

National Quality Use of Medicines Indicators for Australian Hospitals



2014

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Foreword

Medicines are the most common treatments used in health care and make a significant contribution to wellness. However, medicines can be ineffective or cause harm if not used safely or appropriately. We know that medication errors are one of the most commonly reported clinical incidents in acute health care settings and, whilst rates of serious harm are low, their prevalence is of concern particularly as many are preventable. We also know that the quality of medicines use in Australia is variable and patients receiving suboptimal treatment have poorer health outcomes.

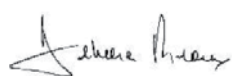
The use of medicines is complex. From the decision to prescribe a medicine through to the administration of the medicine, there are numerous steps and people involved, which provide many opportunities for error. We can minimise these errors through safer systems for managing medicines, using information to drive improvement and by making our care patient centered.

The indicators published by the NSW Therapeutic Advisory Group (NSW TAG) in collaboration with the Clinical Excellence Commission in 2007 have been an invaluable resource for driving improvements in the use of medicines at the local level. However, for the indicators to remain useful, they need to be relevant to contemporary practice and incorporate the latest evidence.

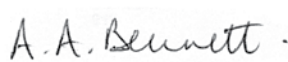
The Australian Commission on Safety and Quality in Health Care funded NSW TAG to revise the indicators in line with current evidence, and develop additional indicators in the areas of continuity of medicines management and acute mental health services. The resulting National Quality Use of Medicines Indicators for Australian Hospitals (National QUM Indicators) 2014 will help health services identify appropriate indicators for targeted quality and safety improvement activities and provide evidence for specific action items in the National Safety and Quality Health Service Standards.

All of the indicators have been field tested in hospitals across Australia and evaluated by clinicians as being clinically meaningful, valid, measurable, and useful. We thank all those hospitals who participated in the testing, the project team and the many clinicians who contributed to the revision and the development of the new indicators.

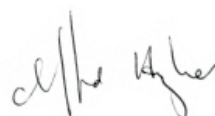
The indicators do not measure all the processes involved in good medication management. They do, however, focus on those areas where there are known gaps between evidence and practice. We encourage anyone interested in improving the safety and quality of medicines management in their health service to use the National QUM Indicators 2014 and the accompanying data collection tools.



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Overview

The National Quality Use of Medicines Indicators for Australian Hospitals (National QUM Indicators) is a set of process indicators developed for Australian hospitals and health professionals. They are designed to:

- measure the safety and quality of medicines use
- drive healthcare practice and quality improvement.

The set consists of thirty-seven indicators in the following practice areas:

- antithrombotic therapy
- antibiotic therapy
- medication ordering
- pain management
- continuity of care
- hospital-wide medication management policies
- acute mental health care.

All indicators have been field tested and evaluated for validity, measurability, clarity, usefulness and comparability.

The National QUM Indicators are provided in the context of:

- an ongoing need for up to date, easily accessible and evidence-based measures of quality use of medicines (QUM) in Australian hospitals
- a growing emphasis on accountability and improvements in healthcare systems
- the importance of linkage with other quality improvement tools for monitoring and improving QUM.

The National QUM Indicators include:

- QUM indicators
- mapping to the National Safety and Quality Health Service Standards¹
- data collection tools for each indicator
- sampling methodology for quality improvement.

The National QUM Indicators do not cover every aspect of quality use of medicines in hospitals. Where possible, indicator specifications are aligned with other indicator sets and standard definitions so that data and collection processes are not duplicated.

Development of the National QUM Indicators was funded by the Australian Commission on Safety and Quality in Health Care and managed by the NSW Therapeutic Advisory Group Inc. Development included revising and updating earlier Australian quality use of medicine indicators,² and the addition of new indicators and tools.

Further information on the National QUM Indicator development process is provided in Appendix 2.



Background

What is quality use of medicines?

Quality use of medicines (QUM) involves:³

- judicious selection of treatment options (including choice between medicine, non-medicine and no treatment)
- appropriate choice of medicine when medicine is required
- safe and effective use of medicines (see Table 1).

QUM forms part of Australia's National Medicines Policy.⁴

In hospitals, QUM is an important contributor to overall health system performance. Problems with medicines result in approximately 230,000 hospital admissions in Australia each year as a result of medication misadventure and inappropriate use of medicines, with an estimated annual cost of \$1.2 billion to the healthcare system.⁵ Improvements in QUM have the potential to reduce morbidity and mortality as well as improve the overall health of Australians.

What are indicators?

Indicators are measures of processes and outcomes of health care. They can guide and monitor the quality and appropriateness of healthcare delivery with the aim of continuous healthcare improvement.⁶

Indicators can be thought of as models of healthcare processes, and as indicators of health system performance, but they are not the healthcare process itself. Indicators have limitations, for example there will always be a relevant aspect of care that is not measured by the indicator. Therefore indicators should be

considered 'flags', identifying specific areas of care that may be problematic and that may require further analysis.

Indicators have been successfully used in hospitals to monitor performance, identify issues that need further investigation, reduce errors, improve quality, provide feedback to prescribers and evaluate interventions through audit.^{7,8}

Types of indicators: structure, process and outcome

Quality use of medicines, like other aspects of health care, can be considered in terms of structures, processes and outcomes.⁹ Monitoring structures, processes and outcomes requires different tools and methods. A comprehensive view of healthcare performance can be built by investigating information from a variety of sources about different aspects of care.

Structure indicators

Structure indicators provide **qualitative** information regarding the environment (hospital infrastructure, culture, systems, policies, procedures and activities) required for provision of quality health care. Structure indicators typically require 'Yes / No' answers and provide a snapshot of the organisational environment at a particular point in time.

An example of a structure indicator is:

Does the hospital have current antithrombotic protocols, pathways, guidelines, nomograms, order sets, flow sheets and/or check lists readily accessible in print or electronic form to doctors, pharmacists and nurses?

Table 1: Quality use of medicines domains³

Judicious selection	Consideration of the place of medicines in treating illness and maintaining health, recognising that for the management of many disorders non-medicine therapies may be the best option.
Appropriate choice	When medicines are required, selecting the best option from the range available taking into account the individual, the clinical condition, risks, benefits, dosage, length of treatment, co-morbidities, other therapies and monitoring considerations. Appropriate selection also requires a consideration of cost, both human and economic.
Safe and effective use	Ensuring the best possible outcomes of therapy, minimising misuse, over-use and under-use and improving the ability of all individuals (health practitioners and consumers) to take appropriate actions to solve medication-related problems.

National Quality Use of Medicines Indicators for Australian Hospitals

Structure indicators available for monitoring QUM in Australia include Medication Safety Self Assessment for Australian Hospitals¹⁰ and Medication Safety Self Assessment for Antithrombotic Therapy in Australian Hospitals.¹¹ These tools can help identify strengths and weaknesses in medication management systems and inform development of medication safety improvement plans.

Process indicators

Process indicators provide **quantitative** data regarding the impact or effectiveness of systems, policies and procedures and can monitor changes over time when measured repeatedly. Where process indicators are evidence-based it is assumed that improved performance results in improved health outcomes as has been shown previously.^{12,13}

An example of a process indicator is:

Percentage of patients prescribed hospital initiated warfarin whose loading doses are consistent with a drug and therapeutics committee approved protocol.

The National QUM Indicators are process indicators. They measure compliance with processes of care related to medication management that have been shown to improve health outcomes. They are thus surrogate measures for health outcomes.

Outcome indicators

Outcome indicators provide **quantitative** data related to the outcomes of health system performance, generally morbidity, mortality and satisfaction with health care. Currently there are few useful and validated outcome measures that can be directly related to medication management. This is an important area for future research.

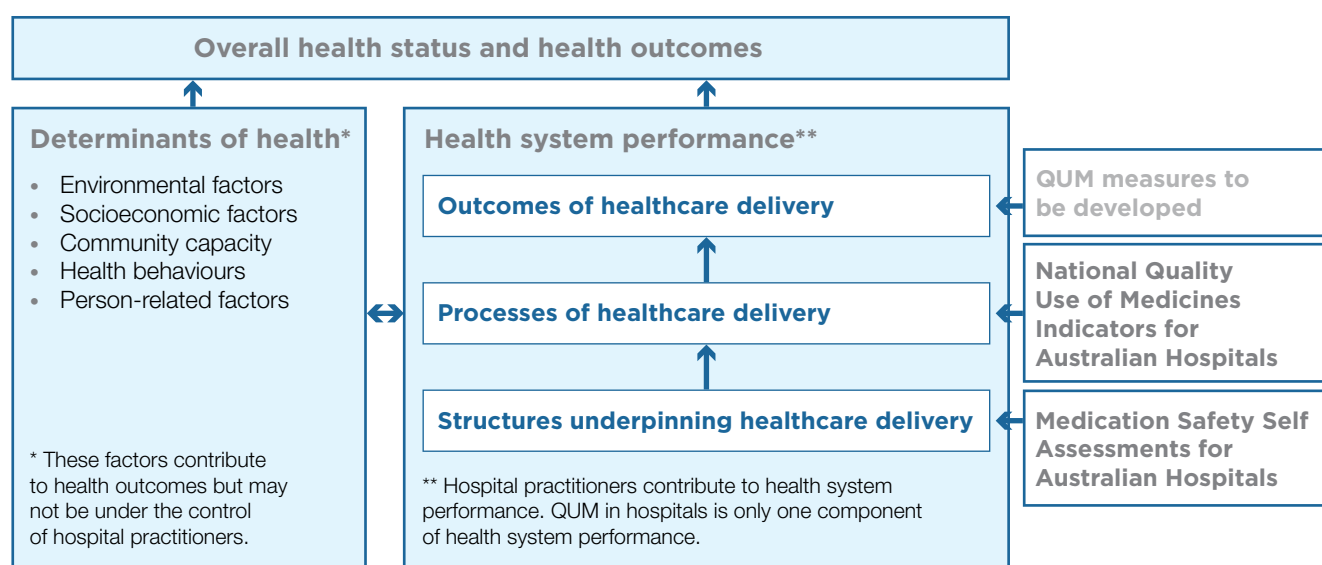
An example of an outcome indicator is:

Percentage of patients who experience bleeding associated with antithrombotic therapy.

Because there are few outcome measures for QUM, incident monitoring systems are sometimes used to describe outcomes. Such monitoring systems are important and provide narrative information about the nature of the outcomes in individual patients. However, they do not provide quantitative measures of outcome for a hospital population and should not be used to report outcome 'rates'.

Figure 1 shows how the National QUM Indicators can be used in conjunction with Medication Safety Self Assessment for Australian Hospitals¹⁰ and Medication Safety Self Assessment for Antithrombotic Therapy in Australian Hospitals¹¹ to monitor different aspects of QUM.

Figure 1: Using indicators to monitor the QUM component of health system performance (modified from the 2001 National Health Performance Framework¹⁴)





Using the National Quality Use of Medicines Indicators for Australian Hospitals

Why use the National QUM Indicators?

The purpose of measuring indicators using clinical audit, analysis and interpretation of data is to inform and guide an ongoing program of local quality improvement activities.¹⁵⁻¹⁷ Results from local quality improvement activities can assist:¹⁸

- monitoring process performance
- assessing if interventions to change structures and processes lead to improvements, providing feedback to clinicians and helping support practice improvements
- assessing if improvements are maintained over time.

The value of using indicators is fully realised with repeated measurement and coordinated action. It is recommended that:

- indicator measurement is part of an ongoing, multidisciplinary local quality improvement activity
- indicator measurement is embedded in routine clinical care
- feedback is simple to understand and used by clinicians to guide everyday practice
- interventions are undertaken in a supportive environment that includes appropriate structures, policies, systems, leadership and organisational culture.

The National QUM Indicators are designed specifically for data collection as part of local quality improvement activities and can be used in a number of ways:

- complementing information gained from the use of Medication Safety Self Assessment for Australian Hospitals (MSSA) tools.^{10,11} The MSSA tools assess medication safety structures and systems and systematically identify ways to improve them. Periodic measurement of indicators, such as annually, can help maintain safe medication systems. Using both the National QUM Indicators and MSSA tools assists hospitals to meet National Safety and Quality Health Service Standards² and ensure that they have systems and processes in place for improving medication safety and quality use of medicines.

- contributing to quality improvement activities using small-scale iterative methods such as the Plan-Do-Study-Act (PDSA) cycle^{18,19} and using quality improvement models such as Clinical Practice Improvement and Continuous Quality Improvement.²⁰⁻²³ A useful quality improvement activity is drug use evaluation which is a multidisciplinary methodology for ensuring coordinated action to improve medicines use, and which can be used as part of ongoing and coordinated quality improvement programs.²⁴ Use of indicators as part of a drug use evaluation process is a proven way to improve quality use of medicines in hospitals.²⁵

Who should use the National QUM Indicators?

The National QUM Indicators are designed primarily for use by clinicians involved in hospital medication management, especially doctors, nurses, and pharmacists. Ideally, clinicians directly responsible for patient care will be involved in the measurement of these indicators, interpretation of results and decisions about subsequent action.

The indicators may provide evidence for accreditation purposes.

Note: The National QUM Indicators are not designed for making comparisons between institutions (benchmarking) or for accountability purposes.¹⁵ When collecting data for these purposes, the sampling method needs to be tailored to the audit activity to ensure data collection is appropriate. Seek advice from the organisers of the activity before collecting data to ensure that definitions, sampling methods and guidelines for audit and reporting are agreed in advance and in consultation with the coordinating agency. Further information on inter-hospital comparisons is provided later in this section.

Getting started

Before starting any data collection activity, convene a multidisciplinary group of clinicians and other stakeholders to advise on the process. An advisory group could include:

- clinicians of varying disciplines (e.g. medical, nursing, pharmacy) who have relevant expertise and understand the clinical process in question
- sub-specialist clinicians relevant to the scope of specific indicators
- people with relevant expertise in data collection, data analysis and clinical practice improvement methodology.

The advisory group can advise on a number of factors including:

- key stakeholders to consult prior to data collection, particularly clinicians and stakeholders whose practice may be affected
- which indicators to use
- what type of data collection is appropriate
- how frequently to measure the indicator
- which population to audit
- whether sampling is required or data will be collected from the whole population
- how many cases/records to include in the sample
- how to ensure the sample is representative of the population
- how to determine appropriate local performance targets
- appropriate actions to take based on indicator results.

Optimising use of the National QUM Indicators: Key decisions

The following pages provide advice for advisory groups and others involved in indicator collection and addresses the following key decisions:

- **Key decision 1: Selecting the overall approach to data collection**
 - intermittent data collection
 - continuous data collection
- **Key decision 2: Selecting the approach to sampling**
 - collect data from the whole population or take a sample
 - sample type
 - random
 - judgement
 - sample size
 - calculated sample size
 - judgement sample size
- **Key decision 3: How to analyse data**
 - statistical analysis
 - descriptive analysis
- **Key decision 4: How to present indicator results**



Key Decision 1: Selecting the overall approach to data collection

There are two types of data collection processes that are commonly undertaken for quality improvement and evaluation of interventions:

1. **Intermittent data collection:** data is collected relatively infrequently as a cross-sectional snapshot or a time series e.g. every six to twelve months. This approach may also be used for global project or program evaluation purposes^{18,26} to determine the overall impact of an intervention.
2. **Continuous data collection:** data is collected relatively frequently as a time series e.g. weekly, monthly or quarterly. This approach may be used as part of rapid cycle ongoing quality improvement activities, using methodology such as the Plan-Do-Study-Act cycles to assess performance of a given process and for data feedback purposes.²⁶

Both intermittent and continuous indicator data collection processes are appropriate scientific approaches when used in the right circumstances. They may both be used in a quality improvement program.²⁶ The approach taken to data collection is dependent on the purpose and context for measurement and can be guided by the advisory group. The choice of approach depends on a number of factors and should be based on local needs. Factors to consider include:^{18,27-31}

- Purpose of indicator collection, such as:
 - monitoring processes of care, implementation and evaluation of interventions
- How the results will be used, such as:
 - is inference from the sample to the whole population required?
 - is assurance about how representative the results are required?
 - is feedback to clinicians and key decision-makers to influence practice required?
 - is demonstration of statistical significance required?

- Practicalities, such as:
 - how difficult it is to find cases that are eligible for inclusion in the audit?
 - how difficult it is to find the exact information in the medical record or elsewhere required for the audit?
- Time and resources available to conduct:
 - data collection
 - analysis
 - feedback
 - reporting.

Regardless of the approach chosen, indicator measurement needs to be ongoing. Indicators become meaningful when measurement is repeated regularly and trends can be monitored and acted upon in a timely way. Repeated indicator measurement allows an assessment of process stability which is important for understanding influences such as the impact of seasonal or chance variation on interventions. The advisory group can advise on how frequently to collect indicator data that is appropriate for the approach chosen, for example intermittent data collection or continuous data collection. Repeated indicator collection is easier when it is embedded into routine processes of care.

Note: Data collection for many National QUM Indicators relies on good documentation in the medical record. In some cases, the desired process or procedure will occur without corresponding documentation. However, clear and complete medical record documentation, including discharge summary documentation, is a critical component of patient care.³² Lack of information and documentation are the second most commonly reported contributing factors to sentinel events in Australian hospitals.³³ Additionally, breakdowns in medication management communication can result in adverse medicine events.³⁴ The National QUM Indicators are therefore calculated using the assumption that if it is not documented, it is not done. In this way, they are intended to promote effective documentation and communication of medication management.

Key Decision 2: Selecting the approach to sampling

Is a sample needed?

For many indicators, testing a sample from a population is recommended (rather than testing the whole population) because it is a more efficient use of time and resources. However, for some indicators it is possible to collect data from all cases in the population being studied rather than taking a sample.^{18,35} The advisory group can advise on the most appropriate approach as well as other key decisions required regardless of whether a sample is collected or not. See the example in Box 1.

Box 1: Decisions on the approach to sampling

Example: QUM Indicator 2.2: *Percentage of prescriptions for restricted antibiotics that are concordant with drug and therapeutics committee approved criteria*

Hospital A

The advisory group wanted to compile baseline information prior to the introduction of a local antimicrobial stewardship program. As part of this program they decided to use QUM Indicator 2.2: Percentage of prescriptions for restricted antibiotics that are concordant with drug and therapeutics committee approved criteria.

This would provide baseline data but could also be used throughout the program to monitor program progress. Because they kept good records that were easily accessible, and knew how many people received restricted antibiotics each week, the advisory group decided to collect data on all patients prescribed restricted antibiotics over a one week period.

In this case, sample type and size considerations were not required. Nevertheless the group needed to discuss whether they would take an intermittent or continuous approach to data collection. Discussions regarding audit frequency, whether frequent feedback to clinicians was required, how analysis would be undertaken and how the future activity would be guided by the results were undertaken prior to data collection.



Sample type

Whether you are collecting a sample for intermittent or continuous data collection, a key decision is whether to collect a random (probability) or judgement (non-probability) sample. Both types of sampling are appropriate in different circumstances and each has strengths and limitations to consider. Definitions and factors to consider are outlined in Table 2.

Table 2: Sample type considerations

	What is it?	Why use it?	Considerations
Random sampling 18,31,35,36	A process of taking a sample so that each member of the population has an equal chance of selection. This removes bias and allows inferences to be made from the sample to the whole population.	Random sampling should be considered if: <ul style="list-style-type: none"> • you need to infer from the sample to the whole population • you need assurance the results are representative of the population • it is a requirement of key stakeholders. 	It may be hard to define a fixed population from which to take a random sample given the dynamic nature of health care. A small but important patient group could be missed if sampling is left to chance as part of random sampling especially if small samples are chosen. There are different types of random sampling*. Consider seeking statistical advice regarding specific sampling needs. See examples in Box 2.
Judgement sampling (also called purposive sampling) 18,19,28,31,36	A non-random process of taking a sample that draws on subject matter expertise to choose the most appropriate types and numbers of cases to include. Used when it's important to exercise judgement in selecting the sample, rather than leaving this to chance.	Consider judgement sampling when taking a random sample is not feasible or when you want to target a particular area, time of day or patient population. This is often a desired approach as it helps target activity to those areas it is important to understand. This approach is particularly useful for activities such as the PDSA cycle.	There is a risk of bias when using judgement sampling and this needs to be considered when interpreting data and may limit the conclusions that can be drawn. Although losing the ability to assess precision of results using traditional statistics, judgement sampling improves the ability to generalise on the basis of samples selected under a wide range of conditions and over time as improvements are made. See examples in Box 2.

* For more information about types of random sampling visit:
www.abs.gov.au/ausstats/abs@.nsf/Latestproducts/A493A524D0C5D1A0CA2571FE007D69E2?opendocument
A simple to use, random number generator is available at www.random.org/integers/

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Box 2: Sample type decisions

Examples: QUM Indicator 5.2: *Percentage of patients with systolic heart failure that are prescribed appropriate medicines at discharge*

Hospital B: Intermittent indicator data collection with random sampling

The cardiology department wanted to audit the use of ACE inhibitors and beta-blockers in systolic heart failure. An advisory group was convened to consider which sampling methodologies would best assure that the results are representative of all patients with systolic heart failure. As heart failure admissions vary during the year, X patients were randomly selected from all those admitted with systolic heart failure over the whole year. A simple random sampling method was chosen and repeated each year.

Hospital C: Continuous indicator data collection with judgement sampling

Stakeholders agreed that random sampling was not feasible and a judgement approach was preferred in this situation. The first Y patients admitted with systolic heart failure each month over the year were reviewed.

Hospital D: Intermittent indicator data collection with judgement sampling

The advisory group decided to do a snap shot audit including all patients with systolic heart failure over a defined period. They decided that one month's worth of data would provide enough information for their needs. However they stipulated that data from a winter month must be used because they were aware their greatest numbers of admissions for heart failure were during these months. The auditor assessed their workload during these months and decided that collection during August was most feasible.

Sample size

For both intermittent and continuous indicator data collection, it is important to determine whether a sample size calculation is required or not. Key considerations are described in Table 3.

Table 3: Sample size considerations

	What is it?	Why use it?	Considerations
Calculated sample size ^{18,28,36,37}	Intermittent indicator data collection		
	A sample size is the number of individuals required to include in the data collection activity so that there is assurance that the results are sufficiently precise.	Consider calculating a sample size if: <ul style="list-style-type: none"> you need to infer from the sample to the whole population you need assurance the results are representative of the population it is a requirement of key stakeholders. 	An easy to use sample size calculator is available at www.openepi.com/SampleSize/SSPropor.htm Discuss with stakeholders how precise the results are required to be, as this can affect the calculation of results. Consider seeking statistical advice. See examples in Box 3.
	Continuous indicator data collection		
	Not applicable: sample sizes are typically not calculated for continuous indicator data collection. See examples in Box 3.		



Table 3: Sample size considerations (continued)

	What is it?	Why use it?	Considerations
Judgement sample size <small>7,12,18,19, 28,31,36</small>	Intermittent indicator data collection		
	<p>Advice from subject matter experts guides the sample size required by balancing degree of assurance required against resource constraints. Exact sample size recommendations cannot be given because they depend on variables such as the specific indicator used, the size of the hospital and what the expected performance is. The final determination will rely on the judgement of the advisory group overseeing the quality improvement activity.</p>	<p>Consider taking a judgement sample size if:</p> <ul style="list-style-type: none"> • there are resource/practical difficulties in calculating a sample size • there is no need to infer from the sample to the whole • stakeholders feel this approach is satisfactory. <p>Also see Table 2.</p>	See Table 2.
	Continuous indicator data collection		
	As above	<p>A judgement sample size can be particularly useful for activities such as the PDSA cycle.</p>	<p>Larger sample sizes generally lead to greater precision and ability to detect change. However, there is a point beyond which increasing sample size gives little improvement in the precision of results.</p> <p>Smaller samples can be collected if the test is repeated frequently. If a given sample is difficult to collect in one go, it can be collected at different times then collated. For example a sample of 15 can be collected as three samples of five.</p> <p>See examples in Box 3.</p>

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Box 3: Sample size decisions

Examples: QUM Indicator 5.8: *Percentage of discharge summaries that contain a current, accurate and comprehensive list of medicines*

Hospital E: Intermittent indicator data collection with calculated sample size

The hospital management requested information about discharge medication processes. During consultation with the key stakeholders, it was clear that assurance was required so that the results would be representative of the whole population. A small pilot study suggested that compliance was 60%. So a sample size calculation was done using a sample size calculator and a confidence interval of 0.05 (giving a precision of 5%). The results of this calculation showed that when 234 people were discharged on average each month, review of 144 records would be required to be 95% certain that results could be considered representative of the whole population. Review of 95 records would be required to be 80% certain. The advisory group decides that they are happy to proceed with 80% certainty and audit 95 discharge summaries. Repeat data collection is planned in 12 months.

Hospital F: Intermittent indicator data collection with calculated sample size

Hospital F averages 500 discharges per month and plans to implement a medication management plan (MMP) to assist medication reconciliation processes at discharge within the next 12 months. They plan to evaluate the impact of the MMP by measuring Indicator 5.8 before and after implementation. However the hospital does not know what its performance level with the indicator will be. The advisory group considers a recent publication showing a 60% compliance rate with a similar indicator. The hospitals in the study were quite different in size, but the advisory group decided to use the published result in their sample size calculation. Calculations showed review of 121 records would be required to be 80% certain that results can be considered to be representative of the whole population.

Hospital G: Continuous audit with judgement sampling size

Hospital G is a relatively small hospital and the advisory group wanted to undertake intermittent data collection with a calculated sample size but felt they did not have the resources required to undertake this. Instead the group felt taking a smaller sample more frequently was more feasible. So the method was changed to continuous indicator data collection and a decision was made to collect data from 10 records a month over the next year, as this would provide adequate information. Over time the group noticed that missing records occurred frequently, so they agreed when that happened they would seek some additional records so they had data from 10 records each month.

Hospital H: Continuous audit with judgement sampling size

Hospital H had been considering an intermittent data collection with a calculated sample size, but as they were a large hospital the number of records required was too large for the resources available. They considered how others had done a similar data collection and referred to the Society for Hospital Medicine MARQUIS implementation manual http://tools.hospitalmedicine.org/resource_rooms/imp_guides/MARQUIS/Marquis_Manual2011.pdf and followed their suggested strategy that recommends using 20 randomly selected patients per month. The key stakeholders were happy with this approach.



Key Decision 3: How to analyse data

For both **intermittent indicator data collection** and **continuous indicator data collection**, a key decision is whether to undertake statistical or descriptive analysis of the collected data. Statistical analysis of data allows for calculation of statistical significance and a high level of assurance that the results are “true”. Descriptive analysis of data provides a convenient and quick view of performance, and an indication of how performance is trending. However, with descriptive data it can sometimes be difficult to determine if observed changes are truly due to performance change or are due to chance. Key considerations are described in Table 4 below.

Table 4: Considerations for analysing data

	What is it?	Why use it?	Considerations
Statistical analysis 16, 36, 38-41	Intermittent indicator data collection		
	When data have been collected randomly according to a calculated sample size and a valid biostatistical calculation performed, the results can be generalised from the sample to the whole population.	Consider statistical analysis if: <ul style="list-style-type: none"> • you need to infer from the sample to the whole population • you need assurance the results are representative of the population • it is a requirement of key stakeholders. 	Statistical advice may be required to determine the correct statistical tests. This is a useful method to consider for overall program evaluation. ²⁶ See examples in Box 4.
	Continuous indicator data collection		
	Statistical process control (SPC) is used to determine if a process is stable or if an intervention has led to improvement or meaningful change. Data are displayed graphically using run or control charts and this is assessed using defined rules. A control chart template has a centre-line (the mean), as well as upper and lower control limits. Figure 4 is an example of a control chart.	Considerations as per intermittent indicator data collection. Benefits include: <ul style="list-style-type: none"> • identification of type of variation present – common cause or special cause variation • determination if improvements are statistically significant. 	Effective use of SPC requires training and a commitment to ongoing and repeated data collection and feedback. To be most helpful in assessing processes of care, SPC requires collection of at least 10 data points before the results can be analysed. Subject matter expertise is required to determine if improvements are clinically significant. A resource that may be helpful is the Institute of Healthcare Improvement Improvement Tracker: http://app.ihi.org/Workspace/tracker/ See examples in Box 4.

Table 4 continued overleaf

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Table 4: Considerations for analysing data (continued)

	What is it?	Why use it?	Considerations
Descriptive analysis	Intermittent and continuous indicator data collection		
	<p>Data plotted as a bar chart or as a line graph provides a descriptive display of results.</p> <p>These methods are widely used and can help teams in their quality improvement activities.</p> <p>Figure 2 is an example of a bar chart used to provide feedback to clinicians.</p>	<p>Consider descriptive analysis if there:</p> <ul style="list-style-type: none"> • are resource and practical difficulties in statistical analysis • is no need to infer from the sample to the whole population • is a reduced need for assurance that results are representative. 	<p>This approach can be useful for providing feedback to stakeholders during rapid cycle quality improvement activities.</p> <p>It can be difficult to determine if any observed differences over time reflect real change.</p> <p>It is important to consult with relevant stakeholders from the outset to ensure usefulness and acceptance of this approach.</p> <p>See examples in Box 4.</p>

Box 4: Analysing data

Examples: QUM Indicator 1.2: *Percentage of hospitalised adult patients that receive venous thromboembolism prophylaxis appropriate to their level of risk*

Hospital I: Statistical analysis with biostatistical calculation

The hospital had recently implemented a new system of assessing venous thromboembolism (VTE) risk on admission and wanted to know if this would improve the rates of appropriate VTE prophylaxis. The advisory group consulted with the relevant stakeholders and because a high level of assurance was required that results were real and represented the whole population it was decided that a representative sample of high risk patients would be sampled every six months. A statistician at a nearby university was consulted to ensure the sample sizes calculated were appropriate and to assist with the required biostatistical calculations.

Hospital J: Statistical analysis using statistical process control charts

The advisory group was very interested in using control charts with statistical process control because they wanted to understand if the implementation of a new medication chart that included VTE risk assessment

documentation would result in improvements in rates of VTE assessment and if this could be maintained. This was an important project so training options in the use of control charts were investigated. Management supported data collection as part of routine work. Within a few months this investment had paid off because the graphical display was extremely beneficial in helping evaluate the positive impact that had occurred with the introduction of the chart and the ability to monitor whether the improvement was maintained. The team is now using control charts for other indicators.

Hospital K: Descriptive analysis using bar graphs

The advisory group decided there were no resources to train auditors to use control charts, but they were still interested in using a graphical display. So they mapped results as a simple time series using a bar graph. This would allow them to provide feedback that they thought would be helpful in change management.



Key Decision 4: How to present indicator results

In order to influence practice improvements, results of indicator measurement must be able to be interpreted and used by clinicians. Unless results are presented in a time frame and format that is meaningful to clinicians, they are unlikely to prompt buy-in and action.

Traditional methods of representing results include tables, histograms and bar graphs (see Figure 2). These are static presentations and represent a snapshot of practice.

Indicator results can be presented more dynamically using run charts and control charts (see Figure 3).⁴¹ In addition to point measurements over time, control charts include control limits, usually set at plus or minus three standard deviations from the mean.

The use of control charts using the principles of statistical process control allows clinicians and managers to assess process stability, determine the right time to take action and identify real improvements over time.^{16,41,42}

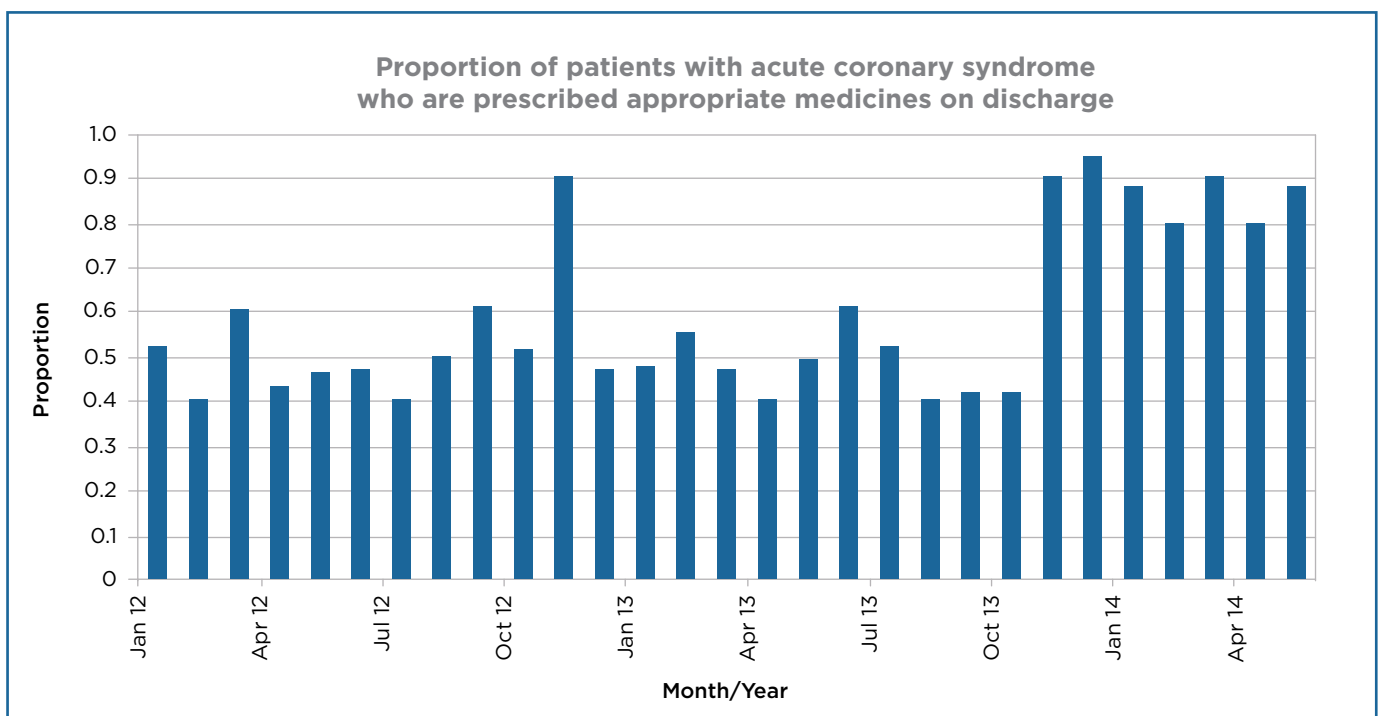
Web-based learning modules in quality improvement, analysis and presentation of results are available at:

- Institute of Healthcare Improvement – Open School: The Science of Improvement on a Whiteboard!, Robert Lloyd, Feb 2014⁴³
www.ihl.org/education/IHIOpenSchool/resources/Pages/BobLloydWhiteboard.aspx

Tools that may assist with analysis and presentation of results include:

- IHI Improvement Tracker
<http://app.ihl.org/Workspace/tracker/>
- Data collection tools, Clinical Practice Improvement Program, Clinical Excellence Commission
www.cec.health.nsw.gov.au/programs/clinical-practice

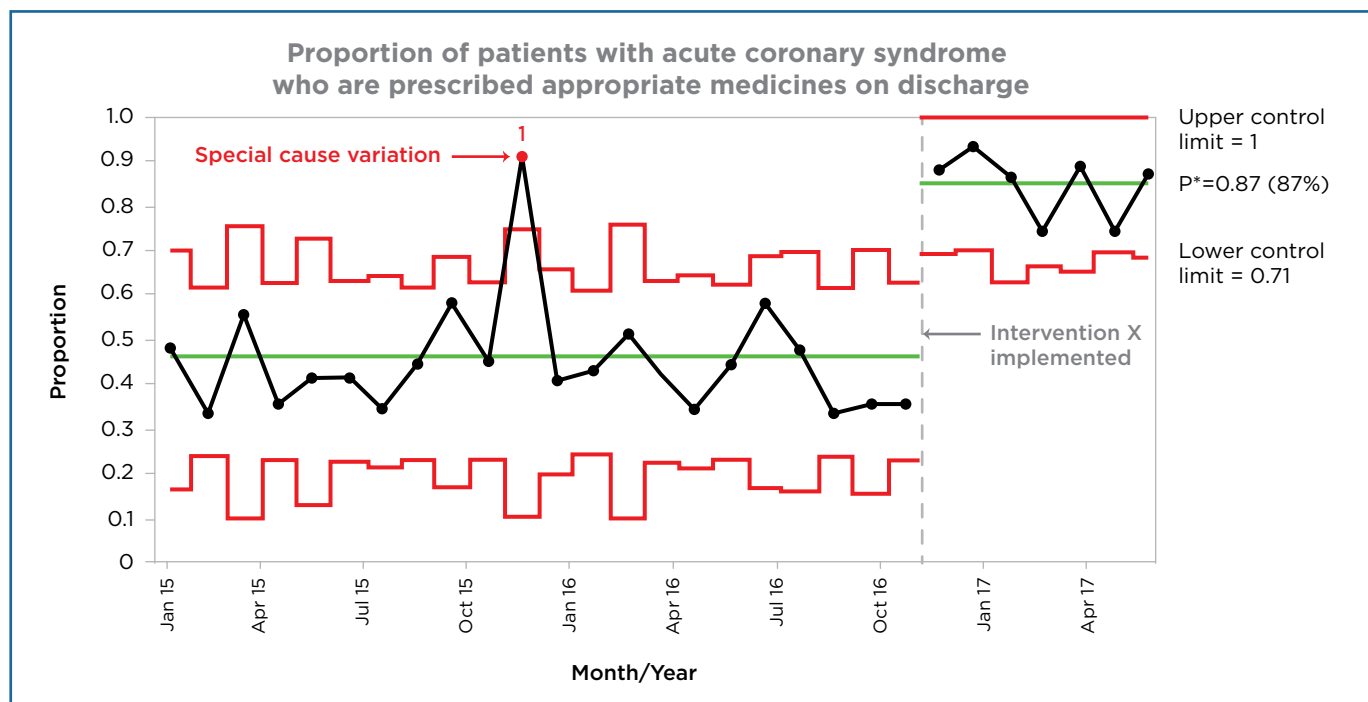
Figure 2: Indicator results presented in a bar graph (not real hospital data)



The above chart provides a visual representation of trends in prescribing. It highlights what appears to be a temporary improvement in November 2012 and an apparently sustained improvement commencing in November 2013.

National Quality Use of Medicines Indicators for Australian Hospitals

Figure 3: Indicator results presented in a statistical process control chart (not real hospital data)



* p is average proportion

The above chart shows that for 22 months an average proportion of 0.48 (48%) of patients were prescribed the appropriate medicines on discharge.

November 2015 displayed a positive special cause variation, being outside the 3 sigma control limits (red horizontal lines). This was investigated and found to be due to an isolated intervention X, which was subsequently implemented across the hospital in November 2016. This resulted in further special cause variation. The chart was therefore split at this point to show the change in process, and control limits were recalculated around the new mean.

As the second part of the chart is now stable we can expect that, unless there is another fundamental change to the process, future monthly performance will average 87% and vary between 71% and 100%.

(Control chart adapted from chart provided by former Northern Sydney Central Coast Health – Clinical Governance Unit.)

Inter-hospital comparisons

The National QUM Indicators were tested in a representative, but relatively small, number of hospitals over a relatively short time period. Testing has demonstrated content validity, face validity and usefulness of the indicators. This is consistent with the indicator development method developed by the Joint Commission (formerly the Joint Commission on Accreditation of Healthcare Organizations) and is considered adequate for internal hospital comparison over time to inform and monitor local action.⁶

Most of the National QUM Indicators are considered potentially useful for inter-hospital comparisons. However, and as for most indicators, ongoing validation is recommended to ensure that they are sensitive and

reliable enough to measure variation in practice between hospitals over time, and to provide a robust measure for meaningful inter-hospital comparison.

Where indicators are intended to be used for inter-hospital comparison or comparative reporting, issues such as consistent availability of data sources and resources for data collection may need to be taken into account when determining the approach to sampling. Risk adjustment on the basis of hospital demographics, case mix and/or patient characteristics may be necessary. Sample size, time frames for data collection and the approach to risk adjustment should be agreed in advance with the coordinating agency to ensure uniformity of data collection.



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National Quality Use of Medicines Indicators for Australian Hospitals

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Indicator summary



Indicator summary

No.	Indicator	QUM domain addressed by indicator	Page
Antithrombotic therapy			
1.1	Percentage of hospitalised adult patients that are assessed for risk of venous thromboembolism	Judicious selection	24
1.2	Percentage of hospitalised adult patients that receive venous thromboembolism prophylaxis appropriate to their level of risk	Judicious selection Appropriate choice	26
1.3	Percentage of patients prescribed enoxaparin whose dosing schedule is appropriate	Safe and effective use	30
1.4	Percentage of patients prescribed hospital initiated warfarin whose loading doses are consistent with a drug and therapeutics committee approved protocol	Safe and effective use	32
1.5	Percentage of patients with an INR above 4 whose dosage has been adjusted or reviewed prior to the next warfarin dose	Safe and effective use	34
1.6	Percentage of patients with atrial fibrillation that are discharged on oral anticoagulants	Judicious selection	36
Antibiotic therapy			
2.1	Percentage of patients undergoing specified surgical procedures that receive an appropriate prophylactic antibiotic regimen	Appropriate choice Safe and effective use	40
2.2	Percentage of prescriptions for restricted antibiotics that are concordant with drug and therapeutics committee approved criteria	Appropriate choice Safe and effective use	44
2.3	Percentage of patients in whom doses of empirical aminoglycoside therapy are continued beyond 48 hours	Safe and effective use	48
2.4	Percentage of adult patients with community acquired pneumonia that are assessed using an appropriate validated objective measure of pneumonia severity	Judicious selection	52
2.5	Percentage of patients presenting with community acquired pneumonia that are prescribed guideline concordant antibiotic therapy	Appropriate choice Safe and effective use	54
Medication ordering			
3.1	Percentage of patients whose current medicines are documented and reconciled at admission	Appropriate choice Safe and effective use	56
3.2	Percentage of patients whose known adverse drug reactions are documented on the current medication chart	Appropriate choice Safe and effective use	60
3.3	Percentage of medication orders that include error-prone abbreviations	Safe and effective use	64
3.4	Percentage of paediatric medication orders that include the correct dose per kilogram (or body surface area) AND an effective and safe total dose	Safe and effective use	66
3.5	Percentage of medication orders for intermittent therapy that are prescribed safely	Safe and effective use	68
3.6	Percentage of patients receiving cytotoxic chemotherapy whose treatment is guided by a hospital approved chemotherapy treatment protocol	Appropriate choice Safe and effective use	70
Pain management			
4.1	Percentage of postoperative patients whose pain intensity is documented using an appropriate validated assessment tool	Judicious selection Safe and effective use	74
4.2	Percentage of postoperative patients that are given a written pain management plan at discharge AND a copy is communicated to the primary care clinician	Safe and effective use	78



No.	Indicator	QUM domain addressed by indicator	Page
Continuity of care			
5.1	Percentage of patients with acute coronary syndrome that are prescribed appropriate medicines at discharge	Judicious selection Appropriate choice	80
5.2	Percentage of patients with systolic heart failure that are prescribed appropriate medicines at discharge	Judicious selection Appropriate choice	84
5.3	Percentage of discharge summaries that include medication therapy changes and explanations for changes	Safe and effective use	88
5.4	Percentage of patients on warfarin that receive written information regarding warfarin management prior to discharge	Safe and effective use	90
5.5	Percentage of patients with a new adverse drug reaction (ADR) that are given written ADR information at discharge AND a copy is communicated to the primary care clinician	Safe and effective use	92
5.6	Percentage of patients with asthma that are given a written asthma action plan at discharge AND a copy is communicated to the primary care clinician	Safe and effective use	94
5.7	Percentage of patients receiving sedatives at discharge that were not taking them at admission	Judicious selection	96
5.8	Percentage of patients whose discharge summaries contain a current, accurate and comprehensive list of medicines	Appropriate choice Safe and effective use	98
5.9	Percentage of patients who receive a current, accurate and comprehensive medication list at the time of hospital discharge	Safe and effective use	102
Hospital-wide medication management policies			
6.1	Percentage of medication storage areas outside pharmacy where potassium ampoules are available	Safe and effective use	106
6.2	Percentage of patients that are reviewed by a clinical pharmacist within one day of admission	Judicious selection Appropriate choice Safe and effective use	108
6.3	Percentage of parenteral opioid dosage units that are pethidine	Appropriate choice	110
6.4	Percentage of submissions for formulary listing of new chemical entities for which the drug and therapeutics committee has access to adequate information for appropriate decision making	Appropriate choice Safe and effective use	112
Acute mental health care			
7.1	Percentage of as required (PRN) psychotropic medication orders with documented indication, dose (or dose range), frequency and maximum daily dose specified	Safe and effective use	114
7.2	Percentage of patients taking lithium who receive appropriate monitoring during their inpatient episode	Safe and effective use	118
7.3	Percentage of patients who receive written and verbal information on regular psychotropic medicines initiated during their admission	Safe and effective use	120
7.4	Percentage of patients taking antipsychotic medicines who receive appropriate monitoring for the development of metabolic side effects	Safe and effective use	124
7.5	Percentage of patients prescribed two or more regular antipsychotic medicines at hospital discharge	Judicious selection Safe and effective use	128

Indicator format

The National QUM Indicators are presented in the following format:

Header	Indicator domain and QUM domain
Indicator number and full title	The indicator number and full indicator title
Purpose	Statements about the rationale for collecting the information in terms of monitoring the effects of relevant healthcare mechanisms
Background and evidence	Statements supporting the content validity of the indicator
Key definitions	Information needed to operationalise the indicator
Data collection for local use	Information regarding sampling, inclusion and exclusion criteria and recommended data sources
Data collection for inter-hospital comparison	Considerations required for sample selection, sample size and methodology
Indicator calculation	Information needed to calculate the indicator from the sample
Limitations and interpretation	Acknowledgements of limitations of each indicator to aid interpretation of results
Further information	Other relevant information
References	Key references
Footer	Date

Indicators



1.1 Percentage of hospitalised adult patients that are assessed for risk of venous thromboembolism

Purpose

This indicator addresses the effectiveness of processes for preventing venous thromboembolism (VTE) in admitted patients.

Background and evidence

Deep vein thrombosis and pulmonary embolism (collectively known as VTE) are major, potentially fatal complications of hospital admission. The incidence of VTE varies with age, medical condition, co-morbidities, type of surgery and duration of immobilisation.¹ Both underuse and inappropriate use of VTE prophylaxis are recognised practice gaps in Australian hospitals²⁻⁴ and national initiatives have been developed to drive improvements in the use of VTE prophylaxis.^{6,7}

The Australian Commission on Safety and Quality in Health Care recommends that hospitals develop a policy outlining standard processes, procedures and responsibilities for assessing all adult patients for VTE risk and guiding the selection of appropriate prophylactic measures.⁶ The policy should be approved by the local hospital drug and therapeutics committee, or other appropriate committee, and be informed by national recommendations such as those from the National Health and Medical Research Council.⁷ Use of locally agreed processes for assessing and documenting VTE and bleeding risks in all adult patients, and locally agreed recommendations for the use of VTE prophylaxis may assist implementation of best practice.

VTE risk assessment should be clearly documented in the medical record or, where applicable, on the inpatient medication chart, together with the appropriate prophylactic measures taken to minimise the risk of VTE. Ideally, the format and location for documentation should be standardised at a hospital level.

Key definitions

Hospitalised adult patients refers to all patients aged 18 years and over who have a length of stay in hospital greater than 24 hours from the time of their initial presentation.

Assessed for risk of venous thromboembolism means that there is explicit documentation of a risk assessment and decision to use or to not use preventative measures by balancing the number and type of risk factors against risk of bleeding. This should be documented in the medical record, on the inpatient medication chart or in another designated place as determined by local policy. The assessment should be dated no later than the end of the calendar day following hospitalisation.

Data collection for local use

Please refer to the section *Using the National Quality Use of Medicines Indicators for Australian Hospitals* for guidance on sample selection, sample size, measurement frequency and other considerations.

Inclusion criteria: Patients aged 18 years and over admitted to hospital or the emergency department.

Exclusion criteria: Patients with length of stay less than 24 hours from the time of initial presentation.

Recommended data sources: Medical records and inpatient medication charts where applicable.

The data collection tool for QUM Indicator 1.1 assists data collection and indicator calculation.

Data collection for inter-hospital comparison

This indicator may be suitable for inter-hospital comparison. In this case, definitions, sampling methods and guidelines for audit and reporting need to be agreed in advance in consultation with the coordinating agency.

Indicator calculation

$$\frac{\text{Numerator}}{\text{Denominator}} \times 100\%$$

Numerator = Number of adult patients that have a documented VTE risk assessment

Denominator = Number of adult patients in sample

Limitations and interpretation

Performing a VTE risk assessment is essential to guide the judicious and appropriate use of VTE prophylaxis. See *Indicator 1.2: Percentage of hospitalised adult patients that receive venous thromboembolism prophylaxis appropriate to their level of risk* for further information regarding the use of VTE prophylaxis. It is recommended that Indicators 1.1 and 1.2 are collected concurrently where possible.

It is recommended that data for different patient groups (e.g. medical, surgical, obstetrics) can be identified separately in order to inform post-audit interventions.

Further information

NSW TAG's position statement on Safe Use of Heparins and Oral Anticoagulants for Venous Thromboembolism Prophylaxis in Adults may assist hospitals with development of policies and guidelines on the use of VTE prophylaxis.⁸

The National Health and Medical Research Council's Stop the Clot program⁵ assists organisations to integrate VTE prevention guidelines into routine hospital care www.nhmrc.gov.au/nics. A number of resources are also available from the Australian Commission on Safety and Quality in Health Care's VTE Prevention Resource Centre⁶ at www.safetyandquality.gov.au

An e-learning module on prescribing VTE prophylaxis for clinicians is available from NPS MedicineWise at <http://learn.nps.org.au>

Medication Safety Self Assessment for Antithrombotic Therapy in Australian Hospitals⁹ (MSSA-AT) can help identify potential strategies for improvement with this and other indicators. MSSA-AT encourages development of robust systems for safe prescribing, dispensing, administration and monitoring of antithrombotic therapy. MSSA-AT is available at www.cec.health.nsw.gov.au

This indicator can be used to assist hospitals in meeting the National Safety and Quality Health Service Standard 1 [items 1.2.1, 1.2.2, 1.5.2, 1.6.1, 1.6.2, 1.7.2, 1.8.1,] and Standard 4 [items 4.2.1, 4.2.2, 4.5.1, 4.5.2, 4.11.1].¹⁰

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1.2 Percentage of hospitalised adult patients that receive venous thromboembolism prophylaxis appropriate to their level of risk

Purpose

This indicator addresses the effectiveness of processes that ensure judicious and appropriate use of venous thromboembolism (VTE) prophylaxis in hospitalised patients.

Background and evidence

Deep vein thrombosis and pulmonary embolism (collectively known as VTE) are major, potentially fatal complications of hospital admission. The incidence of VTE varies with age, medical condition, co-morbidities, type of surgery and duration of immobilisation.¹ Both underuse and inappropriate use of VTE prophylaxis are well-recognised practice gaps in Australian hospitals²⁻⁴ and national initiatives have been developed to drive improvements in the use of VTE prophylaxis.⁵⁻⁷

The Australian Commission on Safety and Quality in Health Care recommends that hospitals develop a policy outlining standard processes, procedures and responsibilities for assessing all adult patients for VTE risk and guiding the selection of appropriate prophylactic measures.⁶ The policy should be approved by the local hospital drug and therapeutics committee, or other appropriate committee, and be informed by national recommendations such as those from the National Health and Medical Research Council (NHMRC).⁷ Use of locally agreed processes for assessing and documenting VTE and bleeding risks in all adult patients, and locally agreed recommendations for the use of VTE prophylaxis may assist implementation of best practice.

VTE prophylaxis incorporates mechanical methods (e.g. graduated compression stockings), pharmacological methods (e.g. heparin, low molecular weight heparin or an oral anticoagulant) or a combination of these. Appropriate prescription of prophylaxis depends on the clinical situation and should be determined by local policy and guidelines.

Key definitions

Hospitalised adult patients refers to all patients aged 18 years and over who have a length of stay in hospital greater than 24 hours from the time of their initial presentation.

Prophylaxis appropriate to their level of risk means prophylaxis that is concordant with the recommendations in a locally agreed guideline, which has been endorsed by the DTC, or where no local guideline is available, the NHMRC guideline.⁷ It is important to consider the following aspects:

- i) VTE prophylaxis is prescribed when indicated
- ii) VTE prophylaxis is not prescribed when not indicated
- iii) VTE prophylaxis is not prescribed when contraindicated.

Data collection for local use

Please refer to the section *Using the National Quality Use of Medicines Indicators for Australian Hospitals* for guidance on sample selection, sample size, measurement frequency and other considerations.

Inclusion criteria: Patients aged 18 years and over admitted to hospital or the emergency department.

Exclusion criteria: Patients with a length of stay less than 24 hours from the time of initial presentation.

Recommended data sources: Medication charts and medical records.

The data collection tool for QUM Indicator 1.2 assists data collection and indicator calculation.

Data collection for inter-hospital comparison

This indicator assesses compliance with local policy, which may affect the ability to draw comparisons between hospitals whose local policies differ. If used for inter-hospital comparison discussion and agreement on an optimal policy consistent with national recommendations should take place. Definitions, sampling methods and guidelines for audit and reporting also need to be agreed in advance in consultation with the coordinating agency.

Indicator calculation

$$\frac{\text{Numerator}}{\text{Denominator}} \times 100\%$$

Numerator = Number of adult patients receiving VTE prophylaxis appropriate to their level of risk

Denominator = Number of adult patients in sample

Limitations and interpretation

Determination of each patient's risk of VTE and risk of bleeding should be guided by an objective assessment of risk factors and clinical judgement and a VTE risk assessment should be clearly documented. This should be used to determine the appropriateness of the prescribed VTE prophylaxis. Where no risk assessment is documented the auditor is required to determine the patient's level of risk in order to assess the appropriateness of prophylaxis. *Indicator 1.1: Percentage of hospitalised adult patients that are assessed for risk of venous thromboembolism* provides further information regarding documentation of VTE risk assessment. It is recommended that the staff carrying out the audit have relevant expertise in order that they can accurately assess the appropriateness of VTE prophylaxis. It is recommended that Indicators 1.1 and 1.2 are collected concurrently where possible.

It is recommended that data for different patient groups (e.g. medical, surgical, obstetrics) can be identified separately in order to inform post-audit interventions.

Further information

NSW TAG's position statement on Safe Use of Heparins and Oral Anticoagulants for Venous Thromboembolism Prophylaxis in Adults may assist hospitals with development of policies and guidelines on the use of VTE prophylaxis.⁸

The National Health and Medical Research Council's Stop the Clot program⁵ assists organisations to integrate VTE prevention guidelines into routine hospital care www.nhmrc.gov.au/nics. A number of resources are also available from the Australian Commission on Safety and Quality in Health Care's VTE Prevention Resource Centre⁶ at www.safetyandquality.gov.au

An e-learning module on prescribing VTE prophylaxis for clinicians is available from NPS MedicineWise at <http://learn.nps.org.au>

The Medication Safety Self Assessment for Antithrombotic Therapy in Australian Hospitals⁹ (MSSA-AT) can help identify potential strategies for improvement with this indicator. MSSA-AT encourages development of robust systems for safe prescribing, dispensing, administration and monitoring of antithrombotic therapy. MSSA-AT is available at www.cec.health.nsw.gov.au

This indicator can be used to assist hospitals in meeting the National Safety and Quality Health Service Standard 1 [items 1.2.1, 1.2.2, 1.5.2, 1.6.1, 1.6.2, 1.7.2] and Standard 4 [items 4.2.1, 4.2.2, 4.5.1, 4.5.2, 4.11.1].¹⁰

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10. Australian Commission on Safety and Quality in Health Care. National Safety and Quality Health Service Standards. Sydney, ACSQHC, 2012.

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1.3 Percentage of patients prescribed enoxaparin whose dosing schedule is appropriate

Purpose

This indicator assesses effectiveness of processes that encourage safe prescribing practices for high risk medicines such as enoxaparin.

Background and evidence

Choice of dose for enoxaparin is dependent on the indication for therapy.^{1,2} The enoxaparin dose for prevention of venous thromboembolism (VTE) is usually 20 mg or 40 mg daily, depending on risk.² The enoxaparin dose for treatment of VTE is based on weight.² The dose may need to be adjusted if the patient has renal dysfunction.²

Patients are at risk of either bleeding or clot progression if inappropriate doses are prescribed. Documentation of both indication and weight are therefore critical to appropriate prescribing and should be recorded on the medication chart.

Key definitions

Dosing schedule is appropriate means that the prescribed dose and frequency of enoxaparin are appropriate for the indication, patient's weight and renal function in accordance with a protocol approved by the drug and therapeutics committee, or in the absence of a local protocol, in accordance with the recommendations in the approved product information.¹ Rounded doses are acceptable.

Data collection for local use

Please refer to the section *Using the National Quality Use of Medicines Indicators for Australian Hospitals* for guidance on sample selection, sample size, measurement frequency and other considerations.

Inclusion criteria: Patients aged 18 years and over prescribed enoxaparin.

Exclusion criteria: Nil.

Recommended data sources: Medication charts, medical notes and pathology results.

The data collection tool for QUM Indicator 1.3 assists data collection and indicator calculation.

Data collection for inter-hospital comparison

This indicator may be suitable for inter-hospital comparison. In this case, definitions, sampling methods and guidelines for audit and reporting need to be agreed in advance in consultation with the coordinating agency.

Indicator calculation

$$\frac{\text{Numerator}}{\text{Denominator}} \times 100\%$$

Numerator = Number of patients prescribed enoxaparin whose dosing schedule is appropriate

Denominator = Number of patients prescribed enoxaparin in sample

Limitations and interpretation

Good documentation supports quality patient care³ and is a critical component of management with potentially toxic medicines such as enoxaparin. Poor communication can result in adverse drug events.⁴ Thus it is important for both indication and weight to be clearly documented on the medication chart to help inform dosing decisions. This indicator assumes that actual patient weight is used when calculating doses. In obese patients, dose calculation on the basis of lean body weight may be more appropriate.

Further information

Medication Safety Self Assessment for Antithrombotic Therapy in Australian Hospitals⁵ (MSSA-AT) can help identify potential strategies for improvement with this and other indicators. MSSA-AT encourages development of robust systems for safe prescribing, dispensing, administration and monitoring of antithrombotic therapy. MSSA-AT is available at www.cec.health.nsw.gov.au

This indicator can be used to assist hospitals in meeting the National Safety and Quality Health Service Standard 1 [items 1.2.1, 1.2.2, 1.5.2, 1.6.1, 1.6.2, 1.7.2] and Standard 4 [items 4.2.1, 4.2.2, 4.5.1, 4.5.2, 4.11.1].⁶

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1.4 Percentage of patients prescribed hospital initiated warfarin whose loading doses are consistent with a drug and therapeutics committee approved protocol

Purpose

This indicator addresses effectiveness of processes that encourage safe initiation of high risk medicines such as warfarin.

Background and evidence

Warfarin is a widely used drug with potentially fatal side effects. There is risk of over-anticoagulation in many groups of patients.¹ Use of a warfarin initiation protocol can help avoid harm to patients through over-anticoagulation during the loading phase and helps achieve a stable therapeutic International Normalised Ratio (INR) in a shorter time.¹

Warfarin loading dose advice is provided in the Australian Medicines Handbook² and may provide a basis for protocol development. At a minimum, the protocol should take into account dosing requirements for people of different ages and medical conditions, such as heart failure, liver failure, severe infection, reduced oral intake, or concurrent broad spectrum antibiotic use.

Key definitions

Patients prescribed hospital initiated warfarin refers to patients who are commenced on warfarin therapy during the current admission.

Loading doses are defined as the initial doses for a patient who is commenced on warfarin, as defined by the local hospital protocol (see below).

A drug and therapeutics committee approved protocol refers to a schedule or protocol for initiating warfarin in a standardised way. The protocol for loading doses, whether developed locally or at an area, state or national level, should be approved by the hospital drug and therapeutics committee (DTC) or equivalent.

Data collection for local use

Please refer to the section *Using the National Quality Use of Medicines Indicators for Australian Hospitals* for guidance on sample selection, sample size, measurement frequency and other considerations.

Inclusion criteria: Patients aged 18 years and over who are commenced on warfarin during the current hospital admission.

Exclusion criteria: Patients previously prescribed warfarin in which warfarin has been re-initiated.

Recommended data sources: Medication charts.

The data collection tool for QUM Indicator 1.4 assists data collection and indicator calculation.

Data collection for inter-hospital comparison

This indicator may be suitable for inter-hospital comparison. In this case definitions, sampling methods and guidelines for audit and reporting need to be agreed in advance in consultation with the coordinating agency.

Indicator calculation

$$\frac{\text{Numerator}}{\text{Denominator}} \times 100\%$$

Numerator = Number of patients on hospital initiated warfarin whose loading doses are consistent with a DTC approved protocol

Denominator = Number of patients on hospital initiated warfarin in sample

Limitations and interpretation

This indicator does not assess re-initiation of warfarin in patients who had ceased it for a surgical procedure or other reason. Nevertheless, appropriate re-initiation of warfarin should also be concordant with approved guidelines and protocols.

Further information

Medication Safety Self Assessment for Antithrombotic Therapy in Australian Hospitals³ (MSSA-AT) can help identify potential strategies for improvement with this and other indicators. MSSA-AT encourages development of robust systems for safe prescribing, dispensing, administration and monitoring of antithrombotic therapy. MSSA-AT is available at www.cec.health.nsw.gov.au

This indicator can be used to assist hospitals in meeting the National Safety and Quality Health Service Standard 1 [items 1.2.1, 1.2.2, 1.5.2, 1.6.1, 1.6.2, 1.7.2] and Standard 4 [items 4.1.1, 4.2.1, 4.2.2, 4.5.1, 4.5.2].⁴

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1.5 Percentage of patients with an INR above 4 whose dosage has been adjusted or reviewed prior to the next warfarin dose

Purpose

This indicator addresses the effectiveness of processes for timely and effective monitoring of high risk medicines such as warfarin.

Background and evidence

Warfarin has a narrow therapeutic index, thus monitoring therapy is critical to prevent harm. The anticoagulant effect of warfarin is monitored by calculating the International Normalised Ratio (INR) – a ratio of the patient's prothrombin time to the mean normal prothrombin time.¹ For most patients requiring warfarin, the target INR range is between 2 and 3.^{1,2}

Bleeding is the most common and serious complication of warfarin² and there is a strong relationship between INR levels and bleeding.³ The risk of bleeding is markedly increased once the INR exceeds 4.⁴

To reduce bleeding risk, dosage adjustment is often needed, particularly for those patients newly initiated on warfarin and/or other medication. This includes patients on warfarin who are hospitalised for conditions unrelated to the requirement for warfarin. However, watchful waiting is an acceptable alternative in patients with mildly elevated INR.⁵ Therefore in some cases it may be appropriate that no dosage adjustment occurs, although regular review is mandatory.

Key definitions

Dosage adjusted is defined as dose reduction or dose omission and must be documented on the medication chart.

Dosage reviewed means there is explicit documentation on the medication chart or in another pre-determined section of the medical record that a high INR has been noted and that dosage adjustment is not required.

Data collection for local use

Please refer to the section *Using the National Quality Use of Medicines Indicators for Australian Hospitals* for guidance on sample selection, sample size, measurement frequency and other considerations.

Inclusion criteria: Patients aged 18 years and over with an INR result greater than 4.

Exclusion criteria: Nil.

Recommended data sources: Medical records, medication charts and pathology results.

The data collection tool for QUM Indicator 1.5 assists data collection and indicator calculation.

Data collection for inter-hospital comparison

This indicator may be suitable for inter-hospital comparison. In this case, definitions, sampling methods and guidelines for audit and reporting need to be agreed in advance in consultation with the coordinating agency.

Indicator calculation

$$\frac{\text{Numerator}}{\text{Denominator}} \times 100\%$$

Numerator = Number of patients with INR above 4 whose dosage has been adjusted or reviewed prior to the next warfarin dose

Denominator = Number of patients with INR above 4 in sample

Limitations and interpretation

Data collection for this indicator relies on documentation in the medical record, especially for demonstration of dosage review. Good documentation supports quality patient care⁶ and is a critical component of management for potentially toxic medicines such as warfarin. Poor communication can result in adverse drug events.⁷ Thus it is assumed that absence of explicit documentation means no review took place.

Further information

Medication Safety Self Assessment for Antithrombotic Therapy in Australian Hospitals⁸ (MSSA-AT) can help identify potential strategies for improvement with this and other indicators. The MSSA-AT encourages development of robust systems for safe prescribing, dispensing, administration and monitoring of antithrombotic therapy. MSSA-AT is available at www.cec.health.nsw.gov.au

This indicator can be used to assist hospitals in meeting the National Safety and Quality Health Service Standard 1 [items 1.2.1, 1.2.2, 1.5.2, 1.6.1, 1.6.2, 1.8.1] and Standard 4 [items 4.2.1, 4.2.2, 4.5.1, 4.5.2, 4.11.1].⁹

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1.6 Percentage of patients with atrial fibrillation that are discharged on oral anticoagulants

Purpose

This indicator addresses effectiveness of processes that encourage judicious use of preventive pharmacotherapy in patients at risk of stroke.

Background and evidence

Under-utilisation of anticoagulation continues to be an issue in people with atrial fibrillation (AF).¹⁻³ Anticoagulants reduce the risk of stroke by about two thirds compared to aspirin which reduces risk of stroke by about one fifth.^{4,5} The benefits of warfarin are not offset by increased bleeding in the majority of patients.⁶ Older people, provided they are carefully monitored, can use anticoagulants with reasonable safety,⁷⁻¹⁰ however, patients over 80 years of age are at greater risk of adverse events.^{5,11} Direct oral anticoagulants (dabigatran, rivaroxaban and apixaban) have demonstrated non-inferiority to warfarin in stroke prevention and show lower rates of intracranial haemorrhage.⁸⁻¹⁰ They are alternative therapeutic options to warfarin in selected patients.

Key definitions

Patients with atrial fibrillation refers to patients less than 80 years of age admitted with permanent (chronic), persistent or paroxysmal (intermittent) AF^{4,5} as a primary or secondary diagnosis.

Oral anticoagulants refer to orally administered vitamin K antagonists such as warfarin, direct thrombin inhibitors such as dabigatran and direct Factor Xa inhibitors such as apixaban and rivaroxaban. Newer medicines may be included within these oral anticoagulant classes as they become licensed for clinical use in stroke prevention in nonvalvular atrial fibrillation in Australia.

Discharged on oral anticoagulants means there is documentation in the discharge summary or letter at the time of transfer to the community, residential care or another hospital that an oral anticoagulant is to be taken on an ongoing basis. A supply of oral anticoagulant may or may not be provided by the hospital.

Data collection for local use

Please refer to the section *Using the National Quality Use of Medicines Indicators for Australian Hospitals* for guidance on sample selection, sample size, measurement frequency and other considerations.

Inclusion criteria: Discharged patients aged between 18 and 80 years of age with a primary or secondary diagnosis of AF.

Exclusion criteria: Patients less than 65 years of age diagnosed with lone AF.

Recommended data sources: Medical records and discharge documentation.

The data collection tool for QUM Indicator 1.6 assists data collection and indicator calculation.

Data collection for inter-hospital comparison

This indicator may be suitable for inter-hospital comparison. In this case, definitions, sampling methods and guidelines for audit and reporting need to be agreed in advance in consultation with the coordinating agency.

Indicator calculation

$$\frac{\text{Numerator}}{\text{Denominator}} \times 100\%$$

Numerator = Number of patients with AF that are discharged on an oral anticoagulant

Denominator = Number of patients discharged with AF in sample

Limitations and interpretation

This indicator examines patients less than 80 years because the risk of bleeding increases after this age, and stroke prevention in this age group is complex and challenging.¹¹ Antithrombotic therapy is not recommended in patients aged less than 65 years with lone AF¹²; hence their exclusion from the sample. Anti-platelet agents have not been included as acceptable alternatives to oral anticoagulants because there is clear evidence of the superiority of anticoagulation.^{13,14}

Consideration of potential contraindications requires a detailed review of risks associated with anticoagulation and specific risks related to each oral anticoagulant.^{15,16} If an oral anticoagulant is not prescribed for the patient on discharge, the reason(s) for omission, such as a contra-indication or a plan to initiate therapy in the future, should be documented in the patient's discharge summary or letter.

Further information

A number of issues need to be considered when evaluating the appropriateness of oral anticoagulants for individual patients. Table 1 outlines a scoring system that may be used to calculate the risk of stroke in patients with AF. Table 2 outlines a scoring system that may be used to calculate bleeding risk. Unfortunately, as the risk of thromboembolism rises, so the risk of bleeding also tends to rise. Absolute and relative contraindications related to a patient's medical condition, functional and cognitive status, and capability to manage their medicines need to be taken into account when evaluating individual patient risk.^{15,16}

The Medication Safety Self Assessment for Antithrombotic Therapy in Australian Hospitals¹⁷ (MSSA-AT) can help identify potential strategies for improvement with this and other indicators. The MSSA-AT encourages development of robust systems for safe prescribing, dispensing, administration and monitoring of antithrombotic therapy. The MSSA-AT is available at www.cec.health.nsw.gov.au

This indicator can be used to assist hospitals in meeting the National Safety and Quality Health Service Standard 1 [items 1.2.1, 1.2.2, 1.5.2, 1.6.1, 1.6.2] and Standard 4 [items 4.2.1, 4.2.2, 4.5.1, 4.5.2].¹⁸

Table 1: Risk factors for stroke in patients with atrial fibrillation: the CHA₂DS₂-VASc scoring system¹⁹

Risk factor		Score
C	Congestive heart failure/left ventricular dysfunction	1
H	Hypertension	1
A₂	Age ≥75 years	2
D	Diabetes mellitus	1
S₂	Stroke/Transient Ischaemic Attack/Thromboembolism	2
V	Vascular disease – coronary artery disease (prior myocardial infarction, peripheral artery disease, or aortic plaque)	1
A	Age 65–74 years	1
Sc	Sex category (i.e. female gender)	1
Maximum Score		9*

* Maximum score is 9 as age may contribute 0, 1, or 2 points.

The European Society of Cardiology (ESC) 2012 focused update of the Guidelines for the management of atrial fibrillation recommends oral anticoagulation if the CHA₂DS₂-VASc is equal to or greater than one, unless a score of one is due to female gender.¹²

When considering the use of thromboprophylaxis the risk of stroke needs to be balanced against the risk of major bleeding, particularly intracranial haemorrhage.²⁰ The ESC guidelines recommend the use of the HAS-BLED score to determine bleeding risk and identify modifiable risk factors and monitoring requirements.¹²

Table 2: Risk factors for bleeding: the HAS-BLED scoring system^{21,22}

Risk factor		Score
H	Hypertension History? (uncontrolled, >160 mmHg systolic)	1
A	Renal Disease? (Dialysis, transplant, Cr >200 micromol/L)	1
	Liver Disease? (Cirrhosis, Bilirubin >2x Normal, AST/ALT/AP >3x Normal)	1
S	Stroke History?	1
B	Prior Major Bleeding or Predisposition to Bleeding?	1
L	Labile INR? (Unstable/high INRs, <60% time in therapeutic range)	1
E	Age ≥65?	1
D	Medication Usage Predisposing to Bleeding? (Antiplatelet agents, NSAIDs, corticosteroids)	1
	Alcohol Usage History?	1
Maximum Score		9

Cr=Serum creatinine; AST=Aspartate aminotransferase; ALT= Alanine aminotransferase; AP=Alkaline phosphatase

HAS-BLED stands for hypertension, abnormal renal/liver function, stroke, bleeding history or predisposition, labile INR, elderly (age over 65), and drugs/alcohol.

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2.1 Percentage of patients undergoing specified surgical procedures that receive an appropriate prophylactic antibiotic regimen

Purpose

This indicator addresses the effectiveness of processes for preventing hospital-acquired infections.

Background and evidence

Surgical site infections have been reported to be the second most common type of adverse event occurring in hospitalised patients,¹ and have been estimated to cost up to \$268 million per year.² Surgical site infections are recognised to be an area for concern internationally, occurring in up to 5% of patients undergoing clean surgery,³ dependent on complexity of surgery, patient risk and surgical skills.⁴ Internationally surgical site infections have been shown to compose up to 20% of all healthcare associated infections.³ The use of antibiotics in preventing surgical site infection has been consistently demonstrated, yet gaps in the use of prophylactic surgical antibiotics continue to occur in Australia and internationally.⁵⁻⁸ Inappropriate antibiotic use ranges from 30% to 90%, especially with respect to timing and duration of antibiotic therapy.⁹

Key definitions

Specified surgical procedures refers to the procedure types identified in the latest version of the Therapeutic Guidelines: Antibiotic⁹ as requiring antibiotic prophylaxis. See Table 1.

An appropriate prophylactic antibiotic regimen refers to:

- Correct antibiotic choice: includes correct medication choice, route of administration and dosing schedule
- Correct timing: generally the antibiotic should be administered up to 60 minutes prior to skin incision and as a single dose. A second dose may be necessary: if there is a delay in starting the operation; if a short acting antibiotic is used (e.g. cephalothin, cephazolin, dicloxacillin or flucloxacillin) and the operation is prolonged (longer than 3 hours); or in other circumstances specified in guidelines
- Correct duration: Antibiotic prophylaxis is ceased within 24 hours of completion of surgery except where postoperative use is specifically recommended (e.g. cardiac and vascular surgery or amputation of an ischaemic lower limb).

All of these criteria must be reached in order for the antibiotic regimen to be deemed appropriate.

The current version of the Therapeutic Guidelines: Antibiotic should be used as a basis to guide clinical practice.⁹ However, practice may be audited against a more restrictive local guideline if desired.

Table 1: Specified surgical procedures requiring prophylactic antibiotics⁹

Surgical area	Specified surgical procedures
Abdominal surgery	Colorectal surgery Appendicectomy Upper gastrointestinal tract or biliary surgery, including laparoscopic surgery Endoscopic procedures that may result in bacteraemia Hernia repair with prosthetic material
Cardiac surgery	Valve replacement Coronary artery bypass graft Cardiac transplantation Insertion of a permanent pacemaker
Head, neck and thoracic surgery	Procedures involving an incision through oral, nasal, pharyngeal or oesophageal mucosa, stapedectomy or similar operations, or the insertion of prosthetic material
Neurosurgery	Prolonged craniotomy or re-explorations and microsurgery Insertion of prosthetic material
Obstetrics and gynaecology	Hysterectomy and termination of pregnancy Caesarean section
Orthopaedic surgery	Prosthetic large joint replacement, other orthopaedic procedures involving insertion of prosthetic or transplant material, and internal fixation of fractures of large bones
Urology	Prostatectomy Transrectal prostatic biopsy
Vascular surgery	Arterial reconstructive surgery involving the abdominal aorta and/or the lower limb, particularly if a groin incision is involved or with the implantation of foreign material
Other	Lower limb amputation

Data collection for local use

Please refer to the section *Using the National Quality Use of Medicines Indicators for Australian Hospitals* for guidance on sample selection, sample size, measurement frequency and other considerations.

Inclusion criteria: Adult, paediatric and neonatal patients undergoing a specified surgical procedure.

Exclusion criteria: Nil.

Recommended data sources: Medical records, medication charts and intra-operative medication administration records.

The data collection tool for QUM Indicator 2.1 assists data collection and indicator calculation.

Data collection for inter-hospital comparison

This indicator may be suitable for inter-hospital comparison. In this case, definitions, sampling methods and guidelines for audit and reporting need to be agreed in advance in consultation with the coordinating agency.

Indicator calculation

$$\frac{\text{Numerator}}{\text{Denominator}} \times 100\%$$

Calculate the indicator separately for each procedure type

Numerator = Number of patients undergoing specified surgical procedures that receive an appropriate prophylactic antibiotic regimen

Denominator = Number of patients who had a specified surgical procedure in sample

Limitations and interpretation

The list of specified surgical procedures in Table 1 is not exhaustive. If desired, other procedures requiring prophylactic antibiotics can be audited using this methodology.

For individual patients there may be clinical reasons why a different antibiotic regimen was chosen. Determining such circumstances retrospectively is complicated and may require clinical judgement. Since this is likely to apply for only a small number of patients, these instances are not accounted for. Where there is concern about results, it may be appropriate to look more closely at these details.

This indicator does not examine situations where antibiotics were given unnecessarily in procedures that typically do not require antibiotic prophylaxis. Such use may contribute to emergence of multi-resistant organisms and should not be neglected.^{9,10}

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Further information

Medication Safety Self Assessment for Australian Hospitals¹¹ (MSSA) can help identify potential strategies for improvement with this and other indicators. The MSSA encourages development of robust systems for safe prescribing, dispensing, administration and monitoring of medicines. The MSSA is available at www.cec.health.nsw.gov.au

This indicator can be used to assist hospitals in meeting the National Safety and Quality Health Service Standard 1 [items 1.2.1, 1.2.2, 1.5.2, 1.6.1, 1.6.2, 1.7.2], Standard 3 [items 3.1.1, 3.1.2, 3.4.1, 3.4.2, 3.4.3, 3.14.1, 3.14.3, 3.14.4] and Standard 4 [items 4.2.1, 4.2.2, 4.5.1, 4.5.2].¹²

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2.2 Percentage of prescriptions for restricted antibiotics that are concordant with drug and therapeutics committee approved criteria

Purpose

This indicator addresses effectiveness of processes for preventing emergence of multi-resistant organisms.

Background and evidence

Multidrug resistance in common clinical pathogens is a growing problem and widespread and indiscriminate use of broad spectrum anti-infectives is a major contributor.¹ Unnecessary use of antimicrobials as well as inappropriate choice, dose and duration of therapy drive selection of resistant bacteria.² Restricting use of certain antibiotics to defined groups of patients and using narrow spectrum antibiotics wherever possible can slow or constrain the emergence of antibiotic resistance and prolong the effectiveness of existing antibiotics.^{1,2} Treatment should be based on knowledge of local patterns of likely pathogens and local susceptibility data.¹ Medicines that remain the last defence against multi-resistant strains should only be used under expert direction.¹

Antimicrobial stewardship (AMS) programs have been developed in response to these issues. AMS is a systematic approach to optimising the use of antimicrobials. As a key quality and public health strategy for each hospital executive, AMS is used to reduce inappropriate antimicrobial use, improve patient outcomes and reduce adverse consequences of antimicrobial use.³

A multidisciplinary AMS committee is charged with liaising closely with several different hospital quality committees, most importantly the drug and therapeutics committee (DTC) with which an antimicrobial prescribing and management policy should be established. This should incorporate an antimicrobial formulary with clear guidelines for antimicrobial treatment and prophylaxis. Policies and guidelines should be consistent with the current edition of Therapeutic Guidelines: Antibiotic² as a minimum standard, although DTCs may choose to impose tighter restrictions in alignment with local resistance patterns. The DTC will establish specified antimicrobial agents which may only be prescribed under restricted conditions. Prospective approval of the AMS team or an infectious diseases clinician may be required for certain agents per treatment episode. Antimicrobial usage audits should be used to monitor appropriate prescribing of antibiotics. Regular audit and feedback has been shown to contribute to improved compliance with restricted antibiotic policies.²

To ensure universal relevance of this indicator and attainment of a reasonable sample size in health facilities of all sizes and areas, its scope has been limited to the antibiotic group of antimicrobials.

Key definitions

Antimicrobial stewardship is an ongoing effort by a healthcare institution to optimise antimicrobial use among hospital patients in order to improve patient outcomes, ensure cost-effective therapy and reduce adverse sequelae of antimicrobial use (including antimicrobial resistance).³

Restricted antibiotics refers to those antibiotics that could contribute to development of multi-resistant organisms including parenteral and/or oral formulations of the following antibiotics:⁴

- Aminoglycosides: amikacin, gentamicin (after 48 hours of use)
- Carbapenems: doripenem, ertapenem, imipenem, meropenem
- Cephalosporins: cefotaxime, ceftriaxone, cefepime, ceftazidime, ceftiofime, ceftaroline
- Glycopeptides: vancomycin, teicoplanin
- Macrolides: azithromycin, clarithromycin
- Quinolones: ciprofloxacin, moxifloxacin, norfloxacin
- Others: aztreonam, colistin, daptomycin, linezolid, sodium fusidate, tigecycline, rifampicin.

Other antibiotics may be included in the audit according to locally agreed antibiotic restrictions. As new antibiotics are introduced into the Australian market, they should be considered for inclusion in this list if they pose a risk for emergence of multi-resistant organisms.

Data collection for local use

Please refer to the section *Using the National Quality Use of Medicines Indicators for Australian Hospitals* for guidance on sample selection, sample size, measurement frequency and other considerations.

Inclusion criteria: All adult, paediatric and neonatal patients prescribed a restricted antibiotic (including those in critical care units such as intensive care, transplant and surgical units).

Exclusion criteria: Nil.

Recommended data sources: Medical records and medication charts.

The data collection tool for QUM Indicator 2.2 assists data collection and indicator calculation.

Data collection for inter-hospital comparison

This indicator may be suitable for inter-hospital comparison. In this case, definitions, sampling methods and guidelines for audit and reporting need to be agreed in advance in consultation with the coordinating agency.

Indicator calculation

$$\frac{\text{Numerator}}{\text{Denominator}} \times 100\%$$

Numerator = Number of prescriptions for restricted antibiotics that are concordant with DTC approved criteria

Denominator = Number of prescriptions for restricted antibiotics in sample

Limitations and interpretation

At times antibiotics may not be prescribed in accordance with DTC criteria, but may nevertheless be approved by microbiology/infectious diseases departments. Where this is explicitly documented it can be considered a concordant prescription. In the absence of documentation regarding specific approval, it should be assumed that antibiotic prescription is not concordant.

Further information

Electronic prescribing systems with decision support and purpose-designed electronic AMS applications can be used to help manage approval processes for use of restricted antibiotics. For further information regarding formulary restrictions and antimicrobial approval systems refer to Australian Commission on Safety and Quality in Health Care publication, Antimicrobial Stewardship in Australian Hospitals 2011³

<http://www.safetyandquality.gov.au/our-work/healthcare-associated-infection/antimicrobial-stewardship/book/>

The Australian Commission on Safety and Quality in Health Care and NPS MedicineWise have developed a series of e-learning modules on antimicrobial prescribing. The modules address specific areas where antimicrobial use in hospitals is suboptimal. The modules can be accessed at <http://learn.nps.org.au>

Medication Safety Self Assessment for Australian Hospitals⁵ (MSSA) can help identify potential strategies for improvement with this and other indicators. The MSSA encourages development of robust systems for safe prescribing, dispensing, administration and monitoring of medicines. The MSSA is available at www.cec.health.nsw.gov.au

This indicator can be used to assist hospitals in meeting the National Safety and Quality Health Service Standard 1 [items 1.2.1, 1.2.2, 1.5.2, 1.6.1, 1.6.2, 1.7.2], Standard 3 [items 3.1.1, 3.1.2, 3.4.1, 3.4.2, 3.4.3, 3.14.1, 3.14.3, 3.14.4] and Standard 4 [items 4.1.1, 4.2.1, 4.2.2, 4.3.2, 4.3.3, 4.5.1, 4.5.2].⁶

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2.3 Percentage of patients in whom doses of empirical aminoglycoside therapy are continued beyond 48 hours

Purpose

This indicator addresses the effectiveness of monitoring the duration of empirical treatment with intravenous aminoglycoside antibiotics and the appropriate and timely responsiveness to susceptibility results.

Background and evidence

Aminoglycosides have rapid bactericidal activity and comparatively low levels of resistance in most community and healthcare-associated Gram-negative pathogens.^{1,2} For this reason they are recommended for short-term empirical therapy of serious infections possibly caused by Gram-negative organisms.^{1,2} However, as a group of medicines they have a narrow therapeutic index and are potentially ototoxic and nephrotoxic. Risk factors for toxicity include renal impairment; complex medical conditions; pre-existing hearing or vestibular impairment; and exposure to other potentially nephrotoxic or ototoxic medicines.¹⁻³

The risk of serious adverse effects increases with increasing treatment duration.¹⁻³ Short term therapy has been shown to have a very low incidence of nephrotoxicity, whilst prolonged therapy has been shown to be an independent risk factor for nephrotoxicity.³ Therefore, when used empirically, it is recommended that no further doses of aminoglycoside should be given beyond 48 hours.² Susceptibility results should be used to guide ongoing therapy. Aminoglycoside therapy should only be continued if a susceptible Gram-negative organism is identified and the patient has an indication for directed therapy.

If susceptibility results are not available by 72 hours and empirical intravenous therapy is still required, the aminoglycoside-containing regimen should be ceased and an alternative regimen used.¹ Monitoring of aminoglycoside plasma concentrations is not required if the clinical plan is to cease therapy within 72 hours of commencement.²

Key definitions

Aminoglycoside refers to the drugs amikacin, gentamicin and tobramycin.

Empirical therapy refers to short-term treatment pending the outcome of investigations. When used empirically, no further doses of aminoglycosides should be given beyond 48 hours after the initial dose.²

Continued beyond 48 hours refers to all intravenous doses of aminoglycoside antibiotics administered beyond 48 hours after the initial dose. The number of doses given during the first 48 hours depends on the prescribed dosing interval. In adults the dosage interval is determined by the patient's renal function.² Specialist advice should be sought with regard to appropriate dosing in paediatric patients.

The times for acceptable empirical doses according to the prescribed dosing interval are shown in the table below:

Dosing interval	Intravenous administration times of empirical doses (hours)	Thereafter empirical therapy should be ceased unless the criteria for directed therapy are met.
8 hourly	0, 8, 16, 24, 32, 40, 48	
24 hourly	0, 24, 48	
36 hourly	0, 36	
48 hourly	0, 48	

Directed therapy refers to treatment with aminoglycosides when results of investigations have shown that this is the most appropriate therapy for the patient, such as in the following circumstances:²

- infections when resistance to other safer antimicrobials has been shown
- combination therapy for serious *Pseudomonas aeruginosa* infections and brucellosis
- low doses as synergistic treatment for streptococcal and enterococcal endocarditis.

It is important to note that therapy cannot be classed as directed unless susceptibility results are used to guide antibiotic choice; pending susceptibility results cannot be used to justify continuation of empirical aminoglycoside therapy beyond 48 hours.¹

Data collection for local use

Please refer to the section *Using the National Quality Use of Medicines Indicators for Australian Hospitals* for guidance on sample selection, sample size, measurement frequency and other considerations.

Inclusion criteria: Adult and paediatric patients who receive a dose of aminoglycoside greater than 48 hours after the initiation of intravenous therapy. Patients on all dosing schedules of aminoglycosides should be included.

Exclusion criteria: Patients in whom aminoglycoside therapy is “directed therapy” from initiation of therapy.

Recommended data sources: Medical records, medication charts and microbiology results.

The data collection tool for QUM Indicator 2.3 assists data collection and indicator calculation.

Data collection for inter-hospital comparison

This indicator may be suitable for inter-hospital comparison. In this case, definitions, sampling methods and guidelines for audit and reporting need to be agreed in advance in consultation with the coordinating agency.

Indicator calculation

$$\frac{\text{Numerator}}{\text{Denominator}} \times 100\%$$

Numerator = Number of patients who received doses of empirical aminoglycoside therapy beyond 48 hours

Denominator = Number of patients who received aminoglycoside therapy beyond 48 hours in sample

Limitations and interpretation

Data collection for this indicator relies on documentation of the reasons for continuing aminoglycoside therapy in the medical record. This may take the form of an explanation of treatment rationale according to microbiological assessment. In the absence of explicit documentation that therapy is directed, it is assumed that treatment is empirical and that treatment has not been reviewed after 48 hours. Clear and comprehensive documentation supports quality patient care⁴ and is a critical component of management with high risk medicines such as aminoglycosides. Poor communication can result in adverse medicine events.⁵

It is recommended to keep records of the age of each patient, clinical area, indication and the aminoglycoside dosing schedule to enable relevant analyses and to inform post-audit interventions.

This indicator does not assess the appropriateness of the choice of empirical antibiotic therapy, nor the appropriateness of therapeutic drug monitoring of aminoglycosides. These are acknowledged as important QUM issues that may need to be addressed separately.

Further information

Medication Safety Self Assessment for Australian Hospitals⁶ (MSSA) can help identify potential strategies for improvement with this and other indicators. The MSSA encourages development of robust systems for safe prescribing, dispensing, administration and monitoring of medicines. The MSSA is available at www.cec.health.nsw.gov.au

This indicator can be used to assist hospitals in meeting the National Safety and Quality Health Service Standard 1 [items 1.2.1, 1.2.2, 1.5.2, 1.6.1, 1.6.2], Standard 3 [items 3.1.1, 3.4.1, 3.4.2, 3.4.3, 3.14.1, 3.14.3, 3.14.4] and Standard 4 [items 4.2.1, 4.2.2, 4.5.1, 4.5.2, 4.11.1].⁷

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2.4 Percentage of adult patients with community acquired pneumonia that are assessed using an appropriate validated objective measure of pneumonia severity

Purpose

This indicator addresses effectiveness of processes that promote judicious selection of treatment choices for patients with community acquired pneumonia (CAP).

Background and evidence

A careful assessment of pneumonia severity is required in all patients presenting with CAP. A number of CAP scoring systems have been developed as objective measures to stratify patients with CAP according to their disease severity and provide guidance with regard to the most appropriate empirical antibiotic therapy.¹ CAP scoring systems aid clinical judgement, rather than replace it. They should never be used in isolation to decide management and the clinical and social context of the patient must always be considered.¹

Two scoring systems derived from Australian studies are identified in the Therapeutic Guidelines: Antibiotic.¹ The CORB and SMART-COP systems use predictors of mortality and of the requirement for intensive respiratory or vasopressor support. These tools draw attention to the important clinical features that predict clinical deterioration. SMART-COP^{3,4} is generally preferred as it is more accurate and has been extensively studied. CORB may be used as an alternative due to its simplicity and ability to be used in the absence of investigation results.¹

Key definitions

Adult patients with community acquired pneumonia refers to all patients aged 18 years and over who present to the emergency department (ED) or are directly admitted to the hospital with community acquired pneumonia (CAP). Patients presenting to ED may be subsequently admitted to the hospital or transferred back to the community for community care.

A careful assessment of pneumonia severity is required in all patients presenting with CAP.

An appropriate validated objective measure of pneumonia severity refers to use of the CORB² and SMART-COP^{3,4} or other validated objective measures of severity. The tool(s) used for severity assessment may be determined at a hospital level, but should be endorsed by the drug and therapeutics committee or other appropriate committee. Pneumonia severity should be objectively assessed and explicitly documented prior to administration of antibiotics.

Validated means the tool has been tested for inter-rater reliability when used according to specific instructions.

Assessed means there is explicit documentation in the medical record of the tool used and the resultant score.

Data collection for local use

Please refer to the section *Using the National Quality Use of Medicines Indicators for Australian Hospitals* for guidance on sample selection, sample size, measurement frequency and other considerations.

Inclusion criteria: Patients aged 18 years and over presenting to the ED or directly admitted to hospital with CAP.

Exclusion criteria: Nil.

Recommended data sources: Medical records including emergency department records.

The data collection tool for QUM Indicator 2.4 assists data collection and indicator calculation.

Data collection for inter-hospital comparison

This indicator may be suitable for inter-hospital comparison. In this case, definitions, sampling methods and guidelines for audit and reporting need to be agreed in advance in consultation with the coordinating agency.

Indicator calculation

$$\frac{\text{Numerator}}{\text{Denominator}} \times 100\%$$

Numerator = Number of adult patients with CAP that were assessed using an appropriate validated objective measure of pneumonia severity

Denominator = Number of patients presenting with CAP in sample

Limitations and interpretation

The objective assessment tools described in this indicator have been validated for use in adults, but are not suitable for use in children. Paediatric patients are therefore excluded from this indicator, although the systematic assessment of pneumonia severity remains important in these patients.

CAP scoring systems assist stratification of pneumonia severity and together with clinical judgment can guide management, including the selection of empirical antibiotic therapy. See *Indicator 2.5: Percentage of patients presenting with community acquired pneumonia that are prescribed guideline concordant antibiotic therapy* for further information regarding appropriate antibiotic therapy. It is recommended that Indicators 2.4 and 2.5 are collected concurrently where possible.

Further information

Medication Safety Self Assessment for Australian Hospitals⁵ (MSSA) can help identify potential strategies for improvement with this and other indicators. The MSSA encourages development of robust systems for safe prescribing, dispensing, administration and monitoring of medicines. The MSSA is available at www.cec.health.nsw.gov.au

This indicator can be used to assist hospitals in meeting the National Safety and Quality Health Service Standard 1 [items 1.2.1, 1.2.2, 1.5.2, 1.6.1, 1.6.2, 1.8.1], Standard 3 [items 3.1.1, 3.4.1, 3.4.2, 3.4.3, 3.14.3, 3.14.4] and Standard 4 [items 4.2.1, 4.2.2, 4.5.1, 4.5.2].⁹

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2. Buisson KL, Thursky KA, Black JF, et al. Identifying severe community-acquired pneumonia in the emergency department: a simple clinical prediction tool. *Emerg Med Australas* 2007; 19: 418-426.
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4. Robins-Browne KL, Cheng AC, Thomas KA, et al. The SMART-COP score performs well for pneumonia risk stratification in Australia's Tropical Northern Territory: a prospective cohort study. *Trop Med Int Health* 2012; 17(7): 914-919.
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6. Australian Commission on Safety and Quality in Health Care. National Safety and Quality Health Service Standards. Sydney, ACSQHC, 2012.

2.5 Percentage of patients presenting with community acquired pneumonia that are prescribed guideline concordant antibiotic therapy

Purpose

This indicator addresses the effectiveness of processes that encourage appropriate antibiotic selection in patients with community acquired pneumonia (CAP).

Background and evidence

Antibiotic prescribing for patients who present to hospital with CAP is often not concordant with Australian guidelines.¹ In adults, validated severity assessment tools²⁻⁴ can be used to help select the most appropriate empirical antibiotic therapy and determine which patients may be candidates for outpatient treatment or intensive respiratory or vasopressor support.⁵ In children appropriate choice of antibiotics is usually determined after consideration of age and clinically assessed severity.⁵

The Therapeutic Guidelines: Antibiotic⁵ (TG) gives recommendations for treatment of CAP in general patient populations. Specific advice regarding antibiotic treatment of CAP is also given for: populations in some regions of tropical Australia; patients in rural and remote areas; patients at risk of *Burkholderia pseudomallei* and *Acinetobacter baumannii*; patients with Gram-negative bacilli in sputum/blood and patients hypersensitive to penicillin.

Key definitions

Patients presenting with community acquired pneumonia refers to patients of all ages who present to the emergency department (ED) or are directly admitted to the hospital with CAP. Patients presenting to ED may be subsequently admitted to the hospital or transferred back to the community for community care.

Guideline concordant antibiotic therapy refers to concordance with the latest version of the TG.

In some hospitals, local infection and resistance patterns may justify the use of guidelines that differ from the TG. In this case, locally endorsed guidelines must be evidence-based, systematically developed, and approved for local use by the hospital's drug and therapeutics committee in order to be a suitable alternative to the TG.

Data collection for local use

Please refer to the section *Using the National Quality Use of Medicines Indicators for Australian Hospitals* for guidance on sample selection, sample size, measurement frequency and other considerations.

Inclusion criteria: Adult, and paediatric patients who present to the ED or are directly admitted to the hospital with CAP.

Exclusion criteria: Nil.

Recommended data sources: Medical records and medication charts.

The data collection tool for QUM Indicator 2.5 assists data collection and indicator calculation.

Data collection for inter-hospital comparison

This indicator may be suitable for inter-hospital comparison. In this case, definitions, sampling methods and guidelines for audit and reporting need to be agreed in advance in consultation with the coordinating agency.

Indicator calculation

$$\frac{\text{Numerator}}{\text{Denominator}} \times 100\%$$

Numerator = Number of patients presenting with CAP that are prescribed guideline concordant antibiotic therapy

Denominator = Number of patients presenting with CAP in sample

Limitations and interpretation

At times there may be clinical reasons for prescribing a different antibiotic to that recommended by guidelines. Determining such circumstances retrospectively is complicated and requires clinical judgement. Since this is likely to apply for only a small number of patients these instances are not accounted for. Where there is concern about results, it may be appropriate to look more closely at these details.

Choice of antibiotic therapy and place of treatment should be guided by an objective assessment of pneumonia severity. For further information regarding CAP severity assessment, see *Indicator 2.4: Percentage of adult patients with community acquired pneumonia that are assessed using an appropriate validated objective measure of pneumonia severity*. It is recommended that Indicators 2.4 and 2.5 are collected concurrently where possible.

Further information

Medication Safety Self Assessment for Australian Hospitals⁶ (MSSA) can help identify potential strategies for improvement with this and other indicators. The MSSA encourages development of robust systems for safe prescribing, dispensing, administration and monitoring of medicines. The MSSA is available at www.cec.health.nsw.gov.au

This indicator can be used to assist hospitals in meeting the National Safety and Quality Health Service Standard 1 [items 1.2.1, 1.2.2, 1.5.2, 1.6.1, 1.6.2, 1.7.2], Standard 3 [items 3.1.1, 3.1.2, 3.4.1, 3.4.2, 3.4.3, 3.14.1, 3.14.3, 3.14.4] and Standard 4 [items 4.2.1, 4.2.2, 4.5.1, 4.5.2].⁷

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3. Charles PG, Wolfe R, Whitby M, et al. SMART-COP: a tool for predicting the need for intensive respiratory or vasopressor support in community-acquired pneumonia. *Clin Infect Dis* 2008; 47: 375-384.
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7. Australian Commission on Safety and Quality in Health Care. National Safety and Quality Health Service Standards. Sydney, ACSQHC, 2012.

3.1 Percentage of patients whose current medicines are documented and reconciled at admission

Purpose

This indicator addresses the effectiveness of processes that promote continuity of care in medicines management.

Background and evidence

Adverse medicine events are commonly caused by lack of effective communication about medicines management, especially in the transition between the community and hospital setting.¹ Medication reconciliation is one of the Australian Pharmaceutical Advisory Council Guiding Principles to Achieve Continuity in Medication Management.² It is an essential component of effective clinical handover and involves verifying the list of medicines a patient is currently taking, identifying variances, and rectifying medication discrepancies at interfaces of care. The purpose is to avoid errors of transcription, omission, duplication of therapy, medicine-medicine and medicine-disease interactions and other errors that may result in adverse medicine events.³

The judicious and appropriate choice of treatment during hospitalisation is more likely when reference can be made to a complete and accurate list of the medicines a patient was taking prior to admission. Thus reconciliation should take place as early as possible after admission so that informed prescribing decisions can be made.

Key definitions

Patients refers to all patients admitted for at least 24 hours.

Current medicines refers to all medicines taken prior to admission including complementary medicines and non-prescribed treatments.

Medication reconciliation is a formal process of obtaining and verifying a complete and accurate list of each patient's current medicines, **matching** the medicines the patient should be prescribed to those they are **actually** prescribed. Where there are discrepancies, these are discussed with the prescriber and reasons for changes to therapy are documented. When care is transferred (e.g. between wards, hospitals or home), a current and accurate list of medicines, including reasons for change is provided to the person taking over the patient's care.⁴

The steps involved are listed in Table 1.

The process and documentation for these steps should be determined by each institution with clear designation of roles and responsibilities and standard documentation of processes irrespective of professional discipline.

Documented means the steps that have been undertaken are explicitly documented in the medical record. Documentation may include use of the dedicated area on the NIMC or other purpose-designed form or medicines management plan, which ultimately forms part of the medical record. If used they should be dated and signed.

At admission means this documentation is completed by the end of the next calendar day after admission. Reconciliation performed at a pre-admission clinic is acceptable.

Table 1. The steps involved in the process of medication reconciliation⁵

1. Obtain a best possible medication history	<p>Using information from patient interviews, GP referrals and other sources, compile a comprehensive list of the patient's current medicines. Include prescription, over-the-counter and complementary medicines and information about the medicine's name (both active ingredient and brand names), strength, dose, dose form, frequency and route; recent changes to treatment; and previous adverse drug reactions.</p> <p>This medication history, sometimes referred to as a Best Possible Medication History (BPMH), should involve a patient medication interview, where possible. The BPMH is different and more comprehensive than a routine primary medication history, which is often a quick medication history.</p>
2. Confirm the accuracy of the history	<p>Use a second source to confirm the information obtained, and ensure you have the best possible medication history. Verification of medication information can include:</p> <ul style="list-style-type: none"> • reviewing the patient's medicines list • inspection of medicine containers • contacting community pharmacists and GPs, with the patient's consent • communicating with carers or the patient's family members • reviewing previous patient health records.
3. Reconcile the history with prescribed medicines	<p>Compare the patient's medication history with their prescribed inpatient treatment. Check that these match, or that any changes are clinically appropriate.</p> <p>Where there are discrepancies, discuss these with the prescriber and ensure that the reasons for changes to therapy are documented e.g. atenolol ceased prior to surgery.</p>
4. Supply accurate medicines information	<p>When patients are transferred between wards, hospitals or to their home or residential care facility, ensure that the person taking over their care is supplied with an accurate and complete list of the patient's medicines.</p> <p>Ensure that the care provider, patient and/or their carer are also provided with information about any changes that have been made to medicines.</p>

Data collection for local use

Please refer to the section *Using the National Quality Use of Medicines Indicators for Australian Hospitals* for guidance on sample selection, sample size, measurement frequency and other considerations.

Inclusion criteria: Current adult, paediatric and neonatal inpatients.

Exclusion criteria: Patients admitted to hospital for less than 24 hours, trauma patients and patients admitted direct to ICU.

Recommended data sources: Discharge documentation, medication charts, medication management or reconciliation forms and medical records.

The data collection tool for QUM Indicator 3.1 assists data collection and indicator calculation.

Data collection for inter-hospital comparison

This indicator may be suitable for inter-hospital comparison. In this case, definitions, sampling methods and guidelines for audit and reporting need to be agreed in advance in consultation with the coordinating agency.

Indicator calculation

$$\frac{\text{Numerator}}{\text{Denominator}} \times 100\%$$

Numerator = Number of patients whose current medicines are documented and reconciled at admission

Denominator = Number of patient records in sample

Limitations and interpretation

Data collection for this indicator relies on documentation that medication reconciliation has occurred. In the absence of a purpose-designed form, such as a medication management plan, documentation of the reconciliation process is likely to be limited. Good documentation supports quality patient care⁶ and poor communication can result in adverse drug events.⁷ Thus it is assumed that absence of explicit documentation means that medication reconciliation did not take place. The indicator assesses the frequency with which medication reconciliation occurs; it does not look at the quality of the process itself. It is recommended that the quality of the medication reconciliation process is assessed and staff performing medication reconciliation undergo regular competency assessment to ensure that the process is consistently carried out to a high standard.

This indicator does not examine reconciliation at other points of transition, or communication of medication information to subsequent care providers. Medication reconciliation is only complete when reconciliation occurs at all transition points, including discharge. It may be useful to collect this indicator concurrently with:

- *Indicator 5.3: Percentage of discharge summaries that include medication therapy changes and explanations for changes*
- *Indicator 5.8: Percentage of patients whose discharge summaries contain a current, accurate and comprehensive list of medicines*
- *Indicator 5.9: Percentage of patients who receive a current, accurate and comprehensive medication list at the time of hospital discharge.*

Further information

The Australian Commission on Safety and Quality in Health Care medication reconciliation web page includes information on the process of medication reconciliation and resources to support its implementation

www.safetyandquality.gov.au/our-work/medication-safety/medication-reconciliation

Use of a medication management plan (MMP) or similar form can improve the accuracy of information recorded on admission and assist with medication reconciliation at transitions of care. A national MMP and tools to support implementation are also available from the Australian Commission on Safety and Quality in Health Care web site at www.safetyandquality.gov.au/our-work/medication-safety/medication-reconciliation/nmmp/

Medication Safety Self Assessment for Australian Hospitals⁸ (MSSA) can help identify potential strategies for improvement with this and other indicators.

The MSSA encourages development of robust systems for safe prescribing, dispensing, administration and monitoring of medicines. The MSSA is available at www.cec.health.nsw.gov.au

This indicator can be used to assist hospitals in meeting the National Safety and Quality Health Service Standard 1 [items 1.2.1, 1.2.2, 1.5.2, 1.6.1, 1.6.2], Standard 4 [items 4.2.1, 4.2.2, 4.5.1, 4.5.2, 4.6.1, 4.8.1, 4.12.1, 4.12.3, 4.12.4] and Standard 6 [items 6.1.1, 6.2.1, 6.3.1].⁹

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3.2 Percentage of patients whose known adverse drug reactions are documented on the current medication chart

Purpose

This indicator addresses the effectiveness of processes to prevent further harm from known adverse drug reactions.

Background and evidence

An adverse drug reaction (ADR) is defined as: “a response to a medicinal product which is noxious and unintended and which occurs at doses normally used in man for the prophylaxis, diagnosis or therapy of disease or for the restoration, correction or modification of physiological function”.¹ This includes, but is not limited to, allergy and anaphylaxis to medicines.

The purpose of ADR documentation is to avoid further harm to patients who have previously experienced an ADR to that (or a similar) medicine. A literature review of medication safety in Australia identified a significant gap in the communication of ADRs to patients and other healthcare professionals in the acute health care sector.²

The Australian National Inpatient Medication Chart (NIMC) was introduced in 2006 as a strategy to improve the safe use of medicines. An audit of the NIMC in 2012 demonstrated that completion of ADR documentation occurred in 79% of the NIMCs.³ This same study showed that, of those patients with previous documentation of an ADR, 11% were prescribed a medicine of a similar class. Another study showed that prescribing errors involving selection of a medicine to which a patient had had a previous ADR, decreased following implementation of the NIMC from 11.3% of patients to 4.6% ($p=0.021$).⁴ Prevention of such errors depends on current and complete information being available at the time of prescribing, dispensing and administration.⁵

Key definitions

Known adverse drug reactions refers to any ADR identified before or during the current admission that has been recorded in the medical record. Any ADR that may influence future therapeutic decision making, whether it involves a prescription medicine (including vaccines), over-the-counter medicine or complementary medicine, should be documented.

Documented means the dedicated space on the current medication chart (defined below) has been completed in a way that is consistent with instructions in the NPS MedicineWise National Inpatient Medication Chart online training course, as follows:

- if there are no known ADRs this should be documented on the medication chart as “nil known”
- if no information is known about the patient’s ADR status, for example if the patient is unable to communicate, this should be documented as “unknown”
- where previous reactions are known, the reaction, type and date should be explicitly documented. If the reaction type or date is unknown, this should be explicitly documented. If there is not enough space to explain the reaction type or date in full, a note should be made to refer to the patient’s medical record for more detail.

The current medication chart refers to the NIMC or other chart approved for use by the hospital drug and therapeutics committee.

Data collection for local use

Please refer to the section *Using the National Quality Use of Medicines Indicators for Australian Hospitals* for guidance on sample selection, sample size, measurement frequency and other considerations.

Inclusion criteria: Current adult, paediatric and neonatal inpatients.

Exclusion criteria: Nil.

Recommended data sources: Medication charts.

The data collection tool for QUM Indicator 3.2 assists data collection and indicator calculation.

Data collection for inter-hospital comparison

This indicator may be suitable for inter-hospital comparison. In this case, definitions, sampling methods and guidelines for audit and reporting need to be agreed in advance in consultation with the coordinating agency.

Indicator calculation

$$\frac{\text{Numerator}}{\text{Denominator}} \times 100\%$$

Numerator = Number of patients whose known ADRs are documented on the current medication chart

Denominator = Number of patients in sample

Limitations and interpretation

Data collection for this indicator relies on documentation of ADRs on the medication chart and in the medical record. Good documentation supports quality patient care⁶ and is a critical component of management. Poor communication can result in adverse medicine events.⁷

Recording a detailed medication history at admission is a critical step in determining the accuracy and completeness of the list of known ADRs. This indicator does not assess the accuracy of the list of known ADRs documented in the medical record, but rather focuses on availability of complete documentation at the point of prescribing, dispensing and administration, i.e. on the medication chart.

Further information

For more information about documentation of ADRs on the NIMC see the NIMC User Guide, available at www.safetyandquality.gov.au/our-work/medication-safety/medication-chart/support-material/ and NPS MedicineWise National Inpatient Medication Chart online training course, available at <http://learn.nps.org.au>

Guidelines for detailed medication history taking and ADR management have been published by the Society of Hospital Pharmacists of Australia.⁸

Medication Safety Self Assessment for Australian Hospitals⁹ (MSSA) can help identify potential strategies for improvement with this and other indicators. The MSSA encourages development of robust systems for safe prescribing, dispensing, administration and monitoring of medicines. The MSSA is available at www.cec.health.nsw.gov.au

This indicator can be used to assist hospitals in meeting the National Safety and Quality Health Service Standard 1 [items 1.2.1, 1.2.2, 1.5.2, 1.6.1, 1.6.2, 1.8.1] and Standard 4 [items 4.1.1, 4.2.1, 4.2.2, 4.4.2, 4.5.1, 4.5.2, 4.6.1, 4.7.1, 4.7.2] and Standard 6 [items 6.1.1, 6.2.1, 6.3.1].¹⁰

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9. Medication Safety Self Assessment for Australian Hospitals: Institute for Safe Medication Practices USA (Adapted for Australian use by NSW Therapeutic Advisory Group and the Clinical Excellence Commission), 2007.
10. Australian Commission on Safety and Quality in Health Care. National Safety and Quality Health Service Standards. Sydney, ACSQHC, 2012.

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3.3 Percentage of medication orders that include error-prone abbreviations

Purpose

This indicator assesses the effectiveness of processes that encourage clear and unambiguous communication of medication orders.

Background and evidence

One of the major causes of medication errors is the use of potentially dangerous abbreviations in prescribing.¹ An abbreviation used by a prescriber may mean something quite different to the person interpreting the prescription. Abbreviations may not only be misunderstood but can also be combined with other words or numerals to appear as something altogether unintended. Although using abbreviations may seem to be a timesaving convenience, use of abbreviations does not promote patient safety.²

In 2006, the Institute for Safe Medication Practices (ISMP) and the US Food and Drug Administration (FDA) launched an educational campaign to help eliminate use of

error-prone abbreviations in prescribing.³ The aim of the campaign was to promote safe practices among those who communicate medical information.

Following this, the NSW TAG SAFER Medicines Group developed a comprehensive list of error-prone abbreviations for NSW public hospitals. This list has now been adopted by the Australian Commission on Safety and Quality in Health Care (ACSQHC) and in 2008 the Australian Health Ministers endorsed standard prescribing terminology, abbreviations and symbols for use in all Australian hospitals.⁴

Key definitions

Error-prone abbreviations relevant to this indicator and their acceptable alternatives are outlined below:

Error-prone abbreviation	Intended meaning	Why?	What should be used?
µg, mcg or ug	microgram	Mistaken as 'mg'	microgram, microg
U or u	unit	Mistaken as the numbers '0' or '4', causing a 10-fold overdose or greater (eg 4U seen as '40' or 4u seen as '44'). Mistaken as 'cc' so dose given as a volume instead of units (eg 4u seen as 4 cc)	unit
No leading zero before a decimal point (eg .5mg)	0.5mg	Mistaken as 5mg if the decimal point is not seen	Use zero before a decimal point when the dose is less than a whole unit
Trailing zero after decimal point (eg 1.0mg)	1mg	Mistaken as 10mg if the decimal point is not seen	Do not use trailing zeros for doses expressed in whole numbers
qd or QD	every day	Mistaken as 'Qid', especially if the period after the 'q' or the tail of the 'q' is misunderstood as an 'i'	daily
o.d. or OD	once daily	Mistaken as 'right eye' (OD-oculus dexter), leading to oral liquid medicines administered in the eye. Can also be mistaken for BD (twice daily)	'daily', preferably specifying the time of the day, eg 'morning', 'mid-day', 'at night'

Data collection for local use

Please refer to the section *Using the National Quality Use of Medicines Indicators for Australian Hospitals* for guidance on sample selection, sample size, measurement frequency and other considerations.

Inclusion criteria: Medication orders of adult, paediatric and neonatal inpatients.

Exclusion criteria: Nil.

Recommended data sources: Medication charts.

For the patients selected for audit, all current medication orders on all current medication charts should be audited.

The data collection tool for QUM Indicator 3.3 assists data collection and indicator calculation.

Data collection for inter-hospital comparison

This indicator may be suitable for inter-hospital comparison. In this case, definitions, sampling methods and guidelines for audit and reporting need to be agreed in advance in consultation with the coordinating agency.

Indicator calculation

$$\frac{\text{Numerator}}{\text{Denominator}} \times 100\%$$

Numerator = Number of medication orders that include error-prone abbreviations

Denominator = Number of medication orders in sample

Limitations and interpretation

This indicator does not measure the use of error-prone abbreviations other than those specified. Other error-prone abbreviations should also be avoided.

Hospitals may choose to audit the use of other error-prone abbreviations, symbols or terminology according to locally agreed priorities, for example the use of abbreviated names of medicines.

Further information

The National Terminology, Abbreviations and Symbols to be Used in the Prescribing and Administering of Medicines in Australian Hospitals is available at

<http://www.safetyandquality.gov.au/wp-content/uploads/2012/01/32060v2.pdf>

Medication Safety Self Assessment for Australian Hospitals⁵ (MSSA) can help identify potential strategies for improvement with this and other indicators.

The MSSA encourages development of robust systems for safe prescribing, dispensing, administration and monitoring of medicines. The MSSA is available at www.cec.health.nsw.gov.au

This indicator can be used to assist hospitals in meeting the National Safety and Quality Health Service Standard 1 [items 1.2.1, 1.2.2, 1.5.2, 1.6.1, 1.6.2] and Standard 4 [items 4.1.1, 4.2.1, 4.2.2, 4.4.2, 4.5.1, 4.5.2].⁶

References

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2. Dunn E and Wolfe J. Let go of Latin! Vet Hum Toxicol 2001; 43: 235-236.
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3.4 Percentage of paediatric medication orders that include the correct dose per kilogram (or body surface area) AND an effective and safe total dose

Purpose

This indicator addresses the effectiveness of processes that encourage effective and safe medication ordering for paediatric patients.

Background and evidence

Incorrect dosing is the most common medication error reported in paediatric patients.^{1,2} Some reasons why paediatric patients are particularly predisposed to risk of medication error and subsequently of morbidity and mortality from medication error include:³

- the different and changing pharmacokinetic parameters of paediatric patients
- the need for calculation of individualised doses based on a weight or body surface area (BSA)
- lack of ready access to high quality information regarding safety and efficacy of medicines in paediatric patients.

Therefore, the intended dose per kilogram (or dose per BSA) and the total dose calculated using an accurate weight (or BSA) should appear on all orders for paediatric patients.³

Key definitions

Paediatric refers to all patients aged up to 18 years.

Medication orders refers to all medicines that require weight-based or BSA-based dose calculations. Creams, drops and other medicines that do not require such dosing are not included. In older paediatric patients, weight-based dosing may not be needed. See following information.

The correct dose per kilogram (or body surface area)

is the intended dose, usually expressed as mg/kg or mg/m², and should be determined with reference to the paediatric prescribing information resource(s) endorsed for local use by the drug and therapeutics committee (DTC). It should be recorded in the dedicated area of the Paediatric National Inpatient Medication Chart (PNIMC) or other chart approved for paediatric use by the DTC.

An effective and safe total dose means within the effective and safe dose range based on patient age and weight (or BSA) as recommended by the paediatric prescribing information resource(s) endorsed for local use by the DTC. It should be recorded in the main order box of the PNIMC or other chart approved for use by the DTC.

Note:

- In obese children, use of ideal weight may be more appropriate for some medicines (check paediatric prescribing information resource(s) for specific guidance).
- In older paediatric patients (or those over 40–50 kg) care should be taken to ensure that the upper dose limit for adults is not exceeded.

Data collection for local use

Please refer to the section *Using the National Quality Use of Medicines Indicators for Australian Hospitals* for guidance on sample selection, sample size, measurement frequency and other considerations.

Inclusion criteria: Medication orders for paediatric inpatients. For the patients selected for audit, all current medication orders on all current medication charts should be audited.

Exclusion criteria: Medication orders that do not require weight or BSA dose calculations.

Recommended data sources: Medication charts.

The data collection tool for QUM Indicator 3.4 assists data collection and indicator calculation.

Data collection for inter-hospital comparison

This indicator may be suitable for inter-hospital comparison. In this case, definitions, sampling methods and guidelines for audit and reporting need to be agreed in advance in consultation with the coordinating agency.

Indicator calculation:

$$\frac{\text{Numerator}}{\text{Denominator}} \times 100\%$$

Numerator = Number of paediatric medication orders that include the correct dose per kilogram (or body surface area) AND an effective and safe total dose

Denominator = Number of medication orders in sample

Limitations and interpretation

Calculating doses based on weight or BSA can be problematic in overweight or older paediatric patients with resultant doses exceeding the safe adult dose range. Caution needs to be applied in these situations.

Further information

Training on safe prescribing for paediatrics is included in a designated module of the NPS MedicineWise National Inpatient Medication Chart online training course, available at <http://learn.nps.org.au>

Medication Safety Self Assessment for Australian Hospitals⁴ (MSSA) can help identify potential strategies for improvement with this and other indicators. The MSSA encourages development of robust systems for safe prescribing, dispensing, administration and monitoring of medicines. The MSSA is available at www.cec.health.nsw.gov.au

This indicator can be used to assist hospitals in meeting the National Safety and Quality Health Service Standard 1 [items 1.2.1, 1.2.2, 1.5.2, 1.6.1, 1.6.2] and Standard 4 [items 4.2.1, 4.2.2, 4.4.2, 4.5.1, 4.5.2].⁵

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5. Australian Commission on Safety and Quality in Health Care. National Safety and Quality Health Service Standards. Sydney, ACSQHC, 2012.

3.5 Percentage of medication orders for intermittent therapy that are prescribed safely

Purpose

This indicator assesses the effectiveness of processes that encourage clear and unambiguous communication of medication orders.

Background and evidence

Australian and overseas incident monitoring systems continue to report adverse outcomes involving medicines intended to be administered intermittently at regular intervals longer than one day that are inadvertently administered daily. Examples include daily administration of oral methotrexate when weekly dosing was intended. Some cases have resulted in fatalities.¹ Similarly, adverse outcomes have occurred when fentanyl patches were administered every 24 hours when dosing every 72 hours was intended.²

Key definitions

Intermittent therapy refers to medicine that is intended to be administered at regular intervals, but less frequently than daily. Examples of medicines administered intermittently include bisphosphonates (e.g. alendronate), cytotoxics (e.g. oral methotrexate), transdermal opioids (e.g. buprenorphine or fentanyl patches) and depot antipsychotics.

Prescribed safely means that the day or days of the week the medicine is to be administered is stated in the order (e.g. Wednesday) AND the days of the week where the medicine is not to be administered are crossed out in the administration section of the medication chart.

Data collection for local use

Please refer to the section *Using the National Quality Use of Medicines Indicators for Australian Hospitals* for guidance on sample selection, sample size, measurement frequency and other considerations.

Inclusion criteria: Medication orders for intermittent therapy of adult, paediatric and neonatal inpatients. Data may be collected on all medicines prescribed intermittently or on specific medicines or medicine groups, depending on the collection setting.

Exclusion criteria: Nil.

Recommended data sources: Medication charts.

The data collection tool for QUM Indicator 3.5 assists data collection and indicator calculation.

Data collection for inter-hospital comparison

This indicator may be suitable for inter-hospital comparison. In this case, definitions, sampling methods and guidelines for audit and reporting need to be agreed in advance in consultation with the coordinating agency.

Indicator calculation

$$\frac{\text{Numerator}}{\text{Denominator}} \times 100\%$$

Numerator = Number of medication orders for intermittent therapy that are prescribed safely

Denominator = Number of medication orders for intermittent therapy in sample

Limitations and interpretation

This indicator does not assess safe prescribing of intermittent therapy in terms of dose level but it assesses the ability of a prescriber to clearly communicate a required interval of longer than 24 hours for any medicine to be given by any route of administration.

Further information

Clear instructions on how to prescribe for intermittent dosing are given in the National Inpatient Medication Chart User Guide³, available at www.safetyandquality.gov.au/publications/national-inpatient-medication-chart-user-guide-including-paediatric-versions

Prescribing of intermittent dosing schedules is included in the NPS MedicineWise National Inpatient Medication Chart online training course, available at <http://learn.nps.org.au>

Medication Safety Self Assessment for Australian Hospitals⁴ (MSSA) can help identify potential strategies for improvement with this and other indicators. The MSSA encourages development of robust systems for safe prescribing, dispensing, administration and monitoring of medicines. The MSSA is available at www.cec.health.nsw.gov.au

This indicator can be used to assist hospitals in meeting the National Safety and Quality Health Service Standard 1 [items 1.2.1, 1.2.2, 1.5.2, 1.6.1, 1.6.2] and Standard 4 [items 4.2.1, 4.2.2, 4.4.2, 4.5.1, 4.5.2, 4.11.1].⁵

References

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3.6 Percentage of patients receiving cytotoxic chemotherapy whose treatment is guided by a hospital approved chemotherapy treatment protocol

Purpose

This indicator addresses effectiveness of processes that encourage safe prescription and management of complex high risk medicines such as cytotoxic chemotherapy.

Background and evidence

Cytotoxic chemotherapy is commonly associated with adverse medication incidents in hospitals.¹ Use of detailed treatment protocols is one way to reduce non-evidence-based variation and to standardise care, both of which are fundamental principles for improving patient safety.²

A chemotherapy protocol should provide details of the cytotoxic and related medicines to be administered on each day of a particular chemotherapy cycle as well as recommendations for safe chemotherapy administration. Ideally a protocol should also specify guidelines for dose calculations, supportive therapy, monitoring parameters and criteria for dose modification.

Protocols, whether printed or electronic, are a form of decision support² and have been shown to improve medicine use generally.³ With specific regard to cancer care, implementation of guidelines, pathways and protocols has reduced variation and improved quality of care,⁴ reduced length of stay and complication rates,⁵ and improved survival.⁶

Printed or electronic copies of the relevant protocol should be available for reference at the point of prescribing, dispensing and administration. Checklists or flowcharts may be used to guide concordance with protocols. Variations from the protocol should be documented.

Key definitions

Guided by a hospital approved chemotherapy treatment protocol means there is clear and explicit documentation of relevant protocol details available to practitioners at the point of prescribing, dispensing and administration of chemotherapy. In particular this means that:

- the name of the intended chemotherapy protocol is clearly and explicitly documented on the chemotherapy medication chart where medication orders and administration records are documented or in another predetermined place in the medical record.
- individual cytotoxic agents are prescribed in accordance with the named protocol for each specific day of the cycle.
- the patient's body surface area (BSA) or height and weight (for BSA calculation) are recorded with the medication order.
- the final prescribed doses of cytotoxic medicines are within a safe range based on patient BSA and protocol guidelines.

Hospital approved chemotherapy treatment protocol means that the treatment protocol has been developed by an expert multidisciplinary team and has been approved by the drug and therapeutics committee or other appropriate committee. Alternatively standard peer-reviewed protocols such as those from the Cancer Institute NSW⁷ or National Health and Medical Research Council⁸ may be approved for use.

Data collection for local use

Please refer to the section *Using the National Quality Use of Medicines Indicators for Australian Hospitals* for guidance on sample selection, sample size, measurement frequency and other considerations.

Inclusion criteria: Adult, paediatric and neonatal inpatients or outpatients who have commenced a cycle of chemotherapy.

Exclusion criteria: Nil.

Recommended data sources: Medication charts and medical records.

The data collection tool for QUM Indicator 3.6 assists data collection and indicator calculation.

Data collection for inter-hospital comparison

This indicator may be suitable for inter-hospital comparison. In this case, definitions, sampling methods and guidelines for audit and reporting need to be agreed in advance in consultation with the coordinating agency.

Indicator calculation

$$\frac{\text{Numerator}}{\text{Denominator}} \times 100\%$$

Numerator = Number of patients starting a cycle of chemotherapy whose treatment was guided by a hospital approved protocol

Denominator = Number of patients starting a cycle of chemotherapy in sample

Limitations and interpretation

Data collection for this indicator relies on documentation in the medical record. Good documentation supports quality patient care⁹ and is a critical component of management with potentially toxic medicines such as cytotoxic chemotherapy. Poor communication can result in adverse medicine events.¹⁰

Ideally, concordance with all aspects of the protocol should be evaluated. However, complex therapy is often difficult to evaluate, especially retrospectively, and identifying deviations from protocol may require specialist clinical knowledge. This indicator therefore only measures concordance with some key aspects of chemotherapy protocol use that form the basis of a safe management process. Other components that could be assessed in a more detailed review include:

- requirements for patient monitoring before and after chemotherapy, including blood counts, biochemistry, screening tests and other protocol specific parameters are complied with and dose modifications are made according to protocol
- concordance with administration recommendations
- concordance with protocol recommendations for use of adjuvant and supportive medicines.

Further information

Cancer Institute NSW Standard Cancer Treatments (eviQ) protocols are available from www.eviq.org.au. Clinical practice guidelines relating to cancer are available via the National Health and Medical Research Council website at www.nhmrc.gov.au/guidelines/publications/subject/Cancer

Medication Safety Self Assessment for Australian Hospitals¹¹ (MSSA) can help identify potential strategies for improvement with this and other indicators. The MSSA encourages development of robust systems for safe prescribing, dispensing, administration and monitoring of medicines. The MSSA is available at www.cec.health.nsw.gov.au

This indicator can be used to assist hospitals in meeting the National Safety and Quality Health Service Standard 1 [items 1.2.1, 1.2.2, 1.5.2, 1.6.1, 1.6.2, 1.7.2] and Standard 4 [items 4.2.1, 4.2.2, 4.5.1, 4.5.2, 4.11.1].¹²

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4.1 Percentage of postoperative patients whose pain intensity is documented using an appropriate validated assessment tool

Purpose

This indicator addresses the effectiveness of processes for appropriate postoperative pain management.

Background and evidence

It is well documented that there are a number of benefits to be gained through the optimisation of acute postoperative pain management.¹ Patient expectations of postoperative pain are high and satisfaction with its management is varied. Australian data indicates that a significant number of postoperative patients are still in moderate to severe pain after discharge. Acute postoperative pain management is an area of interest for many health professionals, specifically in the choice, dosing, timing and efficacy of prescribed analgesia, which remains a practice gap.²

It is reasonable to expect that every surgical patient will be asked at least once about pain even after a procedure that is not expected to be painful.

Assessment of pain in conjunction with routine patient observations ("the fifth vital sign") has been shown to be useful in some clinical settings.³ Assessing postoperative pain management and identifying a patient's current level of pain enables clinicians to choose appropriate pharmacotherapy where necessary, prioritise management, and assess changes in the patient's condition.^{4,5} Monitoring acute pain management using indicators has been recommended by the American Pain Society.^{5,6} It is recommended that choice of pain assessment tools is approved by an appropriate committee that includes pain management experts and that pain scales are standardised across the hospital where possible. It may be useful to build validated pain scales into all routine observation charts.

Key definitions

Postoperative patients refers to all patients admitted for a surgical procedure, including patients admitted to day-stay units.

Pain intensity documented means that at least one postoperative pain score has been documented on the patient's observation chart or in another predetermined place in the medical record. Pain scores must be determined using an appropriate validated tool.

Appropriate means the pain assessment tool is suitable for the patient's age, language and cognitive status.⁷

Validated assessment tool means the tool has been tested for inter-rater reliability when used according to specific instructions.

There are a number of validated pain assessment tools. Examples are shown in Table 1.

Table 1. Examples of validated pain assessment tools

Validated pain tool	Usefulness	Limitations
Visual analogue scale (VAS)	Useful in a wide range of clinical environments.	Usefulness may be limited in the cognitively or visually impaired and sedated patients.
Numerical rating scale (NRS)	Can be used verbally or visually and is useful in most settings.	Usefulness may be limited in the elderly, cognitively impaired and patients with communication difficulties.
Faces rating scale (FRS) NB: A number of different versions are available	Useful for children and patients with poor language skills.	
Behavioural rating scale	Based on clinical observations thus useful in patients who are cognitively impaired, confused or who have language difficulties.	

Data collection for local use

Please refer to the section *Using the National Quality Use of Medicines Indicators for Australian Hospitals* for guidance on sample selection, sample size, measurement frequency and other considerations.

Inclusion criteria: Adult, paediatric and neonatal postoperative patients.

Exclusion criteria: Nil.

Recommended data sources: Medical records, operating theatre lists, medication charts and observation charts.

The data collection tool for QUM Indicator 4.1 assists data collection and indicator calculation.

Data collection for inter-hospital comparison

This indicator may be suitable for inter-hospital comparison. In this case, definitions, sampling methods and guidelines for audit and reporting need to be agreed in advance in consultation with the coordinating agency.

Indicator calculation

$$\frac{\text{Numerator}}{\text{Denominator}} \times 100\%$$

Numerator = Number of postoperative patients whose pain intensity is documented using an appropriate validated assessment tool

Denominator = Number of postoperative patients in sample

Limitations and interpretation

Data collection for this indicator relies on documentation of pain intensity assessment in the medical record. Good documentation supports quality patient care⁸ and is a critical component of management. Poor communication can result in adverse medicine events.⁹ Thus it is assumed that absence of explicit documentation means no pain intensity assessment took place.

This indicator does not assess frequency of pain assessment or effectiveness of analgesic management.

Pain assessment should help guide appropriate post-operative analgesia. *Indicator 4.2: Percentage of postoperative patients that are given a written pain management plan at discharge AND a copy is communicated to the primary care clinician* may also be relevant. It may be appropriate to collect Indicators 4.1 and 4.2 concurrently where possible.

Further information

For further information about validated tools for monitoring pain see:

- The NPS acute postoperative pain (APOP) drug use evaluation (DUE) toolkit¹⁰
www.nps.org.au/health-professionals/professional-development/due-programs/due-kit-for-hospitals/apop
- The Victorian Quality Council Acute Pain Management Toolkit⁴
www.health.vic.gov.au/qualitycouncil/downloads/acute/apmmt_audit_tool_guidelines.pdf

The Medication Safety Self Assessment for Australian Hospitals¹¹ (MSSA) can help identify potential strategies for improvement with this and other indicators. The MSSA encourages development of robust systems for safe prescribing, dispensing, administration and monitoring of medicines. The MSSA is available at www.cec.health.nsw.gov.au

This indicator can be used to assist hospitals in meeting the National Safety and Quality Health Service Standard 1 [items 1.2.1, 1.2.2, 1.5.2, 1.6.1, 1.6.2] and Standard 4 [items 4.2.1, 4.2.2, 4.5.1, 4.5.2, 4.11.1].¹²

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4.2 Percentage of postoperative patients that are given a written pain management plan at discharge AND a copy is communicated to the primary care clinician

Purpose

This indicator assesses the effectiveness of processes intended to ensure that patients and their caregivers receive adequate information for safe and effective medicines management following discharge or transfer to another care level.

Background and evidence

Moderate to severe pain commonly occurs in postoperative patients after transfer to community care.^{1,2} One-fifth of postoperative patients report that they did not receive analgesia at discharge and 10–14% report inadequate pain relief from analgesic medicine.¹ Additionally, pain that is not well controlled is perceived as impacting on time of recovery from surgery.¹ Ongoing postoperative pain is a risk factor for the development of chronic pain,³ and poorly controlled pain is a risk factor for myocardial infarction, pneumonia and venous thromboembolism.⁴

Educating patients about their medicines and communication about medicines management between hospital and community practitioners are guiding principles in the Australian Pharmaceutical Advisory Council Guiding Principles to Achieve Continuity in Medication Management.⁵ Recognition of the practice gap in communication of pain management at discharge was the focus of the National Prescribing Service Acute Postoperative Pain Management Drug Use Evaluation conducted in 2006.²

Key definitions

A written pain management plan should be tailored to individual needs, desires, and circumstances,⁶ and be easily understood by the patient. Details should include: medicine names, dose and frequency; planned duration of analgesia; clear instructions for pain management (e.g. instructions for managing moderate, severe or

ongoing pain and instructions for multimodal therapy); clear instructions for maximum daily doses. A copy of the plan given to the patient should be included in the medical record, or documentation made in the medical record that an individualised plan was given.

A copy is communicated to the primary care clinician means a copy of the plan is sent to the community-based health practitioner nominated by the patient, or included in the discharge summary or discharge or transfer letter. Such communication should be explicitly documented in the medical record.

Data collection for local use

Please refer to the section *Using the National Quality Use of Medicines Indicators for Australian Hospitals* for guidance on sample selection, sample size, measurement frequency and other considerations.

Inclusion criteria: Adult, paediatric and neonatal postoperative patients.

Exclusion criteria: Nil.

Recommended data sources: Medical records, operating theatre lists and discharge referral documentation.

The data collection tool for QUM Indicator 4.2 assists data collection and indicator calculation.

Data collection for inter-hospital comparison

This indicator may be suitable for inter-hospital comparison. In this case, definitions, sampling methods and guidelines for audit and reporting need to be agreed in advance in consultation with the coordinating agency.

Indicator calculation

$$\frac{\text{Numerator}}{\text{Denominator}} \times 100\%$$

Numerator = Number of postoperative patients that were given a written pain management plan at discharge AND a copy was communicated to the primary care clinician

Denominator = Number of postoperative patients in sample

Limitations and interpretation

Data collection for this indicator relies on documentation in the medical record. Good documentation supports quality patient care⁷ and is a critical component of management. Poor communication can result in adverse medicine events.⁸ Thus it is assumed that absence of explicit documentation in the medical record means a pain management plan was not provided to the patient or their primary care clinician.

This indicator does not measure the quality of the written pain management plan or whether the patient's primary care clinician actually received a copy of the plan.

Appropriate postoperative pain management is informed by regular pain assessment. *Indicator 4.1: Percentage of postoperative patients whose pain intensity is documented using an appropriate validated assessment tool* may also be relevant. It may be appropriate to collect Indicators 4.1 and 4.2 concurrently where possible.

Further information

NPS acute postoperative pain (APOP) drug utilisation evaluation (DUE) toolkit is a quality improvement tool to assist hospital surgical, anaesthetic, pharmacy and nursing staff working with surgical patients to conduct an audit of patient care in the area of acute postoperative pain. The toolkit is available at www.nps.org.au/health-professionals/cpd/activities/due-for-hospitals/acute-postoperative-pain/apop/

Medication Safety Self Assessment for Australian Hospitals⁹ (MSSA) can help identify potential strategies for improvement with this and other indicators. The MSSA encourages development of robust systems for safe prescribing, dispensing, administration and monitoring of medicines. The MSSA is available at www.cec.health.nsw.gov.au

This indicator can be used to assist hospitals in meeting the National Safety and Quality Health Service Standard 1 [items 1.2.1, 1.2.2, 1.5.2, 1.6.1, 1.6.2, 1.18.1], Standard 4 [items 4.2.1, 4.2.2, 4.5.1, 4.5.2, 4.11.1, 4.13.1, 4.13.2, 4.14.1] and Standard 6 [items 6.1.1, 6.2.1, 6.3.1, 6.4.1, 6.4.2].¹⁰

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5.1 Percentage of patients with acute coronary syndrome that are prescribed appropriate medicines at discharge

Purpose

This indicator addresses the effectiveness of processes that promote appropriate pharmacotherapy for secondary prevention of acute coronary syndromes.

Background and evidence

There is high level evidence supporting the use of anti-platelet agents, angiotensin converting enzyme inhibitors (ACEIs) or angiotensin II receptor antagonists (ARAs), beta-blockers and statins for secondary prevention of coronary heart disease.¹⁻⁵ Indicators of appropriate management of acute coronary syndromes (ACS) have previously been used in Australian hospitals⁶⁻⁸ and general practice.⁹ Improving management of patients with ACS, including appropriate ongoing medication management, has been associated with reduced mortality.^{2,10} However, despite widespread evidence, many patients admitted with ACS are not discharged on appropriate medicines.^{6,11,12}

Ensuring appropriate medication management after discharge is a guiding principle of the Australian Pharmaceutical Advisory Council Guiding Principles to Achieve Continuity in Medication Management.¹³ This indicator provides a measure of compliance with these guidelines.

Key definitions

Acute coronary syndrome refers to the following groups of conditions:¹

- ST-segment-elevation myocardial infarction (STEMI)
- Non-ST-segment-elevation acute coronary syndrome (NSTEMI)
- Unstable angina pectoris (UAP)

If one or more of these medicine classes is not prescribed for the patient on discharge then the medication regimen can only be deemed as “appropriate” if there is a documented reason in the patient’s discharge summary for omission of that class of medicine, such as a contraindication, allergy or a documented plan to initiate that class of medicine in the future.

Appropriate medicines means the patient is discharged on one (or more) of the medicines from each of the four classes of medicines shown in Table 1.^{2,14,15}

At discharge means there is documentation in the discharge summary or letter at time of transfer to community, residential care or other hospital that these medicines are to be taken on an ongoing basis. A supply of the medicines may or may not be dispensed by the hospital.

Table 1. Appropriate medicines: medicine classes and examples

Medicine class	Examples of suitable medicines available in Australia
Anti-platelet agents	aspirin, clopidogrel, prasugrel, ticagrelor
Beta-blockers	atenolol, metoprolol, propranolol OR in patients with left ventricular systolic dysfunction: carvedilol, bisoprolol, metoprolol (controlled release), nebivolol
ACEIs* OR ARAs*, **	captopril, enalapril, fosinopril, lisinopril, perindopril, quinapril, ramipril, trandolapril OR candesartan, eprosartan, irbesartan, losartan, olmesartan, telmisartan, valsartan
Statins	atorvastatin, fluvastatin, pravastatin, rosuvastatin, simvastatin

* Not all agents have been studied in post-ACS patients. However the clinical effects of the agents within each medicine class are generally considered to be similar¹⁴ and ACS guidelines do not distinguish between specific ACEIs or specific ARAs. However there may be variations in approved (licensed) indications in Australia.^{1-5,14,15}

** Guidelines recommend use of ARAs in patients who are intolerant of ACEIs.¹⁻⁵

Data collection for local use

Please refer to the section *Using the National Quality Use of Medicines Indicators for Australian Hospitals* for guidance on sample selection, sample size, measurement frequency and other considerations.

Inclusion criteria: Patients aged 18 years or over with a principle diagnosis of ACS.

Exclusion criteria: Patients receiving clinical trial medicines, patients discharged against medical advice and patients receiving palliative/end of life care.

Recommended data sources: Discharge referral documentation.

The data collection tool for QUM Indicator 5.1 assists data collection and indicator calculation.

Data collection for inter-hospital comparison

This indicator may be suitable for inter-hospital comparison. In this case, definitions, sampling methods and guidelines for audit and reporting need to be agreed in advance in consultation with the coordinating agency.

Indicator calculation

$$\frac{\text{Numerator}}{\text{Denominator}} \times 100\%$$

Numerator = Number of patients with ACS who are prescribed appropriate medicines at discharge

Denominator = Number of patients with ACS in sample

Limitations and interpretation

This indicator looks at a bundle of care, not individual medicines. However it is recommended that individual components of the indicator are also collected to inform post-audit interventions. It may also be informative to look at data for each diagnosis separately (STEMI, NSTEMI or UAP).

Evidence-based guidelines recognise the importance of dual anti-platelet therapy (DAPT) in the management of STEMI and NSTEMI patients, as well as patients who have received percutaneous coronary intervention (PCI).⁵⁻⁹ Consideration should be given to auditing the use of DAPT in these patient groups, as well as assessing documentation of the recommended duration of DAPT to ongoing care providers at discharge.

The indicator does not take into consideration evidence-based dosing of the individual medicines.

This indicator excludes patients with ACS who presented to the emergency department with UAP but were not admitted. Nevertheless, the need for appropriate ongoing medication management for these patients should not be neglected.

Further information

The Discharge Management of Acute Coronary Syndrome (DMACS) Toolkit published by NPS MedicineWise is a quality improvement tool to assist hospital staff to conduct audits of the discharge management of patients with ACS. The toolkit, including audit tool and educational resources, is available at

www.nps.org.au/health-professionals/cpd/activities/due-for-hospitals/discharge-management-of-acute-coronary-syndromes/dmacs-due/

Medication Safety Self Assessment for Australian Hospitals¹⁶ (MSSA) can help identify potential strategies for improvement with this and other indicators.

MSSA encourages development of robust systems for safe prescribing, dispensing, administration and monitoring of medicines. MSSA is available at www.cec.health.nsw.gov.au

This indicator can be used to assist hospitals in meeting the National Safety and Quality Health Service Standard 1 [items 1.2.1, 1.2.2, 1.5.2, 1.6.1, 1.6.2, 1.7.2] and Standard 4 [items 4.1.2, 4.2.2, 4.5.1, 4.5.2, 4.12.4].¹⁷

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5.2 Percentage of patients with systolic heart failure that are prescribed appropriate medicines at discharge

Purpose

This indicator addresses the effectiveness of processes that promote appropriate pharmacotherapy for systolic heart failure (HF).

Background and evidence

Medication is the foundation of evidence-based HF management. Angiotensin converting enzyme inhibitors (ACEIs) or angiotensin receptor antagonists (ARAs) and beta-blockers increase survival, reduce hospitalisations and improve symptoms in patients with systolic HF when taken according to recommendations.¹⁻⁴ However, gaps in applying HF treatment guidelines have been demonstrated in Australia.⁵⁻⁷ A similar issue has been demonstrated in international studies.⁸⁻⁹ The prescription of ACEIs/ARAs and beta-blockers at discharge from hospital has been shown to improve patient mortality and morbidity.¹⁰

ACEIs, unless not tolerated or contraindicated, are recommended for all patients with systolic HF whether symptoms are mild, moderate or severe. ARAs may be used as an alternative in patients who do not tolerate ACEIs due to kinin-mediated adverse effects (e.g. cough).¹⁻⁴ Selected beta-blockers are recommended, unless not tolerated or contraindicated, for all patients with systolic HF who remain mildly to moderately symptomatic despite appropriate doses of an ACEI.¹⁻⁴

Ensuring appropriate medication management after discharge is a guiding principle of the Australian Pharmaceutical Advisory Council Guiding Principles to Achieve Continuity in Medication Management.¹¹ This indicator provides a measure of compliance with these guidelines.

Key definitions

Systolic heart failure refers to a weakened ability of the heart to contract in systole, and is the most common type of chronic HF. It is diagnosed with a finding of a left ventricular ejection fraction (LVEF) of less than 40% on echocardiography.¹ Patients should have documentation of either their HF type or their LVEF in their discharge summary, so that the specific diagnosis is clear to ongoing care providers. For the purposes of this indicator, patients with no documentation of HF type or LVEF in their discharge summary are assumed to have systolic heart failure.

Appropriate medicines means the patient is discharged on either an ACEI or ARA and a beta-blocker. Examples of suitable medicines from each class are shown in Table 1. If one or more of these medicine classes is not prescribed for the patient on discharge then the medication regimen can only be deemed as “appropriate” if there is a documented reason in the patient’s discharge summary for omission of that class of medicine, such as a contraindication, allergy or a documented plan to initiate that class of medicine in the future.

At discharge means there is documentation in the discharge summary or letter at time of transfer to community, residential care or other hospital that these medicines are to be taken on an ongoing basis. A supply of the medicines may or may not be dispensed by the hospital.

Table 1. Appropriate medicines: medicine classes and examples

Medicine class	Examples of appropriate medicines available in Australia
ACEIs* OR ARAs*	captopril, enalapril, fosinopril, lisinopril, perindopril, quinapril, ramipril, trandolapril OR candesartan, eprosartan, irbesartan, losartan, olmesartan, telmisartan, valsartan
Beta-blockers	bisoprolol, carvedilol, metoprolol (extended release formulation), nebivolol**

* Although not all agents have been studied in HF patients the clinical effects of the agents within each drug class are generally considered to be similar.¹² Most HF guidelines do not distinguish between specific ACEIs or specific ARAs despite variations in approved (licensed) indications in Australia.^{1-4,12,13}

** Nebivolol may be considered an appropriate beta-blocker in patients aged 70 years or older.¹

Data collection for local use

Please refer to the section *Using the National Quality Use of Medicines Indicators for Australian Hospitals* for guidance on sample selection, sample size, measurement frequency and other considerations.

Inclusion criteria: Patients aged 18 years and over with either a principle or secondary diagnosis of HF (according to ICD coding).

Exclusion criteria: Patients with diastolic HF or LVEF >40% documented in the discharge summary; patients receiving clinical trial medicines; patients discharged against medical advice; and patients receiving palliative/end of life care.

Recommended data sources: Discharge referral documentation.

The data collection tool for QUM Indicator 5.2 assists data collection and indicator calculation.

Data collection for inter-hospital comparison

This indicator may be suitable for inter-hospital comparison. In this case, definitions, sampling methods and guidelines for audit and reporting need to be agreed in advance in consultation with the coordinating agency.

Indicator calculation

$$\frac{\text{Numerator}}{\text{Denominator}} \times 100\%$$

Numerator = Number of patients with systolic HF that are prescribed appropriate medicines at discharge

Denominator = Number of patients with systolic HF in sample

Limitations and interpretation

This indicator looks at a bundle of care, not individual medicines. However it is recommended that individual components of the indicator are also collected to inform post-audit interventions.

All patients with suspected HF should undergo an echocardiogram to determine the HF type and guide management.¹ The patient's LVEF or HF type should be clearly documented in the discharge summary to inform the patient's ongoing management plan. Effective communication during transitions of care is a critical component of continuity in medication management.¹¹ Furthermore, under-use of echocardiography is recognised as a gap in the current management of HF patients in Australia.¹ Therefore this indicator assumes that where an HF type or LVEF has not been explicitly documented, the type of HF has not been determined. It is recommended that the rate of undocumented LVEF or HF type is recorded to inform post-audit interventions. It may also be informative to look at the data on medicine use in patients with documented systolic HF separately from those with undocumented HF type.

This indicator does not assess appropriate therapy in patients with HF with preserved systolic function (LVEF >40%) for which there is no conclusive data regarding the efficacy of any medicine class.¹

This indicator does not take into consideration evidence-based dosing of the individual medicines.

Further information

Medication Safety Self Assessment for Australian Hospitals¹⁴ (MSSA) can help identify potential strategies for improvement with this and other indicators. MSSA encourages development of robust systems for safe prescribing, dispensing, administration and monitoring of medicines. MSSA is available at www.cec.health.nsw.gov.au

This indicator can be used to assist hospitals in meeting the National Safety and Quality Health Service Standard 1 [items 1.2.1, 1.2.2, 1.5.2, 1.6.1, 1.6.2, 1.7.2] and Standard 4 [items 4.1.2, 4.2.2, 4.5.1, 4.5.2, 4.12.4].¹⁵

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15. Australian Commission on Safety and Quality in Health Care. National Safety and Quality Health Service Standards. Sydney, ACSQHC, 2012.

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5.3 Percentage of discharge summaries that include medication therapy changes and explanations for changes

Purpose

This indicator assesses the effectiveness of processes intended to ensure that patients and their caregivers receive adequate information for safe and effective medication management after discharge.

Background and evidence

Communicating medicines information is one of the Australian Pharmaceutical Advisory Council Guiding Principles to Achieve Continuity in Medication Management.¹ This indicator provides a measure of compliance with these guidelines.

Key definitions

Medication therapy changes refers to changes to the patient's pre-admission medication regimen that are intended to continue after discharge. Changes may include:

- initiation of a new medicine
- change in the dose, form, route or frequency of a medicine taken prior to admission
- cessation of a medicine taken prior to admission
- recommencement of a medicine that was intentionally withheld prior to admission

If there are no changes to the patient's pre-admission medication regimen as a result of hospital admission, this should be explicitly documented.

Explanations for changes should include sufficient detail to inform future management decisions and should be explicitly documented in the discharge summary or discharge letter.

Data collection for local use

Please refer to the section *Using the National Quality Use of Medicines Indicators for Australian Hospitals* for guidance on sample selection, sample size, measurement frequency and other considerations.

Inclusion criteria: Adult, paediatric and neonatal patients discharged from hospital.

Exclusion criteria: Nil.

Recommended data sources: Medical records, medication charts, medication management plans or reconciliation forms,² discharge summaries and discharge prescriptions. Differences between admission and discharge medicines should be assumed to represent medicine therapy changes.

The data collection tool for QUM Indicator 5.3 assists data collection and indicator calculation.

Data collection for inter-hospital comparison

This indicator may be suitable for inter-hospital comparison. In this case, definitions, sampling methods and guidelines for audit and reporting need to be agreed in advance in consultation with the coordinating agency.

Indicator calculation

$$\frac{\text{Numerator}}{\text{Denominator}} \times 100\%$$

Numerator = Number of discharge summaries that include medication therapy changes and explanations for changes

Denominator = Number of discharge summaries in sample

Limitations and interpretation

The discharge summary should also document details for each medicine such as medicine name, dose and frequency, indications for use, intended duration or review period and sufficient additional information to ensure clear and unambiguous communication about the intended medication management plan to primary care clinicians and the patient or carer. Although equally important, these additional details are not audited in this indicator.

Documenting reasons for all medication therapy changes is facilitated by a process of medication reconciliation at discharge. This in turn is dependent on having an accurate medication history and list of current medicines at admission. It may be useful to collect this indicator concurrently with:

- *Indicator 3.1: Percentage of patients whose current medicines are documented and reconciled at admission*
- *Indicator 5.8: Percentage of patients whose discharge summaries contain a current, accurate and comprehensive list of medicines*
- *Indicator 5.9: Percentage of patients who receive a current, accurate and comprehensive medication list at the time of hospital discharge.*

Further information

Medication Safety Self Assessment for Australian Hospitals³ (MSSA) can help identify potential strategies for improvement with this and other indicators. MSSA encourages development of robust systems for safe prescribing, dispensing, administration and monitoring of medicines. MSSA is available at www.cec.health.nsw.gov.au

This indicator can be used to assist hospitals in meeting the National Safety and Quality Health Service Standard 1 [items 1.2.1, 1.2.2, 1.5.2, 1.6.1, 1.6.2], Standard 4 [items 4.1.2, 4.2.2, 4.5.1, 4.5.2, 4.8.1, 4.12.1, 4.12.3, 4.12.4] and Standard 6 [items 6.1.1, 6.2.1, 6.3.1, 6.4.1, 6.5.1].⁴

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2. National Medication Management Plan User Guide. Australian Commission on Safety and Quality in Healthcare, 2013.
3. Medication Safety Self Assessment for Australian Hospitals: Institute for Safe Medication Practices USA (Adapted for Australian use by NSW Therapeutic Advisory Group and the Clinical Excellence Commission), 2007.
4. Australian Commission on Safety and Quality in Health Care. National Safety and Quality Health Service Standards. Sydney, ACSQHC, 2012.

5.4 Percentage of patients discharged on warfarin that receive written information regarding warfarin management prior to discharge

Purpose

This indicator assesses the effectiveness of processes intended to ensure that patients and their caregivers receive adequate information for safe and effective medication management after discharge.

Background and evidence

Warfarin is a widely used medicine with serious and potentially fatal side effects. Appropriate warfarin education is integral to effective warfarin management. Problems occur in communication along the continuum of care.¹ There is considerable risk of medicine and food interactions and regular monitoring is mandatory. Patient understanding of the medication regimen, and involvement in the therapeutic plan, may minimise the risks of adverse events with warfarin administration. However, research shows that provision of written information to patients is suboptimal in content, especially with regard to daily warfarin management.² Patients state they want “detailed information to increase their confidence in therapy, including better explanations of the reasons for taking warfarin, how it works, how dose adjustments are made, and observed phenomena (e.g. bruising, variable INR results)”.³ Although this information is most important when warfarin is initiated, it is appropriate to provide written medicine information at every opportunity. The information provided should be targeted to individual patient needs and be appropriate to age, language and cognition.

Key definitions

Discharged on warfarin refers to all patients who will continue taking warfarin following discharge from hospital. This includes patients whose therapy is newly initiated as well as those who were established on warfarin prior to hospital admission.

Written information regarding warfarin management could take a number of forms and is dependent on the patient’s circumstances. Written medicine information could include the following:

- provision of a warfarin booklet for tracking warfarin therapy and INR results
- update of an existing warfarin booklet to record INR results during the hospital stay
- instructions for INR testing and review after discharge
- other purpose-designed educational tools.

Provision of written warfarin information must be explicitly documented in the medical record and/or the appropriate space on the National Inpatient Medication Chart or other medication chart endorsed by the drug and therapeutics committee.

Prior to discharge means that the patient received the information at some stage during the current admission. Ideally information will be provided prior to the point of discharge so that patients and carers have adequate time to read and clarify information provided.

Data collection for local use

Please refer to the section *Using the National Quality Use of Medicines Indicators for Australian Hospitals* for guidance on sample selection, sample size, measurement frequency and other considerations.

Inclusion criteria: Patients aged 18 years and over who are prescribed warfarin on discharge from hospital.

Exclusion criteria: Nil.

Recommended data sources: Medical records and medication charts.

The data collection tool for QUM Indicator 5.4 assists data collection and indicator calculation.

Data collection for inter-hospital comparison

This indicator may be suitable for inter-hospital comparison. In this case, definitions, sampling methods and guidelines for audit and reporting need to be agreed in advance in consultation with the coordinating agency.

Indicator calculation

$$\frac{\text{Numerator}}{\text{Denominator}} \times 100\%$$

Numerator = Number of patients discharged on warfarin that receive written information regarding warfarin management prior to discharge

Denominator = Number of patients discharged on warfarin in sample

Limitations and interpretation

This indicator does not assess the patient's understanding regarding their warfarin therapy, or the adequacy or appropriateness of the written information provided.

This indicator relies on documentation in the medical record that relevant written information was provided. Good documentation supports quality patient care³ and is a critical component of management with potentially toxic medicines such as warfarin. Poor communication can result in adverse medicine events.⁴ Thus it is assumed that absence of explicit documentation means no written information was provided.

Further information

Medication Safety Self Assessment for Antithrombotic Therapy in Australian Hospitals⁵ (MSSA-AT) can help identify potential strategies for improvement with this and other indicators. MSSA-AT encourages development of robust systems for safe prescribing, dispensing, administration and monitoring of antithrombotic therapy. MSSA-AT is available at www.cec.health.nsw.gov.au

This indicator can be used to assist hospitals in meeting the National Safety and Quality Health Service Standard 1 [items 1.2.1, 1.2.2, 1.5.2, 1.6.1, 1.6.2, 1.8.2, 1.18.1], Standard 4 [items 4.1.2, 4.2.2, 4.5.1, 4.5.2, 4.11.1, 4.12.4, 4.13.1, 4.13.2, 4.14.1] and Standard 6 [items 6.1.1, 6.2.1, 6.3.1, 6.4.1].⁶

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4. MacKinnon NJ, ed. Safe and Effective: The Eight Essential Elements of an Optimal Medication-use System. Canadian Pharmacists Association, 2007.
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5.5 Percentage of patients with a new adverse drug reaction (ADR) that are given written ADR information at discharge AND a copy is communicated to the primary care clinician

Purpose

This indicator assesses the effectiveness of processes intended to ensure that patients and their caregivers receive adequate information for safe and effective medication management after discharge.

Background and evidence

An adverse drug reaction (ADR) is defined as “a response to a medicinal product which is noxious and unintended, and which occurs at doses normally used in man for the prophylaxis, diagnosis or therapy of disease, or for the restoration, correction or modification of physiological function”.¹ This includes, but is not limited to, allergy and anaphylaxis to medicines.

Educating patients about their medicines and communication about medication management between hospital and community practitioners are guiding principles in the Australian Pharmaceutical Advisory Council Guiding Principles to Achieve Continuity in Medication Management.² This indicator provides a measure of compliance with these guidelines.

Key definitions

A new adverse drug reaction refers to any ADR that occurs for the first time during the current or most recent admission and is likely to affect future therapeutic decision making. Clinical judgement will be required in making this decision.

Written ADR information should include, as a minimum, the following:

- generic and brand names of the medicine(s) involved
- reaction(s) that occurred, described in lay terms e.g. rash, lip swelling, kidney failure
- advice about how to minimise the possibility of a future ADR to that medicine.

A copy of the information given to the patient should be included in the medical record, or explicit documentation made in the medical record that information was given.

A copy is communicated to the primary care clinician means a copy of the plan is sent to the community-based health practitioner nominated by the patient, or included in the discharge summary or discharge letter. Such communication should be explicitly documented in the medical record.

Data collection for local use

Please refer to the section *Using the National Quality Use of Medicines Indicators for Australian Hospitals* for guidance on sample selection, sample size, measurement frequency and other considerations.

Inclusion criteria: Adult, paediatric and neonatal patients who experience a new ADR during their hospital admission.

Exclusion criteria: Nil.

Recommended data sources: Medication charts, medical records and discharge documentation.

The data collection tool for QUM Indicator 5.5 assists data collection and indicator calculation.

Data collection for inter-hospital comparison

This indicator may be suitable for inter-hospital comparison. In this case, definitions, sampling methods and guidelines for audit and reporting need to be agreed in advance in consultation with the coordinating agency.

Indicator calculation

$$\frac{\text{Numerator}}{\text{Denominator}} \times 100\%$$

Numerator = Number of patients with a new ADR that were given written ADR information at discharge AND a copy was communicated to the primary care clinician

Denominator = Number of patients with a new ADR in sample

Limitations and interpretation

This indicator relies on documentation in the medical record that relevant written information was provided. Good documentation supports quality patient care³ and is a critical component of management of adverse drug reactions. Poor communication can result in adverse medicine events.⁴ Thus for the purposes of this indicator, it is assumed that absence of explicit documentation means no written ADR information was provided to the patient or their primary care clinician.

This indicator does not measure the quality of the written information provided to patients regarding ADRs or whether the patient's primary care clinician actually received a copy of the information. It does not measure whether other clinicians involved in the patient's care were notified about the ADR.

Further information

Medication Safety Self Assessment for Australian Hospitals⁵ (MSSA) can help identify potential strategies for improvement with this and other indicators. MSSA encourages development of robust systems for safe prescribing, dispensing, administration and monitoring of medicines. MSSA is available at www.cec.health.nsw.gov.au

This indicator can be used to assist hospitals in meeting the National Safety and Quality Health Service Standard 1 [items 1.2.1, 1.2.2, 1.5.2, 1.6.1, 1.6.2, 1.8.2, 1.18.1], Standard 4 [items 4.1.2, 4.2.2, 4.4.2, 4.5.1, 4.5.2, 4.7.1, 4.7.2, 4.12.4, 4.13.1] and Standard 6 [items 6.1.1, 6.2.1, 6.3.1, 6.4.1].⁶

References

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5. Medication Safety Self Assessment for Australian Hospitals: Institute for Safe Medication Practices USA (Adapted for Australian use by NSW Therapeutic Advisory Group and the Clinical Excellence Commission), 2007.
6. Australian Commission on Safety and Quality in Health Care. National Safety and Quality Health Service Standards. Sydney, ACSQHC, 2012.

5.6 Percentage of patients with asthma that are given a written asthma action plan at discharge AND a copy is communicated to the primary care clinician

Purpose

This indicator assesses the effectiveness of processes intended to ensure that patients and their caregivers receive adequate information for safe and effective medication management after discharge.

Background and evidence

Written individualised asthma action plans form part of patient self-management education and have been shown to improve health outcomes.¹ A written asthma action plan enables patients and/or carers to recognise and respond to worsening asthma symptoms as soon as possible.²

A written asthma action plan is an example of a Medication Action Plan (MAP). MAPs are an important tool for educating patients about their medicines and communicating between hospital and community practitioners about medication management. Development of MAPs and communication between hospital and community are guiding principles in the Australian Pharmaceutical Advisory Council Guiding Principles to Achieve Continuity in Medication Management.³ This indicator provides a measure of compliance with these guidelines.

Key definitions

Patients with asthma refers to patients of all ages admitted with asthma as a principle diagnosis.

A written asthma action plan should be individualised to the patient's needs and should cover:²

- details of regular maintenance and preventer medicines
- how and when to adjust treatment in response to signs and symptoms of exacerbations
- how and when to start oral corticosteroids and seek medical advice for increasing asthma severity
- how and when to seek urgent medical help.

A copy of the plan given to the patient should be included in the medical record, or explicit documentation made in the medical record that an individualised plan was given.

A copy is communicated to the primary care clinician means a copy of the plan is sent to the community-based health practitioner nominated by the patient, or included in the discharge summary or discharge letter. Such communication should be explicitly documented in the medical record.

Data collection for local use

Please refer to the section *Using the National Quality Use of Medicines Indicators for Australian Hospitals* for guidance on sample selection, sample size, measurement frequency and other considerations.

Inclusion criteria: Adult and paediatric patients discharged with a principle diagnosis of asthma or asthma exacerbation.

Exclusion criteria: Nil.

Recommended data sources: Medical records and discharge documentation.

The data collection tool for QUM Indicator 5.6 assists data collection and indicator calculation.

Data collection for inter-hospital comparison

This indicator may be suitable for inter-hospital comparison. In this case, definitions, sampling methods and guidelines for audit and reporting need to be agreed in advance in consultation with the coordinating agency.

Indicator calculation

$$\frac{\text{Numerator}}{\text{Denominator}} \times 100\%$$

Numerator = Number of patients with asthma that were given a written asthma action plan at discharge AND a copy was communicated to the primary care clinician

Denominator = Number of patients with asthma in sample

Limitations and interpretation

This indicator does not examine management of patients with asthma who present to the emergency department and are referred back to the community for ongoing management.

This indicator relies on documentation in the medical record that a written asthma plan was provided. Good documentation supports quality patient care⁴ and is a critical component of management of adverse drug reactions. Poor communication can result in adverse drug events.⁵ Thus it is assumed that absence of explicit documentation means no written asthma plan was provided.

This indicator does not measure the quality of the written asthma management plan or whether the patient's primary care clinician actually received a copy of the plan.

Further information

Templates for asthma action plans are available from the Australian National Asthma Council and state Asthma Foundations and are included in general practice management software.

Medication Safety Self Assessment for Australian Hospitals⁶ (MSSA) can help identify potential strategies for improvement with this and other indicators. MSSA encourages development of robust systems for safe prescribing, dispensing, administration and monitoring of medicines. MSSA is available at www.cec.health.nsw.gov.au

This indicator can be used to assist hospitals in meeting the National Safety and Quality Health Service Standard 1 [items 1.2.1, 1.2.2, 1.5.2, 1.6.1, 1.6.2, 1.8.2, 1.18.1], Standard 4 [items 4.2.1, 4.2.2, 4.5.1, 4.5.2, 4.12.4, 4.13.1, 4.13.2, 4.14.1] and Standard 6 [items 6.1.1, 6.2.1, 6.3.1, 6.4.1].⁷

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7. Australian Commission on Safety and Quality in Health Care. National Safety and Quality Health Service Standards. Sydney, ACSQHC, 2012.

5.7 Percentage of patients receiving sedatives at discharge that were not taking them at admission

Purpose

This indicator addresses the effectiveness of processes for discharge medication reconciliation and review of medicines intended for temporary symptom management.

Background and evidence

Problems arising from the use of benzodiazepines include overdose, particularly from the use of benzodiazepines together with other sedative medicines, and dependence as a result of long-term use. Benzodiazepine dependence rarely develops in patients taking normal therapeutic doses of these medicines for short periods (e.g. one to two weeks). Anyone on long-term benzodiazepine therapy is at risk of becoming dependent, the risk increasing with the duration of treatment.¹ Newer sedatives such as zolpidem have been associated with reports of bizarre sleep-related behaviour and deaths from injury have been reported in Australia.²

Key definitions

Patients receiving sedatives includes patients receiving sedatives regardless of destination after discharge or transfer (home, residential care or another hospital). Psychiatric patients and those prescribed detoxification regimens should be excluded.

Sedatives refer to any oral medicines indicated for treatment of insomnia.³

Data collection for local use

Please refer to the section *Using the National Quality Use of Medicines Indicators for Australian Hospitals* for guidance on sample selection, sample size, measurement frequency and other considerations.

Inclusion criteria: Patients aged 18 years and over receiving sedatives at discharge.

Exclusion criteria: Nil.

Recommended data sources: Medical records, medication charts and discharge documentation.

The data collection tool for QUM Indicator 5.7 assists data collection and indicator calculation.

Data collection for inter-hospital comparison

This indicator may be suitable for inter-hospital comparison. In this case, definitions, sampling methods and guidelines for audit and reporting need to be agreed in advance in consultation with the coordinating agency.

Indicator calculation

$$\frac{\text{Numerator}}{\text{Denominator}} \times 100\%$$

Numerator = Number of patients receiving sedatives at discharge that were not taking them at admission

Denominator = Number of patients receiving sedatives at discharge in sample

Limitations and interpretation

This indicator relies on documentation of accurate medicines information in the medical record. Good documentation supports quality patient care⁴ and is a critical component of management of adverse drug reactions. Poor communication can result in adverse medicine events.⁵

Appropriate medication management at the time of discharge or transfer is facilitated by a process of medication reconciliation at discharge. This in turn is dependent on having an accurate medication history and list of current medicines at admission.

It may be useful to collect this indicator concurrently with one or more of the following:

- *Indicator 3.1: Percentage of patients whose current medicines are documented and reconciled at admission*
- *Indicator 5.3: Percentage of discharge summaries that include medication therapy changes and explanations for changes*
- *Indicator 5.8: Percentage of patients whose discharge summaries contain a current, accurate and comprehensive list of medicines*
- *Indicator 5.9: Percentage of patients who receive a current, accurate and comprehensive medication list at the time of hospital discharge.*

Further information

Medication Safety Self Assessment for Australian Hospitals⁶ (MSSA) can help identify potential strategies for improvement with this and other indicators. MSSA encourages development of robust systems for safe prescribing, dispensing, administration and monitoring of medicines. MSSA is available at www.cec.health.nsw.gov.au

This indicator can be used to assist hospitals in meeting the National Safety and Quality Health Service Standard 1 [items 1.2.1, 1.2.2, 1.5.2, 1.6.1, 1.6.2] and Standard 4 [items 4.1.2, 4.2.2, 4.5.1, 4.5.2, 4.12.4].⁷

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7. Australian Commission on Safety and Quality in Health Care. National Safety and Quality Health Service Standards. Sydney, ACSQHC, 2012

5.8 Percentage of patients whose discharge summaries contain a current, accurate and comprehensive list of medicines

Purpose

This indicator addresses the effectiveness of processes that promote continuity of care in medication management and aim to minimise adverse medicine events when care is transferred.

Background and evidence

Adverse medicine events are commonly caused by lack of effective communication about medicines, especially in the transition between the community and hospital settings.¹ When patients are transferred between hospitals or to their home or residential care facility, healthcare professionals must ensure that the healthcare professional taking over the patient's care is supplied with an accurate and complete list of the patient's medicines.^{2,3} However, studies have shown that unintended discrepancies in the medication information provided on discharge are common.^{4,5} The process of medication reconciliation reduces opportunities for medication discrepancies and helps to ensure that the information communicated to ongoing care providers at discharge is verified and accurate.⁶

Key definitions

Patients refers to all patients admitted for at least 24 hours whose care is transferred from the hospital inpatient setting to home or a community-based care facility.

List of medicines refers to the list of the patient's ongoing medicines that will be communicated to the healthcare professional(s) taking over the patient's care after discharge. This should always be a comprehensive list of the patient's ongoing medicines, current at the point of discharge, whether or not all medicines are supplied by the hospital.

The list of medicines in the discharge summary should list:

- all on-going medicines to be taken by the patient, including the dose and frequency for each medicine. The list should include medicines to be taken by all routes, i.e. oral, topical, parenteral etc.
- all prescription, over-the-counter, and complementary medicines
- all regular, intermittent and "as required" medicines.

Current, accurate and comprehensive means that the list of medicines in the discharge summary contains all the information required for the healthcare professional(s) taking over care after discharge to continue the patient's pharmaceutical care effectively. To determine whether the list of medicines in the discharge summary is current, accurate and comprehensive, the auditor should compare the summary with the:⁶

- medicines prescribed on all current medication charts at the point of discharge. Due consideration should be given to the documented discharge plan, including medicines started, ceased or altered on discharge
- medication management plan or reconciliation form (if used) for any changes to the medication regimen made during the episode of care
- patient's admission medication history/list of medicines taken prior to presentation to hospital to check that any medicines withheld on or during admission are included as appropriate and that all changes are accounted for.

All medicines, doses and frequencies should match up. Any discrepancies that cannot be accounted for by the auditor should be taken to mean that the list of medicines in the discharge summary is not current, accurate and comprehensive.

Data collection for local use

Please refer to the section *Using the National Quality Use of Medicines Indicators for Australian Hospitals* for guidance on sample selection, sample size, measurement frequency and other considerations.

Inclusion criteria: Adult, paediatric and neonatal patients admitted to hospital for greater than 24 hours who are taking one or more medicines at discharge.

Exclusion criteria: Patients transferred to another acute care facility; patients cared for in the emergency department.

Recommended data sources: Discharge documentation, medication charts, medication management plans or reconciliation forms and medical records.

The data collection tool for QUM Indicator 5.8 assists data collection and indicator calculation.

Indicator calculation

$$\frac{\text{Numerator}}{\text{Denominator}} \times 100\%$$

Numerator = Number of patients taking medicine(s) at discharge whose discharge summaries contain a current, accurate and comprehensive medicines list

Denominator = Number of patients taking medicines at discharge in sample

Limitations and interpretation

There may be a number of ways to identify a sample of patients taking medicines at discharge. Certain sampling methods may lead to inadvertent exclusion of some patients. For example, the use of pharmacy dispensing records will exclude those patients who did not have their discharge medicines dispensed by the hospital. It is recommended that patients be identified using inpatient medication charts and/or medication management plans in combination with the medical record.

This indicator does not take into account that the list of medicines in the discharge summary should also include details regarding medication therapy changes during the inpatient episode.^{3,6} It is therefore strongly recommended that this indicator is collected concurrently with *Indicator 5.3: Percentage of discharge summaries that include medication therapy changes and explanations for changes*.

Performance against this indicator is likely to be improved if medicines lists in discharge summaries undergo a process of medication reconciliation. Medication reconciliation is an essential component of effective clinical handover and involves matching the medicines that the patient should be prescribed with those that are actually documented and resolving any discrepancies. This process helps to prevent harm by improving continuity of care and reducing the opportunity for medication errors.

Concurrent measurement of the following indicators will provide a comprehensive measure of the organisation's performance of continuity of medication management:

- *Indicator 3.1: Percentage of patients whose current medicines are documented and reconciled at admission*
- *Indicator 5.3: Percentage of discharge summaries that include medication therapy changes and explanations for changes*
- *Indicator 5.9: Percentage of patients who receive a current, accurate and comprehensive medication list at the time of hospital discharge.*

Further information

The Australian Commission on Safety and Quality in Health Care medication reconciliation web page includes information on the process of medication reconciliation and resources to support its implementation, and is available from www.safetyandquality.gov.au/our-work/medication-safety/medication-reconciliation

Use of a medication management plan (MMP) or similar form can improve the accuracy of information recorded on admission and assist with medication reconciliation at transitions of care. A national MMP and tools to support implementation are also available from the Australian Commission on Safety and Quality in Health Care web site at www.safetyandquality.gov.au/our-work/medication-safety/medication-reconciliation/nmmp/

Medication Safety Self Assessment for Australian Hospitals⁷ (MSSA) can help identify potential strategies for improvement with this and other indicators. MSSA encourages development of robust systems for safe prescribing, dispensing, administration and monitoring of medicines. MSSA is available at www.cec.health.nsw.gov.au

This indicator can be used to assist hospitals in meeting the National Safety and Quality Health Service Standard 1 [items 1.2.1, 1.2.2, 1.5.2, 1.6.1, 1.6.2,], Standard 4 [items 4.1.2, 4.2.2, 4.5.1, 4.5.2, 4.8.1, 4.12.3, 4.12.1, 4.12.4] and Standard 6 [items 6.4.1, 6.5.1].⁸

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7. Medication Safety Self Assessment for Australian Hospitals: Institute for Safe Medication Practices USA (Adapted for Australian use by NSW Therapeutic Advisory Group and the Clinical Excellence Commission), 2007.
8. Australian Commission on Safety and Quality in Health Care. National Safety and Quality Health Service Standards. Sydney, ACSQHC, 2012.

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5.9 Percentage of patients who receive a current, accurate and comprehensive medication list at the time of hospital discharge

Purpose

This indicator addresses the effectiveness of processes that promote continuity of care in medication management and aim to minimise adverse medicine events when care is transferred.

Background and evidence

Adverse medicine events are commonly caused by lack of effective communication about medicines, especially in the transitions between hospital and community settings.¹ Provision of an accurate, comprehensive medication list to the patient or his/her caregiver at hospital discharge helps to promote continuity in medication management.² Medication lists improve patients' ability to understand and manage their own medicines and may reduce the risk of adverse outcomes due to medication errors.³ However, studies have shown that unintended discrepancies in the medication information provided on discharge are common.^{4,5} The process of medication reconciliation reduces opportunities for medication discrepancies and helps to ensure that the information provided to the patient at discharge is verified and accurate.⁶

Key definitions

Patients refers to all patients admitted for at least 24 hours whose care is transferred from the hospital inpatient setting to home or a community-based care facility.

Medication list refers to a list of the medicines provided to the patient or carer, which includes the following information:

- all medicines to be taken by the patient, including the dose, frequency and indication for each medicine. All prescription, over-the-counter, and complementary medicines should be included, as well as all regular, intermittent and "as required" medicines. The list should include medicines to be taken by all routes i.e. oral, topical, parenteral etc.
- information about changes to therapy, including dose changes, new medicines and ceased medicines
- any medicines NOT to be taken by the patient, including those causing allergies/adverse drug reactions.

Active ingredient name should be provided for each medicine and brand names should be listed as appropriate. The list must be in a format that is easily understood by lay persons and should not contain medical terminology or jargon.

Current, accurate and comprehensive means that the discharge medication list contains all the information required for the patient or their caregiver to understand their medication regimen and effectively and safely manage their medicines after discharge.

To determine whether the medication list is accurate and comprehensive, the auditor should compare the list with the:⁶

- medicines prescribed on all current medication charts at the point of discharge. All medicines, doses and frequencies should match up, taking into consideration, the documented discharge plan, including medicines started, ceased or altered on discharge
- patient's admission medication history to check that any medicines withheld on or during admission have been included where appropriate and that all changes can be accounted for.

Any discrepancies that cannot be accounted for by the auditor should be taken to mean that the discharge medication list is not accurate and comprehensive.

At the time of means the medication list is produced and provided to the patient within 24 hours prior to or at the patient's discharge.

Hospital discharge means transfer of care from an inpatient facility to home or another site of community-based care, such as a residential aged care facility, but not transfer to another acute care facility.

Data collection for local use

Please refer to the section *Using the National Quality Use of Medicines Indicators for Australian Hospitals* for guidance on sample selection, sample size, measurement frequency and other considerations.

Inclusion criteria: Adult, paediatric and neonatal patients admitted to hospital for greater than 24 hours who are taking one or more medicines on discharge from hospital.

Exclusion criteria: Patients transferred to another acute care facility; patients cared for only in the emergency department i.e. not admitted.

Recommended data sources: Patient medication lists, discharge documentation including dispensing information and discharge summaries, medication charts, medication management plans or reconciliation forms and medical records.

The data collection tool for QUM Indicator 5.9 assists data collection and indicator calculation.

Data collection for inter-hospital comparison

This indicator may be suitable for inter-hospital comparison. In this case, definitions, sampling methods and guidelines for audit and reporting need to be agreed in advance in consultation with the coordinating agency.

Indicator calculation

$$\frac{\text{Numerator}}{\text{Denominator}} \times 100\%$$

Numerator = Number of patients who received a current, accurate and comprehensive medication list at hospital discharge

Denominator = Number of discharged patients taking medicines in sample

Limitations and interpretation

There may be a number of ways to identify a sample of patients taking medicines at discharge. Certain sampling methods may lead to inadvertent exclusion of some patients. For example, the use of pharmacy dispensing records will exclude those patients who did not have their discharge medication dispensed by the hospital. It is recommended that patients be identified using inpatient medication charts and/or medication management plans in combination with the medical record.

Where it is not possible to provide discharge medication lists to all discharged patients, patients should be prioritised according to their risk. Hospitals should implement policies to determine which patients are provided with discharge medication lists,⁷ for example, patients over 65 years of age, taking multiple medicines, with changes to their medicines during the admission, suspected of non-adherence or taking high-risk medicines. When using this indicator, organisations may wish to select specific patient groups to audit in accordance with their local policy. Reasons why a medication list is not supplied may be collected for further information.

The medication list should also document the indication, intended duration of treatment (where applicable) and specific administration advice for each medicine.⁷ Although equally important, these additional details are not audited in this indicator. The indicator does not assess the patient's understanding of the information provided in the medication list.

Performance against this indicator is likely to be improved if discharge medication lists undergo a process of medication reconciliation. Medication reconciliation is an essential component of effective clinical handover and involves matching the medicines that the patient should be prescribed with those that are actually documented and resolving any discrepancies. This process helps to prevent harm by improving continuity of care and reducing the opportunity for medication errors.

Concurrent measurement of the following indicators will provide a comprehensive measure of the organisation's performance at continuity of medication management:

- *Indicator 3.1: Percentage of patients whose current medicines are documented and reconciled at admission*
- *Indicator 5.3: Percentage of discharge summaries that include medication therapy changes and explanations for changes*
- *Indicator 5.8: Percentage of patients whose discharge summaries contain a current, accurate and comprehensive list of medicines.*

Further information

The Australian Commission on Safety and Quality in Health Care medication reconciliation web page includes information on the process of medication reconciliation, tools to support its implementation and links to other useful web resources, and is available from www.safetyandquality.gov.au/our-work/medication-safety/medication-reconciliation

Medication Safety Self Assessment for Australian Hospitals⁸ (MSSA) can help identify potential strategies for improvement with this and other indicators. MSSA encourages development of robust systems for safe prescribing, dispensing, administration and monitoring of medicines. MSSA is available at www.cec.health.nsw.gov.au

This indicator can be used to assist hospitals in meeting the National Safety and Quality Health Service Standard 1 [items 1.2.1, 1.2.2, 1.5.2, 1.6.1, 1.6.2, 1.18.1], Standard 4 [items 4.1.2, 4.2.2, 4.5.1, 4.5.2, 4.7.2, 4.12.1, 4.12.2, 4.12.4, 4.13.1, 4.15.1] and Standard 6 [items 6.1.1, 6.2.1, 6.3.1, 6.4.1, 6.5.1].⁹

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6.1 Percentage of medication storage areas outside pharmacy where potassium ampoules are available

Purpose

This indicator addresses the effectiveness of processes intended to prevent harm associated with inadvertent administration of concentrated potassium solutions.

Background and evidence

Deaths have occurred in Australia and other countries as a result of errors in administration of parenteral potassium infusions prepared using concentrated potassium ampoules or accidentally selecting potassium instead of saline ampoules.¹ Data from Australian incident monitoring shows that errors in preparation of parenteral potassium infusions using potassium ampoules continue to occur. The common root cause to these errors is the availability of concentrated potassium ampoules in wards and other patient care areas.¹ In 2003, the Australian Council for Safety and Quality in Health Care recommended that hospitals remove potassium ampoules from ward stock and replace them with premixed infusion solutions wherever possible.¹

As deaths from use of concentrated potassium ampoules have occurred even in critical care areas, premixed potassium solutions should be used preferentially in all patient care areas.^{2,3}

Key definitions

Medication storage areas means any cupboard, trolley or other place outside pharmacy where potassium may be stored, including intensive care units, emergency departments, operating theatres and other critical care areas. All medication storage areas should be included whether they are locked or not and regardless of whether risk assessments or other safety precautions have been implemented.

Potassium ampoules means all strengths and presentations of concentrated potassium chloride or other potassium salt solutions that require dilution prior to intravenous infusion.¹

Data collection for local use

Please refer to the section *Using the National Quality Use of Medicines Indicators for Australian Hospitals* for guidance on sample selection, sample size, measurement frequency and other considerations.

Inclusion criteria: Medication storage areas outside pharmacy, including intensive care units, emergency departments, operating theatres and other critical care areas.

Exclusion criteria: Nil.

Recommended data sources: Visual inspection of medication storage areas.

The data collection tool for QUM Indicator 6.1 assists data collection and indicator calculation.

Data collection for inter-hospital comparison

This indicator may be suitable for inter-hospital comparison. In this case, definitions, sampling methods and guidelines for audit and reporting need to be agreed in advance in consultation with the coordinating agency.

Indicator calculation

$$\frac{\text{Numerator}}{\text{Denominator}} \times 100\%$$

Numerator = number of medication storage areas outside pharmacy where potassium ampoules are available

Denominator = number of medication storage areas outside pharmacy in sample

Limitations and interpretation

This indicator does not measure:

- whether potassium ampoules are stored safely
- whether protocols are available to guide safe potassium ampoule use
- whether risk assessments for potassium ampoule storage and use have been performed
- reasons for potassium ampoule availability in certain wards
- reasons why potassium ampoules rather than premixed solutions are used.

Further information

The Australian Commission on Safety and Quality in Health Care web page includes the safety alert, case studies and other tools to reduce the hazards associated with intravenous potassium chloride. Available from www.safetyandquality.gov.au/our-work/medication-safety/medication-alerts/intravenous-potassium-chloride/

A safety alert from the UK National Patient Safety Agency is available from www.nrls.npsa.nhs.uk/resources/?entryid45=59882

Medication Safety Self Assessment for Australian Hospitals⁴ (MSSA) can help identify potential strategies for improvement with this and other indicators. MSSA encourages development of robust systems for safe prescribing, dispensing, administration and monitoring of medicines. MSSA is available at www.cec.health.nsw.gov.au

This indicator can be used to assist hospitals in meeting the National Safety and Quality Health Service Standard 1 [items 1.2.1, 1.2.2, 1.5.2, 1.6.1, 1.6.2] and Standard 4 [items 4.1.2, 4.2.2, 4.4.2, 4.5.1, 4.5.2, 4.10.1, 4.10.2, 4.10.6, 4.11.1, 4.11.2].⁵

References

1. MEDICATION ALERT! Intravenous POTASSIUM CHLORIDE can be fatal if given inappropriately. Australian Council for Safety and Quality in Health Care, 2003.
2. Patient Safety Bulletin: Emerging themes from reported incidents, Vol. 2007: National Patient Safety Agency, January 2007.
3. Medication Errors, 2nd Edn. In: Cohen MR, ed: American Pharmacists Association, 2007.
4. Medication Safety Self Assessment for Australian Hospitals: Institute for Safe Medication Practices USA (Adapted for Australian use by NSW Therapeutic Advisory Group and the Clinical Excellence Commission), 2007.
5. Australian Commission on Safety and Quality in Health Care. National Safety and Quality Health Service Standards. Sydney, ACSQHC, 2012.

Hospital-wide policies

6.2 Percentage of patients that are reviewed by a clinical pharmacist within one day of admission

Purpose

This indicator assesses the availability of timely clinical pharmacy services for all patients.

Background and evidence

Pharmacists undertake clinical pharmacy activities for individual patients to minimise the inherent risk associated with the use of medicines and to optimise the use of medicines. Clinical pharmacy activities support a collaborative approach (with patients, carers, prescribers and other health professionals) to medication management. Australian and overseas practice-based evidence confirms that clinical pharmacy activities reduce morbidity, mortality and the cost of care.¹

The services provided by clinical pharmacists to individual patients include:

- medication reconciliation
- assessment of current medication management
- clinical review, therapeutic medicine monitoring
- adverse drug reaction management
- contribution to the medication management plan
- provision of medicines information
- facilitation of continuity of medication management on discharge or transfer.¹

Clinical pharmacist review should inform prescribing decisions and therefore should be initiated as soon as possible after patient admission.¹

Key definitions

Patients refers to all patients admitted for at least 24 hours.

Review by a clinical pharmacist means there is explicit documentation by the pharmacist on the medication chart or in the medical record demonstrating that review has occurred.

Within one day of admission means documentation of clinical pharmacist review was signed and dated by the end of the next calendar day after admission.

Data collection for local use

Please refer to the section *Using the National Quality Use of Medicines Indicators for Australian Hospitals* for guidance on sample selection, sample size, measurement frequency and other considerations.

Inclusion criteria: Adult, paediatric and neonatal patients admitted to hospital.

Exclusion criteria: Patients with a length of stay in hospital less than 24 hours.

Recommended data sources: Medical records, medication management plans or reconciliation forms and medication charts.

The data collection tool for QUM Indicator 6.2 assists data collection and indicator calculation.

Data collection for inter-hospital comparison

This indicator may be suitable for inter-hospital comparison. In this case, definitions, sampling methods and guidelines for audit and reporting need to be agreed in advance in consultation with the coordinating agency.

Indicator calculation

$$\frac{\text{Numerator}}{\text{Denominator}} \times 100\%$$

Numerator = Number of patients reviewed by a clinical pharmacist within one day of admission

Denominator = Number of patients in sample

Limitations and interpretation

Data collection relies on documentation in the clinical record (generally on the medication chart) of the date of review by a clinical pharmacist. Good documentation supports quality patient care² and is a critical component of management of adverse drug reactions. Poor communication can result in adverse medicine events.³ Thus it is assumed that absence of explicit documentation means no clinical pharmacy review was performed.

This indicator does not assess the extent, appropriateness or quality of the clinical pharmacy service or the pharmaceutical review process provided to an individual patient.

It is acknowledged that some patients may not require full clinical pharmacy review services and therefore the target for this indicator is not necessarily 100%. For example, uncomplicated obstetrics cases and those patients who have been reviewed by a clinical pharmacist in a pre-admission clinic may have a less urgent need for a clinical pharmacy review at admission.

Further information

The Society of Hospital Pharmacists of Australia has published Standards of Practice for Clinical Pharmacy¹ and a number of quick guides and factsheets which support the role of clinical pharmacists in patient care, available at www.shpa.org.au

Medication Safety Self Assessment for Australian Hospitals⁴ (MSSA) can help identify potential strategies for improvement with this and other indicators. MSSA encourages development of robust systems for safe prescribing, dispensing, administration and monitoring of medicines. MSSA is available at www.cec.health.nsw.gov.au

This indicator can be used to assist hospitals in meeting the National Safety and Quality Health Service Standard 1 [items 1.2.1, 1.2.2, 1.5.2, 1.6.1, 1.6.2, 1.8.1] and Standard 4 [items 4.1.2, 4.2.2, 4.5.1, 4.5.2, 4.6.1].⁵

References

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2. The Good Clinical Documentation Guide. National Centre for Classification in Health, Commonwealth of Australia, 2003.
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4. Medication Safety Self Assessment for Australian Hospitals: Institute for Safe Medication Practices USA (Adapted for Australian use by NSW Therapeutic Advisory Group and the Clinical Excellence Commission), 2007.
5. Australian Commission on Safety and Quality in Health Care. National Safety and Quality Health Service Standards. Sydney, ACSQHC, 2012.

6.3 Percentage of parenteral opioid dosage units that are pethidine

Purpose

This indicator assesses the effectiveness of processes that restrict availability of pethidine and is an indirect measure of the appropriateness of opioid use for analgesia.

Background and evidence

Pethidine should not be considered a first line agent for treatment of severe pain.¹ Data from controlled trials consistently show a lack of superior analgesic efficacy of pethidine compared to alternative parenteral analgesics.² Pethidine has a number of disadvantages which limit its usefulness including:³

- shorter duration of action than morphine with no additional analgesic benefit
- similar side effects to morphine, including bronchospasm and increased biliary pressure
- metabolism to norpethidine which has potential toxic effects (e.g. convulsions) especially in patients with renal dysfunction
- association with potentially serious interactions with other medicines, including monoamine oxidase inhibitors and serotonin reuptake inhibitors, which may result in serotonin syndrome
- being a medicine commonly requested by abusers seeking opioids and abused by health professionals.

Key definitions

Parenteral opioid dosage units means ampoules, vials or infusion bags of any opioid medicine for parenteral administration.

Data collection for local use

Please refer to the section *Using the National Quality Use of Medicines Indicators for Australian Hospitals* for guidance on sample selection, sample size, measurement frequency and other considerations.

Inclusion criteria: Orders or requisitions for parenteral opioids presented to the pharmacy.

Exclusion criteria: Supplies of parenteral opioids to other hospitals.

Recommended data sources: Opioid orders or requisitions and relevant pharmacy records.

The data collection tool for QUM Indicator 6.3 assists data collection and indicator calculation.

Data collection for inter-hospital comparison

This indicator may be suitable for inter-hospital comparison. In this case, definitions, sampling methods and guidelines for audit and reporting need to be agreed in advance in consultation with the coordinating agency.

Indicator calculation

$$\frac{\text{Numerator}}{\text{Denominator}} \times 100\%$$

Numerator = Number of parenteral opioid dosage units that are pethidine

Denominator = Total number of parenteral opioid dosage units requisitioned from pharmacy (including pethidine) in sample

Limitations and interpretation

This indicator does not examine the reason for pethidine utilisation or use of oral pethidine. If there is concern about the results of this indicator, further investigation may be appropriate.

It is acknowledged that pethidine may be an appropriate therapy in some specific indications. Nevertheless, the ratio of pethidine to all parenteral opioids should be close to zero.

Further information

A safety bulletin issued by the Institute for Safe Medication Practices Canada, which includes recommendations for improving safety with pethidine (meperidine), is available at www.ismp-canada.org/download/safetyBulletins/ISMPCSB2004-08.pdf

This indicator can be used to assist hospitals in meeting the National Safety and Quality Health Service Standard 1 [items 1.2.1, 1.2.2, 1.5.2, 1.6.1, 1.6.2] and Standard 4 [items 4.1.2, 4.2.2, 4.5.1, 4.5.2, 4.11.1].⁴

References

1. Use of pethidine for pain management in the emergency department. Position statement. NSW Therapeutic Advisory Group, 2004.
2. Clark RF, Wei EM, Anderson PO. Meperidine: therapeutic use and toxicity. J Emerg Med 1995; 13: 797-802.
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4. Australian Commission on Safety and Quality in Health Care. National Safety and Quality Health Service Standards. Sydney, ACSQHC, 2012

6.4 Percentage of submissions for formulary listing of new chemical entities for which the drug and therapeutics committee has access to adequate information for appropriate decision making

Purpose

This indicator addresses the effectiveness of processes that promote systematic and consistent decision-making by area or hospital-based drug and therapeutics committees (DTCs).

Background and evidence

A structured approach to formulary additions encourages evidence-based decision making and promotes consistency and equity of access to medicines.¹

Formulary decisions should take into account objective and appropriately detailed information including relative efficacy, safety and cost-effectiveness in comparison with current alternative therapies. Information about local clinical needs, intended use, potential safety issues and potential cost impacts will also be required if an informed decision is to be made. In some hospitals, the DTC may not make formulary decisions but will act as an advisory body to clinical units. In such cases, the same level of information is required.

A study of Australian paediatric DTCs² found that the quality of submission by applicants was variable and that only one of eight hospitals described the information provided by applicants as generally adequate.³

Use of a standard application form for formulary submissions that includes prompts for information requirements can assist in ensuring that adequate information is provided and that consistent and transparent formulary decisions can then be made by the area- or hospital-based DTCs. A template form for formulary submissions has been prepared by the NSW Therapeutic Advisory Group¹ and is available at www.nswtag.org.au.

Key definitions

Formulary refers to the list of pharmaceutical products which have been approved by the DTC for use in the hospital or area health service.

Adequate information means objective comparative information about clinical efficacy and safety, economic analysis and assessment of local clinical need.

Objective comparative information about clinical efficacy and safety includes clinical trial data from well designed (blinded randomised controlled) studies which compare the new medicine with an appropriate comparator. The context of the clinical trial should be consistent with expected clinical practice.

Economic analysis includes clinical trial data that include economic endpoints or modelling of economic data. The analysis may take a societal or institutional perspective and should include a sensitivity analysis, explanation of assumptions.

Assessment of local clinical need may include any of the following:

- therapeutic alternatives to the new drug
- medicine utilisation information
- relevant medication error and adverse drug reaction reports
- readmission rates due to drug related problems
- local antimicrobial resistance patterns
- case mix and specialty services
- local community health needs.

Data collection for local use

Please refer to the section *Using the National Quality Use of Medicines Indicators for Australian Hospitals* for guidance on sample selection, sample size, measurement frequency and other considerations.

Inclusion criteria: Submissions to the DTC for formulary listing of new chemical entities.

Exclusion criteria: Nil.

Recommended data sources: DTC minutes and relevant meeting papers.

The data collection tool for QUM Indicator 6.4 assists data collection and indicator calculation.

Data collection for inter-hospital comparison

This indicator may be suitable for inter-hospital or inter-service comparison. In this case, definitions, sampling methods and guidelines for audit and reporting need to be agreed in advance in consultation with the coordinating agency.

Indicator calculation

$$\frac{\text{Numerator}}{\text{Denominator}} \times 100\%$$

Numerator = Number of submissions for formulary listing of new chemical entities for which the DTC had access to adequate information for appropriate decision making

Denominator = All formulary submissions for new chemical entities in sample

Limitations and interpretation

This indicator measures the percentage of decisions for which information was available but does not measure the quality of the information available or the quality of the DTC decision process.

Further information

Decision tools for drug and therapeutics committees have been produced by NSW Therapeutic Advisory Group and are available at www.nswtag.org.au

Medication Safety Self Assessment for Australian Hospitals⁴ (MSSA) can help identify potential strategies for improvement with this and other indicators. MSSA encourages development of robust systems for safe prescribing, dispensing, administration and monitoring of medicines. MSSA is available at www.cec.health.nsw.gov.au

This indicator can be used to assist hospitals in meeting the National Safety and Quality Health Service Standard 1 [items 1.2.1, 1.2.2, 1.5.2, 1.6.1, 1.6.2] and Standard 4 [items 4.1.1, 4.1.2, 4.2.2, 4.5.1, 4.5.2].⁵

References

1. Hospital formulary submission template: A decision tool for Drug and Therapeutics Committees. NSW Therapeutic Advisory Group, 2009.
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3. Personal communication. Dr Yashwant Sinha, Centre for Kidney Research, The Children's Hospital at Westmead, 22 Feb 2012.
4. Medication Safety Self Assessment for Australian Hospitals: Institute for Safe Medication Practices USA (Adapted for Australian use by NSW Therapeutic Advisory Group and the Clinical Excellence Commission), 2007.
5. Australian Commission on Safety and Quality in Health Care. National Safety and Quality Health Service Standards. Sydney, ACSQHC, 2012.

7.1 Percentage of as required (PRN) psychotropic medication orders with documented indication, dose (or dose range), frequency and maximum daily dose specified

Purpose

This indicator assesses the effectiveness of processes that encourage clear and unambiguous communication of medication orders.

Background and evidence

Use of medicines on an as required (PRN) basis is essential for managing acute psychiatric inpatient symptoms and behaviours. However, the decision on when to administer a PRN medicine, what to administer and how much to administer usually relies on the judgment of an individual nurse.^{1,2} These decisions are often based upon previous experiences and levels of knowledge.²⁻⁴ In order to ensure that PRN medicines are administered safely, appropriately and as intended, it is important that the prescriber specify the indication for medicine use, the dose to be administered (or a dose range), the minimum time period between PRN doses and the maximum total daily dose (maximum dose in 24 hours) on the medication chart (National Inpatient Medication Chart or electronic medication chart). The National Inpatient Medication Chart (NIMC) has been designed to encourage completion of this information.⁵

Key definitions

As required (PRN) psychotropic medicines refers to any medicine exerting a psychotropic effect (i.e. affecting function, behaviour or experience of the mind⁶), which is prescribed on medication charts and intended to be administered on an as needed basis. Psychotropic medicines most frequently used as required in inpatient mental health settings include anxiolytics (e.g. benzodiazepines), antipsychotics, hypnotics, sedatives and anticholinergics.

Documented indication refers to completion of the indication box of the PRN section of the medication chart to communicate the intended purpose for which the medicine may be administered to the patient.

Dose (or dose range) refers to completion of the dose box of the PRN section of the medication chart to indicate the dose that may be administered to the patient on any one occasion. This may be a specified dose or a dose range with a specified minimum and maximum dose.

For paediatric patients, the “dose calculation” box (e.g. mg/kg or mg/m² per dose in the paediatric NIMC) should be completed to indicate the basis for the calculated dose. This dose should be determined with reference to the paediatric pharmacopoeia endorsed for local use by the drug and therapeutics committee, (also see QUM Indicator 3.4).

Frequency refers to the completion of the hourly frequency box of the medication chart, specifying the minimum amount of time permitted in hours between each administration of the PRN medicine. Frequency descriptions such as bd, tds or qid are not acceptable.

Maximum daily dose refers to completion of the “max PRN dose/24 hrs” box of the PRN section of the medication chart to indicate the maximum PRN dose of the medicine that may be administered in a 24-hour period. Compliance with local policy regarding PRN prescribing should be incorporated into the audit.

Data collection for local use

Please refer to the section *Using the National Quality Use of Medicines Indicators for Australian Hospitals* for guidance on sample selection, sample size, measurement frequency and other considerations.

Inclusion criteria: All adult, adolescent and paediatric patients admitted to a designated inpatient mental health bed.

Exclusion criteria: Nil.

Recommended data sources: Medication charts.

The data collection tool for QUM Indicator 7.1 assists data collection and indicator calculation.

Data collection for inter-hospital comparison

This indicator may be suitable for inter-hospital comparison. In this case, definitions, sampling methods and guidelines for audit and reporting need to be agreed in advance in consultation with the coordinating agency.

Indicator Calculation

$$\frac{\text{Numerator}}{\text{Denominator}} \times 100\%$$

Numerator = Number of as required psychotropic medication orders with documented indication, dose (including basis for dose calculation for paediatric patients), frequency and maximum daily dose specified

Denominator = Number of as required psychotropic medication orders in sample

Limitations and interpretation

It is recommended that the specific psychotropic medicines to be included in the audit be agreed at each hospital.

This indicator assesses the ability of a prescriber to clearly communicate his or her intention for treatment; it does not assess whether the choice of medicine(s) or dose prescribed was appropriate for the patient. Hospitals may choose to collect this data to provide additional information on prescribing practices and guide interventions.

Data collection involves looking at a number of components of safe prescribing. It would be useful to measure the individual components to inform post-audit interventions.

An important aspect of clear communication when prescribing is the use of standardised terminology. *QUM Indicator 3.3: Percentage of medication orders that include error-prone abbreviations* addresses this issue.

Further information

Guidelines for use of the National Inpatient Medication Chart (NIMC) provide clear instructions on the safe and appropriate prescribing of as required medicines.⁵ These can be accessed at www.safetyandquality.gov.au/our-work/medication-safety/medication-chart/support-material

The NIMC online learning program available from NPS MedicineWise assists practitioners to identify the principles of safe prescribing and demonstrates how to complete the NIMC correctly. This is available via: <http://learn.nps.org.au>

Medication Safety Self Assessment for Australian Hospitals⁷ (MSSA) can help identify potential strategies for improvement with this and other indicators. MSSA encourages development of robust systems for safe prescribing, dispensing, administration and monitoring of medicines. MSSA is available at www.cec.health.nsw.gov.au

This indicator can be used to assist hospitals in meeting the National Safety and Quality Health Service Standard 1 [items 1.2.1, 1.2.2, 1.5.2, 1.6.1, 1.6.2], and Standard 4 [items 4.1.1, 4.2.1, 4.4.2, 4.5.1, 4.5.2].⁸

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1. Hilton M and Whiteford H. Pro Re Nata Medication for Psychiatric Inpatients: Time to Act. *Aust NZ J Psych* 2008; 42: 555.
2. Usher K, Baker J, Holmes C. Understanding clinical decision making for PRN medication in mental health inpatient facilities. *J Psych Mental Health Nurs* 2010; 17: 558–564.
3. Baker J, Lovell K and Harris N. Mental health professionals' psychotropic pro re nata (p.r.n.) medication practices in acute inpatient mental health care: a qualitative study. *Gen Hosp Psych* 2007; 29: 163–168.
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6. Ayd F. *Lexicon of Psychiatry, Neurology, and the Neurosciences*, 2nd edn. Lippincott Williams & Wilkins, 2000.
7. Medication Safety Self Assessment for Australian Hospitals: Institute for Safe Medication Practices USA (Adapted for Australian use by the NSW Therapeutic Advisory Group and the Clinical Excellence Commission), 2007.
8. Australian Commission on Safety and Quality in Health Care. *National Safety and Quality Health Service Standards*. Sydney, ACSQHC, 2012.

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7.2 Percentage of patients taking lithium who receive appropriate monitoring during their inpatient episode

Purpose

This indicator addresses the effectiveness of processes for ensuring compliance with best practice recommendations for monitoring lithium therapy.

Background and evidence

Lithium has benefit for both treatment and prophylaxis of bipolar affective disorder and recurrent unipolar depression and is the benchmark when trialling new mood stabilisers.¹ However, lithium has a number of potentially serious adverse effects including hypothyroidism and renal dysfunction. Most side effects of lithium are related to its plasma concentration and the plasma concentration of lithium is dependent on renal function.^{1,2} At toxic concentrations, lithium can cause ataxia, diarrhoea, vomiting, coarse tremor, neurological signs (including hemiplegia), disorientation, dysarthria, muscle twitches, impaired consciousness, acute kidney failure and death. Prolonged toxic concentrations may lead to irreversible brain damage.¹⁻³

Monitoring for the development of adverse effects in patients taking lithium is recognised as an important component of the overall care of these patients. Guidelines recommend monitoring at baseline and every three to six months throughout lithium treatment.¹⁻³ International studies have shown lithium monitoring to be suboptimal⁴ and, in response to this, a safety alert was issued by the UK National Patient Safety Agency.⁵

Key definitions

Patients taking lithium are defined as those patients, admitted to an inpatient mental health bed for greater than 72 hours, taking lithium for any indication.

Appropriate monitoring means that all of the following parameters are measured and recorded:

- renal function;
- thyroid function; and
- lithium plasma concentration.

For patients initiating lithium during the inpatient episode or having initiated lithium within the previous three months, there must be evidence that renal and thyroid function were measured prior to lithium initiation and that plasma lithium concentrations were measured five to seven days after initiation (baseline measurements).

For patients on existing lithium therapy, there must be evidence that monitoring of renal function, thyroid function and plasma lithium concentrations has occurred at least once within the last six months. This may be demonstrated by either:

- measurement of all parameters during the inpatient episode; or
- clear documentation of results obtained within the six months prior to admission.

Data collection for local use

Please refer to the section *Using the National Quality Use of Medicines Indicators for Australian Hospitals* for guidance on sample selection, sample size, measurement frequency and other considerations.

Inclusion criteria: All patients greater than 12 years of age taking lithium during their inpatient episode.

Exclusion criteria: Patients with a length of stay less than 72 hours.

Recommended data sources: Medical and pharmacy records and pathology results.

The data collection tool for QUM Indicator 7.2 assists data collection and indicator calculation.

Data collection for inter-hospital comparison

This indicator may be suitable for inter-hospital comparison. In this case, definitions, sampling methods and guidelines for audit and reporting need to be agreed in advance in consultation with the coordinating agency.

Indicator calculation

$$\frac{\text{Numerator}}{\text{Denominator}} \times 100\%$$

Numerator = Number of patients taking lithium who receive appropriate monitoring

Denominator = Number of patients taking lithium in sample

Limitations and interpretation

This indicator requires a number of separate parameters to be monitored in order for monitoring of lithium therapy to be deemed appropriate. It is recommended that the individual components of the indicator be collected to inform post-audit interventions.

This indicator requires monitoring of all parameters at six-monthly intervals as a minimum. It is recognised that some practice guidelines recommend more frequent monitoring of plasma lithium concentrations² and that some patients in particular may require more frequent monitoring, for example those being stabilised on lithium or those who have had previous abnormal test results.^{1,3}

The indicator recognises that appropriate monitoring may be hospital or community-based, and that relevant parameters should be available across the continuum of care. The indicator investigates whether monitoring occurred, but does not assess whether abnormal results are acted upon appropriately. It is acknowledged that whilst lithium therapy requires ongoing monitoring, this indicator does not assess the continued monitoring of patients post-discharge. It is strongly recommended that results of inpatient monitoring and a plan for continued monitoring be communicated to ongoing care providers and to the patient or carer at discharge.

Further information

Medication Safety Self Assessment in Australian Hospitals⁶ (MSSA) can help identify potential strategies for improvement with this and other indicators. MSSA encourages development of robust systems for safe prescribing, dispensing, administration and monitoring of medicines. MSSA is available at www.cec.health.nsw.gov.au

This indicator can be used to assist hospitals in meeting the National Safety and Quality Health Service Standard 1 [items 1.2.1, 1.2.2, 1.5.2, 1.6.1, 1.6.2, 1.7.2] and Standard 4 [items 4.2.1, 4.4.2, 4.5.1, 4.5.2, 4.7.2, 4.11.1].⁷

References

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2. Taylor D, Paton C and Kapur S. The Maudsley Prescribing Guidelines in Psychiatry, 11th Edn. Wiley-Blackman, 2012.
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5. Patient Safety Alert: Safer lithium therapy. National Patient Safety Agency, 2009.
6. Medication Safety Self Assessment for Australian Hospitals: Institute for Safe Medication Practices USA (Adapted for Australian use by NSW Therapeutic Advisory Group and the Clinical Excellence Commission), 2007.
7. Australian Commission on Safety and Quality in Health Care. National Safety and Quality Health Service Standards. Sydney, ACSQHC, 2012.

7.3 Percentage of patients who receive written and verbal information on regular psychotropic medicines initiated during their admission

Purpose

This indicator assesses the effectiveness of processes that ensure that patients and their carers receive adequate information to make informed choices about their treatments and to manage their medicines safely and effectively after hospital discharge.

Background and evidence

Lack of adherence with medication regimens is a common and potentially serious health problem and there are particular barriers to adherence in mental health patients.¹ Lack of adherence is more common when the patient disagrees with the need for treatment, the medication regimen is complex, or the patient perceives the side effects of treatment to be unacceptable.² Poor adherence to medication regimens is a major risk factor for poor outcomes, including relapse in people with schizophrenia, bipolar disorder and depression.³

Provision of written and verbal information on medicines promotes adherence⁴ and assists with communication along the continuum of care.⁵ The UK National Institute for Health and Clinical Excellence reviewed the evidence for adherence in patients with a range of health conditions. Although it concludes that no specific intervention can be recommended for all patients, it recommends that, in general, adherence is maximised if the patient is offered information about medicines before the decision is taken to prescribe; that this information is actively discussed, taking into account the patient's understanding and beliefs about diagnosis and treatment; and that the information includes the name of the medicine, how it works, the likely benefits and side effects, and how long it should be continued.⁶

Many psychotropic medicines have significant potential adverse effects, medicine and food interactions, and require regular monitoring.¹ Patient understanding of these issues, and involvement in the therapeutic plan, may reduce the risk of adverse events and enhance adherence.

Key definitions

Written and verbal information may vary in their form and are dependent on the individual patient's (and/or carers') needs. Written information should always be supported by verbal information. Both forms of communication should be provided; one is not a substitute for the other.

Some sources of written medicines information include:

- locally developed and approved medicines information brochures
- information from reputable sources e.g. Beyond Blue, Black Dog Institute, SANE Australia, www.choiceandmedication.org
- consumer medicines information leaflets
- NPS MedicineWise consumer medicines information.

Provision of verbal information should involve a two-way discussion of the written information provided. The information most pertinent to the individual patient should be highlighted and any additional information provided as necessary.

Every effort should be made to ensure that the information provided is appropriate to the patient's age, language, cognitive and developmental capacities. When the patient is unable to comprehend all the information, the information should also be provided to the patient's carer(s). For patients (and/or carers) from non-English speaking backgrounds, translated written information and use of an interpreter is highly recommended, where possible. For paediatric patients (and their carers), age-appropriate information that is tailored to the specific needs and issues of paediatric patients should be used where possible.

Provision of written and verbal information must be explicitly documented in the medical record.

Information may be provided at any stage during the current admission, but will ideally be provided at the time of initiation of a new medicine so that the patient and carer can participate in treatment decisions in an informed manner and have adequate time to read and clarify information provided prior to discharge. However, the patient's current mental health state should be considered when determining the most appropriate time to provide the information.

Regular psychotropic medicines initiated during their admission means the last regular psychotropic medicines initiated for the patient during their hospital admission. This medicine may or may not have been continued on discharge. Psychotropic medicines include anticholinergics, antidepressants, antipsychotics, anxiolytics, hypnotics, mood stabilisers and sedatives and any other medicines used for psychotropic effects.

Data collection for local use

Please refer to the section *Using the National Quality Use of Medicines Indicators for Australian Hospitals* for guidance on sample selection, sample size, measurement frequency and other considerations.

Inclusion criteria: All paediatric, adolescent and adult patients admitted to a designated mental health bed who have been initiated on one or more regular psychotropic medications during their hospital admission.

Exclusion criteria: Nil.

Recommended data sources: Medical and pharmacy records including discharge documentation.

The data collection tool for QUM Indicator 7.3 assists data collection and indicator calculation.

Data collection for inter-hospital comparison

This indicator may be suitable for inter-hospital comparison. In this case, definitions, sampling methods and guidelines for audit and reporting need to be agreed in advance in consultation with the coordinating agency.

Indicator calculation

$$\frac{\text{Numerator}}{\text{Denominator}} \times 100\%$$

Numerator = Number of patients who received written and verbal information on the last newly initiated regular psychotropic medicine initiated during their hospital admission

Denominator = Number of patients in sample initiated on one or more new regular psychotropic medicines during their hospital admission

Limitations and interpretation

It is recommended that the specific psychotropic medicines to be included in the audit be agreed at each hospital.

This indicator aims to promote the availability of patient-focussed written medicines information within hospitals and the provision of patient education at a level commensurate with the patient's (and/or carer's) capacities and understanding. However, the indicator does not assess the patient's (and/or carer's) understanding of the written or verbal information provided, or the adequacy or appropriateness of the information for the individual patient.

This indicator does not look at provision of information on existing (pre-admission) or PRN (as required) medicines. However, it is recommended that the need for information on these medicines is assessed and written and verbal information provided where necessary.

This indicator relies on documentation in the medical record that relevant written and verbal information was provided. Good documentation supports quality patient care⁷ and is a critical component of optimal medication management. Poor communication can result in adverse medicine events.⁸ Thus it is assumed that absence of explicit documentation means no information was provided. Where documentation does exist, the extent of documentation that is deemed acceptable for the purposes of indicator compliance should be agreed at each hospital.

Further information

Active promotion of adherence to evidence-based treatments through provision of understandable information forms Standard 10.5 of the Australian National Standards for Mental Health Services.⁴ Use of this indicator to demonstrate provision of medicines information to patients may assist organisations to meet accreditation against this standard.

Medication Safety Self Assessment for Australian Hospitals⁹ (MSSA) can help identify potential strategies for improvement with this and other indicators. MSSA encourages development of robust systems for safe prescribing, dispensing, administration and monitoring of medicines. MSSA is available at www.cec.health.nsw.gov.au

This indicator can be used to assist hospitals in meeting the National Safety and Quality Health Service Standard 1 [items 1.2.1, 1.2.2, 1.5.2, 1.6.1, 1.6.2, 1.8.2, 1.18.1, 1.18.2, 1.18.3] and Standard 4 [items 4.2.1, 4.5.1, 4.5.2, 4.13.1, 4.13.2, 4.14.1, 4.15.1].¹⁰

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7.4 Percentage of patients taking antipsychotic medicines who receive appropriate monitoring for the development of metabolic side effects

Purpose

This indicator addresses the effectiveness of processes for ensuring compliance with best practice recommendations for monitoring of metabolic adverse effects occurring as a result of antipsychotic use.

Background and evidence

The metabolic syndrome describes the concurrence of several closely related cardiovascular risk factors, the key components of which are visceral obesity, dyslipidaemia, hyperglycaemia and hypertension.¹ The metabolic syndrome is more prevalent in patients with schizophrenia than in population controls and is a predictor for the early development of cardiovascular disease (CVD) and type 2 diabetes mellitus.^{2,3} CVD is a major cause of excessive mortality and premature death in people with schizophrenia.⁴

The causes of the metabolic syndrome and increased cardiovascular risk in patients with schizophrenia are complex. Schizophrenia itself is a risk factor; patients are more likely to exhibit risky lifestyle behaviours such as smoking and inadequate exercise and the general medical needs of these patients are often overlooked.^{2,5} Importantly, antipsychotic medicines, the foundation of schizophrenia management, increase the risk of developing the metabolic syndrome as they can lead to weight gain and increase the risk of diabetes, high blood pressure and dyslipidaemia.^{5,6}

Monitoring for the metabolic syndrome in patients taking antipsychotics is recognised as an important component of the overall care of these patients. Guidelines recommend monitoring of metabolic parameters at baseline and every three to six months throughout antipsychotic treatment.^{5,6} However, a number of barriers to the recognition and diagnosis of the syndrome have been described,² resulting in the metabolic complications of antipsychotic therapy being neglected.

Key definitions

Patients taking antipsychotic medicines are defined as those patients admitted to an inpatient mental health bed for greater than 72 hours taking one or more regular antipsychotic medicine⁷ by any route for any indication.

Appropriate monitoring means that all of the following parameters are measured and recorded:⁶

- waist circumference*
- blood pressure
- fasting lipids (including triglycerides and HDL cholesterol)
- fasting blood glucose (or HbA1c in patients with pre-existing diabetes mellitus).

* Waist circumference provides a more specific measure of visceral obesity in adults compared with weight or body mass index and is the preferred measure. In adolescent and paediatric patients weight or BMI is acceptable.

For patients initiating/restarting an antipsychotic, changing medicine or increasing dose during the inpatient episode, there must be evidence that these parameters were measured during inpatient treatment to provide a baseline. For patients whose existing antipsychotic therapy remains unchanged, there must be evidence that monitoring has occurred within the last six months, so either:

- all parameters have been measured during the inpatient episode; or
- there is clear documentation of results obtained within the six months prior to admission.

Data collection for local use

Please refer to the section *Using the National Quality Use of Medicines Indicators for Australian Hospitals* for guidance on sample selection, sample size, measurement frequency and other considerations.

Inclusion criteria: All adult, adolescent and paediatric patients taking at least one regular antipsychotic medicine during their inpatient episode should be included. Patients receiving regular antipsychotic medicine for indications other than psychosis should be included.

Exclusion criteria: Patients with a length of stay less than 72 hours.

Recommended data sources: Medical and pharmacy records including medication charts and pathology results.

The data collection tool for QUM Indicator 7.4 assists data collection and indicator calculation.

Data collection for inter-hospital comparison

This indicator may be suitable for inter-hospital comparison. In this case, definitions, sampling methods and guidelines for audit and reporting need to be agreed in advance in consultation with the coordinating agency.

Indicator calculation

$$\frac{\text{Numerator}}{\text{Denominator}} \times 100\%$$

Numerator = Number of patients taking regular antipsychotic medicines who receive appropriate monitoring for development of metabolic side effects

Denominator = Number of patients receiving regular antipsychotic medicines

Limitations and interpretation

This indicator requires a number of separate parameters to be monitored in order for metabolic monitoring to be deemed appropriate. It is recommended that individual components of the indicator are collected to inform post-audit interventions. The accompanying data collection tool assists the collection of these components. Barriers to appropriate monitoring such as patient refusal for blood tests may also be collected to inform post-audit interventions. The local indicator oversight group may also wish to collect data that allows consideration of this indicator in the broader context of practice intended to improve other health outcomes e.g. smoking, relevant family history.

Determination of whether appropriate monitoring has occurred may be dependent on the extent of documentation in the patient's records. Good documentation supports quality patient care.⁸ Poor communication can result in adverse drug events.⁹ Thus it is assumed that absence of explicit evidence means that monitoring did not take place.

This indicator looks at whether monitoring occurred, but does not assess whether abnormal results are followed up appropriately. It is acknowledged that whilst metabolic syndrome is a long term complication of antipsychotic therapy, this indicator does not assess the continued monitoring of patients post-discharge. It is strongly recommended that results of inpatient monitoring and a plan for continued monitoring be communicated to ongoing care providers and to the patient or their carer at discharge.

Further information

An evidence-based algorithm for metabolic syndrome screening and example monitoring template has been developed by Waterreus and Langhorne at the University of Western Australia and published in the Medical Journal of Australia.⁶ These and other tools^{10,11} may assist hospitals to implement routine monitoring for metabolic syndrome in patients taking antipsychotics.

Medication Safety Self Assessment in Australian Hospitals¹² (MSSA) can help identify potential strategies for improvement with this and other indicators. MSSA encourages development of robust systems for safe prescribing, dispensing, administration and monitoring of medicines. MSSA is available at www.cec.health.nsw.gov.au

This indicator can be used to assist hospitals in meeting the National Safety and Quality Health Service Standard 1 [items 1.2.1, 1.2.2, 1.5.2, 1.6.1, 1.6.2, 1.7.2], Standard 4 [items 4.2.1, 4.4.2, 4.5.1, 4.5.2, 4.7.2, 4.11.1].¹³

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7.5 Percentage of patients prescribed two or more regular antipsychotic medicines at hospital discharge

Purpose

This indicator addresses the effectiveness of processes for ensuring that mental health patients are managed in accordance with evidence-based guidelines.

Background and evidence

Antipsychotics are the cornerstone of the management of schizophrenia and related psychoses. They are used to treat the acute symptoms and reduce the risk of subsequent relapse. Guidelines recommend the use of only one antipsychotic medicine at a time.¹⁻³ Even in patients with a history of treatment resistance there is limited data to support the use of more than one antipsychotic at a time (polypharmacy).^{2,4-6} In the longer term, antipsychotic polypharmacy has been associated with increased morbidity and mortality.³ Polypharmacy increases the risk of adverse effects, increases costs and complicates medication regimens, all of which potentially reduce patient adherence to therapy.

Key definitions

Patients includes all patients (whether they are taking antipsychotics or not) discharged from an inpatient mental health bed to home or residential care.

Regular antipsychotic medicines refers to any antipsychotic medicine³, including typical and atypical antipsychotics, intended to be taken on a regular basis. These may be administered by any route, including oral or parenteral. Medicines to be taken on an as required basis should not be included. The antipsychotic medicine should only be counted once, if more than one formulation of the same medicine is prescribed.

At hospital discharge means that the intention was to continue the prescribed antipsychotics after discharge.

Data collection for local use

Please refer to the section *Using the National Quality Use of Medicines Indicators for Australian Hospitals* for guidance on sample selection, sample size, measurement frequency and other considerations.

Inclusion criteria: All adult, adolescent and paediatric patients (with or without dementia) discharged from a designated inpatient mental health bed to home or residential care, whether or not they are prescribed an antipsychotic medicine.

Exclusion criteria: Patients transferred to another hospital. Patients with more than one admission should only be audited once, with admissions prior to the most recent admission excluded from data collection.

Recommended data sources: Medical and pharmacy records including discharge documentation.

The data collection tool for QUM Indicator 7.5 assists data collection and indicator calculation.

Data collection for inter-hospital comparison

This indicator may be suitable for inter-hospital comparison. In this case, definitions, sampling methods and guidelines for audit and reporting need to be agreed in advance in consultation with the coordinating agency.

Indicator calculation

$$\frac{\text{Numerator}}{\text{Denominator}} \times 100\%$$

Numerator = Number of patients prescribed two or more regular antipsychotics at discharge

Denominator = Number of discharged patients in sample

Limitations and interpretation

This indicator looks at a snapshot in time and does not consider whether the use of polypharmacy in the audited patients was persistent. In some cases it may be justifiable to use two or more antipsychotics for a temporary period, such as when switching from one antipsychotic to another (the cross-over period). Although the evidence of benefit with combination therapy is weak,^{2,4,5} in practice a small number of patients resistant to single antipsychotic therapy may benefit from more than one antipsychotic long term. To assist with post-audit interventions it may be useful to record whether there was documented justification for use of two or more antipsychotics and the nature of the justification.

A variety of methods may be used to identify patients for inclusion in the clinical audit. Auditors need to be aware of the limitations of the various methods and a methodology for sample selection be agreed with relevant stakeholders.

Further information

Medication Safety Self Assessment for Australian Hospitals⁷ (MSSA) can help identify potential strategies for improvement with this and other indicators. MSSA encourages development of robust systems for safe prescribing, dispensing, administration and monitoring of medicines. MSSA is available at www.cec.health.nsw.gov.au

This indicator can be used to assist hospitals in meeting the National Safety and Quality Health Service Standard 1 [items 1.2.1, 1.2.2, 1.5.2, 1.6.1, 1.6.2, 1.7.2] and Standard 4 [items 4.2.1, 4.4.2, 4.5.1, 4.5.2, 4.7.2].⁸

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Appendices



Appendix 1

Matrices mapping the National QUM Indicators to the National Safety and Quality Health Service Standards

The National QUM Indicators have been mapped against the National Safety and Quality Health Service (NSQHS) Standards[†] in order to provide a guide on how the indicators can be used to meet the specific action items required for each standard. Two tables are provided demonstrating this information:

- **Table 1:** Action items of the NSQHS Standards mapped to each National QUM Indicator
- **Table 2:** National QUM Indicators mapped to each action item of the NSQHS Standards.

This information is a guide only, and is correct at the time of publication. Only the four most relevant standards have been referenced in these tables (Standards 1, 3, 4 and 6). There may be items within the other standards for which National QUM Indicators measurement may be used as evidence.

In general, measurement of indicators alone will not provide sufficient evidence for compliance with NSQHS Standards items. Further work, including interpretation of the indicator results and follow up action, will usually be required.

Table 1: Action items of the NSQHS Standards mapped to each National QUM Indicator

National QUM Indicators	National Safety and Quality Health Service Standards items			
	Std 1	Std 3	Std 4	Std 6
1.1	1.2.1, 1.2.2, 1.5.2, 1.6.1, 1.6.2, 1.7.2, 1.8.1		4.2.1, 4.2.2, 4.5.1, 4.5.2, 4.11.1	
1.2	1.2.1, 1.2.2, 1.5.2, 1.6.1, 1.6.2, 1.7.2		4.2.1, 4.2.2, 4.5.1, 4.5.2, 4.11.1	
1.3	1.2.1, 1.2.2, 1.5.2, 1.6.1, 1.6.2, 1.7.2		4.2.1, 4.2.2, 4.5.1, 4.5.2, 4.11.1	
1.4	1.2.1, 1.2.2, 1.5.2, 1.6.1, 1.6.2, 1.7.2		4.1.1, 4.2.1, 4.2.2, 4.5.1, 4.5.2	
1.5	1.2.1, 1.2.2, 1.5.2, 1.6.1, 1.6.2, 1.8.1		4.2.1, 4.2.2, 4.5.1, 4.5.2, 4.11.1	
1.6	1.2.1, 1.2.2, 1.5.2, 1.6.1, 1.6.2		4.2.1, 4.2.2, 4.5.1, 4.5.2	
2.1	1.2.1, 1.2.2, 1.5.2, 1.6.1, 1.6.2, 1.7.2	3.1.1, 3.1.2, 3.4.1, 3.4.2, 3.4.3, 3.14.1, 3.14.3, 3.14.4	4.2.1, 4.2.2, 4.5.1, 4.5.2	
2.2	1.2.1, 1.2.2, 1.5.2, 1.6.1, 1.6.2, 1.7.2	3.1.1, 3.1.2, 3.4.1, 3.4.2, 3.4.3, 3.14.1, 3.14.3, 3.14.4	4.1.1, 4.2.1, 4.2.2, 4.3.2, 4.3.3, 4.5.1, 4.5.2	
2.3	1.2.1, 1.2.2, 1.5.2, 1.6.1, 1.6.2	3.1.1, 3.4.1, 3.4.2, 3.4.3, 3.14.1, 3.14.3, 3.14.4	4.2.1, 4.2.2, 4.5.1, 4.5.2, 4.11.1	

[†] Australian Commission on Safety and Quality in Health Care. National Safety and Quality Health Service (NSQHS) Standards ACSQHC, 2012.



Table 1: Action items of the NSQHS Standards mapped to each National QUM Indicator (continued)

National QUM Indicators	National Safety and Quality Health Service Standards items			
	Std 1	Std 3	Std 4	Std 6
2.4	1.2.1, 1.2.2, 1.5.2, 1.6.1, 1.6.2, 1.8.1	3.1.1, 3.4.1, 3.4.2, 3.4.3, 3.14.3, 3.14.4	4.2.1, 4.2.2, 4.5.1, 4.5.2	
2.5	1.2.1, 1.2.2, 1.5.2, 1.6.1, 1.6.2, 1.7.2	3.1.1, 3.1.2, 3.4.1, 3.4.2, 3.4.3, 3.14.1, 3.14.3, 3.14.4	4.2.1, 4.2.2, 4.5.1, 4.5.2	
3.1	1.2.1, 1.2.2, 1.5.2, 1.6.1, 1.6.2		4.2.1, 4.2.2, 4.5.1, 4.5.2, 4.6.1, 4.8.1, 4.12.1, 4.12.3, 4.12.4	6.1.1, 6.2.1, 6.3.1
3.2	1.2.1, 1.2.2, 1.5.2, 1.6.1, 1.6.2, 1.8.1		4.1.1, 4.2.1, 4.2.2, 4.4.2, 4.5.1, 4.5.2, 4.6.1, 4.7.1, 4.7.2	6.1.1, 6.2.1, 6.3.1
3.3	1.2.1, 1.2.2, 1.5.2, 1.6.1, 1.6.2		4.1.1, 4.2.1, 4.2.2, 4.4.2, 4.5.1, 4.5.2	
3.4	1.2.1, 1.2.2, 1.5.2, 1.6.1, 1.6.2		4.2.1, 4.2.2, 4.4.2, 4.5.1, 4.5.2	
3.5	1.2.1, 1.2.2, 1.5.2, 1.6.1, 1.6.2		4.2.1, 4.2.2, 4.4.2, 4.5.1, 4.5.2, 4.11.1	
3.6	1.2.1, 1.2.2, 1.5.2, 1.6.1, 1.6.2, 1.7.2		4.2.1, 4.2.2, 4.5.1, 4.5.2, 4.11.1	
4.1	1.2.1, 1.2.2, 1.5.2, 1.6.1, 1.6.2		4.2.1, 4.2.2, 4.5.1, 4.5.2, 4.11.1	
4.2	1.2.1, 1.2.2, 1.5.2, 1.6.1, 1.6.2, 1.18.1		4.2.1, 4.2.2, 4.5.1, 4.5.2, 4.11.1, 4.13.1, 4.13.2, 4.14.1	6.1.1, 6.2.1, 6.3.1, 6.4.1, 6.4.2
5.1	1.2.1, 1.2.2, 1.5.2, 1.6.1, 1.6.2, 1.7.2		4.1.2, 4.2.2, 4.5.1, 4.5.2, 4.12.4	
5.2	1.2.1, 1.2.2, 1.5.2, 1.6.1, 1.6.2, 1.7.2		4.1.2, 4.2.2, 4.5.1, 4.5.2, 4.12.4	
5.3	1.2.1, 1.2.2, 1.5.2, 1.6.1, 1.6.2		4.1.2, 4.2.2, 4.5.1, 4.5.2, 4.8.1, 4.12.1, 4.12.3, 4.12.4	6.1.1, 6.2.1, 6.3.1, 6.4.1, 6.5.1
5.4	1.2.1, 1.2.2, 1.5.2, 1.6.1, 1.6.2, 1.8.2, 1.18.1		4.1.2, 4.2.2, 4.5.1, 4.5.2, 4.11.1, 4.12.4, 4.13.1, 4.13.2, 4.14.1	6.1.1, 6.2.1, 6.3.1, 6.4.1

Appendix 1

Table 1: Action items of the NSQHS Standards mapped to each National QUM Indicator
(continued)

National QUM Indicators	National Safety and Quality Health Service Standards items			
	Std 1	Std 3	Std 4	Std 6
5.5	1.2.1, 1.2.2, 1.5.2, 1.6.1, 1.6.2, 1.8.2, 1.18.1		4.1.2, 4.2.2, 4.4.2, 4.5.1, 4.5.2, 4.7.1, 4.7.2, 4.12.4, 4.13.1	6.1.1, 6.2.1, 6.3.1, 6.4.1
5.6	1.2.1, 1.2.2, 1.5.2, 1.6.1, 1.6.2, 1.8.2, 1.18.1		4.2.1, 4.2.2, 4.5.1, 4.5.2, 4.12.4, 4.13.1, 4.13.2, 4.14.1	6.1.1, 6.2.1, 6.3.1, 6.4.1
5.7	1.2.1, 1.2.2, 1.5.2, 1.6.1, 1.6.2		4.1.2, 4.2.2, 4.5.1, 4.5.2, 4.12.4	
5.8	1.2.1, 1.2.2, 1.5.2, 1.6.1, 1.6.2		4.1.2, 4.2.2, 4.5.1, 4.5.2, 4.8.1, 4.12.3, 4.12.1, 4.12.4	6.4.1, 6.5.1
5.9	1.2.1, 1.2.2, 1.5.2, 1.6.1, 1.6.2, 1.18.1		4.1.2, 4.2.2, 4.5.1, 4.5.2, 4.7.2, 4.12.1, 4.12.2, 4.12.4, 4.13.1, 4.15.1	6.1.1, 6.2.1, 6.3.1, 6.4.1, 6.5.1
6.1	1.2.1, 1.2.2, 1.5.2, 1.6.1, 1.6.2		4.1.2, 4.2.2, 4.4.2, 4.5.1, 4.5.2, 4.10.1, 4.10.2, 4.10.6, 4.11.1, 4.11.2	
6.2	1.2.1, 1.2.2, 1.5.2, 1.6.1, 1.6.2, 1.8.1		4.1.2, 4.2.2, 4.5.1, 4.5.2, 4.6.1	
6.3	1.2.1, 1.2.2, 1.5.2, 1.6.1, 1.6.2		4.1.2, 4.2.2, 4.5.1, 4.5.2, 4.11.1	
6.4	1.2.1, 1.2.2, 1.5.2, 1.6.1, 1.6.2		4.1.1, 4.1.2, 4.2.2, 4.5.1, 4.5.2	
7.1	1.2.1, 1.2.2, 1.5.2, 1.6.1, 1.6.2		4.1.1, 4.2.1, 4.4.2, 4.5.1, 4.5.2	
7.2	1.2.1, 1.2.2, 1.5.2, 1.6.1, 1.6.2, 1.7.2		4.2.1, 4.4.2, 4.5.1, 4.5.2, 4.7.2, 4.11.1	
7.3	1.2.1, 1.2.2, 1.5.2, 1.6.1, 1.6.2, 1.8.2, 1.18.1, 1.18.2, 1.18.3		4.2.1, 4.5.1, 4.5.2, 4.13.1, 4.13.2, 4.14.1, 4.15.1	
7.4	1.2.1, 1.2.2, 1.5.2, 1.6.1, 1.6.2, 1.7.2		4.2.1, 4.4.2, 4.5.1, 4.5.2, 4.7.2, 4.11.1	
7.5	1.2.1, 1.2.2, 1.5.2, 1.6.1, 1.6.2, 1.7.2		4.2.1, 4.4.2, 4.5.1, 4.5.2, 4.7.2	



Table 2: National QUM Indicators mapped to each action item of the NSQHS Standards

National QUM Indicators	National Safety and Quality Health Service Standard items				
	1.2.1	1.2.2	1.5.2	1.6.1	1.6.2
National QUM Indicators 1	1.1, 1.2, 1.3, 1.4, 1.5, 1.6,	1.1, 1.2, 1.3, 1.4, 1.5, 1.6,	1.1, 1.2, 1.3, 1.4, 1.5, 1.6,	1.1, 1.2, 1.3, 1.4, 1.5, 1.6,	1.1, 1.2, 1.3, 1.4, 1.5, 1.6,
National QUM Indicators 2	2.1, 2.2, 2.3, 2.4, 2.5	2.1, 2.2, 2.3, 2.4, 2.5	2.1, 2.2, 2.3, 2.4, 2.5	2.1, 2.2, 2.3, 2.4, 2.5	2.1, 2.2, 2.3, 2.4, 2.5
National QUM Indicators 3	3.1, 3.2, 3.3, 3.4, 3.5, 3.6	3.1, 3.2, 3.3, 3.4, 3.5, 3.6	3.1, 3.2, 3.3, 3.4, 3.5, 3.6	3.1, 3.2, 3.3, 3.4, 3.5, 3.6	3.1, 3.2, 3.3, 3.4, 3.5, 3.6
National QUM Indicators 4	4.1, 4.2	4.1, 4.2	4.1, 4.2	4.1, 4.2	4.1, 4.2
National QUM Indicators 5	5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9	5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9	5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9	5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9	5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9
National QUM Indicators 6	6.1, 6.2, 6.3, 6.4	6.1, 6.2, 6.3, 6.4	6.1, 6.2, 6.3, 6.4	6.1, 6.2, 6.3, 6.4	6.1, 6.2, 6.3, 6.4
National QUM Indicators 7	7.1, 7.2, 7.3, 7.4, 7.5	7.1, 7.2, 7.3, 7.4, 7.5	7.1, 7.2, 7.3, 7.4, 7.5	7.1, 7.2, 7.3, 7.4, 7.5	7.1, 7.2, 7.3, 7.4, 7.5

National QUM Indicators	National Safety and Quality Health Service Standard items					
	1.7.2	1.8.1	1.8.2	1.18.1	1.18.2	1.18.3
National QUM Indicators 1	1.1, 1.2, 1.3, 1.4	1.1, 1.5				
National QUM Indicators 2	2.1, 2.2, 2.5	2.4				
National QUM Indicators 3	3.6	3.2				
National QUM Indicators 4				4.2		
National QUM Indicators 5	5.1, 5.2		5.4, 5.5, 5.6	5.4, 5.5, 5.6, 5.9		
National QUM Indicators 6		6.2				
National QUM Indicators 7	7.2, 7.4, 7.5		7.3	7.3	7.3	7.3

Appendix 1

Table 2: National QUM Indicators mapped to each action item of the NSQHS Standards
(continued)

National QUM Indicators	National Safety and Quality Health Service Standard items							
	3.1.1	3.1.2	3.4.1	3.4.2	3.4.3	3.14.1	3.14.3	3.14.4
National QUM Indicators 1								
National QUM Indicators 2	2.1, 2.2, 2.3, 2.4, 2.5	2.1, 2.2, 2.5	2.1, 2.2, 2.3, 2.4, 2.5	2.1, 2.2, 2.3, 2.4, 2.5	2.1, 2.2, 2.3, 2.4, 2.5	2.1, 2.2, 2.3, 2.5	2.1, 2.2, 2.3, 2.4, 2.5	2.1, 2.2, 2.3, 2.4, 2.5
National QUM Indicators 3								
National QUM Indicators 4								
National QUM Indicators 5								
National QUM Indicators 6								
National QUM Indicators 7								

National QUM Indicators	National Safety and Quality Health Service Standard items				
	4.1.1	4.1.2	4.2.1	4.2.2	4.3.2
National QUM Indicators 1	1.4		1.1, 1.2, 1.3, 1.4, 1.5, 1.6,	1.1, 1.2, 1.3, 1.4, 1.5, 1.6,	
National QUM Indicators 2	2.2		2.1, 2.2, 2.3, 2.4, 2.5	2.1, 2.2, 2.3, 2.4, 2.5	2.2
National QUM Indicators 3	3.2, 3.3		3.1, 3.2, 3.3, 3.4, 3.5, 3.6	3.1, 3.2, 3.3, 3.4, 3.5, 3.6	
National QUM Indicators 4			4.1, 4.2	4.1, 4.2	
National QUM Indicators 5		5.1, 5.2, 5.3, 5.4, 5.5, 5.7, 5.8, 5.9	5.6	5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9	
National QUM Indicators 6	6.4	6.1, 6.2, 6.3, 6.4		6.1, 6.2, 6.3, 6.4	
National QUM Indicators 7	7.1		7.1, 7.2, 7.3, 7.4, 7.5		



Table 2: National QUM Indicators mapped to each action item of the NSQHS Standards (continued)

National QUM Indicators	National Safety and Quality Health Service Standard items				
	4.3.3	4.4.2	4.5.1	4.5.2	4.6.1
National QUM Indicators 1			1.1, 1.2, 1.3, 1.4, 1.5, 1.6,	1.1, 1.2, 1.3, 1.4, 1.5, 1.6,	
National QUM Indicators 2	2.2		2.1, 2.2, 2.3, 2.4, 2.5	2.1, 2.2, 2.3, 2.4, 2.5	
National QUM Indicators 3		3.2, 3.3, 3.4, 3.5	3.1, 3.2, 3.3, 3.4, 3.5, 3.6	3.1, 3.2, 3.3, 3.4, 3.5, 3.6	3.1, 3.2
National QUM Indicators 4			4.1, 4.2	4.1, 4.2	
National QUM Indicators 5		5.5	5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9	5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9	
National QUM Indicators 6		6.1	6.1, 6.2, 6.3, 6.4	6.1, 6.2, 6.3, 6.4	6.2
National QUM Indicators 7		7.1, 7.2, 7.4, 7.5	7.1, 7.2, 7.3, 7.4, 7.5	7.1, 7.2, 7.3, 7.4, 7.5	

National QUM Indicators	National Safety and Quality Health Service Standard items				
	4.7.1	4.7.2	4.8.1	4.10.1	4.10.2
National QUM Indicators 1					
National QUM Indicators 2					
National QUM Indicators 3	3.2	3.1	3.1		
National QUM Indicators 4					
National QUM Indicators 5	5.5	5.5, 5.9	5.3, 5.8		
National QUM Indicators 6				6.1	6.1
National QUM Indicators 7		7.2, 7.4, 7.5			

Appendix 1

Table 2: National QUM Indicators mapped to each action item of the NSQHS Standards
(continued)

National QUM Indicators	National Safety and Quality Health Service Standard items				
	4.10.6	4.11.1	4.11.2	4.12.1	4.12.2
National QUM Indicators 1		1.1, 1.2, 1.3, 1.5			
National QUM Indicators 2		2.3			
National QUM Indicators 3		3.5, 3.6		3.1	
National QUM Indicators 4		4.1, 4.2			
National QUM Indicators 5		5.4		5.3, 5.8, 5.9	5.9
National QUM Indicators 6	6.1	6.1, 6.3	6.1		
National QUM Indicators 7		7.2, 7.4			

National QUM Indicators	National Safety and Quality Health Service Standard items					
	4.12.3	4.12.4	4.13.1	4.13.2	4.14.1	4.15.1
National QUM Indicators 1						
National QUM Indicators 2						
National QUM Indicators 3	3.1	3.1				
National QUM Indicators 4			4.2	4.2	4.2	
National QUM Indicators 5	5.3, 5.8	5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9	5.4, 5.5, 5.6, 5.9	5.4, 5.6	5.4, 5.6	5.9
National QUM Indicators 6						
National QUM Indicators 7			7.3	7.3	7.3	7.3



Table 2: National QUM Indicators mapped to each action item of the NSQHS Standards (continued)

National QUM Indicators	National Safety and Quality Health Service Standard items					
	6.1.1	6.2.1	6.3.1	6.4.1	6.4.2	6.5.1
National QUM Indicators 1						
National QUM Indicators 2						
National QUM Indicators 3	3.1, 3.2	3.1, 3.2	3.1, 3.2			
National QUM Indicators 4	4.2	4.2	4.2	4.2	4.2	
National QUM Indicators 5	5.3, 5.4, 5.5, 5.6, 5.9	5.3, 5.4, 5.5, 5.6, 5.9	5.3, 5.4, 5.5, 5.6, 5.9	5.3, 5.4, 5.5, 5.6, 5.8, 5.9		5.3, 5.8, 5.9
National QUM Indicators 6						
National QUM Indicators 7						

Appendix 2

Development of the National QUM Indicators

Development and finalisation of the National Quality Use of Medicines Indicators for Australian Hospitals (National QUM Indicators) was an extensive process involving health service organisations and individuals. The process was similar to that used to develop and finalise the Indicators for Quality Use of Medicines in Australian Hospitals Version 1 (2007 QUM indicator set) published in 2007, and which is detailed below. The project commenced with a review of the 2007 QUM indicator set.

Review of the 2007 QUM indicator set

A review of the 2007 QUM indicator set was undertaken during 2011, including a user survey investigating uptake and user-applied modifications.¹ A literature search for relevant evidence relating to each indicator since 2007 was conducted and key individuals and organisations were consulted.

A review committee was convened to review the survey results and consultation feedback, advise on requirements for further consultation and field testing and assist with decision making regarding the final indicators. Following this initial consultation process, an expert advisory committee (EAC) was convened for the ongoing development and updating of the 2007 QUM indicator set. The EAC included individuals with appropriate expertise. Many EAC members had been involved in the 2007 QUM indicator set development and were familiar with the process and criteria for indicator development.

Further consultation regarding proposed revised indicators was conducted with key individuals and organisations. Various NSW TAG committees also provided feedback on aspects of the proposed indicators.

The EAC recommended that four of the original 30 indicators undergo field testing as the recommended revisions to their specifications were large enough to require confirmation of validity, measurability and clarity. The remainder of the QUM indicators were modified to include updated references as appropriate, information regarding the relevant application to the National Safety and Quality Health Service Standards² and updated sampling guidance.

QUM indicators for continuity of medicine management at discharge

The EAC oversaw development of new QUM indicators on continuity of medicines management at discharge. A literature search was conducted to identify existing indicators looking at medication reconciliation at discharge. Twelve indicators were identified from Australian and international indicator sets. The relevance of these indicators to the Australian healthcare environment was considered by the EAC. Two indicator themes addressing current QUM gaps in Australian hospitals were identified: medication lists in hospital discharge summaries and medication lists provided to patients and/or their carers.

A minimum of three hospitals field tested each indicator to ensure validity, measurability, clarity, usefulness and potential for comparability.

Two new indicators addressing medicines management at discharge have been added to Section 5 Continuity of Care in the National QUM Indicators.

QUM indicators for acute mental health care

A multidisciplinary Mental Health QUM Indicator EAC was convened and a literature search conducted to identify existing indicators for medication processes in acute mental health care. The relevance of indicators identified from Australian and international clinical audit sets to the acute mental health care environment in Australia was considered. Relevant national organisations and key individuals were contacted regarding current QUM gaps in acute mental health care. These processes identified sixteen potential indicators that could address current QUM gaps in Australian hospitals. Evaluation of these indicators, using a formal decision algorithm previously developed and used for the 2007 QUM indicator set (Figure 1) enabled selection of nine potentially useful indicators. Due to resource constraints, the Mental Health QUM Indicator EAC selected five indicators for field testing based on feasibility and the significance of the QUM gaps in acute mental health care. Each indicator was field tested in a minimum of four Australian hospitals. All five were found to be valid and useful indicators.



Field testing

Ethics approval was obtained for the field testing phase of the project. The four revised and seven new candidate indicators were tested by multidisciplinary clinical teams in 19 hospitals in three Australian states, including public, private, large, small, metropolitan and regional hospitals. The majority of hospitals used the developed data collection tools and provided summarised results and feedback regarding the indicator and tool. Results and feedback were reviewed by the Expert Advisory Committees and each indicator was finalised.

Mapping the National QUM Indicators to the National Safety and Quality Health Service Standards²

The National QUM indicators manual includes:

- a table of individual indicators mapped to the NSQHS Standards
- reference to the relevant NSQHS Standards in individual indicator specifications.

The National QUM Indicators have been mapped against the NSQHS Standards in order to guide how the indicators can assist meeting the action items required for each standard.

Data collection tools for each indicator

Data collection tools have been developed for all National QUM Indicators. The tools were developed for field testing of the National QUM Indicators and modified in response to feedback from sites. The data collection tools are intended to assist hospitals and health professionals using the National QUM Indicators, promote quality improvement and assist hospitals providing evidence for accreditation purposes. Standardised tools are also useful for multi-site projects or benchmarking activities where consistency in data collection is important.

Revised and expanded guidance for quality improvement sampling methodology

Review of the 2007 QUM indicator set, recent field testing and international literature³⁻⁵ revealed a lack of guidance regarding sampling options for local quality improvement activities. This was considered a significant barrier to utilising the indicators and subsequent interventions. Additional guidance was developed following a targeted literature review and targeted consultation that will assist health services to conduct successful local quality improvement activities. This has been included in the section *Using the National Quality Use of Medicines Indicators for Australian Hospitals*. The guidance addresses factors such as how to determine sample size and select a sample, how often to undertake clinical audit and how often to monitor changes over time.

Development of the 2007 QUM indicator set

The development of the Indicators for QUM in Australian Hospitals 2007 involved revision of two NSW TAG indicator manuals previously used in Australian hospitals.^{6,7} The previous indicator sets were modelled on a manual of indicators to evaluate the QUM component of the National Medicines Policy developed by the Pharmaceutical Health and Rational Use of Medicines Committee⁸ in response to the World Health Organization's recommendations for developing and monitoring medicinal drug policies.⁹

The first step in the development involved an extensive literature review to identify indicators related to QUM that had been developed and/or used in Australia or internationally. Novel indicators were also proposed based on evidence-practice gaps in health care¹⁰⁻¹² and other national medication management guidelines.¹³ The indicators were mapped to the medication management pathway¹⁴ to ensure all stages of the medication management process were covered. More than 500 indicators were identified during this step.

Appendix 2

The second step involved selection of indicators for possible testing from those identified in step one based on the following principles:

- the indicators were likely to drive clinical practice and/or system improvement
- there was evidence that the highlighted practice would result in improved outcomes
- there was evidence of an important gap in hospital practice
- the indicators were likely to be meaningful for a variety of hospitals and useful to a variety of clinical and administrative groups.

This step resulted in the selection of 120 potential QUM indicators.

A formal algorithm was developed to facilitate further refinement of this list (see Figure 1). Application of this algorithm resulted in a set of 52 candidate indicators for field testing.

The 52 candidate indicators were tested by multidisciplinary clinical teams in 31 hospitals in five Australian states, including public, private, large, small, metropolitan and regional hospitals. The following parameters were evaluated during testing:

- content validity – the indicator content is evidence-based
- face validity – the indicator is accepted as relevant by clinicians
- measurability – the data to inform the indicator measurement can be collected with reasonable effort
- clarity – the indicator specifications can be easily and consistently understood and are considered appropriate
- usefulness – clinicians, departments, hospitals, health services would use the indicator to guide a change in practice
- comparability – the indicator is suitable for intra-hospital and inter-hospital comparison over time.

As a result of this step, a number of indicators were rejected or were identified as requiring further research and/or refinement before they could be widely used.

The final indicator set consisted of thirty indicators in the following areas of practice:

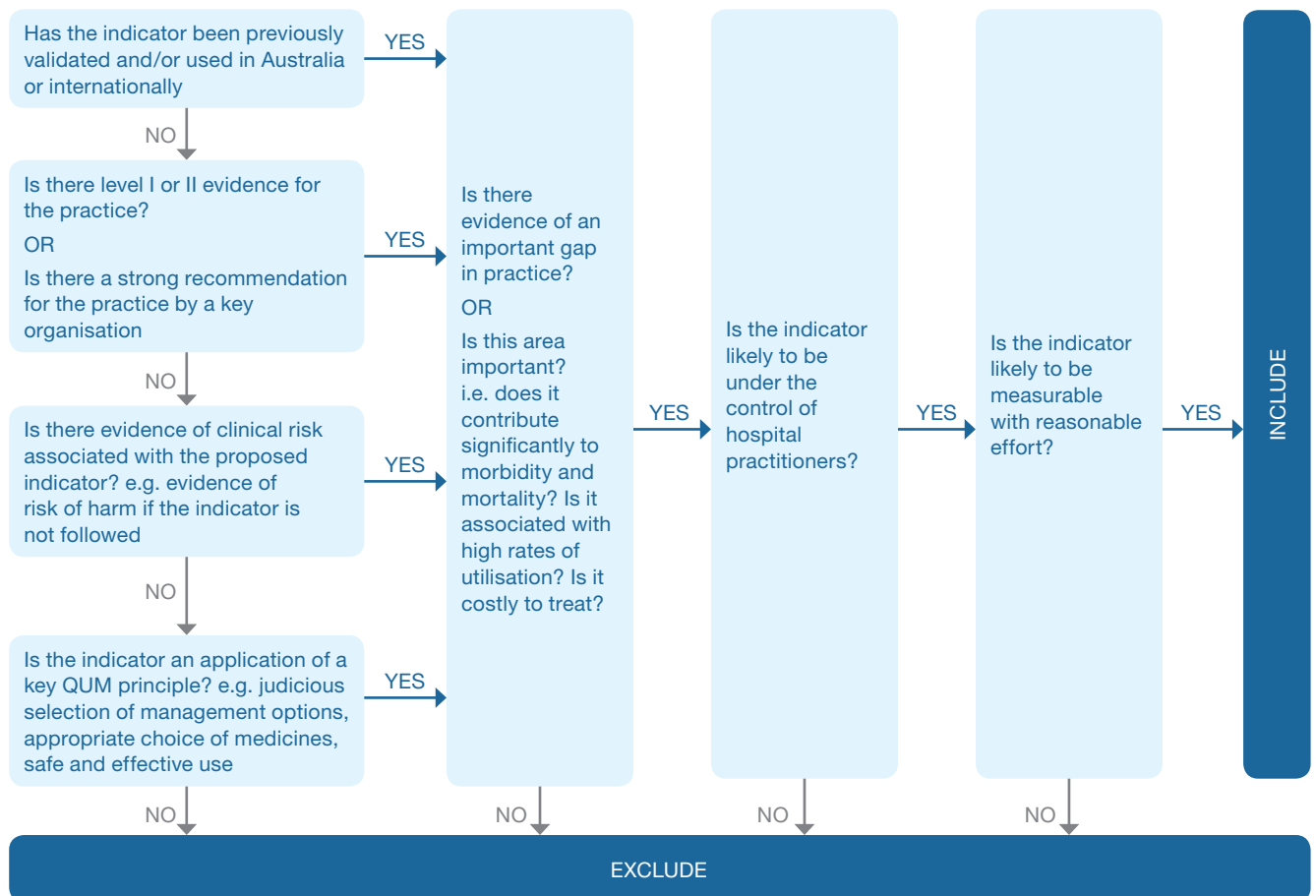
- antithrombotic therapy
- antibiotic therapy
- medication ordering
- pain management
- continuity of care
- hospital-wide medication management policies.

Wherever possible, indicator specifications were aligned with other indicator sets and with standard data definitions so that data sets and collection processes were not duplicated.

The indicators did not cover every aspect of QUM in hospitals. Many indicators regarding important aspects of QUM were not included for various reasons. Future refinement, and the addition of other QUM indicators, was envisaged when the 2007 QUM indicator set was published.



Figure 1: Formal decision algorithm



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Appendix 3

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- Ms Gillian Sharratt, Executive Officer
- Ms Katie Kerr, Lead Project Officer
- Mr Andrew Hargreaves, EMM Project Officer
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- Redland and Wynnum Hospitals, Queensland
- Royal Prince Alfred Hospital, NSW
- St George Hospital, NSW
- St Vincent's Hospital, Sydney, NSW
- St Vincent's Private Hospital, Sydney, NSW
- The Alfred Hospital, Victoria
- The Children's Hospital at Westmead, NSW
- The Royal Hospital for Women, NSW

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Key organisations and individuals who assisted with the National QUM Indicators project are listed in Appendix 4.

Appendix 4

Key contributors

Organisations and individuals providing input into the development of the National QUM Indicators 2014.

Organisations

- Australian Commission on Safety and Quality in Health Care High 5s Medication Reconciliation Project participants
- Australian Commission on Safety and Quality in Health Care Anticoagulation Working Group
- Australian Commission on Safety and Quality in Health Care Antimicrobial Stewardship Advisory Committee
- Australian Council on Healthcare Standards
- Australasian College of Emergency Medicine
- Cancer Institute NSW
- Children's Hospitals Australasia Medication Safety Special Interest Group
- Clinical Excellence Commission Continuity of Medication Management Expert Advisory Group
- Heart Foundation of Australia
- Justice Health & Forensic Mental Health Network, NSW
- NPS MedicineWise
- NSW Expert Group on Multiple Resistant Organisms
- NSW TAG DUE Support Group
- NSW TAG Editorial Committee
- NSW TAG General Committee
- NSW TAG SAFER Medicines Group
- Royal Australian and New Zealand College of Psychiatrists
- Society of Hospital Pharmacists of Australia Committee of Specialty Practice in Mental Health
- Society of Hospital Pharmacists of Australia Committee of Specialty Practice in Medication Safety
- The Cardiac Society of Australia and New Zealand
- The Thoracic Society of Australia and New Zealand



Appendix 4

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