

The AusPSIs: the Australian version of the Agency of Healthcare Research and Quality patient safety indicators

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Abstract

Many countries are seeking ways to measure the safety and performance of their health systems. The ability to track improvement and monitor safety event rates at a population level is provided by routinely collected administrative data in conjunction with a set of well-developed indicators such as the patient safety indicators from the Agency for Healthcare Research and Quality (AHRQ) in the United States of America. These indicators are currently in the International Classification of Diseases Ninth Revision, Clinical Modification (ICD-9-CM) whereas Australia has coded its data in ICD-10-Australian Modification (ICD-10-AM) since 1998. We describe the process recently undertaken to translate and revise the patient safety indicators (PSIs) so they can be of use with ICD-10-AM.

The initial translation (electronic mapping, review and revision by expert coder, programming of codes and testing on data from 1996–1998 [ICD 9-CM] to 1998–2006 [ICD-10-AM, through 4 editions]) found that differences between ICD-9-CM and ICD-10-AM datasets presented some challenges. After this phase, which was faithful to AHRQ's case definitions, the indicators were refined for use with the condition onset flag, resulting in the AusPSIs.

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ACROSS AUSTRALIA and internationally, the measurement of clinical performance, the development of clinical indicators and the interpretation of quality of care are prominent in the agendas of health care funding agencies, providers, consumer groups and key professional bodies. Currently, the identification of adverse events and assessment of clinical performance relies on initiatives that involve voluntary reporting or are targeted at perceived areas of interest and concern

What is known about the topic?

The Agency of Healthcare Research and Quality patient safety indicators were developed after comprehensive literature review, analysis of ICD-9-CM codes, clinician review, implementation of risk adjustment, and empirical analyses to provide information on the quality of health care.

What does this paper add?

This paper describes the process to translate the existing American patient safety indicators to develop the AusPSIs. Challenges occurred with code changes and opportunities for improvement where specificity and functionality was greater in the translated version.

What are the implications for practitioners?

The benefits available in ICD-10-AM may make the AusPSIs useful tools for screening for patient safety events and tracking improvements. Further work in statistical modelling to develop risk-adjusted expected rates and appropriate display and reporting methods will enhance their ability to serve as quality indicators.

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through clinical audits, patient questionnaires, prevalence surveys and peer review. These activities capture information and provide results in relation to set groups of patients in specific areas of care provision. The Victorian Government Department of Human Services maintains a collection of data sources that include clinical registries and databases. These data sources provide excellent clinical detail, and are well-developed for comprehensive interrogation; however, they may be susceptible to delays in reporting, their data collection is labour intensive and their influence is limited to very specific areas of practice.

In order to complement such existing tools and address the limitations of delay and specificity, a complementary set of indicators was sought that would make inexpensive, population-wide surveillance of quality of care possible, based on a routinely available data source such as administrative data.¹⁻⁵ Although there is no agreement on the value of using administrative data for this purpose, these datasets are coded according to nationally and internationally agreed standards⁶ that provide a consistent base for the datasets.

Rather than develop an entirely new tool, a project was undertaken to apply an existing set of indicators developed by the Agency for Healthcare Research and Quality (AHRQ) in the United States for measuring health care quality by using hospital inpatient administrative data.⁷ The patient safety indicators (PSIs) provide information on potential in-hospital complications and adverse events following surgery, procedures, and childbirth.

The 20 provider-level AHRQ PSIs were developed after comprehensive literature review, analysis of International Classification of Diseases Ninth Revision, Clinical Modification (ICD-9-CM) codes, clinician review, implementation of risk adjustment, and empirical analyses.⁸ Further, the usefulness and applicability of the AHRQ PSIs has been investigated and found to be promising.^{3,4}

The PSIs are based on the ICD-9-CM, whereas the standard for coding in Australia since 1998 has been the ICD 10th Revision, Australian Modification (ICD-10-AM). As a result, the AHRQ PSIs

required translation to enable their use with any contemporary Australian administrative dataset.

In this paper, the process of translating the AHRQ PSIs to ICD-10-AM followed by the refinement of the PSIs to suit Australian data (the AusPSIs) are outlined. The lessons from the translation process and subsequent analysis are described in order to provide the context for the potential applications of the PSIs in Australia's public health systems.

Data

ICD-10-AM was developed with Australian practice in mind and with the cooperation of clinicians and clinical coders. Its structure is aligned with anatomy and captures diagnostic, therapeutic and preventive procedures and interventions.⁹ The national ICD-10-AM diagnostic and procedure codes are subjected to biennial updates (resulting in new editions) that are undertaken by the National Centre for Classification in Health (NCCCH) in order to keep pace with changes in clinical practice. This offers the benefit of continuous improvement in ICD-10-AM's coding capacity but necessitates mapping for any time series measurements.

Administrative datasets across Australia are used, to varying degrees, for funding. In Victoria this has been a key application of the dataset where hospital funding is casemix and output based. The Victorian dataset, known as the Victorian Admitted Episodes Dataset (VAED), has been subjected to three data quality audits since the introduction of ICD-10-AM. Published results from the first two audits, conducted on data in 1998–99 and 2000–01, reported that the transition from ICD-9-CM to ICD-10-AM (1998) was implemented with no loss of data quality, and the data showed a high level of reliability and adherence to coding standards.¹⁰ A key reason for the reliability of the VAED is that the outputs are used for funding of hospitals and the ICD classification is undertaken by qualified health information managers whose principal role is coding from patient records with a requirement to maintain expertise in the

national standards. The VAED contains data from all discharges (separations) that occur in Victoria's 142 public hospital campuses. There are about 1.3 million separations reported annually. The VAED is an ideal dataset on which to base analysis as funding is single source, capture is universal and the dataset is stored in a single location.

Translation of AHRQ PSIs from ICD-9-CM to ICD-10-AM

The underlying principle of this initial translation stage of the 20 PSIs was to maintain fidelity to AHRQ's original case definitions. The process of translation consisted of: electronic mapping; review and revisions by an expert coder; and programming of codes and testing on data.

Mapping involved producing ICD-10-AM files from the source ICD-9-CM files of Version 3.0a of the AHRQ PSIs and was undertaken electronically using SAS programs¹¹ and NCCH maps (library files) from ICD-9-CM to ICD-10-AM 4th edition and then back through 3rd, 2nd and 1st editions. Although the 5th edition was current at the time of translation, the decision was made to initially translate to 4th edition as this was a closed and finalised edition. Forward mapping to 5th edition was then completed. In some instances, codes were directly mappable while others had no direct equivalent ICD-10-AM code, either because of complete deletion or expansion into a number of codes replacing the original code.

Review and revision by an expert coder with extensive knowledge and experience of the history of Australian coding standards and practice in both ICD-9-CM and ICD-10-AM was the next step. This review ensured that each of the electronically mapped codes was correct. Where any uncertainty remained, this was referred to the project reference group, consisting of two physician-epidemiologists, two quality and safety experts, a statistician and the project coder and analyst/programmer. This group served to bring current health sector expertise into decisions made about mapping queries.

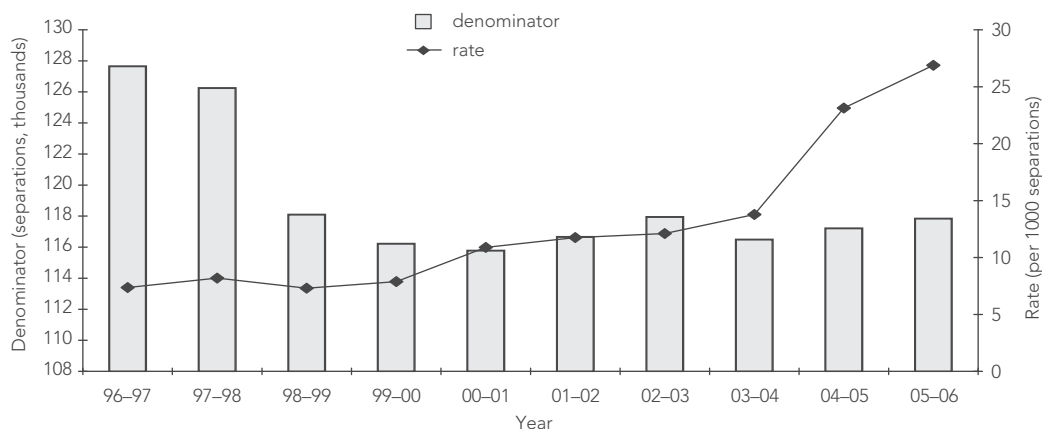
Programming and testing were then developed to enable calculation, output and empirical assessment of each PSI using statistical analysis software.¹¹ The programs were applied to data to produce a time series, which covered years coded with ICD-9-CM (1996–1998) and ICD-10-AM (1 July 1998 on).

Development of AusPSIs

After this initial stage, which adhered to AHRQ's PSI case definitions, the 20 PSIs were revisited to assess whether they could be further tailored to suit Australian data. The existing data enabled the development of a timing variable, the *condition onset flag*, which became available in Australian data beginning in July 2008. To date, in Victoria, this code has taken on one of four values: "P" for primary, for a diagnosis present on admission; "A" for associated, for a condition present at admission but not responsible for admission, and which bears on the treatment received in hospital; "C" for complication for conditions timed as arising after admission, during the hospital stay (the C-prefix); and "M" for morphology which provides further detail for a cancer diagnosis. Each diagnostic variable is associated with a timing variable.

The C-prefix may be coded for a condition arising during an episode of care; a condition resulting from misadventure during surgical or medical care in the current episode of care; and an abnormal reaction to, or later complication of, surgical or medical care occurring during the current episode of care.¹² It holds particular promise in conjunction with the PSIs. Although not all conditions coded with a C-prefix are adverse events, all conditions coded this way are conditions not present on admission. So, an event that is detected via the PSI coding algorithms along with a C-prefix is likely to be a condition acquired during hospitalisation. Although not a panacea, these timing variables/condition onset flags do go a long way to addressing the issue of whether a diagnosis is pre-existing or not.¹³ Use of the C-prefix also promised to simplify the diagnostic coding involved in defining the PSIs as a layer of exclusions used in the AHRQ PSIs to

I Agency for Healthcare Research and Quality (AHRQ) patient safety indicator (PSI) 3 — Decubitus ulcer



International Classification of Diseases Ninth Revision, Clinical Modification (ICD-9-CM) was in use between 1996–97 and 1997–98; ICD-10-Australian Modification (ICD-10-AM) 1st edition between 1998–99 and 1999–00; 2nd edition between 2000–01 and 2001–02; 3rd edition between 2002–03 and 2004–05; and 4th edition between 2004–05 and 2005–06. Victorian Admitted Episodes Dataset audits were conducted during 1998–99 and 1999–00 and 2000–01 and 2001–02 with feedback and education after the audits. A third ICD-10-AM audit was completed in 2006–07.

help ensure appropriate timing detection could be removed.

The AusPSIs are detailed in the Appendix.

Example of a challenge in translation

Throughout and following translation, the raw results were examined by the project team and reference group to identify PSI rates that were inconsistent with expectations or data from other sources, such as registries. These inconsistencies or rate disconnects (sudden changes in the detected rate of a PSI) were anticipated initially at the ICD-9-CM to ICD-10-AM interface (1997–98/1998–99). Thereafter, the biennial edition changes were also closely reviewed for changes. As expected, a number of inconsistencies were detected. Aside from technical issues, the reasons for the inconsistencies included definitional issues for denominator or numerator, coding practice change and inconsistency between ICD-9-CM and ICD-10-AM codes.

For the purposes of demonstration and to inform discussion, an example of inconsistency

or rate disconnect is provided here. This is by no means the only example, but a more detailed list is best suited to a technical description of the translation. Although actual figures are provided these serve only to emphasise points made in the paper and are not intended as reports on the performance of the Victorian health system.

The example used here is “PSI 3 Decubitus ulcer”.

PSI 3 Decubitus ulcer

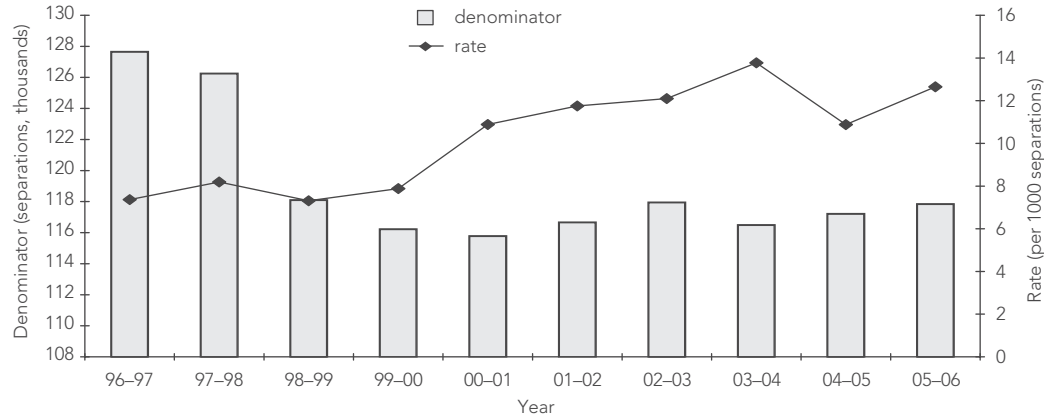
The AHRQ definition for PSI 3 seeks to identify the number of cases of decubitus ulcer per 1000 separations from an at-risk population defined as all medical and surgical separations with lengths of stay of greater than 4 days. Decubitus ulcers are otherwise known as pressure sores or bed sores. They are among the largest but most preventable causes of patient harm facing hospitals.¹⁴ Exclusion criteria exist for patients who: are admitted with a principal diagnosis of decubitus ulcer; have a clear predisposition for developing decubitus ulcers; or are admitted for obstetric reasons.

The initial time series (1996–97 to 2005–06) for PSI 3 is shown in Box 1. At the junction of 2003–04 and 2004–05 there was a notable increase in the rate of detected ulcers. The rate increased from about 14 per 1000 separations to 23 per 1000 separations. This was after an increase in rate of only 6 per 1000 separations over the period 1996–2004 (7.4–13.8 per 1000 separations). The occurrence of this sudden increase in number of ulcers correlates with the conversion from 3rd edition to 4th edition of ICD-10-AM.

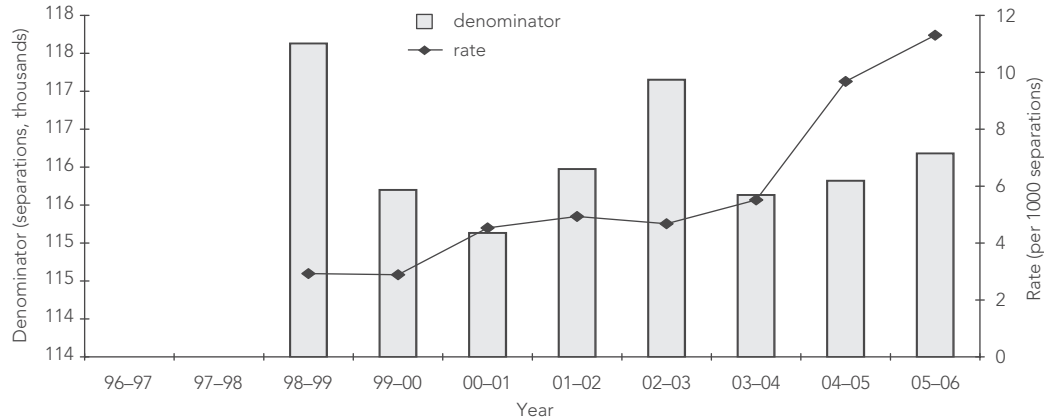
The explanation for this change in rate was thought to be linked to a change in definition of

the code(s) for decubitus ulcer. Before and including the 3rd edition dataset, decubitus ulcer had been captured by a single code. Beginning with the 4th edition the definition of decubitus ulcer was expanded to include five separate codes. This revision meant that each ICD-10-AM code for decubitus ulcer was aligned with a severity staging system and separated ulcers into Stage I, II, III and IV as well as unspecified ulcers. The expansion of codes increased the capture of lower severity ulcers (Stage I and II). Before this point these less severe ulcers had not met the definition of ulcer for the purpose of coding in

2 Agency for Healthcare Research and Quality (AHRQ) patient safety indicator (PSI) 3 — Decubitus ulcer, stages 1 and 2 partitioned out



3 Australian patient safety indicator (PSI) 3 — Decubitus ulcer with condition onset flag



patient records. This change was the most likely primary cause of the rate change noted in the PSI time series.

In order to test this assumption and the impact of the coding changes, all decubitus ulcers that met the definition of Stage I or II were isolated from the 4th edition portion (2004–06) of the time series. The result can be seen in Box 2. The range for the entire time series was now 7.4–13.8 per 1000 separations as opposed to 7.4–26.9 ulcers per 1000 separations.

A confounding factor that bears further examination was the occurrence of a statewide pressure ulcer reduction strategy. This was initiated in 2003, with statewide education and point prevalence surveys in 2003 and 2004. The strategy can also be expected to have an impact on the recognition of ulcers and their recording in patient records.

PSI 3 also lent itself to simplification with the concomitant use of a condition onset flag indicating that this diagnosis arose in hospital (Box 3). AUSPSI 3 includes all levels of ulcer. Notably, the change in coding for AUSPSI 3 impacts more upon the numerator than the denominator, leading to a decrease in the AUSPSI 3 rate.

Discussion

The limitations and strengths of the AHRQ PSIs have received wide-ranging comment.^{3,15,16} They have been tested on paediatric datasets,^{16,17} the United States Veterans Health Administration dataset,¹⁸ and on specific datasets such as for decubitus ulcers.¹⁵ An ICD-10-WHO version of a limited set of these indicators has been adopted by the OECD, based in part on initial translations from Australia and Germany, followed by intensive review by an international reference group.^{19,20}

The strengths of PSIs are their use as screening tools for adverse events that are system related and their basis on a readily available, universal data source that is inexpensive to use and imposes no extra reporting burden.^{16,18} Limitations include bias from socio-economic factors, variances due to differences in coding quality

between institutions, lack of differentiation of the timing of events, questions about their potential preventability and their basis on data whose primary purpose is non-clinical. That is, the data items and definitions are used for administrative purposes.^{16,18}

The recent introduction of the condition onset flag variable associated with each diagnostic code in Australia allows the AusPSIs to be a more straightforward version of the AHRQ PSIs and to more accurately reflect events which arise during hospitalisation which may be flags for quality of care issues. Canada has such a timing variable and the United States is currently introducing it to its administrative data.

Coding changes between editions of ICD-10-AM impact the interpretability of time-series data. Comparisons from year to year must be conducted with caution and based upon a full understanding of changes in codes and coding standards. As such, the AusPSIs may be more useful for comparisons between different groups within a limited timeframe in which codes and standards are more stable. Finally, those AusPSIs for rare events may be most usefully represented as absolute numbers, akin to sentinel indicators with follow-up investigation of each case.

Coding variation between institutions is an issue that affects the utility of administrative data for any purpose including funding models, service planning and research. Given the importance of high quality data, Victoria, like other jurisdictions, has subjected the VAED to three data quality audits since the introduction of ICD-10-AM. The scale of variations can be lessened with routine audit, feedback and education to skilled and educated coders who perform coding. Quantification of these coding variations may also then be taken into consideration when expected rates of these events per hospital are calculated based on risk-adjusted statistical models. With the importance of the condition onset flag, this variable too must be audited routinely, as is currently underway in Victoria.

Following the example of the communication methods of AHRQ, the AusPSIs will be made available for use broadly through a website with

technical documentation, code lists and SAS programs. This website is currently under development. As well, each of the AusPSIs has been assessed to see how risk adjustment (age, gender, comorbidities, type of hospital) and rigorous model fitting can make them more suitable for use. The final development of the AusPSIs is the current exploration of the use of Variable Life Adjusted Display (VLAD) reporting methods, as are being used in Queensland, to assess when rates of these indicators reach levels which warrant further review through mechanisms such as clinical audits.²¹

Finally, in order to have value in assisting the public health system to provide safer hospital care, a decision needs to be made on the most appropriate manner in which quality and safety indicators should be used. Public reporting and the risk, limitations, pitfalls and challenges associated with it have been reported in a number of papers.^{2,4,15,16,22-25} As discussed above, administrative data has many strengths but also many limitations. For these reasons, indicators such as the PSIs may best serve as tools to screen for potential adverse event trends or areas of concern, rather than as end points. This use has been recommended by several authors as the key purpose to which the PSIs should be put.^{2,4,18,26,27} Used in concert with other data sources such as clinical audits, the PSIs can be a very useful tool in directing actions where required.

Conclusion

The Australian version of the AHRQ PSIs are based on a data source that is readily available, comes with no extra reporting burden and is universal in its application. The strength of the AusPSIs is as a screening tool allowing identification of performance variation. Follow-up for areas of concern with more clinically based investigation will then provide a means for both confirmation of these as areas of concern and a method to identify how to improve performance and safety.

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Competing interests

The authors declare that they have no competing interests.

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Appendix

Australian defined patient safety indicators

The general AHRQ exclusion of episodes with age less than 18 years and episodes from Major Diagnostic Category (MDC) 14 *Pregnancy, childbirth and the puerperium* have been dropped from the definition of the AusPSIs. The general exclusion of principal diagnosis codes from the denominator where these codes have been used to define the numerator has also been dropped with complication onset flags used to identify potential complications.

Complications of Anaesthesia (AusPSI 1)

Numerator

Episodes with an ICD-10-AM diagnosis code for complication of anaesthesia that has an associated flag representing status 'not present on admission'. (Vic Prefix = C, national condition onset flag = 1)

Denominator

All episodes with an anaesthetic procedure code (Appendix R)

Exclusions

None

Decisions

Add regional block procedure codes to the denominator (Appendix R). Adopted general principle of including data at fine granularity for analysis at greater granularity with potential to refine (i.e. to err on the side of false positives). The indicator will be output by anaesthetic type: general, sedation, neuraxial block, and regional block.

The exclusion of episodes with codes for self-inflicted injury, poisoning due to anaesthetics and a diagnosis code for active drug dependence or active non-dependent abuse of drugs, have been dropped. The use of condition onset flag obviates the need to exclude episodes where there is concern a "reaction" could be present on admission (e.g. due to recreational drug).

Death in Low-Mortality DRGs (AusPSI 2)

Numerator

Episodes with separation type of "death"

Denominator

Episodes in low-mortality DRGs, defined as DRGs with a total mortality rate less than 0.5% over the previous 3 years or less than 0.5% in any of the previous 3 years

Exclusions

Episodes with any code for trauma, immunocompromised state or cancer are excluded

Decisions

None

Decubitus Ulcer (AusPSI 3)

Numerator

Episodes with an ICD-10-AM diagnosis code for decubitus ulcer that has an associated flag representing status 'not present on admission'. (Vic Prefix = C, national condition onset flag = 1)

Denominator

All episodes

Exclusions

Episodes with any ICD-10-AM diagnosis code for hemiplegia, paraplegia, quadriplegia, spina bifida or anoxic brain damage are excluded

Decisions

The exclusion of episodes from MDC 9 has been dropped. Exclusion of these patients would inappropriately exclude patients with minor skin conditions.

The exclusion of patients based on admission source has been dropped. The intent of the AHRQ exclusion was to remove patients with an increased risk of decubitus ulcer. The use of condition onset flag obviates the need to exclude episodes where there is a concern the condition could be present on admission.

Failure to Rescue — General (AusPSI 4)

Numerator

Episodes with separation type of “death”

Denominator

Episodes with complications of care as defined

Exclusions

None

Decisions

This indicator will be considered in its constituent parts as separate indicators for acute renal failure, DVT/PE, pneumonia, sepsis, shock or cardiac arrest, and GI haemorrhage/acute ulcer.

The exclusions of patients aged over 75 and neonates (MDC 15) have been dropped. Adopted general principle of including data at fine granularity for analysis at greater granularity with potential to refine. The indicator can subsequently be analysed to assess these patients.

The exclusion of patients based on admission source has also been dropped. It is believed that the intent of the AHRQ exclusion was to remove patients with the condition present on admission. The use of condition onset flag obviates the need to exclude episodes where there is a concern the cause could be present on admission.

Failure to Rescue — Acute Renal Failure (AusPSI 4.1)

Numerator

Episodes with separation type of “death”

Denominator

Episodes with an ICD-10-AM diagnosis code for acute renal failure that has an associated flag representing status ‘not present on admission’. (Vic Prefix = C, national condition onset flag = 1)

Exclusions

None

Decisions

The exclusion of patients with a principal diagnosis of abortion related renal failure, haemorrhage, GI haemorrhage, shock, trauma, acute myocardial infarction, cardiac arrest or cardiac arrhythmia has been dropped. It is believed that the intent of the AHRQ exclusion was to remove patients with the condition present on admission. The use of condition onset flag obviates the need to exclude episodes where there is a concern the cause could be present on admission

Failure to Rescue — DVT/PE (AusPSI 4.2)

Numerator

Episodes with separation type of “death”

Denominator

Episodes with an ICD-10-AM diagnosis code for DVT/PE (Appendix K) that has an associated flag representing status ‘not present on admission’. (Vic Prefix = C, national condition onset flag = 1)

Exclusions

None

Decisions

The exclusion of patients with a principal diagnosis of abortion related or post partum obstetric PE has been dropped. It is believed that the intent of the AHRQ exclusion was to remove patients with the condition present on admission. The use of condition onset flag obviates the need to exclude episodes where there is a concern the cause could be present on admission.

Failure to Rescue — Pneumonia (AusPSI 4.3)

Numerator

Episodes with separation type of “death”

Denominator

Episodes with an ICD-10-AM diagnosis code for non-viral pneumonia that has an associated flag representing status ‘not present on admission’. (Vic Prefix = C, national condition onset flag = 1)

Exclusions

Episodes with any ICD-10-AM diagnosis code for viral pneumonia or immunocompromised state (Appendix D)

Decisions

The exclusion of episodes from MDC 4 has been dropped. Adopted general principle of including data at fine granularity for analysis at greater granularity with potential to refine. The indicator can subsequently be analysed to assess these patients

Failure to Rescue — Sepsis (AusPSI 4.4)

Numerator

Episodes with separation type of “death”.

Denominator

Episodes with an ICD-10-AM diagnosis code for sepsis or septicaemia that has an associated flag representing status ‘not present on admission’. (Vic Prefix = C, national condition onset flag = 1)

Exclusions

Episodes with any ICD-10-AM diagnosis code for immunocompromised state (Appendix D).

Decisions

The exclusion of episodes with a length of stay of 3 days or less has been dropped. The use of condition onset flag obviates the need to exclude episodes where there is a concern the cause could be present on admission.

Failure to Rescue — Shock or Cardiac Arrest (AusPSI 4.5)

Numerator

Episodes with separation type of “death”

Denominator

Episodes with an ICD-10-AM diagnosis code for shock or cardiac arrest that has an associated flag representing status ‘not present on admission’. (Vic Prefix = C, national condition onset flag = 1)

Exclusions

Episodes with any ICD-10-AM diagnosis code for haemorrhage (Appendix G), trauma (Appendix C) or GI haemorrhage (Appendix I)

Decisions

The procedure codes for resuscitation used to define the denominator have been dropped.

The use of DRGs to identify trauma patients (Appendix J) has been dropped.

The exclusion of episodes from MDCs 4 and 5 have been dropped. Adopted general principle of including data at fine granularity for analysis at greater granularity with potential to refine. The indicator can subsequently be analysed to assess these patients.

Failure to Rescue – GI Haemorrhage/Acute Ulcer (AusPSI 4.6)**Numerator**

Episodes with separation type of “death”

Denominator

Episodes with an ICD-10-AM diagnosis code for GI haemorrhage or acute ulcer that has an associated flag representing status ‘not present on admission’. (Vic Prefix = C, national condition onset flag = 1)

Exclusions

Episodes with an ICD-10-AM diagnosis code for alcoholism

Decisions

The exclusions of patients with a principal diagnosis of anaemia or any diagnosis of trauma have been dropped. It is believed that the intent of the AHRQ exclusion was to remove patients with the condition present on admission. The use of condition onset flag obviates the need to exclude episodes where there is a concern the cause could be present on admission.

The exclusion of episodes from MDCs 6 and 7 have been dropped. Adopted general principle of including data at fine granularity for analysis at greater granularity with potential to refine. The indicator can subsequently be analysed to assess these patients.

Foreign Body Left During Procedure (AusPSI 5)**Numerator**

Episodes with an ICD-10-AM diagnosis code for foreign body left during procedure that has an associated flag representing status ‘not present on admission’. (Vic Prefix = C, national condition onset flag = 1)

Denominator

None

Exclusions

None

Decisions

This indicator will be presented as an absolute number. The indicator captures events that should not occur

Iatrogenic Pneumothorax (AusPSI 6)**Numerator**

Episodes with an ICD-10-AM diagnosis code for pneumothorax that has an associated flag representing status ‘not present on admission’. (Vic Prefix = C, national condition onset flag = 1)

Denominator

All episodes

Exclusions

Episodes with any ICD-10-AM diagnosis code for chest trauma or pleural effusion.

Episodes with a procedure code related to thoracic or diaphragmatic surgery, lung or pleural biopsy.

Episodes with a cardiac surgery DRG

Decisions

Cardiac surgery DRGs have been used to define the denominator. It is proposed that the use of DRGs is reviewed with the view to using cardiac surgery procedure codes to identify cardiac surgery patients

Infection Due to Medical Care (AusPSI 7) – ON HOLD

Numerator

Denominator

Exclusions

Decisions

Development of this indicator is on hold. The infections specification in the numerator of this indicator are limited and it is unclear what this indicator measures.

In-Hospital Fracture (AusPSI 8)

Numerator

Episodes with an ICD-10-AM diagnosis code for in-hospital fracture device that has an associated flag representing status 'not present on admission'. (Vic Prefix=C, national condition onset flag=1)

Denominator

All episodes aged 50 years and older

Exclusions

Episodes with any ICD-10-AM diagnosis code for bone malignancy (primary and secondary)

Decisions

The description of this indicator has been amended from "Postoperative Hip Fracture" to "In-hospital Fracture". The modified indicator only captures patients over 50 years of age.

Add all fracture diagnosis codes to the numerator.

The exclusions of patients with a principal diagnosis of seizure, syncope, stroke, coma, cardiac arrest, poisoning, trauma (Appendices C and J), delirium and other psychoses or anoxic brain injury, or any diagnosis of metastatic cancer, lymphoid malignancy or self inflicted injury (Appendix L) have been dropped. It is believed that the intent of the AHRQ exclusion was to remove patients with the condition present on admission. The use of condition onset flag obviates the need to exclude episodes where there is a concern the cause could be present on admission.

Revise list of excluded diagnosis codes to contain only diagnosis codes for bone malignancy (primary and secondary).

The exclusion of patients where the only procedure code is for hip fracture repair has been dropped.

The exclusion of episodes from MDC 8 has been dropped. This exclusion would remove too many patients.

Postoperative Haemorrhage or Haematoma (AusPSI 9)

Numerator

Episodes with an ICD-10-AM diagnosis code for postoperative haemorrhage or haematoma that has an associated flag representing status 'not present on admission' (Vic Prefix=C, national condition onset flag=1) and a procedure code for postoperative control of haemorrhage or drainage of haematoma

Denominator

All surgical episodes defined by an anaesthetic procedure code (Appendix R), excluding ECT patients.

Exclusions

None

Decisions

The exclusion of patients where the only procedure codes is for postoperative control of haemorrhage or drainage of haematoma has been dropped

Postoperative Physiologic or Metabolic Derangement (AusPSI 10) – ON HOLD**Numerator****Denominator****Exclusions****Decisions**

Development of this indicator is on hold. The specification of this indicator is complex and it is unclear what it measures

Postoperative Respiratory Failure (AusPSI 11)**Numerator**

Episodes with an ICD-10-AM diagnosis code for acute respiratory failure that has an associated flag representing status 'not present on admission'. (Vic Prefix=C, national condition onset flag=1)

Denominator

All surgical episodes defined by an anaesthetic procedure code (Appendix R), excluding ECT patients

Exclusions

Episodes with any ICD-10-AM diagnosis code for neuromuscular disorder

Decisions

The procedure codes for reintubation used to define the numerator have been dropped. Australian coding standards make it difficult to identify patients where reintubation was required due to complication of care. Definition of the denominator has been broadened from elective surgical patients to all surgical patients. The indicator can subsequently be analysed to assess elective and emergency patients. The exclusion of MDCs 4 and 5 have also been dropped. Adopted general principle of including data at fine granularity for analysis at greater granularity with potential to refine. The indicator can subsequently be analysed to assess these patients. The exclusion of patients where the only procedure code is for tracheostomy has been dropped.

Postoperative Deep Vein Thrombosis or Pulmonary Embolism (AusPSI 12)**Numerator**

Episodes with an ICD-10-AM diagnosis code for deep vein thrombosis or pulmonary embolism (Appendix K) that has an associated flag representing status 'not present on admission'. (Vic Prefix=C, national condition onset flag=1)

Denominator

All surgical episodes defined by an anaesthetic procedure code (Appendix R), excluding ECT patients

Exclusions

None

Decisions

The exclusion of patients where the only procedure code is for interruption of vena cava has been dropped

Postoperative Sepsis (AusPSI 13)

Numerator

Episodes with an ICD-10-AM diagnosis code for sepsis (Appendix O) that has an associated flag representing status 'not present on admission'. (Vic Prefix=C, national condition onset flag=1)

Denominator

All surgical episodes defined by an anaesthetic procedure code (Appendix R), excluding ECT patients

Exclusions

Episodes with an ICD-10-AM diagnosis code for infection (Appendix P) that has an associated flag representing status 'present on admission'. (Vic Prefix=P and A, national onset flag=2)

Episodes with any ICD-10-AM diagnosis code for immunocompromised state (Appendix D) or cancer (Appendix E)

Decisions

The exclusion of episodes with a length of stay of less than 4 days has been dropped. The use of condition onset flag obviates the need to exclude episodes where there is a concern the cause could be present on admission. The use of DRGs to identify cancer patients (Appendix Q) has been dropped

Postoperative Abdominal Wall Wound Dehiscence (AusPSI 14)

Numerator

Episodes with a procedure code for reclosure of postoperative disruption of abdominal wall

Denominator

All abdominopelvic surgical discharges

Exclusions

None

Decisions

The description of this indicator has been amended from "Postoperative Wound Dehiscence" to "Postoperative Abdominal Wall Wound Dehiscence".

The exclusion of episodes with a length of stay of less than 2 days has been dropped. The use of condition onset flag obviates the need to exclude episodes where there is a concern the cause could be present on admission.

The exclusion of episodes with an immunocompromised state has also been dropped. It is unclear what impact such conditions would have on patients suffering wound dehiscence

Accidental Puncture or Laceration (AusPSI 15)

Numerator

Episodes with an ICD-10-AM diagnosis code for accidental puncture or laceration during procedure (T81.2) that has an associated flag representing status 'not present on admission'. (Vic Prefix=C, national condition onset flag=1)

Denominator

None

Exclusions

None

Decisions

The external cause diagnosis codes used to define the numerator have been dropped

This indicator will be presented as an absolute number. The indicator captures events that should not occur

Transfusion Reaction (AusPSI 16) – ON HOLD**Numerator**

Episodes with an ICD-10-AM diagnosis code for transfusion reaction that has an associated flag representing status 'not present on admission'. (Vic Prefix=C, national condition onset flag=1)

Denominator

All episodes with a transfusion procedure code

Exclusions

None

Decisions

Development of this indicator is on hold. The low number of episodes with a coded transfusion reaction, even among patients with a transfusion, produces a rate that prevents meaningful comparison over time

Birth Trauma – Injury to Neonate (AusPSI 17)**Numerator**

Episodes with any ICD-10-AM diagnosis code for birth trauma

Denominator

All liveborn births (newborns) defined by an admission type of newborn and age of zero days and not an ICD-10-AM diagnosis code for out-of-hospital birth

Exclusions

Infants with:

an ICD-10-AM diagnosis code for subdural or cerebral haemorrhage and a diagnosis code for pre-term infant with 1) less than 35 weeks gestation or 2) a birth weight less than 2,500 grams and less than less than 37 weeks gestation

an ICD-10-AM diagnosis code for injury to skeleton and a diagnosis code for osteogenesis imperfecta

Decisions

The in-hospital birth diagnosis codes used to define the denominator have been dropped

Obstetric Trauma – Vaginal Delivery with Instrument (AusPSI 18)**Numerator**

Episodes with any ICD-10-AM diagnosis code for 3rd or 4th degree obstetric trauma

Denominator

All vaginal delivery episodes defined by vaginal delivery DRGs, with any procedure code for instrument-assisted delivery

Exclusions

None

Decisions

The obstetric trauma procedure codes used to define the numerator have been dropped

Obstetric Trauma – Vaginal Delivery without Instrument (AusPSI 19)

Numerator

Episodes with any ICD-10-AM diagnosis code for 3rd or 4th degree obstetric trauma

Denominator

All vaginal delivery episodes defined by vaginal delivery DRGs

Exclusions

Episodes with any procedure code for instrument-assisted delivery

Decisions

The obstetric trauma procedure codes used to define the numerator have been dropped

Obstetric Trauma – Caesarean Delivery (AusPSI 20)

Numerator

Episodes with any ICD-10-AM diagnosis code for 3rd or 4th degree obstetric trauma

Denominator

All caesarean delivery episodes defined by caesarean delivery DRGs

Exclusions

None

Decisions

The obstetric trauma procedure codes used to define the numerator have been dropped

Obstetric Trauma – Vaginal Delivery (AusPSI 21)

Numerator

Episodes with any ICD-10-AM diagnosis code for 3rd or 4th degree obstetric trauma

Denominator

All vaginal delivery episodes defined by vaginal delivery DRGs

Exclusions

None

Decisions

The obstetric trauma procedure codes used to define the numerator have been dropped.

Combines PSIs 18 and 19