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Organisational influences on nurses' use of clinical decision support systems

Rebecca Randell[a,*], *Dawn Dowding*[b]

[a] *Leeds Institute of Molecular Medicine, University of Leeds, Leeds LS9 7TF, United Kingdom*
[b] *Hull York Medical School and Department of Health Sciences, University of York, York YO10 5DD, United Kingdom*

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ABSTRACT

Objective: Nurses are increasingly using computerised decision support systems (CDSS) to support their practice. Previous studies have highlighted the importance organisational factors have on the successful implementation of new technologies in healthcare. However, it is unclear how the organisations where nurses work either facilitate or inhibit the successful use of CDSS. The aim of this paper is to explore what nurses and NHS (National Health Service) managers working in NHS organisations in England perceive as the organisational features facilitating the introduction and successful use of CDSS.

Methods: A study of four case sites where nurses were using CDSS. Data included 124 observations of nurse/patient consultations, 36 patient interviews, 55 nurse interviews and 18 interviews with clinical unit or NHS managers. The majority of the data were qualitative and analysed using thematic content analysis.

Findings: There were a number of drivers for the introduction of CDSS, including instigation from individual clinicians and initiatives at policy level. A key element for the successful introduction of technology such as CDSS was clinician engagement. However, also seen as important for successfully implementation of an IT system are other factors such as the need for adequate resources, characteristics of the system itself and adequate training. Other key issues are a supportive environment and the desire to improve continually the quality of patient services.

Conclusions: For nurses to use CDSS successfully, engagement by clinicians in the procurement and implementation of systems is useful. However, the data collected in this study suggest this is not necessary for successful implementation; nurses may still successfully introduce and use a CDSS if they perceive it to have benefits to their practice.

1. Introduction

Clinical decision support systems (CDSS) integrate information (ideally from high-quality research studies) with the characteristics of individual patients, to provide advice to clinicians to assist them with their decision making [1]. CDSS vary in their functionality, from 'passive' systems providing information only when requested by a clinician, through to 'active' systems automatically providing patient specific recommendations to a clinician [2]. CDSS have a long history; a systematic review of the impact of CDSS contained 5 studies

* *Corresponding author at*: Pathology and Tumour Biology, Leeds Institute of Molecular Medicine, Wellcome Trust Brenner Building, St. James's University Hospital, Leeds LS9 7TF, United Kingdom. Tel.: +44 0 113 3438509.
E-mail address: r.randell@leeds.ac.uk (R. Randell).
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published in the 1970s [3]. The review identified 100 studies, covering the areas of diagnosis, disease management and drug dosing and prescribing [3].

Nurses are increasingly using CDSS and there is a significant push in high income countries for the use of CDSS by nurses to be extended. In part, this is because recent changes in the delivery of healthcare in these countries have led to nurses taking on extended roles previously carried out by doctors [4]. For example, in the UK a number of specialist nurses now have responsibility for the management of care of patients with heart failure [5]. Nurses are also able to prescribe medication [6,7], and often run clinics within primary care and outpatient hospital settings [8]. The provision of CDSS has been identified as a way of supporting nurses within their extended roles, to work more autonomously and as a way of improving patient safety [2]. Examples of areas where nurses use decision support to help them with decision making about patient care include management of asthma [9], diabetes [10] and angina [9], and triage of patients in first contact care [11,12].

1.1. *Organisational influences on technology use*

While organisational factors are generally agreed to play an important role in successful implementation of new technologies within healthcare, a lack of studies exploring this means there is uncertainty as to what these factors are [13]. Because of the complexity of healthcare organisations and the unpredictability of implementation, there is no simple formula for success [13,14]. However, research places emphasis on the notion of 'fit' between the technology and the organisation, achieved through mutual adaptation of the organisation and the technology [15–18]. Thus, barriers to such adaptation become barriers to the successful implementation of technology. May [19] highlights the importance of an organisation's intention and capacity to effectively integrate the technology into the organisation, suggesting a lack of such will and ability results in reduced likelihood of success. However, trying to change processes through the introduction of technology is seen as a dangerous approach. What is required is flexibility in the process of implementation and in the technology [14].

Also influencing successful implementation is the culture of the organisation. Organisations where there is a history of collaboration and team work are more likely to implement technology successfully [20] especially if there is supportive leadership in place. Studies of implementation argue against treating the introduction of new technologies as a purely technical project and argue for users to be involved in order to allow ownership and the creation of systems that match current or future work practice [14]. Certainly, one systematic review of the impact of CDSS found better performance in studies in which the trial authors had developed the CDSS [3]. While possibly the result of biases in assessing outcomes, this finding could also be the result of having a local champion or having more usable and locally appropriate software. When there is not an adequate 'fit' between the technology and the organisation, and when the technology cannot be easily adapted, users often develop 'workarounds' allowing them to use the technology in a way which fits with their work practice [21,22].

Another factor which may affect the way in which new technologies are implemented and used by nurses in clinical practice is the education and training which they receive, both in general IT skills and for the specific system being implemented. A recent survey in the UK indicated the majority of nurses use computers regularly at work but more than 50% had received no training in IT within the last 6 months [23]. Nurses using CDSS within the national telephone triage service in England and Wales reported increased confidence in dealing with mental health related calls and more positive attitudes towards their role in dealing with depressed patients following specific mental health training [24]. However, few studies have examined the training given to nurses on the use of specific computer systems and the effect of training on their subsequent use of technology.

1.2. *Influences on the use of CDSS*

Influences on the use of CDSS can be characterised as being at three levels: the computer interface level; the work process level; and the organisational level [25]. Previous research on the use of CDSS has sought to identify features associated with increased use and acceptance of advice and improved clinician performance and patient outcomes [3,26]. However, such studies have focused on the impact of features at the computer interface level and the work process level [26]. What leads an organisation to introduce CDSS and what aspects of the introduction process lead to successful CDSS use are topics that have received little attention.

A recent survey of the availability of CDSS for nurses across England found nurses who worked in acute National Health Service (NHS) organisations were more likely to have access to a CDSS than nurses who worked in other types of healthcare environment [27]. Larger NHS organisations employing more nurses and with a higher star rating (implying the organisation provided a higher quality of care to their patients) were also more likely to have CDSS in place and used by nurses. This is similar to findings of other surveys examining organisational features associated with more general health IT use; larger hospitals and teaching hospitals are more likely to use health IT than their smaller counterparts [28]. Larger healthcare organisations may have the finances and technical resources to support the introduction of such new technologies [28].

Studies qualitatively examining how nurses use CDSS in practice have highlighted the influence of nurses' knowledge and experience (in general and with CDSS) on how they use the technology [29,30]. Also influencing CDSS use are factors such as the flexibility of the technology. However, what is unclear is how the organisations where nurses work either facilitate or inhibit successful CDSS use. With studies of wider IT implementation highlighting the importance of the organisation on successful technology use, and with increased use of CDSS by nurses, it is important to understand what features may facilitate the introduction of CDSS for nurses in the future.

The results presented here are part of a larger study examining how nurses use CDSS in practice, funded by the Policy Research Programme, National Institute for Health Research in England. The results relating to how nurses use CDSS in practice [29] and the impact of features at the computer interface