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Decision support systems

A general practice research journey

'Mr Jones has a high cardiovascular disease (CVD) risk based on the online calculator you used a few months ago. You now have a CVD risk calculator embedded in your desktop clinical information system, which surprisingly calculates that Mr Jones is now 'low risk'. Even with risk assessment involving many variables, and allowing for rounding and assumptions, this difference is disconcerting. You start to wonder about the automated computer system prompts...'

The clinical software programs that Australian general practitioners use are not independently evaluated, regulated or built to any common safety standard. Significant patient safety and quality issues can and will arise from poorly used or poorly designed clinical decision support systems (CDSS).

The University of New South Wales Academic General Practice Unit is currently establishing the amount and causes of prescribing errors using a conceptual framework including machine and user errors. Errors are classified by type of mechanism: technical, user interface and contributing factors. Test cases were developed to benchmark the safety of prescribing software in terms of errors. Using standardised mock patient records, software will be tested to determine if prescribing advice was provided and whether it was correct, enabling the calculation of sensitivity, specificity, positive and negative predictive values for each system. The mechanisms for machine error will be determined by root cause analyses – tracing errors back to the knowledge base, inference procedures used, or quality of evidence for the alert in the literature. User errors such as alert fatigue, user skills, slip-ups, workload and environmental distractors will be assessed with a national general practice survey using structured telephone interviews based on the critical incident technique. This project will develop recommendations and a toolkit to assess and implement software safety standards and user training requirements.

This research journey began with research into structured electronic medical records¹ and computer generated paper reminder and recall systems as part of a patient held health record (PHR).² While these suggested that there were improved patient outcomes, they also raised issues about the quality of general practice information system data. Patients noted PHR inadequacies (incompleteness, inaccuracies and being out-of-date) when they received their PHR in the mail. General practitioners were not rushing to adopt CDSS.³ Later work on CDSS in falls prevention⁴ and asthma⁵ could not be adequately evaluated because of poor quality clinical data in information systems. On the plus side, these CDSS projects highlighted the relevance and utility of the general practice data model and core data set and the importance of terminology and interoperability standards.⁴

We have travelled back to the fundamental issue of data quality and utility, which is essential if general practice is to optimise the benefits of electronic health records and CDSS. Data quality has assumed greater importance with the increasing use of routinely collected information for practice quality improvement and population health purposes. However, the varied clinical information systems used in Australian general practice lack a valid and reliable data quality assurance methodology and suffer an interoperability problem where information aggregated from diverse systems may be misinterpreted because of different meanings and contexts. Efficient (automated), valid and reliable solutions and tools are needed to improve the quality and consistency of information systems.

The University of New South Wales Academic General Practice Unit, in partnership with other researchers, is examining this data quality issue – having proposed consensus rules on data provenance and governance with a focus on data quality.⁶ A systematic literature review is defining current assessment and management of data quality in clinical information systems. This will examine the

variations in definitions of data quality, data quality matrices, metadata and ontologies used to represent the domain and whether the data and information is fit for purpose. A focus is ontology based data quality management as it has the potential for automated systems to define quality and manage data quality of clinical information systems.⁷ This work is grounded in establishing an electronic Practice Based Research Network. High quality data is essential to enable rigorous research in and about general practice. Questions we are seeking to answer are whether sharing information with patients will improve data quality and whether and how data quality is related to quality of clinical decisions and care.

The journey continues...

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