Collaboration between service professionals during the delivery of health care: Evidence from a multiple-case study in U.S. hospitals

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ABSTRACT

We investigate service delivery in one specific type of professional service firms (PSF), namely hospitals. A distinctive operational feature of this setting is that the delivery of health care services requires continuous collaboration between two professional workforces: physicians and nurses. We conducted a multiple-case study at five acute care U.S. hospitals, which involved 49 semi-structured interviews, to uncover the organizational mechanisms that facilitate effective collaboration between physicians and nurses. Our analyses suggest that they experience distinct challenges that prevented collaboration during health care delivery. Specifically, physicians typically favored evidence-based standards of care which can sometimes undermine patient interactions. We refer to this preference as a disease-focus challenge. We also found that nurses were often hesitant to speak-up during their interactions with the physicians, which constitute a hierarchical challenge. Commonly prescribed mechanisms, such as multi-disciplinary rounding, were not effective in overcoming these challenges. Our analyses revealed new forms of collaboration between different levels of the physician and nursing entities, which we denote as "nursing-led cross-level collaboration" and "physician-led cross-level collaboration". Our study suggests that nursing-led cross-level collaboration helped mitigate the disease-focus challenge experienced by physicians while physician-led cross-level collaboration helped mitigate the hierarchical challenge experienced by nurses. It also offers preliminary insights on how PSF in general can develop and sustain such collaboration. Taken together, our findings offer new insights on the micro-foundations of work performed by PSF.

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1. Introduction

In recent years, scholars have shown a lot of interest in studying the operational challenges experienced by professional service firms (PSF) (Greenwood et al., 2005; Williams and Nersessian, 2007; Lewis and Brown, 2012). A vast majority of this research defines PSF as firms whose operations primarily depend on the complex technical expertise or knowledge intensity of their workforce (Von Nordenflycht, 2010). This definition has resulted in firms from a variety of industries such as accounting, law, advertising, banking, IT, management and engineering consulting, hospitals, and universities to be grouped together as PSF. Deriving a common understanding on the functioning of PSF by studying such a diverse group of industries can be a daunting task. As a result, recent studies on PSF have further characterized them based on dimensions such as their level of capital intensity, and their dependence on professional workforce (Von Nordenflycht, 2010). Such characterization can help researchers take a more granular approach and advance theories on the micro-foundations of work performed in PSF.

The purpose of this research is to extend this line of enquiry by investigating the functioning of one specific type of PSF, namely hospitals. Like all PSF, hospitals rely on high levels of knowledge intensity (Alvesson, 2000), i.e. complex knowledge held by the individual professionals who deliver the care. However, hospitals also exhibit a number of characteristics that makes their operations somewhat different from other PSF and warrant more granular investigation. For instance, in terms of interactions with the consumers, hospitals' patients have a unique and diverse set of needs both in terms of severity — e.g. common cold vs. heart attack — and chronicity — e.g. simple fracture vs. long-term heart failure. Process

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variability is also compounded by external constraints such as payment structures (Medicare, Medicaid vs. other insurers) which results in hospitals having to, on a case-per-case basis, adapt processes to satisfy the requests of multiple customers including patients, federal agencies, and private insurances. Thus findings from existing literature that process variability in PSF are mostly due to "professional preference(s), rather than customer interaction/customization or external constraints" (Lewis and Brown, 2012: p.9) may not be entirely true in hospitals. In the midst of this constant requirement for adaptation, a particularly salient aspect of hospitals' operations is the need for continuous collaboration between two distinct professional workforces, namely physicians and nurses. Although other PSF such as architectural firms also rely on different professional workforces (e.g. architects vs. structural engineers), the relentless pressures and previously identified distinctive challenges associated with treating acutely ill patients can heighten the collaboration challenges among health care professionals. Both physicians and nurses have unique skills which are complementary in the delivery of health care. For instance, physicians' education focuses on the treatment of diseases (Hojat et al., 2002; Levinson et al., 2010; Wen and Kosowsky, 2013) and their skills are well aligned with the close monitoring of evidence-based standards of care. We use the term conformance quality to represent hospital's level of adherence to these standards of care as documented on patients' medical records (Senot et al., 2016a). On the other hand, nurses' education is more holistic in approach. It includes clinical training but also elements such as patient's overall wellness and community-based service learning which facilitates "a sense of caring for others" and the "learning about cultural diversity" (Callister and Hobbins-Garbett, 2000: p.178). Thus, nurses are often better equipped than physicians to interface with the patient during the delivery of care. We define experiential quality as the level of interaction between the hospital's caregivers and patients during health care delivery, as experienced by the patient (Chandrasekaran et al., 2012).

Studies show that synergies exist between conformance and experiential quality in terms of reducing readmission rates (Senot et al., 2016b) and improving patient satisfaction (Chandrasekaran et al., 2012). Noting these synergies, the Centers for Medicare and Medicaid Services (CMS), a public regulatory entity which covers the majority of patients in U.S. hospitals, changed their reimbursement policy, thereby setting the tone for all other payers. Beginning October 2012, U.S. hospitals are at risk of losing 1% of their pre-determined reimbursement rates for CMS patients if they do not show sufficient levels of conformance and experiential quality (cms.gov), with this penalty increasing to 2% by 2017. An apparent solution to avoiding these penalties is to promote collaboration between physicians and nurses during the delivery of health care. However, promoting such collaboration can be challenging for hospitals. Indeed, these professions have distinct strict regulations, which imply some separation between the two workforces. Furthermore, while both professions share a common goal, i.e. caring for the patient, they have different knowledge bases (i.e. different educations), which can lead to disagreements on the approach to delivering care. This tension is exacerbated by the "cat herding" problem, which is defined as the difficulty to retain and direct individuals and which is common in PSF (Lorsch and Tierney, 2002). Thus, hospitals face the additional challenge of promoting collaboration between nurses and physicians when each group itself presents management challenges. The purpose of this research to investigate the following research question: *How do hospitals promote collaboration between physicians and nurses at the patient level during the delivery of health care?*

We use a case study approach to collect and analyze data from the heart failure units of five major teaching hospitals (Hospitals A, B, C,

D & E) to investigate this question. Given our unit of analysis, we henceforth refer to "Hospital X" when discussing the heart failure unit of hospital X. Our case study involved 49 semi-structured interviews regarding the delivery of care at both the strategic (e.g. Chief Medical Officer, Chief Nursing Officer, Chief Quality Officer, Director of Patient Experience) and operational levels (physicians and nurses). We also supplemented this data with other forms of data including training manuals, newsletters, scorecards, and organizational charts. The analyses revealed that physicians and nurses experienced different challenges that prevented collaboration during health care delivery. Specifically, physicians tended to focus on the disease and operated based on technical standards. As a result, they tended to favor conformance quality, often at the expense of experiential quality. We refer to this preference as the disease-focus challenge. Nurses were the primary interface with the patients and were more familiar with important personal information such as allergies, unique patients' circumstances, and their preferences, which was needed to design effective care plans. However, we found that nurses were often culturally challenged to speak up during care delivery due to the hierarchical difference between nurses and physicians. We refer to this cultural barrier as the hierarchical challenge. This also resulted in the unit's difficulty to promote collaboration between physicians and nurses.

Our analyses further revealed that the commonly prescribed mechanisms, such as lateral collaboration between leaders of the physician − i.e. medical − and nursing entities (Jansen et al., 2009) and multi-disciplinary rounding involving nurses and physicians (Gurses and Xiao, 2006), were present in all five hospitals but were not sufficient to promote collaboration at the patient level during health care delivery. What was interesting was that Hospital E, which improved simultaneously on conformance and experiential quality over the previous five years, had two different forms of cross-level collaboration − physician-led and nursing-led − which are not discussed in the literature. Specifically, nursing-led cross-level collaboration involves frequent interactions between a higher level of the nursing entity and a lower level of the physician entity. It helped mitigate the disease-focus challenge experienced by physicians. This form of cross-level collaboration was also present in Hospital D. We also found that Hospital E had physician-led cross-level collaboration, which involves frequent interactions between a higher level of the physician entity and a lower level of the nursing entity. This collaboration helped mitigate the hierarchical challenge faced by nurses. These results offer new insights into how hospitals, and perhaps other PSF that rely on multiple professional workforces, can encourage and support effective collaboration between professional entities.

2. Research design

2.1. Research sites

The research sites for this case study consist of the heart failure units from five U.S. acute care hospitals. Our preliminary conversations with the hospital leaders and caregivers suggested that heart failure patients immensely benefit from high levels of conformance and experiential quality. Indeed, the chronic aspect of the heart failure condition makes it essential for caregivers to not only properly diagnose and treat the symptoms of their disease in the short-term but also to ensure that the patient understands and agrees with the treatment plan and is able to adhere to it long after discharge. Therefore, we selected the hospitals using secondary data on conformance and experiential quality. Both the current scores (see Table 1) and progression along conformance and experiential quality (2006−2012; see Fig. 1) were used to sample these hospitals. Following existing literature, we calculated

Table 1
Overview of hospital's key characteristics and progression along conformance and experiential quality.

	Hospital A	Hospital B	Hospital C	Hospital D	Hospital E
Hospital characteristics					
Region	West	Midwest	Midwest	Midwest	Midwest
Size	350 beds	800 beds	750 beds	350 beds	1200 beds
Corporate Goals	Non-profit	Non-profit	Non-profit	Non-profit	Non-profit
Member of COTH	Yes	Yes	Yes	Yes	Yes
Magnet designation	Yes	Yes	Yes	Yes	Yes
Residents-to-beds ratio	Over 50%	Between 30% and 40%	Between 10% and 20%	Between 20% and 30%	Between 40% and 50%
Case-Mix Index	Between 1.70 and 1.80	Between 1.90 and 2.00	Between 1.80 and 1.90	Between 1.80 and 1.90	Above 2.00
Performance on conformance and experiential quality					
Progression (see Fig. 1)	Trade-offs	Balanced	Initial Trade-off	Sequential	Balanced
Current relative score on conformance/experiential quality	Low/Low	High/Moderate	High/Moderate	High/High	High/High

Note. COTH (Council of Teaching Hospitals) reunites U.S. major teaching hospitals. Magnet designation recognizes the professionalization of a hospital's nursing workforce (http://www.nursecredentialing.org/magnet.aspx). Residents-to-beds ratio reflects intensity of teaching. Case-mix index is a relative value calculated by CMS based on the diversity, clinical complexity, and need for resources of individual patients treated by the hospital; a CMI greater than 1.00 is an indicator of a higher-than-average expected cost per patient.

conformance quality scores as the average percentage of eligible patients that receive care in accordance with the recommended standards when hospitalized for heart failure, heart attack, pneumonia, or surgical care patients (Senot et al., 2016a). These standards were developed by the Joint Commission and CMS in 2003 (see Appendix A1 for items included in our evaluation of conformance quality). Experiential quality is measured using patients' answers to relevant questions on the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey (Chandrasekaran et al., 2012) which was developed by CMS and the U.S. Agency for Healthcare Research and Quality in 2006 and aims at capturing various aspects of interactions between caregivers and patients (see Appendix A2 for items included in our evaluation of experiential quality). While we can evaluate conformance quality specifically for the treatment of heart failure, such granularity cannot be obtained for experiential quality. Thus, we relied on overall hospitals' conformance and experiential quality scores to select cases.

Hospital A contacted the research team after attending a presentation, targeted at practitioners, which related the findings of our previous research and introduced future research interests. After carefully considering Hospital A's characteristics and progression along conformance and experiential quality, we retained this hospital for our study. The remaining four hospitals selected were members of a larger center affiliated with our university. All hospitals had comparable demographics (e.g. large, non-profit, classified as a major teaching hospital, and Magnet designated — a recognition of nursing excellence; see Table 1). It is interesting to note that all five hospitals differed not only in their current scores on conformance and experiential quality, but also in their progression on these dimensions, as illustrated on Fig. 1. For instance, Hospitals A and C experienced tradeoffs between conformance and experiential quality while Hospitals B and D focused on improving conformance quality before improving along experiential quality. Hospital E improved on both conformance and experiential quality over the 2006–2012 time period which testifies to its caregivers' ability to combine both these dimensions during care delivery over the years. As a result, despite a relatively low start, Hospital E demonstrates the highest current scores on both these measures. Hospital E's exceptional ability to combine conformance and experiential quality is supported by its world-renowned reputation as a leader in quality of care and has earned many awards including being ranked as one of America's top 10 hospitals by *U.S. News & World Report* for 2013–2014, and having over 10 specialties (including its heart program) ranked in the nation's top 10.

2.2. Data collection and research methods

The data collection began in September 2012 in Hospital A and ended in April 2013 in Hospital E. We also had access to other hospitals through the university center but decided to stop sampling after obtaining category saturation from analyzing data from the five heart-failure units (Suddaby, 2006). Data collected from these sites involved semi-structured interviews, observations, project meeting reports, newsletters, discharge protocols, and training documents related to the treatment of heart failure. One of the author of this study also participated in hospitals' training programs on patient experience, teamwork, and physicians' communication along with leaders and caregivers. We developed two interview protocols for the strategic- and the operational-level respondents (see Appendix B). The protocol for the strategic level focused on leadership's influence over caregivers' actions with respect to conformance and experiential quality when caring for heart failure patients. It involved questions on organizational goals and priorities, leadership structure and infrastructures, communication within and across hierarchical levels, rewards and incentives structure, use of information technology, and hiring and training procedures. The protocol at the operational level focused on caregivers' decision-making process with regards to conformance and experiential quality when delivering health care to heart failure patients. It involved questions on operational goals and priorities, relation between conformance and experiential quality (e.g. complementarity, tension), team dynamics, extent of bureaucratic control and perceived autonomy, rewards and incentives structure, use of information technology, and training received.

Each interview lasted an hour and included two members of the research team. One member conducted the interview while the other observed, took notes, and sometimes asked for clarification. Overall, 26 interviews were conducted at the strategic level and 23 interviews were conducted at the operational level for a total of 49 individual interviews across the five hospitals. Appendix C gives additional details regarding respondents at each hospital. After conducting all interviews in one hospital, the research team familiarized itself with the obtained data including transcribed interviews (over 300 pages per hospital) and other forms of data collected such as training manuals, newsletters, scorecards, hierarchical charts, etc. Members of the research team met after each site visit to discuss insights and emerging themes. Respondents were also contacted through email or phone when clarification was needed. Additionally, the research team collected additional data from public sources such as the Hospital Compare website or recent
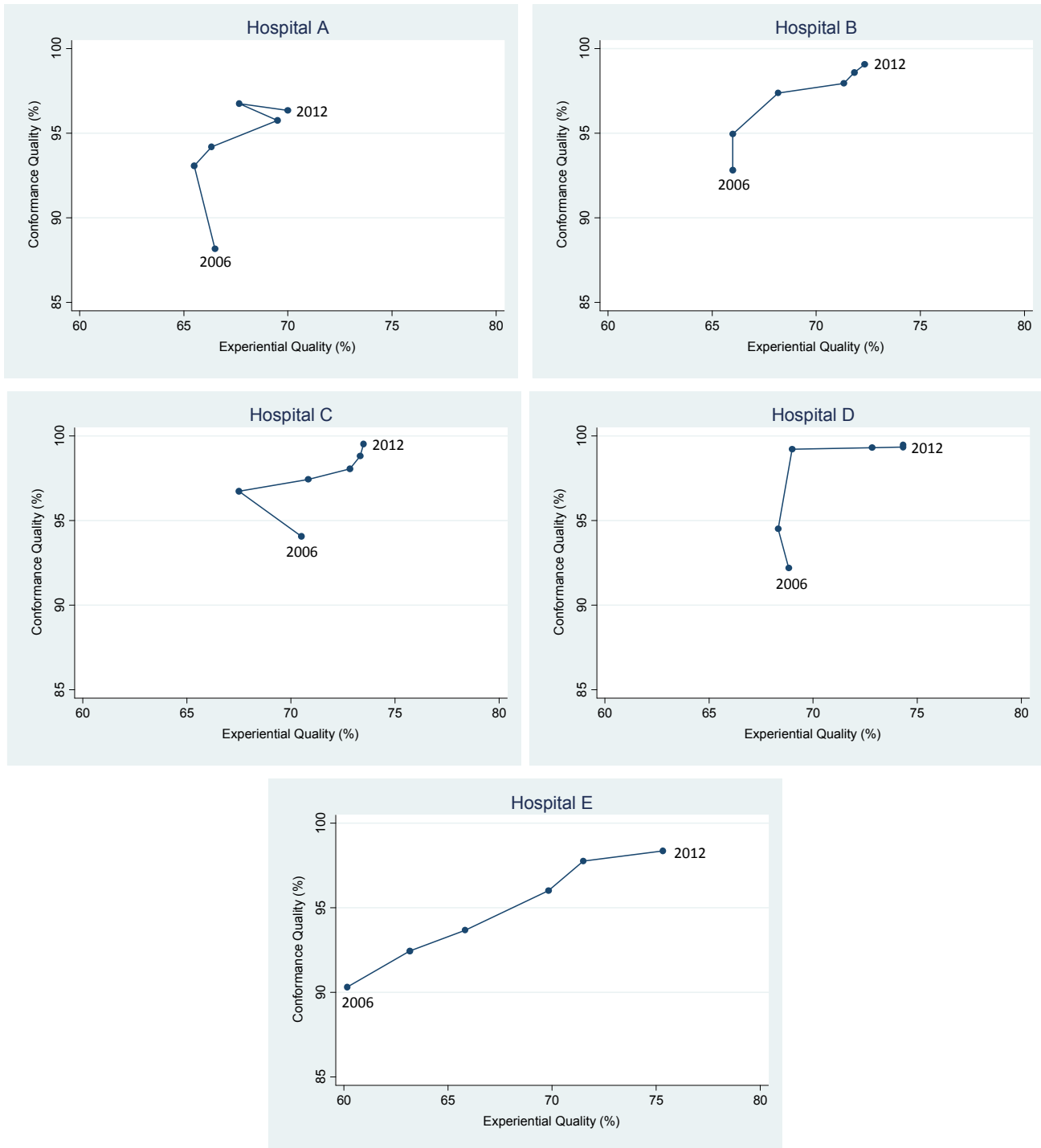
Note. Conformance quality percentage reflects average level of adherence to all inpatient core process measures (see Appendix A1). Experiential quality percentage reflects average proportion of inpatients answering "Always" or "Yes" on HCHAPS survey COMP1-COMP6 elements (see Appendix A2). Experiential Quality scores are adjusted for patient characteristics (age, severity of illness, primary language) and time lag before receipt of survey.

Fig. 1. Hospitals' progression along conformance and experiential quality (2006–2012).

publications based on respondents' insights. For coding, the research team met for multiple rounds after the initial site visits to develop a strategy for synthesizing the data. We followed the general guidelines of open, axial and selective coding during the coding process (Strauss and Corbin, 1990; Miles and Huberman, 1994). In the open coding phase, we used the vocabulary of the respondents in response to each question listed in the protocol. For instance, reasons for tensions between conformance and experiential quality often cited by physicians included factors such as a "*lack of connection*" between these dimensions, the "*different skill sets involved*", the importance of "*doing what needs to be done medically*", and the "*difficulty to truly and reliably assess experiential*

quality". In the axial coding phase, we grouped the open codes that reflected similar concepts. For instance, the lack of connection between conformance and experiential quality and the difficulty to truly and reliably assess experiential quality both related to an "*ambiguity around the concept of experiential quality*". On the other hand, the different skill sets involved and the importance of doing what needs to be done medically both related to physicians "*emphasis on conformance quality*". Finally, in the selective coding phase, we identified overarching themes that further synthesized the data. For instance, for physicians, the ambiguity around the concept of experiential quality and the emphasis on conformance quality both resulted in physicians focusing on the disease rather than the whole patient, which we termed the "*disease-focus challenge*". We then revisited our data to uncover solution to the identified challenges. Since previous literature insists on the importance of (lateral) collaboration as a mean to combine different dimensions, we coded and mapped all interactions between hospitals' workers described in the data. After a few iterations, this mapping led to the schematic view shown in Appendix D, which was then further investigated to differentiate formal vs. informal support mechanisms.

We provided a detailed report and coordinated feedback sessions with each participating hospitals either online or in person. This final step ended in September 2013. A detailed review of the within- and cross-case analyses and findings is given next.

3. Findings

Analyzing the interview data and organizational structure from all five heart-failure units reinforced the concept that physicians and nurses shared responsibilities in the delivery of health care. However, because they obeyed distinct regulations (e.g. state medical boards and state boards of nursing), the dual nature of hospitals' professional workforce led to a dual organizational structure within these units as shown in Fig. 2. This distinction became even more apparent when we discussed the role played by physicians and nurses with respondents. For instance, the Director of Quality and Patient Safety at Hospital C made the following remark regarding this separation.

> [Nurses are responsible for] assessing patients' social situations, assessing their discharge needs, assessing their education, finding opportunities that need to be brought to the forefront so that they can get the care that they need and then providing them the care. [...]The physician is the one to diagnose. Nurses assess; nurses don't diagnose.
>
> -Director for Quality and Patient Safety (Physician entity, Level 1), Hospital C

As seen from Fig. 2, there were typically three levels of decision making within each functional entity: senior leadership (level 1 - e.g. Chief Medical Officer and Chief Nursing Officer), intermediate leadership (level 2 - e.g. medical and nursing directors) and frontline caregivers (level 3 - e.g. physicians and nurses).

3.1. Physician disease-focus challenge

When asked about the benefits derived from such structural separation, one of the nurses had the following response.

> Physicians and nurses are all there to assess different things for the patient. The physician follows more of a clinical medical model, prioritizes problems clinically. And the nurse is doing the exact same thing, but I believe her scope is a little bit more holistic,

> thinking "Where's that family member? Are there other adult children, smaller children? What do I need to do with support services with this particular patient? Is there a nutrition plan?"
>
> -Nurse (Nursing entity, Level 3), Hospital E

However, these different focuses also meant that level-3 physicians and nurses had to find ways to overcome this separation in order to exchange clinical and interpersonal knowledge regarding patients when delivering care. Analyzing the physician interview data revealed distinct challenges at Hospitals A, B, and C experienced by the physician entity regarding such collaborations. In particular, analyzing the response to the question "*What do you think about HCAHPS scores?* (Appendix B — section B)" — the leading instrument used to measure experiential quality — 6 out of 7 level-3 physicians from these hospitals gave these scores little credibility, citing that they relied on subjective data, rather than scientific evidence — one physician was unfamiliar with the survey. They believed mostly in conformance quality which is supported by evidence-based standards. In the words of a cardiologist at Hospital C:

> I don't think HCAHPS has much to do with quality of care. [...] I think that HCAHPS is absolutely nothing but an excuse for the government to claw back money to fund the Healthcare Reform Act. I think that's all it is, okay? [...] I think physicians are uniformly hostile toward it. [...] I don't think that it has been a priority to be addressed. [...] The core measures [i.e. conformance quality] have been fully addressed. [...] Because we've been much more focused on outcomes. [...] I'd have to do a lot of reading if I wanted to understand what a patient views as a good experience.
>
> -Cardiologist (Physician entity, Level 3), Hospital C

Physicians' apparent discomfort with experiential quality was driven by the ambiguity and perceived subjectivity on the measurement of what constitutes good patient interactions. We refer to this undue preference for conformance quality as a disease-focus challenge, which results in physicians not only emphasizing the task-oriented conformance quality but also neglecting to recognize the importance of experiential quality. This created an important barrier to collaboration with the nurses who are primarily responsible for experiential quality. This disease-focus challenge among physicians is also evidenced in the medical literature. For instance, the teaching and assessment of interpersonal skills, which underlies experiential quality, has been part of medical schools' curriculum since 2002 (acgme.org). However, studies found that these skills have been taught to varying degrees across academic programs (Novack et al., 1993; Hojat et al., 2002) and are often overlooked in medical schools (Levinson et al., 2010).

However, analyzing interview data from Hospitals D and E revealed less physician negativity toward experiential quality. In fact, when discussing their perception of HCAHPS scores, we found that only 1 of the 5 level-3 physicians from these units (20%) did not appreciate the usefulness of HCAHPS survey. The remaining 4 physicians recognized that although the HCAHPS survey had some deficiencies (e.g. small number of respondents, only counted perfect scores), it did provide some value by allowing the measurement of the quality of interactions with patients at an aggregate level. The following excerpts from Hospitals D and E offer a nice contrast to the views expressed in Hospitals A, B and C on experiential quality.

> I think all the things that they're looking at on the HCAHPS, so how much time did their caregivers spend with them, are their questions answered, do they understand what's going on, what the plans are
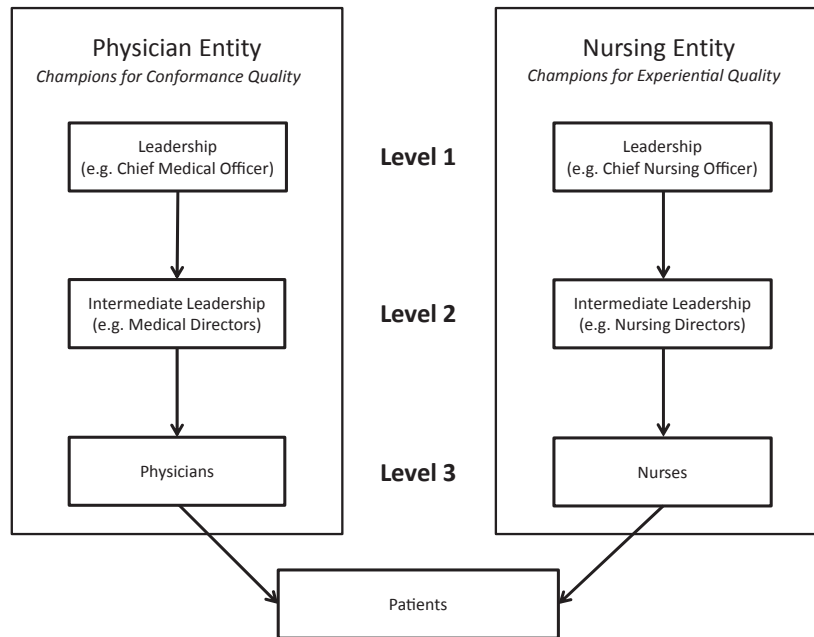
Note: For clarity purposes, we have replaced the term "medical entity" commonly used by health care professionals by "physician entity".

Fig. 2. Structural separation between functional entities in hospitals.

for them, is their room comfortable, is their room clean, I think they all play an important factor. Probably the most important thing though, is patients feeling like they are communicated with and know what's going on and are explained the plan. So communication, I think, between caregivers and the patients is probably the most important thing [on the survey]. […]It's important for [patients] to be participating in their care and if they don't understand why you're doing what you're doing or what they need to do, they're not going to be as likely to do the things that they need to have good outcomes for themselves.

–Cardiologist (Physician entity, Level 3), Hospital D

I think [HCAHPS measures] are imperfect. I don't think that they tell the whole story but I think that they certainly tell us if the patient has a perception that they didn't get good communication […] It's not perfect but I think it has its validity. The experience of a patient is molded by more than just a physician account. Because a physician may see the patient for 20 minutes, 30 minutes in the course of a day, maybe a follow-up later in the day. […] So it's the concept that the team has to be on the same page in terms of communication.

–Hospitalist (Physician entity, Level 3), Hospital E

To understand the differences between these two sets of hospitals (A, B, & C vs. D & E), we closely examined the mechanisms employed within these units to improve collaboration between nurses and physicians. We found that all five units (Hospitals A, B, C, D, & E) adopted mechanisms, frequently discussed in the literature, that promoted lateral collaborations within level 1 (e.g. Smith and Tushman, 2005) and level 3 (e.g. Gittell et al., 2010). For instance they had all implemented some cross-disciplinary quality taskforces that demonstrated the importance of collaboration to caregivers by reuniting upper levels of the medical and nursing entities (Jansen et al., 2009). They also all emphasized cross-disciplinary rounding, which involved physicians and nurses at the operational level (Gurses and Xiao, 2006). Although these initiatives

were ultimately targeted at improving collaboration between physicians and nurses, they were sufficient to mitigate the disease-focus challenge experienced by the physicians. What was interesting was that at Hospitals D & E, in addition to the above strategies, the levels 1 and 2 of the nursing entity frequently interacted with level 2 and level 3 physicians, respectively. We define these frequent interactions between a higher level of the nursing entity and a lower level of the physician entity as "nursing-led cross-level collaboration". At Hospital D, the Chief Nursing Officer made the following comment:

When I have a project planned with my nursing leadership team, I always invite physicians at staff level to participate when [the project] involved anything that had to do with patients in general. […] That helped build credible relationships. […] And so if I have credibility with my physician leaders and I tell them what they need to know around the patient experience, what they need to do […] then they are more likely to listen to me because now I am a credible colleague.

–Chief Nursing Officer (Nursing entity, Level 1), Hospital D

Overall, we found that nursing leaders at Hospital D interacted with physicians in a variety of ways, all targeted at improving the perception of work performed by the nurses among physicians. For instance, the Chief Nursing Officer periodically invited physicians to attend patient care meetings which were primarily held among nursing staff. The Nursing Director for Quality also sent out yearly satisfaction surveys to level-3 physicians. These surveys asked physicians to evaluate the quality of work performed by their level-3 nursing counterparts. Level-3 nurses were in turn given the opportunity, during physician meetings, to address or clarify any concern raised by the physicians. All these initiatives improved the credibility of the nursing staff and their work among the physician entity at Hospital D. Hospital E also exhibited nursing-led cross-level collaboration, but its functioning was somewhat different than at Hospital D. For instance, at Hospital E, nursing leaders

encouraged level-3 physicians to directly ask patient experience type questions (e.g. on the quality of communication with the caregiving team) to patients during their leadership rounding. This allowed physicians to better appreciate the importance of experiential quality. Thus, differently from Hospital D, where credibility of the nursing staff mediated the promotion of experiential quality among physicians, nursing leaders at Hospital E were directly promoting experiential quality among level-3 physicians.

Despite the differences in the initiatives undertaken by each hospital, they all helped mitigate the disease-focused bias among physicians and allowed them to appreciate the importance of experiential quality. As a result, it increased their willingness to include nurses' inputs, derived from extensive interactions with patients, in their decisions. All these arguments suggest the following proposition regarding the role of nursing-led cross level collaboration.

P1: The presence of nursing-led cross-level collaboration between functional entities mitigates the disease-focus challenge for physicians.

3.2. Nursing hierarchical challenge

When analyzing nurses' response regarding team interactions with the physicians (Appendix B − section E), we found differences between Hospital E and the other hospitals (A, B, C & D). At all the other sites, nurses revealed that the hierarchical relationship between nurses and physicians was a big hurdle to communicating information pertaining to patients. For instance, a member from the nursing entity at hospital C made the following comment:

Some of the physicians, you know, for lack of a better term, cocky physicians that, you know, think that, well, they're the doc. [They think] "There's no way I'm wrong on this. I mean, it doesn't matter that I only saw [the patients] for five minutes," and you've spent your entire 12 hour shift with them … You know, you do have some of those that will act that way.

　　　　　　　　-Nurse (Nursing entity, Level 3), Hospital C

In fact, elements of a hierarchical culture between physicians and nurses were systematically mentioned by respondents from all four other hospitals (A, B, C, & D). Indeed, we found that 4 out of 11 informants from Hospital A (37%), 5 out of 10 from B (50%), 5 out of 8 from C (62.5%) and 4 out of 10 from D (40%) cited the perceived hierarchy as a major road block to teamwork as described in this comment from a nurse at Hospital D.

I think the biggest challenge that we face overall is hierarchy and intimidation […]. I think the nurses feel as though their input is not valued. They don't have information that the medical team really cares anything about and historically I think that we've had a lot of situations where nursing […] have to page the physician or call the physician and that communication is not necessarily that open ended. You know they're not thanked for their feedback. Lots of different things like that that feed into … you know … there being this maybe intimidation factor to provide feedback.

　　　　-Nursing Quality Manager (Nursing entity, Level 2), Hospital B

Given their more extensive interactions with each patient, nurses often learned important patient information such as allergies, unique patients' circumstances, and their preferences, which could complement the medical examination performed by physicians and help design effective care plans. For instance,

intimate knowledge of patients' personal circumstances could help ensuring that a patient would be able to follow up on a specific treatment plan after discharge (e.g. afford medication, get transportation, etc.). Studies also show that information learned through interactions with patients can often prevent inaccurate prescription of medication (Manojlovich and DeCicco, 2007). We refer to this cultural barrier as a hierarchical challenge. It results in the inability of the nurses to speak up on the importance of experiential quality during the delivery of care.

When looking at responses from Hospital E, we found that nurses vehemently argued for the absence of such hierarchy in their unit. To gain a better understanding of the reasons explaining the absence of this cultural barrier, we analyzed the collaborations that occurred between physician and nursing entities in this unit. Similar to the nursing-led cross-level collaboration, we found frequent interactions between a higher-level physician (e.g. level 1) and a lower-level nurse (e.g. level 3) in this unit. We refer to this type of interaction as physician-led cross-level collaboration. One example of physician-led cross-level collaboration was the inclusion by the level-1 physicians of level-3 nurses to identify or even pilot initiatives related to improving patient care. Another example was that level-2 physicians participated in hiring level-3 nurses in their department. A physician leader described his participation in level-3 nurses hiring process in the following terms:

We are a team of caregivers; that is the message. All make an important contribution for the common goal which is to help the patient. Titles are not important. The physicians are more of a player/coach but very much a member of the team but not on a pedestal and all must be treated with respect and have a voice. These messages are communicated during the interviewing process [with nurses].

　　　　　-Department Leader (Physician entity, Level 2), Hospital E

Sending such a message in the hiring process, prior to their first day at work, minimized any hierarchical concerns among nurses in this unit. This also served as a signal to level-3 physicians that the nursing staff had been vetted by the physician leadership and thus promoted a perception of nursing excellence among physicians. The mitigation of the hierarchical challenge allowed in turn these nurses to bring to light important patient-level information to the physicians. It also allowed them to speak up and sometimes correct physicians in case of quality issues (e.g. wearing a mask before treating the patient). This suggests the following proposition:

P2: The presence of physician-led cross-level collaboration between functional entities mitigates the hierarchical challenge for nurses.

The different types of collaboration identified in this case study are illustrated on Fig. 3, and findings regarding challenges and countermeasures to collaboration between physicians and nurses at the patient level are summarized on Fig. 4.

3.3. Antecedents to nursing-led & physician-led cross-level collaboration

We found that nursing-led cross-level collaboration was present in Hospitals D & E and helped mitigate the disease-focused challenge faced by the physicians. Hospital E also had physician-led cross-level collaboration which allowed mitigating the hierarchical challenge faced by their nurses. To understand how these respective collaborations were promoted within these hospitals, we analyzed our interview data to compare and contrast between Hospitals D & E and the other hospitals (A, B & C). Given the
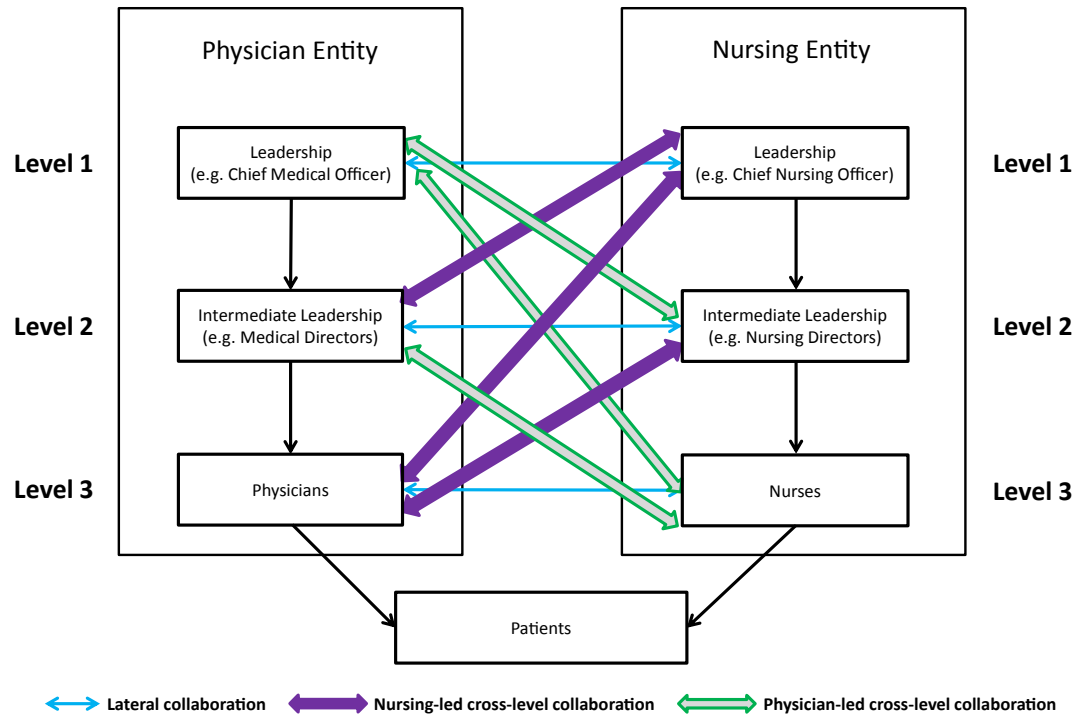
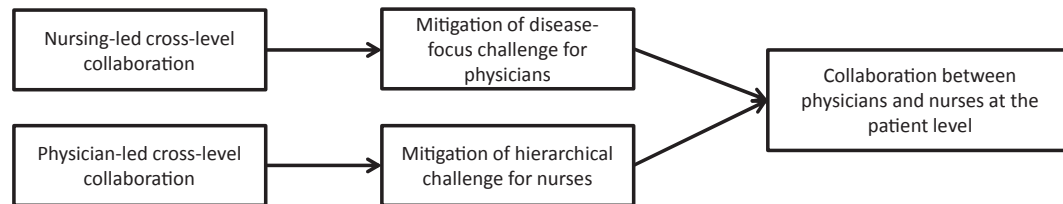**Fig. 3.** Types of collaboration between functional entities.

Fig. 4. Challenges and countermeasures to collaboration at the patient level.

differences between nursing-led and physician-led cross-level collaborations in mitigating challenges faced by physicians and nurses, respectively, we analyzed our case data to understand the antecedents to these collaborative initiatives. We elaborate on this evidence in the next section.

3.3.1. Antecedents to nursing-led cross-level collaboration

Our cross-case analyses comparing Hospitals E & D with the rest showed a couple of interesting differences. First, it was common at Hospital E, during our visits, to see informal hall-way talks between level-1 and -2 nursing staff and level-3 physicians. We refer to such social interactions without any prescribed framework as informal coordination (Smith-Doerr and Powell, 2005; Jansen et al., 2009). Informal coordination allowed communicating the importance of experiential quality to the floor level physicians and encouraging them to involve nurses in their decision process. The Nursing Director had the following remarks regarding informal integration at Hospital E.

We will stop physicians in the hallway to have them join us at our [nursing] meetings. We meet with them all the time to discuss what visionary things they would like to try. [This ensured combining knowledge]

-Nursing Director (Nursing entity, Level 2), Hospital E

Similar to Hospital E, Hospital D also showed strong nursing-led

cross-level collaboration and had several informal integration mechanisms to support this type of collaboration. They included frequent ad-hoc meetings among Chief Nursing Officer (level 1), nursing directors (level 2) and physicians (level 3). These social connections are exemplified in the following quotes from the Chief Nursing Officer and the Magnet Nursing Manager.

Physicians have a sense of ownership. [In a previous hospital], I had great partnerships with my physicians, but it was difficult, for example, to get them to come to meetings so that we could collaborate on projects, and I felt like sometimes I had to drag them to meetings. I come here and didn't invite some physicians to some meetings, and they came knocking on my door angry.

-Chief Nursing Officer (Nursing entity, Level 1), Hospital D

When we had our magnet site visit the last time, we invited a group of physicians. The magnet appraisers wanted to speak with the physicians, and I think we invited about 20 physicians to come and speak to the appraisers. Well more and more physicians came. It was standing room only.

-Magnet Nursing Manager (Nursing entity, Level 2), Hospital D

In addition to these informal coordination, our cross case analyses indicated the presence of formal interventions such as planned leadership rounding at Hospitals D and E. We refer to these planned interventions as formal coordination that are designed and

institutionalized by the hospital leadership (Miller and Friesen, 1984; Gulati and Puranam, 2009). For instance, Hospital E implemented monthly leadership rounding where nursing leaders go to the floor to talk with physicians. Having such formal mechanisms to connect across hierarchies and entities encouraged integration of goals at the floor level. Hospital D also had formal integration mechanisms in the form of a peer-review evaluation process. This formal approach required nurse leaders to systematically include floor-level physicians when evaluating level-3 nurses' performance during the care delivery process. At Hospitals E and D, we found that formal and informal integration mechanisms reinforced each other. For instance, at Hospital D, the fact that physicians' opinion was formally and systematically sought after by nursing leaders when reviewing nurses' performance, strengthened the physicians' interest and willingness to informally participate in projects driven by the nursing leadership, such as Magnet accreditation.

In comparison, Hospitals A and C had weak nursing-led cross-level collaboration (see Table 2). Within-case analyses in each of these hospitals suggest that they had strong formal integration mechanisms but lacked informal integration mechanisms. For instance, Hospital A created a team co-led by the Chief Nursing Officer and a physician to work on improving patient-centered care. Similarly, Hospital C engaged the nursing leadership when hiring physicians. However, having formal integration without informal integration resulted in nursing-led cross-level linkages missing in the organization as shown in Table 2 and in Appendix D. This translated into a much weaker nursing-led cross-level collaboration.

Table 3 summarizes the formal and informal integration mechanisms and nursing-led cross level collaboration found in each hospital. As seen from this table, nursing-led cross-level collaboration was strong when the hospital had both formal and informal integration mechanisms (e.g. Hospitals E and D). It was weak in hospitals that have just formal integration mechanisms (e.g. Hospitals A and C). For Hospital B, both formal and informal mechanisms were present but did not support all possible nursing-led linkages such as collaboration between nursing directors and physicians (see Appendix D).

These analyses suggested that both formal and informal integration complemented each other and were essential to promote nursing-led collaboration. In our cases, Hospitals E and D had both these mechanisms and had strong nursing-led cross-level collaboration while Hospital A, B and C had only one of these mechanisms and demonstrated poor nursing-led cross-level collaboration. This leads to the following proposition also represented in Fig. 5.

P3: Both formal and informal mechanisms complement each other to promote nursing-led cross-level collaboration between functional entities.

3.3.2. Antecedents to physician-led cross-level collaboration

We also examined the antecedents to the physician-led cross-level collaboration present at Hospital E. Findings from the within-case analyses revealed that Hospital E had both formal and informal integration mechanisms but the relationship between these mechanisms was different when compared to what was found for nursing-led cross-level collaboration. Similar to nursing-led cross-level collaboration, formal integration at Hospital E occurred in the form of organized monthly leadership rounding where physician leaders interact directly with nurses. Also, interviews revealed that levels 2 and 3 of the medical staff at Hospital E had weekly meetings with nurses to discuss patients. A physician department leader at Hospital E had the following comment describing a formal integration mechanism.

There is one heart failure meeting we have usually on Tuesdays, which has most of the nursing and pharmacy and case management in it and everybody else.

   -Department Leader (Physician entity, Level 2), Hospital E

When examining the informal integration mechanisms at Hospital E, we found that the medical leadership and nurses had frequent informal conversations regarding the challenges and opportunities to improve processes. They also frequently reached out to each other for help. For instance, the physician senior leadership at Hospital E had frequent ad-hoc interactions with the levels 2 and 3 of the nursing entity. Similarly, medical directors at Hospital E often included nurses in their process improvement efforts as described to us in the following quote.

We can work on processes at any level, but the closer those processes get to the patient, the greater need there is for clinical expertise. So, for instance, we did a project on skill mix on nursing floors. Standard work, but we can't create the standard work, because we don't know — you know, my team doesn't know what a nurse has to do. […] The right way to do it is not to just take over, it is to interface and work together.

   -Medical Director (Physician entity, Level 2), Hospital E

These informal integration mechanisms however were mainly the result of the formal integration mechanisms in place. Indeed, Hospital E's multiple formal integration mechanisms, which included various scheduled cross-functional meetings, created a culture of collaboration between all levels of the medical and leadership entities that fostered informal integration mechanisms. For instance, the following statement describes the relationship between a formal integration mechanism (monthly leadership rounding) and an informal integration mechanism (informal communication between physician leadership and nurses) at Hospital E.

Groups of two or three medical and nursing executives go out monthly and hit almost every unit within the house and they'll talk to whoever is there. So, they'll talk to the nurses. They'll talk to the nursing assistant. And they'll go talk to the physicians. […] Our voice is absolutely being heard.

   -Nurse (Nursing entity, Level 1), Hospital E

By comparison, Hospital A had the weakest physician-led cross-level collaboration in our sample (see Table 2 and Appendix D). Within-case analyses at Hospital A suggested that it had neither

Table 2
Cross-level collaboration between functional entities.

	Hospital E	Hospital A	Hospital B	Hospital C	Hospital D
Cross-level collaboration					
Nursing-led	*Strong*	Weak	Moderate	Weak	*Strong*
Physician-led	*Strong*	Weak	Moderate	Moderate	Moderate
Total cross-level linkages (e.g. Level 3 − Level 1, Level 3- Level 2, Level 2 − Level 1)	6	0	3	1	4

Table 3
Integration mechanisms supporting nursing-led cross-level collaboration.

	Hospital E	Hospital A	Hospital B	Hospital C	Hospital D
Nursing-led cross-level collaboration	*Strong*	Weak	Moderate	Weak	*Strong*
Formal integration mechanisms	Across all levels	Only between nursing level 1 and physician level 3	Only between nursing level 1 and physician levels 2&3	Only between nursing level 1 and physician level 3	Across all levels
Informal integration mechanisms	Across all levels	Absent	Only between nursing level 1 and physician levels 2&3	Absent	Across all levels
Examples					
Formal integration mechanisms		Monthly leadership roundings, Cross-level peer-reviews and hiring, Cross-level process improvement teams			
Informal integration mechanisms		Informal hallway conversations, Ad-hoc meeting attendance, Ad-hoc leadership roundings			

Note. Consistent with nursing-led cross-level collaboration, integration mechanisms considered in this table are between levels 1 & 2 of the nursing entity and levels 2 & 3 of the physician entity, respectively.
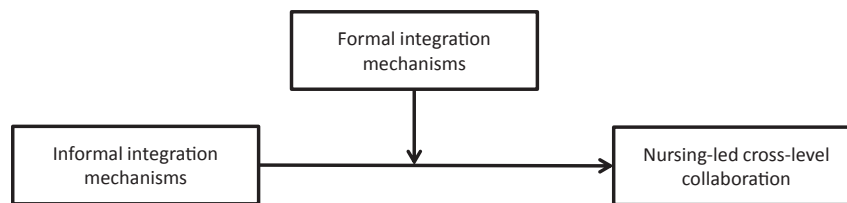

Fig. 5. Antecedents to nursing-led cross-level collaboration.

formal nor informal integration mechanisms to support such collaboration. On the other hand, Hospitals B, C and D had some form of formal and informal integration mechanisms that were comparable to E. Also, similar to Hospital E, the role played by formal integration mechanisms in generating informal integration mechanisms was observed in all three of these hospitals. For instance, Hospital D had assigned Medical Directors to work with the nursing staff on improving processes (formal integration mechanism) as evidenced through the following statement.

We have medical directors on the nursing units, and those medical directors and nurse managers work together. We pay these medical directors to help a nurse manager bring better quality of care to each individual unit. They work collaboratively together.

–Chief Nursing Officer (Nursing entity, Level 1), Hospital D

This formal integration mechanism, in turn, enhanced the informal connections between medical directors and nurses (informal integration mechanism) at Hospital D.

I focus on letting nurses know what they are doing well and congratulating them and letting them know how much we appreciate that hard work. If they're having some struggles, perhaps sitting with them and maybe brainstorming. What could we do to make this process fit into your day-to-day routine better so that we are more successful and letting them know that they have a voice in how things should happen. I think that's very empowering to them as well and can help us all be successful. I think those are the things that I try to focus on.

–Medical Director (Physician entity, Level 2), Hospital D

Similarly, a Medical Director at Hospital C discussed how regularly scheduled rounds (formal integration mechanism) engender informal discussions with bedside nurses (informal integration mechanism):

Myself and another executive go on once a week on safety rounds to various areas in the hospital and basically just see "How things are going? What do you need? How can I help you?". We talk to the

nurses at bedside and the nurse managers to find out what problems they are having. We usually find three or four computers that are out that need to be fixed, you know those sorts of things.

–Medical Director (Physician entity, Level 2), Hospital C

Table 4 summarizes the formal and informal integration mechanisms and physician-led cross level collaboration found in each hospital. This table shows that every physician-led cross-level linkage found in Hospitals B, C, D, and E is supported by a combination of formal and informal integration mechanisms. The scope of these mechanisms determines the extent of physician-led cross-level collaboration, i.e. formal and informal integration mechanisms at Hospitals B, C, and D only support collaboration between the level 2 of the physician entity and the level 3 of the nursing entity while they support collaboration between the levels 1 & 2 of the physician entity and the levels 2 & 3 of the nursing entity at Hospital E (see Appendix D). Physician-led cross-level collaboration was weak in Hospital A, where both formal and informal integration mechanisms were lacking.

Overall, our analyses suggested that physician-led cross-level collaboration between functional entities was supported primarily by formal integration mechanisms which broke down the cultural barriers (i.e. hierarchy between physician and nursing functions) and allowed informal mechanisms to appear and to further strengthen physician-led cross-level collaboration. This leads to the following proposition, which is illustrated in Fig. 6.

P4: Informal integration mechanisms mediate the relationship between formal integration mechanisms and physician-led cross-level collaboration between functional entities.

4. Discussion and conclusion

4.1. Contributions to theory

Our study makes important contributions to the professional services, quality management and organizational design literature. First, our research provides insights on the challenges faced by professional service employees who work in environments

Table 4
Integration mechanisms supporting physician-led cross-level collaboration.

	Hospital E	Hospital A	Hospital B	Hospital C	Hospital D
Physician-led cross-level collaboration	*Strong*	Weak	Moderate	Moderate	Moderate
Formal integration mechanisms	Across all levels	Absent	Only between physician level 2 and nursing level 3	Only between physician level 2 and nursing level 3	Only between physician level 2 and nursing level 3
Informal integration mechanisms	Across all levels	Absent	Only between physician level 2 and nursing level 3	Only between physician level 2 and nursing level 3	Only between physician level 2 and nursing level 3
Examples					
Formal integration mechanisms	Monthly leadership rounding, Medical directors (physicians) assigned to nursing units, Meetings between physician leaders and directors and nurses to discuss patients, weekly safety rounds				
Informal integration mechanisms	Medical directors (physicians) reaching out to nurses to improve processes, frequent conversations on the floor between physician leaders and directors and nurses				

Note. Consistent with physician-led cross-level collaboration, integration mechanisms considered in this table are between levels 1 & 2 of the physician entity and levels 2 & 3 of the nursing entity, respectively.

characterized by high levels of both technical expertise and consumer contact (Harvey, 1998; Lewis and Brown, 2012). For instance, Lewis and Brown (2012) in their study of a law firm show that employees frequently experienced tensions between following standard operating procedures and treating humans like "*bits on a conveyor belt*" (p.12). Our study finds similar tensions in the health care delivery setting, where caregivers have to reconcile adhering to standards of care (i.e. conformance quality) and devoting additional time and effort to adapt their care delivery to patients (i.e. experiential quality). Moreover, our study brings out other challenges, more specific to the hospital context, such as cultural differences between physicians and nurses that are likely not as salient in other professional service settings such as legal firms. Nonetheless, similar differences do exist among other professional services — consider the example of engineers and architects. Both architects and engineers perform several parallel duties that are essential to the design and construction of buildings and other structures (Lawson, 2005). However their training and working relationships are somewhat different from each other and may draw parallels to physician—nurse relationships found in hospitals. An engineers' training is often based on scientific principles and their way of work is often driven by data and facts while architects are trained to be more creative and often rely on aesthetic principles of design when working. These differences can create collaboration challenges due to the distinct training and mindsets. We would suggest that similar cross-level collaboration mechanisms to those found effective in heart failure units can also work in such professional service setting. For instance, frequent interactions between senior level architects and engineers can help the latter understand the value of creative and theoretical thinking and how it can complement the factual and mathematical approaches taken by an engineer to develop a better product. Similarly, frequent interactions between senior level engineers and junior architects can help architects understand the need for communicating their creative ideas frequently with the engineers to continuously check on the feasibility of their creations. The highly charged setting of heart failure units distilled these cross-level collaboration practices in a way that made them quite transparent to observe. However, further research is needed to examine how these collaboration mechanisms work in other professional service contexts such as the one described above.

Second, we find that cultural differences between physicians and nurses give rise to a disease-focus challenge and a hierarchical

challenge, respectively. In particular, our study finds support to the fact that the medical community (i.e. the physicians) often favors the evidence-based conformance quality, which can sometimes come at the expense of experiential quality. Although the health care literature has identified some reasons to this challenge such as medical education and training (Hojat et al., 2002), there is less clarity on its consequences when delivering care. Thus our research contributes towards this end. Similarly, we also explain the connection between the hierarchical challenge among nurses and the resulting difficulty to combine process quality dimensions during health care delivery. We believe that establishing these connections between challenges and outcomes will have important implications to health care quality management research. Although the cultural and hierarchical distinctions between physicians and nurses are legendary, such differences also exist in other PSF. Recall the architects-engineers comparisons discussed earlier. The power of the diversity of thinking (e.g. creative vs. analytical) achieved by bringing two different professions to a problem is intuitive. However, the benefits are only realized when differences can be overcome so that collaboration is achieved. The specifics differ, but managers in all PSF are challenged to incorporate mechanisms to bridge culture and hierarchy. For example, colleagues who study accounting firms describe to us a hierarchical-cultural divide between auditors and increasingly important data analysis/IT professionals in ways that mimic the better-known issues between physicians and nurses described in this paper.

Third, because of these challenges, we find that existing solutions in the organizational design literature that prescribe lateral collaboration at the strategic level (Smith and Tushman, 2005; Chandrasekaran et al., 2012) and operational level (Gittell et al., 2010; Adler et al., 2009) do not adequately explain how to combine conformance and experiential quality during care delivery. Instead, our findings suggest a new form of collaboration, namely cross-level collaboration, which occurs between different levels of the physician and nursing entities. Thus, this form of collaboration effectively integrates collaboration between functional entities as promoted in the organizational design literature (Gittell et al., 2010), with collaboration across hierarchical levels endorsed by operations management researchers (Tucker and Singer, 2014). We also find that cross-level collaborations are critical to breaking down the disease-focus and hierarchical challenges
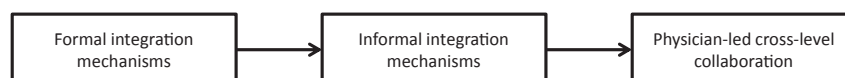

Fig. 6. Antecedents to physician-led cross-level collaboration.

experienced by caregivers. For instance, nursing-led cross-level collaboration allows nursing leaders to continuously promote experiential quality through direct interaction with physicians, thereby minimizing their disease-focus challenge and encouraging the integration of nurses' inputs in their decision-making process. Similarly, by exemplifying direct interactions between physician leaders and nurses, physician-led cross-level collaborations facilitate a shift in culture whereby nurses feel more empowered to share their insights with physicians. These collaborations between different levels of structural entities also addresses the calls for understanding newer forms of work design in complex organizational settings (Sinha and Van de Ven, 2005).

Fourth, we also develop specific and testable propositions on how formal and informal integration mechanisms support the two types of cross-level collaboration identified. Previous research on the effect of formal and informal integration mechanisms on performance has often considered these mechanisms as acting independently (Jansen et al., 2009) or has focused on the extent to which formal and informal integration mechanisms are aligned (Gulati and Puranam, 2009; Soda and Zaheer, 2012). To our knowledge, only Gittell et al. (2010) conceptualize a mediating relationship between formal and informal integration mechanisms and performance. However, their study focuses on lateral collaboration at the operational level. Thus, this research contributes to the literature by investigating the relationships between formal and informal integration mechanisms for physician-led and nursing-led cross-level collaboration. Specifically, we find that a combination of formal and informal integration mechanisms is required to promote both types of cross-level collaboration between functional entities. However, we propose that formal integration mechanisms complement the relationship between informal integration mechanisms and nursing-led cross-level collaboration, while informal integration mechanisms mediate the association between formal integration mechanisms and physician-led cross-level collaboration. In other words, physician-led cross-level collaboration between functional entities benefits from formal integration mechanisms to break down the cultural barriers before informal integration mechanisms can appear to support such type of collaboration. The relationships between formal and informal integration mechanisms found here could provide a helpful framework to investigate further some of their results. In particular, when investigating the effect of formal and informal integration mechanisms separately, Jansen et al. (2009) concluded that formal integration mechanisms are most useful in combining dual learning activities at the operational level. However, their broader results suggest that, similar to our findings for physician-led cross-level collaboration, informal integration mechanisms could mediate the relationship between formal integration mechanisms and combining dual learning activities.

4.2. Contributions to practice

This study also makes several contributions to practice. First, although the leaders from Hospitals A, B, C, & D understood the importance of having collaboration across physician and nursing entities at the operational level, promoting such collaboration using multi-disciplinary rounding were not sufficient to entice true collaboration between the professional entities. Instead, practices of medical-led and nursing-led cross-level collaboration found in Hospital E were more effective in overcoming the identified challenges (i.e. medical disease-focus and nursing hierarchical challenges), thereby enticing collaboration. Our study findings, especially given the improvement path seen in Fig. 1 for Hospital E,

can perhaps offer evidence for other leaders to imitate such collaboration mechanisms in their institutions. For instance, having the Chief Nursing Officer frequently interact with physicians can help promote experiential quality, often considered as "soft" by physicians, and thus mitigate the tendency toward a sole focus on disease which has been reinforced by years of medical training. Similarly, having the Chief Medical Officer frequently interact with nurses can encourage nurses to speak up and even educate physicians regarding patient conditions which can be useful during the delivery of care. Given that these cultural differences are likely less salient in other professional service settings, our study contributions address some challenges particular to the health care delivery context. Nonetheless, as pointed out earlier, the very urgency present in acute heart failure units provides insights that may be applicable in less fraught situations common in other PSF. We provided some insights on how these can help mitigate creativity vs. analytical thinking tensions in the field of architectural design. Certainly, other PSF (e.g. accounting) can also implement similar cross-level collaboration between entities to mitigate identity biases. In the case of public accounting, for example, current audit practice requires extensive collaboration between data analysis/IT professionals and professional accountants. Similar to physicians and nurses or architects and engineers, data analysts and accountants have different training and, it can be argued, different mindsets, which suggests that cross-level collaboration may be helpful in ameliorating non-constructive differences that occur.

Second, our study shows the importance of both formal and informal integration mechanisms for promoting cross-level collaborations. We encourage hospital leaders to invest in such integration mechanisms. While some of these mechanisms — e.g. weekly meetings between nursing and medical entities — are often already in place, there are several other approaches identified in the case analyses which are distinctive. For instance, during our feedback sessions — and follow-up presentations at practitioner conferences — we were informed that some of the mechanisms such as involving nursing leaders in hiring physicians (formal), having a medical director paid to work as part of a nursing unit (formal), or ad-hoc invitations to the physicians to attend nurse meetings (informal). were novel to several hospitals. They may also require extensive infrastructural support and investments. We encourage hospital leaders to implement some of these practices to promote cross-level collaborations and overcome these cultural challenges.

4.3. Limitation and further research opportunities

Several limitations of this study should be recognized. First, although our purpose was to understand the challenges of combining conformance and experiential quality from a caregiver's point of view, it would have been interesting to interview patients in these settings. Unfortunately, the vulnerability of patients admitted for heart failure prevented them from participating in our study. We encourage researchers to further seek patients' perspective, maybe by interviewing them shortly after discharge. Second, due to scheduling difficulties, we were not able to interview any level-3 nurse in Hospital B. However, we did speak to two leaders from the nursing entity who had been level-3 nurses at this hospital. These nurses were also still working closely with the rest of the nursing staff and hence echoed some of the views of the level-3 nurses in our interviews. Third, our research primarily focuses on inpatient settings with somewhat homogenous patient population (e.g. heart failure patients). We are unable to explain whether other healthcare delivery settings such as ambulatory care or emergency departments with diverse patient population experience similar

challenges. We encourage scholars to look at some of these contexts as an extension of our study. Similarly, we encourage application of the insights in other professional services settings where two or more professional groups interact. Finally, we also recognize that the collaboration challenges found in U.S. hospitals may not represent health care delivery models found in other countries. Van Doorslaer et al. (2000) finds that the delivery of care in hospitals differs between the U.S. and several European countries due to items such universal healthcare coverage, tiered system involving public and private providers, and the use of direct payments. As a result, the challenges that we find may not apply to other countries.

Despite these limitations, we hope that the insights developed in this study will not only help hospital leaders formulate effective mechanisms to promote collaboration across physician and nursing entities, but also motivate researchers to continue pursuing this line of inquiry in health care and other professional services settings.

Appendix A1. Description of secondary data considered for conformance quality

Description (Core process measures)	Measure
Heart failure (HF)	
Patients given discharge instructions	HF 1
Patients given an evaluation of LVS function	HF 2
Patients given ACE inhibitor or ARB for LVSD	HF 3
Heart attack (AMI)	
Patients given aspirin at discharge	AMI 2
Patients given fibrinolytic medication within 30 min of arrival	AMI 7a
Patients given PCI within 90 min of arrival	AMI 8a
Patients given a prescription for a statin at discharge	AMI 10
Pneumonia (PN)	
Patients whose initial ER blood culture was perf. prior to admin. of the 1st hospital dose of antibiotics	PN 3b
Patients given the most appropriate initial antibiotic(s)	PN 6
Surgical care improvement project (SCIP)	
Surg. patients who rec. preventative antibiotic(s) 1 h prior to incision	SCIP 1
Surg. patients who rec. appropr. preventative antibiotic(s) for surgery	SCIP 2
Surg. patients w/prev antibiotic(s) stopped w/24 h after surgery	SCIP 3
Surg. patients whose blood sugar is kept under good control in the days right after surgery	SCIP 4
Surg. patients whose urinary catheter was removed on the first or second day after surgery	SCIP 9
Surg. patients who were activ. warmed in the oper. rm or whose body temp. was near normal by the end of surg.	SCIP 10
Surg. patients whose doctors ordered treatments to prev. blood clots for certain types of surgeries	SCIP-VTE1
Surg. patients rec. treat. To prev. blood clots w/24 h before/after selected surgeries	SCIP-VTE2
Surg. patients who were taking beta blockers before and kept on beta blockers just before and after surgery	SCIP-CARD 2

Appendix A2. Description of secondary data used for experiential quality

Description (HCAHPS survey questions)	Measure
Nurse communication	**COMP 1**
Nurses treated patients with courtesy and respect	Q1
Nurses listened carefully to patients	Q2
Nurses explain things to patients in a way they could understand	Q3
Doctor communication	**COMP 2**
Doctors treated patients with courtesy and respect	Q5
Doctors listened carefully to patients	Q6
Doctors explain things to patients in a way they could understand	Q7
Staff responsiveness	**COMP 3**
Patients got help as soon as wanted after pressing the call button	Q4
Patients got help as soon as wanted to use the restroom	Q11
Pain management	**COMP 4**
Patients' pain was well controlled	Q13
Hospital staff did everything they could to help patients manage their pain	Q14
Medication communication	**COMP 5**
The purpose for new medications was explained to patients	Q16
Side effects of new medications were clearly described	Q17
Discharge process	**COMP 6**
Staff verified that patient will have the help needed after leaving the hospital	Q19
Patients received written instruct. regarding symptoms or health problems to monitor after leaving the hosp.	Q20

Appendix B. Operational-level and strategic-level interview protocols

Operational level

Person to be interviewed
   Physician(s) and nurse(s) from the heart failure team.

Preliminary steps

1. Introduce yourself.
2. Discuss the purpose of the study, the time requirement (60 min), the confidentiality and request the use of a tape recorder.
3. Get the background/education of the caregiver
4. Ask the caregiver to define his/her role and responsibilities

REGARDING THE TREATMENT OF INPATIENT HEART FAILURE PATIENT POPULATION:

A. Goals/Priorities
   Define the Triple Aim (better care, better health, lower costs).

- How do you prioritize those goals? Why?
- Do you feel everyone in this organization share those goals?
- How do you think these goals relate to each other?
- What does better care/patient satisfaction/patient experience mean to you? What is the primary factor that affects this?

B. Conformance Quality and Experiential Quality
   Define Conformance Quality (adherence to disease-specific standards of care) and Experiential Quality (interactions focused on meeting the unique needs and preferences of individual patients).

- Do you believe that there are any challenges in combining Conformance Quality and Experiential Quality? Why?
- Who, do you believe, has the responsibility to blend Conformance Quality and Experiential Quality?
- What do you think about HCHAPS scores?
- Do you believe Experiential Quality should be more standardized? If so how? Could you give examples?

C. Communication across levels

- How does management (nurse leadership, etc.) communicate with you?
- Do you often see them on the floor? Is it important? Why?

D. Communication within level (if physician)

- When working with multiple specialists, how is coordination ensured? (hospitalist, primary doctor, main specialist)
- Do you believe that's an ideal mechanism? What are the pros and cons of the current approach? What mechanism would you prefer? Why?

E. Team Dynamics

- When a heart failure patient is admitted and treated, what is the respective role of physicians and nurses? What responsibilities do they share?
- Are there any nurses/physicians characteristics (e.g. AA vs. BSN, specialization of nurses, age of physicians) that facilitate or inhibit communication between physicians and nurses?
- How do you communicate within your team? What input do you have?

F. Rewards and Incentives

- What are the main metrics used to evaluate your performance?
- What are common rewards/incentives/recognitions that you receive for improving on those metrics?

G. Hiring and Training

- What do you believe were the main characteristics for which you were hired?
- Was it hard for you to adapt to this hospital? Why?
     o Relative to Conformance Quality and Experiential Quality:
        ■ What were the main points of focus of your training prior and after being hired?
        ■ Do you believe you should have had more training in a particular area? If so, which one? Why?
- Do you have any input when hiring nurses? Physicians?

IS THERE ANYTHING ELSE THAT YOU BELIEVE WE SHOULD HAVE ASKED ABOUT WHEN TRYING TO UNDERSTAND HOW HOSPITALS COMBINE CONFORMANCE AND EXPERIENTIAL QUALITY?

Strategic level

Person to be interviewed
   Leaders overviewing different areas of care delivery.

Preliminary steps

1. Introduce yourself.
2. Discuss the purpose of the study, the time requirement (60 min), the confidentiality and request the use of a tape recorder.
3. Get the background/education of the department responsible
4. Ask the interviewee to define his/her role and responsibilities

REGARDING THE TREATMENT OF INPATIENT HEART FAILURE PATIENT POPULATION:

A. Goals/Priorities
   Define the Triple Aim (better care, better health, lower costs).

- How do you prioritize those goals? Why?
- Do you feel everyone in this organization share those goals? How do you communicate those goals to the caregivers in your department?
- How do you think these goals relate to each other?
- What does better care/patient satisfaction/patient experience mean to you? What is the primary factor that affects this?

B. Conformance Quality and Experiential Quality
   Define Conformance Quality (adherence to disease-specific standards of care) and Experiential Quality (interactions focused on meeting the unique needs and preferences of individual patients).

- Do you believe that there are any challenges in combining Conformance Quality and Experiential Quality? Why?
- Who, do you believe, has the responsibility to blend Conformance Quality and Experiential Quality?
- What do you think about HCHAPS scores?
- Do you believe Experiential Quality should be more standardized? If so how? Could you give examples?

C. Communication across levels

- How do you communicate with physicians/nurses?
- Do you often go to the floor? Is it important? Why?

D. Communication within management

- Do you often communicate with other leadership entities? Which ones? How often? About which subject(s)?

E. Team Dynamics

- When a heart failure patient is admitted and treated, what do you believe are the respective roles of physicians and nurses? What responsibilities do you believe they share?
- Are there any nurses/physicians characteristics (e.g. AA vs. BSN, specialization of nurses, age of physicians) that you believe facilitate or inhibit communication between physicians and nurses?
- How do you encourage teams to work together? How?

F. Rewards and Incentives

- What are the main metrics used to evaluate your organization performance relative to heart failure patients?
- What are common rewards/incentives/recognitions that caregivers receive?

G. Legislation

- What do you think about the new reimbursement policy? Benefits, risks

H. Hiring and Training

- Who participates in the hiring process for nurses? Physicians?
- What are the main characteristics you look for when hiring physicians/nurses? Why?
- Relative to Conformance Quality and Experiential Quality:
  - What were the main points of focus of the training prior and after being hired?
  - Do you believe being a team player is important? Why? Did training address this area?

IS THERE ANYTHING ELSE THAT YOU BELIEVE WE SHOULD HAVE ASKED ABOUT WHEN TRYING TO UNDERSTAND HOW HOSPITALS COMBINE CONFORMANCE AND EXPERIENTIAL QUALITY?
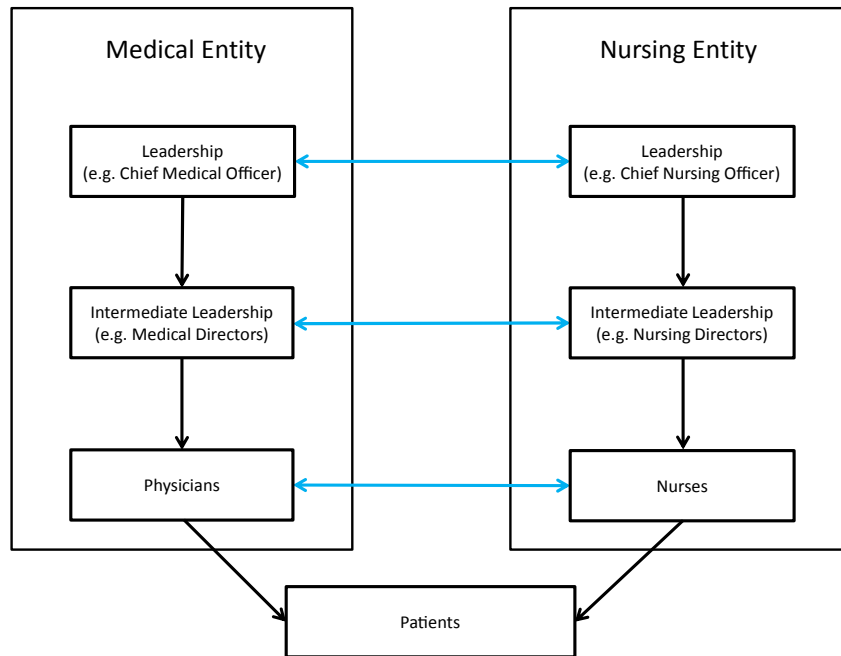
Appendix C. Respondents' characteristics

	Leaders with physician education		Leaders with nursing education		Leaders with other education		Level-3 physicians		Level-3 nurses		Total
	#	background	#	background	#	background	#	background	#	background	
Hospital A	2	general internal medicine	3	ICU, cardiology, dialysis & infection control	1	BS in Business	2	cardiology	3	neuro ICU, oncology	**11**
Hospital B	3	cardio-thoracic surgery, pulmonary & critical care medicine, gastro-hepatology & nutrition	2	neonatal ICU, surgery	1	MS in Public Health	4	cardiology	0	–	**10**
Hospital C	1	pulmonary & critical care medicine	3	MS in Nursing, critical care	0	–	1	cardiology	3	cardiovascular	**8**
Hospital D	1	family medicine	4	MBA, ICU, hematology, oncology & dialysis	1	BS in Healthcare Administration	2	cardiology	2	cardiovascular	**10**
Hospital E	3	cardiology, pathology	0	–	1	MS in Public Health	3	internal medicine, heart surgery	3	MS in communication & nursing, cardiovascular	**10**

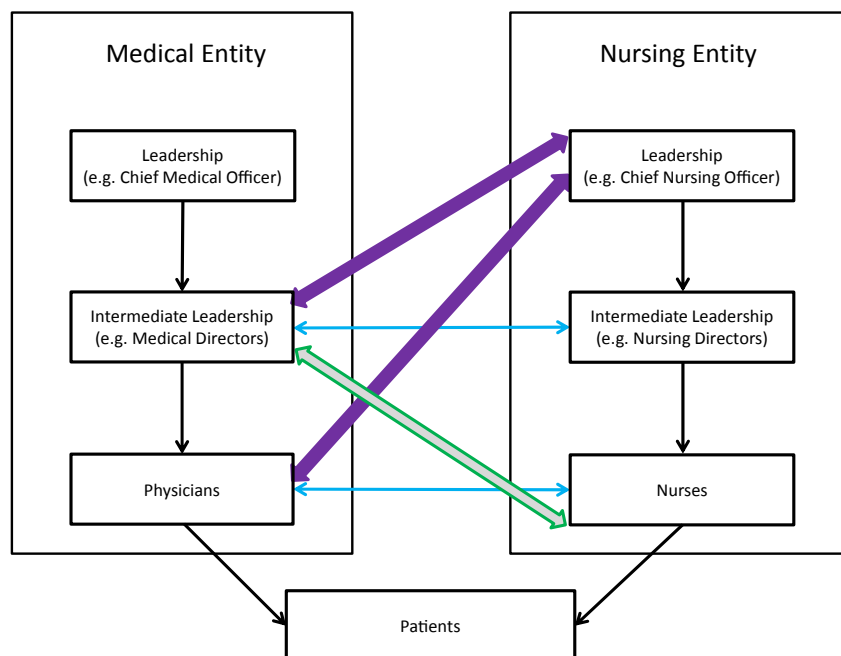## Appendix D. Cross-level collaboration in hospitals
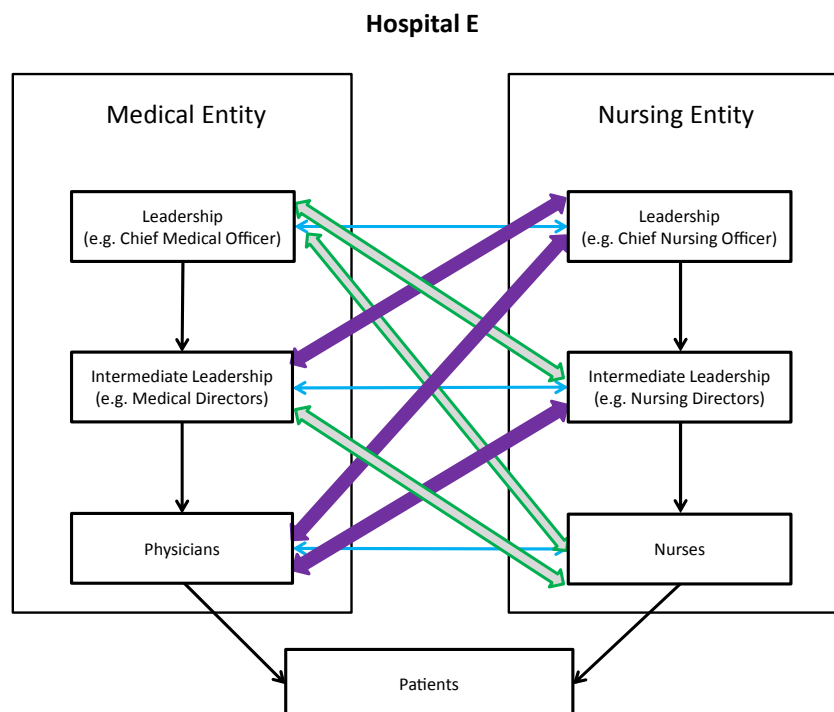
Hospital E

Lateral collaboration   Nursing-led cross-level collaboration   Physician-led cross-level collaboration

Hospital A

Medical Entity

Nursing Entity

Leadership
(e.g. Chief Medical Officer)

Leadership
(e.g. Chief Nursing Officer)

Intermediate Leadership
(e.g. Medical Directors)

Intermediate Leadership
(e.g. Nursing Directors)

Physicians

Nurses

Patients

Lateral collaboration   Nursing-led cross-level collaboration   Physician-led cross-level collaboration

Hospital B

Medical Entity

Nursing Entity

Leadership
(e.g. Chief Medical Officer)

Leadership
(e.g. Chief Nursing Officer)

Intermediate Leadership
(e.g. Medical Directors)

Intermediate Leadership
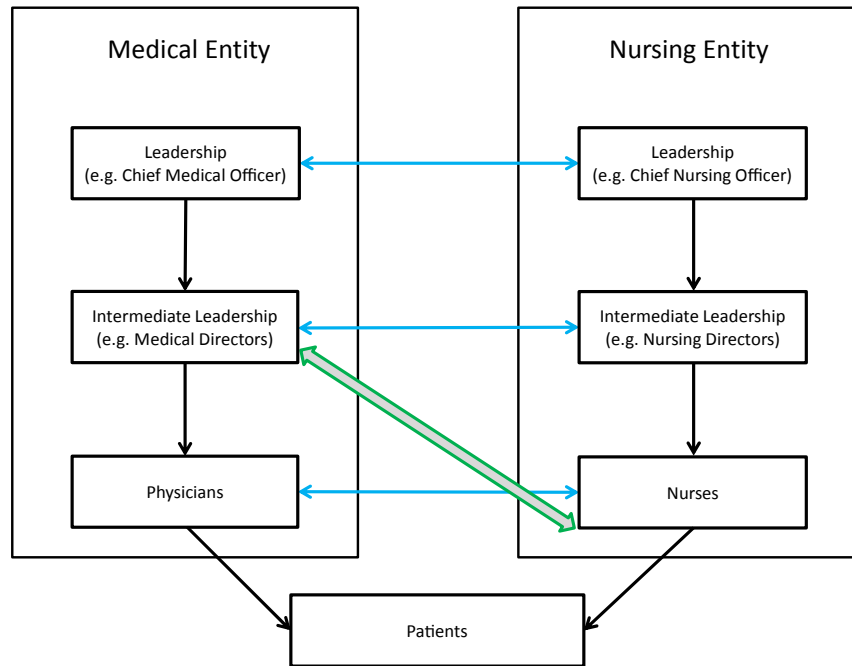(e.g. Nursing Directors)

Physicians

Nurses

Patients

⟷ Lateral collaboration   ⟹ Nursing-led cross-level collaboration   ⟹ Physician-led cross-level collaboration

Hospital C

⟷ Lateral collaboration   ⟹ Nursing-led cross-level collaboration   ⟹ Physician-led cross-level collaboration
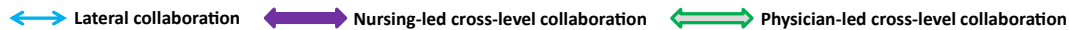
Hospital D

◄——► Lateral collaboration ◄══► Nursing-led cross-level collaboration ◄══► Physician-led cross-level collaboration
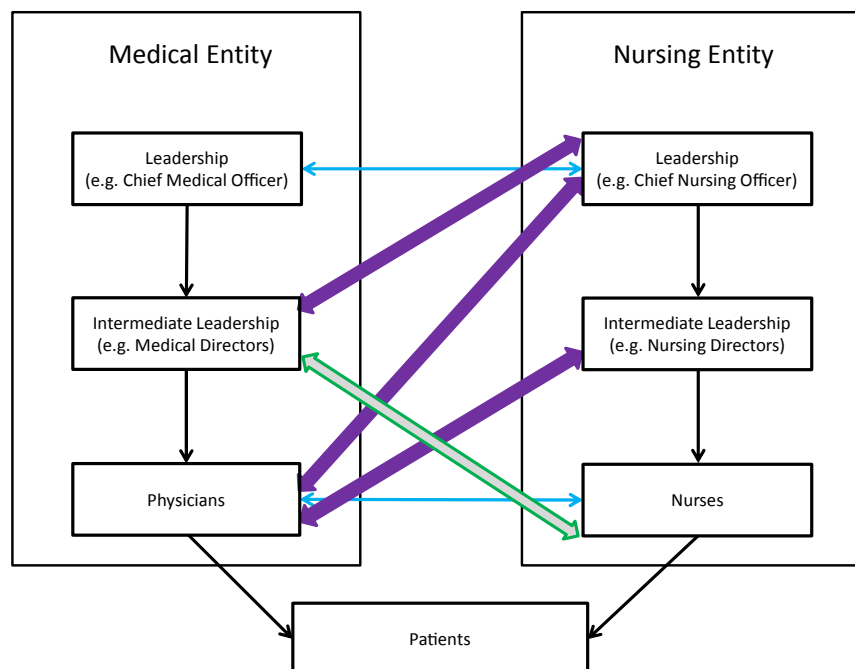
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