

# Improving Transitions of Care between the Intensive Care Unit and General Internal Medicine Ward

## A Demonstration Study

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### ABSTRACT

**Background:** In-hospital transfers such as from the intensive care unit (ICU) to the general internal medicine (GIM) ward place patients at risk of adverse events. A structured handover tool may improve transitions from the ICU to the GIM ward.

**Objective:** To develop, implement, and evaluate a customized user-designed transfer tool to improve transitions from the ICU to the GIM ward.

**Methods:** This was a pre–post intervention study at a tertiary academic hospital. We developed and implemented a user-designed, structured, handwritten ICU-to-GIM transfer tool. The tool included active medical issues, functional status, medications and medication changes, consulting services, code status, and emergency contact information. Transfer tool users included GIM physicians, ICU physicians, and critical care rapid response team nurses. An implementation audit and mixed qualitative and quantitative analysis of pre–post survey responses was used to evaluate clinician satisfaction and the perceived quality of patient transfers.

**Results:** The pre–post survey response rate was 51.8% (99/191). Respondents included GIM residents (58.5%), ICU rapid response team physicians and nurses (24.2%), and GIM attending physicians (17.2%). Less than half of clinicians (48.8%) reported that the preintervention transfer process was adequate. Clinicians who used the transfer tool reported that the transfer process was improved (93.3% vs. 48.8%,  $P=0.03$ ). Clinician-reported understanding of medication changes in the ICU increased (69.2% vs. 29.1%,  $P=0.004$ ), as did their ability to plan for a safe hospital discharge (69.2% vs. 31.0%,  $P=0.01$ ). However, only 64.2% of audited transfers used the tool. Frequently omitted sections included home medications (missing in 83.4% of audits), new medications (33.3%), and secondary diagnosis (33.3%). Thematic analysis of free-text responses identified areas for improvement including clarifying the course of ICU events and enhancing tool usability.

**Conclusion:** A user-designed, structured, handwritten transfer tool may improve the perceived quality of patient transfers from the ICU to the GIM wards.

**Keywords:**

quality improvement; implementation science; patient transfer

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Patient transfers from the intensive care unit (ICU) to the hospital ward put patients at risk of adverse events (1) and medication errors (2, 3) and are a frequent cause of patient, family, and clinician dissatisfaction (4, 5). ICU transfers are particularly challenging as they involve medically complex patients (6), a physical change in location, and the transition from a higher- to lower-resourced environment. Descriptive studies characterizing ICU-to-ward transfers identify clinician-to-clinician communication as a key component to high-quality transitions (4, 7–9). However, this communication can be fragmented, and transfer practices are inconsistent across and within institutions (10, 11). In a 2018 study at 10 centers, agreement of patient issues in the last ICU note and the first ward note was just 42%, highlighting how challenging transitional communication can be (12). In response, our institution has undertaken a quality improvement program to improve clinician communication of key patient information during ICU-to-general internal medicine (GIM) ward transfers.

Our ICU to GIM transfer process has historically been informal, involving a

phone conversation between treating physicians and a nonstandardized transfer note from the ICU team. A structured approach to information exchange is broadly supported (13); common examples including the “Illness Severity, Patient Summary, Action List, Situation Awareness, Synthesis” (IPASS) tool for verbal handovers and ICU liaison services for ward transfers (14, 15). We focused on a handwritten transfer tool to provide a comprehensive overview and permanent document for future reference, compared with verbal handover such as through IPASS, which is more amenable to sign-over for clinician cross coverage. We anticipated that this document could be referenced by the receiving team and our rapid response service, which follows patients after ICU discharge.

Recognizing the importance of local context on quality improvement initiatives (16, 17), we engaged our multidisciplinary ICU team of physicians, nurses, respiratory therapists, and pharmacists to develop the tool and tailor it to our institution. We hypothesized that a user-designed approach would improve clinician engagement and learning about the transfer process, enhance satisfaction, and

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**Author Contributions:** T.B., J.R., W.M., C.M.B., and M.E.D. were involved in study conceptualization. T.B., J.R., W.M., and M.E.D. developed the handover tool and pre-/postintervention survey. Data collection was completed by T.B., J.R., and W.M. Quantitative data analysis was completed by T.B., and qualitative data analysis was completed by T.B. and J.R. The manuscript was prepared by T.B., with review and iterative contributions from J.R., W.M., C.M.B., and M.E.D. Each author had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis. All authors have signed International Committee of Medical Journal Editors authorship disclosures.

**Data sharing statement:** The data set created during the current study is available from the corresponding author on reasonable request.

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provide a reproducible process for other institutions to follow. Our evaluation plan used both qualitative and quantitative methods to assess the effectiveness and feasibility of designing and implementing such a tool. These results were presented at the (18).

## METHODS

We performed a pre–post intervention study demonstrating the development and implementation of a structured handover tool to improve clinician communication during patient transitions from the ICU to the GIM ward. This study was approved by the Mount Sinai Hospital Research Ethics Board (MSH REB 17–0007-E).

### Setting and Participants

Mount Sinai Hospital is a tertiary care academic hospital in Toronto, Canada, with a 16-bed ICU and 100-bed GIM inpatient service. The majority of GIM admissions come from the emergency department, with the remainder being transfers, such as from the ICU. The hospital includes an acute care rapid response team with nurses and physicians who provide ICU consultation and patient follow-up after ICU discharge. Nurses and physicians on the ICU rapid response team are separate from the inpatient ICU team. The rapid response team does not routinely know the details of the ICU admissions but is responsible for follow-up after transfer to the ward.

The study was conducted between June and December 2018. The preintervention baseline was June to September, and the postintervention period was October to December. All ICU–to–GIM ward transfers during the intervention, regardless of their source or duration of ICU admission, were considered eligible to use the handover

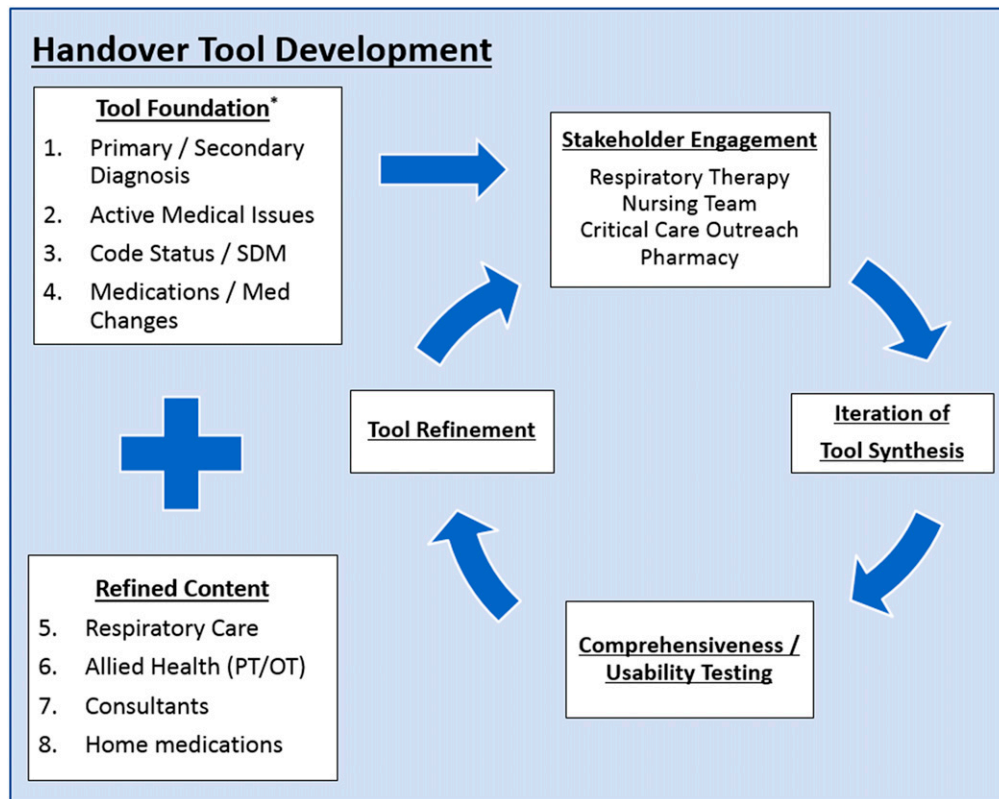
tool. ICU and GIM clinicians on service during the study were approached for pre- and/or postintervention surveys; these included GIM staff physicians and residents as well as rapid response team nurses, residents, and ICU staff physicians.

### Handover Tool Development

The structured handover tool (Appendix E1 in the online supplement) was developed through an iterative process engaging frontline clinicians (Figure 1). The first iteration of the transfer tool was based on a prior survey of GIM and ICU physicians that identified key patient information for inclusion in the transfer process (19). Categories included active medical issues, outstanding issues to follow up, code status, substitute decision-maker contact information, and primary/secondary diagnoses. The tool was refined via formal feedback from ICU and GIM physicians and the ICU allied health team (i.e., respiratory therapy, pharmacy, and nursing). Final categories included patient identifying information, code status, respiratory care requirements, allied health/functional status, primary diagnosis, secondary diagnosis, active medications, and home medications (Appendix E1). The tool was pilot tested for completeness and usability prior to implementation.

### Engagement, Education, and Implementation

Engaging the multidisciplinary team during handover tool development raised project awareness and increased end-user interest in the project. Obtaining input from frontline users with various clinical backgrounds helped develop a unique and comprehensive tool, while educating the multidisciplinary team about patient risks associated with ward transfers. After tool



**Figure 1.** Iterative approach to handover tool development with relative stakeholder engagement. \*Tool foundation from Reference 19. OT = occupational therapist; PT = physiotherapist; SDM = substitute decision maker.

development, use was sustained through a multimodal implementation strategy focusing on resident physician education about patient transfers and clinician awareness of the transfer tool (Figure 2). ICU handover orientations were held monthly to inform incoming residents of

the initiative using PowerPoint (Microsoft Corp) presentations. Sample materials are provided in Appendix E2. Two GIM feedback sessions were held during noon teaching conferences with resident physicians to obtain nonformal feedback on tool implementation and further raise

**Handover Tool Implementation Strategies**

1. ICU Handover Orientation		■		■		■		
2. Post-Intervention Surveys GIM/ICU			■		■		■	
3. GIM Feedback Sessions			■		■		■	
4. Daily Secure Messaging with ICU		■						
	PRE-INTERVENTION	September 2018	October 2018	November 2018	December 2018	POST-INTERVENTION		
1. ICU Handover Orientation: ICU resident orientation to the handover study held monthly (Power Point slides in Appendix 2). 2. Post-Intervention Surveys: ICU and GIM resident surveys distributed monthly during intervention. 3. GIM Feedback Sessions: Two noon teaching conference sessions for informal feedback on the transfer tool implementation. 4. Daily Secure Messaging with ICU: Daily messaging to track transfers, facilitate access and encourage tool utilization, and provide support for questions during transfer process.								

**Figure 2.** Education, engagement, and handover tool implementation timeline. GIM = general internal medicine; ICU = intensive care unit.

transfer tool awareness. Finally, daily reminders were sent via an encrypted group messaging service to ICU residents and fellows to track patient transfers, provide a regular dialogue with the ICU team, and maintain engagement during handover tool rollout.

### Handover Tool Completion

The handover tool was designed to be completed by multiple members of the multidisciplinary ICU team. For example, the pharmacy team could assist with the medication section and the respiratory therapy team with the respiratory care section. The tool was also designed and implemented to replace the need for an additional nonstructured transfer note. In most cases, ICU transfers occur after the ICU team has completed patient rounds, which means a daily progress note may also be present in the chart.

### Implementation Audit

Random chart audits of recently transferred patients were conducted to assess for presence/absence of the tool. A coding system was developed to grade completeness of handover tools by section. If the tool was present, sections were graded as 1 (not at all complete), 2 (partially complete), and 3 (fully complete) in duplicate by T.B. and J.R. with discrepancies resolved by consensus.

### Pre-/Postintervention Survey Tool

We developed a web-based survey tool to evaluate pre- and postintervention satisfaction and perceived effectiveness of the ICU-to-GIM transfer process (Appendix E3). A structured approach to survey development was used based on published guidelines (20). The survey was pilot tested and refined for usability, clarity, and content.

Using a seven-point Likert scale, with one representing negative responses (strongly disagree), four being neutral, and seven representing positive responses (strongly agree), we asked respondents to rate their comfort/agreement with aspects of the ICU-to-GIM transfer process. Survey questions included the respondents' understanding of the primary diagnosis at transfer, understanding of why medications were continued/discontinued in the ICU, and understanding of the patient's goals of care (code status), as examples. Each pre/post survey allowed for free text responses with the following prompts: "Is there anything else you would like to share about the transfer process?" and "Please share feedback and suggestions on how the transfer tool can be improved."

### Sampling Method and Size

A convenience sampling method was used for the pre-/postintervention survey. We calculated that a sample size of 80 completed surveys would provide us with 80% power to detect a 1-point difference in Likert responses for preintervention versus postintervention surveys. GIM physicians and residents on service, and rapid response team members, were contacted during the preintervention phase via e-mail with a link to complete the web-based survey (21). After handover tool implementation, the same groups were contacted via e-mail for the postimplementation survey. One reminder e-mail was sent within 30 days of each distribution. Clinicians directly involved in survey tool content development or testing were excluded from the pre and post survey. Respondents were not assigned tracking numbers, so pairing pre/post responses was not possible.

### Quantitative Data Analysis

Response rates were calculated based on the number of completed surveys divided by the number of distributed e-mails. Respondent demographics were summarized with descriptive statistics. Question-specific response rates were used to address missing data. Surveys with at least one question response are included in the analysis. Pre and post survey responses were compared using chi-square and Fisher's exact tests where applicable after dichotomizing responses into positive responses (Likert 5–7) and negative/neutral responses (Likert 1–4). *P* values are reported with  $P < 0.05$  judged statistically significant. Statistical analyses were performed using Microsoft Excel 2013 (Microsoft Corp) and R Version 4.0.0 (R Core Team).

### Qualitative Data Analysis

A thematic coding system as per Braun and Clarke's model was developed for free-text survey responses (22). Once responses were collated, two authors (J.R. and T.B.) completed coding to develop initial codes and themes. Final themes were agreed upon by all study authors; discrepancies were resolved by consensus.

## RESULTS

### Handover Tool Implementation

During the implementation period, there were 38 transfers from the ICU to the GIM ward. Fourteen transfers were randomly audited, of which nine (64%) had a transfer tool in the chart. Among the nine transfer tools reviewed, the most consistently completed sections included patient identification (100%) and primary diagnosis (100%), whereas the home medications section was least likely to be completed (17%) (Figure 3).

### Quantitative Analysis of Pre/Post Survey

The overall survey response rate was 51.8% (99/191): 58.4% (83/142) preintervention and 32.7% (16/49) postintervention. The majority of respondents were GIM residents (58.5%), followed by ICU rapid response team members (24.2%) and GIM attending physicians (17.2%).

In the preintervention survey, 48.8% (42/86) of respondents agreed that the current ICU transfer process was adequate (as rated 5–7 on the 7-point Likert scale). Most respondents reported understanding current active medical issues upon transfer (71.4% [60/84]), but only 29.0% (25/86) of respondents reported understanding why medications were continued or

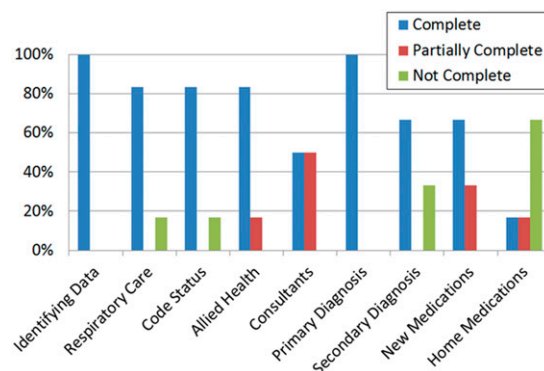


Figure 3. Structured handover tool audit for completeness of different transfer tool sections.

**Table 1.** Preintervention survey responses for GIM clinicians and ICU rapid response team

Survey Question*	GIM Physicians and Residents (n = 64)	ICU Rapid Response Team (n = 22)	P Value
1. I have a good understanding of the patient's reason for admission and hospital course, n (%) agree	38 (59.4)	16 (72.7)	0.26
2. I understand why medications were continued/ discontinued following the transfer, n (%) agree	12 (18.8)	13 (59.1)	<0.001
3. I understand the patient's current or anticipated active medical issues upon transfer from ICU, n (%) agree	42 (66.7)	18 (81.8)	0.18
4. I have the information needed for a safe transfer of care from the ICU, n (%) agree	39 (61.9)	17 (77.3)	0.19
5. Handover adequate for an eventual safe discharge home (appropriate for a creation of a comprehensive discharge plan), n (%) agree	17 (27.0)	10 (45.5)	0.11
6. I was easily able to identify consulting services involved in the patients' care, n (%) agree	20 (31.7)	13 (59.1)	0.02
7. The code status of the patient was easily available, n (%) agree	44 (68.8)	15 (68.2)	0.96
8. Overall, the current ICU transfer process is adequate, n (%) agree	28 (43.8)	14 (63.6)	0.11

Definition of abbreviations: GIM = general internal medicine; ICU = intensive care unit.

\*Agree = Rank of 5–7 on a 7-point Likert scale.

discontinued. Responses differed by group (Table 1). The rapid response team was more likely to report understanding why medications were continued or discontinued compared with GIM attending physicians and residents (59.1% vs. 18.8%,  $P < 0.001$ ). The rapid response team was also more likely to report easily finding which consultant services were following the patient (59.1% vs. 31.7%,  $P = 0.02$ ). Compared with the preintervention baseline, those who used the ICU transfer tool perceived an improvement in multiple domains (Table 2).

#### Qualitative Analysis

The response rate for free-text comments was 35.4% (35/99): 33.7% (28/83) preintervention and 43.7% (7/16) postintervention. The majority of free-text responses were from GIM residents (60.0%),

followed by GIM attending physicians (25.7%) and rapid response team members (14.3%). Residents were postgraduate year 1–3, and attending physicians had a range of experience (less than 5 yr to more than 10 yr). The rapid response team consisted of ICU physicians, residents, and nurses.

#### Preintervention Survey

We identified several themes under the umbrella of the *patient journey*. Subthemes included an *unclear course in hospital*, challenges assessing readiness for *transfer to the ward*, inconsistency in *current handover practices*, and concerns over *duplication of work* (Box 1).

Regarding the *unclear course in hospital*, the transfer process frustrated many GIM residents, especially when patients had a

**Table 2.** Survey responses for GIM clinicians and ICU rapid response team before and after implementation of the structured handover tool

Survey Question*†	Preintervention (n = 86)	Postintervention (n = 16)	P Value
1. I have a good understanding of the patient's reason for admission and hospital course, n (%) agree	54 (62.8)	12 (92.3)	0.05
2. I understand why medications were continued/discontinued following the transfer, n (%) agree	25 (29.1)	9 (69.2)	<0.01
3. I understand the patient's current or anticipated active medical issues upon transfer from ICU, n (%) agree	60 (70.6)	10 (83.3)	0.50
4. I have the information needed for a safe transfer of care from the ICU, n (%) agree	56 (65.9)	11 (84.6)	0.22
5. Handover adequate for an eventual safe discharge home (appropriate for a creation of a comprehensive discharge plan), n (%) agree	27 (31.0)	9 (69.2)	0.01
6. I was easily able to identify consulting services involved in the patients' care, n (%) agree	33 (38.8)	10 (76.9)	0.01
7. The code status of the patient was easily available, n (%) agree	59 (68.6)	9 (69.2)	1.00
8. Overall, the current ICU transfer process is adequate, n (%) agree	42 (48.8)	14 (93.3)	0.03

Definition of abbreviations: GIM = general internal medicine; ICU = intensive care unit.

\*Questions differed for the pre- and postintervention survey. Postintervention survey questions were framed "Using the handover tool" or "based on the handover tool," prior to the question shown in Table 2.

†Agree = Rank of 5–7 on a 7-point Likert scale.

long ICU admission. They had difficulty summarizing the ICU course and identifying the current problem list (Box 1, Comment 1). When an ICU patient was identified for *transfer to the ward*, GIM resident and attending physicians felt pressured to accept the patient when a bed became available (Box 1, Comment 2). GIM resident and attending physicians described times when ward transfers happened without time for adequate patient assessment by the accepting team, adding stress to the transfer process (Box 1, Comment 3).

Respondents also felt the current process resulted in *inconsistent handover*, with variation in quality depending on the ICU clinician. In some instances, ICU residents who were not actively following a patient prior to transfer would provide handover to the receiving team, which provided

insufficient detail (Box 1, Comment 4).

Finally, GIM residents felt they needed to conduct an extensive chart review to get information, which sometimes represented a *duplication of work* (Box 1, Comment 5). Information was sometimes lost when certain aspects of a patient's journey were not handed over or well documented including code status and involvement of allied health members (Box 1, Comment 6).

### Postintervention

Seven postintervention responses were received (six residents, one rapid response team member) (Box 2). Thematic analysis suggested improved efficiency using the handover tool (Box 2, Comment 7).

One respondent provided feedback that a multidisciplinary approach to form completion, such as having pharmacists fill



**Box 1: Preintervention Qualitative Survey Responses—Patient Journey**

## Unclear Course in Hospital

- Comment 1: “It is difficult to determine the highlights during the admission. Many times the resident providing handover is not very familiar with the patient.” (General Internal Medicine [GIM], Postgraduate Year [PGY] 3)

## Readiness for Transfer

- Comment 2: “As [a] senior [resident], I have had many experiences where I am highly pressured to take patients immediately. To this end, I have had experiences with being told there was a bed when there wasn’t, being told clinical information about stability which was not true, or being asked to take patients who are only very recently stabilized.” (GIM, PGY 2)
- Comment 3: “In general, transfer is pretty good, but sometimes the transfer occurs and I (as staff) and my senior resident never heard of the transfer until the patient was already on the ward.” (GIM Attending)

## Inconsistent Handover

- Comment 4: “I have received handover from Housestaff who have not been following the patient, so in these cases, handover is less informative.” (GIM, PGY 2)

## Duplication of Work

- Comment 5: “It is highly resident dependent. Some handover is excellent... Other times it is dismal, the verbal and written transfer note are not helpful. The chart review is also variable - sometimes it is difficult to discern the day-to-day changes... the (documented) plan will not capture what the team is doing in terms of management. I think having a set template for the written transfer note would be beneficial.” (GIM, PGY 2)
- Comment 6: “I’ve rarely heard a code status although it can be often deduced if the patient was intubated. I often don’t have a good grasp of how much social work has been involved when someone comes out of the ICU so I’m usually assuming that I’m starting from scratch.” (GIM Attending)

out the medication section, could be helpful (Box 2, Comment 8).

**DISCUSSION**

This demonstration study evaluated the feasibility of implementing a user-designed, structured, handwritten ICU-to-GIM ward transfer tool. Our handover tool was associated with improved clinician satisfaction and the perception of improved clinician-reported understanding of patient care details following transfer.

However, suboptimal tool use indicates the

need for careful consideration of usability during tool design and clinician engagement strategies during implementation.

Less than half of surveyed clinicians felt the ICU-to-GIM transfer process was adequate prior to our intervention. This dissatisfaction is consistent with prior studies of in-hospital transfers (4, 5, 19), with a myriad of contributing factors such as poor communication, lack of standardization, and unmet patient needs (4, 7–9). Missing information during patient transfers inhibited the sending and

**Box 2: Postintervention Qualitative Survey Responses—Improved Efficiency**

- Comment 1: “As someone who has done ICU transfers pre and post implementation of this tool, I feel this tool helps me understand the main issues and plan, making the transfer process less time consuming and safer.” (General Internal Medicine, Postgraduate Year 2).
- Comment 2: “I wish the handover tool isn’t only filled by MDs. It would be great if Pharmacists for example completed the medications’ part. RNs and RTs as well.” (Intensive Care Unit Resident)

receiving clinicians from developing a shared mental model, which can place patients at risk of adverse events (23). In our study, ward clinicians found ICU medication changes particularly challenging to understand. Suboptimal handover of the rationale for ICU medication changes may have downstream consequences, such as discontinuation of important chronic home medications (2, 9) and unintended continuation of ICU medications at hospital discharge (24, 25). Future interventions to improve ICU transfers should consider patient important outcome measures, and our work supports the frequency of medication errors as an appropriate target. Preintervention analysis of free-text survey responses identified additional areas for transfer process improvement. GIM residents found the transfer process stressful, citing time pressures for assessment when transferring patients out of the ICU. Receiving physicians were also concerned about duplication of work, sometimes referred to as “rework” or the act of “repeating previously completed patient care tasks to compensate for suboptimal handoff communication” (26). In a resource-limited system (27), rework is potentially wasteful and may increase the risk for errors and discrepancies in care plans after transfer (12). Our preintervention survey confirms the need for ICU-to-GIM transfer optimization in our hospital, with a structured handover process a logical approach (13).

In both quantitative and qualitative analysis, clinicians felt that multiple domains of the ICU transfer process were improved by the handover tool. Support for transfer tools makes sense because ICU transfers are frequent (7), and the opportunity for adverse events is high (26, 28). Standardization of the transfer process is likely to improve care delivery (14, 29), and

approaches such as the verbal IPASS handover technique have been shown to reduce patient harm (15). In this study, we expect that our user-centered design approach involving frontline users during tool design was particularly helpful in improving clinician satisfaction. The user-designed approach takes into consideration the importance of institutional context in quality improvement initiatives (16).

Although outwardly successful, suboptimal tool use rates suggest room for improvement. De Grood and colleagues recommend considering flexibility, usability, and accountability when designing handover tools (8). In making our tool comprehensive, the numerous data entry fields were likely too onerous and inflexible for clinicians. Multiple sections were frequently incomplete, including home medications (not complete 83.4% of the time), new medications (33.3%), and secondary diagnoses (33.3%). The handwritten nature of the tool increased time for completion and may have impacted assimilation into daily practice. A potential solution is to electronically automate tool data field population (5, 14). However, this was not possible at our institution where documentation is in a paper chart, highlighting how far we are from an automated transfer tool that is populated in real time with key ICU events (30). In this context, tools need to be designed keeping in mind the amount of work needed to manually complete data fields. Future studies may consider tracking completion time during tool pilot testing to identify overly time-consuming sections.

A lack of accountability for tool completion may have also affected use. Tool completion was intended to be multidisciplinary and include nurses, respiratory therapists, and pharmacists. However, educational sessions during

implementation targeted ICU residents preferentially, under the premise that residents are transient team members who require monthly orientation and also have a key role in the handover process. Ultimately, ICU residents ended up being the sole clinicians completing the tool. Future implementation plans should focus on a multidisciplinary education and awareness to engage all disciplines involved in the transfer process and to provide expectation clarity. Lack of clarity about who would or should complete the tool is a form of responsibility ambiguity, a concept that has been linked to adverse events and poor performance in other studies (8, 29). Furthermore, the ward-based physicians were not involved in tool completion, despite being the ones responsible for patient care moving forward. Future interventions may consider striking a balance between sending and receiving clinicians' efforts and attempt to foster collaboration—a potential key to success (29).

Our study has limitations that merit consideration. First, the tool was implemented at a single teaching hospital and only for GIM transfers, limiting the generalizability to other settings. However, our user-designed approach to handover tool development is meant to represent a process that can be used to develop handover tools specifically suited to other institutional contexts. Second, our study relies on clinician self-report of the perceived quality of handovers rather than patient outcomes related to the patient transfer process. Future improvement initiatives should focus on patient outcomes, such as a reduction in medication errors described during ICU transfer (2). Third, the postintervention sample size was small with survey

response rates below 50%, increasing the chance of response bias, which may have influenced the perceived effectiveness of our intervention. However, using a mixed-methods analysis allowed us to maximize data extraction, including the highly relevant preintervention survey baseline. Furthermore, our demonstration study aimed to assess the feasibility of implementing a user-designed handover tool, which we were able to achieve through our tool implementation audit despite our low postintervention survey response rate. Finally, the transfer tool use was lower than anticipated. It is possible that the nature of ICU transfers is heterogeneous and some patients are not as amenable to having a rigorously structured handover tool. In future work, implementation audits should attempt to characterize patient data as well, to understand if certain populations are more or less amenable to such an intervention.

## Conclusions

This demonstration study suggests that a user-designed, structured handover tool may improve clinician satisfaction and the perceived quality of transfers from the ICU to the GIM ward. It also highlights the challenges faced when implementing such a tool. Our experience provides a platform for future interventions to improve the quality of ICU-to-GIM transfers. Future interventions should focus on usability and ease of completion of transfer documents as well as patient-centered outcome measures to evaluate handover tool effectiveness.

**Author disclosures** are available with the text of this article at [www.atsjournals.org](http://www.atsjournals.org).

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