DOCpass: A tool to assess readiness for work in surgeons and anaesthetists to improve and ensure the safety of surgical patients

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A M A R T I C L E  I N F O

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A B S T R A C T

Background: To protect patient safety it is important that surgeons and anaesthetists are aware of work readiness and its influence on their performance before each operation. The purpose of the study was to design a tool to promote such awareness, DOCpass, to study its feasibility in operating room practice and redesign it.

Material and methods: The content of the prototype DOCpass was selected on the basis of literature on aspects of health and work that can affect performance. A suitable platform was subsequently chosen to meet such requirements as ease of use and accessibility. Feasibility in the operating room practice was determined through post-task walkthroughs with seven surgeons and anaesthetists at a university medical centre in the Netherlands.

Results: DOCpass was developed as a webpage in JavaScript and HTML. It screens for personal aspects (e.g. fatigue and mood states) and work-related aspects (e.g. shift and sleeping time duration) that have been found to affect performance and patient safety. The prototype was adjusted according to 13 improvement points suggested by future end users. Their points concerned the content of the introduction and the relevance of screening methods.

Conclusion: DOCpass assesses and provides feedback on work readiness through the digital screening of work and personal health aspects. The participating surgeons and anaesthetists reported that the tool could be useful were the content improved to add more practical value to work by providing feedback that can easily be acted upon.

1. Introduction

Patient safety is an important factor in quality of care.¹ In the operating room (OR), patient safety can be endangered by the imbalance between work demands and the worker health status of the physician. High and diverse work demands can affect health status and work performance or functioning, which can induce human errors or even lead to detrimental effects.² Literature³ shows that surgeons’ and anaesthetists’ reduced physical and mental health might influence the quality of delivered care. In a recent study, small to moderate relationships were found between, for example, having a burnout and decreased quality of care and patient safety.⁴ It was also found that physical and mental job demands – for example fixed postures⁵, long working hours that require high levels of concentration, and production pressure⁶ – can affect a physicians’ performance and endanger patient safety.⁷,⁸ Besides health aspects, also situational awareness can influence safety outcomes in practice⁹ Creating self-awareness in healthcare professionals would therefore help to prevent errors and guarantee patient safety in the daily OR practice.¹⁰ In this study, we focused on the awareness of readiness for work, which is defined as having the mental and physical capabilities required to successfully perform a task and work without increased risk to the own and others’ health and safety.⁹,¹⁰ An instrument could therefore be developed to create more awareness of work readiness among surgeons and anaesthetists that will hopefully lead to fewer mistakes being made in daily OR practice. Various instruments have already been developed both in and outside the domain of medicine that encounter aspects of safety in practice. An important example is the I’M SAFE checklist¹¹ that pilots use to self-assess their physical and mental state before a flight (readiness to fly) in order to create awareness and alert them to possible personal limitations in performance.¹¹,¹² Another example is SURPASS (SURgical PAtient Safety System), a checklist developed to help reduce surgical complications and mortality in the OR, and therefore improve patient safety. This checklist, however, is ultimately aimed at the surgical

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because the latter either focus more on the patient were not developed which both physician and patient safety could be in danger. Literature. Threshold values were also set in order to indicate the point at which early recognition of potential error sources and learning from these analyses to create an effective patient safety programme. To our knowledge, however, there is still no instrument available to specifically screen a physician’s work-relevant health more regularly both during and between shifts. The research questions in this study were: how can a DOCpass tool best be designed and developed? And what is the feasibility of a DOCpass prototype in daily OR practice?

2. Material and methods

The DOCpass tool was developed in two phases. First, the tool content was determined from a literature review, after which the prototype was designed and developed. The second phase was testing the feasibility of the prototype DOCpass in a clinical setting.

2.1. Design and development DOCpass

2.1.1. Content creation

The content of DOCpass had to consist of questions on aspects of physicians’ health and work that could possibly influence their performance, and the feedback to provide to users after they have used the tool. To determine the content and aspects that DOCpass should screen for, a literature review was conducted in PubMed. Important health problems in surgeons and anaesthetists that could induce human errors or affect performance were searched for. Appropriate screening methods, either validated or not, were then selected and feedback was written based on background information from the found and available scientific and grey literature. Threshold values were also set in order to indicate the point at which both physician and patient safety could be in danger.

2.1.2. Instrument design and development

The Adobe Dreamweaver editor was used to develop the prototype on the basis of a set of predefined requirements related to ease of use and accessibility. Heuristic design principles (Jakob Nielsen)—which include such aspects as match between system and the real world, recognition rather than recall, and minimalist design—were then applied to implement the content in a way that would be user friendly and compatible with working flows in practice. During development, versions of the prototype were discussed in the project group to optimize content and design. Having determined the content, the prototype tool was developed. The most suitable platform was selected according to the predefined system’s requirements, namely that the platform had to integrate into one instrument (i) easy access and availability for fast and regular use, (ii) the ability to generate personal advice based on input, and (iii) the ability to easily implement assessment methods for work readiness. The advantages and disadvantages of shortlisted options (i.e. internet website, intranet website, questionnaire software and web application) were then compared.

2.2. Feasibility of the prototype DOCpass

2.2.1. Post-task walkthrough

The feasibility of the DOCpass tool in practice was determined with post-task walkthrough sessions during which future users’ actions were reflected back to them after observation. Every participant in the study attended a walkthrough session that consisted of two parts and was led by one of the project team members. The sessions were held in a setting other than the usual workplace.

2.2.1.1. Participants. Senior and junior physicians in the surgery and anaesthesiology departments at a university medical centre in the Netherlands were invited to participate in this study, because both the specialism and the age of the users could be of possible influence on the results. The target population for this feasibility study were potential end users of DOCpass, namely surgeons, anaesthetists, resident surgeons and resident anaesthesiologists.

We aimed at recruiting eight participants, namely two participants from each subgroup of potential end users as defined in the previous paragraph. In order to identify the major problems in using DOCpass, we needed to have at least five participants.

Participants were recruited and enrolled using printed and digital information leaflets. The A4 leaflets were distributed to all senior and resident physicians in the surgery and anaesthesiology departments. A total of approximately 150 leaflets were distributed in November 2016. Physicians were also personally approached in the OR’s doctors’ lounge in January 2017 and via email in February and March 2017.

2.2.1.2. Procedures. After giving their informed consent, the participants were asked to fill in the DOCpass tool at their own pace and in complete silence while they were being observed. Mouse and computer screen activity was recorded using Camstudio and played back during the second part of the walkthrough. In this second part, observer and participant discussed any problems or questions that arose during the use of the prototype. Data from this part were collected in a prearranged observation scheme that covered various questions about the content and design of DOCpass. The walkthrough discussions were recorded using the Audacity audio recorder for further analysis but were not transcribed verbatim. Each session lasted approximately 30 min. All post-task walkthrough sessions took place in the period November 2016 – March 2017.

2.2.1.3. Outcome measures. The main outcome measures were points of improvement for the content and design of the prototype DOCpass. These suggested improvements were obtained from a sample of the potential end user group and are considered to promote the feasibility of the tool.

2.2.1.4. Data analysis. After the walkthroughs, the observation schemes were completed with information derived from the audio- and videotapes and were digitalized by project member BN. The schemes were then scanned into a computer and all the data from the scheme and the audio- and videotapes were gathered and organized into a new digital version of the observation scheme. Data were
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