Project Title

Background research for an NIHR bid on nurse rescheduling

Start/End Date

November 2011 to July 2012

Main contact

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Research Team

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Context

Hospital wards must be staffed 24 hours a day, 7 days a week, by a limited number of qualified nursing staff. Organising sufficient nursing care and allocating staff to shifts is a difficult scheduling challenge in itself, but, as well as the usual cover, legal & cost constraints, the quality of patient care and retention of valuable staff are also important factors for 2 reasons:

1. The effects of shift work on an individual nurse is crucially important, with patients’ lives put at risk if nurses are made to work undesirable or disruptive shift schedules that may adversely affect their behaviour and the care they provide. A poorly constructed schedule can lead to fatigued nurses which can in turn lead to mistakes. In particular, unforeseen circumstances mean that nursing shifts are often rescheduled at short notice, frequently resulting in disruptive new schedules that adversely impact the quality of care.

2. Shortages in qualified nurses are regularly reported. The Royal College of Nursing has found that "nurses who are forced to work a rotating pattern of day and night shifts are more likely than other nurses to want to leave the National Health Service” and supports the idea of more flexible schedules. Research has shown that allowing nurses to have some choice about the shifts they work can improve their perception of the shifts which in turn improves morale and has a positive behavioural effect on the nursing staff.

Thus good nursing shift schedules and subsequent rescheduling are very important to provide good patient care and improve nurse retention as well as to use scarce resources efficiently and effectively.

Project description

Clark & Walker (2011)* proposed models designed for scheduling and then rescheduling nurses’ shifts, and tested them computationally with synthesised typical data. The results showed that the models are viable and fast enough for operational use, can take nurses personal constraints and preferences into account, and can keep to a minimum the disruption caused by rescheduling. However, to be useful in practice, the model needs testing and refining in the field.

Key findings

The review article submitted to the Journal of Nursing Management is attached to this report. It is entitled “Re-scheduling nursing shifts: scoping the challenge and examining the potential of mathematical model based tools”, and has as authors:

1. Alistair Clark BA MA PhD FORS, Reader in Operational Research, Department of Engineering Design and Mathematics, University of the West of England, Bristol.
2. Pam Moule RGN BSc MSc EdD, Professor of Health Services Research (Service Evaluation), Director of the Centre for Health and Clinical Research, University of the West of England, Bristol.
3. Annie Topping RGN BSc PGCE PhD, Professor of Nursing, Director of the Centre for Health & Social Care Research, University of Huddersfield.
4. Martin Serpell BSc AKC MSc MBA PhD, Research Associate, Department of Engineering Design and Mathematics, University of the West of England, Bristol.

The article:

1. presented a systematic critical literature review identified rescheduling issues and existing mathematical modelling tools, and
2. reported the key issues identified in a listening exercise with managers in four English NHS trusts to inform the development of mathematical tools for rescheduling decision-making.

The listening exercise founds that shift rescheduling is unrecognised as an everyday time-consuming management task with different imperatives than scheduling.

The key findings were that minimal research exists on rescheduling compared to scheduling, and that very little research examines management challenges or mathematical modelling for rescheduling. The review concluded that nursing shift rescheduling is a complex and frequent management activity that is more challenging than scheduling. Mathematical modelling may have potential as a tool to support managers to minimise rescheduling disruption, given that the lack of specific methodological support for rescheduling that takes into account its complexity increases the likelihood of harm for patients and stress for nursing staff and managers.

Outcomes

The outcomes in the proposal were:

- A review article submitted in August 2012 to the Journal of Nursing Management;
- A new collaboration with Prof. Annie Topping, Director of Huddersfield University’s Centre for Health & Social Care Research;
- Preparation for a subsequent collaborative inter-disciplinary bid to NIHR, making use of the review article;
- Capacity-building for Dr Serpell.

Lessons learned from interdisciplinary research

Drs Clark and Serpell learned how to communicate and write in a cross-disciplinary manner, so as to effectively communicate with nursing professionals, particularly during the drafting of the article for
JofNMgt. We learnt a lot from the different nature and rigor of qualitative socially-oriented research comparison to the mathematically-centred quantitative research that we are accustomed to. As such, the drafting of the article was a steep learning curve. The input of Profs Moule and Topping into the article was fundamental and very rewarding.

**Future plans**

We are now in a position to submit a collaborative inter-disciplinary bid to NIHR. After much discussion with various nursing researchers at several universities, we have identified the NIHR’s i4i (Invention for Innovation) programme as the most appropriate. The 3rd i4i call opens on 1 Nov 2012, with submission on 7 December 2102.