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A Human Factors and Systems Engineering Evaluation of Readmission Following Complex Surgery

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Abstract

OBJECTIVE—To utilize a human factors and systems engineering approach to understand contributors to surgical readmissions from a patient and provider perspective.

BACKGROUND—Prior studies on readmission neglect the patient perspective. To address this gap and to better inform intervention design, we evaluated how transitions of care relate to and influence readmission from the patient and clinician perspective using the Systems Engineering Initiative for Patient Safety (SEIPS) model.

METHODS—Patients readmitted within 30 days of discharge following complex abdominal surgery were interviewed. A focus group of inpatient clinician providers was conducted. Questions were guided by the SEIPS framework and content analyzed. Data were collected concurrently from the medical record for a mixed-methods approach.

RESULTS—Readmission occurred at a median 8 days (range, 1–25) following discharge. All patients had follow-up scheduled with their surgeon, but readmission occurred prior to this in 72% of patients. Primary readmission diagnoses included infection, gastrointestinal complications, and dehydration. Patients (n=18) and clinician providers (n=6) identified a number of factors during the transition of care that may have contributed to readmission, including poor patient and caregiver understanding; inadequate discharge preparation for home care; insufficient educational

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process and materials, negatively impacted by electronic health record design; and inadequate care team communication.

CONCLUSIONS—This is the first study to utilize a human factors and systems engineering approach to evaluate the impact of the quality of the transition of care and its influence on readmission from the patient and clinician perspective. Important targets for future interventions include enhancing the discharge process, improving education materials, and increasing care team coordination, with the overarching theme that improved patient and caregiver understanding and engagement are essential to decrease readmission and post-discharge health care utilization.

INTRODUCTION

Although the validity of readmission as a quality metric has been actively debated,^{1–3} readmission rates are now publicly reported and hospitals are penalized for higher than benchmark readmission rates, as required by the Centers for Medicare and Medicaid (CMS)^{1,2}. Motivated largely by this reporting, predictors of readmission have been extensively investigated, primarily using large administrative databases that lack the patient's perspective. Not surprisingly, risk prediction tools generated from this data are imprecise,² which may be due to the lack of patient-specific information regarding the etiology of readmission.

A seminal report from the National Academy of Engineering and the Institute of Medicine outlined the essential contribution of systems engineering approaches to improving health care outcomes⁴, yet no study has utilized a systems engineering approach to evaluate readmission. Expanding on Donabedian's structure-process-outcome model of healthcare quality,⁵ the Systems Engineering Initiative for Patient Safety (SEIPS) model provides a robust framework with which to understand health care work systems and their impact on healthcare processes and patient and organizational outcomes (Figure 1)^{6–8}. It provides an ideal model for better understanding the patient's perspective on readmission because the person (in this case the patient) is central in the model.^{8,9} It also provides a useful framework for evaluating readmission that incorporates human factors and systems engineering concepts, as it accounts for both work system complexity and the interaction of patient-specific factors. By restructuring the work system to resolve identified problems, the work processes and outcomes can be optimized to improve quality of care for patients, including reducing unnecessary readmission.

The etiology of readmission may be different in surgical patients than medical, as multiple studies have shown that post-operative complications drive surgical readmissions^{10–14}. In contrast, medical readmissions are primarily associated with worsening of underlying medical issues¹⁵ while other psychosocial factors and socioeconomic status (SES) clearly contribute^{14,16}. Interestingly, there may be less influence of SES on readmission in surgical patients, but this remains unclear^{10,15}. Finally, in some clinical contexts, readmission in surgery may actually indicate higher quality of care because it reflects a system designed to identify and "rescue" sick patients suffering from surgical complications^{17,18}. These contradictions demonstrate that readmission is a highly complex process whose etiology

may differ by patient population, and that the current use of readmission as a measure of quality may be suboptimal.

Although patient-level interventions targeting the transition of care from hospital to home have been shown to reduce medical readmissions^{19–21}, there is limited understanding of the impact of care transition quality on readmission in surgical patients. In order to use readmission as an accurate indicator of quality of care and design effective strategies to reduce post-discharge resource utilization, a better understanding of the effect of the quality of transitional care on readmission is needed. Further, given that readmission in surgical patients is multifactorial, with involvement of not only clinical and organizational (i.e., work system) but also patient factors^{3,22}, it is crucial to understand the patient's perspective on the quality of the transition of care and how the transitional care experience relates to readmission. Thus, using a systems engineering approach to focus on the patient and clinician-provider perspective, we sought to evaluate how transitions of care relate to and influence readmission from the patient and clinician perspectives.

METHODS

A mixed methods approach was guided by the SEIPS model.^{7,8} The five elements of the work system as defined by the SEIPS model, namely People, Tasks, Technology and Tools, Organization and Environment, framed data collection as well as thematic analysis for investigating aspects of the work system during the transition of care from hospital to home that may have contributed to readmission. Qualitative data were collected for readmitted patients through face-to-face interviews and a focus group with inpatient clinician providers. Descriptive quantitative data was obtained concurrently from patient medical records.

Patient Interviews

Patients undergoing complex abdominal surgery of the pancreas, liver, colon, rectum, or esophagus were included. Beginning in November 2013, patients readmitted within 30-days of discharge to the same regional, academic medical center at which they had surgery were sequentially identified from daily hospital reports generated on patient readmissions. Patients were screened for eligibility based on the following criteria: complex abdominal surgery of the pancreas, liver, colon, rectum, or esophagus; discharged home <30 days previously; not already interviewed (repeat readmission); and able to communicate. Because colorectal cases were much more frequent, pancreatic, liver and esophageal patients were purposefully sampled beginning in April 2014, with the goal of reaching an even distribution of cases. Patients were approached while hospitalized within 48 hours of readmission. Written informed consent was obtained from all participants.

The first 12 patients were interviewed using a semi-structured interview guide containing both fixed-response questions guided by work system elements as well as open-ended questions, including specific focus on post-operative inpatient care, preparation for discharge, and etiology of readmission (see online Appendix for interview questions). The interview guide was revised based on this experience, and an additional 6 patients were interviewed using the modified guide. Patient demographics, chronic comorbidities, and details on the index and readmission hospitalizations including primary discharge diagnosis

and readmission chief complaint and diagnosis were gathered from the electronic health record (EHR). Length of hospital stay and time to readmission were calculated.

Inpatient Clinician-Provider Focus Group

A focus group comprised of inpatient clinician providers was conducted in March 2014. Participants of the 70-minute clinician provider focus group included 2 surgical residents, 2 inpatient nurses, a case manager and inpatient pharmacist. All 6 health care providers who were approached to participate agreed. The focus group was charged with addressing the following questions: 1) *What are the (medical/surgical, social, and other) reasons for readmission among patients who have had complex surgery?* and 2) *Why do these readmissions happen?* A human factors engineering team member (ASH) with extensive experience leading focus groups served as facilitator.

Analysis

Each interview and the focus group were audio-recorded and transcribed verbatim. Content from the focus group and patient interviews were subjected to thematic analysis^{23,24}. Each underwent repeated review and constant comparison²⁵ by two researchers (ASH, TJL) to identify emergent themes pertaining to the elements of the patient work system. An initial coding framework was developed and applied independently, followed by further review, discussion, and agreement on final coding by these researchers (a human factors engineer and a health outcomes researcher). Saturation of theme identification²⁶ was confirmed after 12 interviews although content for all completed interviews was analyzed. Summaries were distilled for each theme and final themes were categorized by the SEIPS work system elements, prioritizing the patient perspective. Coded transcripts were catalogued using NVivo (QSR International, Melbourne, Australia).

Data from the EHR and responses to fixed-response interview questions were summarized descriptively using mean, median and range or by frequency and percent. This study was reviewed and approved by the Institutional Review Board of the University of Wisconsin-Madison.

RESULTS

Study Population

Between November 2013 and May 2014, 21 patients were approached and 18 (86%) participated. Surgical procedures included colorectal resection (n=8), pancreatectomy (7), hepatectomy (2, one with a combined biliary reconstruction), and esophagectomy (1). Nearly 60% of patients were treated for malignancy (10/18). Patient demographics, route of readmission, chief complaint and diagnosis at readmission are summarized in Table 1. Interviews were 20–110 (median 34) minutes in length.

All patients had a follow-up appointment scheduled with their surgeon (3 patients within 7 days, 10 within 8–14 days, and 5 more than 14 days) following discharge. Most did not present to the appointment (13/18, 72%) because they were readmitted prior to their appointment (readmission occurred at a mean of 7 days before follow-up appointment). The

majority of patients (10/14, 71%) were not scheduled to see their primary care provider following discharge. Most patients (76%) made at least one telephone call to the medical center before being readmitted. Only one-third of patients had home health visits and/or special home equipment arranged by the hospital care team.

Sixty-nine percent (11/16) of patients did not feel their readmission was preventable. All patients were readmitted due to surgical complications, including ileus/obstruction, infection, dehydration, and others (Table 1). When asked to describe the reason for readmission, all patients ascribed readmission to clinical issues attributable to a surgical complication. While the majority (67%, 12/18) of patients lived with someone who could act as a primary caregiver during at-home recovery, a third of patients lived alone, and 50% of these patients did not arrange for someone to act as a primary caregiver in the home following surgery.

Emergent Themes

Analysis revealed 10 major themes in the interview and focus group content (Table 2) categorized to one or more elements of the following SEIPS work system elements; People, Tasks, Technology & Tools, and Organization (Figure 2). Patient and caregiver expectations and understanding of the patient's care needs were considered as central to the work system (People), influenced by aspects of the patient's education and preparation for discharge (Tasks), educational materials (Technology & Tools) and the structure of the patient's care team immediately in the hospital and post-hospitalization (Organization). Two additional themes (EHR design (Technology and Tools) and inadequate insurance coverage (Organization)) were noted in the focus group that could influence patient and caregiver understanding and self-care following discharge to home (People).

Patient and caregiver's expectations and understanding (People)—Poor understanding and unrealistic expectations of the patient's needs and abilities at home, including misunderstanding the patient's needs associated with being physically deconditioned, was noted by patients and their caregivers. One patient noted *"I just didn't know what the setbacks were going to be after the surgery...I thought that I was going to come out of it okay, and go home."* Several factors were noted to impact a patient's ability to comprehend and remember care instructions, including their health literacy and post-operative cognitive status. Patients noted many factors contributing to unclear sensorium, including anxiety and worsening health status at home, along with side effects of pain medication and other drugs—*"...the medicines you're on make you just a little foggy sometimes and you know you just don't know or remember what they said..."*. Consistent with these findings, nearly half (47%) of the patients reported being only 'somewhat confident' or unsure of their ability to take care of themselves and prevent problems once returning home.

Discharge preparation (Tasks & Organization)—The timing of discharge, as well as the magnitude of changes incorporated in after-hospital care plans immediately prior to discharge, was noted to impact patients receiving sufficient instructions and therefore negatively affected their readiness for self-care at home. Patients reported experiencing

hurried and sometimes last minute discharge instructions that left insufficient time for thorough education. Focus group participants noted that patients often have “*information overload*” at the time of discharge teaching, which makes it unclear to the educator/provider if the patient fully comprehends information. Consistent with this, only 43% of patients felt they remembered all or most of their discharge instructions upon returning home. Having new medications prescribed prior to discharge was one example of the “*many changes*” that patients faced prior to discharge. One patient noted: “*She flipped through the whole thing in my room...but it was...but not enough time...[It] felt pressured you know...to hurry up and get it done.*”

Educational process (Tasks)—Having inadequate or incomplete education left patients feeling poorly prepared for their care at home. Patients noted incomplete instructions on details specific to their needs, such as nutritional needs, bowel and ostomy care, and home equipment use. Several patients noted a lack of guidance on oral intake that contributed to misunderstanding their needs at home and ultimately to their readmission—“*On diet...there really wasn’t that much instruction on what I should and shouldn’t do...this wasn’t as detailed as it should be.*” The clinician providers also noted the lack of coordination to ensure the caregiver’s presence for discharge teaching that, in turn, prevents a clear understanding of the patient’s abilities and needs prior to discharge. Teaching of the patient alone, or instructing the caregiver and patient in a hurried manner, was felt to result in inadequate teaching.

Content of education materials (Technology & Tools)—Patients noted being ill prepared for self-care at home due to ineffective educational materials. Patients remarked on 1) a high quantity of paperwork that contained only general information—“*We had so much paperwork....we have a little satchel here and it was stuffed....*” and 2) lack of details specific to a patient’s individual needs—“*I think that the book that we got..... It just had the general things to watch for...like four or five pages with very little information in it*”. Content was not reader friendly and was poorly organized for finding details. Despite this large volume of information, some patients were unable to find a specific phone number to contact to for follow-up.

Care team structure and communication (Organization)—Organizational aspects of the care team, including their communication, clinical practice, and structure, was noted to interfere with patients’ care and their preparation for discharge. Patients noted poor communication practices by team members included having premature discussions about test results before the results were finalized, and that team members relayed conflicting answers to patients, both of which contributed to misunderstanding. Patients stated that more direct communication with the surgeon was preferred. Consultations on inpatient nutritional needs were lacking. Variability in nursing personnel knowledge, practice, and availability also left patients ill prepared to deal with their care needs at home—“*You could just tell that some [nurses] were doing a lot better than others...they seemed to just know a little bit more...*” Providers also noted that the structure of the inpatient care team, including the availability of care team members to participate in discharge planning/rounds, may result in misunderstanding of patients’ immediate and long-term care plans. Lack of awareness of the

final care plan by the providers until close to discharge was felt to contribute to the patient being poorly prepared for discharge and care at home.

Service coverage (Organization)—Limited after business-hours staffing coverage for patient care services was noted to adversely impact preparation of the patient or the patient's care at home. Patients remarked on inadequate coverage of telephone calls during holiday/nonbusiness hours—*"Monday [holiday] I tried to call the clinic, but the clinic was closed.... I was surprised to hear that it was closed, you know I kind of thought that someone would answer...I was so frustrated that ... I called again and no one calls back..."*. Providers noted a lack of after business-hours service coverage for patient and family education may contribute to poor preparation for discharges late in the day. They also observed that the lack of a full clinical team outside regular daytime work hours resulted in difficulty managing complications, and likely led to greater emergency room use and subsequent readmission.

Outside clinician support (Organization)—Lack of expertise to manage the patient at the local hospital was observed, and felt to contribute to readmission at the academic center. Patients noted that they, their primary care provider, and/or their local emergency department, expected that the specialty care needed for inpatient care would be best provided at the academic medical center.

Home health services and equipment (Organization)—Insufficient home health support and lack of awareness by the care team of the specific home equipment the patient would use was noted to negatively affect patient care at home. Patients stated that they wanted more frequent and/or extensive home care support—*"I don't know if there is kind of an in-between, it just felt like, hospital to home and having the home health nurse come to check your vitals, just felt a little, I don't know, a little ...like there should have ...I don't know if there is an in-between..."* Lack of awareness of the specific equipment the patient would be using from home health services prevented adequate patient education for enteral feeding, *"she tried to explain it to me on discharge...the way they wanted me to do it...(but) my machine ...would not handle the overnight feedings."*

Electronic health record design (Technology & Tools)—A suboptimal sequential process for discharge driven by the EHR was noted by providers to prevent earlier education and thus lead to rushed discharge preparation. Standardized EHR-formatted materials were observed to be poorly organized for teaching and included information that may not be pertinent to all patients, and not specific to surgical patients. Further, the care team noted that some individualized instructions conflicted with orders that were autopopulated in the discharge materials.

Inadequate health insurance (Organization)—Having no or inadequate health insurance coverage was perceived by clinician providers as negatively impacting a patient's home care, including a lack of home health support and/or insufficient supplies and medication, and therefore may contribute to readmission.

DISCUSSION

Using the human factors and systems engineering SEIPS framework, several components during the transitions of care were identified with the most potential for actionable change: 1) patient and caregiver understanding and education, 2) care team communication, and 3) the discharge process. Unique to this study is the use of the Systems Engineering Initiative for Patient Safety (SEIPS) model, a human factors and systems engineering framework that helps demonstrate how patients and other factors of the health care work system interact to influence transitions of care.^{6–8} Patients identified that the education they received was inadequate at many levels—the discharge instructions did not meet patient’s needs and education on self-care tasks was insufficient. They also identified that discharge preparation occurred at a time when their cognition was poor and the process was hurried. The overarching theme patients voiced was that the discharge process was too rushed, they were provided too much information that did not address their specific needs, and they were too overwhelmed and ill to adequately process the information.

Enhancing our ability to effectively deliver the necessary educational components to patients in a way they can comprehend is essential. A recent systematic review of patient education modalities demonstrated that computer technology, audio and video, demonstrations, and written information were associated with retention of knowledge, decreased anxiety, and increased patient satisfaction; however, the effectiveness of patient education was dependent on identifying and applying the modality that was best suited to the patient’s learning style and preference²⁷. Further exploration of these concepts during the transition of care following surgery has strong promise to enhance the educational process, improve patient satisfaction, and potentially decrease post-discharge health care utilization.

Additionally, the clinician provider focus group members stated that the infrastructure of the EHR impeded patient education prior to discharge, and led to hurried and inadequate discharge teaching. Paradoxically, the EHR, designed to optimize continuity of care, may hinder patient and team functionality when specified algorithms usurp individualized care. An early and personalized preparation for discharge to familiarize patients with medication routines, self-cares, and areas of potential struggle may afford patients time to generate relevant questions with opportunities for discussion with care teams.

Patients felt unprepared for discharge both in their ability to care for themselves and their understanding of what post-operative care would realistically entail. This lack of understanding may be due, in part, to an inability to understand the implications of major surgery and recovery. Studies examining how patients process information during discussion of informed consent suggest that only one-third of patients understand conveyed information well enough to make a truly informed decision regarding their care,²⁸ and that patients frequently forget vital information about procedures²⁹. For many patients, hospitals are foreign, intimidating, and not conducive to absorbing new and important information. Patients feel like the hospital is “an alien world,” where it is difficult to generate and ask relevant questions¹⁸.

In addition to these challenges, post-operative cognitive dysfunction and delirium may diminish a patient's retention and understanding of information conveyed by care teams due to deficits in short-term memory, attention span, and level of consciousness^{30,31}. The incidence of both post-operative cognitive dysfunction and delirium varies by patient age and surgical procedure, but can be as high as 50–60% in abdominal surgery patients^{32,33}, and increases in frequency with age³⁴ and major surgery³⁵. In addition, 'post-hospital syndrome,' consisting of a high degree of stress, sleep deprivation, poor nutrition, pain, and physical deconditioning³⁶ contributes to an altered sensorium that make it challenging for patients to process information normally. The inherent confusion and lack of understanding, along with the influence of postoperative cognitive dysfunction and delirium, may be compounded in more complex and extensive surgeries^{35,37}, because the post-operative course is more difficult to predict, and therefore it is impossible to fully prepare the patient preoperatively.

Inherent deficits in patient understanding are exacerbated by a rushed discharge process. Inadequate time for discussion, processing of information, and generation of questions left patients feeling unprepared to manage home care. A link between the quality of the discharge process and readmission has been reported in recent qualitative studies^{18,38}, wherein patients experienced a varied discharge experience and reported not understanding discharge instructions or finding instructions too general¹⁸. In addition, clinician providers in the current study noted that, because of a poorly planned and rushed discharge process, patient education was often done without the patient's caregiver, resulting in inadequate training, understanding, and preparation. This is clearly problematic, as caregivers play an essential role in enhancing patient recovery after hospitalization^{18,38}.

Our results suggest that increasing caregiver engagement during the discharge process may improve patients' capacity to fully understand expectations for postoperative care, and lead to smoother transitions of care. Reflecting the impact such an approach may have, although no simple readmission reduction tool using a single intervention has been effective³⁹, comprehensive and complex, multistep post-discharge support for patients and their caregivers has been associated with reduced readmissions²¹. In addition, risk prediction models for readmission are imprecise.² These disappointing findings may be due, in part, to the lack of understanding of the patient's perspective. In order to more accurately predict risk of readmission, a framework that captures the complexities of the interactions in the work system, including the patient's central role, and how their influence on outcomes may improve our ability to predict post-discharge health care utilization, including readmission.

Supporting the idea that enhanced patient education during the transition of care will improve patient knowledge, post-discharge nurse visits result in improved understanding of expectations for patient recovery, as reported by patients themselves⁴⁰. The emphasis of these programs on repeated education regarding the expected stages of recovery, with selective intervention if the clinical situation worsens, is crucial. The nurse-based follow up programs emphasize a *relationship* between patient and care team that focuses on appropriate expectations, reassurance of normal recovery process, and connection of inpatient and outpatient care teams. This is an indispensable but largely missing aspect of most conventional transitional care programs.

The major themes identified via this SEIPS-based analysis help to more completely describe patient-centered components of transitional care that may have contributed to readmission. There exists a high potential for intervention regarding many of the identified themes not only in how multidimensional care teams function, but also in how the discharge process is organized and patients are educated, and all of these components could benefit from incorporating patient-centered perspectives. Proposed future interventions that address these patient-identified SEIPS themes are outlined in Figure 3.

There are several limitations of this study. Only the perspective of readmitted patients was included in order to provide an in-depth evaluation of the issues that may have contributed to readmission, and thus non-readmitted patients were not included. Patients themselves may not have the medical insight to recognize certain important factors, such as signs and symptoms of disease worsening or medication errors that may have contributed to readmissions. The study emphasizes the issues patients face as inpatients and during the transition from hospital to home, but it is impossible to ascribe the patient's reports to causality of readmission. In addition, the number of patient interviews was small, but was clearly within the expected number that would allow us a rich data capture, based on accepted qualitative methodology²⁶. In addition, data saturation was reached at 12 interviews and remained consistent through the last 6, thus new themes would be unlikely even with additional interviews.

CONCLUSION

In patients who are readmitted following complex abdominal surgery, direct interviews with patients and a focus group of clinician providers using a human factors and systems engineering framework identified multiple areas of transitional care process improvement. The most important targets for the future include enhancing the discharge process, improving education materials, and increasing care team coordination, with the overarching theme that improved patient and caregiver understanding and engagement are essential components of future interventions designed to optimize transitions of care with the intent of decreasing readmission and post-discharge health care utilization.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Figure 1.
The Systems Engineering Initiative for Patient Safety (SEIPS) Framework.

Figure 2.
The Systems Engineering Initiative for Patient Safety framework for complex surgical patient readmissions.

Theme Addressed	Proposed Interventions
Patient and caregiver's expectations and understanding Discharge Preparation	<ol style="list-style-type: none"> 1. Initiate multiple discharge planning conversations 2-3 days prior to discharge with a specific focus from each team: <ul style="list-style-type: none"> o Pharmacy: medication reconciliation o Social work: home health needs or need for skilled nursing facility o Physicians: expectation for normal recovery and when to seek medical attention o Nurses: discharge process and teaching 2. Include caregivers in all pre-discharge conversations <ul style="list-style-type: none"> o Repeat meetings with care teams, patient, and caregiver during the predischARGE process 3. Provide patient with a specific time and date of discharge, pre-arranged follow up appointments, and a specific point of contact for future questions or issues.
Educational Process Content of educational materials	<ol style="list-style-type: none"> 1. Present only patient specific information in educational sessions and have multiple opportunities for educational sessions prior to discharge 2. Identify educational medium best suited for patient's learning style and optimal retention 3. Integrate practicing self-care (wounds, drains etc) into discharge preparation with the goal that patients must be capable of managing relevant self-care independently PRIOR to day of ischarge 4. Conduct practice sessions and scenarios where patients learn to identify and handle warning signs of worsening condition
Care team structure and coordination	<ol style="list-style-type: none"> 1. Present organized and unified communication from care team, leaving patient with coordinated messages and goals for recovery 2. Provide patient-specific information regarding nutrition, self-care, and expectations for recovery 3. Anticipate discharge date and facilitate meeting with all components of care team to form a coordinated care plan and follow up

Service coverage	<ol style="list-style-type: none"> 1. Offer a specific nurse-based "on call" contact for patients who can help triage concerns, with a single phone number with 24/7 availability
Outside clinician support	<ol style="list-style-type: none"> 1. Establish a regional network whereby outpatient providers can speak directly with an "on call" academic center physician regarding postoperative management and triaging high-risk patients 2. Offer patients a specific post-surgical nurse-based contact trained in acting as a liaison between inpatient and outpatient care teams
Home health service and equipment	<ol style="list-style-type: none"> 1. Establish enhanced availability of low cost hotel near academic medical center for patients that may need more frequent postoperative care but do not qualify for inpatient status 2. Provide hospital-based home health services for those that do not qualify or are uninsured
EHR design	<ol style="list-style-type: none"> 1. Obtain input from end users to enhance discharge process 2. Adjust auto-populated printed material to prioritize patient-specific education and follow up contacts

Figure 3.

Interventions for factors contributing to poor transition of care

Table 1

Characteristics of the study population (N=18).

Characteristic	Median or n (%)	Range
Age, years	62	24–82
Male	8 (44%)	
Non-Hispanic white	17 (94%)	
Index length of stay, days	7	5–38
Time to readmission, days	8	1–25
Readmission length of stay, days	5	1–22
Route of readmission:		
Academic center ER	5 (28%)	
Local hospital ER	7 (39%)	
Scheduled surgical follow-up	3 (17%)	
Other clinic appointment	3 (17%)	
Chief complaint on readmission: *		
Abdominal pain	9 (50%)	
Nausea and vomiting	7 (39%)	
Diarrhea	2 (11%)	
Fever	3 (17%)	
Fatigue	3 (17%)	
Dehydration/mental status changes	1 (6%)	
Shortness of breath	1 (6%)	
Bleeding from drain	1 (6%)	
Principle diagnosis for readmission: *		
Infection	9 (50%)	
Gastro-intestinal	5 (28%)	
Dehydration	3 (17%)	
Other	3 (17%)	

ER Emergency room,

* Some patients recorded > 1 complaint or diagnosis.

Table 2

Reasons for patient's poor preparation for discharge to home and/or hospital readmission.

Theme	Description	Patient Quotes
People: Patient's and caregiver's expectations and understanding	Inadequate understanding or expectations of the patient/caregiver Inability of patients to understand and have realistic expectations of their needs or consequences related to surgery and care post-discharge	"we just wanted to make sure that we are doing what is right here and whether we should continue with the medicine or not..." "we ran out of options...because I didn't know what to do for her" "I didn't really know what questions to ask, I think that is the other hard part. For not being a surgery patient ever before in my life, I had no idea what to expect."
Tasks: Discharge preparation	Timing or magnitude of changes before discharge impedes patient receiving sufficient discharge instructions	"...new medications I had to reference...there were just so many changes..." "There was plenty of time earlier to go over my information..."
Tasks: Educational process	Inadequate or incomplete instruction that negatively impacts patient's care at home	"The only problem was that I didn't know how to use my (J-tube) ...I think that I should have been taught a little bit more about that here." "They should have spent more time on liquids and full liquids in comparison to eating solids. Because I think that lead to eating too much food in my stomach or in my colon that I couldn't get rid of..."
Tools & Technology: Content of education materials	Aspects of the content of educational materials to be used at home that impeded teaching, understanding or use	"We had so much paperwork..." "It would have been nice to have a specific contact...all they do is give you some general information about what to do..."
Organization: Care team organization	Aspects of care team communication, practice, structure/ roles that may interfere with care and preparation for patient's discharge	"I think there...there was a lot of people that...I was glad that I was getting everyone's opinions, it was just um trying to get every-one's opinions together...I think that getting on the same page took...a little bit of time." "I don't think that anybody called but it would have been nice... you know if someone would have called and said do you have any concerns"
Service coverage	Inadequate after business-hours coverage at the academic center for services required by the patient that adversely impacts care or preparation of patient's home care/discharge	"The lady had said that within the hour I should get a call back from one of the resident doctors and I had not gotten a call back..."
Outside clinician support	Lack of clinical or procedural expertise to manage patient outside the academic center	"I went to my hospital, where my primary physician is and they said that they weren't capable in handling my type of...they're just a small hospital they said and they didn't want to...they couldn't do my...care there because they were not familiar with it..."
Insufficient home health services or equipment	Insufficient or unknown home health services negatively affects care or preparation for care at home Lack of awareness of home equipment negatively affects care or preparation for care at home	"So unfortunately the nurses can only come once a day...awe, so that really didn't work for me..." "I think the hospital needs to do is to help people like me ... develop a ...core team to check on people..."

SEIPS, System Engineering Initiative for Patient Safety