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Role of Bottom-Up Decision Processes in Improving the Quality of Health Care Delivery: A Contingency Perspective

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Recent changes to health care reimbursements policy mandate hospitals to improve simultaneously on conformance and experiential quality. Conformance quality measures the level of caregivers' adherence to evidence-based standards of care while experiential quality measures the level of interaction between caregivers and patients. Hospitals operate in regulated environments characterized by heavy top-down control mechanisms that are conducible for improving conformance quality. However, mechanisms that propel experiential quality, which emerges from the operational-level interactions between caregivers and patients, remain unclear. This study employs a two-phase multi-method research to investigate this issue. The first phase uses qualitative data from five U.S. acute care hospitals involving 49 semi-structured interviews and develops hypotheses on the effect of bottom-up and top-down decision processes on hospitals' ability to simultaneously improve on conformance and experiential quality. These hypotheses are then tested and refined using secondary data for a sample of 3,124 U.S. acute care hospitals between the years of 2006 and 2012. Results from the case analyses suggest that Magnet status, a sign of bottom-up decision processes, is associated with hospitals' ability to improve on both conformance and experiential quality. However, hospitals' administrative intensity, which relates to top-down decision processes, appears to mitigate the effect of Magnet status on simultaneous improvement. Testing this framework using large-scale secondary data supports the positive effect of Magnet status on simultaneous improvement. However, we do not find support for a negative moderating effect of administrative intensity. A follow-up analysis reveals that this moderation is in fact curvilinear (inverted U-shape), which indicates that a moderate level of administrative intensity is most beneficial to the relationship between Magnet status and simultaneous improvement. Taken together, our results provide new insights into the complementary between top-down and bottom-up decision processes in hospitals.

Key words: conformance and experiential quality; Magnet status; administrative intensity; bottom-up and top-down decision processes; contingency theory
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1. Introduction

In 2010, the United States government passed the Patient Protection and Affordable Care Act which includes a Pay for Performance Plan known as the Value-Based Purchasing (VBP) program. Beginning in fiscal year 2013, this program ties the hospital reimbursements to their scores on both conformance and experiential quality, making it imperative for hospitals to focus on both these dimensions. Conformance quality measures the *level of adherence to evidence-based standards of care* achieved by hospital's caregivers, as documented on the patients' medical records (Senot et al. 2015, Theokary and Ren 2011). Providing a fibrinolytic medication to all eligible heart attack patients within 30 minutes of arrival to dissolve blood clots is an example of conformance quality. Experiential quality, on the other hand, measures the *level of interaction between hospital's caregivers and patients during health care delivery*, as experienced by the patient (Nair et al. 2013, Chandrasekaran et al. 2012). Caregivers' changing the delivery of discharge instructions (e.g., verbal vs. visual) depending on patient's needs and preferences is an example of experiential quality.

Research shows that hospitals often struggle to simultaneously improve on conformance and experiential quality (Chandrasekaran et al. 2012, Donabedian 1988). Simultaneous improvement on these dimensions requires that caregivers perform different types of activities that can sometimes be difficult to reconcile (March 1991, Inkpen and Tsang 2005, Gupta

et al. 2006). In particular, improving on conformance quality requires a task-oriented perspective and a focus on minimizing variation in existing practices while improving on experiential quality requires a relationship-oriented perspective which might introduce variation during the delivery of care. One approach to simultaneously improve on these dimensions is to physically separate these activities and have different people work on improving them (e.g., Hayes et al. 2004, Jansen et al. 2009, O'Reilly and Tushman 2004). However, such as separation is difficult to implement in health care delivery settings. Indeed, not only each caregiving team, but also each caregiver in the team (physician or nurse) is required to focus on both conformance and experiential quality during each care episode with the patient.

There are a few studies that have looked at how organizations simultaneously improve on multiple dimensions in contexts that are devoid of structural separation. For instance, when studying capital budgeting, Bower (1974) argues that investing in decision processes that facilitate both top-down control and bottom-up involvement within the same unit can allow organizations to focus on multiple dimensions. The top-down processes provide hierarchical control and guidance within the organization and hence favor activities related to conformance quality (Burgelman 2002). The bottom-up processes promote flexibility by allowing practical issues and solutions that need not obey the rules of standard process to emerge and hence aid activities related to experiential quality (Gibson and Birkinshaw 2004). There exist parallels in hospitals, which function in highly regulated environments which are inherently designed to have strong top-down decision processes. For instance, using standard checklists during the delivery of care (Pronovost and Vohr 2010) and documenting all treatment plans on patient medical records (Shortell et al. 1995) are standards of care ensured by top-down processes that are shown to improve conformance quality. The functioning and value of bottom-up decision processes in hospitals, however, remains less clear and is addressed in this research.

We adopt a multi-method approach to investigate how hospitals invest in bottom-up decision processes to simultaneously improve on conformance and experiential quality when delivering health care. The first method incorporates a multiple-case study design and is aimed at gaining a better understanding of how bottom-up processes work and of their contribution to a hospital's simultaneous improvement on conformance and experiential quality. Yin (2003) recommends using cases for theory refinement purposes when existing theories are not well enough formulated to allow for explicit hypotheses testing. Iterating between the extant literature and case analyses revealed that Magnet status, a sign of systemic involvement of frontline nurses in operational- and strategic-level decision making (bottom-up decision processes), facilitated hospitals' simultaneous improvement during the delivery of care. However, our cases also revealed that hospital administrative intensity, which reflects a move toward more centralized control (top-down decision processes), could result in a task-focused approach that often came at the expense of experiential quality. Case analyses suggest that such centralization of authority indicated by administrative intensity negatively moderated the relationship between Magnet status and simultaneous improvement.

We next examine these hypotheses using secondary data from 3,124 U.S. acute care hospitals between the years 2006 and 2012. Using multiple methods such as case studies and econometric estimation allows us to not only develop a new theoretical understanding but also to test and refine this understanding using large-scale data. Results from the econometric analyses support our hypothesis on the positive association between Magnet status and simultaneous improvement. However, we do not find support for a moderating effect of administrative intensity. A follow-up analysis reveals that this moderation is in fact curvilinear (inverted U-shape), which indicates that a moderate level of administrative intensity is most beneficial to the relationship between Magnet status and simultaneous improvement. By showing such complementarity between bottom-up and top-down decision processes, these results both support the importance of frontline employee involvement in all levels of decision making as well as offer a contingency perspective on the effect of organizational decision processes on performance.

2. Phase 1: Theory Development and Hypotheses

2.1. Qualitative Research Method

We conducted a multiple-case study in the heart failure units of five acute care hospitals to gain a better understanding of the bottom-up decision processes within hospitals. Our preliminary conversations with health care professionals suggested that improving simultaneously on conformance and experiential quality is extremely important for patients treated for the heart failure condition. The chronic aspect of this condition means that caregivers are not only required to properly diagnose and treat patient's symptoms in the short run but must also ensure that the patient understands and adheres to the treatment in the long run. As a result, we focused our data collection efforts within these units. A brief overview of the research

sites and research design involved in this multiple-case study follows.

2.1.1. Research Sites. We sampled five U.S. acute care hospitals, all treating heart failure patients. We will henceforth refer to them as Hospital A, Hospital B, Hospital C, Hospital D, and Hospital E. Administrators from Hospital A contacted the research team after attending one of its presentations, targeted at practitioners. We looked at Hospital A's progression on conformance and experiential quality using secondary data and found it to have experienced trade-offs along its quality improvement path. The remaining four hospitals selected were members of a larger center affiliated with the research team's university and were comparable, in terms of characteristics, to Hospital A. In particular, they were all large –that is, >300 beds, classified as a major teaching hospital –that is, member of the Council of Teaching Hospitals (COTH), non-profit, and with relatively high Case-Mix Index (CMI)—a measure of clinical complexity of patients treated by the hospital. However, these hospitals differed in their progress on conformance and experiential quality.[1] In particular, Hospital E showed simultaneous improvement on both process quality dimensions for six straight years. The research team also had access to additional hospital contacts through this center but achieved category saturation after analyzing data from these five hospitals and hence did not sample more hospitals (Suddaby 2006).

Table 1 gives an overview of the research sites. The data collection began in September 2012 and ended in April 2013. It involved semi-structured interviews, observations, project meeting reports, newsletters, discharge protocols, and other training documents. One of the authors of this study also participated in the hospital's training programs along with the caregivers. We ended our study with feedback sessions at the participating hospitals.

All five hospitals studied referred to the challenge of simultaneously adhering to technical standards of care—conformance quality—while valuing individual interactions with patients during the delivery of care—experiential quality. As stated by the Director for Quality and Patient Safety at Hospital D:

> We deal with this tension [between conformance and experiential quality] every day. All the things that we are required to do to properly take care of the patient [conformance quality], yet remembering to show a human face to all those requirements [experiential quality]... It sounds easy on the surface but it is quite challenging.

The different learning orientations between conformance and experiential quality that contributes to this tension are further underlined by the Director for Patient Experience at Hospital E:

> [Our hospital] is fragmented [between conformance and experiential quality]. Patient experience becomes another thing to do. It is also perceived as quite soft. Culturally, we are a very "get it done" model. That efficiency that made us so good clinically [high conformance quality] is exactly what we are now trying to temper [in order to improve on experiential quality].

Table 1 Multiple-Case Study: Overview of Research Sites*

	Hospital A	Hospital B	Hospital C	Hospital D	Hospital E
Average adherence to HF process of care measures (conformance quality)	Between 97% and 98%	Above 99%	Above 99%	Above 99%	Between 98% and 99%
Average score on COMP1–COMP6 of HCHAPS survey (experiential quality)	Between 70% and 72%	Between 72% and 74%	Between 72% and 74%	Between 74% and 76%	Between 74% and 76%
Bed size	Between 300 and 500 beds	Over 500 beds	Over 500 beds	Between 300 and 500 beds	Over 500 beds
Residents-to-beds ratio	Over 50%	Between 30% and 50%	Between 15% and 25%	Between 15% and 25%	Between 30% 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
Respondents					
Leaders	6	6	4	6	4
Physician caregivers	2	4	1	2	3
Nurse caregivers	3	–	3	2	3

Notes: Scores on conformance quality for HF patients and experiential quality reflect performance for October 2011–September 2012 time period (most recent time period available at time of case study).
*All hospitals are non-profit and major teaching hospitals (i.e., members of the Council of Teaching Hospitals).

2.1.2. Qualitative Data Collection and Analysis. While the decisions regarding allocation of resources to conformance and experiential quality takes place at the strategic level, implementation of these decisions typically takes place at the caregiver (i.e., operational) level. As a result, our study investigates issues related to hospital's simultaneous improvement at both the strategic and the operational level. Interviews with the leaders and caregivers involved open-ended questions on hospital's goals and priorities, potential tensions between conformance and experiential quality, communication across levels and within care teams, team dynamics, rewards and incentives, hospital's hiring and training policies, and impact of legislation on these process quality dimensions. Strategic level interviews involved 26 senior level executives including the Director for Quality and Patient Safety, the Director for Patient Experience, the Chief Medical Officer, the Chief Nursing Officer, the Director of Nursing Quality, the Director of Cardiovascular Medicine, the Director of Hospital Medicine, the Heart Failure Program Manager, and the Manager of Magnet Nursing. We also interviewed, using a separate protocol, 12 floor-level physicians and 11 floor-level nurses responsible for the treatment of heart failure inpatients. Overall, we conducted a total of 49 individual semi-structured interviews. Two members of the research team were present at most of these interviews, one as an interviewer and one as an observer (Langley 1999).

After each interview, the research team met to discuss emerging theories. Once a case was completed, findings from these sites were used to develop initial coding themes (Glaser and Strauss 1967). All recorded interviews were transcribed and coded using NVivo10. Coding was done independently by one researcher and two assistants. Differences in coding were discussed until an agreement was reached. In accordance with the replication logic, cross-case analyses were conducted only once all cases were completed (Yin 1994). In what follows, we iterate between the emerging themes from our cross-case analyses and the extant literature to develop an understanding on the effectiveness of bottom-up decision processes as a mechanism to facilitate hospitals' simultaneous improvement on conformance and experiential quality.

2.2. Magnet Status: Evidence of Bottom-Up Decision Processes

After defining conformance and experiential quality, all interviews began with an open-ended question on their relative importance and the potential challenges to simultaneously improve on both these dimensions. One theme that emerged from the cross-case analyses is that respondents across all hospitals valued both these dimensions but indicated that the organizational pressure to improve on conformance quality was much greater compared to experiential quality. They attributed this relative imbalance to the ease of formally monitoring conformance quality. In other terms, because the activities supporting conformance quality were easier to document, they facilitated an ever-growing top-down oversight throughout the organization through the use of simple control tools (e.g., standardized documentation, checklist). On the other hand, experiential quality was harder to operationalize consistently throughout the organization because it required caregivers to vary their health care delivery depending on individual patient' needs and preferences and could thus not translate into a set of standardized tasks like conformance quality. As a result, fewer top-down control mechanisms could be implemented for experiential quality and systemic continuous improvement along this dimension appeared more challenging. As stated by the Director for Quality and Patient Safety at Hospital D:

> We do a lot of inspection for what we expect in [conformance] quality. I don't know that we've done that as successfully in our patient experience world [to assess experiential quality].

This highlighted the potential role played by bottom-up, as opposed to top-down, processes in allowing decisions regarding experiential quality to emerge from the operational level and, ultimately, in restoring an organizational balance between conformance and experiential quality. A first step toward investigating the effectiveness of such bottom-up decision processes was to better understand who, at the operational level, was responsible for these processes. Although all respondents recognized their role in pursuing both conformance and experiential quality, they also agreed that experiential quality was ultimately the responsibility of the nurses. Reasons cited included nurses' more holistic education, nurses having fewer patients and thus spending more time forging relationships with them, and nurses caring for the whole patient while multiple specialists might be called in to treat different concurrent diseases.

Given the central role played by nurses in promoting experiential quality, the importance of nurse involvement in strategic decision making to rebalance the organizational focus toward experiential quality became evident in our cross-case analyses. However, evidence from the extant literature reveal that physicians, rather than nurses, have traditionally been included in all strategic decisions, irrespective of their domain (Nembhard et al. 2009). This often results in a

hierarchical culture wherein physicians decide and nurses execute. When discussing organizational facilitators to nurses' involvement in all levels of decision making, the "Magnet" status, which had been adopted by all hospitals in our case study, was frequently cited by respondents as an important milestone and continuous motivator. Although all our hospitals had Magnet status, our respondents were able to anecdotally compare the current hospital operations with their past experience, prior to obtaining this certification or in other hospitals that did not have this certification, when discussing the benefits of Magnet status.

The Magnet certification, created by the American Nurses Credentialing Center (ANCC) in 1993, was initially named following the hospitals' ability to attract and retain well-qualified nurses at a time when hospital nurses were scarce. Overall, having the Magnet status, which is renewed every 4 years, reflects the presence of organizational initiatives within a hospital that allow greater professionalization of nursing, through flatter hierarchical structures and an emphasis on "increasing levels of education for all nurses within the organization, nursing involvement in governance and decision making in patient care, and the development of research-based nursing practice" (Abraham et al. 2011, p. 307). More specifically, the Magnet Recognition Program model has five components related to the involvement of frontline nursing staff in operational and strategic decision making (bottom-up decision process) and identified as important differentiators for hospitals (www.nursecredentialing.org). These components and associated characteristics are described below along with illustrative quotes from the case study.

The first component of the Magnet model is "Transformational Leadership", which involves a nursing leadership that is strong, visible, accessible, and supportive of staff at all levels. The following quote from the Chief Nursing Officer at Hospital D exemplifies such leadership:

> I make a habit of meeting with every single new nurse that comes in here personally, so I talk to them and I meet them and we tell stories in groups, and then I round, and now I see them on the floor, so I try to build a relationship. I have staff meetings and I have a monthly meal with the chief nurse where I ask two questions: Tell me one thing that's going right, and tell me one thing we can do better. [. . .] I round at nighttime. I have an open door policy. Staff can e-mail me: we have a website where they can ask me questions.

The second component of the Magnet model is "Structural Empowerment". This reflects the existence of structures and programs to develop, direct, and empower nursing staff. For instance, an important feature of Magnet hospital is shared governance which reflects the systemic participation of nursing staff in strategic decision making. This is described in the following quote made by the Chief Nursing Officer at Hospital D:

> A main element to be a Magnet hospital is to have a model of shared governance. It is a management methodology that is much less hierarchical than your traditional way of managing things. It is a way of having nurses participating in making decisions about their practice and the care of patients. We have formal structures [for shared-governance] to hardwire it to make sure that it is embedded in our culture. For instance, staff nurses and nurse managers are the chairs for many of our patient care meetings. It is a way to ask for everyone's input in the decisions that we make. It gives frontline staff the opportunity to interact with senior level management and make decisions about what we do.

The third component of the Magnet model is "Exemplary Professional Practice". This entails giving nursing staff greater autonomy and accountability in the provision of direct patient care, and an organizational recognition of this professionalism through, for example, strong interdisciplinary collaboration between nurses and physicians that belong to the same care team. The Medical Director for Quality and Patient Safety at Hospital C made the following statement, which supports the importance of Magnet certification in promoting mutual respect between nurses and physicians:

> One of the things it [Magnet] does is that it takes the physician from sitting at the top of the hierarchy to flattening out that hierarchy where we all see that we have role to play in the team. I think that that culture change is going to be a key for us providing more patient-centered care.

The fourth component of the Magnet model is "New Knowledge, Innovations & Improvements". This represents the existence of organizational structures and processes to advance the science of nursing and continuously improve the quality of care delivery. For instance, efforts to maintain Magnet status at Hospital B involved the hiring of a nurse researcher, whose role is further described in this quote by the Director of Nursing Quality:

> Nursing science is relatively new compared to medical science, so having a nurse researcher

> here in our department is really important as we try to increase our nursing science knowledge and look for best practices. [...] Our nurse researcher helps to facilitate interest in research, and is working with different groups to spearhead research projects. [...] It is about making sure that we are evidence-based in nursing.

The fifth and last component of the Magnet model is "Empirical Outcomes". This reflects not only the consideration of innovative structures and processes but also the measurement of outcomes achieved relative to explicitly established benchmarks. These outcomes include clinical outcomes related to nursing, workforce outcomes, patient outcomes, and organizational outcomes in order to provide a comprehensive view of the organization's commitment to quality. This all-encompassing view is illustrated in the following comment made by a nurse at Hospital E:

> [Magnet status] is the highest recognition that a nursing facility or institution can obtain. To me it really stands out, meaning that we have proven ourselves as a nursing group, to be professionals, to be competent in our practice, to demonstrate good quality outcomes, and to really have opportunities for professional development enhancement. To me, it's just an overall great positive recognition of the work environment and the professionalism of the nurses that we have here.

Overall, our analyses showed that Magnet status represented a systematic involvement of frontline nurses in all levels of decision making regarding patient care, reflecting the existence of extensive bottom-up decision processes within these hospitals.

2.2.1. Effect of Magnet Status on Simultaneous Improvement. Our case analyses further showed that Magnet status played a key role in facilitating simultaneous improvement on conformance and experiential quality for hospitals. Further analysis of our cases highlighted two reasons that explained this effect. First, in Magnet-certified hospitals (such as the ones in our study), nurses are more likely to play a critical part in designing pathways for delivering care. Using their expertise therefore helps develop better standards of care throughout the organization by integrating experiential quality elements, such as ensuring that patients understand the medications provided, in tools typically used to ensure conformance quality, such as checklists. As an example, consider the delivery of discharge instructions to heart failure patients at the end of their hospital stay. An important requirement is to prescribe the appropriate medications and provide necessary instructions to the patient prior to discharge (i.e., conformance quality). However, because patients might have individual challenges, fulfilling this requirement does not ensure that the patient will be able to follow through with those instructions. As learned through our interviews, sometimes, the patient's insurance plans may not cover specific medications and the patient may thus not be able to afford these. In other instances, we found that the patient may not have access to appropriate transportation to go to the pharmacy, or the patient may not own a weighing scale to check his/her weight regularly, etc. Much of this information can go unnoticed without proper interactions with the patients (i.e., experiential quality), resulting in poor compliance and ultimately bad outcomes. Our conversations with the nursing staff revealed that Magnet status allowed nurses to speak up and share these issues with the rest of the care team. This can result in the design of alternative discharge standards across the hospital (e.g., asking about insurance coverage, talking to social worker to arrange appropriate transportation, provide a weighing scale to the patient, etc.). In this example, because of Magnet status (i.e., bottom-up approach), conformance, and experiential quality were integrated into the health care delivery model to create a more effective discharge plan for the patient.

Second, our conversations with caregivers indicate that Magnet status helped change the conceptualization of care delivery among all staff including the physicians. In fact, we found that Magnet status facilitated overcoming a task-focused culture by restating the importance of caring for the patient rather than the disease to all caregivers. This is also supported by the nursing literature, which finds that nurses in Magnet-certified hospitals generally see themselves as advocates for their patients and seek to promote this patient-centered view throughout their organization (McClure 2005). As a result, physicians are able to see the value of interacting with their patients rather than solely focusing on their disease. For instance, in Hospital E, which has had the Magnet status since 2003, a physician made the following remark.

> I think [experiential quality] is rescuing medicine from the way it was going, from just becoming a detached technological, scientific discipline. It is recuing it back toward a patient-centered and humanistic discipline, where you will have the technological component, but making sure that we don't forget that the patient is the most important thing.

These arguments on the practical and conceptual changes generated by Magnet status suggest the

following relationship between hospital's Magnet status and simultaneous improvement on conformance and experiential quality.

HYPOTHESIS 1. *Magnet status is positively related to hospital's likelihood of simultaneous improvement on conformance and experiential quality.*

2.2.2. Relationship between Administrative Intensity, Magnet Status and Simultaneous Improvement. Our cross-case analyses revealed that the ease of monitoring conformance quality through simple tools such as checklists and electronic medical records was associated with increased administrative intensity across all hospitals to further control this aspect of quality. The extant literature suggests that this growing administrative intensity, in turn, typically encourages a greater focus on aspects that are easily monitored (Blau and Schoenherr 1971, Damanpour 1987), such as conformance quality, creating a reinforcing loop.

However, rather than only benefiting conformance quality, our interviews suggested that administrative intensity can also have unintended negative effects on experiential quality because of the change in behavior that it engendered. In particular, this growing administrative oversight often promoted a task-driven behavior among all caregivers, including nurses, which could deter from improving on experiential quality. This is illustrated by the following comment made by the Chief Quality and Patient Safety Officer at Hospital B:

> They are all these tasks that people have to do in order to achieve some level of care [conformance quality] and sometimes you lose the patient [experiential quality] in that, you definitely lose the family.

This implied increase in administrative intensity can dampen the effectiveness of initiatives, such as Magnet status, that are targeted at rebalancing the focus toward experiential quality. Under these conditions, caregivers tend to prioritize explicit and measurable tasks which can come at the expense of simultaneous improvement. This is evidenced from the observation made by the Chief Nursing Officer at Hospital D:

> The challenge is that we have become a health care society where health care workers are so busy checking things off the list [conformance quality] that they forget about relationships [experiential quality].

The change in behavior engendered by administrative intensity and the difficulty for a single nurse to reconcile task- and relationship-driven behaviors is further illustrated in the following comments made by the nursing staff at Hospital B and Hospital D:

> I think we are so focusing on making sure that everything, all the guidelines [i.e. conformance quality] and all the big entities that are monitoring us are happy that the patient [i.e. experiential quality] is like an afterthought.

> The thing that we've done to nurses at the bedside is we keep adding more things for them to do [related to conformance quality]. We keep adding okay here's this regulatory guideline. Now we have to chart about this; now we have to do that. We've never taken anything away, and so the things that have dropped off have been those you know human connection things [i.e. experiential quality] that we so value in nursing but we're struggling to have time to do.

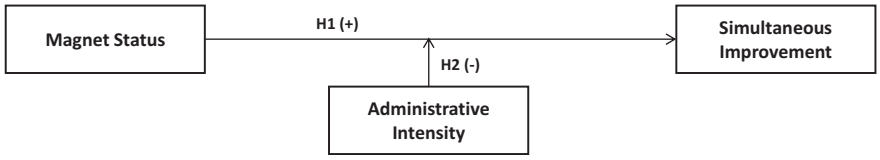
The extant literature on organizational theory supports these insights. Indeed, early research has recognized the role of administrative oversight as a mechanism to improve performance when all tasks can be explicitly described such as for conformance quality (e.g., Stene 1940, Burns and Stalker 1961, Child 1973, Damanpour 1991). However, researchers have also underlined that adherence to strictly defined rules can sometimes come at the expense of personal or situational idiosyncrasies, which are critical to experiential quality (e.g., Abernethy and Lillis 1995, March and Simon 1958, Mintzberg 1979, Whitley 1999).

Thus, we argue that administrative intensity negatively moderates the relationship between Magnet status and simultaneous improvement. With increasing administrative intensity, which reflects top-down control, nurses in Magnet hospitals develop a task-driven behavior which is ill-fitted to the relationship-oriented experiential quality. As a result, increases in administrative intensity may tend to undermine the effectiveness of Magnet status with regard to achieving a more balanced progression between conformance and experiential quality. This is formally stated in the following hypothesis:

HYPOTHESIS 2. *Administrative intensity negatively moderates the relationship between hospital's Magnet status and its likelihood of simultaneous improvement on conformance and experiential quality.*

Figure 1 summarizes the framework that emerged from iterating between insights from the multiple-case study and existing theory. The next step involves

Figure 1 Framework Developed in Phase 1



testing this framework using large-scale secondary data.

3. Phase 2: Theory Testing

To test our hypotheses, we collected secondary data over 6 years (July 2006–June 2012) for all 3,474 US acute care hospitals listed in the Centers for Medicare and Medicaid Services (CMS) database as of June 2012. Although the first phase of our research focused on heart failure units to allow specific insights, we considered all conditions of conformance quality that are evaluated by CMS (i.e., heart attack, heart failure, pneumonia, and surgical care) in our theory testing phase. CMS reports hospitals' performance for conformance quality for these four conditions beginning in July 2004 and for experiential quality for all inpatients beginning in July 2006. These data are available from cms.gov for all years until June 2013. However, for this study, we consider conformance and experiential quality for the July 2006–June 2012 time period. We excluded the last year of available observations to avoid other potentially confounding variables such as recent institutional effects that can influence experiential and conformance quality. This is especially true for this last year given the recent VBP program, enacted in October 2012 by CMS, which links hospitals' reimbursement to both their conformance and experiential quality scores.

A total of 3,141 acute care hospitals reported scores to CMS for both conformance and experiential quality dimensions for the time period considered, allowing observing whether simultaneous improvement occurred. As reported in Table 2, we collected and matched secondary data from the following six distinct sources: CMS process of care measures (conformance quality), CMS Hospital Consumer Assessment of Health care Providers & Systems (HCAHPS) survey (experiential quality), the ANCC website (Magnet status), CMS Cost Reports (administrative intensity), CMS Impact Files, and CMS Hospital Files (controls). The final sample consists of 13,841 hospital-years observations across 3,124 hospitals.

3.1. Variables

3.1.1. Dependent Variable: Simultaneous Improvement. We measured hospital's simultaneous improvement on conformance and experiential quality using the following approach. First, we computed, for each hospital i and year t, a performance score for conformance quality (CQ_{it}) and for experiential quality (EQ_{it}). More details on the computation of these individual quality scores are given next. We then

Table 2 Theory Testing: Variables and Sources

Variables	Description	Source
Performance path		
Conformance Quality	Hospital's weighted average score on AMI, HF, PN, and SCIP process of care measures	CMS Process of Care measures
Experiential Quality	Hospital's average score on COMP1–COMP6 of inpatient survey	CMS HCAHPS survey
Simultaneous Improvement	Binary variable: 1 if hospital improves on both conformance and experiential quality in year t, 0 otherwise	–
Organizational architecture		
Magnet Status	Binary variable: 1 if hospital is Magnet certified in year t, 0 otherwise	ANCC website
Administrative Intensity	Ratio of administrative hours divided by total hours billed	CMS Cost Report
Controls		
CQ_{t1}	Hospital's score on conformance quality in year $t-1$	CMS Process of Care
EQ_{t1}	Hospital's score on experiential quality in year $t-1$	CMS HCAHPS survey
Bed Size	Ln(number of beds)	CMS Cost Report
Ownership	Binary variable (public = 1/private = 0)	CMS Hospital File
Corporate Goal	Binary variable (for-profit = 1/non-profit = 0)	
Rural Location	Binary variable	CMS Impact File
Large Urban Location	Binary variable	
Teaching Intensity	Residents-to-beds ratio	
Case-Mix Index	Ln(Average of weighted DRGs computed by CMS)	

computed for each hospital a progression score between successive years on both quality dimensions as follows:

$$\Delta CQ_{it} = CQ_{it} - CQ_{it-1} \quad \text{for conformance quality,}$$

$$\Delta EQ_{it} = EQ_{it} - EQ_{it-1} \quad \text{for expriential quality.}$$

The binary variable, *Simultaneous Improvement*, is coded as 1 if both $\Delta CQ_{it} > 0$ and $\Delta EQ_{it} > 0$, and 0 otherwise. We also considered an alternative, continuous, measure to assess simultaneous improvement which is explained in the robustness section.

Conformance Quality (*CQ*) represents the level of systematic adherence to technical standards achieved by hospitals when delivering health care to the patient. Conformance quality is measured using scores on CMS process of care measures that reflect the percentage of eligible hospitalized patients who received care in accordance with the evidence-based technical measures during each year considered. These measures were developed in 2003 by CMS and the Joint Commission and results are reported on the CMS Hospital Compare website (hospitalcompare.hhs.gov).

Specifically, we considered adherence to the process of care measures for the four inpatient conditions monitored by CMS: Heart Attack (AMI), Heart Failure (HF), Pneumonia (PN), and Surgical Care (SCIP). We only included measures that were common across all years. For each measure, CMS reports the percentage of eligible inpatients who actually receive the treatment in a given hospital. A complete list of the 13 conformance quality measures used in this study along with our sample average for the 6 years considered are presented in Appendix A.

Following CMS guidelines, only percentages that are based on a sample of at least 25 eligible patients were included in the study. The conformance quality score is computed as the hospital's weighted average percentage across the 13 selected measures (Theokary and Ren 2011).

Thus, *Conformance Quality* for hospital i in year t is given by the following:

$$CQ_{it} = \frac{\sum_{j=1}^{13} P_{jit} \times n_{jit}}{N_{it}},$$

with P_{jit} = percentage adherence on process of care measure j for hospital i in year t, n_{jit} = number of patients eligible for process of care measure j for hospital i in year t, and

$$N_{it} = \sum_{j=1}^{13} n_{jit}.$$

Experiential Quality (*EQ*) reflects the quality of interactions between hospital's caregivers and patients, as experienced by the patient. Experiential quality is evaluated using patients' response to the HCAHPS survey obtained during the 6 years considered. These measures were developed by CMS and the US Agency for Healthcare Research and Quality (AHRQ) in 2006. Results are also reported on the CMS Hospital Compare website after being aggregated at the hospital-level and adjusted by CMS for patient characteristics (education, self-rated health, primary language, age, and service line) that are beyond a hospital's control and might affect patients' answers to the survey.

To compute the experiential quality score, we used the six composite items issued from this survey that measure the hospitals' emphasis on communicating with patients and involving them in the care process (Boulding et al. 2011). CMS defines these composites based on common themes which relate to the extent to which patients' individual care needs were considered during the process of care, such as the quality of communication with nurses and physicians (COMP1 and COMP2), how responsive caregivers are to patients' needs (COMP3), how well caregivers help patients manage their pain (COMP4), how well caregivers explain medications to patients (COMP5) and the quality of the discharge instructions (COMP6). Full text of composites, summary statistics for all years considered, and underlying survey questions are shown in Appendix B. Cronbach's alpha for these items is above 0.90 for each year considered, which indicates excellent internal consistency (Hair et al. 2010).

Based on CMS guidelines, only data from hospitals that had survey responses from at least 100 patients were included in the study. The survey data are aggregated at the hospital level by CMS. For each composite COMP1 through COMP5, CMS reports the adjusted percentage of patients at the hospital who answered the question using the response categories "Never/Sometimes", "Usually" or "Always." We used the percentage of patients who answered "Always" as the measure for the composites' individual scores. COMP6's response categories are only "Yes" or "No," so the percentage score for that composite is the percentage of respondents who answered the question with "Yes." Finally, an overall experiential quality score for each hospital was calculated by computing the average of the percentage scores for the six composites[2] (Senot et al. 2015).

Thus, *Experiential Quality* for hospital i in year t with percentage score E_{jit} on composite j is given by:

$$EQ_{it} = \frac{\sum_{j=1}^{6} E_{jit}}{6}.$$

3.1.2. Independent Variables. *Magnet Status*, coded as a binary variable, reflects whether a hospital was a Magnet-designated organization in the focal year. Once a hospital gets Magnet certified, it typically maintains this status through redesignation every 4 years and very rarely opts out of the certification. Given our study period, we only considered whether a hospital was Magnet certified up to 2012. This data was collected from the ANCC website (www.nursecredentialing.org). Dates of first Magnet certification for the hospitals included in our sample ranged from 1994 (1 hospital) to 2012 (19 hospitals) with a total of 287 hospitals in our sample being Magnet certified as of 2012 (9.2% of our sample). None of these hospitals opted out of the certification process upon their first certification.

Administrative Intensity reflects the relative amount of administrative duties in a focal hospital as a percentage of total work performed in the hospital. We evaluate this variable using the wage data found in the yearly cost report submitted by hospitals to CMS. Each hospital's cost report submitted to CMS contains over 160 pages of data (accompanied by almost 300 pages of documentation) describing in detail this hospital's expenses, computation and allocation of costs, patient population, etc. and is used by CMS for reimbursement determination purposes. We account for both employees and contract labor and we used the number of billed hours devoted to administrative duties divided by the total number of billed hours for the hospital. Considering billed hours rather than direct salaries allows better comparisons across hospitals without the need to account for geographical differences such as cost of living. The specific cost report categories included in the numerator and denominator are adapted from previous research (Woolhandler et al. 1993) and are shown in Appendix C.

3.1.3. Controls. Since our study investigates the hospital's progression along conformance and experiential quality rather than observing their raw scores on these dimensions, for each year t, we control for hospital's initial scores on conformance quality (CQ_{it-1}) and experiential quality (EQ_{it-1}). This prevents penalizing hospitals that have already high scores and thus less room for improvement.

We also control for several variables that could potentially explain variations in hospitals' simultaneous improvement. They include *Year* (2007–2012), *Ownership* (public or private), *Corporate Goals* (for-profit or non-profit) (Weiner et al. 2006), hospital's location represented by two binary variables to reflect *Rural* and *Large Urban* areas (Jha et al. 2009), *Teaching Intensity* (residents-to-beds ratio) (Sloan et al. 2001), and *CMI* which reflects the relative amount of resources needed to treat the mix of patients present in this hospital (Carling et al. 2003).

3.2. Quantitative Analyses and Results

The 13,841 hospital-year observations in our sample demonstrate different performance paths with 7267 observations (53% of sample) showing simultaneous improvement between year $t-1$ and year t, 4282 observations (31% of sample) showing improvement along conformance quality alone, 1346 observations (10% of sample) improving along experiential quality alone, and 946 observations (6% of sample) improving along neither dimension in a given year. Table 3 represents the summary statistics and pairwise correlations for all variables considered in this study, averaged across years.

Given that our dependent variable *Simultaneous Improvement*, represents a binary outcome, we report and interpret the odds ratio (OR) for all our predictors. Odds for a hospital are defined as its probability of realizing the studied outcome (e.g., simultaneous improvement) divided by the probability of not realizing this outcome (e.g., not improving simultaneously). The OR is the comparison of odds across two different values of a predictor variable.

$$\text{For binary predictors (Magnet Status)}: \quad \text{OR} = \frac{\text{Odds (predictor = 1)}}{\text{Odds (predictor = 0)}},$$

$$\text{For continuous predictors (Administrative Intensity)}: \quad \text{OR} = \frac{\text{Odds (predictor + 1)}}{\text{Odds (predictor)}}.$$

An OR greater than 1 indicates that the relative likelihood of realizing the studied outcome (*Simultaneous Improvement)* increases with the predictor (e.g., *Magnet Status*). Conversely, an OR of less than 1 would suggest that the predictor is negatively related to the likelihood of realizing the studied outcome.

3.2.1. Results for the Relationship between Magnet Status and Simultaneous Improvement. Hypothesis 1 predicts a positive relationship between Magnet status and hospital's likelihood to simultaneously improve on conformance and experiential quality. Given the binary variable used to reflect *Simultaneous Improvement*, we adopt a logistic regression model to test this hypothesis. We initially used a multi-level model to account for hospital-level variations. However, the absence of dependence among simultaneous improvement outcomes for the same hospital ($\rho = 0.01$, $p = 0.48$) indicated that single-level modeling is most appropriate here. We therefore report (single-level) logistic regression results but, nonetheless, with robust standard errors clustered at

the hospital level. Model 1 in Table 4 summarizes the results of our analysis.

As shown in Model 1, *Magnet Status* shows an OR greater than 1 with regard to *Simultaneous Improvement* (OR = 1.24, $p < 0.01$). This provides strong support for Hypothesis 1 and suggests that hospitals with Magnet status are 24% more likely than their counterparts to demonstrate simultaneous improvement.

3.2.2. Results for the Moderating Effect of Administrative Intensity. Hypothesis 2 predicts a negative moderation of administrative intensity on the relationship between Magnet status and hospital's likelihood to improve simultaneously. We also use a logistic regression model to test this hypothesis. Model 2 in Table 4 shows results when *Administrative Intensity* is included as a standalone variable. In Model 3, the interaction between *Administrative Intensity* and *Magnet Status* is added.

As shown in Model 3, the interaction term is not significant ($p = 0.24$). Hypothesis 2 is thus rejected. It is also interesting to note that the main effect of administrative intensity on hospital's likelihood to simultaneously improve is also not significant ($p = 0.25$). Overall, these results suggest that the effect of administrative intensity is not as straightforward as expected. This is somewhat surprising given the established arguments on the deterring effects of top-down control on activities that required a non-task-focused approach in the extant literature (e.g., Abernethy and Lillis 1995, March and Simon 1958). We thus conducted post hoc analyses to further explore alternative relationships.

3.3. Posthoc Analyses: Investigating Nonlinear Effects

Our argument for the negative moderation effect of administrative intensity was primarily based on the evidence from the five acute care hospitals which all had relatively high levels of administrative intensity (compared to the large sample of hospitals used in the second phase). Perhaps, administrative intensity, which allows involvement from senior leaders, could support and thus be beneficial to initiatives such as Magnet certification up to a certain level, after which the detrimental effect discussed previously and highlighted in our cases, would take over. Given the lack of variability in our case data, we explored for such nonlinear effects in our econometric analyses involving 3124 hospitals. Specifically, we created a squared term of administrative intensity and tested for its interaction with Magnet certification in our post hoc analyses.

Table 5 shows the results of our posthoc analyses. Testing for a curvilinear moderating effect of administrative intensity is done by including the interaction

Table 3 Descriptive Statistics and Correlations—Variables Averaged by Hospital Across All 6 Years

	Variable	Mean	SD	Minimum	Maximum	1	2	3	4	5	6	7	8	9	10	11	12
1.	*Simultaneous improvement*	0.52	0.23	0	1	1.00											
2.	*Magnet Status*	0.07	0.25	0	1	0.08	1.00										
3.	*Administrative Intensity*	0.20	0.06	0.01	0.73	−0.18	−0.14	1.00									
4.	*Conformance Quality*$_{t-1}$	0.91	0.06	0.22	1.00	0.13	0.14	−0.22	1.00								
5.	*Experiential Quality*$_{t-1}$	0.70	0.05	0.40	0.96	−0.26	0.01	0.21	−0.01	1.00							
6.	*Bed Size (ln)*	4.80	0.85	1.79	7.39	0.30	0.31	−0.39	0.29	−0.49	1.00						
7.	*Teaching Intensity*	0.06	0.15	0	1.06	0.09	0.22	−0.06	0.13	−0.21	0.39	1.00					
8.	*Case-Mix Index (ln)*	0.35	0.20	−0.22	1.14	0.21	0.25	−0.34	0.40	−0.11	0.52	0.32	1.00				
9.	*Ownership (1 = public)*	0.17	0.38	0	1	−0.08	−0.05	0.18	−0.21	0.10	−0.10	0.09	−0.16	1.00			
10.	*Corporate Goal (1 = for profit)*	0.21	0.41	0	1	−0.03	−0.11	−0.04	−0.01	−0.03	−0.16	−0.11	0.04	−0.24	1.00		
11.	*Large Urban Location*	0.39	0.49	0	1	0.13	0.13	−0.25	0.15	−0.36	0.30	0.25	0.24	−0.08	0.01	1.00	
12.	*Rural Location*	0.28	0.45	0	1	−0.19	−0.16	0.33	−0.25	0.30	−0.44	−0.22	−0.50	0.15	−0.02	−0.50	1.00

Notes: Significance levels: $p \le 0.01$ if $|r| > 0.05$; $p \le 0.05$ if $|r| > 0.03$.

Table 4 Magnet Status and Administrative Intensity Predicting Simultaneous Improvement

	Simultaneous improvement (odds ratios)		
	Model 1	*Model 2*	*Model 3*
Magnet Status (MS)	1.24***	1.24***	1.29***
Administrative Intensity (AI)		0.78	0.70
MS × AI			3.31
Controls			
CQ_{it-1}	*1.00*	*1.00*	*1.00*
EQ_{it-1}	*0.90***	*0.90***	*0.90***
Bed Size	*1.00*	*1.00*	*0.99*
Teaching Intensity	*0.63***	*0.64***	*0.64***
Case-Mix Index	*2.84***	*2.81***	*2.80***
Public	*0.93*	*0.94*	*0.94*
Profit	*0.85***	*0.85***	*0.85***
Large Urban	*0.86***	*0.86***	*0.86***
Rural	*1.06*	*1.07*	*1.07*
+Years			
Observations	13,841	13,841	13,841
Hospitals	3124	3124	3124
χ^2	941.41***	946.65***	946.61***
Pseudo R^2 (%)	6.39	6.40	6.40

*$p \leq 0.10$; **$p \leq 0.05$; ***$p \leq 0.01$. Because hospitals are observed over 6 years, simultaneous improvement can only be observed over 5 periods. Robust standard errors clustered at the hospital level. Coefficients represent odds ratios (OR) from logistic regressions. Example interpretation: Hospitals with Magnet status are 1.24 times as likely as hospitals without Magnet status to improve simultaneously on conformance and experiential quality.

Table 5 *Post-Hoc*: Curvilinear Moderating Effect of Administrative Intensity

	Simultaneous improvement (odds ratios)	
	Model 4	*Model 5*
Magnet Status (MS)	1.29***	1.39***
Administrative Intensity (AI)	0.69	0.69
MS × AI	4.01	0.53
AI^2	13.51	29.62*
MS × AI^2		0.01**
Controls		
CQ_{it-1}	*1.00*	*1.00*
EQ_{it-1}	*0.90***	*0.90***
Bed Size	*0.99*	*0.99*
Teaching Intensity	*0.64***	*0.64***
Case-Mix Index	*2.79***	*2.80***
Public	*0.94*	*0.94*
Profit	*0.85***	*0.85***
Large Urban	*0.86***	*0.85***
Rural	*1.07*	*1.07*
+Years		
Observations	13,841	13,841
Hospitals	3124	3124
χ^2	946.91***	956.51***
Pseudo R^2 (%)	6.41	6.44

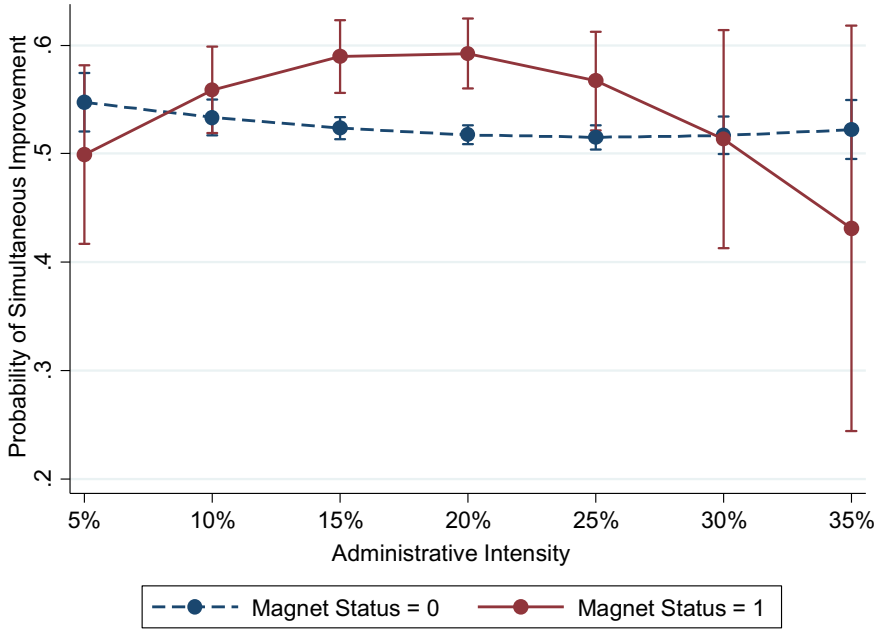
*$p \leq 0.10$; **$p \leq 0.05$; ***$p \leq 0.01$. Robust standard errors clustered at the hospital level. Coefficients represent odds ratios (OR) from logistic regressions.

between *Magnet Status* and *Administrative Intensity*^{2}, as well as all lower level terms, that is, *Magnet Status*, *Administrative Intensity*, *Magnet Status* × *Administrative Intensity*, and *Administrative Intensity*^{2} (Aiken and West 1991). Model 4 only includes the lower level terms and Model 5 shows the final results, with the interaction between *Magnet Status* and *Administrative Intensity*^{2}.

As shown in Model 5, the effect of *Magnet Status* × *Administrative Intensity*^{2} on *Simultaneous Improvement* is significant ($OR_{MSxAI}{}^2 = 0.01$, $p < 0.05$), which provides support for a curvilinear (inverted U-shape) moderating effect of administrative intensity on the relationship between Magnet status and simultaneous improvement. However, the significant positive effects of *Magnet Status* ($OR_{MS} = 1.39$, $p < 0.01$) and *Administrative Intensity*^{2} ($OR_{AI}{}^2 = 29.62$, $p < 0.10$) on *Simultaneous Improvement* makes these analytical results hard to directly interpret. We therefore generate a graph, represented in Figure 2, which accounts for all effects shown in Table 5, and shows the total effects and associated confidence intervals.

As seen in Figure 2, the probability of simultaneous improvement along conformance and experiential quality remains similar (i.e., confidence intervals overlap) between Magnet and non-Magnet hospitals *except* under moderate levels of administrative intensity, when this probability becomes significantly higher for Magnet hospitals. For instance, consider a hospital for which 20% of activities are administrative duties (20% of administrative intensity is roughly both the average and the median for hospitals in our sample). Results suggest that, holding all other variables constant and at their mean, this hospital would have a probability of simultaneous improvement of 59% if it had Magnet status vs. a probability of simultaneous improvement of only 52% if it did not have Magnet status ($\Delta = 7\%$, $p < 0.01$). Beyond supporting a curvilinear moderating effect of administrative intensity on the relationship between Magnet status and likelihood of simultaneous improvement, this graph suggest that the effect of Magnet status on hospital's likelihood of simultaneous improvement is in fact entirely dependent on the levels of administrative intensity. Indeed, considering a 95% confidence interval, this graph shows that at relatively low levels of administrative intensity (i.e., below 11%) and high levels of administrative intensity (i.e., above 26%), the effect of Magnet status on likelihood of simultaneous improvement is not significant (i.e., confidence intervals overlap). However, when administrative intensity levels are relatively moderate (i.e., between 11% and 26%), Magnet status is found to have a significant and positive effect on hospital's likelihood of simultaneous improvement.

Figure 2 Predictive Probability of Simultaneous Improvement with 95% Cis



These results refine the hypotheses developed using case analyses. They suggest complementarities between bottom-up (Magnet status) and top-down (administrative intensity) decision processes which makes simultaneous improvement possible in regulated settings like hospitals but subject to additional contingencies.

3.4. Robustness Checks

We conducted additional analyses to ensure the robustness of our results and to exclude alternative explanations. First, the characteristics of Magnet status described in subsection 2.2 relate to nurse involvement in all levels of decision making—that is, bottom-up decision processes, which is the focus of this study. However, as a result of these characteristics, a Magnet-certified hospital is also more likely to attract and retain qualified nurses (Kelly et al. 2011, Staggs and Dunton 2012), hence the term "Magnet". Thus, independent of nurse involvement, nurse staffing factors could contribute to simultaneous improvement as argued in the extant literature (e.g., Friese 2005). Unfortunately, nurse staffing data is not publically reported by hospitals, which prevents us from collecting this data for our sample. We found one exception. The State of Illinois publicly reports this data for its acute care hospitals through its department of Public Health.[3] We therefore repeated our analysis with various nurse staffing controls, averaged across the medical, surgical, and critical care units for the 125 Illinois acute care hospitals for which nurse staffing data was provided (1 Illinois hospital in our sample did not provide such data). In particular, we include total nursing hours per patient day (*Nur.Hrs/Pat.Day)*, total registered nurse nursing hours per patient day (*RN Hrs/Pat.Day)*, registered nurses' turnover rate (*RN Turn.*), and percentage of registered nurses employed vs. contracted (*RN Emp.)* Only hospitals' most recent data is provided (fiscal year 2012), therefore we only performed this robustness check on the last year of our study's time period. This resulted in a final sub-sample of 106 hospitals. Results indicate that none of the four nursing staff indicators considered have a significant influence on probability of simultaneous improvement and that all previous results hold when these additional controls are included in the model. This minimizes the concern on the effect of nurse staffing in our analyses.

Second, we previously used a binary variable to indicate whether a hospital achieved simultaneous improvement over a given year. In order to account for differences in rates of simultaneous improvement, we developed an alternative dependent variable, *Min SI*, which quantifies simultaneous improvement. In particular, *Min SI* represents the minimum amount of improvement between conformance and experiential quality (with 0 reflecting no improvement). Formally, this new variable is measured as follows:

$$Min\ SI = 0 \quad \text{if Simultaneous Improvement} = 0,$$

$$Min\ SI = Min\{\Delta CQ_{it}, \Delta EQ_{it}\} \quad \text{if Simultaneous Improvement} = 1.$$

Thus, the higher *Min SI*, the better a hospital's ability to simultaneously improve. Since this variable is truncated at 0, we employ a Tobit model to analyze the effects of *Magnet Status* and *Administrative Intensity* on hospital's *Min SI* (Narayanan et al. 2014). The

Tobit model evaluates effects on the uncensored latent variable. We include all dependent variables used in our post hoc analyses (Model 5). Results are consistent with those in our main analyses. In particular, results indicate that an average hospital for which 20% of activities are administrative duties would experience, on average, a minimum yearly increase of 0.30 percentage points in both conformance and experiential quality if it had Magnet status vs. a minimum yearly increase of only 0.04 percentage points if it did not have Magnet status ($\Delta = 0.26\%$, $p < 0.01$).

4. Implications and Conclusions

4.1. Theoretical Implications

This study makes a number of contributions to the health care, organizational learning, and operations management literatures. First, it focuses on the largely understudied domain of how to simultaneous improve on conformance and experiential quality in regulated environments such as hospitals. Scholars have argued for structural separation as a potential solution to manage activities that trigger different learning orientations such as the task-oriented conformance quality and the relationship-oriented experiential quality (Adler et al. 1999, Jansen et al. 2009, O'Reilly and Tushman 2004). Proponents of this approach recommend physically separating and using different resources for conformance and experiential quality at the operational level. This allows different decision processes—top-down or bottom-up—to be used for different types of activities. However, research remains unclear on how hospitals, where the same caregiver is required to reconcile the closely monitored "black-and-white" conformance quality with the more subtle experiential quality, can simultaneously improve on these activities. Our study reveals the value of Magnet status which, when combined with moderate levels of administrative intensity, allows reconciling these two goals. The complementarity between Magnet status, which reflects involvement of nurses in all levels of decision making, and administrative intensity, which correlates with managerial oversight, is in line with recent arguments for the importance of having both bottom-up and top-down decision-making processes to reconcile dual organizational goals. For instance, in the context of new product development, Hutchison-Krupat and Kavadias (2015) find that substituting to some extent top-down decision-making processes with bottom-up decision-making processes mitigates the negative effects of information asymmetry on resource allocation decisions while respecting the organization's overall allocation strategy. Along these lines, we find that involving nurses, who have specialized knowledge on experiential quality, at all levels of decision making can help mitigate the existing bias toward conformance quality. However, this bottom-up decision process needs to be supported by hospital leaders, who will provide not only the influence and resources, but also the guidance needed to ensure coordination and make such processes successful.

Second, involvement of nurses in all levels of decision making—a characteristic of Magnet—is a key aspect of frontline employee empowerment. However, researchers studying such empowerment have mostly characterized it as an increase in individual decision-making autonomy at the operational level (Adler et al. 1999, Avolio et al. 2004, Nembhard and Edmondson 2006, Tucker and Edmondson 2003). While autonomy can help explain how to develop flexibility at the floor level, it doesn't address sustainable change at the organizational level, that is, how frontline employee empowerment can bring their unique expertise to the table and influence practice in a consistent manner throughout the organization. For instance, Tucker and Edmondson (2003) note that "The flip side of empowerment [defined as increase in frontline employees autonomy], however, is the removal of managers and other non-direct labor support from daily work activities, leaving workers on their own to resolve problems that may stem from parts of the organization with which they have limited interaction. [. . .] Managers tend to have a broader perspective than line workers, possess status necessary to resolve problems that cross organizational boundaries, and are capable of implementing solutions on a wider basis. (p. 64)" Thus, our study adds on these findings by considering a broader conceptualization of frontline employee empowerment that includes their involvement in all levels of decision making, as reflected by hospitals' Magnet status.

Third, the result on the nonlinear complementarity between administrative intensity and Magnet status helps refine existing frameworks on the interplay between top-down and bottom-up decision processes. For instance, Burns and Stalker (1961) find that formal administration, which closely relates to administrative intensity in our study, negatively affects flexibility at the operational level and hence argue for organic (i.e., weakly formalized) organizational structures. Adler and Borys (1996) enrich this discussion and introduce some contingency by differentiating between coercive and enabling formalization. Coercive formalization is defined as a top-down form of control designed to "coerce effort and compliance from employees" (Adler and Borys 1996, p. 62) while enabling formalization insists on the role of leadership in guiding, nurturing, and valuing employees' skills. In the context of our study, coercive formalization could be assimilated to high levels

administrative intensity which would hinder the effectiveness of any bottom-up decision-making processes on performance. On the other hand, enabling formalization would seem to appear in hospitals with moderate levels of administrative intensity and hence can complement initiatives aimed at developing bottom-up decision-making processes, such as acquiring Magnet status. Thus, we further refine the framework on the effect of top-down decision-making processes by suggesting that their type (coercive or enabling) is not an intrinsic characteristic but rather depends on both the degree of formalization and the co-existence of bottom-up decision-making processes within the organization.

Finally, our approach to use a multiple-case study followed by econometric analyses is consistent with the recent calls for multi-method research (Cheng et al. 2012, Singhal and Singhal 2012a,b, Sodhi and Tang 2014) to study problems in the domain of operations management. These researchers argue that using multiple methodologies has the potential to reveal rich insights on a given problem that may go unnoticed when studied using a single method. Consistent with this view, the multiple-case study developed an initial framework on the role of Magnet certification and on the moderating effect of administrative intensity, while the econometric estimation approach refined this framework and further enriched the theoretical discussions. Using multiple methods in our study was thus critical to reveal the subtle complementarity between bottom-up and top-down decision-making processes. Echoing the recent calls, we urge operations management scholars to use multiple methods in their research inquiry.

4.2. Practical Implications

4.2.1. Insights for Hospitals' Administrators. From a practice standpoint, our study not only demonstrates the importance of bottom-up decision processes in reconciling dual learning activities but also emphasizes the importance of moderate levels of administrative intensity (i.e., top-down decision processes)—a characteristic that is common in highly regulated environments. Thus, while hospitals need to value and use the expertise of their frontline employees through systemic involvement of their nursing staff in all levels of decision making, they also need to realize that such initiative cannot be a full delegation of control and decision-making power but should rather complement a more formal and supportive hierarchical structure.

The complementarity that we find also implies that too little or too much administrative intensity could jeopardize the effectiveness of organizational initiatives aimed at developing bottom-up decision processes, such as acquiring Magnet status. Thus, in light of the many changes to the health care legislation that started in October 2012, a potential trap for hospitals would be to increase administrative intensity in an effort to comply with the growing regulatory requirements. Reviewing the health care industry press reveals that, the "Institute Model" (Cosgrove 2014) seen at the Cleveland Clinic may be a potential avenue to deal with a larger than optimal administrative intensity. This model divides services within the hospitals not based on specialties such as surgery, medicine, etc. (which would disrupt continuity of care and the integration of conformance and experiential quality) but based on all the services a typical patient might need, e.g., the Heart and Vascular Institute combines departments such as cardiovascular surgery, cardiovascular medicine, and preventative cardiology and rehabilitation. Conformance and experiential quality could thus be integrated at the institute level rather than the hospital level, thereby effectively mitigating the negative effect of a potentially large hospital-level administrative intensity.

4.2.2. Insights for Policymakers. The VBP program, enacted by CMS in October 2012, links the hospitals' reimbursement to their past progression along conformance and experiential quality dimensions. However, our research reveals that simultaneous improvement on both these dimensions is, at least partially, the result of a complex relationship between two types of decision processes: Magnet status which relates to the involvement of the nursing staff in all levels of decision making (i.e., bottom-up decision processes), and administrative intensity which reflects the amount of formal managerial control in the organization (i.e., top-down decision processes). It is thus important for policy makers to understand their role in supporting hospitals' quality initiatives, such as the pursuit of Magnet status, and carefully evaluate their regulatory requirements to strike the right balance between too little oversight and too much administrative burden (American Hospital Association 2001).

The importance of Magnet status also reveals the insufficiency for health care legislators to simply set guidelines to evaluate performance. Instead health care legislators may want to consider a program that rewards active managerial efforts and the processes that allow improving the care quality, such as the development of mechanisms to systematically involve the frontline workforce in decision making, rather than simply focusing on the results.

4.3. Limitations and Future Research

We recognize the following limitations in our research. First, all hospitals in our case study had Magnet status and we thus relied mostly on retrospective evidence when discussing the role of Magnet on simultaneous

improvement. Although, we avoided retrospective bias by talking to multiple informants and collecting other archival data from these hospitals (Langley 1999), we recognize this as an important limitation.

Second, we looked at the effect of two variables that reflect key aspects of hospitals' organizational decision processes. In particular, Magnet status and administrative intensity reflect a wide (i.e., top-down and bottom-up decision processes) yet limited view of potential organizational factors, related or not to decision processes, that affect hospitals' dual focus on conformance and experiential quality. Future research could look for other organizational mechanisms that facilitate simultaneous improvement.

Third, although Magnet status has been widely recognized by health care organizations as an indicator of nurse involvement in strategic decision making, getting Magnet certified is a costly process. Therefore, some hospitals might have implemented structures and infrastructures that support a similar level of nursing staff involvement while deciding to forego this formal recognition. Thus, we encourage future research to identify other involvement indicators and check the robustness of our results.

Fourth, while we report and use the McFadden (1974) pseudo-R^2 to compare models (Hosmer and Lemeshow 2004), its absolute value does not have a straightforward interpretation in the context of logistic regression. Thus, researchers agree on the inappropriateness of pseudo-R^2 as a measure of fit and on the overall lack of powerful diagnostics for such regression (Hagle and Mitchell 1992, Keizers et al. 2003). As better measures of fit are developed for logistic regression, we will be able to further assess the predictive power of our models.

4.4. Conclusion

We study hospitals, a highly regulated context where the focal process—the delivery of care—relies on two different quality dimensions that are interconnected. We show how two types of organizational decision processes interact to affect the tension between these process quality dimensions. These are important findings to the health care operations and organizational design literatures. They also suggest a daunting task for hospital leaders as they seek to comply with requirements that they improve on both quality dimensions or face financial consequences. The data suggest that this task rests on a fragile organizational equilibrium between bottom-up decision making and top-down guidance and support. We encourage further research to investigate to what extent such contingency applies to other settings.

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Appendix A: Conformance Quality: Description of Items and Sample Averages (%) by Year

		Calendar year ending in June					
Description	Measure	2012	2011	2010	2009	2008	2007
Conformance quality	CQ	96.65	95.16	93.94	91.90	88.31	84.45
Heart attack (AMI)							
Patients given aspirin at discharge	*AMI 2*	98.89	98.47	98.20	97.44	96.50	95.89
Patients given fibrinolytic medication within 30 minutes of arrival	*AMI 7*	81.00	81.50	76.00	72.57	72.00	70.00
Patients given PCI within 90 minutes of arrival	*AMI 8*	94.89	92.25	90.22	84.96	77.95	64.27
Heart failure (HF)							
Patients given discharge instructions	*HF 1*	92.28	89.79	87.68	83.78	78.92	71.86
Patients given an evaluation of LVS function	*HF 2*	98.43	97.59	96.90	95.73	93.94	91.56
Patients given ACE inhibitor or ARB for LVSD	*HF 3*	96.53	95.26	94.50	93.25	91.24	86.88
Pneumonia (PN)							
Patients whose initial ER blood culture was perfect prior to administration. of 1st antibiotics	*PN 3*	97.23	96.26	95.50	94.08	91.71	90.20
Patients given the most appropriate initial antibiotic(s)	*PN 6*	95.12	93.67	91.78	90.17	88.53	87.73
Surgical care improvement project (SCIP)							
Surgical patients who received preventative antibiotic(s) 1 hour prior to incision	*SCIP 1*	98.13	97.26	96.35	94.12	89.44	84.61
Surgical patients who received appropriate preventative antibiotic(s) for surgery	*SCIP 2*	98.19	97.43	96.86	96.71	94.32	91.38

(continued)

Appendix A Continued

Description	Measure	Calendar year ending in June 2012	2011	2010	2009	2008	2007
Surgical patients w/prev antibiotic(s) stopped w/24 hours after surgery	*SCIP 3*	97.02	95.44	93.93	90.69	85.36	77.56
Surgical patients whose doctors ordered treatments to prevent. blood clots for certain types of surgeries	*SCIP-VTE1*	97.48	94.70	93.13	91.38	87.58	78.78
Surgical patients received treatment to prevent blood clots w/24 hours before/after selected surgeries	*SCIP-VTE2*	96.82	93.11	91.39	89.06	84.46	83.15

Appendix B: Experiential Quality: Description of Items and Sample Averages (%) by Year

Description	Measure	Calendar year ending in June 2012	2011	2010	2009	2008	2007
Experiential quality	EQ	72.96	71.42	71.05	69.97	69.58	68.76
Nurse communication	*COMP 1*	77.11	75.51	74.98	73.61	72.81	72.15
Nurses treated patients with courtesy and respect							
Nurses listened carefully to patients							
Nurses explain things to patients in a way they could understand							
Doctor communication	*COMP 2*	80.37	79.57	79.49	78.96	79.06	78.62
Doctors treated patients with courtesy and respect							
Doctors listened carefully to patients							
Doctors explain things to patients in a way they could understand							
Staff responsiveness	*COMP 3*	64.56	62.41	62.12	60.88	60.41	58.96
Patients got help as soon as wanted after pressing the call button							
Patients got help as soon as wanted to use the restroom							
Pain management	*COMP 4*	69.94	68.86	68.62	67.85	67.50	66.86
Patients' pain was well controlled							
Hospital staff did everything they could to help patients manage their pain							
Medication communication	*COMP 5*	62.03	59.96	59.45	58.06	57.94	56.98
The purpose for new medications was explained to patients							
Side effects of new medications were clearly described							
Discharge communication	*COMP 6*	83.77	82.22	81.65	80.47	79.77	78.98
Staff verified that patient will have the help needed after leaving the hospital							
Patients received written instructions regarding symptoms or health pbs to monitor after discharge							

Appendix C: Cost Report Items Used to Measure Administrative Intensity

Fiscal year	2007–2010	2010–2012
CMS form	2552–96	2552–10
Worksheet	S-3	S-3
Numerator (Administrative Hours Billed)		
Part II – salaries		
Physician – part A – administrative		
Part II – other wages and related costs		
Management and administrative services		
Contract labor: physician – part A – administrative		
Home office: physician – part A – administrative		
Part II – overhead costs – direct salaries		
Employee benefits		
Administrative & general		
Administrative & general under Contract		
Nursing administration		
Central services & supply		
Medical records & medical records library		
Denominator (total hours billed)		
Part III – hospital wage index summary		
Subtotal salaries		
Subtotal other wages & related costs		

Notes

[1]Measurement of conformance and experiential quality constructs is described in details in subsection 3.1.1 of this paper.

[2]Each survey included had responses to every question, therefore a weighted average is not needed here.

[3]The other states that require some form of public disclosure were not used in this robustness check because of small sample size (Vermont: $n = 6$, Rhode Island: $n = 11$, New Jersey: $n = 63$), or lack of systematic disclosure (New York). Illinois is also the state that provides the most comprehensive reporting.

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