Organizational and Environmental Context for Including Advanced Practice Providers in UPMC Hospitalist Models

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This study qualitatively examines the environmental and organizational context driving the implementation of advanced practice providers (APPs) in hospital medicine at UPMC. We utilized a comparison case study methodology, including field observation and semi-structured interviews at two hospital medicine programs. We identified three distinct models of APPs in hospital medicine, including the Team Approach, Divide and Conquer, and a Hybrid model, and linked the evolution of these models to contextual factors. Our findings present unique insight into the roles of APPs on UPMC hospital medicine teams. We show that environmental pressures, organizational initiatives, and clinician experience can influence APP roles.

INTRODUCTION

Over the past twenty years, the shortage of internal medicine and family medicine physicians, reduced hospitalization rates, caps on resident hours, and payer incentives to improve inpatient costs and care quality, have all contributed to the nationwide increase in hospitalists with over 30,000 currently in practice (Hamel, Drazen, & Epstein, 2009; Harbuck, Follmer, Dill, & Erickson, 2012; Meltzer & Chung, 2010; Rachoin et al., 2012; Wachter & Goldman, 1996; White & Glazier, 2011). Nurse practitioners and physician assistants (advanced practice providers or "APPs") have also taken on larger roles in the

provision of general medicine inpatient care, changing how hospitalist physicians practice (Cowan et al., 2006; Kleinpell et al., 2008; Rosenthal & Guerrasio, 2009; Roy et al., 2008). The rapid adoption of new hospitalist models in the United States suggests that hospitals are facing challenges within the larger health care system context.

While studies have looked at the direct cost and clinical effects of new hospital medicine models of care, few have studied the context for these models (A. D. Auerbach et al., 2014; Craig et al., 1999). The models and their effect on outcomes can vary greatly with some studies pointing to growing concern about the ability of hospitalists to effectively communicate with and transition patients to community-based primary care providers (Dynan et al., 2009; Elliott, Young, Brice, Aguiar, & Kolm, 2014; Kripalani et al., 2007; Meltzer & Ruhnke, 2014; Pham, Grossman, Cohen, & Bodenheimer, 2008). This indicates the importance of studying their variability. The provision of inpatient care encompasses an array of interdependent forces with complex historical political, clinical, financial, legal and social contexts that can vary between hospitals and health systems (McDaniel Jr & Driebe, 2001). The purpose of this study is to embrace the complexity inherent in healthcare and describe models of hospitalist care utilizing APPs and contextual factors related to implementation of new hospital medicine models (Greenhalgh, Robert, MacFarlane, Bate, & Kyriakidou, 2004; McDaniel Jr & Driebe, 2001; H. Tsoukas & Dooley, 2011; Van De Ven & Poole, 2005).

UPMC (University of Pittsburgh Medical Center) is the second largest integrated healthcare delivery system in the United States and utilizes hospitalists in the majority of its 26 hospitals. Four years ago, UPMC formed the Office of Advanced Practice Providers (OAPP) to manage recruitment, training and placement of APPs throughout the health system. The OAPP has quickly accelerated the role of APPs in hospital medicine; however, we have anecdotally observed that APP hospitalists are utilized differently across UPMC. This expansion provides an opportunity to study the variation in hospital medicine models between the hospitals to better understand the context within which they are being implemented. The study results may contribute to UPMC's quality improvement efforts around hospital medicine and inform the larger health system and hospital medicine community.

METHODS

We utilized a comparative case study approach to describe how and why hospital medicine programs incorporated APPs into their operations in two purposively chosen UPMC hospitals (George & Bennett, 2005; Haridimos Tsoukas & Hatch, 2001; Van De Ven & Poole, 2005; Yin, 2009). Organizational and environmental context are important factors within the fields of implementation science and organizational studies (Damschroder et al., 2009; Greenhalgh et al., 2004). We utilized qualitative methods to capture the complexity inherent in organizational change and to explore relationships between emerging themes (Patton, 2002; Haridimos Tsoukas & Hatch, 2001). The overall qualitative approach that we employed is called qualitative description, which seeks to generate themes that are "close to the data" without applying an overarching theory (Crabtree & Miller, 1999; Sandelowski, 2000, 2010). Specifically, we used both field observation and semi-structured interviews to collect data. Field observation was intended to allow us to directly observe the structure of the hospital medicine program at each hospital and to understand the context for the questions that we asked in the interviews (Patton, 2002). Subsequent semi-structured interviews allowed us to ask about changes in the program and probe for clinician and management perspectives on the program that may not emerge in the observation of day-to-day practice (Dicicco-Bloom & Crabtree, 2006; Patton, 2002).

Sampling

We designed our study to extract a depth of understanding from a larger number of individuals involved with hospital medicine from a smaller number of hospitals rather than covering a larger number of hospitals with less input from the involved clinicians. To maximize environmental and organizational variance between the cases, we selected the two UPMC hospitals by the following variables: (1) length of time using hospitalist APPs, (2) urban and rural location, (3) hospital type. Given the small sample size,

we intentionally chose to focus on hospitals without medical residencies. Hospital 1 is a rural community hospital that has integrated APPs into its hospital medicine practice for five years. Hospital 2 is a suburban tertiary care hospital that integrated APPs into its hospital medicine program in the past year. Within each hospital, we used a purposive heterogeneous sampling strategy to maximize the number of unique perspectives about the change in the hospital medicine program (Ulin, Robinson, & Tolley, 2005). The sample for each hospital included a hospitalist physician, an APP hospitalist, a nurse manager or case manager, and administrative leaders directing the program, see Table 1. We chose physicians and administrators that were integral to the development of the APP hospitalist program at that hospital and APPs, nurse managers, and case managers with the longest involvement with the APP hospitalist program. Administrators at the hospitals included a director of nursing, the chief medical officer, and a vice president of operations. We also interviewed three individuals from management at the UPMC system level for the system perspective, including the vice president of hospitalist services, the administrative coordinator of the APP residency program, and a physician assistant leader involved with the development of the program

TABLE 1
NUMBER OF INTERVIEWS BY PROFESSIONAL GROUP

Position	Hospital 1	Hospital 2	System
Administration	2	1	2
Hospitalist Physician	1	1	0
Hospitalist APP	2	1	1
Care Manager/Nursing	1	2	0
Total	6	5	3

Conceptual Framework

To select the topics and questions that we included in the semi-structured interviews, we conducted a brief literature review across several disciplines to find frameworks that include contextual drivers of change. From this review, we identified four frameworks and three additional studies that include an array of environmental and organizational constructs (Armenakis & Bedeian, 1999; Barnett, Vasileiou, Djemil, Brooks, & Young, 2011; Buchanan et al., 2005; Damschroder et al., 2009; Fitzgerald, Ferlie, Wood, & Hawkins, 2002; Greenhalgh et al., 2004; Holt, Helfrich, Hall, & Weiner, 2010; A. Kitson, Harvey, & McCormack, 1998; A. L. Kitson et al., 2008; Rafferty, Jimmieson, & Armenakis, 2013). We extracted constructs from these papers specific to organizational and environmental context. The frameworks include Greenhalgh *et al*'s multidisciplinary "Conceptual Model for Considering the Determinants of Diffusion, Dissemination, and Implementation of Innovations in Health Service Delivery and Organization," which was based on a systematic review and a synthesis of 495 sources. From this framework we considered constructs under the authors' categories of 1) system antecedents for innovation, 2) system readiness for innovation, and 3) outer context (Greenhalgh et al., 2004). The second framework, Damschroder *et al*'s "Consolidated Framework for Implementation Research," comes from the implementation science literature and is an aggregation of theories of implementation. We focused on constructs from the outer setting portion of this framework (Damschroder et al., 2009). The third framework, Kitson *et al*'s PARIHS "Promoting Action on Research Implementation in Health Services" framework, is also from the implementation science and evidence-based practice literature and was developed by the Royal College of Nursing Institute. From this framework we utilized constructs under the context heading (A. Kitson et al., 1998; A. L. Kitson et al., 2008). The fourth framework, Holt *et al*'s "Readiness for Change" comes from the organizational change and quality improvement literature. This framework's section on organizational readiness for change provided several constructs (Holt et al., 2010). The additional studies include two by Fitzgerald *et al* and Barnett *et al* that used empirical study to

advance theories of diffusion of innovations in healthcare (Barnett et al., 2011; Fitzgerald et al., 2002) and two by Armenakis *et al* and Buchanan *et al* that conducted literature reviews on organizational change in the management literature (Armenakis & Bedeian, 1999; Buchanan et al., 2005; Rafferty et al., 2013). We aggregated explanatory factors that contribute to change in healthcare organizations and constructed questions that address the major constructs, listed next to the interview questions in Table 2.

TABLE 2
INTERVIEW GUIDE

Construct	**Question**
Introductory	1. Please describe your role within hospital medicine at [Facility] (e.g., physician, nurse practitioner, case manager, administrator)
Structure	2. What are the other roles in the hospital medicine program at [Facility]?
Structure	3. What do you think are the most important processes within the hospital medicine program at [Facility]? (e.g., rounding, patient discharges, documentation)
Environmental norms	4. How is your hospital medicine program similar to or different than your peer hospitals'? (e.g., structure, age of program, teaching status, cohesiveness of group)
Structure	5. How has your hospital medicine program changed over the past three years? (e.g., implemented advanced practice provider hospitalist role)
Absorptive capacity	6. What do you think are the factors that contributed to these changes? (e.g., resource constraints, heard about new structure from peers)
Culture and climate	7. How have the members of the hospital medicine program responded to these changes? (e.g., hostility, receptiveness)
Patient needs	8. How have the needs of your patients been included or not included in decisions about the hospital medicine program? (e.g., improving patient communication, addressing specific patient population)
Organizational goals	9. Please describe [Facility] or UPMC leadership involvement with the hospital medicine program and its changes? (e.g., organizational initiatives, education programs)
Economic considerations	10. In what ways to you think the changes have affected the hospital medicine program financially? (e.g., cost effectiveness)
	11. How is the performance of the hospitalist program being measured?
	12. Do you have any advice about how the hospital medicine program might change in the future?

Data Collection

For the field observation, the first author observed an APP hospitalist at each hospital for nine hours to capture the breadth and structure of their job and interpersonal interactions throughout a normal day. Prior to observation, the researchers developed an observation report form to capture two types of information - structural information (e.g., time, hospital location, tasks completed) and information on interpersonal interactions. All interactions that the APP had with other hospital employees were recorded on the form and included the title of the person with whom the interaction took place and the content.

The first author conducted 35-50 minute semi-structured telephone interviews with a total of 14 individuals between February and April 2015. All interviews were audio recorded. Before the interview

began, the interviewer informed the interviewee of the purpose of the interview, how the results would be used, ensured confidentiality, and obtained verbal consent. The questions which guided the interview are listed in Table 2, based on the conceptual framework. Follow-up probes were used as needed. The questions were pilot tested with a hospital medicine administrator at UPMC and altered to reflect the terminology used in practice. All interviews covered the same questions although the ordering was adjusted on a case-by-case basis due to the flow of the interview dialogue. Furthermore, the system level interviews asked the interviewees to reflect on the questions for UPMC hospital medicine in general versus specific to a particular hospital. The audio recordings were transcribed to capture verbatim content while excluding extraneous utterances not additive to the meaning of the spoken words. Transcription resulted in 112 pages of single-spaced text.

Data Analysis

The first and second authors read all of the transcripts and independently developed an initial set of codes. These two researchers and the last author then met to compare codes and used an iterative approach to negotiate consensus on a final code list that represented the major themes present in the interviews. We decided on the major themes by the frequency of their mention across the interviews and by the contextual importance that the interviewees placed on them. We aimed to generate major themes from that data that would be useful to a hospital medicine practice-based audience, consistent with the qualitative description approach (Crabtree & Miller, 1999; Sandelowski, 2000, 2010). Next, the first author used the revised codes to systematically code the interview data, using Atlas.ti version 7.5.7 software (Atlas.ti GmbH, Berlin, Germany). The first author then grouped the data into the major thematic categories and extracted quotations to illustrate them with iterative input of the second and last author.

This study was approved by the UPMC Health System Quality Improvement Review Board.

RESULTS

This study identified two large organizational changes occurring within hospital medicine at the two hospitals – the integration of APPs into hospital medicine and the implementation of interprofessional care coordination rounds. We will focus on the results relevant to the integration of APPs into hospital medicine, which were distinct from the second organizational change. While our interview guide covered seven areas of organizational and environmental context, we noted that structure, economic considerations, patient needs, absorptive capacity, and organizational goals were the major themes identified while culture and climate and environmental norms were not stressed. Resource availability was a major theme identified not explicitly included in the interview guide. The themes and subthemes from our analysis are presented in Table 3.

TABLE 3
THEMES, SUBTHEMES, AND QUOTES RELATED TO UPMC APP HOSPITALIST MODELS

Themes	Subthemes	Quotes
1. Environmental contextual factors are increasing APP usage in hospital medicine	1.1 APPs can supplement hospitalist physician shortages (Resource availability)	**System physician assistant:** "Although we talk about a primary care and physician shortage, there's definitely a distribution issue of what we currently have. There are currently nine jobs on the market for every hospitalist … unless we are able to come up with a new model of care that does use APPs and has less physician responsibility, we're going to have a huge problem in the inpatient environment."

		Hospital 1 physician assistant: "[At the beginning of the program] you'd only have a doc for maybe one of two days and then you'd get another one maybe for the whole week and then the next week would be someone different. So yeah it was a little more fragmented … I was kind of the main player." **Hospital 2 nurse practitioner**: "It's really hard for just one person to come up and do all of this, you know, see all the patients, do all the interactions with the staff, do all the interactions with the consultants, you look at everything. I think we're just like the right hand person for the doctor."
	1.2 APPs can improve inpatient efficiency (Economic considerations)	**System administrator:** "With the new changes in healthcare, we expect patients to have lengths of stay in hours and not days. So it's nice to have more hands on deck to help follow up and this is something that you don't, a physician alone is hard to do." **Hospital 1 administrator:** "It might be, in theory you could say it's a little more expensive to do it in the team, but from a quality standpoint if you're able to keep your length of stay down, if you're able to keep your readmissions down then that's the balancing act that you're looking at for this whole thing." **Hospital 2 administrator:** "I think there's an overarching belief that we need to be as efficient as we can from a cost standpoint and a structure standpoint, and utilizing APPs effectively in the healthcare team is an overarching UPMC goal… If operationalized appropriately and efficiently, improving the efficiency of the hospital stay, shortening the hospital stay, coordinating the discharge, decreasing readmissions, I think all of those are opportunities that could be realized." **Hospital 1 physician:** "I'm seriously considering that you would have 50% greater capacity because it's not just doubling it because there's still stuff to do and there's still slowdowns and interruptions and so forth, but I can safely say 50% increase in my productivity by having an extender. And I also think that details are not missed and things are done in a more timely fashion so we could see those 20 people with better quality." **Hospital 2 nurse practitioner:** "And if you do any of the reading and any of the projections, they say that mid-levels are really going to help with costs, keeping costs down."
	1.3 APPs improve patient experience and satisfaction (Patient needs)	**Hospital 2 administrator:** "I mean I think that as value based purchasing and all of the, the fact that patient experience is going to play a significant role in how hospitals are compensated moving forward puts the patient at the forefront of every decision that we make, including the hospitalists. So certainly, traditionally APPs have had a little bit more time to communicate details, I mean I've seen programs where APPs

		work at the time of discharge to spend a significant amount of time making sure that the patients follow up care is appropriately arranged, and they understand their discharge medications." **System physician assistant:** "In an inpatient setting specifically the attending physician may not have the amount of time required to adequately explain things to the patient at the bedside about what's going on, how it's going, and what the outcomes are. I would say that across the board, advanced practice providers have been doing that, they have the time available … I think that that definitely improves patient satisfaction and probably to an extent patient outcomes." **Hospital 1 physician:** "We're standing there side by side, she's [PA] got an iPad, we're both in direct, facing the patient and the family, and we take turn fielding questions. So I give my main spiel with the patient, and then sometimes I'll fill in with the spouse or a family member, and if someone has a follow up question, I'll pause, and if she just jumps in and picks up the ball, she'll go on with education and instruction." **Hospital 2 nurse practitioner:** "And the other thing I have found over the years is that a patient will talk to me because they don't think they're wasting my valuable time. Where when a doctor comes in they feel like they can't spend a lot of time talking to him because his time is more valuable … A lot of folks, especially the older folks, don't feel that the doctors are approachable or don't have the time to answer the questions like we do." **Hospital 2 nurse practitioner:** "Some of the hospitalists their culture is different and also some of them have a language barrier. You know, they don't understand the quirks in the language. Like somebody said something Monday and the doctor looked for me to explain what the patient meant … Or the doctor will say something and the patient will look at me like 'I don't understand what he said.' So I'll say 'He is saying such-and-such.' I'm sort of like an interpreter in those instances."
2. Organizational contextual factors are shaping hospitalist APP usage	2.1 UPMC APP system initiative (Organizational goals)	**System administrator: "**The APP program itself is new out there [Hospital 2], our two new APPs went out there in June of last year for the residency program and then one of them stayed on and we hired a new one in November so that itself is very new, we just started that last year." **System physician assistant:** "I don't think there's a very good communication between what the end-all be-all plan is for the role of the APP going forward. I think it's been improving ever since the Office of Advanced Practice Providers was created … but as far as is there a coherent message about the ultimate plan,

		about the role utilization, the growth – of particulars about how we're going to be used, how much we're going to paid, what we're expected to do, number of APPs in practices versus number of attendings, and all of the nuances that go into developing the role, I don't think there has been any communication." **Hospital 2 administrator:** "We were looking at expanding our APP role here at [Hospital2], I sent out a query to find out what they were doing in other parts of the country, to find out how they were utilizing APPs, and I was sort of surprised that a lot of parts of the country are really not utilizing APPs as much as we are." **Hospital 2 physician:** "Initially through the e-mails and [our chief hospitalist] who is our coordinator here, the chief hospitalist, we got more information. But we did have a couple of meetings with [system hospital medicine administrator] who has actually presented about this, APPs in our hospitalist group."
	2.2 Physician experience drives APP hospitalist models (Absorptive capacity)	**Hospital 1 physician: "**The team that [one PA] is on is usually fill-ins from other hospitals or locums … and so these again are people that aren't comfortable working with PAs, they have less guidance for him, so they're happy turning him loose and letting him do his own thing." **Hospital 1 physician assistant:** "Part of the reason that I think we do what we do [team rounds] is initially with so many people, I found it easier, they found it easier because they didn't know the people here, they didn't know the system well. So I was like 'Let's go see these people together, I'll be right there, you'll be right there if anyone's got questions.'" **Hospital 2 administrator:** "Each doctor had in their mind what they thought [the model] should be … and [the APPs'] responsibilities changed somewhat, and that's part of my dismay, depending upon the physician working." **Hospital 2 nurse practitioner**: "I'm able to do a lot more than some of the doctors are willing to let me do, and I have other doctors that would probably let me do more than I feel comfortable doing."

Structure

The results of our study reflect structural characteristics and changes within the hospital medicine programs. Through the field observation and semi-structured interviews we identified three unique models of how APPs are deployed in hospital medicine, which we termed the "Team Approach," "Divide and Conquer," and "Hybrid," see Table 4. Hospital 1 primarily utilizes the Team Approach where the hospitalist physician and APP round, document, and admit together. This model is used in the ICU, general medicine, and surgical units. The interviewees noted, however, that moonlighting physicians often use Divide and Conquer. Hospital 2 uses one PA hospitalist with the Divide and Conquer model in

the observation unit, and he rounds, documents, and admits independently with hospitalist physician contact as needed, mainly through text messages, phone calls, and brief meetings. During the study, this PA was re-deployed to an admitting only role in the emergency department, again with physician contact as needed. In a general medicine unit of Hospital 2, an NP under a Hybrid model works both side-by-side with and independently from the hospitalist physician as volume in their unit changes.

TABLE 4
CHARACTERISTICS OF DIFFERENT APP HOSPITALIST MODELS AT UPMC

	Hospital 1	**Hospital 2**	
Hospital Medicine Program Daytime Staffing	2 hospitalist physicians with 2 APPs	6 hospitalist physicians with 2 APPs	
Models	Model 1 – Team Approach	Model 2 – Divide and Conquer	Model 3 - Hybrid
Year Implemented	2008	2014	2014
APP Type	Physician assistant	Physician assistant	Nurse practitioner
APP Location	Intensive care and general medicine units	Observation unit or emergency department admissions	General medicine unit
APP Hospitalist Working Style	Side-by-side with hospitalist physician	Independent with intermittent hospitalist physician contact	Both side-by-side with and independent of hospitalist physician
APP Schedule	12 hour days, seven days on-seven days off, staggered with physician	12 hour days, seven days on-seven days off, staggered with physician	8 hour days, weekdays
APP Management	Chief of Hospital Medicine	Hospitalist Physician APP Residency Director	Director of Nursing

Environmental Context for APPs in Hospital Medicine

Staff at both hospitals identified three environmental pressures as drivers for the implementation of APPs in hospital medicine. Scarce hospitalist resources was related to resource availability, improving inpatient efficiency was an economic consideration and improving patient experience and satisfaction is related to patient needs. Administrators and clinicians viewed the role of APPs as a means of supplementing hospitalist physician resources. At Hospital 1, the rural hospital medicine program faces challenges hiring and retaining physicians and relies on a stable APP staff from the local community and the Team Approach to orient and work with new physicians. The longest tenured PA at the hospital viewed the Team Approach as a pragmatic outcome of her efforts to integrate a stream of new physicians into the program over time, which then evolved into the normal practice at the hospital. At Hospital 2, increases in hospital census and patient complexity were overburdening the hospitalist physicians. They were routinely calling in physicians to work during their time off or paying expensive temporary staff to increase their clinical capacity. APPs were viewed as a means to cover tasks, such as managing observation patients or admitting, to reduce physician workload without adding permanent physician staffing.

At the same time, the health system was feeling pressure to improve quality metrics and efficiency measures, such as length of stay, due to reimbursement changes. This theme was mainly prevalent in Hospital 2. Administrators identified APPs as a means to provide more efficient management of patients,

in particular their ability to respond quickly to questions and follow-up on tests is expected to improve the efficiency of discharging patients. Achieving the optimal mix of physicians and APPs was also considered more cost effective than a physician only model. Finally, including APPs in hospital medicine is perceived to improve cost, efficiency and quality.

Another environmental driver identified by the Hospital 2 administrator is the role of patient experience for hospital reimbursement, such as in value based purchasing. While the clinicians did not echo this as a driver for change, they do indicate the need for effective communication with patients and that involving APPs in hospital medicine enhances interactions with patients. With the Team Approach, APPs were purported to improve the richness of the patient-physician interaction by removing distractions and providing additional education to family and caregivers. In the Divide and Conquer approach, the APPs dedicated to a unit were able to spend more time with patients for questions and deeper explanations than if they were covering multiple units with the physician. The APPs also felt that they improved patients' confidence in asking questions and helped to overcome cultural barriers with foreign physicians.

Organizational Context for Hospitalist APPs at UPMC

Within the past four years, UPMC coordinated the training, placement and management of APPs across the health system within the OAPP. A joint organizational goal between UPMC hospitalist services and the OAPP was to increase placements of APPs into hospitalist medicine through recruitment and also through an APP hospitalist residency program. We found that UPMC system leadership held informational in-person meetings and webinars with hospital leaders to introduce different models of APPs in hospital medicine. Administrators at the hospital felt unclear about the best model for their hospital and sought advice from their colleagues in other health systems. Information from hospital leadership was communicated to clinicians through e-mail, meetings, and word-of-mouth. Due to the rapid expansion in APP utilization across the system, clinicians were unclear about the expectations for APPs and improvised at their own locations.

We note that the absorptive capacity of the hospital organizations, or the ability to find, interpret and recodify new knowledge, relative to APPs in hospital medicine was mainly driven by the hospitalist physicians. The main determinant of the role of hospitalist APPs is the past experience of the physicians with hospital medicine and/or APPs in hospital medicine. At Hospital 1, we observed that the PA with experience in the Team Approach guided new hospitalist physicians to utilize that approach. Experienced hospitalist physicians used to independent rounding, such as moonlighting physicians, however, were more likely to use Divide and Conquer. At Hospital 2, there was also variability in the APP hospitalist models because of differing physician ideas about their skills and their role.

DISCUSSION

This study highlights the context for UPMC's integration of the APP hospitalist role. The stated management goals for the APP hospitalist program were to 1) improve efficiency of inpatient stays *vis a vis* cost, length of stay, discharge, and readmissions and 2) to improve patient experience. These management goals are consistent with environmental factors and the national conversation around healthcare cost reduction (Berwick & Hackbarth, 2012) and patient experience (VanLare & Conway, 2012). To aid in the implementation of this program, system and hospital administrators created the APP residency program and utilized webinars, e-mails and other communication modes to disseminate the organizational goals of roles and models for APP hospitalists. This dissemination included several models of APP hospitalists, allowing for local variation. The "top-down" organizational initiative influenced implementation of the APP hospitalists, but the manner of implementation of APP hospitalists within the two hospitals resulted from local factors. Based on the comments in subtheme 2.1, there was confusion about the system goals for APPs, and the physicians relied on their own experiences or asked peers for their opinions. This resulted in variability between the models used at each hospital and even variability

within the hospitals. We have identified the absorptive capacity of the hospitalist physicians as a common factor for how the APP hospitalists were implemented.

Currently there is not data to support whether one approach to utilizing APP hospitalists achieves better outcomes than another. Instead, the models arise from contextual factors at each site. The physician shortage in the rural hospital resulted in a "bottom-up" formation of the Team Approach to overcome operational difficulties with physician turnover. New hospitalist physicians were trained to use the Team Approach, and the model was endorsed by the chief hospitalist physician. APP hospitalists were utilized as a method to address resource availability of trained hospitalists, and subsequently the Team Approach was adopted within the hospitalist group culture. However, experienced moonlighting physicians often chose to continue working independently based on their past experience and unfamiliarity with the APP hospitalist role. This suggests that shared beliefs and shared culture among the consistent staffing allowed for diffusion of the model while the outsider members did not necessarily share the beliefs.

Physicians at the suburban hospital implemented the Divide and Conquer and the Hybrid models based on their perceived needs within hospital medicine and their knowledge of APP skills. Hospital 2 had a dedicated observation unit, unlike Hospital 1. Two physicians perceived that the less complex patients in this unit could be managed by an APP while more complex patients would require greater input from a physician. Also, while the physicians at Hospital 2 acknowledged the benefits of the Team Approach, they perceived that dividing up the work allowed greater resource use given their capacity constraints with a higher than usual census. In this case, the APPs had less hospital-based experience and were newer to the team than the hospitalist physicians. The APPs interviewed also expressed a greater preference for autonomous work versus team work than at Hospital 2.

APPs are being utilized across the healthcare system and are a growing component of the healthcare workforce (D. I. Auerbach, 2012; Hooker & Muchow, 2014). While APPs have been in existence as a profession longer than hospitalists, the roles and tasks that APPs perform are little understood (Kartha et al., 2014). Previous studies have suggested that APPs in hospital medicine may reduce costs (Cowan et al., 2006; Roy et al., 2008), but there is little information on how the APPs are utilized. While previous studies have identified environmental factors that lead to use of APP hospitalists,(Ford & Britting, 2010) this is the first study to begin unpacking the context of why and how these APPs are used. One notable early barrier to this strategy is the lack of understanding about APP roles and expectations at the hospital level. Implementation strategies such as ongoing education or clinical champions could work to overcome this barrier.

A limitation of the current study is the small size of the sample observed and interviewed. We have anecdotally heard of a multitude of different APP hospitalist models across UPMC and nationwide. While our clinical co-authors suggested that our findings were generalizable to other settings, building on the present study with additional sites would reduce the bias of the small sample. The study also relies on the perceptions of administrators and clinicians. This study is intended to be hypothesis generating and draw out the organizational rationale for these changes versus suggesting that the rationale has been empirically proven. Future quantitative analysis that compares patient and financial outcomes across hospital medicine models could provide further insight about the relative performance of the different hospital medicine models. Finally, this study was conducted in an integrated delivery system, which has corporate infrastructure and initiatives unique to large health systems. We believe that the environmental pressures and strategies to address them, however, could be generalizable to all hospitals.

In conclusion, we provide insight into different APP hospitalist models used at UPMC. We analyzed contextual factors, such as physician shortages and cost pressures that hospitals commonly face, and suggest that these models might help to meet those challenges. Based on the perceptions of the clinical staff, it is also suggested that incorporating APPs into the hospital medicine team could improve team communication, patient satisfaction, and quality of care. These findings are relevant for hospital leadership considering implementing APP hospitalists in their facilities.

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