Connecting Health and Humans
K. Saranto et al. (Eds.)
IOS Press, 2009

doi:10.3233/978-1-60750-024-7-96

Review of an Automated Rostering System from a Nurse Manager's Perspective

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Abstract. In 2007 the Rostering Project Team (RPT) completed an audit of nursing managers using computerised rostering system. This audit highlighted the overall lack of rostering experience among the participants and the need for formalised education in this area.

Keywords: Rostering, Nurse Scheduling, Rostering Management.

1. Introduction.

Producing an effective roster for nurses is a time consuming, complex process for already busy ward managers in the Mater Misericordiae University Hospital, Dublin which is a 600-bed teaching and tertiary referral hospital in the city centre. The department of nursing is currently in the process of introducing an integrated nursing information system (three components), with the aim of supporting optimum healthcare delivery. One of the components "Nurse Rostering" focused on the provision of facilities to determine, schedule, allocate, and monitor the nursing staffing resources. Following extensive investigation an Integrated Rostering System (IRS) was chosen. This is an automated system that accumulates all rostering information in hours. Staff requests, requirements, and skill-mix, are incorporated to create an automated roster. The system enables electronic duty requesting based on staff coverage and qualifications rules entered by the nurse managers. Manual alterations, following the automated creation of the roster, are possible providing greater flexibility over the roster. The system is integrated with both the patient dependency system, the Hospital Information System and is linked to the payroll system. The four components are-

1. Intragale: Registered Nurses enter requests based on rules entered by their manager.
2. ShiftMaker: For automated generation of the rosters by nurse managers.
3. Centralstaffer: Used by Senior Nursing Managers to obtain a hospital wide view of rosters and staff location.
4. Credential Manager: Educators may record class attendance and approve hospital training.

The system is now operational in all wards, operating theatres, and the emergency department. This paper will give a background to the complexity of rostering, an outline of the IRS, and will report on the audit of the Clinical Nurse Manager's use of the system.

2. Background

Rostering is a multifaceted complex task, which affects patient care and safety, nurse's job satisfaction and health care budgets (11). The linkage between positive patient outcomes and adequate nurse staffing levels has been demonstrated in the literature (1,

4). Yet little attention is paid to the source of the daily staffing levels – the roster. It is not enough to have staff numbers at an acceptable level; rostering requires that the competencies and skills of each staff member are considered when creating the roster (11). Nursing shortages and staff retention are major issues worldwide (3, 9). It has been shown that dissatisfaction with rosters is one of the most common reasons for leaving nursing or changing jobs (4) therefore authors suggest that greater flexibility in scheduling may be an answer to the retention problem (5)

With soaring health budgets and constrained resources it makes sense to examine rostering practice. Budgets are scrutinised for overtime and temporary nurse usage (6), yet there is little attention paid to the planning, design, and creation of nursing rosters, which generate the cost. Rostering has traditionally been a task handed on with no structured training to new inexperienced managers. There is no evidence of any formal rostering education in the literature, however the need for standardisation is being recognised. The New Zealand Nurses Organisation (8) issued guidelines and standards of best practice for rostering. An audit tool was included to evaluate achievement of standards. The Office for Health Management (10) in Ireland recognised rostering as a required nursing management competency. They recommended support for Information Technology and rostering learning and development time. The New South Wales Health Department (7) promoted a review of rostering practices and the use of computerised rostering systems.

3. Audit Aims

- To ascertain the computer skills, staff grade, level of nursing education, and the user's rostering experience.
- To examine: rostering preparation time, rostering complexity, and elements involved.
- To highlight the benefits of the system for users and other agencies.
- To evaluate the in-house training programme.

4. Methodology

The survey used Zoomerang, free custom designed web-based questionnaire software. A structured questionnaire using both closed and open-ended questions was designed. It was piloted among senior nurse managers and adjustments in wording made.

5. Participants

The inclusion criteria for the study were that participants must be trained and use ShiftMaker to generate their computerised rosters.

Staff studied consisted of: Clinical Nurse Managers (CNM) 1, 2, and 3 Assistant Director of Nursing (ADN), Registered Nurses (RGN) and Clerical staff. 50 questionnaires were emailed to those identified as participants in the study.

6. Data Collection

40 completed questionnaires were returned by email with a response rate of 80%.

7. Data Analysis

The analysis was also completed using Zoomerang. Themes were generated from the responses to the open-ended questions.

8. Findings

8.1 Computer Skills:

56% of the group studied considered their previous computer experience as '**Intermediate**' i.e. can use email, internet, and word processing. The other 14% considered their use as "**Basic**" i.e. can turn the computer "on and off".
Staff Grade:
Those in charge of completing the roster were:
68% CNM 2, 10% CNM 3, 10% RGN, 8% CNM 1, 5% ADN.

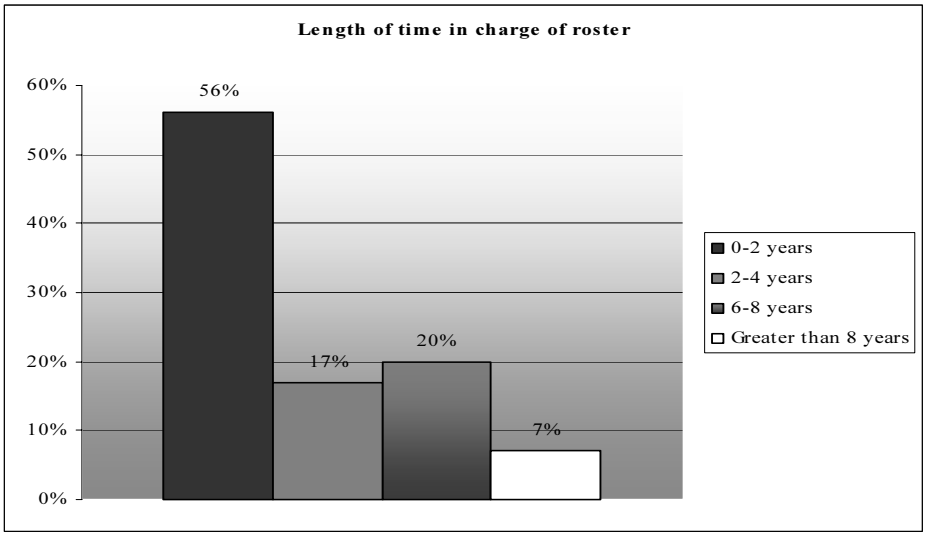
8.2 Nursing Education Level:

The educational level of the study participants ranged from 14 with a Diploma or Higher Diploma, 16 in the Certificate category with the remainder either at Degree level, Masters Level, or undertaking further education. 25 of the participants had more than one qualification.

8.3 Length of time in charge of a roster:

56% of the study group who created rosters were in the 0-2 years category. This percentage shows that a high percentage of staff undertaking roster creation are quite recent to the role.

Table 1 Length of time in charge of a roster



8.4 Previous Rostering Experience:

59% of the group responded "Yes" when asked if they had previous experience of making up rostered duty for a group of nurses. However 41% had no previous experience of creating rosters.

When asked, 88% said the prevailing method of their previous rostering experience was paper based. Only 17% had any experience with computerised rosters.

8.5 Present Rostering Experience:

56% of the respondents received rostering theoretical and practical training from the RPT. 25% gained knowledge through trial and error, while a colleague or previous ward manager taught 12%. The remainder gained their knowledge through experience.

8.6 Time Spent on Roster Preparation:

33% indicated it took from five minutes up to one hour to complete a roster. 33% of respondents indicated it took days to complete the roster. This ranged from one day up to a week. Comments included:
'*I would do it over a few days. An hour here and there where I can. Usually over a week, it never gets done as an uninterrupted task due to demands of the job'*
'Some rosters more difficult than others due to vacancies, skill mix issues, conflicting requests"

Rosters were created months in advance by 40%, one month ahead by 37% and 2-3 weeks in advance by 18%. This system offers automated generation of rosters, but will also allow manual manipulation of shifts after automated generation. The study revealed 66% of all users fine-tuned the roster manually post generation. 32% indicated that they entered greater than 50% of the roster manually.
These results demonstrated that a significant number of users still record manually and do not allow the automated system assistance in the creation of their roster.

8.7 The Complexity of Rostering:

It is inevitable that changes will be made to the active roster and essential that these changes are made in "real time". Real-time data maintenance of the IRS facilitates Senior Nursing Managers to accurately identify actual staffing levels throughout the hospital. It also ensures exact payroll data and correct levels of absenteeism thus reducing time spent checking at the end of a calendar month.

Changes are made on a daily basis as a result of sick leave, annual leave, study days or staff swapping duty (Table 2). The reasons for making changes on a weekly basis were because of leaves, but also recording of Agency or Bank staff, and hours worked up or taken back. Reasons for not entering changes were either they weren't required or changes were entered on a daily basis. Payroll appears to be the prevailing reason from respondent's comments in making changes on a monthly basis.

8.8 The most important aspects of making up a roster:

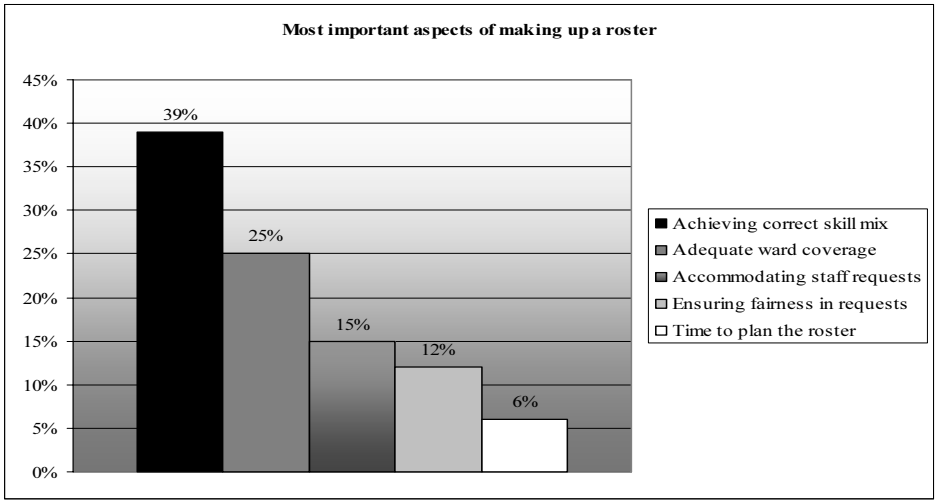
- Achieving the correct skill mix
- Ensuring adequate ward coverage
- Accommodating and ensuring fairness in staff requests. (Table 2)

8.9 Rostering Choice:

When asked which method of rostering they would prefer: 85% chose the IRS. Reasons for this choice included the following comments:

"*Computerised rostering is a better format as information is easier to find".*
"*Easier to check accumulated hours worked and annual leave, rostering on paper more difficult to check through especially if you are going back months".*

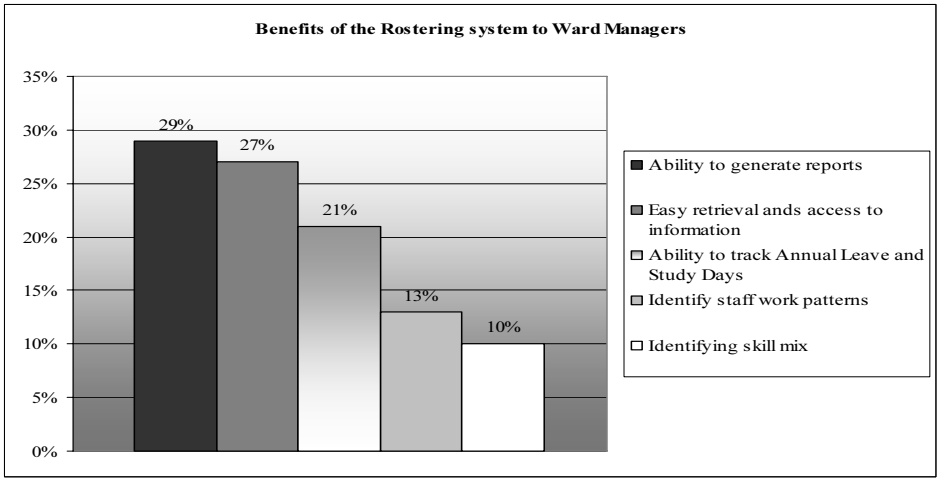
Table 2 The most important aspects of making up a roster



8.10 Rostering Benefits:

Information entered on Rostering was considered beneficial by 97% of participants. The majority of the participants (29%) indicated that generating reports was the greatest benefit, followed by (27%) who valued retrieval and access to information (Table 3). The ability to track annual leave and, study days was appreciated by 21%. The remaining 10% indicated identification of staff patterns of work and skill mix was most beneficial.

Table 3 Rostering Benefits:



8.11 Benefits to other disciplines.

38% felt ward managers benefited most from the system as it enabled them to take greater responsibility and monitor leave, payroll, and education. Salaries and Human

Resource departments benefited most according to 28% of participants. 22% felt ADNs could use the information from the Rostering System to ensure resources are being used properly and to create staffing levels awareness.

8.12 Training in the Rostering system:

All participants were satisfied with the training received in the IRS. Comments made included: *"Rostering Project Team very helpful in the when I have queries".*
74 % of respondents stated that their rostering knowledge had improved since using the computerised system. It is noteworthy that 39% of comments from the respondents indicated their only knowledge of roster creation was through training received from the RPT.

9. Study limitations

The free software completed questionnaires had to be returned within 10 days.

10. Discussions and Conclusion

The audit supported what has been evident in the literature – that staff with little rostering experience are in charge of this complex task. Despite the multiple academic qualifications and basic to intermediate computer experience the majority of the group had no previous rostering experience and even fewer had experience with computerised rosters. However the inexperienced respondents were well aware of the important aspects of creating a roster; skill mix, ward coverage, and fairness in accommodating staff requests. One specific characteristic of rostering not discussed in the literature is the need for constant changes in the roster. Changes are made daily as a result of various leaves, and changes to study days or staff swapping duty. This is a very time consuming facet of the rostering process and to ensure accurate data changes need to be made in real time on a daily basis. As the system is linked to payroll and dependency systems this adds to the urgency of updating. Although the system is automated some manual manipulation of duty is required post generation. By making changes in the computer auto scheduling options we hope to reduce the 32% who indicated that they entered greater than 50% of the roster manually. The benefits of the computerised system led 85% of our participants to choose it over the paper-based version. These benefits give managers easy and instant access to relevant current information to assist them in their managerial role. This information is already being used for determining trends, patterns of work, absences, and future resource planning for both local and divisional nurse managers. The principal finding of this audit is the need for continued and detailed education in the rostering process. A standardised rostering training programme already exists and there are plans to have an e-learning component on the hospital's Intranet to assist all managers on a 24-hour basis. Managers will also need further education in the use of this information to empower and improve nursing resources.

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