Emergency medicine electronic health record usability: where to from here?

Katie Walker [1,2] Tim Dwyer,[3] Heather A Heaton [4]

Information technology (IT) usability is the degree to which software can be used by specified consumers (eg, doctors) to achieve quantified objectives (eg, manage emergency patients in an emergency department (ED)) with effectiveness, efficiency and satisfaction with each interaction.[1] Usability is relevant to new learners, infrequent users and regular users, and for people with a wide variety of capabilities. The software should minimise the risk and consequences of errors, and be straightforward to use for routine tasks. Hence an IT system with high usability is simple, guides users through the least labour-intensive route, and does not require expert knowledge for use.

Bloom *et al* present an important study on the usability of electronic health record (EHR) systems in British EDs.[2] The large survey clearly demonstrates the poor usability of all systems currently deployed throughout the UK, with none of them meeting the international minimum standards required for IT in any industry. The study was not able to tell us which aspects of usability are poor. The issue of EHR usability is not new, with articles published over the years calling for improvements, describing how large sums of health money has been spent on unproven IT systems without any evidence of improvements in safety, quality or efficiency.[3]

The authors mention that some may feel that the concept of usability is nebulous, however, usability is well defined.[2] The computer science discipline, known as Human Computer Interaction, has studied the science and developed the practice of creating usable systems for decades.[4] In industry, user-centred design is a well-established engineering practice, with widely accepted protocols for delivering effective interactive systems and improving the user experience. Solutions for developing user-friendly software to manage electronic records efficiently exist and we need to ensure they are incorporated into our software. While the needs of medical professionals may not be identical to user requirements in other domains, the practice of user-centred (or human-centred) design exists to elicit these requirements through direct involvement of the end-users in the development process to tailor solutions to their needs. The applicable international usability standards can be found online.[1 5]

Emergency medicine (EM) practises within a very complex environment, requiring business relationships and interactions with most community and hospital healthcare services. There is a high degree of variability, making automation hard, with few IT solutions applicable to all patients. The EM physician is trained to scrutinise undifferentiated complaints to determine if an emergency condition exists; the investigation requires both diagnostics and therapeutics and must occur efficiently to ensure the safety of the patient. Communication of symptoms and needs is dependent on the varied communication abilities of patients, families and clinicians; and the information does not often fall out in a linear, stepwise fashion. EM physicians are master multitaskers, with the typical emergency physician completing over 100 separate tasks per hour.[6] Currently, the electronic capture of each task may take longer than the task itself, creating a choice for clinicians between not documenting tasks electronically or seeing fewer patients.

Poor EHR usability creates multiple issues for end users and consequently their organisations and the patients they care for. One of the more important problems related to poor usability is the deterioration in productivity in EM; for every electronic task that is demanded of clinicians, time is taken away from core roles. This adds up to a very large proportion of healthcare worker time being spent on clerical work.

An initial step towards improvement is to distinguish between core emergency physician tasks and other work. Core tasks for emergency doctors relate to extracting and synthesising information; communicating decisions, information and needs to patients, families and health teams and occasionally undertaking procedures. Non-core tasks, such as collecting extra performance data for audits, registries, coding, billing and operations information, should be reconsidered. Thoughtful evaluation could determine whether the task adds value and to whom, why it is being completed by a doctor, what the true costs are of obtaining the data (minutes x number of patients per annum). Opportunities to transition clerical work to clerks, scribes or other personnel for essential non-core data should be considered.[7] This will reduce the cost of clerical data entry and return physicians to bedside patient care.

Of those tasks that remain for the physician, there should be as much automation as possible. For example, filling in electronic forms regarding when a specialty doctor was paged should be ceased and replaced with the page itself generating the page time and a record of the page for clinicians and administrators. Requesting a hospital bed should not require retyping details data available in the EMR already. Entering key clinical information such as a diagnosis of confirmed appendicitis should trigger prepopulated and preferably personalised options for pain and antiemetic medication, fluids, antibiotics, a bed, surgical referral, fasting status, illness certificate and so on.

Our systems should be designed and integrated to minimise interruptions and maximise cognitive processing. Having to login frequently to multiple software applications during the same shift, or to enter trivial and unrelated data in the middle of a complex EHR task is more than just frustrating. It is likely to increase errors as trains of thought are interrupted, or mean that patient investigations aren't reviewed as it is too hard and we have too many competing demands.

Beyond the interaction with the EHR, where the interaction occurs in the ED must be understood. EM is conducted in multiple settings within an ED. We have conversations in ambulance bays, waiting rooms, at triage, in corridors, at bedsides and we undertake work at work stations. We require accurate information at our fingertips, with bidirectional capabilities (being able to enter and receive data) in all locations, without our technology tools impairing our conversations. Fixed workstations, requiring us to stand with our backs to patients if we are to see anything on screens, or being unable to enter details about patients as we talk to them is unhelpful and reduces safety

[1]Emergency Department, Casey Hospital, Berwick, Victoria, Australia
[2]School of Clinical Sciences, Faculty of Medicine, Nursing and Health Sciences, Melbourne, Victoria, Australia
[3]Department of Human Centred Computing, Monash University Faculty of Information Technology, Clayton, Victoria, Australia
[4]Department of Emergency Medicine, Mayo Clinic, Rochester, Minnesota, USA

Correspondence to Professor Katie Walker, Emergency Department, Casey Hospital, Berwick, VIC 3806, Australia; katie_walker01@yahoo.com.au

and communication. It may be that more portable small tools, such as tablets with touchscreens and keyboards are the way forwards. Research on the best technology is urgently required. This should include determining which is the best tool as well as translational issues such as barriers and enablers for the use of the device. Barriers might include concerns about loss or theft of portable devices, limited processing power or poor data entry interfaces. Enablers might include improved patient safety by encouraging data entry at point of care and productivity gains by avoiding paper note-taking and later transcription of clinical data into EHRs at a workstation.

User experiences are unlikely to improve unless the developers of the EHR systems conduct ethnography studies to really understand how their tools are used by clinicians. Ethnography is a combination of passive observation, contextual interviews and analysis. It takes time, but often the time is well spent if the end IT product is one that is simple and intuitive. This would prevent simple system flaws from being implemented, which are obvious to clinicians but not to designers—such as not allowing patients to be managed (electronically) until they are registered by clerks. The sickest of our patients are far too unwell to provide their demographic and insurance details until after stabilisation. Most of our emergency processes work in parallel, not in series and our IT systems need to reflect this.

Other key considerations for improving usability and the user experience include usability evaluations with the resources to resolve problems (ongoing, not just at system implementation). The bedside clinician must be engaged at all stages of improvements rather than people with administration roles (less clinical exposure) or those from IT. Physician informaticians can provide a vital link between translating the needs of the practice to IT; for example, helping design visual displays that provide critical information at a glance in a reliable format rather than a display poorly designed where essential information is hidden under menus or constantly moving depending on the information displayed.

Finally, investing in hardware that is up to the task of running our EMRs is important. Slow computers, frequent outages, clinicians without computers and computers on wheels that are not fit for purpose cause frustration, burn-out and clinical delays, contributing to poor user experiences and reduced patient safety. If we are to use EMRs, we need adequate equipment.

Moving forward, there are clear areas of opportunity to improve EHR usability. How to improve EHRs is a challenge that should be taken on by the healthcare and technology communities given the massive opportunity costs of continuing with the status quo and the disservice provided to our patients when systems used as a part of their care are inefficient. We require improvements in both software and hardware and must be able to access and enter data where we acquire and use the information. We need to move beyond the click box transactional system to one where emergency care is advanced by use of this technology. We must address the cost of care delivery with our current system and demand the EHR serve our patients above all other priorities.

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ORCID iDs
Katie Walker http://orcid.org/0000-0002-5313-5852
Heather A Heaton http://orcid.org/0000-0001-6683-1315

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