Published in final edited form as:

J Surg Educ. 2016 ; 73(6): 1052–1059. doi:10.1016/j.jsurg.2016.05.017.

Using Interdisciplinary Workgroups to Educate Surgery Residents in Systems-Based Practice

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Abstract

BACKGROUND—Meaningful education of residents in systems-based practice is notoriously challenging, despite its recognition as 1 of the 6 Accreditation Council for Graduate Medical Education core competencies. To address this challenge, surgery residents and other members of the health care team were organized into interdisciplinary workgroups that were tasked with developing solutions to “systems issues” confronted on a daily basis. The project’s goals included providing more meaningful, hands-on educational experience for residents in system-based practice, while also generating practical solutions to workflow issues through interprofessional collaboration.

PROJECT DESIGN—Project participants included all surgery residents at the University of Virginia in Charlottesville, VA, as well as surgical health care professionals across all disciplines. Participants were organized into workgroups. Over the course of 3 sessions, each of 1-hour, each workgroup identified commonly encountered systems issues, chose 1 issue to address, and determined an implementable solution for this issue. In total, 140 participants were divided among 13 workgroups.

PROJECT EXECUTION—Workgroup topics ranged from improving paging etiquette to standardizing interdisciplinary communication. In total, 9 of the 13 proposals have been piloted or fully implemented as standard practice at our institution, either within a single unit or over the entire health system.

DISCUSSION—This project demonstrates an innovative approach toward resident education in system-based practice, providing residents with a hands-on experience in problem solving from a systems perspective. These inter-disciplinary workgroups generated effective solutions to issues that were meaningful to frontline health care providers. Interdisciplinary collaboration within the workgroups served as a valuable team-building exercise to improve relations between the

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COMPETENCIES: Systems-Based Practice, Interpersonal and Communication Skills

disciplines. This project can serve as a model for other institutions desiring meaningful education in the Accreditation Council for Graduate Medical Education competency of systems-based practice.

Keywords

systems-based practice; problem-based learning; resident education; interdisciplinary; workgroups; ACGME milestones

INTRODUCTION

The topics of systems-based practice and quality improvement are central to the well-rounded education of any resident. The Accreditation Council for Graduate Medical Education (ACGME) conveys this importance in its expectations, naming systems-based practice as 1 of the 6 core competencies and quality improvement as 1 of the 6 focus areas of the Clinical Learning Environment Review.^{1,2} However, it is notoriously challenging to meaningfully educate residents on these topics.³ Systems-based practice can be a nebulous subject, and many faculty are not comfortable with their knowledge and their ability to teach residents in this area.⁴ Many programs have added systems-based practice and quality improvement to their standard didactic curriculum, but pure didactics are not the ideal modality for teaching these subjects.^{5,6} Therefore, some programs are turning to practical, hands-on, experience-based approaches instead.⁷⁻¹⁵

Hands-on experiences in systems-based practice would invariably incorporate interdisciplinary collaboration. The ACGME similarly recognizes the importance of collaboration with other health professionals in its description of the core competencies of interpersonal communication, professionalism, as well as systems-based practice. As we move away from the traditional model of 1 doctor making all patient care decisions independently and toward a more team-based approach, the way in which team members work together and interact becomes critical to patient safety and the quality of care provided.¹⁶⁻¹⁸ Interprofessional educational endeavors are being used more and more frequently, with the understanding that formal training in interpersonal team dynamics can improve clinical outcomes.^{19,20}

The purpose of this project was to create a practical, hands-on experience for surgery residents in systems-based practice. Residents and other members of the health care team were organized into interdisciplinary workgroups that were tasked with developing solutions to “systems issues” that they confronted on a daily basis. Our hope was that this project would provide a more meaningful educational experience for the residents on the topic of systems-based practice, while also generating practical solutions to workflow issues through interprofessional collaboration.

PROJECT DESIGN

Planning and Participant Recruitment

Before initiating this project, support was obtained from administrative leaders across multiple disciplines (physician, nursing, and pharmacy) within the University of Virginia

Health System. This support was used to access resources when needed for the project itself and while operationalizing the proposals from the various workgroups. A subset of these leaders was selected as the project's leadership team to help oversee the project's design and implementation.

With the support of the General Surgery Program Director, all general surgery residents were expected to participate in each workgroup session, with the exception of individuals on an off-site rotation. For the nonresident cohort of workgroup participants, the target for recruitment was "everyone who takes care of general surgery inpatients." Because each outpatient clinic has its own unique workflows and issues, outpatient personnel were not recruited for this iteration of the project. Using the support and help of the multidisciplinary leaders, participants were recruited with representation from nurses (floor, intensive care unit [ICU], operating room, and perioperative), operating room scrub technicians, pharmacists, nurse practitioners/physician assistants, respiratory therapists, physical therapists, occupational therapists, case managers/discharge coordinators, social workers, nurse assistants, unit secretaries, bedcenter personnel, and EPIC programmers (EPIC is the electronic medical record for our health system). Additionally, residents from other departments that interact with surgery patients (e.g., Anesthesia) were recruited as well.

Workgroup Sessions

The workgroup sessions took place over 3 meetings, each of 1-hour, in Spring 2014. Meetings were held on Wednesday mornings during the protected academic time for the surgery residents. Each session had a total of 13 separate workgroups, with approximately 10 individuals in each group (3 surgery residents, 2 or 3 nurses, 4 or 5 other allied health members).

The first session began with a brief lecture addressing the goals of the project and basic ground rules for group discussions. Workgroup participants were instructed to focus on problems with the system, rather than problems with a person or group of people. Additionally, they were encouraged to view issues from multiple perspectives, "putting themselves in someone else's shoes." These points of emphasis were designed to facilitate open, respectful, and constructive dialogue among the group members. To further promote this focus of conversation, each group had 1 "moderator" who did not participate in the discussion's content but made sure the conversation was "on topic," and group members were interacting congenially.

After this short introduction, the participants separated into their individual groups. For the remainder of the 1-hour session, the groups were tasked with generating a list of "systems issues" that they encountered on a daily basis—workflow that could be more efficient, problems that could compromise patient safety, etc. The groups were encouraged to clearly define the problems, but not attempt to solve these problems during this session.

At the end of the first session, the systems issues uncovered by each of the workgroups were compiled into a comprehensive list. Then, the leadership team evaluated all issues on this list and selected 13 problems to be tackled by the groups in the upcoming sessions. In selecting these problems, the leadership team focused on problems that were interdisciplinary in

nature and would affect more than one group of health professionals caring for patients. The scope of the problem and the potential solutions were also considered, selecting problems that had the potential to be meaningfully impacted by the solutions of these frontline providers. Health system-level issues that were broader, institutional problems requiring significant monetary investment and would be too large for these groups to address, such as hospital staffing levels and hospital bed capacity, were not chosen. Once the topics were selected, an administrative leader was matched with each topic to guide the conversation at the subsequent 2 sessions and provide the administrative-level perspective on this topic to the frontline providers discussing it. The workgroup participants were then provided with the list of topics and were asked to choose which issues they are most interested in discussing. Each participant was then assigned a topic, disbanding the groups from the first session. This allowed for the creation of new groups with members invested in the topic, again maintaining an even distribution of physicians and other allied health members.

During the second session, each workgroup discussed possible solutions to their designated problem. They were encouraged to examine how their problem affected each group of health care professionals and how a potential solution would affect each group—taking a system-level viewpoint of the problem rather than a limited individual perspective. The discussion was structured using an A3 format.²¹ A3 is a well-known problem-solving tool used to organize process improvement. In brief, the A3 steps involve first defining the problem, describing the current state and the ideal state, and then discussing countermeasures to improve the workflow from the current state toward the ideal state. After discussing possible countermeasures for their topic, each workgroup chose a solution that they felt was best. This solution needed to address the problem in a way that was fair to all involved health professionals, efficiently used existing resources, and was feasible to implement. Each group was specifically asked if there were stakeholders that were “missing” from this session and should be present for the final session. Representatives from these missing areas were then recruited to participate in the third session.

For the third session, each workgroup developed their chosen solution into a formal proposal, determining how it would be implemented, the location and timeframe for implementation, what resources/costs would be required, the plan for educating providers on this new initiative, and how to measure the success of the initiative (defining outcomes and metrics).

Implementation of Proposals

The administrative leader assigned to each workgroup served as the default point person for moving forward with their group’s proposal, in collaboration with motivated and engaged group members. The leadership team facilitated this process as well. It was the expectation that each proposal would at least be piloted in some capacity, unless discussion with administrative personnel outside of the workgroup deemed a proposed solution would not be feasible.

Survey of Participants

Before and after participating in the workgroups, the TeamSTEPPS Team Attitudes Questionnaire was administered to the group members.²² This questionnaire was developed by the Agency for Healthcare Research and Quality in conjunction with the Department of Defense as part of the larger TeamSTEPPS project. TeamSTEPPS was created as a program to serve as the national standard for team training in health care. The Team Attitudes Questionnaire was designed to measure individual attitudes toward the core components of teamwork. Questions were grouped into categories (Team structure, communication, and mutual support) with 6 questions per category (18 questions total). Each question is a statement about an element of teamwork, and the responder answers with how strongly their personal opinion agrees or disagrees with the statement, on a five-point likert scale. The survey results are presented as a composite average score in each of the 3 categories, with a higher score demonstrating a more favorable opinion of the teamwork element. Student's *t*-test was used to compare scores before and after project participation.

PROJECT EXECUTION

Each of the 3 sessions had 130 to 140 participants, with approximately 40 general surgery residents, 40 nurses, 20 pharmacists, and representation from a wide variety of other health professionals including other residents, nurse practitioners/physician assistants, respiratory therapists, physical therapists, occupational therapists, case managers/ discharge coordinators, social workers, nurse assistants, unit secretaries, operating room scrub technicians, bedcenter personnel, and EPIC programmers.

Table 1 displays the 13-system issues chosen and discussed by a designated workgroup, as well as the solution proposed by each group. Further, 4 representative issues and solutions would be expanded upon in more detail below. In total, 9 of the 13 proposals have been either piloted or fully implemented as standard practice at our institution, some within a single unit and others across the entire health system. The remaining 4 proposals each contributed to ongoing discussions regarding their respective topics at the health system level.

Workgroup members were surveyed before and after participating in this project. There was a significant improvement on the Teamwork Attitudes Questionnaire in the category of team structure (4.56 vs. 4.42, $p = 0.01$) as well as trend toward improvement in the category of communication (4.42 vs. 4.26, $p = 0.056$). There was no change in the category of mutual support (4.04 vs. 4.06, $p = 0.76$).

Paging Etiquette Standards

During the first workgroup session, almost every group discussed interdisciplinary communication as a source of frustration. There were some unspoken rules of etiquette that many individuals used, but these behaviors were not consistent across specialties and across disciplines. To address these inconsistencies, this workgroup compiled a list of rules of etiquette to be used when communicating with other health professionals, most commonly while using the hospital's paging system (Fig. 1). These Paging Etiquette Standards called

for standardization of these communication practices, with an emphasis on behaviors that displayed courtesy and respect for the time of other health professionals. For example, a nomenclature system was constructed to designate the urgency of each page, beginning with FYI and routine pages and escalating to urgent and come now. This system more clearly communicated the urgency of each page and allowed the individuals' receiving pages to more effectively triage them. Another standard was that after sending a page, the sender was to be available by phone for 3 minutes so that the receiver could call back if needed, as a sign of respect to the receiver. When designing the standards, the workgroup quickly realized that these guidelines would have to apply across the entire health system to be effective. Therefore, representatives from all residency programs as well as the nonsurgical inpatient areas were recruited specifically for the third workgroups session, so that all potential stakeholders were involved in this discussion.

Given the scope of the Paging Etiquette Standards, a second workgroup was tasked with designing the educational rollout of this large-scale, health system-wide initiative. The educational effort was multipronged, using flyers in work areas across the health system, screen savers on hospital computers, announcements at unit and department meetings for all health professional disciplines, emails from hospital leadership, and a light-hearted online video involving many well-known faces in the health system. Additionally, the hospital's paging website was modified to allow a drop-down menu for selection of urgency level for every page sent.

To assess the effectiveness of this initiative, hospital staff were surveyed before and after the initiative regarding their perception of paging practices at our institution. As displayed in Table 2, there was significant improvement in all questions, with increases in the incidence of favorable behaviors and a reduction in behaviors that reflect poor etiquette.

Delay in Response to Pages While Scrubbed in the Operating Room

When surgical residents are operating, they are unable to personally return pages, commonly resulting in delays in patient care. Often the circulating nurses are able to return pages for residents, but this practice varied dramatically across operating rooms. Frustration was expressed by residents, but even more passionately by floor personnel who were trying to reach the residents in the operating room. When investigating the common barriers to returning pages in the operating room, this workgroup discovered that pagers were not being placed in a consistent location—sometimes on the resident's hip, sometimes at the physician's workstation, etc. They also discussed circulating nurses' reluctance to answer pages. Therefore, this group outlined a standard for pager placement: creating placards that would reside on the circulating nurse's desk for consistent placement of pagers (Fig. 2). Additionally, floor nurses were invited to speak at the operating room staff meeting to emphasize the importance of answering resident pagers in the operating room, highlighting the safety of patients outside of the operating room. Implementation of the Paging Etiquette Standards also helped this issue, as it allowed circulating nurses to more easily triage the resident pages that they were reading and answering.

Operating Room Medication Documentation

At our institution, documentation within the operating room by the nurses and anesthesia team is done outside of EPIC (the electronic medical record for the rest of the health system). Therefore, medications administered to patients while in the operating room are not viewable within the medication administration record within EPIC, creating numerous patient safety issues once these patients leave the operating room. To address this issue, the workgroup proposed changing the template within EPIC for the brief operative note. This note is completed after every operation, and is a common location where health professionals look for details of the operation. The template was modified to include a section for documentation of intraoperative medications to bridge the gap between operating room documentation and EPIC. This workgroup also emphasized to the administrative leadership that the ideal fix would be to purchase the EPIC version of operating room documentation to fully integrate our documentation across all patient care areas. This EPIC transition is currently under active discussion by hospital administration.

Surgical and Trauma ICU Patients in Medical ICU—Whom to Page?

When there are no empty beds in the surgical and trauma ICU (STICU), some patients are forced to board in other ICUs including the medical ICU (MICU). However, the MICU team members were not familiar with the structure of STICU resident teams. The MICU is a closed unit, whereas the STICU is an open unit, with separate teams for surgical patients and for trauma patients. Additionally, the surgical ICU patients each have another team that performed their index operation separate from the ICU team, which generated further confusion as to exactly whom to call with patient concerns. Therefore, this workgroup, with participation from MICU nurses, designed simple, visually appealing flow diagrams of whom to call regarding STICU patients residing in the MICU (Fig. 3). In addition to creating flyers from these diagrams, an educational effort was organized for MICU personnel regarding whom to page. Feedback at the MICU departmental meeting was uniformly positive regarding the effectiveness of this initiative.

DISCUSSION

The description of this project demonstrates an innovative educational platform for hands-on resident experience in systems-based practice. This pilot project was quite large in scale and a logistical challenge, with over 130 participants divided into 13 separate workgroups. Despite these challenges, it was quite successful, as 9 of the 13 solutions proposed by the workgroups have either been implemented as standard practice or piloted at the local or hospital level. There was substantial positive feedback from the workgroup participants, and even more acclaim from individuals at the administrative level within the health system. This project aligned with many department, ACGME, and health system goals, many of which are difficult to operationalize, including resident education, resident involvement in process improvement and quality improvement, education in systems-based practice, and interdisciplinary collaboration. At the time of the study, our institution was in the process of applying for the American Nurses' Credentialing Center for Magnet status. This project was able to demonstrate a commitment between nurses and physicians to improve patient care, which was a strong factor in our subsequent attainment of Magnet designation.

Resident education in systems-based practice is quite variable across different institutions and departments. Because the subject does not lend itself as easily to traditional didactic lectures, many institutions have taken more creative approaches, ranging from online web modules to group exercises with systems engineers to a survivor-themed tour of the health system.^{15,23,24} However, the theme common to many programs is a focus on hands-on experiences that provide residents with the system perspective.⁷⁻¹⁵ For example, Carey and Colby⁸ used a quality improvement-based curriculum as the framework to educate and evaluate their trainees (neonatal ICU fellows) on systems-based practice. In addition to didactics, the fellows participated on the Neonatal ICU Quality and Safety Committee; each fellow then led an interdisciplinary team that developed and enacted an evidence-based quality improvement initiative. Fellow-led projects produced reductions in the rate of bronchopulmonary dysplasia and catheter-associated blood stream infections within the neonatal ICU.

Similarly, Miller et al.¹¹ established a curriculum in which their general surgery chiefs were trained in Six Sigma practices, a well-known process improvement system. Each resident then designed a process improvement initiative, with presentation of his or her results at a departmental grand rounds conference. Resident self-assessment of understanding and comfort with process improvement increased substantially at the end of the project.

The interdisciplinary workgroups described above generated several benefits to the project participants and to our health system at large. First, it provided residents with a hands-on experience with process improvement as a way of understanding and applying systems-based practice. This experience contributed to the well-rounded resident education mandated by the ACGME with systems-based practice as well as the expectation that residents “work in interprofessional teams to enhance patient safety and improve patient care quality and participate in identifying system errors and implementing potential systems solutions.”¹ Second, it facilitated interdisciplinary discussion of systems issues and also generated concrete solutions that were brought to fruition with positive results. Third, it empowered frontline providers to develop solutions to issues that were important to them, leading to an improvement in their work environment—a well-proven strategy to improve employee engagement and satisfaction. Finally, it served as an invaluable team-building exercise where individuals could see problems from the perspective of other providers and work together to generate solutions, all while building relationships and promoting understanding between the disciplines. There were numerous incidences where participants gained understanding from a perspective they had not considered and had visible “light bulb” experiences.

The design and structure of this project is a generalizable model that could be replicated at other institutions in any type of residency program. There were several factors that were important to its success. First, there was a concerted effort to obtain participation from all stakeholders from every tier of health care delivery, consisting predominantly of frontline providers who take care of patients every day. These frontline personnel, the individuals with the most intimate knowledge of the workflow issues, developed solutions to these problems, with the assistance and support of administrative leaders. This leads to the second point—the importance of administrative support, both globally to give the project credibility and access to resources, but also with administrator participation in each workgroup to

ultimately facilitate implementation of the proposed countermeasures. Third, the opening lecture provided the proper framing and ground rules for group interaction, raising the level of conversation, increasing its productivity, and largely avoiding finger-pointing. Fourth, obtaining protected time for resident participation was key. With only 3 sessions, each of 1-hour, the short-time available actually served as an advantage, giving the groups fixed deadlines to have a discussion and develop a feasible solution. Fifth, there was an expectation among the project leaders that each proposal would at least be piloted. This demonstrated to the group members that their participation would not be a wasted effort, and that they could make a positive contribution to improve their work environment. Finally, the project's success was fueled by its passionate leaders, whose infectious energy and desire to improve our health system were critical to overcoming roadblocks and making the interdisciplinary workgroups a reality.

This project has select limitations. The variable rotation and work schedules of the workgroup participants were such that each session did not have the exact same individuals present. This created some discontinuity in the group discussions. Additionally, a robust curriculum to educate in systems-based practice, process improvement, or quality improvement was not employed. More comprehensive didactic education in these subjects would improve the participants' understanding and likely also synergistically increase the effect and productivity of the workgroup sessions.

CONCLUSIONS

In conclusion, this project demonstrates an innovative approach toward resident education in systems-based practice, providing residents with a hands-on experience in problem solving from a system perspective. These interdisciplinary workgroups generated practical solutions to several "system issues" encountered by frontline providers on a regular basis. With administrative support, these solutions were implemented with positive effects that were measurable. Additionally, the interdisciplinary collaboration within the workgroups served as a valuable team-building exercise to improve relations between the disciplines. This project can serve as a model for other institutions desiring meaningful education in the ACGME competency of systems-based practice.

ACKNOWLEDGMENTS

This research was funded in part and supported by the National Heart, Lung, and Blood Institute of the National Institutes of Health, United States, under Award number T32HL007849. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health. Results pertaining to this study were presented at the Association of American Medical Colleges, Group on Residents Affairs Spring Meeting, on April 24th and 25th, 2015 in Austin, TX, and at the 2015 Association for Hospital Medical Education Institute, on May 13th, 2015 in San Diego, CA. We would like to recognize the contributions of the following individuals: Jacob R. Gillen: study design, data collection and analysis, and manuscript writing; Adriana G. Ramirez: manuscript writing and editing; Diane W. Farineau: study design, writing assistance; Tracey R. Hoke: study design and implementation, writing assistance; Bruce D. Schirmer: study implementation, writing assistance; Michael D. Williams: study design, writing assistance; and Christine L. Lau: writing assistance and manuscript editing.

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FIGURE 1. Guidelines of Paging Etiquette. The visual display was created as an aid during implementation of a tiered system of urgency and hospital-wide rules regarding effective paging.

FIGURE 2.
Example of placard developed for standardizing placement of pagers during surgical procedures in the operating room.

How do I contact the resident taking care of STBICU boarders? **FIGURE 3.**

Flowsheet designed to improve communication of STICU patients boarding outside of the unit in the MICU.

TABLE 1**Workgroup Topics and Proposed Solutions**

Systems Issue	Proposed Solution
Poor paging etiquette	Health system–wide paging etiquette initiative
Need for education on paging etiquette	See above
Paging the wrong person	See above
Interdisciplinary rounding	Piloted on general surgery floor
Communicating the daily plan	Use of whiteboards in patient rooms
Delay in response to pages while scrubbed in the operating room	Standardized location for pager placement when scrubbed in operating room
Operating room medication documentation	Operating room medications added to the brief operative note template
More efficient preoperative patient check-in	Move surgical admission ticket into our electronic medical record system
STICU patients in MICU—whom to page?	Local educational initiative in MICU
Lack of floor respiratory therapy protocol	Protocol developed and implemented
Incorrect team assignments with patient transfers between units	Revised language and workflow in electronic medical record
Medication reconciliation at admission	Standardize the person doing this task
Medication reconciliation at discharge	Standardize the person doing this task

TABLE 2**Physician Survey Results Before and After Implementation of Paging Etiquette Standards**

	Pre (n = 423)	Post (n = 218)	p Value
I receive text pages containing only a call-back number for nonemergencies	3.34	2.91	<0.01
I receive text pages containing a pager number but no call-back number	2.62	2.42	0.01
I receive text pages for patients I am not covering	2.54	2.33	<0.01
When I return text pages, I am placed on hold while the person who paged is located	3.11	2.93	0.02
When I need to send text pages, the correct "Provider Team" pager is listed in the Electronic Medical Record	3.47	3.72	<0.01
Text pages I send are not returned	2.47	2.32	0.01
When communicating via paging and phone calls, I feel like my time is valued and respected by other health care providers	3.33	3.52	<0.01
I am satisfied with current text paging practices	2.87	3.19	<0.01

1, never; 2, rarely; 3, sometimes; 4, often; 5, always.