

ORIGINAL ARTICLE

A tool to assess the components of a safe and quality medical handover

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ABSTRACT

Background: Robust medical handovers are paramount to ensure patient safety throughout the course of a hospital admission. Anecdotal evidence within our Australian tertiary hospital suggested that medical handovers were typically less structured when compared to allied health handovers. Medical handovers at our hospital had never been evaluated before, and the development of a questionnaire to assess the key components of a safe and quality handover was necessary. This tool would evaluate our medical handovers, and identify potential areas for improvement in both the tool, and medical handover practice. **Methods:** Based upon a literature search, and local and national guidelines of best practice, the tool was created around six key components of quality medical handovers—members involved in handover, environment and logistics, structure and content, management plans, patient-related and documentation. The tool was developed to audit the after-hours team handover at our 600-bed tertiary hospital. The tool was trialled at 20 medical handovers for our after-hours team, results were captured on REDCap, and data analyzed. **Results:** The tool was useful in assessing a wide range of key medical handover components and highlighting areas for improvement within our medical handovers. Through this trial, limitations were discovered in the tool that can be incorporated into future revisions of the tool. **Conclusion:** Overall, this study provided valuable insight into medical handovers by identifying current clinical practice and highlighting areas for improvement. The broader utility of this tool is the ability of other health services to evaluate their own medical handover, or serve as a starting point to develop their own audit tool.

Key words: medical handover, patient safety

INTRODUCTION

Effective medical handovers play a vital role in ensuring patient safety throughout the course of a patient's admission. Medical handovers occur frequently within hospitals and known to have high variability.^[1] Variability is introduced by factors including—the situation (shift change, ward transfer, discharge, *etc.*), the method (face-to-face, telephone, aided by electronic handover tools), the handover location (bedside, ward, clinic room), and the individuals involved in the handover (patient, clinicians, multi-disciplinary staff).^[1] Furthermore, as workplaces have changed, residents are


now rostered for fewer working hours, and a greater number of clinical handovers can occur.^[2] Poor handovers can compromise patient safety. Therefore, many health services have handover guidelines which provide standardisation.^[3–5] Whilst various guidelines exist, there is no accepted gold standard handover—this may be because flexibility is needed for each clinical context.^[1] In Australia, the National Safety and Quality Health Service Standards provide expectations for the level of care provided by health services.^[1] Standard 6 “Communicating for Safety” describes the key principles of a clinical handover and outlines minimum information for safe handover.^[6]

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Anecdotal evidence in our Australian tertiary hospital suggested that medical handovers were less structured when compared to allied health handovers, and furthermore had never been evaluated before. Our hospital has an after-hours team rostered every evening from 4 pm until 11 pm. One Medical Registrar, four Resident Medical Officers (RMO) and four Clinical Nursing Specialists (CNS) cover all wards within the hospital, except the emergency department, acute medical, coronary care and intensive care units (ICU). This team attends a 4pm handover where “Patients of Concern (POC)” are discussed. This handover is unique in that it does not involve one medical team handing over to another team, but rather the after-hours team elicits information from the hospital-wide patient software. For example, a patient may have had a Medical Emergency Team (MET) call during the day or have been transferred from ICU to the ward, which would prompt the ward CNS to identify them as a POC on the patient software. These POCs, then auto-populate an electronic list. The electronic handover for each patient is structured in the iSoBAR manner (identify, situation, observations, background, agreed plan, read-back), with free-text boxes for each domain of iSoBAR.^[5] This text is viewed by the after-hours team at the 4 pm handover, and each patient must then be reviewed by a doctor after the handover.

Given medical handovers had never been audited in our hospital before, we developed a tool to audit them based upon local and international guidelines for best practice in handovers.^[1,3,7,8] The aim of this study was to develop a tool to assess medical handover, demonstrate how the tool performed, and identify areas for improvement in the tool and our medical handovers.

METHODS

Study design, setting and data collection

This observational, prospective study occurred at a 600-bed tertiary hospital in Australia. The 4 pm after-hours team handover was selected for this study, because it occurs daily at a designated time and location.

An initial literature search was performed using keywords including, “medical handover”, “handover”, and “patient safety” through the PubMed database to identify published articles relating to medical handovers. In addition, a wider internet search was also incorporated to include local and international guidelines and policy articles focused on best practice in clinical handovers.^[1,3,7,8]

Based on common themes in the literature, we extracted the vital components of a medical handover. These components were subsequently refined to suit the after-

hours handover in our hospital, and incorporated into our tool. These ultimately included team members involved, environment and logistics of handover, structure and content, management plans, the patient, documentation and teaching opportunities. The questionnaire was trialled at one clinical handover, and no changes were made to the tool prior to the study period (Table 1).

Data collectors attended 20 after-hours team handovers, over a two-month period in 2022. Data collectors were medical professionals and were not involved in the handover themselves. Random handovers between Monday to Friday were attended, dependent on data collector availability. There were no unique or confounding factors, such as COVID, which influenced the usual practice of this handover. At the handover, the data collection tool was completed and submitted electronically to a REDCap database.^[9,10] This data was subsequently analyzed as described below, and strengths and limitations of the tool were elicited in the analysis phase of the audit by the authors.

Statistical analysis

Data was exported from REDCap to Excel, and subsequent analysis was performed by the study team.

RESULTS

The results of the audit tool regarding the safety and quality of the after-hours medical handover are outlined below, and the tool’s performance is discussed subsequently.

Members involved in the handover

Of the 20 after-hours team handovers, 65% had the expected number of attendees—30% of handovers were short on Resident Medical Officers (RMOs), and 50% of handovers were short on nursing staff. The handover expected one Registrar, four RMOs and three nursing specialists per handover. We found an average of 1.25 Registrars, 3.7 RMOs and 2.5 nursing specialists attended each handover. Non-attendance was due to staff sickness and alternative clinical commitments. There was an obvious leader in all handovers, and it was always the Registrar. Jobs and responsibilities were always discussed and allocated to members of the team during the handover.

Environment and logistics

All handovers occurred in a fixed location, and in a quiet environment. 85% of handovers experienced an interruption—60% interrupted by phone call(s), 45% interrupted by pager(s), 15% interrupted by other (including MET calls, technology issues) and zero interrupted by people.

Table 1: Audit tool. An audit tool developed to evaluate key components of medical handovers

| | |
|---|---|
| Date & Start time | |
| Members involved | |
| Registrars | (number) |
| Residents | (number) |
| Nursing staff | (number) |
| Environment & Logistics | |
| Was there a fixed/ dedicated time for regular handover? | Yes/No |
| Where was the handover? | [free text] |
| Was the handover environment appropriate? <i>e.g.</i> , occurred in a quiet room | Yes/No |
| Were there interruptions? | <input type="radio"/> None <input type="radio"/> Phone calls <input type="radio"/> Pagers <input type="radio"/> Interrupted by person <input type="radio"/> Other |
| What were the other barriers to the handover process? | [free text] |
| Team involved | |
| Is everyone who was expected to attend present? | Yes/No |
| If no, who was not present? | [free text] |
| Was there an obvious leader in the handover process? | Yes/No |
| If so, who was the leader? | [free text] |
| Were all the appropriate members of the team involved? | Yes/No |
| Was there clear/ apparent allocation of agreed responsibilities, and accountability of roles during the handover? | Yes/No |
| Was there discussion of escalation of care to other team members when appropriate? | Yes/No/Not applicable |
| If team members had to leave to attend to clinical matters, who accepted handover on their behalf? | <input type="radio"/> Not applicable <input type="radio"/> No-one accepted handover <input type="radio"/> Another doctor <input type="radio"/> Other |
| Any further comments? | [free text] |
| Structure & Content | |
| Did the handover follow a consistent structure (<i>e.g.</i> , iSoBAR)? | Yes/No |
| If yes, which structure? | [free text] |
| Did the handover include prioritisation of patients? (<i>i.e.</i> , patients of concern, new admissions, transfer of patients)? | Yes/No |
| Was the reason the patient is highlighted as a patient of concern listed and clarified? <i>e.g.</i> , ex-ICU, MET call <i>etc.</i> | Yes/No |
| Were there any patients not on the list who were added to the list during the handover? | Yes/No |
| If yes, who highlighted the new patient/s of concern, and why were they highlighted? | [free text] |
| Were the patients details sufficient for safe handover of patients? <i>i.e.</i> , unit number, ensuring patients common or same names are clarified <i>etc.</i> | <input type="radio"/> Always <input type="radio"/> Most of the time <input type="radio"/> Half of the time <input type="radio"/> Rarely <input type="radio"/> Never |
| Any further comments? | [free text] |
| Was there access to up-to-date management plans for the patients | |
| Summary of patient admission | Yes/No |
| Was there clear handover of management plans for each patient? | <input type="radio"/> Always <input type="radio"/> Most of the time (> 50%) <input type="radio"/> Sometimes (< 50%) <input type="radio"/> Never |
| Any further comments? | [free text] |
| Documentation | |
| Was there any documentation in the patient notes/record regarding handover? | <input type="radio"/> All <input type="radio"/> Most (> 50%) <input type="radio"/> Some (< 50%) <input type="radio"/> None |
| If there was documentation, is there a clear plan for the upcoming shift/time period? | Yes/No |
| Any further comments? | [free text] |

Patient

Was patient privacy ensured? *i.e.*, handover discussion not within hearing of other patients/visitors, handover board of patients not in view of others *etc.* Yes/No

Was the patient involved/ present during the handover? Yes/No

Any further comments? [free text]

Teaching

Were there any opportunities for teaching/learning facilitation of staff observed during handover? Yes/No

If yes, what examples were noted? [free text]

Structure and content

No patient handover strictly followed an accepted handover structure *e.g.*, iSoBAR. Given the handover is based off the electronic POC list as previously described, all patients were prioritised. In 20% of handovers, there were patients where it was not entirely known why they were a POC. For example, a patient was listed as a POC for a recent MET call, but the reason for the MET call was not described, for example tachycardia or hypoxia.

Management plans

Due to lacking or brief electronic patient data, there was never access to completely up-to-date summaries of patient admissions, nor access to clear, up-to-date management plans for each patient.

Patients

Patient privacy was always ensured, *i.e.*, not within hearing distance of other patients and visitors. No patient was involved in any of the handovers.

Documentation

There was no documentation of handover itself having occurred in the patient clinical records.

Teaching

Teaching opportunities were found in 10% of the handovers.

DISCUSSION

Statement of principal findings

Through the tool, it was found that the handover environment and patient privacy were optimal. Moreover, several areas for improvement were identified; including staffing shortages, repeated interruptions, lack of a structured handover and poor access to up-to-date management plans. The tool itself successfully allowed analysis of key medical handover components; however, it did have some limitations.

Strengths and limitations

Strengths of this study included the development of a tool which efficaciously gained insight into medical handovers, particularly at our hospital where medical

handovers had not been previously evaluated. Bias was limited with data collection being carried out by members not involved in the handover process itself. However, generalisability is limited by the small sample size of 20 handovers. Additionally, the nature of this medical handover was unique, with a team eliciting information from computer software, thus limiting generalisability to person-to-person handover. Consequently, areas for improvement include widening the audit scope to assess other team or ward handovers, at different times of the day or week.

Limitations in the tool itself became apparent during the analysis phase. Chiefly, the questionnaire did not capture the number of patients discussed at each handover. While initially this did not seem to be a key component to include within the tool, its lack narrowed the clinical correlation of some findings. For example, the audit was able to show that 20% of handovers included patients whose reason for being a POC was not clearly identified. However, given there was no data captured on the number of patients discussed at each handover, it prevented this from being expressed as a proportion of patients in which this was a concern, thus potentially overestimating the number of patient handovers affected.

The tool was created with tick box and drop-down menu options for most questions. While this enabled ease of data collection, it limited the capacity to clearly reflect the extent of certain issues identified. For example, the audit was able to show that 85% of handovers experienced an interruption; however, unless specifically commented upon under additional comments, this did not allow for differentiation between a handover that was interrupted multiple times, and a handover that experienced a more minor interruption. We attempted to reduce this limitation by having free text boxes throughout the questionnaire; however, in retrospect there should have been another question explicitly regarding the number of times the handover was interrupted.

Interpretation within the context of the wider literature

Our tool performed well by allowing analysis of the key

components of medical handover and highlighting the components which were optimal, and those which require improvement.

In terms of handover attendance, it was found that 65% of handovers had the expected number of attendees. It is known that staff shortages and high workloads compromise patient safety,^[11] and thus hospital administration must implement mechanisms to prevent or manage staff shortages. Ideally, 100% attendance should be achieved, as staff are rostered on the shift and expected to attend the handover. An obvious leader was always present, and there was always an agreed allocation of jobs and responsibilities. Importantly, the Registrar was the leader in every handover—senior clinician involvement is essential as it ensures the appropriate level of management decisions.^[10] Whilst teaching is not a fundamental component of handovers, 10% of handovers contained teaching. This included discussion of interesting conditions presented and management strategies.

In regards to patient safety, patient details and prioritisation were satisfactory for safe handover, however; improvements in documentation could be made. Patients' details were always sufficient for safe handover; including patient hospital number, full name and date of birth. This met minimum standards set by guidelines, and is an integral part of any handover.^[3,7,8,12] There was always prioritisation of patients handed over, since the handover solely includes POC. Beyond this, there was no specific order to the patients discussed; however, unwell patients were sometimes further prioritised, to allow the Registrar to review them immediately after handover. Prioritisation is important to ensure unstable patients are reviewed early, and by a senior doctor.^[13] Regarding improvements in patient safety, there was no documentation in the patient records of the handover itself having occurred. However, when a patient was reviewed following the handover, the doctor would document their assessment which is essential. It is not common practice to document handover of care officially; rather it is assumed that the team receiving handover will adopt responsibility.

The environment was suitable for safe handover, being quiet, private and in a fixed location, however; improvements should be made to prevent interruptions, given 85% of handovers were interrupted. In our hospital, all emergencies (medical, personal, fire, *etc.*) are transmitted through every pager, affecting the quality of the handover. It is recommended that non-critical interruptions are limited.^[3] Therefore, the authors recommended that handover be “pager-free”, excepting life-threatening emergencies,^[7] or allocating one person to receive all pagers. Alternatively, we recommend that personal phones are allocated to staff instead of pagers,

to provide a more direct method of communication, thus limiting unnecessary interruptions.

The iSoBAR framework, endorsed by the World Health Organisation,^[5] provides a standardised approach to handover structure. This audit showed that none of the handovers strictly followed an accepted handover structure. It is essential that good handover practices are revisited and maintained; however, education regarding handover may not be prioritised in hospitals due to time constraints.^[14] Protected teaching time, and accessible resources are effective ways to counteract this.^[14] Although a consistent and clear structure is recommended, it is suggested that the “iSoBAR tool should be used in a manner that suits the clinical context to guide the content and structure of the handover”.^[3] Ultimately, the handover studied is unique given its electronic format, and thus a distinct iSoBAR handover may not be reasonable when the medical staff are yet to review the patient.

No handovers had access to wholly up-to-date summaries or management plans for every patient. As aforementioned, our after-hours handover is unique in that there is not one medical team handing over to another team, rather the team elicits information from the hospital-wide software POC list. Accurate and safe handover depends on the handover software being kept up-to-date with clinical progress, and this did not always occur diligently. This is a major shortcoming, and thus we submitted several recommendations to our health care service. We recommended educational resources to be placed on the wards to notify medical staff of this downfall. Additionally, the task of updating the electronic medical handover must be allocated to a staff member, perhaps a RMO, to ensure the electronic record is updated prior to handover. Furthermore, we recommended changes to the electronic software to ensure that minimum information in each domain of iSoBAR must be entered before the handover can be submitted.

Finally, 20% of handovers experienced a failure to identify why a patient was a POC. When a patient is added to the POC list, staff must input a reason for concern—be that MET Call or ICU step-down. In 20% of handovers, there were patients who appeared on the list, who either—did not have MET Call or ICU listed, or if they did, there was no elaboration as to why, or what had happened. For example, they may have listed MET call but did not elaborate if the emergency was due to hypoxia, hypotension or arrhythmia. To ensure more information was available for handover, we similarly recommended an alteration to the electronic software to guarantee that as “MET Call” is input as the reason for POC, a clinical scenario such as hypoxia must also be entered. In medical handovers, there is an expectation

that “minimum information content” is reached.^[1] This includes diagnosis, clinical condition, up-to-date management plans, and emerging critical information.^[1,12] Our handover system includes free text boxes, with no minimum information required. Studies have demonstrated that free-text boxes are often insufficient for safe handover, and to be seen as useful by staff, electronic handovers must be simple, practical and informative.^[12] Without direction, essential information for a safe handover is frequently omitted, which has implications for patient safety.^[15] If a health service relies on electronic handovers, we recommend designing software that requires a certain number of details to be included in order to be submitted, thereby aiding handover safety and effectiveness.

Implications for policy, practice and research

This audit highlights practical improvements for our hospital, as well as broader implications for other healthcare services. Staffing shortages are known to impact patient safety,^[8,11] and we recommend ensuring adequate on-call staffing to cover sick calls. Minimizing repeated interruptions to handover would improve the efficiency and safety of handovers. Implementing this could appear different in different health services, for example, designating “pager-free” time,^[8] limiting non-critical interruptions,^[3] or allocating one person to receive all messages. Finally, sufficient details of patient admission are required for safe and effective handovers. There are benefits to an electronic medical handover, such as legibility, providing more in-depth information than written handovers, and improved staff satisfaction.^[16,17] Despite these benefits, our data demonstrates difficulties in accessing up-to-date management plans and patients’ current clinical status. As discussed, mechanisms must be implemented in a healthcare service to ensure minimum content information is reached, in both verbal and electronic handovers. Ultimately, if a health service has not reviewed its medical handovers, our study raises the possibility that there are areas for improvement within their practice.

In this regard, our audit questionnaire is a useful tool for health services aiming to audit the medical handovers within their organisation. The questionnaire was able to successfully capture a breadth of information related to a number of key components of medical handovers. However, through analysis of the data, it was also clear that the audit tool was limited in certain aspects, such as the lack of data reflecting the number of patients discussed at each handover, and the restrictive nature of the tick box format as aforementioned. As such, the questionnaire developed and tested by our audit could be utilized by other health services as a starting point for the development of their own audit tool, by adapting the

strengths of our questionnaire and building upon the areas for improvement. Finally, a further project with wider scope could assess medical handovers at various points of the patient care journey, including transfer of service or discharge to other facilities.

In conclusion, the optimal handover may not be a one size fits all approach; however, it is important to be aware of minimum standards for a medical handover, and ensure these are implemented within the context of the healthcare service. Through the development and application of our audit tool, we have identified areas for improvement in our after-hours medical handover. Looking forward, this tool can be adapted by other healthcare services aiming to evaluate the medical handovers within their organisations. This tool can be easily adapted by utilizing the headings and questions, as well as some of our recommendations, to generate an audit tool suited to different handover environments. As with our healthcare service, we expect that if medical handovers were evaluated in more international hospitals, improvements in medical handovers would be elicited, and ultimately patient care and safety could be further optimized.

DECLARATIONS

Author contributions

Forbes C contributed to the data curation, methodology, software, investigation, formal analysis and original draft writing. Jayamaha JY contributed to the data curation, methodology, investigation, writing, review and editing. Lee E contributed to conceptualization, methodology, supervision, writing, review and editing.

Conflict of interest

The authors have no conflicts of interest to disclose.

Data sharing statement

No additional data is available.

REFERENCES

1. Australian Commission on Safety and Quality in Health Care. The NSQHS Standards | Australian Commission on Safety and Quality in Health Care. The NSQHS Standards [Internet]. 2022 [cited February 16, 2023]. Available from: <https://www.safetyandquality.gov.au/standards/nsqhs-standards>.
2. Jaggi R, Weinstein DF, Shapiro J, Kitch BT, Dorer D, Weissman JS. The Accreditation Council for Graduate Medical Education's Limits on Residents' Work Hours and Patient Safety. A study of resident experiences and perceptions before and after hours reductions. *Arch Intern Med* 2008;165:493-500.
3. Western Australia Department of Health. Clinical Handover Guideline. Clinical Handover Guideline [Internet]. 2018 [cited February 16, 2023]. Available from: <https://ww2.health.wa.gov.au/~media/Files/Corporate/general%20documents/Quality/PDF/Clinical-Handover-Guideline.pdf>.

4. New South Wales Health. Clinical Excellence Commission. Clinical Handover [Internet]. 2019 [cited February 16, 2023]. Available from: <https://www.cec.health.nsw.gov.au/improve-quality/teamwork-culture-pcc/teamwork/clinical-handover>.
5. Abdellatif A, Bagian JP, Barajas ER, Cohen M, Cousins D, Denham CR *et al.* Communication during patient hand-overs: patient safety solutions. *Joint Commission Journal on Quality and Patient Safety* 2007;33:439-442.
6. Royal Hobart Hospital. National Clinical Handover Initiative - Safety and Quality. Overarching Minimum Data Set [Internet]. 2008 [cited March 6, 2023]. Available from: https://www.safetyandquality.gov.au/sites/default/files/2019-06/minimum_data_set.pdf.
7. Merten H, van Galen LS, Wagner C. Safe Handover. *BMJ* 2017;359.
8. Australian Medical Association. Guidance on Clinical Handover for Clinicians and Managers. Safe Handover: Safe Patients [Internet]. 2006 [cited February 16, 2023]. Available from: https://www.ama.com.au/sites/default/files/documents/Clinical_Handover.pdf.
9. Harris PA, Taylor R, Minor BL, Elliott V, Fernandez M, Lindsay O'Neal L, *et al.* The redcap consortium: building an international community of software platform partners. *J Biomed Inform* 2019;95:103208.
10. Harris P, Taylor R, Thielke R, Payne J, Gonzalez N, Conde J. Research Electronic Data Capture (Redcap)—a Metadata-Driven Methodology and Workflow Process for Providing Translational Research Informatics Support. *Journal of Biomedical Informatics* 2009;42:377-381.
11. Källberg AS, Ehrenberg A, Florin J, Östergren J, Göransson KE. Physicians' and nurses' perceptions of patient safety risks in the emergency department. *Int Emerg Nurs* 2017;33:14-19.
12. Cheah LP, Amott DH, Pollard J, Watters DA. Electronic medical handover: towards safer medical care. *Med J Aust* 2005;183:369-372.
13. Ah-kye L, Moore M. A simple prioritisation system to improve the electronic handover. *BMJ Qual Improv Rep* 2015;4.
14. Burgess A, van Diggele C, Roberts C, Mellis C. Teaching clinical handover with isbar. *BMC Med Educ* 2020;20:1-8.
15. Till A, Sall H, Wilkinson J. Safe Handover: Safe Patients - the Electronic Handover System. *BMJ Qual Improv Rep* 2014;2.
16. Barnes SL, Campbell DA, Stockman KA, Wunderlink D. From theory to practice of electronic handover. *Aust Health Rev* 2011;35:384-391.
17. Vithlani R. Introduction of a new electronic medical weekend handover at Tunbridge Wells Hospital. *BMJ Qual Improv Rep* 2015;4.