

A health IT-related classification system*

The Australian Commission on Safety and Quality in Health Care (the Commission) is an Australian Government agency that leads and coordinates national improvements in the safety and quality of health care based on the best available evidence. By working in partnership with patients, carers, clinicians, the Australian, state and territory health systems, the private sector, managers and healthcare organisations, the Commission aims to ensure that the health system is better informed, supported and organised to deliver safe and high-quality care.

The development of standardised taxonomies to describe clinical incidents related to EMM systems continues to be a challenge in Australia and internationally with a multitude of classifications available for implementation.

Australia required a standardised health IT-related incident classification system that provides a unified and consensus-based approach that can be readily applied during the EMM implementation process. This led to the development of [Guidance for hospitals: Classifying EMM-related adverse events and incidents](#) (the Guidance).

For problems associated with IT systems used in healthcare

This classification system developed by Magrabi and colleagues describes problems associated with the use of health information technology (health IT) systems. It was developed by examining 'natural categories' of problems described in incidents from a range of health care settings in Australia, the USA and England.

The classification system is grouped into four dimensions which cover the spectrum of problems associated with clinical information systems (CIS) including:

1. Availability and infrastructure
2. Using CIS
3. CIS issues
4. Transitions and need for vigilance.

The overall schema is given in Figure 1 and detailed explanations (or examples) of all problem categories are included in Table 1.

Background: The classification was initially validated in Australia,¹ and then expanded with new categories of software problems using incidents from the US Food and Drug Administration over a 30-month period.² It was subsequently validated with 850 incidents reported in the English National Health Service over a 6-year period,³ and a further 90 incidents reported by Australian GPs over a 19-month period.⁴ The validation was supported by a 2017 systematic review of problems with health IT systems⁵ which included 34 studies.

In 2017 a literature review was published by the Commission about approaches for investigating health IT incidents. The literature review identified that this classification system was used in 56% (n=10) of the 18 incident investigations that were examined.⁶ An update of this literature review, published by the Commission in 2019, reconfirmed that the Magrabi et al classification system as commonly cited and widely used to classify health IT-related incidents.⁷

Beyond the published literature, this classification was endorsed by the American Nursing Informatics Association through their position paper on IT safety.⁸ It has been used by multiple government agencies and patient safety organisations including the Australian Digital Health Agency; the US Joint Commission; and the Emergency Care Research Institute (ECRI).

In 2019, it was adopted by ISO, the International Organization for Standardization as the basis for a new technical specification to improve reporting about the safety of health software (www.iso.org/obp/ui/#iso:std:iso:ts:20405:ed-1:v1:en).

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Figure 1: A classification for problems reported in patient safety incidents involving CIS

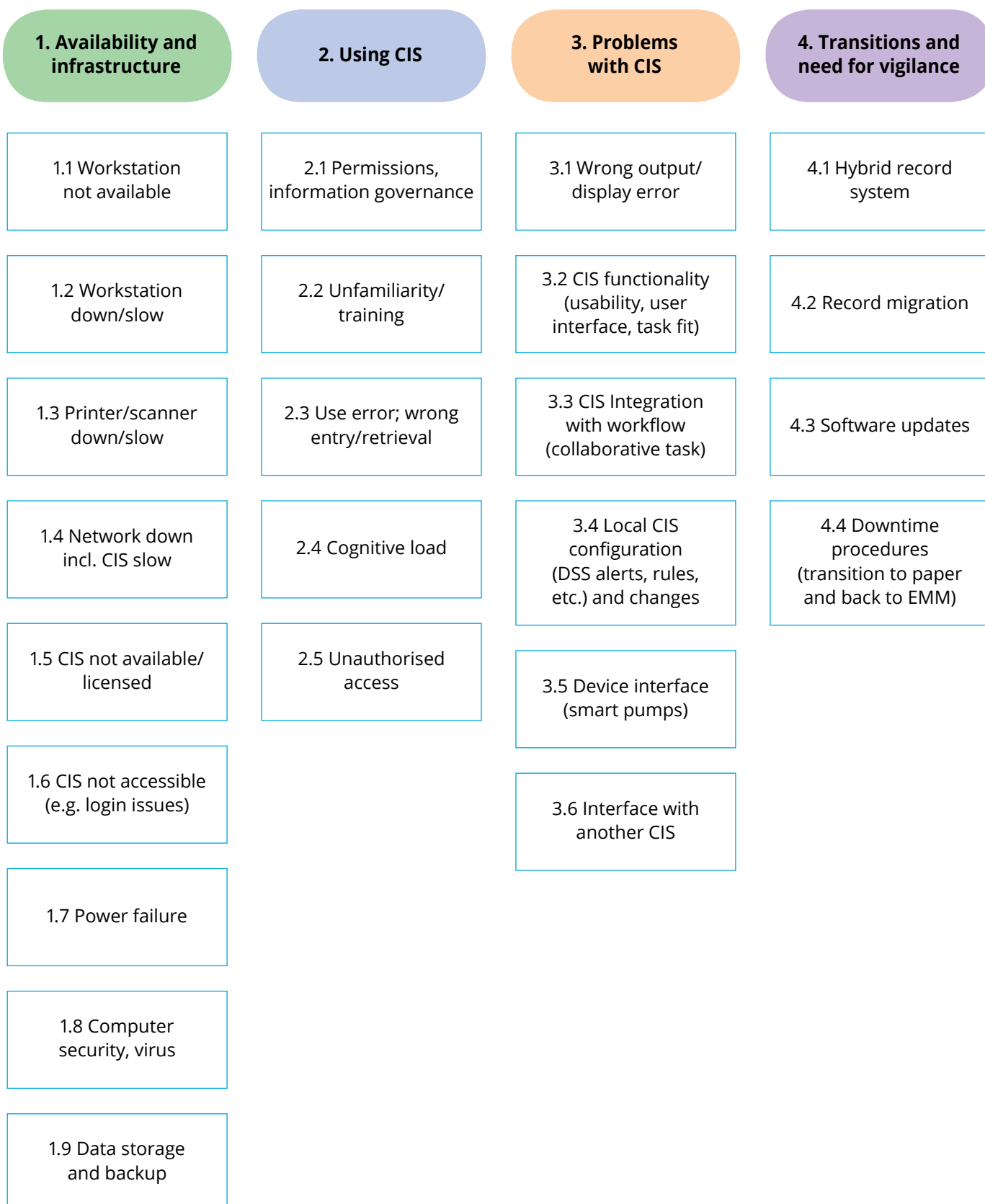


Table 1: Categories of problems involving clinical information systems (CIS)

| Dimension | Category | Explanation/example |
|---|--|--|
| 1. Availability and infrastructure | 1.1 Workstation not available | No workstation was available for clinician to access CIS |
| | 1.2 Workstation down/slow | Workstation was not functioning or slow |
| | 1.3 Printer/scanner down/slow | A scanner, keyboard, mouse, computer display or printer was not functioning or slow |
| | 1.4 Network down incl. CIS slow | A hospital computer network was not available or only partially available due to planned maintenance or an unplanned incident |
| | 1.5 CIS not available/licensed | Software required to view images was not available or the license has expired |
| | 1.6 CIS not accessible (e.g. login issues) | Software did not allow a user to log on |
| | 1.7 Power failure | Any disruption to the power supply, for example: <ul style="list-style-type: none"> Following a storm or routine maintenance |
| | 1.8 Computer security, virus | An attack by malware including computer viruses or ransomware |
| | 1.9 Data storage and backup | A problem with the storage and access to historical data, for example: <ul style="list-style-type: none"> Offsite archive got corrupted or could not be accessed |
| 2. Using CIS | 2.1 Permissions, information governance | Any issue with accessing information with the CIS, for example: <ul style="list-style-type: none"> Clinicians were unable to access critical test results from a previous hospital admission because the results of certain tests were only visible to the ordering clinician due to privacy considerations |
| | 2.2 Unfamiliarity/training | Users were not trained or they were not familiar with certain functions due to gaps in the training program |
| | 2.3 Use error; wrong entry/retrieval | Any error is using CIS that leads to wrong entry or retrieval of information, for example: <ul style="list-style-type: none"> Doctor prescribed the wrong medication Nurse did not retrieve the final page of a patient's discharge summary |
| | 2.4 Cognitive load | User interrupted or multi-tasking while using CIS |
| | 2.5 Unauthorised access | Data breach, patient records are lost or subjected to unauthorised access or disclosure, for example: <ul style="list-style-type: none"> User did not log-off CIS Patient records are stolen by a hacker or malicious attack |

| Dimension | Category | Explanation/example |
|--|---|---|
| 3. Problems with CIS | 3.1 Wrong output/display error | Errors in the information output/displayed by CIS, for example: <ul style="list-style-type: none"> ■ The printout of a prescription did not match medicines displayed on the computer screen ■ The dose and strength of a medicine was missing from a label printed by a system |
| | 3.2 CIS functionality (usability, user interface, task fit) | Issues with the functionality and usability of CIS i.e. CIS does not fit task, for example: <ul style="list-style-type: none"> ■ Software did not save entries into the medical record ■ Drop-down list with multiple options arranged in a counterintuitive manner |
| | 3.3 CIS Integration with workflow (collaborative task) | CIS is not integrated with workflow i.e. CIS not integrated with collaborative task, for example: <ul style="list-style-type: none"> ■ A nurse not able to review medication chart at the time of administration because the system was not accessible at patient's bedside |
| | 3.4 Local CIS configuration (DSS alerts, rules, etc.) and changes | Problem with configuration of CIS for local clinical practice, for example: <ul style="list-style-type: none"> ■ Decision support system not set up or incorrectly set up, and system allows duplicate drug to be ordered ■ Local antibiotic guidelines not implemented as 'rules' within the decision support system |
| | 3.5 Device interface (smart pumps) | Issues at the interface between CIS and medical devices, for example: <ul style="list-style-type: none"> ■ Interface with smart pump not working ■ Dose correct in the CIS but incorrectly displayed on the smart pump |
| | 3.6 Interface with another CIS | Issues at the interface between CIS and another CIS, for example: <ul style="list-style-type: none"> ■ Medication orders not listed in the pharmacy dispensing system due to a problem with the software interface between the two systems |
| 4. Transitions and need for vigilance | 4.1 Hybrid record system | Some patient information kept electronically and some on paper-based records due to partial implementation of CIS |
| | 4.2 Record migration | Migration of historical medical records to new CIS introduces errors into the record, for example: <ul style="list-style-type: none"> ■ Old prescriptions displayed within the current medication chart or medicines list |
| | 4.3 Software updates | Problems with routine updates to software packages and drug databases |
| | 4.4 Downtime procedures (transition to paper and back to EMM) | Missing or inadequate safety practices for instances in which clinicians cannot access all or part of the CIS |

References

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Questions?

For more information, please visit: safetyandquality.gov.au/electronic-medication-management

You can also contact the eHealth and Medication Safety team at: mail@safetyandquality.gov.au