

# Lessons Learned by Medical Students about Systems-Based Practice as Patients Transition their Care

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## Research Article

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# **Abstract**

*Background:* One in five patients suffer an adverse event within two weeks of discharge as they transition from one healthcare setting to another. Systems-based practice is a core competency of physicians and seeks to minimize these events; however, education of trainees is inconsistent. We asked whether structured post-discharge phone calls and reflections on barriers to discharge and practice improvement can enhance students' understanding of systems-based practice.

*Method:* Medical students in the Internal Medicine Clerkship were assigned to perform a structured post-discharge phone call on hospitalized patients as part of a "Transitions of Care" assignment. Students reflected on issues occurring at the transition from hospitalization to discharge. We performed qualitative analysis of 90 medical student responses and identified themes and sub-themes addressing issues with care transitions.

*Results:* Students consistently identified barriers to safe discharge including issues scheduling follow-up care, poor care coordination, and inadequate social support. The post-discharge phone calls revealed problems with patients' understanding of their discharge diagnosis, medication-related issues and patients' failure to attend scheduled follow-up. Common student-proposed practice improvement interventions included: enhanced provider-patient communication and education, improved interdisciplinary collaboration and care coordination, and greater attention to patient's psychosocial and financial status.

*Conclusions:* Medical students learned about systems-based practice from a transitions of care assignment involving a post-discharge phone call, identifying critical events in over half of patients identified. Self-reflective practice within the context of direct patient care offers insights into practice improvement in care transitions.

## **Introduction**

A transition in the health care setting and/or provider is a vulnerable period for patients. Studies have shown that as many as one in five patients suffer an adverse event within two weeks of discharge[1]. These adverse events often involve medication-related side effects [2] or medication discontinuation [3]. Additionally, patient understanding of post-discharge instructions are frequently poor due to inadequate communication between the physician and patient at the time of discharge [4] [5]. Provider-to-provider communication at the transitions of care may also be inconsistent [6] and lead to poor care coordination [7]. Since these errors may be preventable [1]; mistakes at the transitions of care are targets for quality improvement as they impact both quality and cost of care [8].

In academic medical centers, resident physicians and medical students are heavily engaged in patient care and the discharge process. Regulatory bodies for both graduate and undergraduate medical education, namely the Accrediting Council for Graduate Medical Education (ACGME) [9] and the Liaison Committee on Medical Education (LCME) [10] now include systems-based practice and effective

communication and care across the continuum as core competencies and skills of physicians. Systems-based practice (SBP) is one of the six ACGME core competencies of a physician and is also highlighted in the LCME's standards that medical students learn about societal problems, cultural competence, health care disparities, and interprofessional collaboration. SBP remains the most abstract competency, although the sub-competencies that comprise it are foundational to daily practice. These include: (1) effective navigation of various health care settings, (2) patient care coordination, (3) cost awareness and risk-benefit analysis, (4) advocacy, (5) interprofessional collaboration, (6) identification of system errors and (7) health promotion and disease prevention.

Many different education efforts have been published which aim to teach resident physicians and medical students the skills necessary to effectively transition patients through the health care system [11]. Transitions of care curricula for third- and fourth-year medical students frequently are often incorporated into the Medicine Clerkship [12–16] and may include didactic components [12–15, 17–20]. Student learning is contextualized through direct patient contact, a post-discharge phone call, or home visit [12, 13, 15, 18, 21], and/or through student reflection [14, 17, 19]. Measures to assess effectiveness of these educational efforts were varied in these studies, most measured student confidence in carrying out discharge-related tasks.

We developed an assignment during the Medicine Clerkship in which students completed a structured post-discharge phone call, and later reflected on the barriers to safe discharge and ways to improve their future practice. We sought to understand what insights students gained from this exercise and whether these activities offer students a better understanding of the issues encompassed within systems-based practice.

## Methods

### Study Design and Participants:

Qualitative thematic analysis was performed on written assignments from third-year medical students at Weill Cornell Medical College who completed their third-year Medicine Clerkship during one academic year. No assignments were excluded from the data analysis. Participants were not offered a monetary incentive, as this assignment was a required activity in the Clerkship. Students spend two months rotating in inpatient medicine among four hospitals in New York, NY and Houston, TX during the Medicine Clerkship. All sites serve primarily urban populations; one hospital is specialized in cancer evaluation and treatment. Students must complete a required and graded assignment titled "Transitions of Care" during the sixth week of the clerkship. The Weill Cornell Medical College institutional review board approved the study protocol.

### Data Collection

The "Transitions of Care" assignment was developed to encourage contextual learning through reflection. Students were given electronic access, via the course website, to an excerpt from an article highlighting

issues surrounding transitions of care [22]. They were asked to identify a patient whom they cared for in the hospital and helped to discharge. Medical students were then given instructions on how to conduct a post-discharge follow-up phone call using tool #5 in the Agency for Healthcare Research and Quality (AHRQ), which is offered as one of several kits designed to improve health care transitions:

(<https://www.ahrq.gov/professionals/systems/hospital/red/toolkit/redtool5.html>).

In the written assignment, students responded to the following questions:

- 1) *"What issues and barriers to safe discharge did you encounter for your patient?"*
- (2) *"Were there any problems with the patient's understanding of their discharge diagnosis?"*
- (3) *"Did they understand the medications they were supposed to be taking?"*
- (4) *"Did they make it to their follow-up appointment or understand why they had to follow-up with their physician after discharge?"*
- (5) *"Identify ways in which you can change your practice in the future to assist with safe transitions of care for your patients, based on your experience with this patient."*

The completed written assignment was then uploaded onto the learning management system and discussed by students in their faculty-led tutor groups (consisting of 4 to 5 students), which met on a weekly basis during the Medicine Clerkship.

## Data Analysis

Transitions of care assignments from students enrolled during one academic year were collated and de-identified. Qualitative thematic analysis was performed with the assistance of the web-based analytic software Dedoose™, which was developed for mixed methods research by academics from UCLA. Three researchers (EE, DS and EP) independently read the complete data set and developed codes, starting with a partial list of codes generated through data from available literature on common issues related to hospital discharge and post-discharge problems frequently encountered. Sub-codes and new codes were generated as they were identified during open coding. Categorization or axial coding was conducted during group discussions and these were further built into themes and sub-themes by group consensus. Disputes were resolved by discussion and terms used for themes and subthemes were coalesced as needed. Quotations that the researchers deemed to be most representative of the responses were selected for inclusion. Minor edits were made to the quotations for clarity and grammar. The frequency with which students identified issues, problems or barrier during reflection or conversation with the patient were calculated. Finally, we examined these excerpts and mapped the themes to milestones linked by UME/GME to the core competency of systems-based practice.

## Results

During one academic year, 90 medical students were enrolled in the Medicine Clerkship and submitted their assignments. They each chose one patient they cared for in the hospital and identified barriers to hospital discharge, carried out a post-discharge phone call, and reflected on ways to improve their own future practice to address issues related to transitions of care.

## **Barriers to Timely or Safe Hospital Discharge**

During the chosen patients' hospitalizations, medical students identified 201 different barriers to timely or safe hospital discharge. Only in three patients were no barriers present, according to students, and one student did not address this question. These barriers were grouped into patient-inherent factors (34.8%), issues related to the patient's social support structures (25.4%), medication or treatment-related issues (15.9%), problems arranging follow-up (14.4%) and delays in the coordination of care (9.5%).

### **The most common patient-inherent factor identified was patient noncompliance. A student wrote:**

She admitted that having to take medications at multiple times throughout the day was difficult, and she would get confused easily. During her hospitalization and for her discharge, we modified home medications for HTN by adding new medications, discontinuing medications, and changing the dosing of some home medications. During the hospitalization, we increased her doses of amlodipine and valsartan. We emphasized that this information would be outlined clearly in the patient's discharge note. However, the patient was worried that she would get confused about the medications. To simplify the medication administration, we decided to have her throw out all her old medications and only use the newly prescribed pills. Furthermore, for each HTN medication, they would be given once daily with one pill to simplify the process.

In this instance, a patient's inability to adhere to a complex medication regimen necessitated choice of once daily medications as well as the team discarding old medications to ensure that the patient would not be confused with the changes.

Additional discharge impediments included poor functional status and cognitive impairment (26), health literacy and language barriers (11), psychiatric history or alcohol/drug use (12) and the patient's anxiety about being discharged (4).

A lack of adequate social support or issues with navigating the health care system featured prominently as barriers to timely discharge in 51 instances. A student described:

On the day of her discharge, the patient let me know that she could not find her food stamps. I got in touch with the social worker who was fortunately able to arrange for God's Love We Deliver to bring her meals until she got her next batch of food stamps.

## **Another wrote:**

Subacute rehab facilities are able to administer IV medications as q8H, but the facility delayed accepting the patient to evaluate the cost of meropenem. Had the facility rejected the patient, the care team would have had to find an alternative place, switch to a cheaper medication (which would have been difficult given the patient's allergies) or arrange for home care (which would have been complicated by the patient's lack of social support).

A lack of access to medications or treatment, including the need for prior authorization, the need for optimization of the medication regimen or intolerance led to delays in discharge 32 times. A student noted:

The patient's CPAP machine had been malfunctioning for weeks and contributed to her admission. I spoke with the social worker who said she would make sure a respiratory therapist visits the patient's home prior to discharge to ensure that her machine is functioning; however, it turns out there was some delay and that it could not happen until the day after discharge. I was concerned that there would be another delay and that the patient would be stuck with a malfunctioning machine.

## **Post-Discharge Events and Issues**

Eighty-nine (89) students successfully reached their patients by telephone and conducted a post-discharge phone call and inquired about their understanding of their discharge diagnosis, and any issues with medications or follow-up. No issues were identified in only 19 (21.3%) of patients. Six students did not inquire about their patient's understanding of their diagnosis, but 27 of 83 patients (32.5%) were unable to demonstrate full comprehension of the reason for their recent hospitalization. Over half (46/89, 51.7%) of patients had issues related to medications or treatments prescribed and nearly half (44/89, 49.4%) had problems with the follow-up arranged prior to discharge.

In some patients, cognitive impairment or a language barrier contributed to a lack of understanding of their diagnosis. However, in one patient, a student noted:

The entire team talked with Ms. X daily about her medical condition and why she was in the hospital. However, on the phone, she was unclear about why she remained in the hospital. She did say, "Well I was there because I needed oxygen." When asked about her discharge diagnosis, she did not know.

The post-discharge phone call revealed that problems with medications were common among patients (18, 20%). Students noted that patients were "*unable to tell me the reasons why he was taking the medications he was prescribed*" or "*could not exactly recall the changes made to her metoprolol dose*" or "*noted that two of them were for the heart but could not describe why she had been prescribed colchicine.*" Upon discharge, several patients encountered difficulties obtaining their medications or treatments. Two comments included:

She told me they could not increase her home oxygen from 4 liters (L) to 6 L when walking because apparently 4 L was the maximum. I did not realize this and should have touched base with the social worker earlier.

She could not afford the fourth medication (esomeprazole) as the pharmacy wanted to charge her \$300. She found an over-the-counter version that cost \$50, but still was still too much, since she did not have insurance coverage.

An additional 11 instances of medication noncompliance, 8 issues with side effects and 4 errors in taking medications were identified during the call.

Nearly half of the patients encountered problems with post-discharge follow-up. Some either never made (6), forgot (6) or changed (4) the appointment. Several simply did not go (7), lacked transportation (8), had no primary care physician (3) or were confused why they had been scheduled to see a particular physician (2). During the phone call, a few students identified inadequate home care services in several (6) patients.

Another issue was with his home care services, who only came once over the course of 10 days. They were supposed to do wound dressing changes three to four times per week.

A couple of students learned about unforeseen readmission or emergency room (ER) visits.

When I called to check on him on Wednesday evening, he informed me that he had fallen at home on Tuesday morning and had to come to the ER again. He was found to have a humeral fracture and was discharged from the ER to follow up with orthopedics next week for surgery.

Several students learned during the phone call that their patients' condition improved (21), was persistent (11) or that new problems arose (6).

I decided to call Mr. C's home health nurse to get her perspective on the patient's condition and his understanding of his condition. She told me that Mr. C's leg swelling has worsened since he left the hospital, which she attributes to his prednisone.

*The patient actually came back to the hospital the next day because he felt a sensation in his throat that worried him.*

## Future Practice Improvement

Finally, we asked students to reflect upon their experiences with their patients' transition and offer some ways by which their future practice will be changed by their new insights into systems-based care. Enhanced communication with the patient and their family and providing more patient education, constituted 92 of these improvements.

*"I will try to stop by before the patient officially leaves the hospital to clarify any last-minute questions about diagnoses, management, etc. even after the nurse has walked through the discharge summary with the patient."*

One useful practice is to review the patient's medication list completely, with one consolidated list. Patients can quickly become overwhelmed and confused when medications are discussed individually, at disparate times, so repetitively reviewing their medications in total is likely a beneficial exercise. From now on, I will use any opportunity to walk with my patients. I learned a lot more about Mr. M and his challenges during a short walk around the unit. At some point, he had become defensive with the medical team and when we walked, I was not playing the role of a 'medical professional.' Greater awareness of the inner workings of the health care system and paying greater attention to psychosocial and sociocultural factors were the focus of 40 practice-based improvements.

I will see if a patient can afford their medications prior to discharge.

One thing I can incorporate into my practice is making sure that patients have adequate transportation to follow-up appointments and that they will be able to cover the cost of planned visits and treatments. I will make sure to communicate with social work early and often to ensure no patient needs slip through the cracks.

Another area of practice intervention identified by students involved greater collaboration among health care practitioners, including enhanced communication through the medical records.

Although discharge summaries may be short and succinct, be sure to summarize all work and interventions cogently to make all events of the hospital course intelligible to all subsequent medical providers.

*"Always touch base with other team members, particularly physical/occupational therapy and social work) about safe discharge planning, even when the patient is medically stable."*

*"The transition coordinator had taken care of faxing the discharge summary to various providers. The nurse gave the patient the prescriptions she would need and re-explained the instructions for taking her medications. The social worker had arranged for home PT and visiting nurse services to begin after discharge. Each of these decisions and conversations were necessary to facilitate a safe transition for this patient."*

In a final analysis, we examined the student assignments and asked whether knowledge gained by students reflected an understanding of systems-based practice. The Alliance of Academic Internal Medicine has previously mapped 21 milestones at both undergraduate and graduate medical education to systems-based practice, which can be broadly categorized into learners effectively working in various health care systems (SBP A1-A3), effectively working with members of health-care personnel (SBP-B1-B4), system errors and improvement (SBP C1-C6), health care costs (SBP D1-D4) and cost-effectiveness (SBP E1-E4). We found that excerpts from student assignments could be mapped to 13 of these milestones (**Supplemental Table 1**).

## Discussion

Our 'Transitions of Care' assignment for students enrolled in the Medicine Clerkship successfully engaged students in activities in which they learned many of the components of systems-based practice.

Thematic analysis of student narrative responses suggests that by fostering close student-patient relationships, students become deeply involved in the discharge planning process and in understanding the psychosocial contexts in which health care is provided. Students identified barriers to discharge and common post-discharge problems that have been previously identified in the literature. Many patients had difficulty understanding their diagnosis or medications, obtaining the necessary medications and treatments or following up with their health care providers after discharge. The post-discharge phone call revealed the psychosocial and economic issues which interplay with their patients' health outside the hospital. Furthermore, students identified many ways in which they can modify their future practice to prevent the system errors, challenges and limitations that they encountered with their patient.

Despite the importance of systems-based practice in the practice of medicine, clinical clerkship curricula continue to focus mainly on the biomedical aspects of medicine and do not consistently include the teaching of SBP. Morzinski et al. found that students reported negative emotional reactions to observed care transitions, therein emphasizing the need for greater attention to education on SBP [19]. A recent review of curricula focused on the teaching of transitions of care to medical students and residents highlights many possible innovative approaches [11]. The Educational Research Outcomes Collaborative has recommended a milestone-based assessment of resident physician competency in implementing safe and effective discharge of patients. Our study was not designed to be a comprehensive curriculum to teach students about systems-based practice, but rather focuses on learning through reflection and active engagement in the hospital discharge process. Although a similar study performed qualitative analysis of students' impressions of care transitions, students were not intensely involved in a patient's care and were not required to do a follow-up exercise [14]. Another study examined interdisciplinary post-discharge visits done by medical and pharmacy students and similarly highlighted the importance of contextualizing the learning by having it focused on a patient previously cared for by the students, but this study offered little insight into what students experienced and learned [13]. In another study, a multimodal curriculum included a post-discharge visit by students, but the lessons student learned from the experiential component were not revealed in the study [12].

Post-discharge phone calls have previously been shown to have little impact on patient satisfaction scores [23] and quality of care transitions, including 30-day readmission rates [24, 25], but have been shown to identify patients in whom problems occurred after discharge [26]. However, in most prior studies a non-physician health care provider was the one to perform post-discharge calls. Weisman et al. found that 93% of residents who completed the call felt that it was beneficial to patient care but did not offer insight into what these physicians learned, as we have in this study [23]. Contact with patients after discharge may provide an opportunity for physicians to obtain feedback on their performance in carrying out safe transitions. Indeed, several students reported unexpected outcomes, some of which students felt could have been better anticipated.

Our study was not designed to provide a comprehensive curriculum for teaching care transitions and systems-based practice. We did not provide any assessment of whether students felt more confident in their ability to conduct a safe discharge in the future. Nor did we survey students later to ascertain

whether they in fact changed or improved upon their practice. Additionally, one could study how patients and medical students perceive the impact this exercise has on the patient-physician relationship.

A multifaceted approach will be required to design curricula used to educate physician trainees on systems-based practice. Our study shows that students gain valuable insights and skills on the discharge process through both a post-discharge call and an intensive reflective exercise.

## **Conclusions**

Systems-based practice is a core competency of physicians; however, education of trainees is inconsistent. Medical students learned about systems-based practice from a transitions of care assignment involving a post-discharge phone call, identifying critical events in over half of patients identified. Self-reflective practice, within the context of direct patient care, offered insights to medical students into how they may improve their future practice to facilitate safer care transitions.

## **Declarations**

### **Abbreviations:**

Not applicable

### **Ethics approval and consent to participate:**

The Weill Cornell Medical College institutional review board approved the study protocol and consent to participate was waived.

### **Consent for publication:**

Not applicable

### **Availability of data and material:**

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

### **Competing interests:**

The authors of this manuscript each declare that they have no conflicts of interest to report.

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## Authors' contributions:

EPP, DS, and ELE performed analysis of the qualitative data. SK, LG, DJK, SKS and ELE helped design the assignment and the study. EPP, SK, LG and ELE were major contributors in writing the manuscript. All authors read and approved the final manuscript.

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