

## Safe Handover : Safe Patients - The Electronic Handover System

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### Abstract

Failure of effective handover is a major preventable cause of patient harm. We aimed to promote accurate recording of high-quality clinical information using an Electronic Handover System (EHS) that would contribute to a sustainable improvement in effective patient care and safety. Within our hospital the human factors associated with poor communication were compromising patient care and unnecessarily increasing the workload of staff due to the poor quality of handovers. Only half of handovers were understood by the doctors expected to complete them, and more than half of our medical staff felt it posed a risk to patient safety. We created a standardised proforma for handovers that contained specific sub-headings, re-classified patient risk assessments, and aided escalation of care by adding prompts for verbal handover. Sources of miscommunication were removed, accountability for handovers provided, and tasks were re-organised to reduce the workload of staff. Long-term, three-month data showed that each sub-heading achieved at least 80% compliance (an average improvement of approximately 40% for the overall quality of handovers). This translated into 91% of handovers being subjectively clear to junior doctors. 87% of medical staff felt we had reduced a risk to patient safety and 80% felt it increased continuity of care. Without guidance, doctors omit key information required for effective handover. All organisations should consider implementing an electronic handover system as a viable, sustainable and safe solution to handover of care that allows patient safety to remain at the heart of the NHS.

### Problem

Effective handover and its failure, has long been recognised as a major preventable cause of patient harm (1). At Northampton General Hospital in the UK, we found there were multiple instances where incomplete and/or omitted information during the handover process could potentially have been compromising patient care, as well as unnecessarily increasing the workload of staff. A recent meeting of the BMA Junior Doctors committee also focused upon this area (2). Human factors propagating poor communication and systemic error were principally involved in our hospital. As a direct result, handover was deemed a high priority area for improvement.

### Background

Our current electronic handover system, 'Doctor Handover', is a bespoke package utilising the intranet based PCS (Patient Content Store) programme developed by an external company, Teleologic Ltd. In conjunction with our local Trust, Teleologic Ltd. create ward maps for the hospital which links to our electronic patient management system. Doctors are then able to enter handover tasks for any patient, on any ward, onto this central electronic database from any intranet connected Trust computer, forming a list of tasks. The out-of-hours medical team can then access this when they commence their shift during the evening, night, and weekend. Tasks are allocated a clinical priority and are completed accordingly, alongside any additional tasks they are contacted about via the 'bleep' system.

Our overall aim, highlighted as a key recommendation within the Mid Staffordshire NHS Foundation Trust Public Inquiry, was to design a system containing prompts and defaults to promote safe and accurate recording of high-quality clinical information and

contribute to effective patient care and safety (3). Mindful of the need to maintain any improvement we ensured our revisions would be sustainable by utilising our existing Electronic Handover System, Doctor Handover, as a vehicle for this, and promoted a culture where every doctor's priority is effective, safe handover (4).

### Baseline Measurement

We formulated a process map and conducted a realistic criteria based audit of the current out-of-hours handover process, as well as an anonymous qualitative opinion survey. These highlighted various problems, sources of inefficiency, and revealed multiple opportunities for improvement. Utilising the practical frontline knowledge of the junior doctors leading the project, combined with the support and experience of senior patient safety leads within the Trust, we were able to conduct a focussed, in depth review.

We found that it was time efficient for doctors to input handover tasks onto the existing system from any ward. However, we found that without a structured proforma and face-to-face contact facilitating clarification of vital information, the quality of handovers were poor. Improvements were therefore targeted towards establishing a minimum standard of information required for handover to reduce the human factors associated with poor communication. Furthermore, we found that not all of the handover information entered was available to view on the centralised handover task list. This was clearly leading to the handover of incomplete and/or omitted information between teams.

Our qualitative review highlighted numerous points of concern from junior medical staff. 32% of those surveyed (n=25) felt it was ineffective and more alarmingly, 56% believed that the current system was a risk to patient safety out-of-hours. Inadequate training was also highlighted as an area of deficiency. 64% had received

some information on the handover system but 40% had completed an out-of-hours shift without being aware of tasks handed over. Practical issues, which lead to miscommunication and increased the high workload burden of out-of-hours staff, were also identified (e.g. handovers entered late onto the system, delayed escalation of care, inefficiently structured handover task lists, and inappropriate 'Red-Amber-Green' risk assessments).

Our realistic criteria based audit of handovers on the system proved that, as expected from our process map and qualitative opinion survey, the quality of handovers were far below that expected. We based our criteria on those published in the Academy of Royal Medical Colleges document 'A Clinician's Guide to Record Standards – Part 2' (5). We combined these with what we considered to be best practice standards within our hospital. A minimum of 100 handovers were then analysed over a consecutive three-week period to provide a representative sample. Furthermore a group of junior doctors, who were due to complete the handover tasks, analysed whether they thought the handover could be clearly understood in order for them to successfully complete what was required of them. Table 1 outlines this baseline assessment and the audit criteria used to assess the handovers.

[TABLE 1 - Handover Assessment]

Our electronic system, already in existence, guaranteed that patient identifiers and patient location were already included on every handover.

See supplementary file: ds3004.docx - "Table 1 - Handover Assessment"

## Design

Our baseline assessment highlighted a serious cause for concern in that only half of handovers could be clearly understood by those expected to action them. Often there was no indication for the handover task, or management plan recommended on completion of the task. Not only did we feel that this omitted information compromised continuity of care and patient safety out-of-hours, but additionally, that it was an inefficient use of doctors time during a busy on-call shift by having to try and determine exactly what was required of them for each task. The need for a rapid 'Plan-Do-Study-Act' (PDSA) cycle targeting out-of-hours handover due to the quality of handovers being far below that expected, was emphasised.

Various strategies were implemented but fundamentally our design focussed on creating a handover checklist, that is a formal list used as a visual aid to enable the user to overcome the limitations of short-term human memory, to allow the human errors of miscommunication to be remedied before they caused harm (6,7).

The various improvements we introduced were:

1. Of the two blank free text boxes where information could be inputted, only one was actually printed on the centralised handover task list. As a result, we merged the two boxes to remove this potential source of miscommunication.

2. Within our newly merged single handover task box we created pre-populated handover sub-headings to create a standardised proforma. These were based on the well-evidenced 'Situation, Background, Assessment, Recommendations' (SBAR) communication tool and were reviewed by a team of junior doctors and senior clinicians to ensure they were appropriate, clear, and understandable. They now read as follows: Date task to be completed; Current problem list / Differentials; Past Medical History; Task Plan/Action to be taken; Other Relevant Information (e.g. treatment escalation plan)
3. There was concern that tasks entered late on the system, (after 5pm when on-call duty commences), were being missed out. It was also apparent that we could prevent a delay in the escalation of care if all 'red' risk classified patients were discussed with the on-call registrar, rather than simply being added to a handover list. As a result we included a prompt for verbal handover in certain situations. The warning, clearly visible on the handover box, read as follows: "Priority red patients must be discussed with the on-call registrar. Requests outside 09:00-17:00 Mon-Fri must be discussed with on-call FY1"
4. In an attempt to aid clarity of handovers, provide feedback to individual doctors handing over and add accountability, we included the name of the doctor entering the information.
5. Many doctors using the system out-of-hours found the structure of the task-list confusing. Tasks were listed in priority order irrelevant of which ward they were on. As a consequence, doctors felt it posed a risk to patients through tasks being missed out as they had to search through the various pages of handovers to find what was required of them on the particular ward they were on at that time. We restructured the list into ward order and then clinical priority, to address this issue.
6. The 'Red-Amber-Green' risk assessment allocated patients to particular grades of doctor (i.e. Red=Registrar, Amber=SHO, Green=FY1). The feedback suggested that this lead to those grades only completing those jobs allocated to their grade, rather than all the jobs that were handed over for a particular ward. During a busy out-of-hours shift, the majority of doctors felt this was inefficient, particularly SHO's and FY1's. As a result, this 'RAG' rating was altered in line with Royal College of Physicians recommendations for immediacy of review (1): RED: Haemodynamic / respiratory instability, unclear diagnosis, sepsis; AMBER: Response to treatment requires close monitoring; GREEN: Stable and discharge planned.

## Strategy

The electronic nature of our handover system meant that our changes could be immediately implemented once the IT department had actioned our requests. Initially there was resistance to this without the lead consultant's support. However, once this was confirmed, we had the freedom to make the changes, within the system's capabilities, that we desired. Following agreement of each change with our local IT department, they then had to be implemented by Teleologic Ltd. which potentially could have

incurred costs and caused lengthy delays to our project. However, Teleologic Ltd's enthusiasm to optimise the system for our requirements meant there were no costs incurred and our changes went 'live' within one-two months. Establishing a relationship with the department was vital and rather than relying on e-mail we found that regular face-to-face contact was crucial.

## Results

The improvement strategies implemented vastly improved the quality of handovers within the Trust. Table 2 highlights the percentage improvement based on our audit criteria and the handover sub-headings we chose to incorporate. As with the baseline audit, we included all handovers for a consecutive three-week period to obtain a minimum of one hundred handovers. This was done immediately after our improvements were implemented, and again after three months, to assess for long term sustainability/effect.

[TABLE 2 - Handover Reassessment]

As with many facets of patient safety, a quantifiable outcome measure against which we could gauge improvement was difficult to identify. However, the repeat qualitative opinion survey revealed that 80% of junior medical staff (n=15) felt continuity of care out of hours had improved and 87% stated they felt it improved patient safety. With regards to the actual handover sub-headings themselves, 80% found them useful and 67% felt it had helped them to improve their handover skills.

See supplementary file: ds3005.docx - "Table 2 - Handover Reassessment"

## Lessons and Limitations

In order to facilitate sustainable change, it was important that we harnessed support not only from the users themselves, but also the Hospital Board. Results and recommendations were delivered to a variety of audiences. This included our Trust's 'Patient Safety Board', 'Grand Round', and both the medical and orthopaedic directorates. Simultaneously, Trust-wide screensavers promoting the improved system were displayed on all computers and e-mails were sent to all consultants informing them of the existence of the system and the importance of promoting and supporting its use amongst their juniors. The aim was to broaden the number of departments utilising the system and promote uniformity. The system also acted to continually educate doctors on the provision of effective handover, a skill integral to their duty as a good medical professional. The work has been presented nationally and has generated much interest from many other Trusts. It is clear that our hospital is not alone in dealing with this problem area.

## Conclusion

Without guidance, much of the key information required for an effective handover is often omitted, propagating dangerous miscommunication between teams. This is a particularly

controversial area considering the widespread press coverage of the so-called 'dangers' hospitals pose to patients at weekends. As Bates & Gwande emphasise, in order for medicine to achieve major gains in quality and patient safety, information technology will play a key part, and in our opinion, all organisations should consider developing a simple electronic handover system befitting their circumstances (8). We have shown, through the introduction of clear and pertinent handover sub-headings, that the quality of vital information exchanged between teams is vastly improved and importantly, is sustainable. The continuity of care improves, avoidable risks to patient safety as a result of miscommunication are minimised, and the productivity of busy out-of-hours medical staff is increased. High priority must be given to the provision of guidance on usage of the system at junior doctors' induction and it is vital every opportunity is taken to encourage inter-directorate uniformity of patient care. An Electronic Handover System is a viable, sustainable, and safe solution to handover of care that allows patient safety to remain at the heart of the NHS.

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## Declaration of interests

Nothing to declare.

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