Ensuring effective computerised clinical decision support

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As part of our series on the NICE Medicines Optimisation guidance,¹ this article discusses the section of the guidance concerning computerised clinical decision support and how clinicians working in general practice can ensure its effectiveness and safety at the point of prescribing medicines.

The seventh principle of the NICE guidance on Medicines Optimisation focuses on computerised clinical decision support as a means of improving medication safety at the point of prescribing.¹ The PRACtICE study conducted in England showed that medication errors occurred for one in eight patients and involved one in 20 prescription items, with one severe error in every 550 prescription items.² The complexities of the prescribing process and the multifactorial nature of iatrogenic harms mean that a single approach to prescribing safety is insufficient.

Clinical decision support embedded in general practice computers has shown great potential in facilitating safe prescribing by performing background safety checks and providing clinical advice and alerts to prescribers.³ A number of definitions exist for clinical decision support. In this article, we define a clinical decision support system (CDSS) as software designed and embedded in general practice computers that provides intelligently filtered, evidence-adaptive knowledge or person-specific information, to directly support clinical decision-making at the point of prescribing medicines.

Key themes in the NICE guidance

The NICE guidance highlights some challenging aspects of designing and developing effective CDSS. However, it does not specify how computerised CDSS should be designed or implemented, to encourage innovation and solutions that are fit for purpose. A summary of the NICE recommendations and the implications for general practice is presented in Table 1.

Recommendations for optimal use of CDSS

- Ensure you have correctly recorded all necessary patient information, such as date of birth, weight and allergy status in the general practice computer system. This will ensure that the safety alerts generated by the GP computer system reflect patient-specific information. If you have decided after careful evaluation that the benefits of prescribing a medicine singly or in combination with other medicines outweigh the risks and elect to override an alert, then this should be clearly documented in the patient record and highlighted on the prescription.⁵
- Give specific instructions when prescribing. For example, instructions such as “as directed”, “as required” or “prn”
are not useful if the dose of a medicine is required in tailoring clinical advice and alerts.

- One of the key priorities of the NICE guidance is implementing a “system for identifying, reporting and learning from medicines-related patient safety incidents”. CDSS can help with identifying patients who may have been subject to medication errors or adverse drug events in the past so that on subsequent visits, clinicians are warned to avoid any potential error or harm.
- Adopt a culture of safety and encourage appropriate safety behaviour devoid of fear of being disciplined unnecessarily. Evidence suggests that prescribers override alerts even when few false positive alerts are displayed. Avoid ignoring alerts without review and remember to flag false, inappropriate or unnecessary alerts you come across to other clinicians and system developers.
- Provide regular evaluation and feedback on the performance of general practice computer systems, including the integrated clinical decision support, to help inform current and future development. Collaboration with clinical decision support creators and system vendors will help optimise the design and effectiveness of CDSS.
- Be aware of how the CDSS alert information is updated. Any new information should be clearly and easily identifiable by users to ensure they do not miss important information.

Opportunities for further improvements

The NICE guidance presents a good opportunity to address recurrent and difficult problems associated with safety alerts generated by clinical decision support in general practice computer systems. The results of a 2005 questionnaire survey of GPs from six English primary care trusts regarding the safety features of general practice computer systems showed that many were unsure as to whether the system they were using had some of the safety features specified in the survey. Additionally, some of the respondents incorrectly believed that their clinical computer systems would warn them about potential hazardous situations, such as contraindications, abnormal doses and frequencies, and only a few of the respondents said they had received formal training on how to use the safety features in their general practice computer system. Although the study needs to be updated in light of current practice, it is a window into some of the key prescribing and medication safety problems facing clinicians in practice.

The NICE guidance could be extended to provide clear recommendations and specify responsibilities for managing patients who may have shared care arrangements.

### Table 1. Summary of the NICE Medicines Optimisation guidance on use of computerised clinical decision support systems (CDSS) in primary care and their implications for practice

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<th>Summary of recommendations</th>
<th>Implications for practice</th>
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<td><strong>Organisations are encouraged to use CDSS taking into account existing systems and resource implications to support clinical decision-making and prescribing, but ensure that these do not replace clinical judgement</strong></td>
<td>• Organisations should provide CDSS&lt;br&gt;• Clinicians should use the CDSS provided but remember that their clinical judgement supersedes any advice that may be offered by such systems</td>
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<td><strong>Organisations should ensure that robust and transparent processes are in place for developing, using, reviewing and updating computerised CDSS</strong></td>
<td>• Organisations should ensure that the system is up to date and allow feedback about the performance of the system to facilitate further improvement&lt;br&gt;• Clinicians should avoid creating workaround because these can cause errors</td>
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<td><strong>Organisations are to ensure that clinicians using CDSS at the point of prescribing have the required knowledge and skills, including an understanding of its limitations</strong></td>
<td>• Clinicians need to make sure that they have the necessary knowledge and skills to use CDSS effectively, including knowing the capabilities of the CDSS at their disposal&lt;br&gt;• They also need to identify their own development and training needs to help them and their organisations meet prescribing safety goals</td>
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<td><strong>CDSS for clinical decision-making and prescribing support should:</strong>&lt;br&gt;• Identify important safety issues&lt;br&gt;• Provide facility for health professionals to acknowledge mandatory alerts and this should not be customisable for alerts relating to medicines-related ‘never events’&lt;br&gt;• Reflect the best available evidence and be up to date&lt;br&gt;• Contain useful clinical information that is relevant to the health professional to reduce ‘alert fatigue’</td>
<td>• Clinicians should not turn off mandatory alerts. Rather, they should review and action or acknowledge such alerts&lt;br&gt;• Clinicians should review and reflect on how they use CDSS in practice and whether this is at a level that continually optimises prescribing</td>
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### Conclusion

CDSS are useful tools for making clinical and prescribing decisions, and can optimise medicines use. The risks associated with prescribing and use of CDSS must be recognised, managed and controlled, ideally by adopting a human factors approach. Regular review and feedback on the effectiveness of features and functionalities of CDSS are essential for accurate, consistent and quality clinical decision-making and to ensure safe prescribing.

### References

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New definition of sepsis, new bedside screen to identify patients at high mortality risk

Clinical question: What are the best criteria to identify sepsis and septic shock?

Bottom line: An international task force of experts has updated the definitions of sepsis and septic shock and created a new bedside scoring tool to identify patients with suspected infection who may be at high risk for poor outcomes. Based on the Sequential Organ Failure Assessment (SOFA) score, the new quickSOFA states that meeting two of three clinical criteria (respiratory rate of 22 per minute or greater, systolic blood pressure of 100mmHg or less, and altered mental status) identifies patients at high risk of poor outcomes from sepsis.

This score will need to be validated further in multiple healthcare settings before it can be widely accepted in clinical practice. (LOE = 5)

Synopsis: Systemic inflammatory response syndrome (SIRS) criteria are present in many hospitalised patients, even those without infections or life-threatening illnesses. The use of these criteria to identify sepsis may lead to misdiagnosis. Funded by the European Society of Intensive Care Medicine and the Society of Critical Care Medicine, an international task force consisting of 19 critical care, infectious disease, surgical, and pulmonary specialists convened to update the definitions of sepsis and septic shock and identify clinical criteria that can be used to recognise patients at high risk for mortality.

Researchers conducted a systematic review and meta-analysis of observational studies followed by a Delphi consensus process to determine appropriate criteria for identifying septic shock. Furthermore, they validated and confirmed the ability of different clinical criteria, including the SIRS criteria and the SOFA score, to predict poor outcomes in patients with suspected infection.

Per the task force’s recommendations, sepsis should be defined as life-threatening organ dysfunction caused by a dysregulated host response to infection. Septic shock is a subset of sepsis in which there is an increased risk of mortality due to profound circulatory and cellular metabolism abnormalities.

Sepsis can be identified by an increase in the SOFA score of 2 points or more. This is associated with an in-hospital mortality exceeding 10 per cent. Septic shock can be identified by a vasopressor requirement to maintain a mean arterial pressure of 65mmHg or greater and a serum lactate level greater than 18mg/dL (> 2mmol/L) after adequate fluid resuscitation. This combination of clinical criteria is associated with a hospital mortality rate of 40 per cent.

Using a derivation and validation cohort of approximately 75,000 patients, the group also developed a new bedside clinical measure termed quickSOFA, or qSOFA, which consists of a respiratory rate of 22 per minute or greater, altered mental status, and systolic blood pressure of 100mmHg or less. Patients with suspected infection who are not in the intensive care unit and have at least two of these three criteria are at higher risk of poor outcomes from sepsis (area under receiver operating characteristics curve = 0.81).

Declaration of interests
None to declare.

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