QUALITY IMPROVEMENT PROJECT

Improving the Quality of Medical Handover Through the ISBAR$_3$ Technique in Children's Health Ireland at Temple Street

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Abstract

Background: Medical handover is considered an important aspect of patient care to provide safe and quality care to patients. As the medical community moves away from 24-hour shifts, there is a greater need for a standardised handover to be implemented. Medical handover techniques are currently being criticised for their lack of structure, often leading to errors in patient care. Improvement in medical handover is crucial, as transfer in care can be associated with hospital mortality. We aimed to integrate interactive prompts and brief teaching sessions on the ISBAR$_3$ technique to improve the quality and standardisation of medical handover.

Methods: Plan-Do-Study-Act (PDSA) methodology was employed. Four cycles, each of a 3-day duration, were completed over a 4-week study period. Data collection and introduction of implementation measures were completed from Monday to Friday to increase staff awareness. The methodology of each cycle was developed from the outcomes of previous cycles and discussions with key stakeholders.

Results: The baseline data of this project revealed inconsistent and unreliable use of some aspects of the ISBAR$_3$ handover tool. The second cycle displayed an overall improvement in the engagement of ISBAR$_3$. The areas of *Identify*, *Situation*, *Background*, and *Assessment* averaged 100% utilisation across all days of phase 2. Outcomes of the third cycle revealed continuous engagement with ISBAR$_3$, inferring the beneficial use of multi-media prompts. Outcomes of the final cycle, focused on clinical handover adherence and standardise access to computer software, showed significant improvement in all areas of the medical handover.

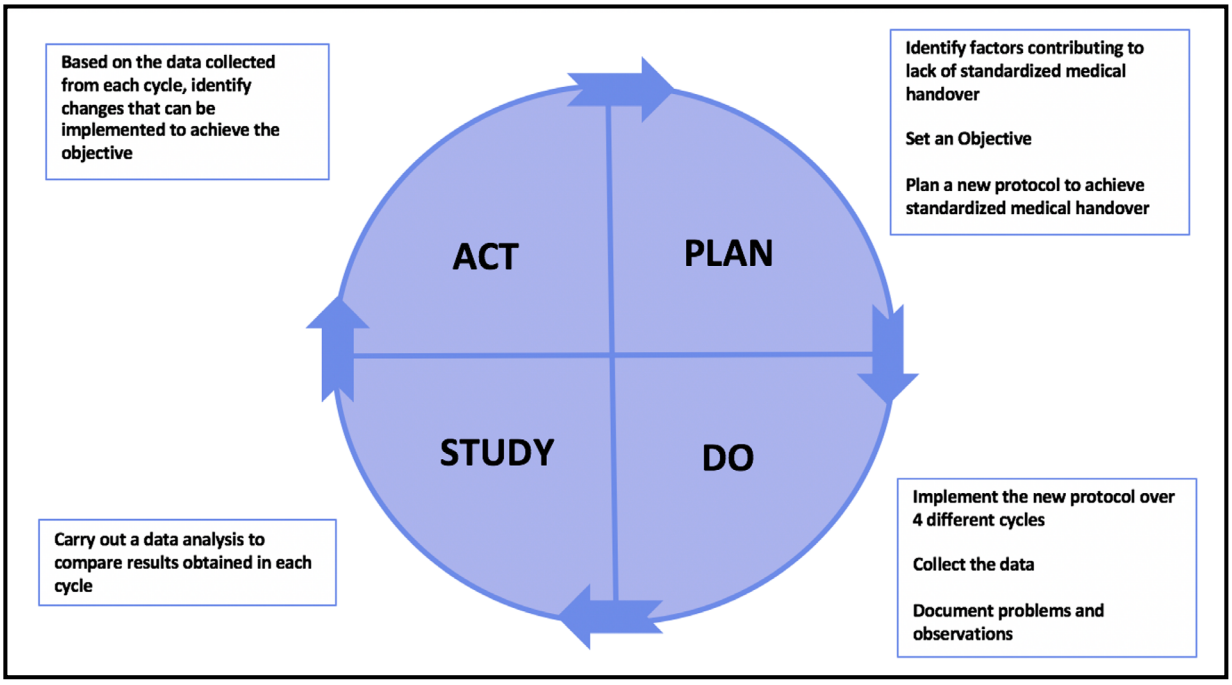
Conclusion: This PDSA–based quality improvement project demonstrates the speed at which a high-quality intervention can be rolled out in a high-pressure clinical environment. The 4-cycle PDSA model had a positive impact on the process measures of clinical handover in a tertiary paediatric centre.

Keywords: Medical Handover, Plan-Do-Study-Act (PDSA), Quality Improvement Project

Introduction

The HSE defines a medical handover as the transfer of responsibility and accountability for aspects of patient care to another professional or team on a temporary or permanent basis[1]. Teamwork, clinical expertise, and leadership are utilised in a structured manner by healthcare professionals to improve the quality and safety of patient care. Clinical handover is a high-risk time during the patient journey and is associated with hospital mortality[2]. Current criticism of handover includes poor communication, which is the leading cause of medical errors[3]. Exclusion of the patient can occur at many different points in the transfer of care during a patient's stay in hospital[4]. As full-time employment and 24-hour shifts become less common in medicine, there is an increased need for and reliance on efficient, standardised, and effective clinical handover[5]. Implementation of a handover programme has been shown to reduce medical errors by 23% and preventable adverse events by 30%[6]. The World Health Organisation advocates for the use of ISBAR$_3$ (*Identify, Situation, Background, Assessment, Recommendation, Risk, Readback*) as a handover tool due to its multidisciplinary nature and user-friendly technique[7]. This specific tool has also been suggested to improve individual and team communication in a timely manner[8]. Although, many studies have explored the importance of achieving a high-quality medical handover there are themes identified among the literature that highlight the gaps in the handover process. Some of the major themes identified among the literature included the lack of research on standardisation of electronic

Figure 1. **PDSA Model for Quality Improvement in Medical Handover**



documentation, minimal data on the handover process in the private hospital setting, and limited data on the structure and implementation of educational sessions regarding medical handover. More importantly, the role of patient interaction during the handover process remains an unclear and complex area in this field of study and requires further exploration. The aim of the project was to increase utilisation of the ISBAR$_3$ technique through a peer-led educational model using visual prompts, brief teaching sessions, technology modification, and stakeholder engagement in order to standardise the medical handover process.

Methods

A quality improvement framework was developed for clinical handover in the general paediatrics unit at Children's Health Ireland at Temple Street, which is a 154-bed tertiary paediatric hospital in Ireland. A Plan-Do-Study-Act (PDSA)[10] approach was adopted. This cyclical model provides a clear method for repetitious development of change by incorporating complex interventions of interdependent steps and key criteria[10]. Incorporating a PDSA cycle will provide structure for a quality improvement approach, such as the Model of Improvement (MFI). MFI is essential for creating a framework that incorporates developing, testing, and implementing changes that will ultimately lead to improvements[11]. Four cycles were completed over a 4-week study period from 9 December 2020–7 January 2021. Each PDSA cycle would take place for 3 days before moving onto the next cycle. Data was collected by a Specialist Registrar involved in the study and the implementation measures were introduced from Monday to Friday to increase staff awareness of the measures. The first cycle involved a *Plan* for the project, *Doing* a collection of baseline data on the quality and effectiveness of the clinical handover using process measures (**Figure 1**). The collection of baseline data on how often each handover task was completed, the distribution of handover information in group chats and task delegation, multi-media advertisements to raise awareness about medical handover, and the creation of dedicated login details for access to essential computer programs and printers were all part of the process measures. *Study* involved interpretation of this data and *Actions* that were implemented formed the foundation of the second cycle (**Figure 1**). The methodology of each cycle was developed based on findings of the previous cycle and discussions with key stakeholders (**Table 1**). Key stakeholders were paediatric medical Senior House Officers (SHO) or Registrars participating in clinical handover during the 4-week period of this study.

Results

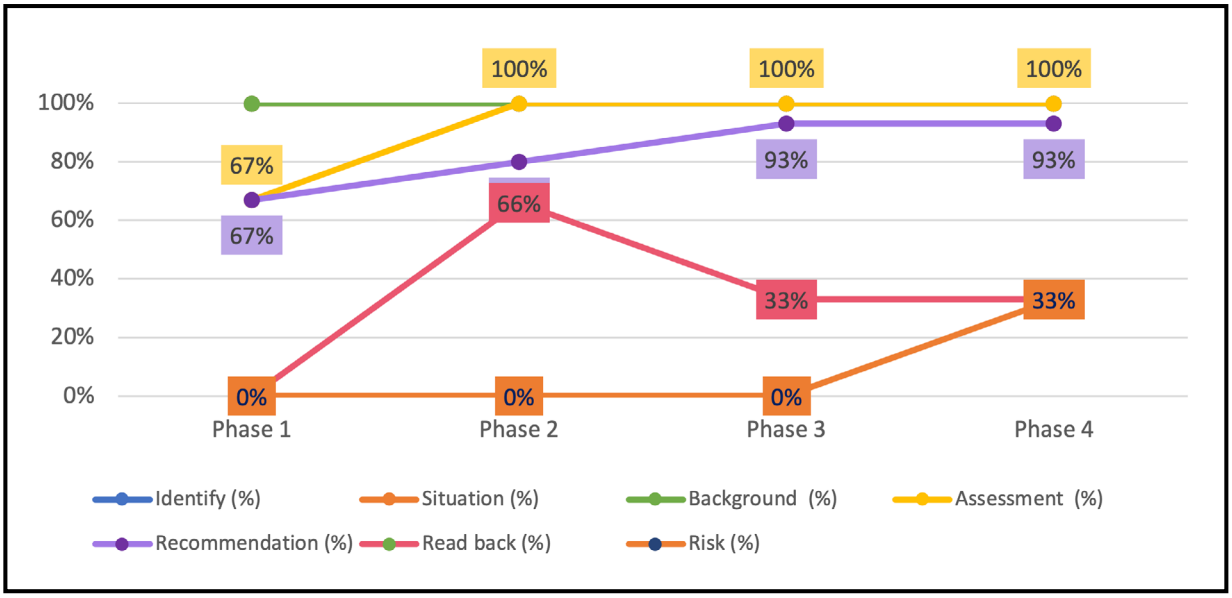
The baseline data of this project revealed inconsistent use of some aspects of the ISBAR$_3$ handover tool. When incorporating ISBAR$_3$, *Identify*, *Situation*, and *Background* were consistently achieved across all the 3 days of phase 1; however, *Assessment* and *Recommendation* were only achieved on day 1 and 2 (**Figure 2**). Additional baseline data showed insufficient engagement by team members in handover tasks, such as readback, risk, updates regarding the Watchers list, intensive care unit (ICU) discharges, medical consults, and Paediatric Early Warning Scores (PEWS)/arrests documentation. During phase 1, the radiology programme, National Integrated Medical Imaging System (NIMIS), was accessed on day 3 and lists were updated on day 1, but there was no use of printed handover lists. The data analysis from phase 1 highlighted areas of improvement that became the target for phase 2.

Table 1. **Details of Four PDSA Cycles Conducted by Research Team from 9 December 2020–7 January 2021**

	Plan	Do	Study	Act
PDSA 1: 9–11 December 2020	• Understand the current procedural protocol in place to develop key strategies for improving medical handover	• Collect baseline data on the quality and effectiveness of the current handover method used at that point in time	• Team attendance 100% • Readbacks, risk, watchers updated, ICU discharges, medical consults and Paediatric Early Warning Scores (PEWS)/arrests not documented • Lists not printed • Lists updated 1 out of 3 days • **Day 3 lacked assessment and recommendation following ISBAR$_3$ tool** • NIMIS accessed 1 out of 3 days	• Teams were not utilising every aspect of the ISBAR$_3$ tool • Key aspects of medical handover process were excluded
PDSA 2: 12–14 December 2020	• Address lack of awareness of the impact of handover and lack education regarding the ISBAR$_3$ structure • Increase efficiency of the handover with increased computer program use and pre-printing of lists	• Posters about medical handover reminders placed at congregation points • Reminder messages displayed on most frequently used computer monitors	• Team attendance 100% • Readback improved to 2 out of 3 days • Medical consults improved to 2 out of 3 days • 33% increase in lists printed • Lists updated 2 out 3 days • **Following ISBAR$_3$ tool; assessment improved 100% on day 3 and recommendation averaged 80%** • NIMIS accessed 3 out of 3 days	• Implementation of education sessions/ information showed an improvement in the uptake of ISBAR$_3$ protocol • Establishing clear roles for each team member showed benefit
PDSA 3: 15–17 December 2020	• Increase awareness of handover, to reinforce the structure of ISBAR$_3$, and to seek feedback from key stakeholders	• Posters about medical handover reminders placed at congregation points • Reminder messages displayed on most frequently used computer monitors	• Team attendance 100% • Readback decreased to 1 out of 3 days • Medical consults decreased to 0 out of 3 days • Lists printed 1 out of 3 days • Lists updated 3 out of 3 days • **Following ISBAR$_3$ tool; assessment 100% across all 3 days and average recommendation improved to 93%** • Documentation of PEWS improved to 1 out of 3 days • NIMIS accessed 3 out of 3 days	• Multi-media reminders proved to be effective in reinforcing the structure of ISBAR$_3$
PDSA 4: 5–7 January 2021	• Increase adherence with printing of the lists prior to clinical handover • Standardise access to computer programmes	• Creation of a dedicated computer login for clinical handover—access to printers and essential computer programmes	• Team attendance 100% • Readback maintained at 1 out of 3 days • Risk, watchers updated, ICU discharges documentation increased to 1 out of 3 days • Medical consults improved to 2 out of 3 days • Lists updated 3 out of 3 days • Lists printed 3 out of 3 days • **Following ISBAR$_3$ tool; assessment 100% across all 3 days and average recommendation improved to 93%** • Documentation of PEWS improved to 3 out of 3 days • NIMIS accessed 3 out of 3 days	• The addition of each previous cycle resulted in an overall positive outcome for the medical handover process • The results reveal that it is beneficial for teams to actively engage in each aspect of the ISBAR$_3$ handover tool to see an overall improvement

The second PDSA cycle involved distributing handover information in WhatsApp groups and completing an educational session with medical staff to emphasise handover importance and the ISBAR$_3$ structure. A selection of entertaining memes was used to capture attention and improve interaction between key stakeholders. Task delegation was also formalised in this cycle by displaying roles and tasks on evenly spaced chairs in the handover room. Tasks included opening the radiology and laboratory computer programmes at the beginning of handover, printing handover lists, and updating the lists. This step served to improve adherence to public health Coronavirus Disease 2019 (COVID-19) guidance, increase computer program use for more efficient handover, and address the issues highlighted from phase 1. Results of this cycle displayed an overall improvement in the engagement of ISBAR$_3$. The areas of *Identify, Situation, Background,* and *Assessment* averaged 100% utilisation across all days of phase 2. When analysing the area of *Recommendation*, the calculated average was 80% for the duration of phase 2. There were also improvements in the use of *Readback*, printed lists, updated lists, and NIMIS programme.

Figure 2. **Run Chart of Compliance With ISBAR$_3$ Elements Over 4 Phases**



For the third PDSA cycle, posters about medical handover were displayed in key congregation points throughout the hospital to increase awareness of handover, reinforce the structure of ISBAR$_3$, and obtain feedback from key stakeholders. Reminder messages were affixed to the most frequently accessed computer monitors to increase use of the online shared worklists and reduce reliance on verbal handover. Outcomes of this cycle revealed continuous engagement with ISBAR$_3$. The areas of *Identify*, *Situation*, *Background*, and *Assessment* continued to average 100% use across the duration of phase 3. The use of *Recommendation* increased to an average of 93%. There was consistent use of NIMIS (100%) and an increased uptake in PEWS/arrest documentation by a day (+33%). A reduction was seen in the use of *Readback*, the discussion of medical consults, and printing lists by a day (-33%). Although there was regression in a few of the handover tasks, there was an overall increase in use of ISBAR$_3$.

The fourth PDSA cycle involved creating a dedicated computer login for clinical handover that provided access to printers and essential computer programmes. This step aimed to increase adherence to printing of the lists prior to clinical handover and standardise access to computer programmes during clinical handover. The use of *Identify*, *Situation*, *Background*, and *Assessment* was consistent, while the use of *Recommendation* remained at an average of 93% during phase 4. The final phase of the PDSA cycle showed significant improvement in all areas of the medical handover that were analysed. Discussion about risks, watchers, and ICU discharges increased by 1 day (33%). Updated and printed lists were both fulfilled on all days. Discussion about medical consults increased by 2 days (66%), documentation of PEWS or arrests increased by 2 days (66%), and NIMIS access remained at 100%.

Discussion

Several previous studies have focused on the challenges that arise when conducting a medical handover[12-14,16-18]. Throughout our search, communication seemed to be the challenge to arise most often. As many institutions move away from 24-hour shifts, there is a greater need for structured medical handover with technical communication about patients, their conditions, and current ongoing needs of care. The quality of communication among medical professionals is essential for patient safety and optimal care.

Communication includes technical facts about medical needs, but also requires positive attitudes and professionalism to foster dynamic relationships among colleagues and ensure effective conversation[12]. In addition to communication, other barriers to achieving a structured medical handover included time management, delegation of responsibility, and administrative challenges. Understanding the challenges of a medical handover will provide insight on how to develop a protocol to improve the quality and structure of a sustainable medical handover.

Sarvestani et al. discussed time management as a barrier to effective handover practices[13]. Sarvestani et al. demonstrated that an average handover lasted for approximately 41 minutes, and that time was usually not managed appropriately[13]. It was found that prolonged verbal reports during a handover often led to the inability to prioritise the patients' needs[13]. With technological advancements and a move towards fully supported electronic databases, verbal communication can be lost during the process. A study conducted by Auroa et al. demonstrated that verbal communication is still very important when it comes to transmitting patient information[14]. They found that the replacing a telephone call with an electronic reporting system for reporting critical lab values resulted in 45% of emergency lab results going unchecked[14]. The researchers concluded that ineffective verbal communication during medical handovers is a common event regarding adverse events

in patient care[14]. It can be concluded that effective verbal communication during a medical handover is critical for improving safety and quality of patient care. The implementation of structured verbal communication and use of skills such as "read-backs" during handovers have been shown to reduce errors in patient care[15]. Further review of the literature demonstrated that handovers combining both verbal information and electronic data results in minimal data loss during the transmission of patient information[16].

Regarding medical handovers, delegation of responsibility is of utmost importance. There are often many professionals involved in providing care for one patient. When there is a lack of responsibility or clear leadership roles, complications tend to arise and lead to errors in patient care. Leadership is important to delegate tasks based each professional's knowledge, experience, and expertise. Inappropriate delegation of tasks during medical handovers can compromise patient care[17].

Complications in medical handovers can also arise when there are technical issues within administrative processes. Many institutions rely on electronic tools to record, review, and analyse patient information. Barriers to the use of electronic tools can cause poor communication, lead to non-cohesiveness, and prevent standardised data transfer during medical handovers[18].

Although it is critical to understand the barriers we face when conducting medical handovers, it is just as important to identify techniques and tools that are beneficial in creating a structured medical handover. Dr Ming-Keng Teoh of Medical Protection Society states that "good handovers provide continuity of care and can help to avoid errors" [19]. A good handover not only allows the exchange of information, but also the chance to ask questions and affirm the information received about the patient[17]. There are several steps that should be taken to perform a successful handover. There should be an assigned senior clinician to facilitate the session and encourage discussions between all other team members. Each session should be allotted an adequate timeframe based on the size of the institution and patient population. A good medical handover should take place in a focused environment free from interruptions and distractions. When appropriate, handover should involve health professionals from other specialties and disciplines for a multi-disciplinary approach[20].

Implementation of the $ISBAR_3$ framework is beneficial for assembling a medical handover[21]. The framework stands for Identification, Situation, Background, Assessment, Recommendation, Read-back, and Risk. This simple framework is logically constructed and simplified to allow its users to quickly recall its elements and conduct a comprehensive handover. The $ISBAR_3$ tool provides a focused approach to set expectations, ensure completeness of information, and reduce errors in patient care. There are many different methods when approaching a medical handover. Implementation of the $ISBAR_3$ technique has been shown to increase communication content, improve structure and consistency in the delivery of patient information, and allow recipients to feel prepared with essential information about their patients[22]. To achieve good quality handovers, it is important to deliver educational training sessions to medical staff on how to properly execute and utilise the $ISBAR_3$ method. An Australian study found that junior doctors valued handover education and desired more constructive feedback from senior doctors[9]. When the study was conducted, there was poor attendance at the educational sessions. Those who did attend the training sessions found it to be very beneficial. The researchers concluded that some of the reasons for poor attendance to the training sessions included a lack of awareness about the importance of medical handovers, competing clinical demands, and the challenges of implementing educational programs in a hospital setting. We found our results to be concurrent; the implementation of educational sessions among medical staff and updates via group chats were associated with better use of the $ISBAR_3$ structure and improvements in the medical handover process.

There are multiple barriers that can hinder the quality of medical handovers. However, with the introduction of improved communication techniques, educational programs for medical professionals, and the standardisation of a structured protocol, it is possible to improve the quality of handovers and optimise patient safety across healthcare institutions. In our project, only the morning handover (8.30am) was studied during this project for feasibility reasons.

This project does have limitations. We used a short time frame for each cycle. Ideally, more time allotted to each cycle would have been more beneficial to see a greater evolution of change but due to change over of Specialist Registrars the selected timeframe was only feasible. With frequent rotation changes among the teams at Temple Street, a short time frame for each cycle was decided on to allow for each cycle to completed and analysed as thoroughly as possible before moving onto the next cycle. Despite the short time frame of the cycles, significance in the data remained clear throughout the duration of the project.

In addition, this project was conducted during the COVID-19 pandemic. The pandemic caused an ever-evolving environment within the hospital, potentially leading to unpredictable changes in specific protocols regarding the health and safety among staff and patients. The methodology design of this project was developed during the pandemic with the hopes of incorporating techniques that will withstand diverse and challenging situations that may arise in the future of healthcare. We recognise the importance of evolving with the changes that the COVID-19 pandemic poses on the hospital setting and more specifically the medical handover process.

Conclusion

This PDSA–based quality improvement project demonstrated the speed at which a high-quality intervention can be rolled out in a high-pressure clinical environment. The 4-cycle PDSA model had a positive impact on the process measures of clinical handover in

a tertiary paediatric centre. The implementation of the ISBAR$_3$ technique will work to increase communication, improve structure and consistency in the delivery of patient information, and prepare recipients with essential patient information. Future studies may involve linking results from this project with outcome data, such as length of stay, time from medical consultation request to consultant review, and consultant satisfaction with incoming registrar's knowledge of cases.◂

Declarations

The authors declare that this quality improvement project report was conducted in the absence of any relationships—commercial, financial, or otherwise—that could be construed as a potential conflict of interest.

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