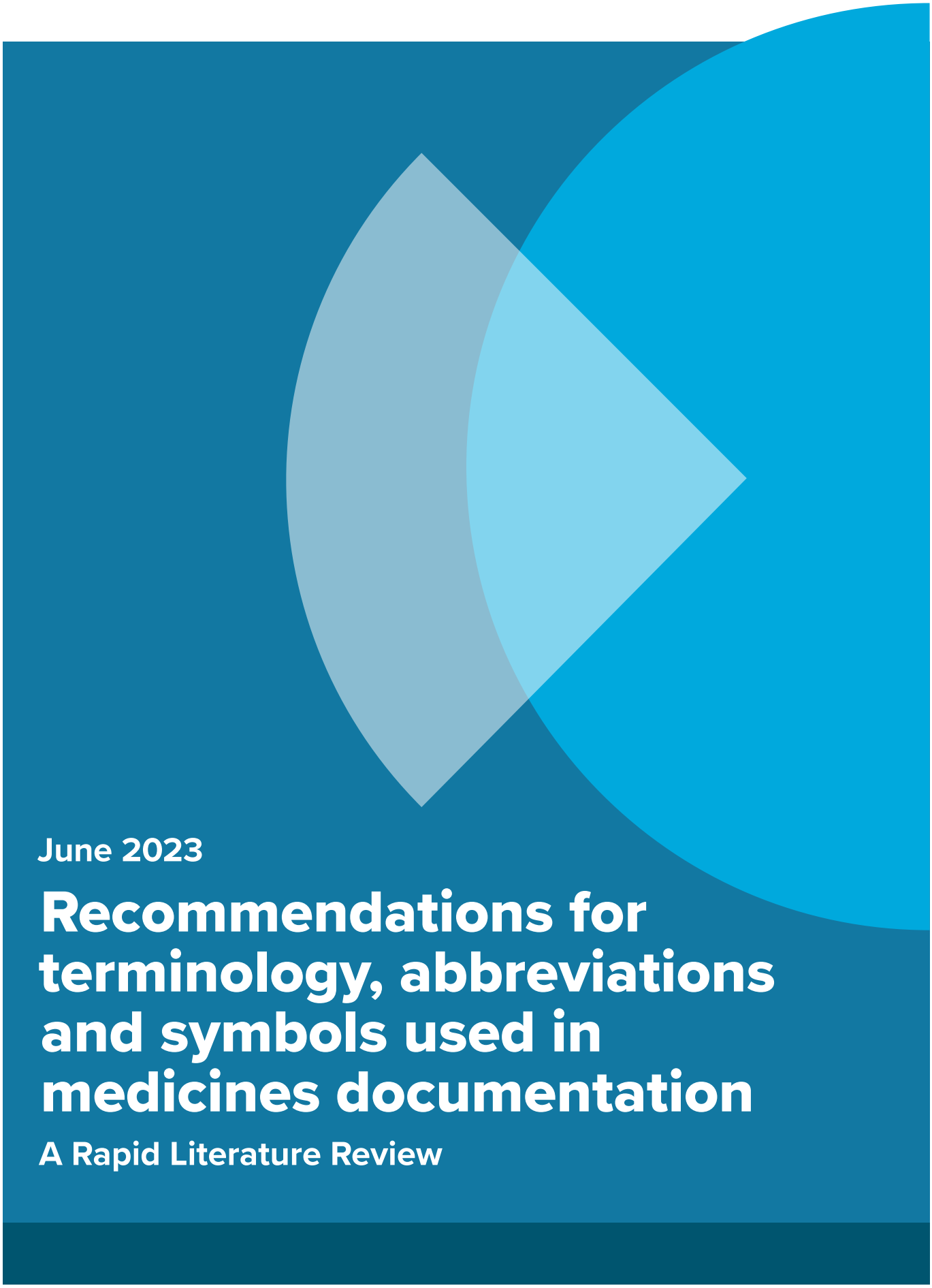
AUSTRALIAN COMMISSION
ON SAFETY AND QUALITY IN HEALTH CARE



June 2023

Recommendations for terminology, abbreviations and symbols used in medicines documentation

A Rapid Literature Review

Published by the Australian Commission on Safety and Quality in Health Care

Level 5, 255 Elizabeth Street, Sydney NSW 2000
Phone: (02) 9126 3600
Email: **mail@safetyandquality.gov.au**
Website: **www.safetyandquality.gov.au**

ISBN: 978-1-922880-48-2

The Commission's preference is that you attribute this publication (and any material sourced from it) using the following citation:

Australian Commission on Safety and Quality in Health Care. Recommendation for terminology, abbreviations and symbols used in medicines documentation. A Rapid Literature Review. Sydney: ACSQHC; 2023

Disclaimer

The content of this document is published in good faith by the Commission for information purposes. The document is not intended to provide guidance on particular healthcare choices. You should contact your health care provider for information or advice on particular healthcare choices.

The Commission does not accept any legal liability for any injury, loss or damage incurred by the use of, or reliance on, this document.

Preface

The Australian Commission on Safety and Quality in Health Care (the Commission) has a commitment to promote, support and encourage safety and quality in use of medicines. The Commission is established to contribute to improve health outcomes and experiences for all patients and consumers, and improved value and sustainability in the health system by leading and coordinating national improvements in the safety and quality of health care.

The *Recommendations for terminology, abbreviations and symbols used in medicines documentation: A Rapid Literature Review* (the Rapid literature review) was conducted for the Commission in 2023 by a team from Macquarie University, Australian Institute of Healthcare Innovation, led by Dr Magda Raban.

The Rapid literature review aims to provide relevant and useful information for the Commission's medication safety stakeholders, including health service organisations and Australian Government agencies.

Background

In December 2016, the Commission published ***Recommendations for terminology, abbreviations and symbols used in medicines documentation*** (the 2016 Publication). The objective of this publication is to ensure medication errors are prevented by clarifying the appropriate and inappropriate use of abbreviations and dose expressions in health care settings.

Since 2016, several international organisations have published updated guidance on medicines documentation. For example, in February 2021, the Institute for Safe Medication Practices (ISMP) based in the USA published an updated **list of error-prone abbreviations** addressing the diverse range of medication-related technologies that are now used in contemporary health care settings.

An evolving digital landscape in contemporary acute health care settings may have also introduced misleading changes in terminology, abbreviations, and symbols used in Australia. For instance, digital transformation in Australian health care settings contributed to managing the COVID-19 pandemic, which may have paved the way for new terminology, abbreviations and symbols.

In December 2022, the Commission sought a Rapid literature review and environmental scan to gain advice on the possible issues arising from the rapidly expanding digital health environment to inform the update of the 2016 Publication. As such, its future update will maintain principles for safe, clear, and consistent terminology and abbreviations for medicines and dose designations when documented in both paper-based and digital health environments.

This Rapid literature review has considered the safety issues related to incidents and reports regarding the use of safe and unsafe abbreviations, terminology and symbols, drawn from relevant literature; policies, policy directives and/or standards; and the Commission's issues registers from 1 January 2017 to January 2023.

Key findings and recommendations

Based upon the literature, international developments and feedback from medication safety stakeholders within the Australian states and territories, the authors of the Rapid literature review proposed several changes to the 2016 Publication:

- Enhance the differentiation between application within the paper-based versus digital environments
- Ensure the scope with respect to digital devices is clear
- Include additional examples of abbreviations and symbols to avoid
- Expand the guidance related to abbreviations and terminology for modified-release medicines
- Include advice on risk assessment when deviating from the Commission's ***Recommendations for terminology, abbreviations and symbols used in medicines and documentation***.

The authors also noted that there were limited reports available on medicines documentation for emerging digital health technologies, and an "... increased risk in communications of medicines information ..." as standalone digital health systems may lose the benefits of standardisation as they become less centralised.

Appendix 3 provides a summary of the key differences identified within the 2016 Publication during the Rapid literature review from both international and Australian sources. Some of the 'dos' and 'don'ts' may provide useful and specific examples for appropriate documentation within digital health environments.

Next steps for the Commission

The Commission will use the findings from the Rapid literature review to inform the review of the 2016 Publication in ongoing consultation with key stakeholders.

Of note is that the **National guidelines for the on-screen display of medicines information** (2017), which are aligned and referenced in the 2016 Publication, are undergoing a separate review in 2023. As a result of these changes, the 2016 Publication also needs to remain contemporary and suitable to recommend for use within health care settings, by healthcare professionals, and the medical software industry.

AUSTRALIAN INSTITUTE
OF HEALTH INNOVATION
Faculty of Medicine, Health and Human Sciences

MACQUARIE University

Recommendations for terminology, abbreviations and symbols used in medicines documentation

A RAPID LITERATURE REVIEW

Authors: Dr Magdalena Z Raban, Alison Merchant, Erin Fitzpatrick, Prof. Farah Magrabi

AUSTRALIAN INSTITUTE
OF HEALTH INNOVATION
Faculty of Medicine, Health and Human Sciences

MACQUARIE University

L6, 75 Talavera Road
North Ryde, NSW 2113
T: (02) 9850 2400
mq.edu.au

ABN 90 952 801 237
CRICOS Provider 00002J

Prepared for the Australian Commission on Safety and Quality in Health Care by:

Dr Magdalena Z Raban
Alison Merchant
Erin Fitzpatrick
Prof. Farah Magrabi

Australian Institute of Health Innovation
Faculty of Medicine, Health and Human Sciences
Macquarie University

Contents

Overview

The Australian Commission on Safety and Quality in Health Care (the Commission) was established to contribute to improved health outcomes and experiences for all patients and consumers, and improved value and sustainability in the health system by leading and coordinating national improvements in the safety and quality of health care. As part of this work, the Commission published *Recommendations for terminology, abbreviations and symbols used in medicines documentation*[1] is in 2016 (referred to as the 'Commission's 2016 recommendations' in this report). However, an evolving landscape, including an updated list of error-prone abbreviations by the Institute for Safe Medication Practices (ISMP) and a changing digital landscape, requires a review of the recommendations to ensure that they remain contemporary and suitable for use within health care settings, by healthcare professionals and the medical software industry.

Research questions

The overarching aim of this project was to identify areas for updating the Commission's *Recommendations for terminology, abbreviations and symbols used in medicines documentation*[1], through a rapid literature review. Specifically, the review's objectives were to:

- Draw on existing international and local jurisdiction guidelines and documents to identify gaps and areas for strengthening of the 2016 recommendations
- Investigate the uptake and/or implementation of the 2016 recommendations, including within protocols for electronic medical records
- Consider the emerging digital health technologies and how these may impact recommendations
- Investigate how COVID-19 and its treatment has introduced new terminology and abbreviations
- Identify changes made to policy and policy directives in Australia with regard to clear expression of abbreviations and dosages.

Methods

We searched the grey and peer-reviewed literature for articles, reports and policies discussing the use of medicines terminology, abbreviation or symbols published since 2016. The following sources were searched:

- Websites of key international medication safety bodies (for example, ISMP)
- Websites of tertiary acute care settings (adult and paediatric) within Australia
- Medline via OVID for peer-reviewed literature
- Websites and guidelines from peak health technology bodies relevant to emerging technology
- Australian COVID-19 treatment guidelines.

The full search strategy, including a list of organisation websites searched is provided in **Appendix 1**. All searches were conducted in January 2023. In summary, searches were performed of websites for 16 international organisations from nine different countries, websites for 11 different Australian state health departments or other state based advisory groups, websites for 25 Australian hospitals, websites for 21 other Australian associations or organisations, and websites for over 20 different general pharmacy or medicines resources from both Australia and overseas.

In addition to the sources listed above, the Commission provided a report summarising feedback from the Health Services Medication Expert Advisory Group (HSMEAG) on medicines terminology, abbreviations and symbols. HSMEAG feedback on recommendations was sought in 2022. HSMEAG consists of multi-disciplinary experts from state and territory public and private hospitals. HSMEAG was asked to provide feedback on the uptake and implementation of the Commission's 2016 guidelines, including protocols for electronic medical records (eMR); the impact of emerging digital technologies on terminology, abbreviations and symbols used; the impact of COVID-19 on the terminology, abbreviations and symbols used, and; concerns about the existing 2016 guidelines.

Inclusion and exclusion criteria

Documents were included in this report if they contained information or recommendations on the use of terminology, abbreviations and symbols in medicine documentation and were published in 2016 or onwards. Additionally, published reports of medicine safety incidents where the medicine terminology, abbreviations or symbols may have been a contributor were eligible for inclusion. Documents with recommendations for labelling of products, or; lists of commonly used medical or medicine abbreviations without a recommendation of which are safe, or; examinations of terminology for medication error and adverse event reporting were excluded.

Peer-reviewed articles reporting on the types of medicine abbreviations, terminology and symbols used in paper and electronic prescribing were eligible. Case reports or articles detailing incidents where the medicine documentation contributed to an error were also included.

Data extraction and synthesis

The recommendations in each included resource were examined and compared to the Commission's 2016 recommendations to identify differences, including in the specific examples of safe or unsafe abbreviations, terminology and symbols. The differences are listed throughout the report; however, their inclusion in the report does not imply that they should be adopted by the Commission in its updated recommendations, rather that they be considered for relevance to the Australian context, as well as the updated document's scope and aims.

Additionally, whether each included resource referenced the Commission's 2016 recommendations was noted to provide an overview of the recommendations' uptake. Peer-reviewed literature was summarised narratively and the most frequently used medicine abbreviations reported in included articles were extracted when available. The report of feedback from HMSEAG was summarised.

Results

International guidelines on medicines terminology, abbreviations and symbols

Reports from the following international organisations were identified as containing information or recommendations on medicines terminology, abbreviations and symbols:

- ISMP
- ISMP Canada
- National Coordinating Centre for Medication Error Reporting and Prevention (NCC MERP)
- The Joint Commission
- Health Quality and Safety Commission of New Zealand.

Table 1 provides an overview of the international documents included, whether they contained recommendations not included in the Commission's 2016 recommendations and whether they cite the 2016 recommendations.

Table 1: Summary of content in publicly available international sources on medicine terminology, abbreviations and symbols

Organisation	Document name	Year of publication	Contains additional or different recommendations to the Commission's 2016 document[1]	References the Commission's 2016 document[1]
ISMP	*List of Error-Prone Abbreviations, Symbols, and Dose Designations*[2]	2021	✔	
	FDA and ISMP lists of look-alike drug names with recommended tall man (mixed case) letters[3]	2023	✔	
ISMP Canada	*Reaffirming the Do Not Use: Dangerous Abbreviations, Symbols and Dose Designations' List*[4]	2018	✔	✔
NCC MERP	Secondary Dangerous Abbreviations[5]	2014	✔	
The Joint Commission	*Do Not Use List Fact Sheet*[6]	Unclear	✔	
Health Quality and Safety Commission of New Zealand	*National Medication Chart user guide (third edition)*[7]	2021	✔	

Institute for Safe Medication Practices

Key documents identified from the ISMP covered error-prone abbreviations and an updated list of tall man lettering.

The ISMP published the *List of Error-Prone Abbreviations, Symbols, and Dose Designations* in 2021.[2] The recommendations were based on incident reports to the NCC MERP where abbreviations, symbols and dose designations were linked to medication errors due to misinterpretation. The recommendations state that the listed abbreviations, symbols and dose designations should never be used in any communication (verbal, electronic or handwritten). Recommendations that are mostly relevant to handwritten medicine documentation are flagged in the report, as are recommendations included in The Joint Commission's *Do Not Use List Fact Sheet*[6] (see section below), which are stated as compulsory to include by all sites in their 'do not use' lists. The list of recommendations contains items that are not included in the Commission's 2016 recommendations, which were too numerous to list here.

The ISMP's new guidelines on the use of tall man lettering for medicine names, *FDA and ISMP lists of look-alike drug names with recommended tall man (mixed case) letters,* were published in January 2023.[3] The update is based on an analysis of incident reports, a survey of practitioners (including clinicians), and an internal review.[8] In the supporting information[8], ISMP recognises the mixed empirical evidence of the effectiveness of tall man lettering on reducing medication errors, but states that there remains sufficient evidence, empirical and anecdotal, to suggest tall man letters are a worthwhile medication safety intervention. Key differences between the *FDA and ISMP lists of look-alike drug names with recommended tall man (mixed case) letters*[3] and the Commission's *National Tall Man Lettering List*[9], aside from the medicines listed, is the ISMP advice on capitalisation of the first letter for all brand names and the use of bolded capital letters (see section below on 'Medicine terminology considerations for technology').

Institute for Safe Medication Practices Canada

In 2018, ISMP Canada published a bulletin titled *Reaffirming the 'Do Not Use: Dangerous Abbreviations, Symbols and Dose Designations' List*.[4] The bulletin reports on a review to potentially update to ISMP Canada's 'do not use' list (developed in 2006), based on a literature review and a review of incident reports. It acknowledges that the elimination of dangerous abbreviations, symbols and terminology in medicines communication is increasingly important as patients and their caregivers are given a higher level of access to health information, including through digital records.[4] The 2006 list that is referred to in the bulletin contains the following **'do not use' abbreviations** not listed in the Commission's 2016 recommendations[10]:

- QD, QOD (to mean 'every day' and 'every other day')
- OS, OD, OU (to mean 'left eye', 'right eye', 'both eyes')
- cc (to mean 'cubic centimetre')
- **µg (to mean 'micrograms')**
- @ (to mean 'at').

The ISMP Canada bulletin provides examples of incidents involving abbreviations that have led to errors.[4] The following **'do not use' abbreviations** are not listed in the Commission's recommendations[4]:

- & (to mean 'and')
- SS (to mean 'single strength')
- SL (to mean 'sublingual')
- SC, SQ (to mean 'subcutaneous')
- D (to mean 'daily')
- Abbreviations to denote formulations which are not part of the drug name (for example, CR, LA, SR). The example provided was an incident involving 'Dilaudid IR' which was misread as 'Dilaudid IV'.

The Joint Commission's Do Not Use List Fact Sheet

The Joint Commission's *Do Not Use List Fact Sheet* includes nine items[6], the majority of which are covered by the Commission's 2016 recommendations. The following **'do not use' items** were not present in the 2016 recommendations:

- Q.D., QD, q.d., qd (to mean 'daily')
- Q.O.D, QOD, q.o.d., qod (to mean 'every other day').

NCC MERP's Secondary Dangerous Abbreviations

The NCC MERP website lists dangerous abbreviations.[5] The **'dangerous abbreviations'** not specifically listed in the 2016 recommendations include:

- QD (to mean 'every day')
- QOD (to mean 'every other day')
- SC or SQ (to mean 'subcutaneous')
- TIW (to mean 'three times a week')
- D/C (to mean 'discharge')
- HS (to mean 'half strength')
- cc to mean 'cubic centimetres')
- AU, AS, AD (to mean 'both ears', 'left ear', 'right ear').

Health Quality and Safety Commission of New Zealand

The *National Medication Chart user guide (third edition)* was published in January 2021 and contains a list of 'Commonly used abbreviations' and 'DO NOT USE abbreviation and symbol list'.[7] The **'do not use' list contains** the following abbreviations that are not present in the 2016 recommendations:

- HCl (to mean 'hydrochloric acid')
- HCT (mistaken for 'hydrocortisone' or 'hydrochlorothiazide')
- OD, od, or O.D. (to mean 'daily')
- Q.D, q.d., qd, QD (to mean 'every day' in USA)
- SC (to mean 'subcutaneous')
- SL or S/L (to mean 'sublingual')
- mEq or milliequivalent
- Roman numerals (for example, ii, iv, x).

The following abbreviations are provided as examples of **commonly used** to indicate special release characteristics of medicines:

- CD (to mean 'controlled delivery')
- CR (to mean 'controlled release')
- ER (to mean 'extended release')
- HBS (to mean 'hydrodynamically balanced system with controlled release')
- LA (to mean 'long acting')
- MR (to mean 'modified release')
- SR (to mean 'slow release').

Additionally, the medicines Sinemet and Madopar are provided as examples of multiple ingredient medicines where brand names can be used.

Australian policies and guidelines on medicines terminology, abbreviations and symbols

Publicly available policies, guidelines and reports from the following Australian jurisdictions were identified as containing information or recommendations on medicines terminology, abbreviations and symbols: Australian Capital Territory (ACT), South Australia (SA), Western Australia (WA), and New South Wales (NSW). These are described in **Table 2** which provides an overview of the included documents, whether they contain recommendations that differ to or are not present in the Commission's 2016 recommendations, and whether they reference the Commission's 2016 recommendations.

In addition, in this section we provide a summary of the feedback obtained from HSMEAG in relation to current policies and uptake of the Commission's 2016 recommendations.

Table 2: Summary of content in publicly available Australian sources on medicine terminology, abbreviations, and symbols

Jurisdiction	Document name	Year of publication	Contains additional or different recommendations to the Commission's 2016 document[1]	References the Commission's 2016 document[1]
Australian Capital Territory	ACT Health *Clinical Policy: Medication Handling*[11]	2017	✔	✔
South Australia	SA Health *Spell it Out: Standardised terminology, abbreviations and symbols to be used when communication about medicines*[12]	2018		✔
Western Australia	WA Health *Acceptable prescribing terms and abbreviations*[13]	2017	✔	
	WA Health *Guidelines for the WA Hospital Medication Chart (Adult and Paediatric)*[14]	2022	✔	✔
New South Wales	NSW Health Policy Directive: *Medication handling*[15]	2022	✔	✔
	NSW Health Policy Directive: *Electronic medication management system governance and standards*[16]	2019		✔
	NSW Health Policy directive: *High-Risk Medicines Management*[17]	2020	✔	
	SCHN* Approved abbreviation list for use in medical records[18]	2020	Requires review	✔
	RHW† *Clinical Policies, Procedures and Guidelines: Medication – Prescribing*[19]	2017	Requires review	✔
Other	*Australian Medicines Handbook*[20]	2023		
	CATAG‡ *Position Statement on the use of low-dose methotrexate*[21]	2020		

* Sydney Children's Hospital Network.
† Royal Hospital for Women.
‡ Council of Australian Therapeutic Advisory Groups.

ACT Government and Canberra Health Services

The Australian Capital Territory Government/Canberra Health Services provides recommendations in the *Medication Handling* policy[11], published in July 2017 and updated in 2022. Section 2.2 on 'Consistent Prescribing Terminology' references the Commission recommendations. In addition, the policy provides the following recommendations for **medicines where the brand name should be used**, that were not listed in the 2016 recommendations:

- Combination inhalers (for example, Seretide, Symbicort)
- Pentavite liquid or Ferroliquid
- Insulin products (for example, Actrapid, Novorapid, Novomix 30).

The ACT policy also recommends the following in relation to handwritten and electronic prescriptions with deliberately unusual doses:

- Where a medication order deliberately contains an unusual or dangerous dose, the prescriber must underline the dose and initial beside it. Where using an electronic prescription, some acknowledgement that the dose is deliberately unusual must be made.

However, please see the **Medicine documentation considerations for technology** section for an example of a harmful error occurring due to unclear documentation of an overdose in an in electronic system.[28]

Government of South Australia

SA Health has a policy directive titled *Spell it Out: Standardised terminology, abbreviations and symbols*[12] to be used when communicating about medicines, published in August 2018. This document promotes the use of the Commission's 2016 recommendations, and recommends that sites intending to add further terminology or abbreviations to their lists should do so after a risk assessment.

Government of Western Australia

Key documents include *Acceptable prescribing terms and abbreviations*[13] list published in January 2017; and *Guidelines for the WA Hospital Medication Chart (Adult and Paediatric)*[14] published in 2022. The Guidelines reference the Commission's 2016 recommendations.

The *Acceptable prescribing terms and abbreviations*[13] contains a list, of which the following **acceptable terms** are different to the Commission's 2016 recommendations:

- Use 'both' (instead of 'each') for eye/ear route of administration
- Use 'international units' (instead of 'units').

The *Guidelines for the WA Hospital Medication Chart (Adult and Paediatric)*[14] contain lists of **acceptable abbreviations** in the appendices, of which the following abbreviations are not present in or substantially different to the Commission's 2016 recommendations:

- MA (to mean 'metered aerosol')
- Top (to mean 'topical')
- tds or tid (to mean 'three times a day').

Of relevance are also three tables detailing error-prone **abbreviations that should not be used**[14], which may have additions to the Commission's 2016 recommendations:

- S/C or sc (to mean 'subcutaneous')
- S/L or sl (to mean 'sublingual')
- E (to mean 'eye' or 'ear')
- ug, µg, or mcg (to mean 'microgram')
- d (to mean 'daily')
- QD or qd (to mean 'every day')
- M (to mean 'morning')
- N (to mean 'night')
- 6/24 (to mean 'every six hours')
- X 3d (to mean 'for three days').

New South Wales Health and site-specific guidelines

Key documents identified from NSW Health include the following policy directives:

- *Medication handling*[15], August 2022;
- *Electronic medication management system governance and standards*[16], October 2019
- *High-Risk Medicines Management*[17], November 2020.

The *Medication handling* policy directive[15], in section 3.2, provides guidelines on 'Consistent Prescribing Terminology', and references the 2016 Commission recommendations. The policy also references the Therapeutic Goods Administration's (TGA) updated medicine ingredient names, with a small a number of medicines requiring dual names (for example, adrenaline [epinephrine]). The policy provides the following recommendation, which is not present in the Commission's 2016 recommendations:

- The route for administration must be specified.

The *Electronic medication management system governance and standards*[16] references the 2016 recommendations, but provides no additional guidance on medicines terminology and abbreviations.

The *High-Risk Medicines Management*[17] policy provides the following additional recommendations for the presentation of medicine names:

- Hydromorphone: 'To reduce the risk of hydromorphone being confused with morphine, prescribers should also include in the order the trade name of the hydromorphone preparation, for example: hydromorphone Dilaudid.'
- Opioids: 'Where possible, when prescribing hydromorphone, oromucosal fentanyl, oral immediate and modified release morphine, and oxycodone products, prescribers should include the trade name of the product in the order.'
- Paracetamol: 'Orders should be written using the active ingredient drug name. However, where a brand name is used on the order the active ingredient term 'paracetamol' or 'contains paracetamol' should be documented adjacent to the brand name.'
- Potassium: 'The name of the potassium salt should be used for intravenous potassium orders. For example, potassium chloride. Chemical abbreviations must not be used for intravenous potassium orders.'

Two hospital specific policies that made recommendations for medicine documentation were identified. The first was from the Sydney Children's Hospital Network's (SCHN's) *Approved abbreviation list for use in medical records*[18] policy (published in 2020) and included medicine specific guidance on abbreviations and terminology referencing the Commission's 2016 recommendations. The policy also contains a full list of approved medicine, as well as medical, abbreviations. The list could be reviewed for recommendations that may be relevant to the update of the Commission's 2016 recommendations.

The Royal Hospital for Women (RHW) (Sydney) *Clinical Policies, Procedures and Guidelines*[19] document, published in 2017, contains a link to the Commission's 2016 recommendations.

Other sources

The *Australian Medicines Handbook* (2023 edition)[20] contains a 'Guide to prescribing' which includes a section on medicine terminology and a list of commonly used abbreviations, with a statement not to use other abbreviations. The **commonly used abbreviations** listed that are not included in the 2016 recommendations are:

- tid (to mean 'three times a day')
- ac and pc (to mean 'before food' and 'after food').

The Council of Australian Therapeutic Advisory Groups (CATAG) published a *Position statement on the use of low-dose methotrexate*[21] in 2020, which contains specific guidance on how terminology and instructions should be presented for low-dose methotrexate to avoid potentially fatal errors in prescribing, dispensing and administration.

Feedback from HSMEAG

The summary of feedback from five states or territories (NSW, Qld, SA, WA, Tas) indicated that the 2016 Commission recommendations were integrated into or referenced in state or territory level prescribing policies or procedures in all cases. Feedback from other states/territories (Vic, NT, ACT) was not included.

Examples of the way the 2016 recommendations were implemented or promoted at both state and local hospital levels included: dissemination via state-wide safety alerts; use of the 2016 publication as a guide for local National Standard Medication Chart audits; dissemination amongst medical staff; used in medical, nursing and pharmacy education sessions or orientation processes; used as part of a self-reflection prescribing tool for junior doctors; integration of the guideline into standard build rules for relevant content in electronic systems; referenced in user guides for medication charts; used as a basis for a local hospital culture change initiative supporting feedback for safe prescribing; and promotion via local Drugs and Therapeutics Committees who also monitor compliance, collate and analyse incident reports relating to errors with prescribing abbreviations, terms and symbols.

The HSMEAG summary also included additional feedback, areas of inconsistency or other concerns regarding the existing abbreviations, terms or symbols within the 2016 recommendations. A common suggestion was to include more detail on what is and is not acceptable: 'Clearly there are 'unacceptable' abbreviations, and 'safe terms or abbreviations' but there are many others which fit in neither of the provided list'. It was also noted, however, that the 2016 publication was comprehensive but also concise, in contrast with some lists, for example, ISMP, which include many additional, possibly unnecessary abbreviations. Other suggestions were associated with frequency, route, unit, dose forms and medicine name presentation. These abbreviations are presented in detail in **Appendix 2**.

Further HSMEAG feedback regarding emerging technologies and COVID-19 specific terminology is summarised in the following sections.

Peer-reviewed literature on medicine abbreviations in use and their adverse consequences

Studies reporting on the prevalence of unapproved and/or dangerous abbreviations in medicine orders were identified.[22-24] We extracted the most frequently used abbreviations from these studies (up to the top five abbreviations), which are shown in **Table 3**. None of these studies examined whether there were adverse outcomes from the use of these abbreviations or whether changes in abbreviation use resulted in a reduction in adverse outcomes.

Case report summaries on the use of abbreviations for the thrombolytic agents tenecteplase (TNK), alteplase (t-PA) and reteplase, highlight the issue of using abbreviations for these drugs. The use of 't-PA', 'rt-PA' or 'TPA' has resulted in medication administration errors. As a result of continued case reports, the ISMP has now included these on the 'do not use' list.[25,26]

Table 3: Studies reporting on the prevalence of medicine abbreviations and the most frequent abbreviations reported by studies

Study	Country	Abbreviation list source	Method to identify abbreviation use	Top abbreviations used
Awan, 2016[22]	Pakistan	Seven lists	Survey of medical students (n=88)	▪ $ZnSO_4$ ▪ µg ▪ Q.D. ▪ IU
Cheung, 2018[23]	Canada	ISMP Canada *Reaffirming the 'Do Not Use: Dangerous Abbreviations, Symbols and Dose Designations' List*[4]	Audit of paper orders (n=714) and electronic orders*	Paper orders: ▪ D/C ▪ Drug name abbreviation ▪ OD ▪ U ▪ cc
Haseeb, 2016[24]	Saudia Arabia	ISMP *List of Error-Prone Abbreviations, Symbols, and Dose Designations*[2]	Audit of paper orders pre- and post-intervention	Pre-intervention: ▪ IJ ▪ SC ▪ OD ▪ D/C

* Electronic order abbreviations are reported in the **Medicine documentation considerations for technology** section.

Medicine documentation considerations for technology

Peer-reviewed literature

The implementation of electronic medical records (eMRs) assists in reducing the use of unapproved medicine abbreviations, terminology and symbols; however, their use can still persist. A study examining the prevalence of dangerous abbreviations (using ISMP Canada's *Reaffirming the 'Do Not Use: Dangerous Abbreviations, Symbols and Dose Designations' List*[4]) in electronic and paper medicine orders across six hospitals in Canada, reported only 0.4% of electronic orders with a dangerous abbreviation, compared to 24% of paper orders.[23] The dangerous abbreviations used in electronic orders were: '> or <'; drug name abbreviations, and 'D/C'.[23] The authors noted that while the prevalence of dangerous abbreviations was lower in electronic orders, abbreviation use could be further reduced by reducing free-text orders through the availability of pre-built orders in electronic systems, as well as ensuring field character limits allowed for long medicine names so as to avoid abbreviation.[23]

Another study examining the use of medical and medicine abbreviations in 1,102 electronic discharge summaries reported that abbreviations accounted for 19% of the discharge summary content.[27] Of all abbreviations, 23% were ambiguous, with 52% of the ambiguous abbreviations were assessed as dangerous. However, the results were presented for abbreviations overall and not for specifically for medicine abbreviations.

Lastly, a case study documented an error involving the administration of immediate release metoprolol instead of sustained release, resulting in a patient's death.[28] The error occurred due to misinterpretation of the digital medicine order containing 'SA', as 'short-acting' instead of 'sustained action'. The case study calls for greater guidance on presentation of modified release products within digital systems.[28]

ISMP's *Guidelines for the Safe Electronic Communication of Medication Information*

in addition to considerations around which medicine terminology and abbreviations are safe to use when documenting medicine information electronically, how the medicine information appears on-screen and how electronic decision support is designed are important to consider. The Commission's *National guidelines for on-screen display of medicines information* provide guidance on this.[29] Additionally, the ISMP published *Guidelines for the Safe Electronic Communication of Medication Information* (ISMP Guidelines) in 2019.[30] The document contains a total of 54 recommendations covering medicines terminology, abbreviations and symbols, as well as issues with the electronic system design, under the following topics[30]:

- Safe presentation of drug names
- Safe presentation of doses, dosing units, weights, measures, and directions
- Safe presentation of product selection menus and search choices
- Safe presentation of complete medication orders or prescriptions
- Electronic system design features: Medication information
- Electronic system design features: Patient information associated with medication safety
- Other topics requiring further investigation.

The ISMP Guidelines acknowledge that the medicine names used must match the US Food and Drug Administration approved nomenclature, so that all digital records agree with container labelling.[30] In terms of medicines abbreviations, the ISMP Guidelines refer readers to the Joint Commission's *Do Not Use List Fact Sheet*[6] and the ISMP *Error-Prone Abbreviations, Symbols, and Dose Designations*[2], and have listed the most relevant for electronic communication. Of these, the following are not listed in the Commission's 2016 recommendations[30]:

- Do not use M or MM (to mean 'million') or K or M (to mean 'thousand')
- Do not use '**µg**', **but use of 'mcg' which is listed as an abbreviation that is acceptable**
- Do not use a full-stop after unit abbreviations
- Do not use IN (to mean 'intranasal') as it may be confused with IV or IM
- Do not use IT (to mean 'intrathecal')
- Acceptable abbreviations should be capitalised (for example, IV, IM)

- When expressing half tables, text (for example, half tablet) or reduced font-size fractions (for example, ½ tablet) are preferred to typical font-size numbers with slash marks (for example, 1/2)
- Trademark symbols should not be used (for example, ™, ®).

It is important to note, that ISMP's advice on the use of 'mcg' in electronic medicines information differs from other sources, such as the NHS National Patient Safety Agency, which recommends that 'micrograms' be spelled out in full in electronic medicine documentation.[31]

The ISMP Guidelines also have specific recommendations for the safe presentation of medicine names. These include:

- If required, the salt should be displayed after the drug name and not abbreviated unless it is an abbreviation approved by the US Pharmacopeia (for example, K to mean 'potassium')
- When using a brand name, the first letter should be capitalised
- The word 'Mix' should be included for fixed combination insulin products, followed by the numerical values part of the brand name
- For tall man lettering, use bolded uppercase tall man letters (for example, vin**CRIST**ine)
- For medicine names ending in the letter 'l', capitalise the 'L'
- If using a brand name, use the suffixes that are part of the brand name (for example, SR, CD, CR). For generic names, express modified release products to convey the release formulation (for example, 12-hour extended-release, 24-hour extended-release)
- While it is preferred medicine names should not be abbreviated, it is acknowledged this may be required for multi-ingredient formulations (for example, multivitamins, due to space constraints, with the caveat that medicines on the *List of High-Alert Medications in Acute Care Settings*[32] should never be abbreviated).

Other sources

Other technology being implemented in acute care settings includes automated dispensing cabinets (ADCs) to assist in the correct selection of medicines for administration. Entering abbreviations of medicine names into an ADC can result in incorrect selection of a medicine. An example is an incident involving the incorrect selection and administration of tenecteplase, instead of alteplase. The order had been written as 't-PA', and when the nurse entered 't' into the ADC, 'Tenecteplase' appeared as an option, which was selected and administered to the patient.[25]

The pitfalls of using free-text fields in electronic systems to convey medicine information has been noted by the Healthcare Safety Investigation Branch UK (HSIB).[33] Specifically, in response to a prescribing error that resulted in patient harm, the HSIB cautions on the use of free-text fields to verify or confirm unusual doses. The use of the phrase 'as per discussion with haematology' falsely confirmed a ten-times overdose of dalteparin, which was dispensed and administered to the patient on multiple occasions.[33] As a result of their investigation, HSIB recommended the purpose of free-text fields be evaluated and used consistently to prevent unintended consequences. The HSIB report suggested that adding the intended 'units/kg' dose to the field may have prevented the error reaching the patient.[33]

Medicine documentation in the context of system inter-operability

Different electronic systems are used at different acute care sites, in different care settings, as well as often at the same site. To reduce the risk of errors occurring, systems must be able to transfer medicine information accurately and safely. This issue also extends to the use of technology such as electronic prescription (e-prescriptions) systems which are being adopted by Australian hospitals. The studies outlined below have examined the issues that can occur with system interoperability and when digital standards for medicine documentation are not adhered to. No studies identified reported on abbreviations and terminology with respect to emerging standards for interoperability, such as Fast Healthcare Interoperability Resources (FHIR).

One study from the USA analysed the 209 patient safety incident reports related to electronic health record (EHR) interoperability.[34] Among these reports, the majority involved interfacing with pharmacy systems, that is, they were medication-related (29% of all reports). The authors reported that the incidents occurred predominantly when information was being received by the EHR (69% of all incidents), as opposed to information sent from the EHR; and between systems within the same organisation (62% or all incidents), as opposed to between systems in different organisations.[34] However, no details are provided about how the medicine terminology, abbreviations or symbols used may have contributed to the safety incidents.[34]

For successful interoperability, standardised medicine information needs to be used by disparate systems. Issues can occur when non-standard medicine products are entered into EHR, either by system managers or physicians. One study reported on the variation between the medicine terminology entered in e-prescriptions when compared to the RxNorm standard.[35] Of the 353,000 medicine descriptions examined, only 42%, 51% and 10.6% of ingredients, strengths, and dose forms used matching terminology, respectively.[35]

The use of free-text in e-prescriptions has also been identified as an issue with one analysis of 10,000 e-prescriptions identifying that prescribers often put important information regarding the medicine in free-text comment fields (38% of e-prescriptions) that were not transmitted to the dispensing pharmacy.[36] For example, one comment entered read 'Please run medication compatibility with all meds'.[36] A third of these non-transmitted comments were assessed as crucial for patient safety and with a potential for patient harm if not communicated.[36] Others have reported that prescribers often enter information into the free-text field that should be entered into the available structured data-entry field, for example, the directions for the patient and the quantity to be dispensed.[37] The conclusions of these studies suggest that some of the issues could be averted through better pre-implementation usability testing, user training and post-implementation surveillance of e-prescribing applications.[37]

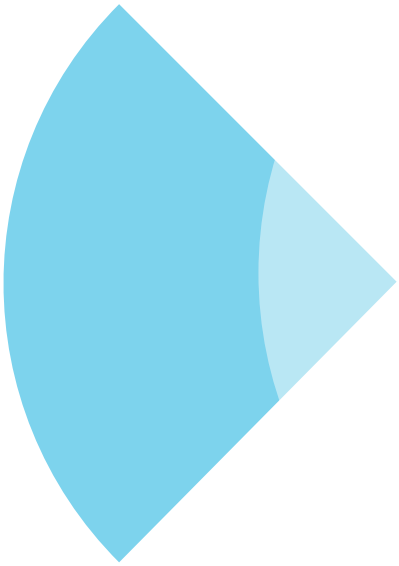
Other solutions proposed to improve the safety of medicine documentation on e-prescriptions involve the inclusion of indication in medicine documentation and standardisation of the instructions field.[38]

Feedback from HSMEAG

States, territories and local health service organisations were asked for feedback regarding areas to be addressed in terms of abbreviations and terminology used in electronic medical records (eMRs) or medication management (eMM) systems. The Commission's 2016 recommendations was reported to be embedded within some state eMM Policy Directives, for example, the NSW Health *Policy Directive: Electronic medication management system governance and standards*.[16] Respondents noted that eMRs, eMM systems and other emerging technologies (such as infusion pump profile medication name libraries) aim to conform to Commission recommendations as outlined in two documents: *Recommendations for terminology, abbreviations and symbols used in medicines documentation*[1] and *National guidelines for on-screen display of medicines information*.[29] For example, several state-wide Queensland Health eMM/eMR systems have integrated the Commission's 2016 recommendations into standard build rules for relevant content, for instance, with the Cerner Millenium eMR build. As new state-wide eMM/eMR systems are implemented, these same build rules will be used. As part of this process the build was reviewed against the initial guidelines and any exceptions were identified and individually assessed in terms of risk/benefit. The Commission's 2016 recommendations also informed design decisions for addition of new content (especially medicines and pathology). Any new content that cannot conform to the Commission's 2016 recommendations were reported to require additional governance as an exception. A different respondent also noted similarly that the Commission's 2016 recommendations were often referred to when consultation was needed to assess the appropriateness of a system change request. While another site stated that they used the *National guidelines for on-screen display of medicines information*[29] to guide eMM/eMR design, rather than the *Recommendations for terminology, abbreviations and symbols used in medicines documentation*[1], as the latter was more relevant for paper-based prescribing.

Respondents also highlighted limitations, noting that some aspects of what is unsafe may change in the electronic environment, and applying the 2016 recommendations may not always be possible. The lack of on-screen space was a commonly cited reason for not being able to adhere to the Commission's 2016 recommendations. For example, 'mcg' or 'microg' were sometimes used instead of 'microgram'. This same issue was also relevant for smart infusion pumps which tend to have a small screen. For example, 'Hartmanns(CSL)+Potassium' was abbreviated to 'CSL+Pot'; 'Sodichlor/gluc/potassium IVF' to 'NSgluPot'; 'Potassium Chlorid. Minibag 10' to 'KCL10'. It was noted that when abbreviating a medicine or fluid name was necessary and there was no specific guidance on what abbreviation to use, sites were left to choose their own abbreviations causing a lack of standardisation.

Other system limitations that prohibit the implementation of the Commission's 2016 recommendations included data fields with specific requirements. For example, dose fields that are numerical (for example, 1000), prohibit the entering of text (for example, 'one thousand') or other characters (for example, '1,000'). Other issues mentioned included the use of abbreviations that differ based on the setting (community-based 'mg' prescribing versus hospital-based 'mg/mL' prescribing for oral liquids).



COVID-19 specific terminology and abbreviation recommendations

Standardised medicines terminology, such as Australian Medicines Terminology (AMT) and RxNorm in the USA have been updated with preferred terms for COVID-19 vaccines and treatments. The included reports and literature, did not provide any further insights into how COVID-19 may have affected medicines documentation.

Feedback from HSMEAG

States, territories and local health service organisations were asked the following: With emerging digital health technologies and as a result of the COVID-19 pandemic, what impact has there been on the range of abbreviations, terminologies and symbols used by health practitioners in your state or territory? Sites highlighted prescribing of combined oral antiviral therapy needing to be spelt out in full, given that most clinicians are familiar with the brand names for example, Paxlovid. Additionally, variation in COVID-19 versus SARS-CoV-2 nomenclature caused confusion. Sites also reported on the impact of the pandemic on the workforce's ability to undertake education of clinicians on appropriate medicine abbreviations and terminology, leading to an increase in the use of inappropriate abbreviations. Similarly, staffing issues during the pandemic resulted in some sites stopping audits of error-prone abbreviations, whilst, other sites were able continue such audits.

Conclusions

Since 2016, a number of international organisations have released new guidance on medicine documentation, and thus an update of the Commission's recommendations is timely. In this report we provide an overview of key differences between the Commission's 2016 recommendations and other medicine documentation guidelines, which are presented throughout the report, but also summarised in **Appendix 3** (with a distinction between 'Do this' and 'Don't do this' recommendations). However, we recognise that not all recommendations from international sources are relevant for the Australian context, and the Australian recommendations should strike a balance between being comprehensive and being concise, as noted by a HSMEAG member. Thus, the differences that are presented in the report may not be appropriate for inclusion in the Commission's revised document but are presented to inform the revisions in consultation with stakeholders.

Findings from Australian sources (government bodies and hospitals) indicate high uptake of the Commission's 2016 recommendations in local policies. However, feedback from HSMEAG also provided valuable insights into how users may like to see the updated recommendations presented (details are provided in **Appendix 2**). Specifically, there are valuable insights into the issues jurisdictions face when implementing the 2016 recommendations in digital systems.

While the Commission's 2016 recommendations have a table listing unacceptable abbreviations, the recommendations take a principles-based approach, with a focus on presenting recommendations of how to document medicines information. Other organisations, for example, ISMP (USA), ISMP Canada and the Joint Commission, focus on presenting recommendations in the form of 'do not use' lists, which include commonly misinterpreted abbreviations that were involved in harmful medication errors. While such all-inclusive lists can be reassuring for users, the omission of an abbreviation or term from these lists does not imply the term is safe to use; however, it is possible that users may interpret lists this way. In formulating the updated recommendations, the Commission will need to decide whether to continue with the current approach with a minimum list of dangerous abbreviations, terminology and symbols for elimination by Australian acute care providers, or whether to expand this list as a complement to the principles-based recommendations.

Based on the literature and HSMEAG feedback, we consider the following should be considered for inclusion in the Commission's updated document:

- Differentiate between medicines terminology, abbreviations and symbols recommendations for documentation on paper versus the digital environment: This could include flagging issues that are more relevant the paper/digital charting. For example, current guidelines state to avoid using fractions (for example, 1/2); however, the ISMP guidelines for electronic medicines documentation state that the use of reduced-font fraction is acceptable (for instance, ½). The ISMP also acknowledges that medicine names may need abbreviation in the case of multi-ingredient products and limited screen space on digital devices was cited by HSMEAG as a reason for not adhering to recommendations. Thus, it may be useful to provide acceptable medicine name abbreviations for the digital context when full medicine names are not able to be presented, so that these are standardised across jurisdictions. This may require stakeholder consultation to ascertain commonly abbreviation names.
- The scope of digital devices covered by the updated recommendations will need be clear: We note that the Commission's *National guidelines for on-screen display of medicines information*[29] clearly state the scope of digital devices covered. Similarly, the updated terminology and abbreviations recommendations should include a similar statement.
- Add examples of symbols to avoid: Specifically, the use of symbols '&' and '@' is not recommended in a number of guidelines, including in guidelines for digital documentation. Other examples of symbols to avoid include: '+', '-', ®.
- Expand guidelines regarding abbreviations and terminology for modified-release medicines: Recent and historical cases highlight the ongoing issues around clear prescribing for modified release versus immediate release medicines.[28] In light of this, an expansion to section 2.6 may be warranted. For example, this should include guidance (and likely, discouragement) of the use of the abbreviation 'IR' to indicate 'immediate release', as there is an example of 'IR' being misinterpreted as 'IV' by ISMP Canada. Digital documentation of modified-release products and restrictions within systems that may affect the implementation of recommendations

(for example, use of brand names), due to the design of systems by the vendor or state-wide build requirements, could be addressed.

- Addition of a section on risk assessment when deviating from the recommendations: Deviations from the recommendations on medicines documentation occur, particularly in instances when digital technology cannot accommodate a recommendation, as reported by HSMEAG. An overview of a process that should be taken to assess the risks when selecting alternate solutions would be beneficial to users. For example, risk assessments could be undertaken by a hospital's Medication Safety Committee, which should also consider alternate interpretations of proposed abbreviations. It is also clear that ongoing audit is an important component of safe prescribing[23], so guidance on this process may be appropriate.

There are a number of limitations of the review that should be noted. The findings in this report are limited to publicly available documents, and much of the policies in place in Australian hospitals were not accessible. However, the HSMEAG feedback filled this gap in terms of the uptake of the Commission's 2016 recommendations. There was also limited reports available on medicine documentation for emerging technology, and it should be noted that there is increased risk in communication of medicine information as systems move away from being centralised towards health information exchanges.

In conclusion, the findings and documents identified in this rapid literature review provide a foundation for the update of the Commission's *Recommendations for terminology, abbreviations and symbols used in medicines documentation*.[1]

Appendix 1: Search strategy including list of organisation websites searched

International sources

Organisation	Location	Web address
Institute for Safe Medication Practices (ISMP)	Pennsylvania, USA	www.ismp.org
Office of the National Coordinator for Health Information Technology	USA	www.healthit.gov
The Joint Commission	Illinois, USA	www.jointcommission.org
National Coordinating Council for Medication Error Reporting and Prevention (NCCMERP)	USA	www.nccmerp.org
US Food and Drug Administration (FDA)	USA	www.fda.gov
Foundation for Health Care Quality	Seattle, Washington, USA	www.qualityhealth.org
Institute for Safe Medication Practices (ISMP) Canada	Ontario, Canada	www.ismp-canada.org
National Institute for Health and Care Excellence (NICE)	London, UK	www.nice.org.uk/bnf-uk-only
Health Quality and Safety Commission New Zealand	Wellington, New Zealand	www.hqsc.govt.nz
Ministry of Health New Zealand	Wellington, New Zealand	www.health.govt.nz
Health Service Executive (HSE)	Dublin, Ireland	www.hse.ie/eng/about/who/qid/quality-and-patient-safety-documents/abbreviations.pdf
Hong Kong Hospital Authority	Kowloon, Hong Kong	www.ha.org.hk/haho/ho/hesd/MIRP25e.pdf
World Health Organization (WHO)	Geneva, Switzerland	http://www.who.int http://www.guidetogoodprescribing.org
European Medicines Agency	Amsterdam, The Netherlands	www.ema.europa.eu/en
Danish Medicines Agency	Copenhagen, Denmark	laegemiddelstyrelsen.dk/en

Australian sources: State and territory health departments and other state- or territory-based groups

Organisation	Web address
Australian Capital Territory Health	www.health.act.gov.au
New South Wales Therapeutic Advisory Group (NSW TAG)	www.nswtag.org.au
New South Wales Health	www.health.nsw.gov.au
Northern Territory Health	health.nt.gov.au/homepage
Queensland Health	www.health.qld.gov.au
South Australian (SA) Health: SA Health Medication Safety Pharmaceutical Services and Strategy Branch	www.sahealth.sa.gov.au
Tasmanian Department of Health	www.health.tas.gov.au
The Clinical Excellence Commission (CEC)	www.cec.health.nsw.gov.au
Victorian Department of Health	www.health.vic.gov.au
Victorian Therapeutics Advisory Group (VicTAG)	www.victag.org.au/members-area/quality-use-of-medicines/medical-safety-alerts
Western Australian Department of Health	ww2.health.wa.gov.au
Western Australian Therapeutics Advisory Group (WATAG)	www.health.wa.gov.au/Articles/U_Z/Western-Australian-Therapeutics-Advisory-Group-WATAG

Australian hospitals

Organisation	Location	Type	Web address
Canberra Hospital	Canberra, ACT	Metro	www.canberrahealthservices.act.gov.au
Children's Healthcare Australasia	Various	Paediatric	children.wcha.asn.au
Fiona Stanley Hospital (South Metropolitan Health Service)	Murdoch, WA	Metro	www.fionastanley.health.wa.gov.au
Frankston Hospital (Peninsula Health)	Frankston, Vic	Outer metro	www.peninsulahealth.org.au
John Hunter Hospital (Hunter New England Local Health District)	Newcastle, NSW	Outer metro	www.hnehealth.nsw.gov.au/facilities/hospitals/john-hunter-hospital
Monash Medical Centre (Monash Health)	Clayton, Vic	Metro	monashhealth.org
Northeast Health Wangaratta	Wangaratta, Vic	Rural	www.northeasthealth.org.au

Appendix 1

Organisation	Location	Type	Web address
Orange Health Service (Western NSW Local Health District)	Orange, NSW	Rural	www.service.nsw.gov.au/nswgovdirectory/orange-health-service
Royal Brisbane and Women's Hospital	Brisbane, Qld	Metro	metronorth.health.qld.gov.au/rbwh
Royal Darwin Hospital	Darwin, NT	Metro	nt.gov.au/wellbeing/hospitals-health-services/royal-darwin-hospital
Royal Hobart Hospital	Hobart, Tas	Metro	www.health.tas.gov.au/hospitals/royal-hobart-hospital
Royal North Shore Hospital (Northern Sydney Local Health District)	Sydney, NSW	Metro	www.nslhd.health.nsw.gov.au/RNSH/Pages/default.aspx
Royal Perth Hospital	Perth, WA	Metro	rph.health.wa.gov.au
Sir Charles Gairdner Hospital	Perth, WA	Metro	www.scgh.health.wa.gov.au
Sydney Children's Hospitals Network (SCHN)	Sydney, NSW	Metro	www.schn.health.nsw.gov.au
The Alfred (Alfred Health)	Melbourne, Vic	Metro	www.alfredhealth.org.au
The Queensland Children's Hospital	Brisbane, Qld	Metro	www.childrens.health.qld.gov.au/qch
The Royal Adelaide Hospital	Adelaide, SA	Metro	www.rah.sa.gov.au
The Royal Children's Hospital Melbourne	Melbourne, Vic	Metro	www.rch.org.au/home
The Royal Melbourne Hospital	Melbourne, Vic	Metro	www.thermh.org.au
Townsville Hospital	Townsville, Qld	Rural	www.townsville.health.qld.gov.au
University Hospital Geelong (Barwon Health)	Geelong, Vic	Outer metro/ Rural	www.childrens.health.qld.gov.au/qch/ www.barwonhealth.org.au
University of Canberra Hospital	Canberra, ACT	Metro	www.canberrahealthservices.act.gov.au
Wagga Wagga Health Service (Murrumbidgee Local Health District)	Wagga Wagga, NSW	Rural	www.mlhd.health.nsw.gov.au/our-facilities/wagga-wagga-health-service
Westmead Hospital (Western Sydney Local Health District)	Sydney, NSW	Metro	www.wslhd.health.nsw.gov.au/Westmead-Hospital
Women's and Children's Hospital	Adelaide, SA	Metro	www.wch.sa.gov.au

Other Australian organisations

Organisation	Description	Web address
Ambulance Service Australia	Ambulance/ paramedics	www.ambulanceaustralia.com.au
Australian College of Nurse Practitioners	Nursing	www.acnp.org.au/aboutnursepractitioners
Australian College of Rural and Remote Medicine (ACRRM)	Medical	www.acrrm.org.au
Australian Dental Association	Dental	www.ada.org.au
Australian Digital Health Agency (ADHA)	Digital health	www.healthterminologies.gov.au/document-library
Australian Health Practitioner Regulation Agency (Ahpra – all HCP boards)	Multidisciplinary	www.ahpra.gov.au
Australian Medical Association (AMA)	Medical	www.ama.com.au
Australian Paramedical College	Ambulance/ paramedics	http://australianparamedicalcollege.com.au
Australian Practice Nurses Association (APNA)	Nursing	www.apna.asn.au
Council of Australian TAGs (CATAG)	Multidisciplinary	catag.org.au
Dental Board of Australia	Dental	www.dentalboard.gov.au
National Prescribing Service (NPS)	Multidisciplinary	www.nps.org.au
Neonatal Emergency Transport Service (NETS)	Ambulance	www.nets.org.au/About-NETS/NETS-Ambulances.aspx
NSW Ambulance	Ambulance	www.ambulance.nsw.gov.au
Nursing and Midwifery Board of Australia	Nursing	www.nursingmidwiferyboard.gov.au
Pharmaceutical Defence Limited (PDL)	Pharmacy	pdl.org.au/about-us
Pharmaceutical Society of Australia (PSA)	Pharmacy	www.psa.org.au
Pharmacy Board of Australia	Pharmacy	www.pharmacyboard.gov.au
Pharmacy Guild of Australia	Pharmacy	www.guild.org.au
Rural Doctors Association of Australia (RDAA)	Medical	www.rdaa.com.au
Society of Hospital Pharmacists of Australia	Pharmacy	www.shpa.org.au

Other general resources

Resource	Web address
American Hospital Formulary Service (AHFS)	Via the Clinical Information Access Portal (CIAP) www.ciap.health.nsw.gov.au
American Society of Health-Systems Pharmacists (ASHP)	www.ashp.org
Australian Injectable Drugs Handbook	Via CIAP www.ciap.health.nsw.gov.au
Australian Medicines Handbook (AMH)	amhonline.amh.net.au.acs.hcn.com.au/guides/guide-prescribing#guide-prescribing-07
Australian Pharmaceutical Formulary (APF)	www.psa.org.au/media-publications/australian-pharmaceutical-formulary
Australian Don't Rush to Crush Handbook: Therapeutic Options for People Unable to Swallow Solid Oral Medicines	www.shpa.org.au/publications-resources/drtc
British National Formulary for Children (BNF-C)	www.bnf.org/products/bnf-online
Palliative Care Handbook	www.hospice.org.nz/wp-content/uploads/2019/03/Palliative-Care-Handbook.pdf#page=45
Pharmaceutical Benefits Scheme (PBS)	www.pbs.gov.au/info/healthpro/explanatory-notes/section1/Section_1_2_Explanatory_Notes#Preparing-general-PBS-prescriptions
US Pharmacopeia (USP)	www.usp.org

Recent terminology requirements or recommendations relating to COVID-19 prescribing

Resource	Web address
Australian Immunisation Handbook	immunisationhandbook.health.gov.au/abbreviations
Australian Injectable Drugs Handbook	www.shpa.org.au/publications-resources/aidh
Australian Technical Advisory Group on Immunisation (ATAGI)	www.health.gov.au/committees-and-groups/australian-technical-advisory-group-on-immunisation-atagi
ISMP Medication safety alerts	www.ismp.org/medication-safety-alerts
MIMS Australia	www.mims.com.au
National Clinical Evidence Taskforce	clinicalevidence.net.au
RxNorm	www.nlm.nih.gov/research/umls/rxnorm/index.html
SHPA information	www.shpa.org.au
Telehealth/Virtual Care Guidelines	A selection of available international and Australian telehealth/ virtual care guidelines were sourced via an internet search
Therapeutic Guidelines	www.tg.org.au

Peer-reviewed literature

Medline via Ovid will be searched using a combination of keywords and subject headings for relevant journal articles published since 2016. Reference lists of relevant articles will be reviewed to capture further articles. The table below provides an overview of the search terms used.

Search terms

1. medicines.mp
2. medication.mp
3. drug.mp
4. exp Drug Therapy/
5. exp Medication Systems, Hospital/
6. 1 or 2 or 3 or 4 or 5
7. exp Terminology as Topic/
8. abbreviation.mp
9. terminology.mp
10. Sybmol.mp
11. SNOMED.mp
12. FHIR.mp
13. *Health Information Interoperability/
14. 7 or 8 or 9 or 10 or 11 or 12 or 13
15. *Medication Errors/
16. error.mp
17. incident.mp
18. safety.mp
19. 15 or 16 or 17 or 18
20. 6 and 14 and 19
21. limit 17 to ye='2016 -Current'

Appendix 2: HSMEAG suggestions with respect to medicine documentation

Summary of inconsistencies, concerns and additional feedback from HSMEAG

Theme	Feedback
Frequency abbreviations	▪ Terminology for '4 hourly' (also applies to 2, 4, 6, 8, 12, 24 hourly): The responder noted that this is common in Australia (never used in the USA), particularly in the ICU setting, and prone to misinterpretation as an infusion 'over 4 hours' as opposed to 'every 4 hours'. The responder suggested abolishing the terminology '4 hourly' for a 4 hour frequency (same for other frequencies), and instead only use 'every 4 hours'. If it is an extended infusion use the terminology 'over 4 hours' (for instance, infusion duration of 4 hours). For example, if piperacillin + tazobactam frequency is q8h and the infusion of each dose is over 4 hours – it should be written out 'every 8 hours [each dose infused over 4 hours]' ▪ It was noted that some 'unapproved' frequency abbreviations are used by prescribers due to insufficient space in the medication orders in the PRN section (space as a barrier to correct documentation). For example, the issue of 'q' (for example, q6h) when prescribing PRN orders: 'Other than the 'q' being misinterpreted as a 9, it is hard to provide rationale for this.' Additionally, it was noted that: ' 'q4hrly' or similar instead of 'every 4 hrs' as suggested is a really hard sell, especially space-wise on PRN chart' ▪ Other suggestions of abbreviations to be clarified as either unacceptable or safe in the update of the guideline (many of these were noted as commonly used frequency abbreviations by prescribers): Q4H, Q6H, Q8H etc, QQH, tid, 2O for 2hrly, QDS instead of QID, and 2h as an abbreviation for every 2 hours
Route abbreviations	▪ One respondent suggested need for additional route abbreviations: for example, TPT (Transpyloric Tube), Intraperitoneal (recommendation needed as it is commonly abbreviated to IP due to space constraints) ▪ Suggestions of abbreviations to be clarified as either unacceptable or safe in the update of the guideline: top, inh, tid, midi (midday), $\bar{O}$ for oral ▪ Another respondent suggested inclusion of MDI as route appropriate for salbutamol MDI (while acknowledging 'inhale' as route is best practice) ▪ Consider adding transdermal to summary sheet ▪ Consider including 'top' as an acceptable abbreviation: 'I always like to justify rationale to why an abbreviation is unsafe, but for 'top' I cannot ever provide an example to junior medical and nursing staff'
Unit abbreviations	▪ Suggestion for abbreviations to be clarified as either unacceptable or safe in the update of the guideline: gm (gram) ▪ One respondent noted that 'parts per million' is the Unit of Measure for the dose of nitric oxide, and is abbreviated to 'ppm' in the Product Information, AMT and Martindale.[39] Additionally 'ppm' may be the abbreviation displayed on the equipment used to administer the desired dose, however, in the 2016 publication 'ppm' is not a recommended abbreviation
Dose form abbreviations	▪ Suggestions of abbreviations to be clarified as either unacceptable or safe in the update of the guideline: tab (tablet), cap (capsule), IR (immediate release)

Theme	Feedback
Medication names or salts	▪ It was recommended that it would be helpful to include further examples of unapproved but commonly used medication names for example, GTN, also newer medications, for example, medicinal cannabis products where often 'CBD' or 'THC' are used, and the respondent noted: 'These need to be specifically called out as unacceptable abbreviations'. ▪ Insulin names used in the 2016 version have changes – Lantus is no longer available. ▪ One respondent highlighted a discussion around Principle 5 – Use generic medicine names: 'As the National Health (Pharmaceutical Benefits) Amendment (Active Ingredient Prescribing) Regulations 2019, and the Veterans' Affairs Pharmaceutical Benefits Schemes (Electronic Prescriptions and Active Ingredient Prescribing) Amendment Instrument 2019 have mandated active ingredient prescribing, the exception recommending using trade names instead of generic medicine names for combination products is no longer appropriate.' ▪ Additionally, they noted for Principle 8 – Do not include the salt of the chemical unless it is clinically significant: 'A consistent definition of a 'clinically significant salt' is needed across Commission documents to prevent inconsistencies and confusion across eMM systems. The Commission's 2016 recommendations imply (by giving mycophenolate as an example), that a clinically significant salt is when more than one salt of the same base exists. The *National guidelines for on-screen display of medicines information*[29] also outline that a clinically significant salt is one that defines the strength of the product (for example, warfarin sodium). However, the ISMP does not advise that salts defining the strength of the product are displayed (see *Guidelines for Safe Electronic Communication of Medication Information*.[30]
Other	▪ In the Commission's 2016 recommendations, Roman numerals are considered unacceptable, and Hindu-Arabic numbers are recommended. One respondent wanted clarity regarding the use of modified roman numerals on handwritten prescriptions (for example, Ⅰ̇ Ⅱ̇ for 1 and 2) ▪ One respondent indicted that it was unclear whether < and > symbols are acceptable as they are listed in the table on page 8 in the 'intended meaning' column with the safe terms/ abbreviations as 'less than, greater than': 'If acceptable then perhaps the symbols should be in the column on the right. and if not acceptable then remove from this table and describe on page 7' ▪ Finally, a respondent queried the ongoing use of Latin for prescribing and suggested it was time for this to be phased out, and plain English only used

Appendix 3: Summary of differences between 2016 Commission recommendations and sources identified in the review

This appendix is an amalgamation of the recommendations on medicines terminology, abbreviations and symbols within the report that are identified as different to those contained in the Commission's 2016 recommendations. Please note, the entire list of ISMP's 'do not use' abbreviations, included in the ISMP *List of Error-Prone Abbreviations, Symbols, and Dose Designations*[2], is not included here as it is too numerous to list.

Differences in examples and recommendations from international sources

Don't do this:

- QD, QOD (to mean 'every day' and 'every other day')
- OS, OD, OU (to mean 'left eye', 'right eye', 'both eyes')
- cc (to mean 'cubic centimetre')
- **µg (to mean 'micrograms')**
- @ (to mean 'at')
- & (to mean 'and')
- SS (to mean 'single strength')
- SL or S/L (to mean 'sublingual')
- SC, SQ (to mean 'subcutaneous')
- D (to mean 'daily')
- Abbreviations to denote formulations which are not part of the drug name (for example, CR, LA, SR). The example provided was an incident involving 'Dilaudid IR' which was misread as 'Dilaudid IV'
- TIW (to mean 'three times a week')
- D/C (to mean 'discharge')
- HS (to mean 'half strength')
- cc to mean 'cubic centimetres')
- AU, AS, AD (to mean 'both ears', 'left ear', 'right ear')
- HCl (to mean 'hydrochloric acid')
- HCT (mistaken for 'hydrocortisone' or 'hydrochlorothiazide')
- OD, od, or O.D. (to mean 'daily')
- Q.D, q.d., qd, QD (to mean 'every day' in the US)
- mEq or milliequivalent
- Roman numerals (for example, ii, iv, x)
- Do not use M or MM (to mean 'million') or K or M (to mean 'thousand')
- Do not use a full-stop after unit abbreviations*
- IN (to mean 'intranasal') as it may be confused with IV or IM*
- IT (to mean 'intrathecal')*
- Font-size numbers with slash marks (for example, 1/2)*
- t-PA (to mean 'alteplase')
- SA (to mean 'sustained action')
- D/C (to mean 'discharge')

Do this:

- mcg (in electronic documentation is listed as an acceptable abbreviation)*
- Acceptable abbreviations should be capitalised (for example, IV, IM)*
- When expressing half tables, text (for example, half tablet) or reduced font-size fractions (for example, ½ tablet) are preferred to typical font-size numbers with slash marks (for example, 1/2)*
- If required, the salt should be displayed after the drug name and not abbreviated unless it is an abbreviation approved by the USP (for example, K to mean 'potassium')*
- When using a brand name, the first letter should be capitalised*
- The word 'Mix' should be included for fixed combination insulin products, followed by the numerical values part of the brand name*

* These recommendations were specific for digital documentation (from ISMP's *Guidelines for Safe Electronic Communication of Medication Information*).[30]

- For tall man lettering, use bolded uppercase tall man letters (for example, vin**CRIST**ine)*
- For medicine names ending in the letter 'l', capitalise the 'L'*
- If using a brand name, use the suffixes that are part of the brand name (for example, SR, CD, CR). For generic names, express modified release products to convey the release formulation (for example, 12-hour extended-release, 24-hour extended-release)*
- While it is preferred medicine names should not be abbreviated, it is acknowledged this may be required for multi-ingredient formulations, for example, multivitamins, due to space constraints, with the caveat that medicines on the *List of High-Alert Medications in Acute Care Settings*[32] should never be abbreviated.*
- Sinemet and Madopar should use brand names due to containing multiple ingredients

Differences in examples and recommendations from Australian sources

Don't do this:

- S/C or sc (to mean 'subcutaneous')
- S/L or sl (to mean 'sublingual')
- E (to mean 'eye' or 'ear')
- ug, µg, or mcg (to mean 'microgram')
- d (to mean 'daily')
- QD or qd (to mean 'every day')
- M (to mean 'morning')
- N (to mean 'night')
- 6/24 (to mean 'every six hours')
- X 3d (to mean 'for three days')
- Chemical abbreviations must not be used for intravenous potassium orders

Do this:

- Use 'both' (instead of 'each') for eye/ear route of administration
- Use 'international units' (instead of 'units')
- MA (to mean 'metered aerosol')
- Top (to mean 'topical')
- tds or tid (to mean 'three times a day')
- ac and pc (to mean 'before food' and 'after food')
- Use brand name for combination inhalers (for example, Seretide, Symbicort)
- Use brand name for Pentavite liquid or Ferroliquid
- Use brand name for insulin products (for example, Actrapid, Novorapid, Novomix 30)
- Where a medication order deliberately contains an unusual or dangerous dose, the prescriber must underline the dose and initial beside it. Where using an electronic prescription, some acknowledgement that the dose is deliberately unusual must be made.†
- Hydromorphone: 'To reduce the risk of hydromorphone being confused with morphine, prescribers should also include in the order the trade name of the hydromorphone preparation, for example: hydromorphone Dilaudid.'
- Opioids: 'Where possible, when prescribing hydromorphone, oromucosal fentanyl, oral immediate and modified release morphine, and oxycodone products, prescribers should include the trade name of the product in the order.'
- Paracetamol: 'Orders should be written using the active ingredient drug name. However, where a brand name is used on the order the active ingredient term 'paracetamol' or 'contains paracetamol' should be documented adjacent to the brand name.'
- Potassium: 'The name of the potassium salt should be used for intravenous potassium orders. For example, potassium chloride. Chemical abbreviations must not be used for intravenous potassium orders.'

---

* These recommendations were specific for digital documentation (from ISMP's *Guidelines for Safe Electronic Communication of Medication Information*).[30]

† See note in the section **Other sources** for a caveat related to this recommendation, noting the pitfalls of using free-text fields in electronic systems.[33]

References

1. Australian Commission on Safety and Quality in Health Care. Recommendations for terminology, abbreviations and symbols used in medicines documentation. Sydney: ACSQHC, 2016.
2. Institute for Safe Medication Practices (ISMP). ISMP List of Error-Prone Abbreviations, Symbols, and Dose Designations: ISMP, 2021.
3. Institute for Safe Medication Practices (ISMP). FDA and ISMP lists of look-alike drug names with recommended tall man (mixed case) letters: ISMP, 2023.
4. Institute for Safe Medication Practices (ISMP) Canada. Reaffirming the 'Do Not Use: Dangerous Abbreviations, Symbols and Dose Designations' List. ISMP Canada Safety Bulletin: ISMP Canada, 2018.
5. National Coordinating Council for Medication Error Reporting and Prevention. Dangerous Abbreviations. Secondary Dangerous Abbreviations. **www.nccmerp.org/dangerous-abbreviations**.
6. The Joint Commission. Do Not Use List Fact Sheet. Secondary Do Not Use List Fact Sheet. **www.jointcommission.org/resources/news-and-multimedia/fact-sheets/facts-about-do-not-use-list/**.
7. Health Quality and Safety Commission New Zealand. National Medication Chart user guide (third edition). Wellington, 2020.
8. Institute for Safe Medication Practices (ISMP). ISMP updates its list of drug names with tall man (mixed case) letters based on survey results. ISMP Medication Safety Alert! Acute Care 2023;28:1–4.
9. Australian Commission on Safety and Quality in Health Care. National Tall Man Lettering List. Sydney: ACSQHC, 2020.
10. Institute for Safe Medication Practices (ISMP) Canada. Do Not Use: Dangerous abbreviations, symbols and dose designations: ISMP Canada, 2006.
11. Canberra Health Services. Clinical Policy: Medication Handling. Canberra: ACT Government, 2022.
12. Medicines and Technology Programs. Spell it Out: Standardised terminology, abbreviations and symbols to be used when communication about medicines (Policy Directive). Adelaide: Government of South Australia,, 2018.
13. Department of Health. Acceptable prescribing terms and abbreviations. Perth: Government of Western Australia.
14. Medicines and Technology Unit – Patient Safety and Clinical Quality Directorate. Guidelines for the WA Hospital Medication Chart (Adult and Paediatric). Perth: Department of Health – Government of Western Australia, 2022.
15. New South Wales Government. Policy Directive: Medication handling. Sydney: Legal and Regulatory Services – NSW Government, 2022.
16. New South Wales Government. Policy Directive: Electronic medication management system governance and standards. Sydney: Legal and Regulatory Services – NSW Government, 2019.
17. New South Wales Government. Policy Directive: High-Risk Medicines Management. Sydney: Clinical Excellence Commission, 2020.
18. The Sydney Children's Hospitals Network. Approved abbreviation list for use in medical records: Policy Sydney: SCHN, 2020.
19. The Royal Hospital for Women. Clinical Policies, Procedures and Guidelines: Medication – Prescribing. Sydney: RHW, 2017.
20. Australian Medicines Handbook. Australian Medicines Handbook (AMH). [Internet] Adelaide: Australian Medicines Handbook Pty Ltd. Available from **amhonline.amh.net.au**.
21. Council of Australian Therapeutic Advisory Groups. Position Statement on the use of low-dose methotrexate: CATAG, 2020.
22. Awan S, Abid S, Tariq M, et al. Use of medical abbreviations and acronyms: knowledge among medical students and postgraduates. Postgraduate Medical Journal 2016;92(1094):721–25.
23. Cheung S, Hoi S, Fernandes O, et al. Audit on the Use of Dangerous Abbreviations, Symbols, and Dose Designations in Paper Compared to Electronic Medication Orders: A Multicenter Study. Annals of Pharmacotherapy 2018;52(4):332–37.
24. Haseeb A, Winit-Watjana W, Bakhsh AR, et al. Effectiveness of a pharmacist-led educational intervention to reduce the use of high-risk abbreviations in an acute care setting in Saudi Arabia: a quasi-experimental study. BMJ Open 2016;6(6):e011401.
25. Paparella SF. Think Twice Before Using This Abbreviation. Journal of Emergency Nursing 2019;45(1):85–87.

26. Zrelak PA. Leading the Way by Adopting Safe Medication Practices Associated With Abbreviation Use. Journal of Neuroscience Nursing 2018;50(3):121–22.
27. Mohd Sulaiman I, Bulgiba A, Abdul Kareem S. Prevalence and Risk Factors for Dangerous Abbreviations in Malaysian Electronic Clinical Notes. Evaluation & the Health Professions 2022:1632787221142623.
28. Amato M, Schiff G. Slow down: right drug, right formulation. WebM&M: Case Studies, Patient Safety Network 2018. **psnet.ahrq.gov/web-mm/slow-down-right-drug-wrong-formulation**.
29. Australian Commission on Safety and Quality in Health Care. National guidelines for on-screen display of medicines information. Sydney: ACSQHC, 2017.
30. Institute for Safe Medication Practices (ISMP). ISMP Guidelines for Safe Electronic Communication of Medication Information ISMP, 2019. **www.ismp.org/resources/guidelines-safe-electronic-communication-medication-information**.
31. National Patient Safety Agency. Design for patient safety: Guidelines for safe on-screen display of medication information: NHS, 2010.
32. Institute for Safe Medication Practices (ISMP). ISMP List of High-Alert Medications in Acute Care Settings. ISMP; 2018.
33. Healthcare Safety Investigation Branch – UK. Weight-based medication errors in children. UK: HSIB, 2022.
34. Adams KT, Howe JL, Fong A, et al. An Analysis of Patient Safety Incident Reports Associated with Electronic Health Record Interoperability. Applied Clinical Informatics 2017;8(2):593–602.
35. Lester CA, Flynn AJ, Marshall VD, Rochowiak S, Rowell B, Bagian JP. Comparing the variability of ingredient, strength, and dose form information from electronic prescriptions with RxNorm drug product descriptions. Journal of the American Medical Informatics Association 2022;29(9):1471–79.
36. Ai A, Wong A, Amato M, Wright A. Communication failure: analysis of prescribers' use of an internal free-text field on electronic prescriptions. J Am Med Inform Assoc 2018;25(6):709–14 doi: 10.1093/jamia/ocy003.
37. Dhavle AA, Yang Y, Rupp MT, Singh H, Ward-Charlerie S, Ruiz J. Analysis of Prescribers' Notes in Electronic Prescriptions in Ambulatory Practice. JAMA Intern Med 2016;176(4):463–70 doi: 10.1001/jamainternmed.2015.7786.
38. Schiff G, Mirica MM, Dhavle AA, Galanter WL, Lambert B, Wright A. A Prescription For Enhancing Electronic Prescribing Safety. Health Aff (Millwood) 2018;37(11):1877-83 doi: 10.1377/hlthaff.2018.0725.
39. Martindale: The Complete Drug Reference. Available from: **about.medicinescomplete.com/publication/martindale-the-complete-drug-reference**.

AUSTRALIAN COMMISSION
ON SAFETY AND QUALITY IN HEALTH CARE

Level 5, 255 Elizabeth Street, Sydney NSW 2000
GPO Box 5480, Sydney NSW 2001

PHONE: (02) 9126 3600

@ACSQHC

safetyandquality.gov.au