RCPCH
Royal College of Paediatrics and Child Health
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Self-rostering in paediatrics

Introduction

Effective rostering is fundamental to achieving both high-quality paediatric service and staff well-being. It requires a balance between allocating shifts that provide adequate staffing levels and expertise, while accommodating staff needs and remaining intrinsically flexible. Well-documented pressure on staffing following the pandemic and the cost-of-living crises alongside rising waiting lists, rota gaps and congruent changes in complexity of care mean that rostering is more challenging than ever before. In this document, we describe the ways in which electronic-based self-rostering (e-rostering) can be an effective alternative to manual rostering in turn, prioritising staff wellbeing while accounting for both service and staff requirements plus mandatory regulations, all in a timely fashion.

Rota planning has traditionally fallen on the shoulders of individual staff members who have been required to allocate shifts as they deem appropriate, juggling service requirements, staff requests and regulatory conditions – all as part of a manual process. Given the challenge this entails, solutions have been proffered that look to simplify and improve the rostering process leading to a move towards e-rostering. E-rostering algorithms can incorporate both staff preferences such as annual leave, alongside service requirements e.g. minimal staffing in addition to mandatory regulations using partially or fully automated processes. Electronic self-rostering is currently being trialled in a number of units across the UK using both a manual-automated hybrid, which requires some human user manipulation and a purely algorithmic approach. Here, we take a look at the background and evolution of self-rostering with a focus on hybrid and fully-automated methods presenting an example of two new platforms designed to improve the rostering process.

E-rostering background

Traditional rostering in the NHS has generally been a fully manual process that requires significant involvement from HR teams, managers and supervisors. Those performing this task are required to keep track of all necessary service requirements, regulations and mandatory service-based compliance, whilst also trying to ensure that staff requests regarding leave and shift patterns are fulfilled equitably. However, in addition to service provision, staff wellbeing should remain a priority when compiling a roster. This means that study leave requests should be honoured while annual leave and work pattern requests should similarly be permitted where possible. This is particularly relevant with the rapid increase in flexible working with 40% (predicted to rise to 60%) of postgraduate doctors in training (PGDiT) working less than full time. Alongside this, breaks, absences and cover should be monitored and accounted for, and the number of hours worked recorded. However, on a busy rota, particularly where longer-term

gaps are occurring, the priority of the rota manager will be to ensure service provision leaving well-being inadvertently deprioritised. This is can lead to unfair distribution of overtime, inability to take full breaks or attend training opportunities and overall difficulty in integrating flexibility, creating issues regarding minimal staffing (or in some cases overstaffing) which in turn leads to low morale, overburdened staff, lower quality of service and plummeting retention.

Within the NHS, the 2016 Carter review advocated for greater technological implementation to help reduce absences and save money (1), while a London School of Economics report stated that more widespread use of e-rostering would save money and improve patient care (2). According to the BMA, self-rostering is considered aspirational best practice whereby the best employers provide staff the opportunity to self-roster (where possible) supported by guidance on mandatory duties and required shift types.

The benefits of e-rostering are potentially manifold. There is no fixed work pattern, which inherently improves flexibility. Staff have greater control allowing them to choose their preferred shift patterns, out of hours and non-working days in a system that incorporates contractual health and safety obligations and staffing/skill-mix requirements. E-rostering also helps manage rota gaps with staff more accurately allocated to shifts in addition to a more equitable distribution of extra shifts that reduces the need for short-term locum support making the system more cost-effective.

Successful e-rostering does require a certain level of staff commitment in terms of submitting requests in advance to allow rotas to be built with not all requests guaranteed despite the sophistication of the systems being used. This change in culture requires both time and adequate explanation for buy-in. However, anecdotal evidence suggests that keeping staff informed and the ensuing advantages of e-rostering, which does allow for last minute changes and shift swaps, ensures that the system functions well. Additionally, there may be a shift to personalised rotas, already used in flexible working but not for those on full time generic rotas. Trusts can opt to base pay on personalised work schedules for both full and flexible working or more simply, ensure that for all full-time staff the number of shifts are equal to that of a generic work schedule.

Early case studies

Royal Free Hospital

In the NHS, e-rostering has been used in varying degrees for nursing rotas with managers incorporating flexible working requests (3). In 2018, the Royal Free Hospital acted as a pilot site as part of a wider project aimed at reducing nurse turnover by improving flexibility, fairness and work-life balance (4). Key to the success of this temporary employment was discussion of the basic principles between roster managers, senior staff and the wider staff group. With e-rostering implemented at the Royal Free's Intensive Care Unit, nurse vacancy rates dropped by 6.5% in five months, turnover fell from 29.8 % to 17.2% within a year and requested shifts increased by 34% over 18 months. E-rostering, therefore, improved turnover while providing staff with an enhanced role in work planning.

Brighton and Sussex University Hospital

A related study was conducted in 2017 whereby both annualisation and e-rostering was implemented for doctors across all tier rotas (at the time labelled consultants, middle grade and junior) at Brighton and Sussex University Hospital (5). As with previous examples, there had been an issue with retention and, as part of a push to improve the situation, annualised self-rostering was put forward as a potential solution. Using a system called 'Health Rota', annualised rotas were created whereby hours were allocated according to doctor availability within a service need framework and based on clinical hours available. PGDiT were able to block out non-working days, the appropriate skill mix would be automatically mapped and any examples of non-rota compliance identified. Shift patterns were disseminated a year in advance, with shifts easily swapped via the use of an app. This led to 24/7 emergency cover and more than a threefold increase in consultants and Tier 2 doctors, in addition to a significant drop in the use of locums. Retention improved with e-rostering a factor in posts being recommended to colleagues; wellbeing and burnout also improved while those working less than full time had more flexibility. Participants also found it easy to request annual leave and study leave. Importantly, both service quality and patient experience was notably improved.

Examples of e-rostering systems currently being used

Hybrid System: Bristol Royal Hospital for Children

With rolling rotas in place, Bristol Royal Hospital for Children completed a survey around causes of work-related stress and rota impact on their lives and wellbeing, of which 7 of the top 8 stressors were directly linked to poor training opportunities, rota design and work-life balance. The key disadvantages of a rolling rota were again highlighted i.e. lack of flexibility and a reduction in training opportunities. At the point that the survey was conducted, retention at Bristol Children's Hospital was at an all-time low, gaps were high and so was burnout.

E-rostering was initially piloted for a cohort of 19 paediatric registrars registrars (10 full time equivalent) on the general on-call rota and then extended to 56 paediatric registrars across multiple specialty rotas. Supported by online meetings and written guidelines, the pilot was considered a success; feedback was overwhelmingly positive with all participants agreeing that they would rather work in a department which self-rosters in the future. 96% of PGDiT attested to the fact that self-rostering facilitated a good work-life balance compared to 45% on the original rolling rota. All respondents reported that self-rostering provided enough flexibility to allow them to have their preferred annual and study leave (compared to 27% on the original rolling rota) with the percentage day-time working within specialty increasing from 57.5% to 70.1% hours for sub-specialists and up to 67.9% for generalists – in line with the RCPCH recommended quota of 70%. Likewise, the allocation of protected SPA time almost doubled increasing from 9 to 16.5 hours per month for ST4-ST5 PGDiT – in line with the BMA training charter. There was also evidence of more ground cover during the day and each registrar had an extra non-working day per annum across both general and specialist rotas. Finally, there was a significant reduction in locum costs due to less gaps coupled with more consistent coverage of doctors which meant a measurable saving of nearly £150K between 30 FTE registrars. This has since been extended to the SHO rota as well with similar informal feedback.

It should be highlighted, that this approach still requires dedicated staffing, which could prove prohibitive in smaller units where staffing is minimal.

Week	Mon	Tue	Wed	Thu	Fri	Sat	Sun
1	8:30 - 17:30	8:30 - 17:30	8:30 - 17:30	8:30 - 17:30	8:30 - 17:30		
2	8:30 - 17:30	8:30 - 17:30	8:30 - 17:30	8:30 - 17:30	8:30 - 17:30		
3	8:30 - 21:15	8:30 - 21:15	8:30 - 21:15	8:30 - 12:30			
4	8:30 - 17:30	8:30 - 17:30	8:30 - 17:30	8:30 - 17:30	8:30 - 17:30		
5	8:30 - 17:30	8:30 - 17:30	8:30 - 17:30	8:30 - 17:30	8:30 - 17:30		
6	8:30 - 17:30	8:30 - 17:30	8:30 - 17:30	8:30 - 17:30	8:30 - 12:30		
7	8:30 - 17:30	8:30 - 17:30	8:30 - 17:30	8:30 - 17:30	8:30 - 17:30		
8	8:30 - 17:30	8:30 - 17:30	8:30 - 17:30	8:30 - 17:30	8:30 - 17:30		
9	8:30 - 21:15	8:30 - 21:15	8:30 - 17:30	8:30 - 12:30			
10	8:30 - 17:30	8:30 - 17:30	8:30 - 17:30	8:30 - 17:30	8:30 - 17:30		
11	20:30 - 24:00	00:00 - 9:15, 20:30 - 24:00	00:00 - 9:15, 20:30 - 24:00	00:00 - 9:15, 20:30 - 24:00	00:00 - 9:15		
12	8:30 - 12:30	8:30 - 17:30	8:30 - 17:30			8:30 - 21:15	8:30 - 12:30
13	8:30 - 12:30	8:30 - 17:30		8:30 - 17:30	8:30 - 17:30		
14	8:30 - 17:30	8:30 - 17:30	8:30 - 17:30	8:30 - 17:30	8:30 - 17:30		
15	8:30 - 17:30	8:30 - 17:30	8:30 - 17:30	8:30 - 17:30	8:30 - 17:30		
16	20:30 - 24:00	00:00 - 9:15, 20:30 - 24:00	00:00 - 9:15, 20:30 - 24:00	00:00 - 9:15, 20:30 - 24:00	00:00 - 9:15		
17	8:30 - 17:30	8:30 - 17:30	8:30 - 17:30	8:30 - 17:30	8:30 - 17:30		
18	8:30 - 17:30	8:30 - 17:30	8:30 - 17:30	8:30 - 17:30		8:30 - 21:15	8:30 - 12:30
19	8:30 - 17:30	8:30 - 17:30	8:30 - 17:30	8:30 - 17:30			
20	8:30 - 17:30	8:30 - 17:30	8:30 - 17:30		20:30 - 24:00	00:00 - 9:15, 20:30 - 24:00	00:00 - 9:15, 20:30 - 24:00
21	00:00 - 9:15		8:30 - 17:30	8:30 - 17:30	8:30 - 17:30		
22	8:30 - 17:30	8:30 - 17:30	8:30 - 17:30	8:30 - 17:30	8:30 - 17:30		8:30 - 12:30
23	8:30 - 17:30	8:30 - 17:30	8:30 - 17:30	8:30 - 17:30			
24	8:30 - 17:30	8:30 - 17:30	8:30 - 17:30	8:30 - 17:30		20:30 - 24:00	00:00 - 9:15, 20:30 - 24:00
25	00:00 - 9:15		8:30 - 17:30	8:30 - 17:30	8:30 - 17:30		
26	20:30 - 24:00	00:00 - 9:15, 20:30 - 24:00	00:00 - 9:15, 20:30 - 24:00	00:00 - 9:15, 20:30 - 24:00	00:00 - 9:15		

Fig 1. Example of a Rolling Rota (courtesy of Karthik Darma)

Table 4: Feedback from trainees. Total N = 12						
	Strongly agree n (%)	Agree n (%)	Neither agree nor disagree n (%)	Disagree n(%)	Strongly disagree n(%)	No response
A self-rostering rota allows a good work/life balance	8 (66)	4 (33)	0 (0)	0 (0)	0 (0)	0 (0)
I think self-rostering will significantly improve my wellbeing	8 (66)	4 (33)	0 (0)	0 (0)	0 (0)	0 (0)
There is enough flexibility in the self-rostering rota to have the annual and study leave I want	8 (66)	4 (33)	0 (0)	0 (0)	0 (0)	0 (0)
I would prefer to work within a department which self-rosters in the future	8 (66)	4 (33)	0 (0)	0 (0)	0 (0)	0 (0)
I think I am more likely to pick up locum shifts with a self-rostered rota	5 (42)	3 (25)	4 (33)	0 (0)	0 (0)	1 (8)
I think self-rostering enables me to access more educational opportunities on my specialty	5 (42)	5 (42)	2 (16)	0 (0)	0 (0)	0 (0)

Fig 2. Survey results (courtesy of Karthik Darma)

AI-Based: InGenius

InGenius is a fully-automated software working within an AI framework and recommended by the government website as not just an e-rostering platform but also for staff bank management. Being AI-powered, it allows both clinician preferences and regulatory requirements to be easily incorporated and the cloud-based framework means that information is easily accessible including by smartphone.

We have discussed the advantages of e-rostering in depth, but a fully automated system can also avoid any shift allocation preference bias based on 'first come first served' and avoid the risk of the least desirable slots being the hardest to fill, offering solutions where rotas are short-staffed or with high proportions of flexible working staff. Fully automated approaches balance between rotas and staff. A fully automated approach has the advantage that it creates the optimal shifts for each staff member on an individual basis while accounting for departmental requirements including minimum staffing levels and skill mix alongside staffing requirements such as training needs, SPA time and working pattern preferences. As with other new software, InGenius is currently being piloted in a number of units across the UK and early reports suggest reductions in temporary staffing requirements with over 90% of leave requests accommodated.

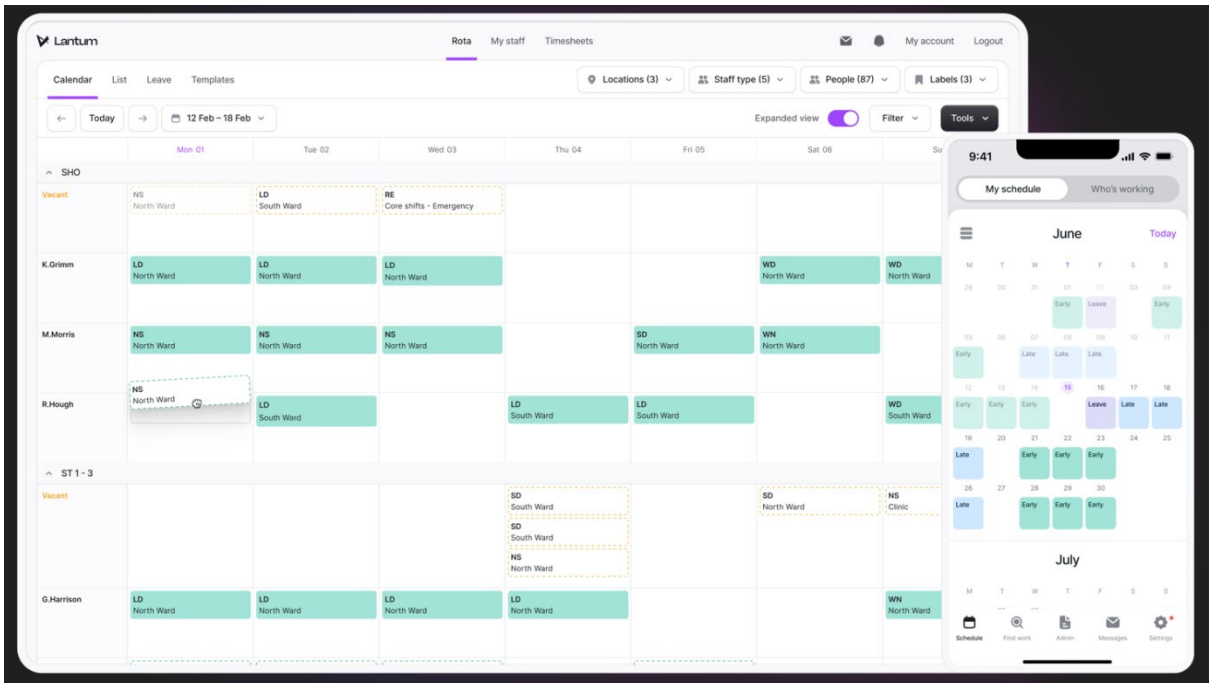

Fig 3.Example of a rota using InGenius rostering (courtesy of Lantum)

Conclusion

While e-rostering is in its relative infancy, there are a set of proven advantages that suggest that it should be embraced within paediatric rota planning. Not only can it reduce time spent in creating increasingly complex rotas, but the implementation of e-rostering could improve training opportunities, support wellbeing and optimise staffing levels while providing an appropriate skill mix.

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Published 2024 by the Royal College of Paediatrics and Child Health (RCPCH)
Registered charity in England and Wales (1057744) and in Scotland (SC038299).