Chapter 2
Avoiding Adverse Consequences of E–Health

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ABSTRACT
E-health has been heralded as a possible solution to reducing the major problem of preventable medical error. However, the available evidence is not strong, and there is increasing awareness that implementation of health information technology can result in error of itself. E-health has the potential to alter workflows in unpredictable ways, introduce new types of error, and change the way clinicians communicate and behave. It is necessary to educate designers and clinicians about these problems so that solutions can be created that minimize risk. Given the pace of e-health development, agreement on a broad strategy is needed now to ensure that it helps to improve safety for users of health services. The principles of patient safety should be integrated into e-health solutions so that adverse consequences are avoided.

INTRODUCTION
One of the major selling points of e-health (electronic health) technology is the promise that it will be a tool to improve patient safety and reduce adverse events. Healthcare is one of the most high-risk endeavours in the world, and about one in ten people admitted to hospital are the victim of an adverse event (Leape, 1994). In many other industries, automation has improved efficiency, costs and rates of error. Almost every company uses technology for some aspect of their business. Healthcare has been one of the slowest areas to implement these solutions on a large scale. Proponents of e-health argue that it is now untenable to prevent implementation of new digital solutions, and that it will lead to a poorer outcome for patients. This has led to a strong international drive in support of e-health, with some countries introducing financial incentives to progress health information technology.

However it is unwise to make such potentially radical change without first examining the evidence for implementation of technology within
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healthcare, and also making an individualised assessment of what the expected positive – and negative - outcomes might be. Few people consider that e-health can pose a threat to patient safety. However any change in workflow can lead to adverse outcomes – an entirely possible situation when introducing new technology into healthcare. It is even possible that new types of error can be introduced after adoption (Nadzam, 2001). This would be an unwanted result in any industry, but in healthcare adverse outcomes include illness and death. Graham (2008) argues that the airline industry would never have its first trial of an airplane with real passengers, but the equivalent situation is currently occurring in healthcare with information technology. The concern is that with such a concerted effort to introduce these systems, they are being implemented too rapidly without a detailed risk/benefit assessment.

This chapter considers the evidence for e-health as a means to deliver healthcare in a safer, more patient-centred way. It considers the theory of patient safety and explains why we need to build these concepts into our design of e-health systems. The causes of error and risk are explained, with examples of how technology can be a disruptive influence and increase the possibility of adverse outcomes. Finally, available solutions are analysed and possibilities for future research are outlined.

BACKGROUND

The term e-health may be familiar to many people, but it is a broad construct with many subsidiary components. A concise all-inclusive definition remains elusive, with one review revealing that there were over 50 definitions in use (Oh, 2005). Eysenbach’s (2001) is possibly the most accepted and states that:

E-health is an emerging field in the intersection of medical informatics, public health and business, referring to health services and information delivered or enhanced through the Internet and related technologies.

As e-health has developed, it has also matured into a way of thinking, and an approach to healthcare, rather than just the use of technology. The potential advantages of e-health such as increasing patient access to their health information can be a driver to increase end-user involvement, and allows more transparency in how care is delivered. Many other terms such as telehealth, telemedicine and m-health (mobile health) are often used interchangeably with e-health, and a range of definitions for each term exist. However, these are now recognised to be individual entities within the broader area of e-health. The themes of health and technology and the interaction between these fields appear to be common across all attempts to define it (Oh, 2005).

E-health is fast becoming an integral aspect of healthcare provision, and is expected to become ubiquitous as the current technology-driven younger generations age. There is strong political and industry support. The European Commission’s 7th research framework programme involves an investment of more than 50 billion euro from 2007-2013, with prioritisation of e-health. In the United States, President Obama signed into law the HITECH legislation, which provided for up to $27 billion financial stimulus, with incentives for health information technology. Solutions must satisfy “meaningful use” criteria, which makes funding contingent on demonstration of effectiveness. This has increased the drive to show e-health in a positive light and there is now a significant scientific literature that has attempted to evaluate whether it is of benefit.

In healthcare, there is a need for any new medication, to demonstrate evidence of efficacy before it is introduced. In the United States, the FDA (Food and Drug Administration) must approve any new pharmaceutical products and only do so after extensive development and testing has occurred, with enrolment of participants in
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