

Original Research Article

Developing a new flexible tool for handover

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Abstract

Background: Transferring medical information among professionals and between shifts is a crucial process, allowing continuity of care and safety, especially for complex patients in life-threatening situations. This process, handover, requires focusing on specific, essential medical information while filtering out redundant and unnecessary details.

Objectives: To create and implement a tool for handover that would be flexible enough to meet the unique needs of specific departments.

Methods: We used Plan–Do–Study–Act (PDSA) methodology to prospectively develop, implement, evaluate and reassess a new handover tool in a 900-bed teaching hospital in central Israel. Nurses from 35 departments participated in developing a tool that presents the staff’s viewpoint regarding the most critical information needed for handover.

Results: A total of 78 nurse managers and 15 doctors (63.7%) completed the questionnaire. Based on exploratory factor analysis, 15 items explained 58.9% of the variance. Four key areas for handover were identified, in addition to basic patient identification: (i) updated clinical status, (ii) medical information, (iii) special clinical treatment and (iv) treatments not yet initiated. Subsequently, a Flexible Handover Structured Tool (FAST) was designed that identifies patients’ needs and is flexible for the specific needs of departments. Revisions based on hands-on experience led to high nurse satisfaction with the new tool in most departments. The FAST format was adopted easily during the COVID-19 pandemic.

Conclusion: Implementing a new handover tool—FAST—was challenging, but rewarding. Using PDSA methodology enabled continuous monitoring, oversight and adaptive corrections for better implementation of this new handover reporting tool.

Key words: patient safety, handoff, redesigned handover tool, hospital change, implementation, PDSA, quality improvement

Introduction

Shift handover is the process through which responsibility and accountability for safe patient care is transferred from one healthcare provider to another [1–5]. Although shift transfers occur routinely within complex healthcare systems, they encompass many challenges. Appropriate, timely handover requires complete and unambiguous transfer of the precise, essential medical information needed to maintain optimal continuity of care [6] while filtering redundant details.

In a review of almost 5000 sentinel events, the Joint Commission International concluded that communication failures (including handover) contributed to 60–80% of preventable patient safety incidents [7, 8].

Despite its complexity, handover is one of the most frequently occurring, routine procedures in healthcare systems in general and in hospitals in particular. The interactions involve a risk of error [9, 10].

Riesenberg *et al.* [9] found that obstacles to effective handoffs are staff hierarchy; social, language and ethnic barriers; communication

styles; lack of training; lack of information; physical barriers such as lighting, location, noise and interruptions, as well as difficulties due to patient complexity, lack of time, work overload and high patient-staff ratios [9, 10].

Several protocols for improving communication during handover have been proposed [11, 12]. The most frequently used tools are SBAR (Situation, Background, Assessment, Recommendation) [11–13], I-PASS (illness severity, patient summary, action list, situational awareness, and synthesis) [14] and SOAP (Subjective, Objective, Assessment, Plan) [15], among others [16]. These tools use mnemonics and are best suited to situations when a brief summary is needed, such as when a patient arrives to the emergency department by an ambulance or is transferred to another hospital [13, 15, 16].

Handover is one of the most frequent high-risk points in patient care and a very important factor in continuity of care [17]. The variety of tools used reflects that none is completely effective or superior to another. Some structured handover methods that were adapted from other industries, such as the Air Force, which also manages high-risk situations, are not well-suited to healthcare [4]. The negative consequences of inadequate handoffs challenge healthcare managers to create a tool that will ensure the best results. Several models are used in daily practice; yet, finding a comprehensive method is difficult.

For each department, the daily routine of the clinical staff in each department entails handovers of about 30 patients within a limited time of ~20 min, to match inter-shift changes. Therefore, the information transferred must be focused and clear and provide the incoming shift with adequate data to enable appropriate continuity of patient care, especially for the most complex patients.

The aim of this study was to develop and implement a tool for handover that would be flexible enough to meet the unique needs of specific department and prioritize patients by medical complexity and illness severity.

Methods

The tool was developed based on the Plan–Do–Study–Act (PDSA) method and custom-designed for healthcare. The following is the step-by-step description of how we used the PDSA model to develop, assess and reassess a new handover tool and its implementation.

Plan

We performed the planning phase in two stages, to determine the essential information needed for effective handover. First—observation—we collected information about the methods nurses were using during shift transfer. Observing handovers in the Departments of Internal Medicine, Orthopedics, Surgery and Pediatrics revealed that various processes were used to communicate patient information. We found that these included personal ‘to do’ notes that nurses from the incoming shift wrote in order to remember essential information. In addition, separate log books were used to follow up on tests and results; to follow up on patients with comorbidities (such as diabetes) and to note managerial information, such as new policies and guidelines, new medications, logistic gaps and staff issues. No uniform or consistent method was observed.

During the observations, nurses raised several concerns about the current process, such as fear of losing information, having to depend on the reliability of the information from each staff member (regardless of education and experience) and complaints that the information received was disorganized and overloaded with unnecessary details. They indicated that the major challenge they faced was lack of time to transfer the necessary information adequately.

Second, as a result of these observations, a questionnaire was developed based on commonly used handover models and on the literature [18, 19]. It included 15 components of handover (Appendix 1). It was sent to all 150 physicians and nurse managers in the organization.

The questionnaire was pre-tested with 10 nurses from the departments and found reliable with a Cronbach’s alpha of 0.78. It was then sent to all 150 senior physicians and nurse managers in the organization. Respondents were asked to rank the importance of each item from 1 (less important) to 6 (very important). We used SPSS, version 23.

Do Creating the Flexible Handover Structured Tool (FAST) model

The universal, structured, medical tool for shift handover was developed based on parameters defined by the medical team as ‘important’ and relevant to the situation and to each patient’s condition and each specific department. The new tool was presented to the doctors and nurses in a 900-bed hospital in central Israel by one of the authors (O.T.). She met with six clinical leaders in the hospital (physicians, departmental managers and head nurses) to prepare for future implementation of the handover process and achieve maximum understanding and cooperation.

Study

Several departments were chosen to test the model, based on need and leaders’ engagement. Initially, only nurses were required to use the new tool, as they were already accustomed to conducting well-established activities, and we expected full compliance. The process of information transfer in these departments was observed and recorded at least weekly for 2–3 months by two of the authors (R.M. and I.G.). They validated the nurses’ use of the new tool, evaluating correct prioritization of high-risk patients and inclusion of all four components.

An important part of the process involved introducing and incorporating the new tool into daily practice. This included meetings of the research team with hospital division managers, followed by meetings with all physicians and nurse managers. At each of the meetings, a lecture was presented that introduced the principles of the new tool, along with demonstrations of shift transfer scenarios. Each manager was instructed to train the medical staff in his or her department. In addition, a quality representative trained to monitor Flexible Handover Structured Tool (FAST) use was appointed from each department.

Act

This step of the PDSA model is the summary of our implementing the FAST. This included quarterly follow-up meetings with the nurses, to learn about their experiences and satisfaction using the tool. Three months after the FAST was implemented, the nurses were asked to complete a short satisfaction questionnaire that included open-ended questions to describe their experiences using the tool.

Results

A total of 78 nurse managers and 15 doctors (63.7%) completed the questionnaire. Based on the responses, exploratory factor analysis—principal component analysis with varimax rotation was conducted. The analysis was forced to yield four factors. Fifteen items explained 58.9% of the variance of the responses to the questionnaire. Table 1 presents the factor loadings and the Cronbach’s alpha of each factor.

Table 1 Analysis of the most important components of handover

Component	Updated clinical status	Medical information	Special clinical therapy	Treatments not yet initiated
Respiratory/hemodynamic status	0.847	0.194	0.65	-0.017
Important clinical findings	0.659	0.464	-0.024	0.114
Fluid balance	0.602	0.080	0.472	0.386
Information on social support, legal guardian, vulnerable population and cultural sensitivity	0.585	-0.076	0.342	-0.073
Relevant emotional or behavioral status	0.525	-0.168	0.397	-0.096
Estimated length of stay	0.403	-0.092	0.015	0.128
Cronbach's $\alpha = 0.80$				
Primary diagnosis/reason for hospitalization	0.025	0.783	0.126	0.160
Current complaint	-0.020	0.628	0.388	-0.073
Clinical background and previous diagnoses	0.086	0.566	0.445	-0.217
Special treatment/medical equipment	-0.021	0.526	0.138	0.452
Cronbach's $\alpha = 0.55$				
Allergies	0.142	0.049	0.724	0.019
Change or renewal of medications and other treatments	0.126	0.174	0.724	0.344
Special events	0.110	0.390	0.523	0.371
Cronbach's $\alpha = 0.58$				
Medication or medical device	0.000	0.043	0.084	0.840
Treatments not yet initiated	0.158	0.058	0.057	0.755
Cronbach's $\alpha = 0.57$				

In addition to ensuring correct patient identification, the four categories were defined, each with several components:

- (1) Updated clinical status, including respiratory and hemodynamic status; important clinical findings; fluid balance; information on social support, legal guardian, vulnerable populations, cultural sensitivity; relevant emotional or behavioral status; and estimated length of stay.
- (2) Medical information: primary diagnosis/reason for hospitalization, current complaint, clinical background, previous diagnoses and special therapy or medical equipment.
- (3) Special clinical therapy: allergies and change or renewal of medications and other treatments.
- (4) Treatments not yet initiated: medication or medical device or treatments ordered but not yet initiated.

In addition to these four components, the tool contains a flexible section that adds specific information for each department. Table 2 describes the additional and flexible elements specific to each department. Each department could add specific relevant patient information, especially those with high-risk patients, such as the adult and pediatric intensive care units, emergency department and post-surgical unit. These departments require additional information about specific, high-risk elements of patient care, for example, changes in scheduled surgery for surgical departments, results of critical laboratory tests, changes in respiratory volumes and special diets for pediatric and geriatric department patients.

A total of 35 departments were involved in the initial implementation of FAST. Compliance was determined based on the number of shifts that the forms were completed in each quarter, in each of the five divisions. Table 3 presents the compliance information for each division in the first five quarters of implementation. In the first quarter of the program, acceptance of the FAST method was documented in 837 (62%) shifts in the pediatric division (five departments), 2016 (83%) in the surgical division (nine

departments), 1004 (93%) in intensive care units (four departments), 2164 (99%) in obstetrics and gynecology (eight departments) and 2406 (99%) in internal medicine (nine departments). In the second quarter, most departments maintained or increased this performance level.

The first quarter of 2020 included the onset of the COVID-19 pandemic. During this time, the hospital's Corona Unit was established under the Division of Internal Medicine. The tool proved suitable for patients who were diagnosed with COVID-19, even during these unprecedented circumstances. However, there was a slight decrease (from 2409/2484 (97%) to 2333/2430 (96%)) in the use of FAST, especially in the first two weeks of the outbreak, while adjusting to the new situation. This identified how significant the flexibility of the tool is.

Monitoring and nurse satisfaction

Based on the number of responses to each question, 115/126 (91.3%) of the nurses were satisfied with the FAST, 117/128 (81.7%) stated it contributed to patient safety and 101/126 (80.3%) felt comfortable when handing over information to the next shift (Table 4).

Discussion

Statement of principal findings

Using the PDSA method for developing a new tool for shift handovers was innovative. Handovers are one of the most frequently occurring procedures in hospital departments in daily practice and are critical for patient safety and continuity of care.

This new handover tool has two distinct advantages. First, it is flexible and adapts to include the important information each department needs for shift transfer (as identified by the medical teams). Second, it is adaptable to clinical conditions and requires information for complex patients to be transferred in writing and verbally for other patients.

Table 2 Additional department-specific information

Division	Information common to all departments (see Table 1)	Major background diagnoses	New treatments, medications	Changes in OR schedule	NPO or special diet	Updates on fluid balance	Behavior	Changes in personal equipment/ room/location
Surgery	X			X	X		X	
Internal medicine	X		X				X	
Pediatrics	X		X		X		X	
Gynecology	X		X				X	
Emergency department	X							
Intensive care units	X	X					X	
Geriatrics	X		X			X	X	X

Table 3 Use of FAST by hospital divisions in each quarter of 2019

Period	Clinical divisions (No. of departments per division)									
	Internal medicine (9)		Surgery (9)		Pediatrics (5)		Ob-Gyn (8)		Intensive care (4)	
	N ^b	%	n ^b	%	n ^b	%	n ^b	%	n ^b	%
Q1 2019 (n = 270) ^a	2406	99%	2016	83%	837	62%	2141	99%	1004	93%
Q2 2019 (n = 273) ^a	2236	91%	1990	81%	819	60%	2164	99%	1049	96%
Q3 2019 (n = 276) ^a	2385	96%	2061	83%	1159	84%	2186	99%	1018	90%
Q4 2019 (n = 276) ^a	2409	97%	2186	88%	1256	91%	2186	99%	1071	97%
Q1 2020 (n = 270) ^a	2333	96%	2357	97%	1229	91%	2141	99%	1048	97%

^aNumber of possible shifts to fill-out FAST forms per quarter for each department.

^bNumber of shifts with completed FAST forms per division per quarter.

Table 4 Satisfaction survey

Question	N	Agree	Disagree
The current handover method contributes to patient safety	128	81.7%	8.5%
The quality of shift handovers is excellent	128	63.4%	15.5%
Essential information is not omitted during patient handover	72	60.6%	23.9%
Efficiency			
The handover tool is efficient	126	69.0%	12.7%
Contents			
I feel comfortable when handing over information to the next shift	126	80.3%	2.8%
When I start the shift, I usually understand the treatment plan, planned by the previous caretaker.	126	71.8%	8.5%
When I handover my shift, I feel confident that the staff member replacing me understands my patients' care plans.	125	74.7%	4.2%
I use the FAST handover form to plan my activities during the shift.	123	66.2%	12.7%
Communication			
Information is communicated clearly during handovers.	125	78.9%	5.6%
During handovers, concise and relevant information on patients is transferred.	124	70.4%	12.7%
During handovers you can ask questions for clarification.	125	84.5%	1.4%
Overall satisfaction with the handover tool		High	Low
Satisfaction	126	91.5%	8.5%

The tool was designed based on the following principles: (i) it had to be structured in a way that would create a standardized system for transferring information throughout the hospital, (ii) it should be flexible, enabling modifications for unique departments, (iii) it should be concise, to minimize the time needed to document and transfer information and (iv) the information should prioritize patients with special clinical or psychosocial needs to enhance safety and risk prevention. The FAST model differentiates between information that needs to be transmitted during handover, according to patient status.

Strengths and limitations

The study was conducted in a medium-size, general hospital. Expanding the study to other hospitals with different features, ownership and populations may result in different definitions of complex patients and other components of the tool. The flexible component may be very useful in these circumstances. Although departmental leaders were consulted, selected team leaders were chosen, those who were usually engaged in quality interventions. We initially implemented the tool with the nurses and currently are introducing it among

the physicians. We intend to investigate the process throughout the hospital.

Interpretation within the context of the wider literature

Previous studies presented several models for handover. But their characteristics differed, especially when describing patient outcomes [21], transferring patients between units and teams and regarding family satisfaction with the information they were provided [22].

Professionals, health system leaders and hospital managers in particular seek appropriate ways to transfer medical information that will avoid mistakes due to wrong or missing data, as a critical path to increasing patient safety. The omission of critical information and the transfer of erroneous data during handoff are common [16, 17, 20]. The process of writing has a greater impact on memory than does spoken words [21]. Written handoffs were found to be more concise and to save nurses time [22]. We recommend writing information regarding complex or at-risk patients only.

Rüdiger-Stürchler *et al.* [23] found that a five-item list contributed to a significant decrease in the time it took for an emergency room to transfer a shift. These findings strengthen the structure of our FAST tool, as it contains up to five types of information for all departments and an additional three types of information, specific to some departments.

Implications for policy, practice and research

The FAST protocol for shift transfer that we recommend is based on two main principles: (i) at each shift change, information regarding patients with complex clinical conditions will be transferred first (department heads choose the specific cases) in written format, using a structured, comprehensive form; all hospital departments will document the information about complex patients; (ii) for routine patients, the information is transmitted verbally.

In addition to implementing the FAST tool, we also learned that introducing changes in an organization is a complex task. We had to find the leaders in each department and the clinical leaders of the hospital to explain the new tool. We had to convince them that implementing this change would be useful for the team and improve patient safety and that it would increase compliance and effectiveness and staff satisfaction. An instructor's guide and staff training were also very important. The final component involved monitoring the changes while considering the staff's feelings.

Conclusions

Developing a simple, clear, comprehensive, universal and flexible tool for all handovers in a hospital was a challenge. FAST allows re-evaluation and continuous improvement over time and increased staff and patient satisfaction. Including the staff members in the development process was the key to successful adoption of the process.

Future studies should investigate the patients' experiences and how involvement during handovers influences their activation and physical situation during hospitalization and after.

Follow-up on effectiveness and benefits must be considered by the hospital management, based on the continuous measuring of preferences and error prevention. The involvement of patients and families should be considered, as a source of accurate information and sharing in treatment decisions. We also need to study patients' feelings regarding the way patient information is reported at the bedside

during handovers (discussing the patients without acknowledging them).

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Data availability statement

Data may be obtained upon request from the corresponding author.

Ethics approval

The process was approved by the Shamir Medical Center Ethics Committee.

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Appendix 1 Questionnaire

1. Please state the department in which you work _____
2. Profession: physician/nurse/other_____
3. The table below contains information regarding shift transfer. Please rate each item from 1 (unimportant to transfer verbally) to 6 (of the utmost importance to verbally report) according to how important you find the item.

Items to include in verbal shift transfer	1	2	3	4	5	6	Other
Full name, ID number, sex and age							
Estimated length of stay							
Clinical background and previous diagnoses							
Allergies							
Respiratory/hemodynamic status							
Primary diagnosis/reason for hospitalization							
Fluid balance							
Change or renewal of medications and other treatments							
Important clinical findings							
Treatments not yet initiated							
Special events							
Information on social support, legal guardian, vulnerable population and cultural sensitivity							
Relevant emotional behavioral status							
Current complaint							
Medication or medical device							
Special treatment/medical equipment							