approach to Patient Safety Surveillance in WA Hospitals, Health Services and the Community: 2012. Delivering Safer Care Series Report Number 1.* Department of Health: Perth.

Graves. N, Birrell. F, & Whitby, M. (2005) Effect of pressure ulcers on length of hospital stay. *Infection Control and Hospital Epidemiology*, 26, 293-297.

Haines, T. P., Hill, A., Hill, K. D., Brauer, S. G., Hoffmann, T., Etherton-Beer, C., and McPhail, S. M. (2013). Cost effectiveness of patient education for the prevention of falls in hospital: Economic evaluation from a randomized controlled trial. *BMC Medicine, 11*(1), 135.

Hughes J., Averill, R., Goldfield, A., Gay, J., Muldoon, J. McCullough, E., and Xiang, J. (2006) Identifying potentially preventable complications using a present on admission indicator. *Health care financial review, 27* (3) 63 - 82.

Jackson TJ, Duckett SJ, Shepheard J, Baxter K (2006). Measurement of adverse events using 'incidence flagged' diagnosis codes. *Journal of Health Services Research and Policy; 11*(1), 21-25.

Jackson TJ, Michel JL, Roberts R, Jorm C, Wakefield J (2009). A Classification of Hospital Acquired Diagnoses for use with routine hospital data. *Medical Journal of Australia, 191*(10), 544-548

Jackson, T. (2009) *One Dollar in Seven: Scoping the Economics of Patient Safety. A literature review prepared for the Canadian Patient Safety Institute*. Canadian Patient Safety Institute.

Jackson, T., Nghiem, H.S., Rowell, D., Jorm, C. and J. Wakefield (2011) 'Marginal costs of hospital acquired diagnoses: Information for priority setting for patient safety programs and research,' *Journal of Health Services Research andPolicy, 16*(3), 141-146

Jump, R. L. P. (2013). Clostridium difficile infection in older adults. *Aging Health, 9*(4), 403-414.

Kings Fund (2011) I*mproving the quality of care in general practice Report of an independent inquiry commissioned by The King's Fund*. Kings Fund, London.

Lagoe RJ, Bick, J. (2013) Reducing hospital inpatient complications: A four year experience. A*dvances in Bioscience and Biotechnology 4,*118-125.

Lagoe RJ, Johnson PE, Murphy MP. (2011) Inpatient hospital complications and lengths of stay: a short report. *BMC Research Notes 24*(135).

Lagoe RJ, Westert GP. (2010) Evaluation of hospital inpatient complications: a planning approach. *BMC Health Services Research 10*(200) 7-12.

Lahmann, N., Halfens, R.J.G., Dassen, T., (2006). Effect of non-response bias in pressure ulcer prevalence studies. *Journal of Advanced Nursing* 55 (2), 230–236.

Loggie C., Elsworthy A., McNamee J., Cook, R. and Gootemaat P. (2013) *A Literature Review on Integrating Quality and Safety into Hospital Pricing Systems*. Centre for Health Service Development, University of Wollongong.

Long, S. J., Brown, F. B., Ames, D. And Vincent, C. (2013) What is known about adverse events in older medical hospital inpatients? A systematic review of the literature. *International Journal for Quality in Health Care*

Michel J. L., Cheng D., Jackson T.J. (2011).Comparing the coding of complications in Queensland and Victorian admitted patient data. *Australian Health Review; 35*, 245–252

Michel J.L., Nghiem H.S., Jackson T.J. (2009). Using ICD-10-AM codes to characterise hospital-acquired complications. *Health Information Management Journal; 38*(3), 18-25.

Mohammed, M. A., Sidhu, K. S., Rudge, G., and Stevens, A. J. (2012). Weekend admission to hospital has a higher risk of death in the elective setting than in the emergency setting: A retrospective database study of national health service hospitals in England. *BMC Health Services Research, 12*(1), 87.

Moje, C., Jackson, T. J., and McNair, P. (2006). Adverse events in Victorian admissions for elective surgery. *Australian Health Review, 30*(3), 333-43

NHS Litigation Authority (2012) Solicitors' Risk Management Reports on Claims: Analysis and Annual Review. London

Naessens et al.(2009) A comparison of hospital adverse events identified by three widely used methods. *Int J Qual Health Care*

National Patient Safety Agency (2013) *NRLS Quarterly Data Workbook up to March 2012.*

National Quality Forum (2011) S*erious Reportable Events in Healthcare- 2011 update: a consensus report.* National Quality Forum, Washington.

Oliver, D. and Morse, J. M. (2006) Assessing the risk of falls in hospitals: Time for a rethink? *Canadian Journal of Nursing Research*, 38(2): p. 89-96.

Oliver, D., Daly, F., Martin, F. C., and McMurdo, M. E. T. (2004) Risk factors and risk assessment tools for falls in hospital in-patients: A systematic review. *Age and Ageing*. 33(2), 122-130.

Pronovost P.J., Miller M.R., Wachter R.M. (2006) Tracking progress in patient safety: An elusive target. *Journal of the American Medical Association*. 296 (6) (pp 696-699)

Queensland Health (2012). *2012-13 Hospital and health service performance framework: key performance indicators*. Queensland Health, Brisbane.

Queensland Government (2012) *A safer future for Emily: Queensland incidents in Transfusion (QiiT) June 2007–2009 Report.* Queensland Health, Brisbane.

Queensland Health (2012) *Patient safety: from learning to action 2012 Fifth Queensland Health report on clinical incidents and sentinel events in the Queensland public health system 2009–10 and 2010–11.*

Queensland Health (2008*) Project Report: Investigating practices related to malnutrition in Queensland Health facilities.* Queensland Health, Brisbane.

Rigby K, Clark RB, Runciman WB. (1999) Adverse events in health care: setting priorities based on economic evaluation. *J Qual Clin Pract 19*, 7–12.

Roughead, L., Semple, S. & Rosenfeld, E. (2013) *Literature Review: Medication in Australia*. Samson Institute: Prepared for the Australian Commission on Safety and Quality in Healthcare. University of Australia, Adelaide.

Roughead, E. And Lexchin, J. (2006) Adverse drug events: counting is not enough, action is needed. *MJA, 184* (7) 315-316.

Roughead, L. And Semple, S. (2008) *Literature review: medication safety in acute care in Australia.* Sansom Institute, University of Australia, Adelaide.

Runciman W.B., Edmonds M.J., Pradhan M. (2002) Setting priorities for patient safety. *Qual Saf Health Care 11,* 224–9.

Runciman WB, Moller J. (2001) *Iatrogenic injury in Australia. Report prepared by the Australian Patient Safety Foundation for the National Health Priorities and Quality Branch of the Department of Health and Aged Care of the Commonwealth Government of Australia.* Australian Patient Safety Foundation, Adelaide.

Runciman WB, Webb RK, Helps SC, et al. (2000) A comparison of iatrogenic injury studies in Australia and America. 2: A review of behaviour and quality of care. *Int J Qual Health Care, 12* (5), 379–88.

Runciman, W. (2002) Lessons from the Australian Patient Safety Foundation: setting up a national patient safety surveillance system--is this the right model? *BMJQS, 11*(3) 246-251.

Runciman, W., Roughead, E., Semple, S. And Adams, R. (2003) Adverse drug events and medication errors in Australia. *Int J Qual Health Care , 15,* (S1) i49-i59.

SA Health (2012) *South Australian Patient Safety Report 2011 - 2012.* Government of South Australia, Adelaide.

Sari, A., Sheldon, T., Cracknell, A. and Turnbull A. (2006) Sensitivity of routine system for reporting patient safety incidents in an NHS hospital: retrospective patient case note review. *BMJ, 10,* 1136.

Scobie S., Thomson R., McNeil J.J., and Phillips P.A. (2006) Measurement of the safety and quality of health care. *MJA,184*, S51-S55.

Sheps, S., and Birnbaum, D. (2012). Mandatory reporting of healthcare associated infections. *Clinical Governance, 17*(2), 96-100.

The Bristol Royal Infirmary Inquiry. (2001) *Learning from Bristol: the report of the public inquiry into children's heart surgery at the Bristol Royal Infirmary 1984–1995.* Norwich, UK: The Stationery Office, London(www.bristol-inquiry.org.uk).

Thomas E., Studdert D., Burstin H., Orav E., Zeena, T., Williams E., Howard K., Weiler P. and Brennan T. (2000) Incidence and Types of Adverse Events and Negligent Care in Utah and Colorado. *Medical Care, 38* (3)261-271.

Thomas EJ, Studdert DM, Newhouse JP, et al. (1999) Costs of medical injuries in Utah and Colorado. *Inquiry, 36* (3) 255–64.

Travers. C, Gray. L, Martin-Khan, M. & Hubbard, R. (2013) Rapid Review: Evidence for the safety and quality issues associated with the care of patients with cognitive impairment in acute care settings: Draft Report. UniQuest, Queensland

Tsang C., Majeed A., Aylin P. (2012). Routinely recorded patient safety events in primary care: a literature review. Family Practice. 29, 8-15.

Tsang C., Palmer W., Bottle P., Majeed A., and Aylin P. (2012). A Review of Patient Safety Measures Based on Routinely Collected Hospital Data. *American Journal of Medical Quality. 27,* 154-169.

Utz M, Johnston T, Halech R, (2012) *A review of the Classification of Hospital-Acquired Diagnoses (CHADx)*, Queensland Health, Brisbane.

Van Den Bos, J., Rustagi, K. Gray, T. Halford, M Ziemkiewicz, E. and Shreve, J. (2011) The $17.1 billion problem: the annual cost of measurable medical errors. *Health Affairs, 30* (4) 596-602.

Vincent , C. (2012) The Essentials of Patient Safety. Adapted from Vincent , C. (2012) *Patient Safety*, 2nd Edition, Wiley-Blackwell, London.

Vincent C.A. (1989). Research into medical accidents: a case of negligence? *BMJ. 299*, 1150-3.

Wilson R., Harrison B., Gibberd R. and Hamilton J. (1999) An analysis of the causes of adverse events from the Quality in Australian Health Care Study. *MJA 170*, 411-415.

Wilson R.McL, Runciman W.B., Gibberd R.W., Harrison B.T., Newby L. & Hamilton J.D. (1995) The Quality in Australian Health Care Study. *Med J Aust,* 163:458–71.

Woolf S., Kuzel A.J., Dovey S.M., Phillips R.L. (2004) A String of Mistakes: The Importance of Cascade Analysis in Describing, Counting, and Preventing Medical Errors. *Ann Fam Med. 2* (4), 317-326.