Handover: The Fragile Lines of Communication

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About the Authors

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Summary

Handovers have been increasingly recognized as an important determinant of patient safety and quality of care. Changes in patterns of physician and resident work hours have increased the importance of safe handover. The current review summarizes previous literature on deficiencies in current handover practices, consequences of suboptimal handover, and barriers to effective handover. This review concludes by summarizing results of studies that used education, standardization, technology, and bundled interventions to improve handover.

Introduction

Handover is the act of transferring both the responsibility for a patient's care, and the information necessary to provide care, from one healthcare professional (or team) to another. Handover has increasingly been recognized as an important patient safety issue, especially as recent changes in physician and resident work hours have increased the need for safe handover practices.¹ A study of handover frequency at an academic US centre found that on a one-month internal medicine clinical teaching unit rotation, a typical intern was involved in 300 patient handovers. In addition, a patient admitted for 5 days had their information handed-over approximately 15 times.² The failure of duty-hour restrictions to improve measures of patient safety may be due to an increase in handovers.^{3,4} When the greater demands for handover are combined with the growing complexity of internal medicine patients, the potential consequences of inadequate handover on patient safety increase substantially.

This article will aim to review the current state of handover between physicians in the inpatient medical setting, using a quality improvement perspective.

What problems exist in current handover practices?

Many early studies of handover were single-centre audits that identified content omissions in handover (summarized in Table 1).^{5,6,7,8} Surprisingly, some of the omitted content (e.g. current status, active medical problems) was vital information. Estimating the frequency of these omissions is difficult, as the goal of these studies was primarily to characterize the omitted information. However, the nature of this omitted information highlights the potential impact of handover on patient safety.

Unlike handover content, deficiencies of the handover process have not been studied as often. The most in-depth investigation involved retrospective interviews with residents who were asked to recall adverse events in which suboptimal handover occurred.⁸ Using this method, the most commonly identified deficiency in the process was the lack of face-to-face communication during handover. Other identified process deficiencies that lead to communication breakdowns were illegible handwriting and double handovers, where the primary team handed over to a covering physician, who then handed over to another physician (as often occurs in

night-float systems). One study demonstrated that 41% of handovers at one institution (which utilizes a night float system) did not involve a physician from the patient's primary team.⁷

Table 1. Classification and examples of omitted handover content. Anticipatory guidance refers to instructions provided to covering physicians to be carried out if a potentially foreseeable event occurs.

Omitted Content	Example(s)
Active medical problems/ current clinical status	<ul style="list-style-type: none"> - Failure to inform covering MD of active bronchospasm requiring bronchodilator therapy that day. Patient required transfer to higher level of care.⁵ - Failure to inform covering MD of elevated BPs in a patient who had required multiple doses of IV anti-hypertensives.⁸
Recent significant events	<ul style="list-style-type: none"> - Episode of hypoglycemia in a patient with diabetes (treated with insulin) not handed over.⁵
Pending events and investigations	<ul style="list-style-type: none"> - Failure to notify covering MD of multiple pending consults from subspecialties.⁸
Rationale for desired action	<ul style="list-style-type: none"> - Covering MD not informed of rationale for MRI (to define anatomy prior to OR planned for the next morning). MRI was not performed.⁵ - Failure to include rationale for not initiating antibiotics leading to uncertainty.⁸
Anticipatory guidance	<ul style="list-style-type: none"> - Attempts at guidance either absent, or vague ("If you are called regarding high blood sugars, can you start insulin?").⁷

What are the consequences of deficiencies in handovers?

The potential for handover to affect the quality of patient care has been suspected for many years. A study from the 1990s suggested a link between discontinuity of physician coverage and adverse events.⁹ Years later, in a review of almost 5000 sentinel events, the Joint Commission concluded that communication failures (including handover) contributed to 60-80% of preventable patient safety incidents.^{10,11}

While these studies implicated handover as a cause of harm to patient, direct evidence of handover leading to adverse events has been difficult to demonstrate. One study that did investigate patient harms identified adverse events that could be attributed to handover at a rate of 7.5 per 100 patient days.⁵

Evidence of harm from handover issues has also been inferred from malpractice claims. A study of missed or delayed diagnoses identified approximately 20% and 24% of claims involved inadequate handover in ambulatory care and the emergency department, respectively.^{12,13}

The perception of postgraduate trainees is that handover problems contribute to adverse events. When surveyed, residents in internal medicine and surgical specialties believed that 9.4% of patients they had cared for had suffered harm due to a handover problem and 12.3% of those harms had major consequences.⁶

What are the barriers to effective handover?

The transfer of information is a recognized source of error in multiple professions.¹⁴ From a systems perspective, the lack of standardized processes is a major barrier to efficient handover. In many institutions, handover is carried out in a haphazard manner according to the availability of physicians.¹⁵ The lack of a consistent, dedicated space for handover may contribute to the high frequency of interruptions that affect handover.¹⁶ The cognitive psychology literature suggests that interruptions can have deleterious effects on tasks, like handover, that have high demands on working memory.¹⁷

Time pressures may contribute to the failure of the primary team to provide detailed instructions and for the covering physicians to ask questions and seek clarification. It has been estimated that each patient is discussed for an average of 35 seconds during handover, leaving little time for questions or clarification.⁷

Another systemic issue affecting handover quality is a lack of specific training regarding handover during medical school and residency. A survey of internal medicine training programs in 2006 indicated that 60% of programs did not provide any instruction in handover.¹⁸

In addition to these systems issues, there are cognitive aspects to handover that affect the individuals involved. In many academic centres, handover is often carried out between a senior resident and a junior resident. Though other industries have a greater appreciation of how hierarchies affect the transfer of information these may be just as pertinent in medicine.¹⁹ However, the one study that reported on this

phenomenon found little evidence that it affected handover between interns and senior residents.⁷

Another cognitive factor that may affect handover is the ‘egocentric bias’ demonstrated in a study in which residents were asked to estimate the effectiveness of their handover. Residents who provided handover expected on-call residents to recall important pieces of information more effectively than the on-call residents were able to when tested (2.6 vs. 1.6, $p < 0.01$).²⁰

While this overestimation of the effectiveness of handover may reflect an egocentric bias on the individual providing handover, the high complexity of the information communicated may also affect the ability of on-call physicians to retain salient points. Previous research has suggested that attention and engagement vary as the complexity of a task increases,^{21,22} which may contribute to the lack of questioning observed during handover sessions.⁷

What interventions to improve handover have been studied?

Many institutions have pursued quality improvement initiatives that focus on handover. The formats of these attempts differ, but most include education, standardization, implementation of technology, or a combination of these (i.e. bundled interventions).

Education

In the context of quality improvement, education is used to address gaps in knowledge that contribute to deficient practices. However, as an intervention, education is generally regarded as having limited effectiveness.^{23,24} Educational interventions to improve handover quality were addressed in a systematic review that found improvements were generally limited to attitudes, knowledge, and skills and not to actual behavior change or performance.²⁵

One educational intervention that appears promising is teamwork training. This has been used in other industries to improve communication between team members, and to overcome barriers created by authority gradients.¹⁹ While not studied on its own, teamwork training has begun to be introduced into bundled interventions to improve handover (see below).

Standardization

Standardization of processes, with integration of safe practices, is regarded as a more effective intervention to

improve safety than education.^{23,24} Many centres have attempted to strengthen handover through standardization.²⁶

Handover mnemonics are a standardization attempt to assist clinicians in remembering the important content of handover and to provide structure to the handover process. A large number of handover mnemonics (e.g. SIGNOUT, HANDOFFS, ANTICipate) have been developed, intended for use in a variety of settings (e.g. inpatient setting, emergency department).²⁷

Isolated studies of standardization attempts have documented increased comfort, confidence, and satisfaction in handover content amongst trainees.^{28,29} One study also demonstrated a perception amongst trainees that the standardized handover format led to increased updates to patients and family members. More definitive evidence (i.e. beyond the perceptions of physicians) has not been measured.

Technology

The use of technology has proven to be an effective method of improving handover.^{23,24} Multiple studies have demonstrated an association between the implementation of a computerized handover tool and an improvement in measures of handover quality. One study demonstrated a reduction in content omissions following implementation of a computerized sign-out tool,³⁰ while another found that the reported accuracy of handover was higher after the implementation of an online signover.³¹

Adverse events (defined as events that prolonged hospital stay or resulted in patient disability), as reported by physicians, were found to be lower following the implementation of a computerized handover tool.³²

Bundled Interventions

Early investigations demonstrated the potential of bundled interventions to improve measures of handover quality.^{33,34} The most impressive results from a handover intervention were recently reported from a study involving a bundled intervention for pediatric residents. This before and after study investigated the effect of a “handoff bundle” (teamwork training, use of the I-PASS mnemonic and a structured sign-over tool) on errors on 2 pediatric wards within a single centre. Medical errors occurred significantly less frequently in the 3-month period after the implementation of the handover bundle compared to a 3-month period before its implementation (18.3 vs. 33.8 medical errors per 100 admissions, $p < 0.001$). Fewer content omissions were noted after the bundle was implemented, and

no differences in the time spent handing over were observed.³⁵ Though the study had limitations,³⁶ it demonstrated the possibility to reduce patient harm with improvements in handover.

Conclusion

The changing profile of physician work hours has increased the need for effective handover. As with other quality improvement initiatives, the greatest benefits have been demonstrated following implementation of bundled interventions. While these findings are promising, evidence linking improved handover to improved patient safety is still sparse, and many barriers to effective handover remain poorly addressed. As demands for high value care increase, handover is likely to remain a key target for quality improvement interventions.

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