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Improving availability and accuracy of the junior doctors' on-call handover through digitalisation

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ABSTRACT

Clinical handovers from out-of-hours activity are essential for relaying information about events such as new admissions, outstanding or complete investigations, physical health reviews, ward jobs and risk. This information enables the day team to effectively prioritise and follow-up any necessary tasks.

Junior doctors at a hospital site in the London Borough of Newham were aware that the existing handover system, constituted of a word document circulated via email, was lacking robustness and that the handover was not sent out reliably on a daily basis.

Quality improvement (QI) methods including process mapping, PDSA ('Plan, Do, Study, Act') cycles, driver diagrams and run charts were used to understand the issue, create a more robust process and measure the improvements made, all supported by regular QI project meetings. The change ideas included moving from an informal Microsoft (MS) Word document, which was emailed out, to an Excel spreadsheet stored centrally on MS Teams. Column headers were added for admissions, ward jobs, seclusion reviews, matters relating to mental health law and Accident and Emergency (A&E) assessments, as well as defined columns for outstanding jobs and standard tasks that need to be completed for all admissions. Responsibility for circulating the handover list was given to the incoming day duty doctor if the night doctor was too busy, with admin support to chase the circulation of the handover. Results were studied for the following 18 months.

The percentage of handovers being appropriately sent out increased from a median of 80% to 100% during the project period, and the availability of handover data where the data were visible to doctors on MS Teams but had not been sent out also increased from a median of 80% to 100%. The system was deemed safe, effective and easy to use, and has already been replicated at neighbouring hospitals.

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Clinical handover is a well-recognised point of vulnerability for patient safety and care. Electronic handovers are recommended but can have training and technical obstacles to implementation.

WHAT THIS STUDY ADDS

⇒ This project has demonstrated that digitalisation and centralisation of the handover document using cost-free, familiar software improves performance and is easy to use.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ The model outlined in this project is simple, affordable and effective and therefore provides a ready system for implementation elsewhere in the National Health Service.

PROBLEM

This quality improvement (QI) project emerged from an awareness that the handover process at Newham Centre for Mental Health (NCfMH) was flawed in three critical domains: content; data governance; and sharing. During their out-of-hours work, on-call doctors on the Newham Core Trainee Psychiatry rotation provide psychiatric cover at three distinct sites: NCfMH, the Coborn Centre for Adolescent Mental Health (the Coborn) and Newham University Hospital (NUH). All out-of-hours activity, comprising work undertaken overnight and at weekends, needs to be captured and safely handed over to the respective day teams at the start of the day.

The handover process begins at 17:00 on a weeknight, at which point doctors from the day shift would hand over tasks to two doctors working from 17:00 to 21:00, one covering Accident and Emergency (A&E) and one working on the wards. This would occur face to face, via email or via telephone call, and the information would be captured in a manner of the doctor's choosing and no record would be stored. A further handover would occur at 21:00, at which point the two evening doctors would hand over to the night doctor, who covered the shift from 21:00 to 09:00 the following day. This was usually conducted in person, but sometimes one of the doctors would pass on a message informally. The night doctor would then have to write up the handover from the preceding

evening and night shift on a Microsoft (MS) Word document, including any information deemed relevant, and circulate it to those recipients believed to require it at 09:00 before leaving the site. At a weekend, the night doctor would have an in-person handover with the day doctor who would work from 09:00 to 21:00. Usually, doctors' notes were kept in paper form for each shift and then discarded in confidential waste, so only the last on-call doctor of the weekend would type their notes to circulate by email attachment.

With respect to content, it was apparent that there were instances of crucial information being missing from the handover; there was no record made of whether, or why, jobs had not been done. This created unnecessary uncertainty and additional workload for the recipients as the day team would have to check records to see what was missing. Regarding data governance, the handover information was captured on a simple template on MS Word and circulated as an email attachment. Once sent, the handover document was not held centrally and therefore there was no readily available repository of handover information for clinical governance purposes. If the handover was not sent out all the information regarding the out-of-hours shift would be lost. When it came to sharing, there was also no centrally available list of necessary recipients; the list would usually be sent to the same group of recipients as the previous day's list, thereby any omissions were carried over day after day.

NCfMH is located in the London Borough of Newham and serves a local population that is highly diverse[1] and is the second most deprived borough in London, with 36% of individuals living in poverty.[2] It is an adult inpatient mental health unit which is part of the East London NHS Foundation Trust. The Centre is staffed by doctors, nurses, psychologists, occupational therapists and managers, and works closely with external organisations to support recovery. It comprises a unit with seven wards, a seclusion room and a Section 136 (S136) suite. The Coborn is an adolescent inpatient unit with 12 acute beds and 16 psychiatric intensive care beds as well as a seclusion bay. NUH is a physical health hospital with a busy emergency department as well as inpatient wards, including a paediatric unit. Handovers are an unavoidable and critical part of managing activity across multiple sites, systems and teams.

The intention of this project was to improve the handover across all three domains of content, data governance and sharing. Specifically, the aim was to increase the circulation of the daily handover to the correct recipients from 80% to 100% and to improve the availability of handover information (stored centrally if not sent out) from 80% to 100% over a 12-month period. Quality of handover was assessed using a local survey and national General Medical Council (GMC) survey results.

BACKGROUND

Clinical handovers are regarded as one of the most 'perilous procedures in medicine'.[3] As patients move between teams or wards, or as staff change shifts, essential clinical information risks being lost and responsibility for jobs not readily assumed. Inadequate handovers can lead to delays in treatment and care, repeated tests and inaccurate decision-making, inadequate communication and a poor experience for the patient that could affect therapeutic relationships. It is a well-recognised point of vulnerability in clinical care and therefore the systems in place have significant implications for patient safety and effective, efficient care.

Handovers can broadly be categorised into verbal, paper based and electronic. While the WHO recommends using the SBAR (Situation, Background, Assessment, Recommendation) tool as a standard,[4] it is recognised that handovers will need to be tailored to the individual setting and clinical priorities. Similarly, there is no standardisation within electronic handovers, which range from simple electronic documents to tailor-made programmes that integrate with local clinical systems.[3] The latter may confer benefits in terms of efficiency and accuracy of information, but require information technology (IT) and financial resources that are not at the disposal of many clinical teams.

Pezzolesi *et al*[5] examined the nature of the errors in the handover process, identifying and analysing 334 handover incidents over a 36-month period in one general hospital. The most common type of handover was within specialty at the time of shift changes, and here also lies the greatest incidence of handover error. The most common type of handover error involved incomplete information transfer, which mirrors the concerns that generated this project. The severity of incidents reported in Pezzolesi *et al*[5] was generally low, but the frequency of errors confers a substantial weakness to the system according to Reason's 'Swiss Cheese' model of patient safety[6] with potentially catastrophic consequences. Donaldson *et al*[7] found that 5% of deaths relating to patient safety concerns in a national database were attributable to poor or inadequate handovers.

As a result, improving the handover process has been a research and clinical priority. Despite extraordinary advances in technologies within the National Health Service (NHS), operational and systems-based solutions have been lagging behind. The aviation industry has repeatedly been the source of inspiration for diminishing human error in patient safety by using strategies such as checklists and standardised protocols.[8] Electronic handover tools have been promoted as effective ways to improve the quality of handovers,[9 10] but their incorporation into day-to-day clinical work has been limited. This project demonstrates a practicable, cost-effective and acceptable means of delivering this much needed improvement.

MEASUREMENT

Initial data collection involved the members of the QI project team reviewing emails to ascertain whether a handover had been circulated or not on each day of the week over the preceding 9 weeks in order to calculate baseline weekly totals. If the email had been sent with the handover document attached then it was deemed to have been circulated ('handover sent out'), and also that handover data were available ('data available'). A weekly percentage was calculated for the 'handover sent out' metric generating a baseline of 80% (median) on the run chart. The 'data available' metric was identical as if it had not been sent out then the data were de facto not available, therefore also having a baseline of 80%.

After initiation of the QI project, the 'handover sent out' data continued to be measured on a weekly basis by checking emails, and the 'data available' metric was measured by checking the MS Teams channel to see if a handover file was present for each day of the week.

After an incident several months into the project where the handover was not sent out until the afternoon, the operational definition was amended to incorporate the standard of sending out the handover by 09:30.

Quality of content was not measured but the MS Teams template contained headers that served as prompts regarding matters regarded as key for a complete and comprehensive handover. The MS Teams spreadsheet included defined sections for identifiers, admissions, mental health act details, ward jobs, seclusion reviews, physical health, S136 assessments and A&E assessments, and defined columns for outstanding jobs and standard tasks that need to be completed for all admissions.

DESIGN

In recognition of the weaknesses of the previous handover system, a QI project team was set up. Interested junior doctors at NCfMH were invited to participate. The administration team who manage the on-call rota also agreed to be involved. Given that the target of improvement was an internal process that did not directly involve patients, there was no patient or public involvement in the design of this improvement project.

The team first undertook an analysis of the problem to understand its origins. The flaws in the handover process were identified to originate in human factors (eg, locums who do not know the process, or doctors forgetting to document key information), IT factors (eg, having access to the right systems) and processes (eg, not having a repository for the handover document). Driver diagrams were then used to develop a theory of change (see figure 1). Divergent thinking methods were used to generate a range of change ideas and convergent thinking to focus on ideas worthy of selection and prioritisation. Four change ideas were initially generated as follows:

- Creating a centralised Excel spreadsheet on MS Teams to be used for each and every on-call shift.
- Adding specific columns to the spreadsheet to prompt doctors to document specific tasks for admissions (see online supplemental material 1).
- Making it the day duty doctor's responsibility to send the file out if the night doctor omitted to do so.
- Having a paper-based backup system.

A core element of the design was using systems and software that were readily available without cost and familiar to users to avoid the need for training. This ensured time and resource efficiency in the design and a higher likelihood of uptake and sustainability of the handover system once implemented.

STRATEGY

In our first PDSA cycle of August 2020, a centralised daily spreadsheet was introduced which was generated and stored on MS Teams. To accompany this, a training document was created which was presented to all the new trainees as part of their induction to instil the new system as current and best practice. The aim was that the percentage of 'handovers sent out' and 'data being available' (but not sent out) would increase.

In our second PDSA cycle, a change was implemented where the administration team would be copied in to the handover email, thereby being in a position to remind the day duty doctor to send it out if not sent by 09:45. The aim was that the percentage of 'handovers sent out' would increase.

In our third PDSA cycle, a change was implemented where the administration team had set daily reminders in their MS Outlook calendar to chase the handover if not sent by 09:20. The aim was that the percentage of 'handovers sent out' would increase.

In our fourth PDSA cycle, a hierarchy of options was implemented for use by non-Trust locums arranged at the last minute. The aim was that the percentage of 'handovers sent out' and 'data being available' would increase.

In our fifth PDSA cycle, a change was implemented to measure whether the handover was sent out by 09:45 as an issue with a doctor not sending it out until the afternoon occurred. The aim was to improve the timeliness of the handover being sent out.

In our sixth PDSA cycle, a process was implemented to have the previous month's data reviewed as part of the monthly Junior-Senior Meeting so that any issues could be discussed and changes to the process agreed. The aim was that this would make the system sustainable and self-evolving.

RESULTS

The run charts (see figures 2 and 3) indicate that for the 9 weeks prior to the first intervention, the percentage of handovers being sent out per week was 80%. In the following 18 months this increased to 100%.

The run charts show that for handover data being available (but not sent out) the baseline figure of 80% increased to 100% over the 18-month period.

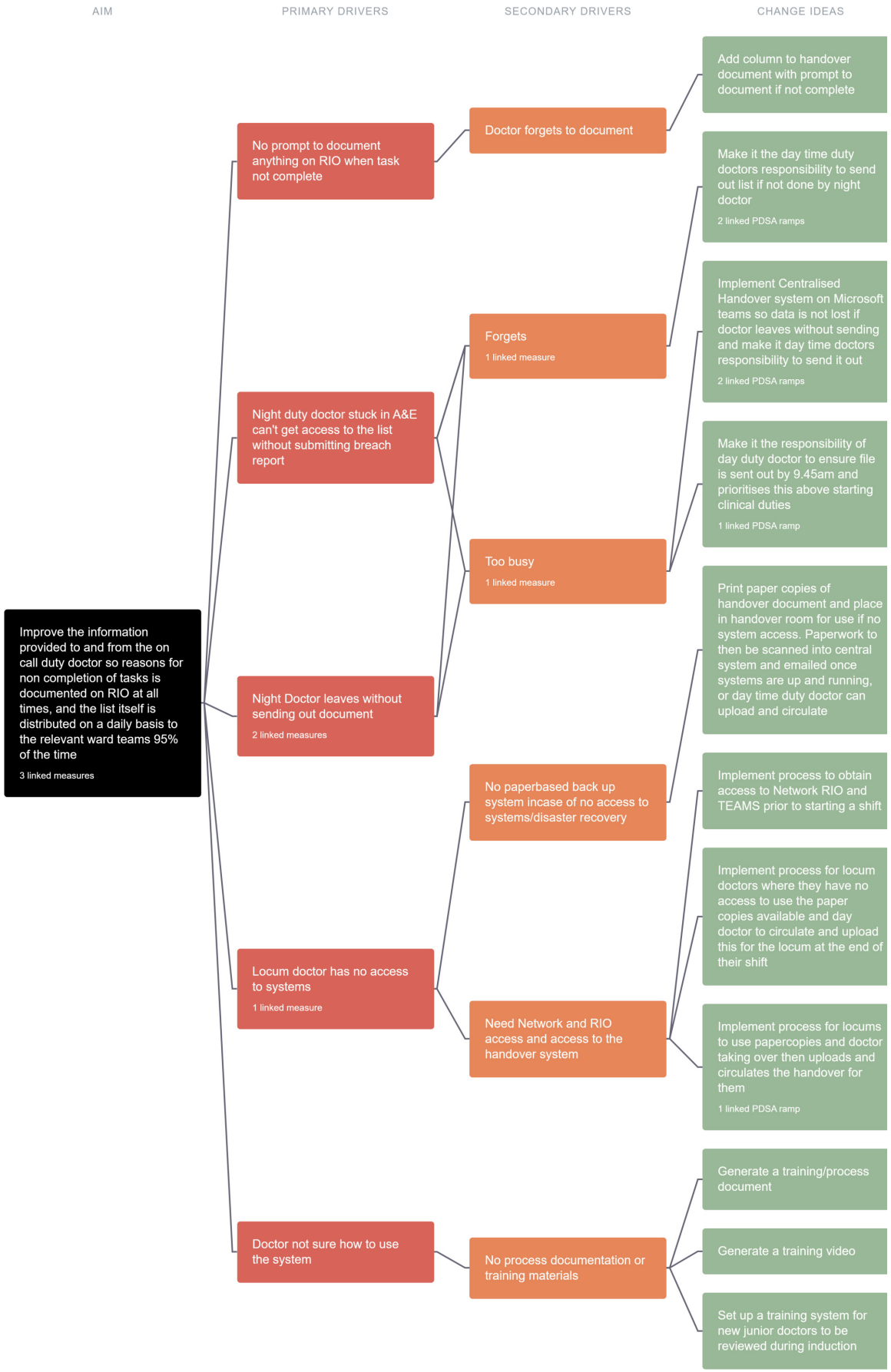

Figure 1 Driver diagram used to generate change ideas. A&E, accident and emergency; PDSA, Plan, Do, Study, Act; RIO, electronic patient record syste.

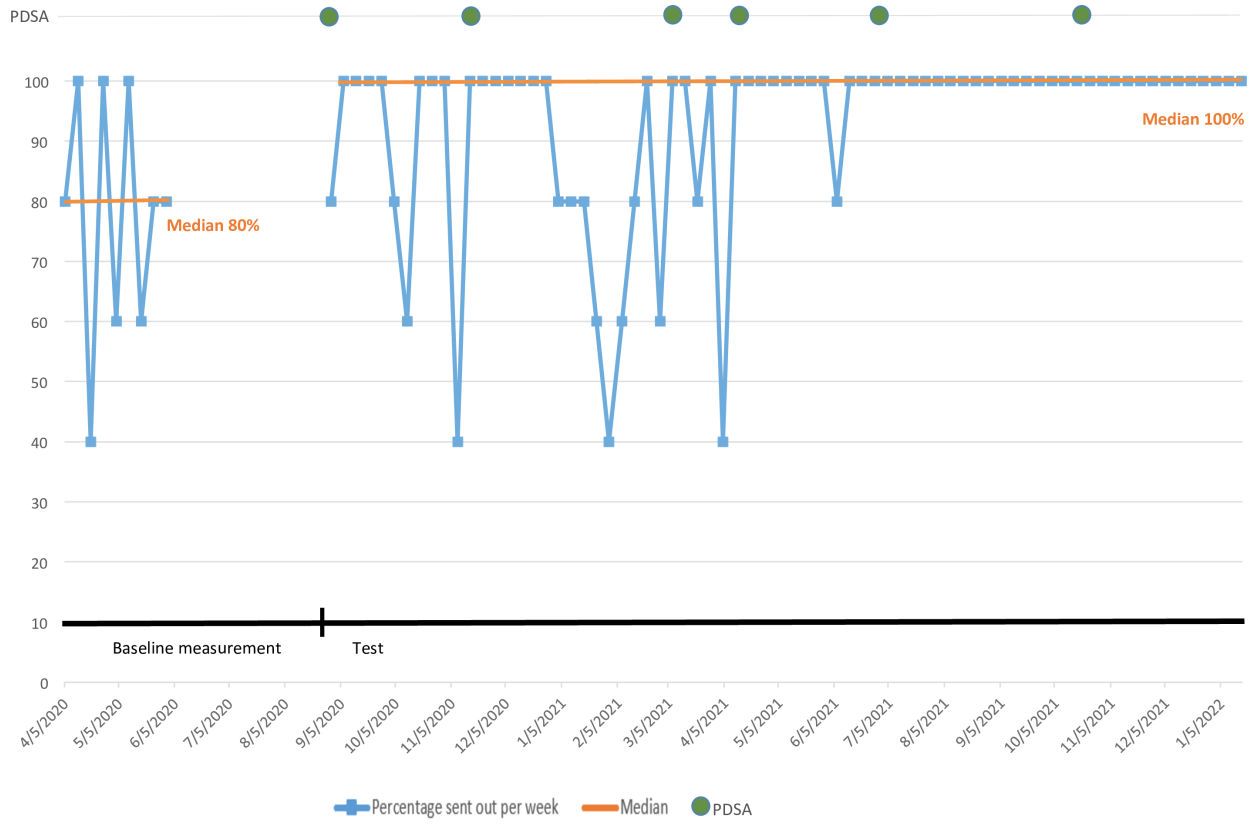

Figure 2 Percentage of days handover sent out per week. PDSA, Plan, Do, Study, Act.

In both our outcome measures, the run charts show shifts, indicating non-random variation and building a degree of belief that the interventions have led to sustained improvement. In addition to the quantitative results on the run charts, qualitative feedback was sought from the doctors who use the system by sending

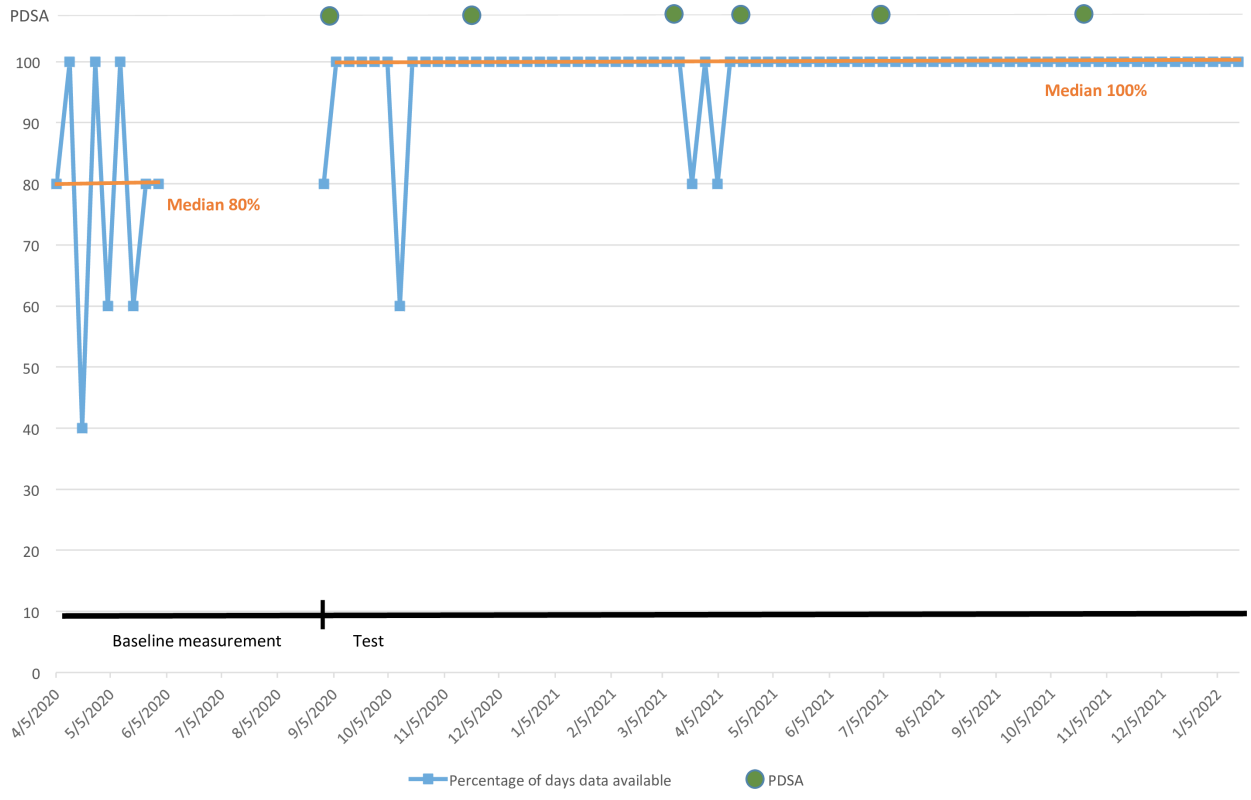

Figure 3 Percentage of days handover data available per week. PDSA, Plan, Do, Study, Act.

out a survey to obtain views about the new system. This was sent to 20 doctors of whom 10 replied. 80% felt the new system was more reliable than the old system and 20% were unsure. 100% felt the new system was safe and easy to use. This is supported by data from the GMC survey, which showed that satisfaction with the handover process among junior doctors based in Newham jumped from 54.69 in 2019, before the introduction of the new handover process, to 77.08 in 2021 (no data were available for 2020). This improvement was sustained, with reports showing satisfaction levels of 76.04 and 72.09 in 2022 and 2023, respectively.

LESSONS AND LIMITATIONS

The aim of the project was to improve the handover process in terms of reliability and availability of handover data and also improve the quality of the data within the handover. One of the main issues prior to implementing this QI project was that if the handover was not sent out by the night doctor, all the data were lost as the doctor would leave the unit and then be sleeping during the day for their next night shift. The use of a centralised system on MS Teams meant that even if the handover was not sent out the data were still available to the daytime doctors and therefore this problem was eliminated.

The handover was also not being reliably sent out to all the staff it should be sent to, which included all the general practice (GP) trainees, core trainees, specialist registrars and consultants. Having a process document available on MS Teams with the correct group emails to use made this process more robust and also helped people to understand how to use the system effectively. The QI process demonstrated that there were still some areas of confusion despite this document being available, and so a set of frequently asked questions (FAQs) was generated for the users of the system to be able to clarify those more general misunderstandings. Doctors who were less confident using the system contributed to the project and were a helpful resource to plug those gaps in understanding.

To make the process easier for others to understand, three training videos were produced showing people how to use the system step by step. This was a resource that people could refer to as well as offering documentation to assist people with different learning styles. This helped embed the system in the daily use of the junior doctors and it is now used regularly as a reliable resource.

One key element to the success of the new process was having the input of the administration team who chase the daytime doctor if the handover has not been sent out by 09:20, which makes the whole system more robust. It was the clinical director who pronounced that the daytime doctor should also prioritise sending the handover out before starting ward rounds, after it was sent out in the afternoon on one occasion. This support from senior leadership was invaluable in embedding the system within the doctor cohort.

The administration team have also ensured that new doctors are added to the system prior to induction, and that the process documentation and training videos are circulated prior to commencement on the rotation. To help with this, a list of tasks was generated with dates prior to induction by which the new users needed to be added by admin to make the system more robust and sustainable and is now embedded in their new starters' induction processes.

To make the system easier to use for new starters, a section in the junior doctors' induction was introduced where they would be shown how to use the system and where to find the process documents and videos. A test folder was established where they could practise creating a new handover document before they had to use the system for the first time to help build confidence using the system. A process for the handover data to be discussed in the monthly Junior-Senior Meeting was also established so that any issues or changes that might need to be made to the system could be discussed and agreed to make the process self-evolving.

Using the spreadsheet on MS Teams meant that multiple users could add jobs to the list without needing others to log in or out, which added convenience and flexibility to the system, and during the COVID-19 pandemic the system enabled doctors to hand over virtually on MS Teams while socially distancing.

There is a risk that if there is no network access or if there are problems with MS Teams then people may not be able to access or update the list. If there were network issues, MS Teams could still be accessed via mobile phones. No issues with accessing MS Teams have occurred in the 18 months since implementation. The risk relating to network outage is common to both the old and new handover systems. Furthermore, some non-Trust locums do not have network access at the time of their shift. This risk was mitigated by the presence of a printed backup handover document, which could be handwritten and then uploaded and circulated at the end of the shift in the same manner as the spreadsheet.

Subjective acceptability and satisfaction with the handover was assessed locally and by the GMC, and the doctors surveyed determined the new process to be safe, effective and easy to use. Quantitative use of the essential fields of the handover document could be assessed in the future to ascertain objectively the effective uptake of different elements of the handover document, and revision of the document or user training could be undertaken as indicated. It was not possible to attribute any change in patient safety outcomes to changes in the handover process, but given the established links between effective handovers and patient safety the new handover system is likely to be a key asset in delivery of safe and effective patient care at NCfMH.

CONCLUSION

This project emerged from a realisation that crucial handover information from the out-of-hours doctor at

NCfMH was not being captured, saved and circulated in a way that was consistent with patient safety and information governance expectations. Appropriate handover between doctors increases patient safety and saves time for the day teams as they can quickly see what jobs have been completed and what is outstanding. It also provides key information about any safety or medical concerns that have occurred out of hours and details the follow-up that is needed. The new handover process is an improvement that will reduce the likelihood of occurrence of serious incidents relating to tasks not being handed over effectively, and will improve the efficiency of the admission process.

A QI methodology was used to improve the access to the handover and its circulation. A number of different change ideas were tested via six PDSA cycles. The most effective changes included the use of a spreadsheet on MS Teams, including predefined sections and columns reminding people of the different tasks required for admissions, educating new starters on how to use the system via a process document, creation of a FAQ document and training videos, and implementing the task for the incoming day doctor to check and send the document if not already sent. Administrative staff chasing this process was also key to its success. A sustainable improvement was achieved and it is still in use after 30 months. Due to the simplicity and affordability of this system, it has already been adopted in neighbouring hospitals and holds the promise of being adopted elsewhere around the NHS.

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Contributors WHL led the project, overseeing the project from inception to completion, chairing meetings and providing leadership. He was a significant contributor to the manuscript and acts as guarantor. AH was the principal author of the manuscript and lead creator of the poster presented at the RCPsych International Congress. NH was corresponding author for the poster presentation. WHL, KR and DD together conceived the idea for the project and were instrumental in collecting baseline data and establishing the QI team. WHL, AH, KR, GN, AR, DD and NH were all members of the QI team and involved in meetings, planning and data analysis. All authors discussed the results, contributed to the project poster and to the final manuscript.

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