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The Role of Technology in Medication Safety Incidents: Interpretative Analysis of Patient Safety Incidents Data

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Abstract

This is a study of medication safety incidents reported to the NHS in England (UK) associated with the use of digital technology. An interpretative analysis of 888 incidents reports offers insight into uses and features of this technology associated with medication errors and potential patient harm.

Keywords:

Patient safety; Drug therapy, Computer-assisted.

Introduction

Electronic medicines management systems (e.g. Computerised Provider Entry Systems - CPOE) are increasingly used worldwide, giving rise to availability of related patient safety data. A number of studies have provided classifications of the types of errors with this technology and contributing factors. Schiff et al [3], for example, queried incidents reported to the United States Pharmacopeia; more than 63 thousands were classed as related to CPOE. Test case scenarios were generated and used to assess vulnerabilities in current systems. CPOEs were found to lack adequate barriers to protect against wrong orders, or their design made data entry error-prone. In Australia, a study of medication incidents in primary care [1] found IT impacted on patient care, including harm or near misses, disrupted clinical workflow, created inefficiencies and user frustration. Although for some incidents risks had always been present, others were more likely to occur with IT, and some were 'unique to IT' [1]. We undertook a sociotechnical analysis of patient safety incidents reported to the National Reporting and Learning System (NRLS) in England and Wales [2] to better understand the role and impact of digital systems on medication safety in the English National Health Service (NHS). The NRLS contains voluntary anonymised reports from all areas of healthcare.

Methods

The aim was to carry out a qualitative analysis of NRLS data to investigate: the role of the technology in medication incidents; issues with the design or implementation of the technology that are incident-prone; if there are specific types of medications involved. The analysis was informed by a set of principles and theoretical assumptions,as follows:

1. Safety is an emerging property of systems; errors are 'normal' in complex systems.
2. Technology influences the risk of errors occuring. Technology can be made 'safer by design'.Through forcing functions or effective display of information, some human errors can be prevented.
3. Human factors principles and heuristics can aid in the design, evaluation, and configuration of systems.

Data were extracted from the NRLS, to retrieve reports of incidents related to the use of a range of digital systems for the supply and use of medicines over five years. It included all incidents reported in the period from 1/1/2012 to 31/12/2015 (based on date of incident), irrespective of associated degree of harm, incident type and care setting of occurrence. A total of 24,889 records were retrieved. A sample of 888 (approximately 4%) were analysed and coded. Thematic extraction (by VL) was based on initial opportunistic identification and follow up scoping to produce a spectrum of issues until saturation was reached. Content validity was achieved by inspection and ratification by remaining authors. The sample lead to identification of 50 themes, and 6 overarching categories: Design, Data, Software, Hardware & Network, Use and Mix-ups. IT related medication safety incidents were across hospital, primary care and community settings, involving a number of IT systems, beyond CPOE. In one case, related to Hardware & Network infrastructure, patient harm was reported as severe,

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