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### Towards A Triadic Patient Care Quality Measurement Framework

#### ABSTRACT

In its recent overall ratings, the Centers for Medicare and Medicaid Services (CMS) has summarized all measures to the hospital level, thereby making it difficult to trace individual hospital and healthcare team problems. This approach to reporting quality of care ignores the consideration of patients, the hospital's external and internal relationships, and other relevant organizations in the hospital's extended ecosystem. We offer a conceptual overarching framework for measuring PCQ in the U.S. healthcare system that utilizes a triadic approach to integrate various aspects of care quality having different levels of measurement.

KEYWORDS: patient care quality, triadic approach, systems thinking, U.S. healthcare.

#### INTRODUCTION

Although quality measurement in healthcare is more than two centuries years old, neither have the aims of healthcare quality measurement changed, nor have the challenges associated with the measurement of quality in healthcare reduced (Loeb, 2004). While a lot of detailed quality metrics based on the nature of the ailment (such as stroke, pneumonia, cardiac arrest) and number of days of hospitalization necessary for the cure and hospital readmission rates have become popular as standardized metrics to measure healthcare quality (CMS, 2016), patient safety has been emerged as a key aspect of healthcare quality (Kohn, Corrigan, & Donaldson, 1999; Pronovost, Miller, & Wachter, 2006).

Even though healthcare quality improvement has been the focus of research in various disciplines for almost two decades or more, many quality related issues have not yet been resolved (Boyer & Pronovost, 2010; Pronovost et al., 2006). Therefore, we reviewed the extant literature to identify the major outstanding issues. All studies that had a focus on healthcare quality and used either conceptual, empirical or modeling methodologies were reviewed. A review of the important studies on healthcare quality measurement is presented in Table 1.

**TABLE 1**  
**Major Studies on Quality Improvement in Healthcare**

<b>Study</b>	<b>Purpose</b>	<b>Research Type</b>	<b>Main Findings</b>
Shortell et al. (1995)	Relationships among organizational culture, quality improvement processes and outcomes	Empirical	The authors found that a participative, flexible and risk-taking organizational culture was significantly related to continuous quality improvement (CQI). CQI was positively associated with greater perceived patient outcomes and human resource development. Larger-size hospitals experience lower clinical efficiency due to higher charges and higher length of patient stay as they had more bureaucratic and hierarchical culture that served as a barrier to CQI implementation.
Li (1997)	Relationship between hospital quality management and service quality performance	Empirical	Results indicate that medical technology investment alone does not contribute to a significant improvement in hospital service quality. Their study also shows that organizational cooperation, workforce development, medical technology investment, and process analysis mediate the relationship between top management leadership and health service quality.
Laing and Hogg (2002)	Advocate reforming the public-sector healthcare services in UK to reorient service provisions around the users	Empirical	Using a survey of patient attitudes towards service provision in the National Health Service in Scotland (NHSiS) and in-depth interviews with senior hospital managers the authors explore the emerging perspectives of both patients and professionals towards the consumerization of healthcare and the changing nature of the relationship between patients and professionals.

Study	Purpose	Research Type	Main Findings
Raju and Lonial (2002)	Impact of service quality on financial performance in healthcare	Empirical	A framework is offered linking four constructs—quality context, quality outcomes, market orientation, and market/product development outcomes to a hospital’s financial performance. They found that a sequential chain of relationships exists among the constructs where market orientation mediates the effect of quality context on quality outcomes, and market/product development outcomes mediate the effect of quality outcomes on financial performance.
Hinings, Casebeer, Reay, Golden-Biddle, Pablow and Greenwood (2003)	Critically examine the re-organizing attempts of the Alberta government in Canadian healthcare from several different perspectives	Conceptual	The authors propose that the greater the degree of loose coupling in an organization, the more difficult change is likely to be, and the more likely the occurrence of unanticipated consequences.
Kanji and Sa (2003)	Total Quality Management (TQM) initiatives in healthcare	Conceptual	Per the authors, TQM has emerged as a potential solution to improve the efficiency and effectiveness of healthcare. The reasons for failure of TQM implementation are found to be insufficient support of health professionals, lack of leadership commitment and the tendency to look at TQM in isolation.

Study	Purpose	Research Type	Main Findings
Buchanan, Abbott, Bentley, Lanceley and Meyer (2005)	Explore user-driven organizational change in the National Health Service (NHS)	Conceptual	The NHS Plan created Patient Advice and Liaison Services (PALS) to provide information, solve problems and drive user-led change. Using evidence from a study of PALS in London acute, primary care, mental health and specialist trusts, drawing on discussion forums, interviews with PALS officers and documentation the authors suggest that a networked and diversified context isolates PALS structures from management decision-making, constraining their power base, and inhibiting the promotion of substantive change agendas.
Coffey et al. (2005)	Critical paths in patient care	Conceptual	Critical paths are defined as the optimal sequencing and timing of interventions and collaborative efforts by physicians, nurses and other staff for a particular diagnosis or procedure. The authors note that these paths are developed to minimize delays and resource utilization and to maximize quality of care. These paths also reduce variation in the care provided, facilitate expected outcomes, reduce delays, reduce length of patient stay, and improve hospital cost effectiveness. The approach and goals of critical paths are an important part of an organization's TQM process.

<b>Study</b>	<b>Purpose</b>	<b>Research Type</b>	<b>Main Findings</b>
Lucas et al. (2005)	Environmental and organizational factors supporting CQI adoption in nursing homes	Empirical	New requirements, environmental competition, organizational time and manager training differentiate the CQI adopters vs. non-adopters. The authors summarize that CQI adoption is facilitated by effective use of information systems, flexible use of personnel and team support, as well as CQI training for managers. The authors create a profile of CQI adopters that can guide administrators and policy-makers and can help nursing homes focus internal resources on key facilitators.
Shojania and Grimshaw (2005)	Review of quality improvement (QI) implementation literature	Conceptual	The authors review QI research problems and note that routine medical practice often failed to incorporate research evidence in a timely and reliable manner. They suggest that QI efforts should be based on evidence as well as the practices that the hospital seeks to implement.
Alexander, Weiner and Griffith (2006)	Association between the scope and intensity of hospitals' QI implementation and their performance	Empirical	Results suggest that QI has a measurable impact on global measures of organizational performance. Hospitals that implement QI effectively can expect to improve their financial and cost performance.
Gowen, McFadden, Hoobler and Tallon (2006)	Relationships among healthcare quality program practices, employee commitment initiatives and perceived results	Empirical	Perceived quality program results are related to employee commitment and control more than quality practices.

<b>Study</b>	<b>Purpose</b>	<b>Research Type</b>	<b>Main Findings</b>
Pellicone and Martocci (2006)	Demonstration of how adoption of six sigma quality system reduces delays in hospital bed assignment turnaround time	Empirical	The hospital under study decided to focus on patient flow when it noticed an increase in patient volume. Delays in some areas in the hospital affected other departments causing a dip in patient services and physician satisfaction. The authors noted that in the following six months the six-sigma team decreased its mean turnaround time.
Addicott, McGivern and Ferlie (2007)	Examine whether managed networks technique is the most appropriate management style for delivery of health services in the UK	Empirical	Drawing upon the authors' research on managed clinical networks for cancer in the UK—a model that set out to guide and develop knowledge flows across cancer service providers, their analysis suggests that the initial knowledge-sharing purpose of networks underwent top-down 'distortion' by the demands of central government, which resulted in superficial bottom-up adoption of the networks model and limited impact upon organizational processes.
Martin (2007)	Comparison of three different quality models	Conceptual	The authors examine some well-known quality improvement programs such as six-sigma, lean and the Institute for Healthcare Improvement's model for healthcare and suggest that each of these models could work alone as well as together.
Gowen, Stock and McFadden (2008)	Usefulness of knowledge management for six-sigma implementation in hospitals	Empirical	Knowledge management improves the success of six sigma initiatives, specifically for knowledge dissemination and responsiveness.

Study	Purpose	Research Type	Main Findings
Naranjo-Gil, Hartmann and Maasz (2008)	Examine the role of top management team (TMT) heterogeneity in facilitating strategic change	Empirical	Using data collected from 92 full TMTs of hospitals in Spain that were confronted with institutional pressures that challenged their current strategies, the authors' analyses show job-related TMT heterogeneity moderates the relation between strategic change and operational performance and they did not find any moderating effect for non-job-related TMT heterogeneity.
Nicolini, Powell, Conville and Martinez-Solano (2008)	Review the current literature on knowledge management (KM) concepts, policies and practices in healthcare	Literature review	Based on the analysis of the important publications, the authors note three overarching themes: the nature of knowing in the healthcare sector, the type of KM tools and initiatives that are suitable for the healthcare, and the barriers and enablers to the take up of KM practices.
Currie and Locket (2011)	Examine leadership in practice, particularly the interaction of leaders and followers, considering the context	Literature review	Employing Gronn's (2002) dimensions of concertive action and conjoint agency, the authors use distributed leadership as a unit of analysis to analyze the iterative nature of relationships among leadership, followership and context. They apply their conceptual framework to healthcare.

Study	Purpose	Research Type	Main Findings
Peng and Bourne (2009)	To demonstrate that competition and cooperation between health networks can co-exist	Empirical	Drawing from a detailed case study of two healthcare networks in Taiwan, the authors demonstrate how the networks first initiated competition, followed by cooperation and then cooperation. The authors offer propositions to address the forces driving competition and cooperation and the different structures that allow competition and cooperation to coexist and suggest that the simultaneous existence of cooperation and competition is not dependent on closeness to the customer, as previously suggested in the literature, but on the balance between the forces for cooperation and for competition.
Dobson, Hasija and Pinker (2011)	Effect of reserving slots for urgent patients in a primary healthcare practice on service quality	Modeling	The authors found that encouraging routine patients to call for same-day appointments is a key ingredient of the success of advanced-access in clinical settings.
Goldstein and Iossifova (2012)	Long-term relationship between an organization's quality management practices and process-level performance	Empirical	The authors investigated the quality practices of U.S. general acute care hospitals. They found differing effects that are dependent on hospital slack. In hospitals with high slack, quality practices predict three of four studied process performance measures, but in hospitals with low slack, quality practices predict only one of the four process performance measures while other factors outweigh the effects of quality practices. This study supports management taking a long-term perspective related to implementation of quality management systems and highlighted the relevance of slack.

<b>Study</b>	<b>Purpose</b>	<b>Research Type</b>	<b>Main Findings</b>
Burgess and Currie (2013)	To demonstrate the strategic importance of the hybrid middle-level managers (MLM) in healthcare	Conceptual	Drawing from the example of their managerial role in healthcare, the authors highlight that the hybrid MLM enacts a strategic knowledge brokering role and discuss the factors that impact the strategic role of MLM.
Kirkpatrick, Bullinger, Lega and Dent (2013)	Offer a framework for comparing changes in the management of public hospitals across different national health systems, drawing on insights from institutional theory	Conceptual	Using a range of secondary data, the authors demonstrate how a particular form of hospital management, pioneered originally at the Johns Hopkins Hospital in Baltimore has been successfully translated differently in four health systems: England, Denmark, Italy and France.
Ancarani, Ayach, Di Mauro, Gitto and Mancuso (2016)	Management of hospital team diversity	Empirical	Using a sample of wards from three large hospitals in Dubai, the authors empirically test a model where team religious diversity has non-linear effects on efficiency and they also consider the role of moderating variables of the relation diversity–efficiency. Their results suggest an inverse U-shaped relation between religious diversity and the wards’ efficiency and the relation is moderated by task complexity, task conflict, team leader tenure and diversity in nationality.
Spyridonidis and Currie (2016)	Analyze what hybrid nurse middle managers do in their managerial practice	Empirical	Using two comparative hospital cases and drawing upon Scandinavian institutionalism, the authors show that hybrid middle managers enact a strategic translational role and outline situational constraints that impact this more strategic role.

A detailed examination of studies in Table 1 indicates that most studies have chosen to focus only on a few specific issues that impact U.S. healthcare, perhaps due to the serious challenges of operationalization and data collection from hospitals. It is clear that an inclusive perspective, which considers the patient, the hospital's external and internal relationships, and the nodal organizations, is missing. It is therefore important to adopt a systemic perspective in healthcare because patient care quality (PCQ) related variables are also influenced by issues that are outside the control of the hospitals.

In this paper, we briefly highlight quality management (QM) philosophy. Then drawing from its tenets, we offer an overarching framework to comprehensively measure PCQ in U.S. hospitals. We elaborate a detailed research design for triadic measurement of PCQ. Next, we offer two specific propositions to demonstrate the association of PCQ with hospital performance, over the long run. Finally, we end with implications for healthcare practitioners and hospitals.

## **QUALITY MANAGEMENT AND PCQ: ANTECEDENTS AND OUTCOMES**

Quality management (QM) is an integrative philosophy of management for continuously improving the quality of products and processes (Feigenbaum, 1961). The basic premise is that the quality of products/services and processes of their manufacture/generation is the responsibility of everyone who is involved with the creation or consumption of the products/services (Feigenbaum, 1961). QM highlights the involvement of the factory management, workforce, suppliers, and even customers to meet or exceed customer expectations (Ahire, 1997; Deming, 1986; Kaynak & Hartley, 2008).

*Patient care quality* (PCQ) is defined as the excellence of the medical care received by admitted patients in hospitals (Chang, Ma, Chiu, Lin, & Lee, 2009; Ma, Yang, Lee, & Chang, 2009; Nelson & Niederberger, 1990; Van Ess Coeling & Cukr, 2000; Ware, Snyder, Wright, & Davies, 1983). McFadden, Henagan and Gowen (2009); McLaughlin, McLaughlin and Kaluzny (2004) are some of the well-known proponents who have extended the general philosophy of quality management to the healthcare settings. In extant literature, many studies have focused on the identifying the determinants of PCQ, both in hospital and clinical settings. The major recent studies on PCQ quality are noted in Table 2, and comparison of our study with the literature is presented in Table 3.

**TABLE 2**  
**PCQ Dimensions Identified in Literature**

<b>Study</b>	Donabedian (1968)	McFadden, Stock and Gowen (2006)	Dagger et al. (2007); Gill and White (2009)	Isaac, Zaslavsky, Cleary and Landon (2010)	Boyer et al. (2012)	Chandrasekaran et al. (2012)	Nair, Nicolae and Narasimhan (2013)
<b>Characteristics</b>	Application of modern scientific medicine	Patient safety	Interpersonal quality	Communication with nurses	Patient satisfaction data collection	Clinical quality	Clinical quality
	Emphasizes prevention		Technical quality	Communication with doctors	Quality teams of employees	Experiential quality	Experiential quality
	Requires cooperation between patients and physicians		Environmental quality	Responsiveness of hospital staff	Statistical quality (process control using control charts)		
	Considers the individual as a whole		Administrative quality	Pain management	Competitive benchmarking of best-in-class processes		
	Maintains close and continuing personal relation between physicians and patients			Communication about medicines			
	Coordinated with social welfare work			Discharge information			
	Includes all types of medical services			Cleanliness and quietness of hospital			

**TABLE 3****PCQ Dimensions in Healthcare Studies: A Comparison**

This Study	Donabedian (1968)	McFadden, Stock and Gowen (2006)	Dagger et al. (2007)	Gill and White (2009)	Isaac et al.(2010)	Boyer et al. (2012)	Chandrasekaran et al. (2012)	Nair, Nicolae and Narasimhan (2013)
Interpersonal quality			X	X				
Technical quality	X	X	X	X	X	X	X	X
Environmental quality	X		X	X				
Administrative quality	X		X	X				

A review of the studies cited in Tables 2 and the comparisons in Table 3 reveal that a total of 25 different characteristics related to patient care quality such as cooperation between patients and physicians, cleanliness and quietness of hospital, and coordination with social welfare work have been identified. Based on a synthesis of the multi-dimensional nature of patient care quality discussed in extant literature (Dagger, Sweeney, & Johnson, 2007; Gill & White, 2009) it is suggested that PCQ has the following four primary dimensions: *interpersonal*, *technical*, *environmental* and *administrative quality*.

*Interpersonal quality* reflects the relationship developed and the dyadic interplay that occurs between the healthcare team and the patient (Dagger et al., 2007; Gill & White, 2009). It takes into consideration issues such as whether healthcare teams treat their patients with respect, healthcare team members listen to what patients have to say, members give personalized attention to patients and whether team members are willing to answer questions that the patient or their kin may have.

*Technical quality* reflects the expertise, professionalism, and competency of the healthcare team in delivering the cure (Dagger et al., 2007; Gill & White, 2009). It is concerned with whether patients are administered the correct medical care that is required to cure their ailment, tests (e.g., X-rays and lab tests) are ordered on patients only when required, healthcare team members are qualified, and whether they carry out their tasks competently.

*Environmental quality* comprises hospital atmosphere such as cleanliness and order and tangibles like hospital bed and required equipment for patient health needs (Dagger et al., 2007; Gill & White, 2009). It takes into account whether the design of the hospital is patient friendly, the lighting at the hospital is appropriate, the temperature at the hospital is pleasant and whether the furniture at the hospital is comfortable.

*Administrative quality* facilitates the production of the core medical cure while adding value to the patient (Dagger et al., 2007; Gill & White, 2009). Considerations such as whether the internal hospital services (e.g., pathology) work well, waiting time at the hospital is minimum, the hospital provides patients with a range of patient support services and whether the hospital records and documentation (e.g., billing) are error free are in the domain of this dimension of quality.

We now introduce an important antecedent to PCQ—healthcare team effectiveness. Then we briefly highlight a crucial outcome for the hospital—hospital quality performance.

### **Healthcare Team Effectiveness**

We define a team as “a collection of individuals who are interdependent in their tasks, who share responsibility for outcomes, who see themselves and who are seen by others as an intact social entity embedded in one or more larger social systems (for example, business unit or corporation), and who manage their relationships across organizational boundaries” (Cohen & Bailey, p. 241). In our study, a healthcare team refers to the doctors, nurses and supporting staff who work together as a group to care for admitted patients in most hospitals.

In an organizational context, effectiveness refers to whether the action taken is right or correct (Sundstrom, De Meuse, & Futrell, 1990). *Healthcare team effectiveness* refers to how well the team is able to perform to survive, adapt, maintain itself and grow (Goodman, 1986). Scholars in the area of team effectiveness (Katzenbach & Smith, 2013; McGregor, 1987) suggest that effective teams have a clear unity of purpose. Team members criticize each other frequently but collectively agree on group activity. A team’s performance on three important attributes is known to determine the degree of its effectiveness. First, the ability of any team to exploit its environment to acquire scarce resources influences the team’s ability to deliver (Shipper & White, 1983). Second, effective teams have a high degree of internal team efficiency, team spirit, confidence, trust, communication and support (Sundstrom et al., 1990). Third, and most important, effective teams are able to identify output goals and assess how well

they can be attained (Hall, 1980). The characteristics of a firm's industry also influence task design which in turn, is related to internal and external group processes and group psychosocial traits such as the norms, all of which finally determine team effectiveness (Cohen & Bailey, 1997). The team's internal activities also influence team effectiveness in a work context (Goodman, 1986).

Although teamwork is one of the QM practices (Flynn, Schroeder, & Sakakibara, 1995; Kaynak, 1997, 2003; Kaynak & Hartley, 2008), not all teams are effective. Members of an effective team are able to deliver and achieve the team's goals (Shipper & White, 1983). Therefore, we included team effectiveness, instead of teamwork as the variable in our study.

## **Hospital Quality Performance**

We define hospital quality performance as a comprehensive reflection of how well the hospital is performing on a wide variety of quality-related parameters, as compared to their competition. Many scholars have already investigated the impact of QM practices on a firm's quality performance (Adam et al., 1997; Choi & Eboch, 1998; Easton & Jarrell, 1998; Fynes & Voss, 2001; Fynes, Voss, & de Búrca, 2005; Hendricks & Singhal, 1997; Samson & Terziovski, 1999). Here, hospital quality performance is a comprehensive representation of quality of care that encapsulates both dimensions of a firm's internal quality performance identified first in the manufacturing literature but also extended to the world of services later—conformance quality and design quality and all aspects of a firm's external quality.

Hospital quality performance measurement has been in vogue for quite a few years now, albeit it is calculated differently by many organizations. On one hand, it could be as sophisticated as the using 10 Hospital Quality Alliance (HQA) performance indicators to calculate a summary performance score for each of the three clinical conditions--acute mesenteric ischemia acute myocardial infarction (AMI) or heart attack, congestive heart failure (CHF), and pneumonia (Jha, Orav, Li, & Epstein, 2007). On the other, they could be as simple as averaging all hospital star ratings given by patients or kin on websites like Healthgrades, RateMDs, Vitals and Yelp. As a third example, the overall hospital quality ratings like the one introduced by the Centers for Medicare and Medicaid Services (CMS) in 2015 (CMS, 2016) could be considered. The CMS overall hospital rating follows a somewhat detailed methodology using 62 items from the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey grouped into seven sub-categories but it is still not as detailed as the first method, and is therefore not as reflective of true quality of the patient care being delivered at the hospital. HCAHPS is a patient satisfaction survey required by CMS for all hospitals in the U.S.

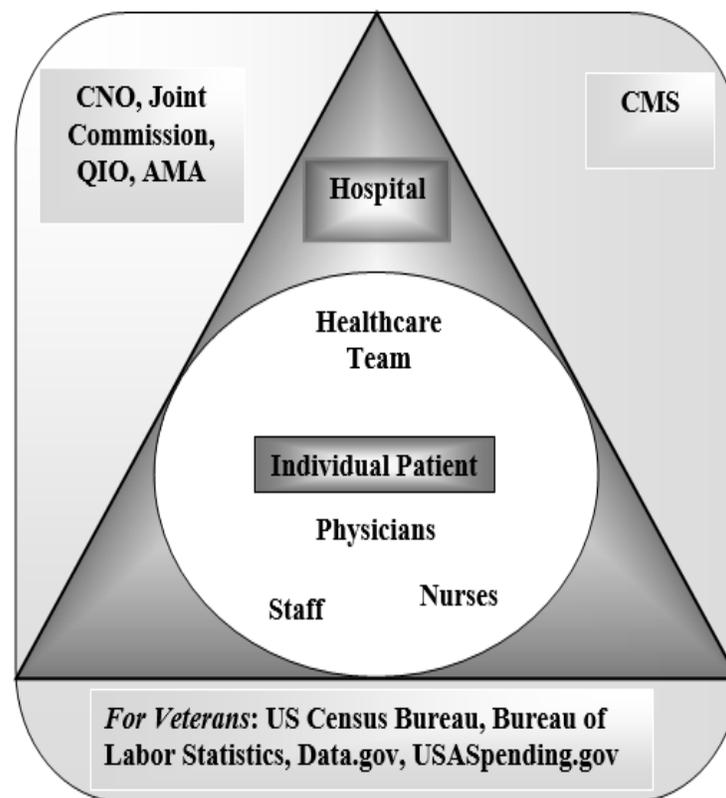
In this paper, we are ultimately interested in investigating the relationships among three different variables drawn from the three levels that form the PCQ measurement triad. In so doing, we also throw light on a crucial antecedent to and an important outcome of PCQ in U.S. hospitals so as to highlight the entire stream of care quality in U.S. hospitals.

## **PCQ MEASUREMENT TRIAD: ELEMENTS**

Nerenz and Neil's (2001) study suggested that scholars should incorporate many different aspects of healthcare performance such as the quality of care, the utilization/cost/efficiency of the hospital resources, the patient satisfaction and reports of care, and financial performance should be integrated in a framework. In healthcare, PCQ represents the service quality and is therefore, the most important outcome to measure (Alaigh, 2010) because the entire healthcare system strives to be oriented towards offering high care quality for patients. Further, incorporating all performance criteria suggested by Nerenz and Neil's (2001) study in a single framework is extremely difficult because of the challenges in its operationalization, especially for a single empirical study.

To fill the aforementioned gap in extant literature, we take a small step here with our unifying conceptual framework for PCQ measurement (Figure 1) that ties in three tiers of the U.S. healthcare system—the patient, the healthcare team and the hospital (CMS, 2016). In Figure 1 we depict the patient at the core with a rectangle, the healthcare team in the middle with an ellipse and hospital in the outer layer with a triangle because any healthcare system's avowed aim is to offer appropriate health services to cure the patient's diseases/ailments, thereby highlighting that PCQ should be the main systemic performance outcome. All entities in the U.S. healthcare ecosystem are shown in corresponding layers depending upon the closeness of their interaction with the patient.

**FIGURE 1**  
**U.S. Healthcare Ecosystem Stakeholders**



*Notes.* The individual patient is shown by a rectangle at the center; the healthcare team (comprising physicians, nurses and hospital staff) is represented by the ellipse and the hospital is depicted by the triangle. All other important stakeholders are also shown.

In Table 4, we provide the operational details of our framework. Specifically, for each layer we identify the major stakeholder, all other important stakeholders, the interacting systems, the existing measurement instruments that could be used and the organizations involved in PCQ measurement. Next, in Table 5, we propose a research design for a triadic PCQ measurement using a few existing and enhanced instruments in the U.S. healthcare ecosystem.

TABLE 4

## U.S. Healthcare Ecosystem Elements

Level	Primary Entity	Other Stakeholders	Interacting Systems	Existing Healthcare Quality Measurement Instruments and Sources
Individual	Patient	Kin	<ul style="list-style-type: none"> <li>• EHR</li> <li>• HCAHPS survey</li> <li>• Patient complaints</li> </ul>	<ul style="list-style-type: none"> <li>• HCAHPS survey questionnaire</li> <li>• Complaints to the Joint commission, the state QIO, if using Medicare</li> <li>• Complaints posted by patients/kin on websites such as Healthgrades, RateMDs, Vitals, Yelp</li> </ul>
Team	Healthcare team	Physician, Nurse, staff	<ul style="list-style-type: none"> <li>• EHR</li> <li>• HCAHPS survey</li> <li>• HealthIT.gov</li> </ul>	<ul style="list-style-type: none"> <li>• HCAHPS survey questionnaire</li> <li>• Hospital's internal quality improvement effort</li> </ul>
Organization	Hospital	CMS, CNO, Joint Commission, QIO, AMA.  <i>For Veterans/VA:</i> US Census Bureau, Bureau of Labor Statistics, Data.gov, USASpending.gov	<ul style="list-style-type: none"> <li>• EHR</li> <li>• HealthIT.gov</li> <li>• VistA</li> </ul>	<ul style="list-style-type: none"> <li>• Hospital Compare website</li> <li>• Annual report to U.S. Congress</li> </ul>

**Notes.** **CMS**—Centers for Medicare and Medicaid Services is the nodal body tasked with tracking hospital quality improvements. **The Joint Commission** is an independent, not-for-profit body to which patients can complain about their hospital issues. **QIO**—Quality Improvement Organization is the organization to complain if the patient is receiving Medicare; there are separate bodies for each state. **ONC** - The Office of the National Coordinator for Health Information Technology (IT) is the federal body responsible for coordinating nationwide efforts to implement electronic exchange of health information using the **healthIT.gov** network. **AMA**—American Medical Association helps physicians help patients by uniting doctors and medical students nationwide to work on the most important issues. **VA**—The United States Department of Veterans Affairs is the military veteran benefit system and coordinates all healthcare services for veterans (currently part of U.S. military or in the past). **VistA**—Veterans Health Information Systems and Technology Architecture—is VA's health IT system, which provides an integrated inpatient and outpatient electronic health record for VA patients. **EHR**—Electronic Health Record, the technology platform used by all entities. **HCAHPS**—the Hospital Consumer Assessment of Healthcare Providers and Systems is the (survey) method of data collection currently used by CMS.

**TABLE 5**  
**Triadic PCQ Measurement Research Design**

Level	What to measure	How to measure	Metrics	Affected PCQ Dimensions
Micro / patient	<ul style="list-style-type: none"> <li>• Patient care quality (PCQ)</li> <li>• Patient satisfaction with the medical treatment</li> <li>• Recurring complaint themes among patients for a hospital</li> </ul>	<ul style="list-style-type: none"> <li>• Use HCHAPS survey to get patient data.</li> <li>• Randomly select several patients with different ailments at every hospital using improved HCHAPS survey.</li> <li>• Data mining to obtain customer complaint themes from websites for the hospital from four common websites (Healthgrades, RateMDs, Vitals and Yelp).</li> </ul>	<ul style="list-style-type: none"> <li>• PCQ</li> <li>• Patient Satisfaction</li> <li>• Major complaint themes obtained from text mining</li> </ul>	<ul style="list-style-type: none"> <li>• Interpersonal</li> <li>• Environmental</li> <li>• Administrative</li> </ul>
Meso / healthcare team	<ul style="list-style-type: none"> <li>• Healthcare team dynamics such as cohesion and effectiveness</li> <li>• Effectiveness of treatment processes</li> <li>• Hospital resource utilization</li> </ul>	<ul style="list-style-type: none"> <li>• Randomly select one or more healthcare teams in hospitals such that each team includes all the physicians, nurses and the staff who come into direct contact with patients.</li> <li>• Administer updated questions on team cohesion, team effectiveness and resource utilization.</li> <li>• Actual data on the number of patients handled by the team in a month and how many of those admitted patients with a procedure had to be readmitted within a 30-day window to determine effectiveness.</li> <li>• Collect actual data on number of working hours of each healthcare team member to calculate utilization.</li> </ul>	<ul style="list-style-type: none"> <li>• Healthcare team resource utilization</li> <li>• Healthcare team cohesion</li> <li>• Healthcare team effectiveness</li> </ul>	<ul style="list-style-type: none"> <li>• Interpersonal</li> <li>• Technical</li> <li>• Environmental</li> <li>• Administrative</li> </ul>
Macro/ hospital	<ul style="list-style-type: none"> <li>• Existing hospital performance based on ailment types and number of days of hospitalization such as 30-day mortality rates, 30-day readmission rates</li> </ul>	<ul style="list-style-type: none"> <li>• Obtain actual data for each hospital from CMS <i>Hospital Compare</i> website for the following metrics: <ul style="list-style-type: none"> <li>➢ 30-day mortality rate</li> <li>➢ 30-day readmission rates after a procedure</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Existing hospital-level averaged data for 30-day mortality rate and 30-day readmission rates after a procedure</li> </ul>	<ul style="list-style-type: none"> <li>• Technical</li> <li>• Administrative</li> </ul>

At the core of our framework lies the patient (either admitted in the hospital or visiting the outpatient clinic). Along with the patients, the other key stakeholder is the patient's kin, who stays with the patient/visits the hospital during the period of admission or accompanies the patient to the outpatient clinics. PCQ can be measured in the inner layer by tapping the patient's health facts from the electronic health record (EHR) system and his/her opinions on the quality of care that he/she experienced in the hospital using the Hospital Consumer Assessment of Health Care Providers and Systems (HCAHPS) survey questionnaire. EHR is the software platform extensively used in all U.S. hospitals by the nurses, staff and physicians to electronically record all patient information beginning with their name and demographics, to their body temperature, medication history, medical procedures, allergies and several other relevant medical information. The HCAHPS survey, administered mostly by independent survey contractors and sometimes by the hospital staff to patients in the hospital is currently used by CMS to collect patient data on PCQ and several other aspects of hospital operations for its own annual reporting to the U.S. Congress.

In the U.S., patients having issues with their healthcare (which include the hospital, the physicians, the nurses, the hospital staff and the medications administered to them as well as medical procedures performed on patients) could complain to either the official bodies or on independent websites. The Joint Commission is an independent, not-for-profit U.S. body to which patients can complain about their hospital issues. If the patient receives Medicare benefits, he/she can complain about their healthcare quality issues to the quality improvement organizations (QIO), which are separate organizations in each of the 50 states of the U.S. Patients could also complain about their healthcare quality issues on popular websites like Healthgrades, RateMDs, Vitals and Yelp about any hospital, doctor, nurse or staff. Systemic analyses of patient complaints could help healthcare researchers find the recurring themes among patients' complaints for each hospital, and also the recurring themes among similar hospitals across the U.S., which could be considered as areas of enhancement of the HCAHPS survey. These gaps or areas of improvement could also prove to be directly helpful for the hospitals in their effort to improve PCQ.

We suggest that the focus of an integrated PCQ measurement framework in the inner/core layer should be to effectively measure all aspects of PCQ including its four dimensions—interpersonal, technical, environmental and administrative quality and patient satisfaction with the medical treatment because ultimately, the patient needs to not only recover fully from the disease/ailment but also be satisfied with the cure and its associated costs. The core part of our proposed framework is at the micro level, with the unit of analysis being the individual patient. Data could be mined from websites for every hospital from four common websites (Healthgrades, RateMDs, Vitals and Yelp) to obtain customer complaint themes and all the individual data for the hospital collected in a month to be grouped and averaged into single number.

Next, we move to the middle layer of our proposed framework, where most of the medical treatment processes occur. Most hospitals have three primary responsible stakeholders who interact very closely with the patient—the physician, the nurse and the healthcare staff who could be playing one or more of the following roles: physician assistant, dietician, pharmacist, therapist/rehabilitation specialist or hospital administrative/support personnel. To measure PCQ in the middle layer, the HCAHPS survey questionnaire could be relied upon. In addition, several hospitals undertake internal quality improvement exercises and even conduct small-scale controlled experiments from time to time. The results of such in-house hospital quality improvement exercises could supplement the HCAHPS survey domains for PCQ. All four different aspects of PCQ—interpersonal, technical, environmental and administrative quality domains must be measured in a holistic way. Many of these PCQ domains are covered currently in the HCAHPS survey instrument. As a separate exercise, the

existing HCAHPS instrument could be enhanced with suitable questionnaire items to incorporate any additional PCQ domains that are not currently covered.

EHR, the HCAHPS survey and HealthIT.gov are the three major platforms currently used by entities in this layer. HealthIT.gov is the official government health network that encompasses the use of computer hardware, software to record, store, protect, and retrieve clinical, administrative, or financial information related to all aspects of health information about patients in U.S. hospitals and clinics. HealthIT.gov makes it possible for healthcare providers to better manage patient care through secure use and sharing of health information, which includes the use of EHRs instead of paper medical records to maintain people's health information. All three platforms interact with patients either directly or indirectly, store or exchange patient information. Therefore, the Health Insurance Portability and Accountability Act (HIPAA) of 1996, the U.S. legislation that provides data privacy and security provisions for safeguarding medical information is a major concern that needs to be factored in any effort to collect, and disseminate patient data. Adequate care must be taken while calculating PCQ metrics to depersonalize patient information completely.

We argue that the focus of an integrated PCQ measurement framework in the middle layer should be to effectively measure healthcare team effectiveness, which ultimately affect PCQ. In addition, human resource utilization could be calculated using the hourly work schedule for all team members. All measurements of quality of care at this layer would involve (other than the patient) members of the particular healthcare team responsible for the patient's care—the physician, nurse and staff members and would thus be at a meso team level. While designing the enhanced measures, one or more healthcare teams in hospitals could be randomly selected such that each team includes all the physicians, nurses and the staff who come into direct contact with patients. Updated questions on team cohesion, team effectiveness could be administered to the team members. Further, actual data on the number of patients handled by the healthcare team in a month and the number of hours worked each day by every team member could be used from hospital records. How many of those admitted patients with a procedure had to be readmitted within a 30-day window could be used to determine healthcare team effectiveness. Finally, all healthcare team-level data for the hospital collected in a month to be grouped and averaged into single number.

Finally, we shift gears to the outer layer of the PCQ measurement triad. We suggest that the outer layer of our proposed framework comprises CMS, the nodal U.S. governmental body tasked with tracking hospital quality improvements across all U.S. hospitals. There are four key stakeholders that routinely interact and collaborate with CMS and a few others that occasionally interact with CMS in the PCQ measurement and management efforts, as and when required. The Joint Commission and the state QIO are two important stakeholders. The Office of the National Coordinator (ONC) for Health Information Technology (IT), the federal body responsible for coordinating nationwide efforts to implement electronic exchange of health information using the national healthIT.gov network, is a third stakeholder. Similarly, the American Medical Association (AMA) which helps physicians help patients by uniting doctors and medical students nationwide to work on the most important issues, is a fourth important stakeholder in the PCQ measurement because it can guide physicians and medical research teams with core technical care issues and evolving medical standards.

In the U.S., currently, there is a parallel system of healthcare for veterans (who were in the past or are currently a part of active U.S. military). The United States Department of Veterans Affairs (VA) is the military veteran benefit system and coordinates all healthcare services for veterans. The Veterans Health Information Systems and Technology Architecture (VistA) is the VA's health IT system, which provides an integrated inpatient and outpatient electronic health record for VA patients. For the veteran patients, CMS interacts with four other stakeholders. The U.S. Census Bureau keeps track of total veterans in the U.S. while the Bureau of Labor Statistics keeps track of the employment situation of veterans, thereby helping

decide the veteran benefits in general, and their health benefit entitlements, in particular. The Data.gov is VA's home of open data and application program interface (API), which are a set of openly available routines, protocols, and tools for building software applications. Data.gov releases de-personalized veteran data, APIs, tools and resources that can be used by the public to develop web and mobile applications using VA resources to help veterans in their daily lives. Similarly, all transaction data shown on USAspending.gov is reported by the U.S. federal agencies making contract, grant, loan, and other financial assistance awards. CMS interacts with VA and these four peripheral stakeholders as and when required to build the quality profile for veteran hospitals and measure quality of care received by the veterans, at large. EHR, HealthIt.gov and VistA are the three technology platforms currently used by entities in this layer. Both the country-wide networks—the HealthIT.gov and the VistA—extensively rely on the EHR as the software platform to collect and disseminate the patients' health information in electronic format. CMS has been mandated by the U.S. government to measure and monitor U.S. hospitals' adherence to patient safety and patient care quality being offered in hospitals across the 50 states and draw up national averages on specific quality measures, which are then used for comparisons among hospitals. CMS uses these comparisons to also reward and penalize hospitals, especially reimburse the hospitals for their costs incurred to serve the Medicare patients but those CMS functions are beyond the scope of the discussion on PCQ measurement here.

We advocate that the focus of an integrated PCQ measurement framework in the outer layer should be to measure hospital quality performance, based on the quality of care provided in the hospital. In this context, a lot of existing detailed hospital-level averaged data already tracked by CMS and published in Hospital Compare website could be re-used. Examples of detailed metrics currently used include the following: (1) the 30-day risk-standardized mortality rates for each of the four ailments—Acute Myocardial Infarction (heart attack), heart failure and pneumonia; (2) the 30-day risk-standardized readmission rates after each of the four medical procedures—Acute Myocardial Infarction (heart attack), heart failure, pneumonia and hip/knee surgery. All PCQ measures in this layer would be at the macro/organizational or hospital level. Next, we identify the main antecedent to delivering a high PCQ in the hospital—a team-level variable: *healthcare team effectiveness* and then draw attention to the hospital-level outcome variable: *hospital quality performance*.

## **A TRIADIC PCQ MEASUREMENT FRAMEWORK**

Firms should have cohesive cross-functional teams to implement quality practices across the organization because cohesive groups are known to have a high degree of group identity and commitment to the group's tasks (Govers, 2001; Wang, Chou, & Jiang, 2005; Wang, Ying, Jiang, & Klein, 2006). This premise is based upon QM philosophy (Ahire, Golhar, & Waller, 1996; Feigenbaum, 1961; Jayaram, Ahire, & Dreyfus, 2010; Kaynak & Hartley, 2008) which emphasizes that team work is a required characteristic to achieve good employee relations, which in turn is required to implement quality practices. Effective healthcare teams are known to perform their routine tasks little differently than other teams and they learn quickly from each other.

In the healthcare context, small surgical team members are able to quickly learn from each other due to workload sharing and team helping, especially when the task complexity is very high (Vashdi, Bamberger, & Erez, 2013). To be effective, healthcare teams use physician empathy (Kim, Kaplowitz, & Johnston, 2004) and nurse emotional involvement (McQueen, 2000) to positively influence the interpersonal relationships that they are able to establish with their patients. Effective healthcare teams take an active interest in their patients' medical condition, empathize with their suffering (Roark & Sarah, 1989), communicate clearly to the patient and kin about their medical condition and unanimously work toward their quicker cure,

which would result in better interpersonal quality of patient care (Deeter-Schmelz & Kennedy, 2003).

Adequate and timely access to and use of up-to-date patient health information enhances the technical quality of patient care by providing physicians and nurses the correct up-to-date information on the patient's health (Chen, Garrido, Chock, Okawa, & Liang, 2009; Jha et al., 2009). Effective healthcare teams use EHR and other hospital medical information systems to have all patient information readily available to the physicians for decision-making and nurses for support (Graetz et al., 2014).

All physical elements of a patient's environment such as the hospital bed, clothes and equipment need to be clean and disinfected (Aiken, Clarke, & Sloane, 2008). Hand hygiene prevents infection among patients and others (Pittet et al., 2000). Effective healthcare teams meticulously follow all hospital procedures, take all necessary precautions related to hygiene, ensure that all physical elements of the hospital including the beds and other medical and surgical equipment are thoroughly cleaned and disinfected before use on any patient (Carling, Parry, & Von Beheren, 2008). Further, effective healthcare teams interact with housekeeping to ensure that the hospital wards are organized, clean and aesthetically pleasing (Mathur, 2014; Wearmouth, 2001). These steps would result in better environmental quality.

Hospital administration departments like billing and reception generally work with a silo mentality (Bokar & Perry, 2007; Conway, 1997) oblivious to the fact that all departments need to support the healthcare teams in their effort to provide quality patient care. Effective healthcare teams interact closely with the hospital's administrative units (White & Whitman, 2006) to ensure that information is provided timely to the patients or their next of kin. Because administrative quality is a key element of patient care (Grumbach & Bodenheimer, 2004), effective healthcare teams frame a few preliminary procedures of their own to educate patients on simple administrative steps such as scheduling hospital visit appointments, providing food and dietary information related to the sickness to the patient or to their kin, explaining healthcare decision making processes to patients, and when required, interacting with the hospital's administrative departments on behalf of patients (Grumbach & Bodenheimer, 2004).

Based on the above discussions we suggest that having effective healthcare teams in the hospital would avoid unnecessary delays and reduce variability in healthcare processes. Members of an effective healthcare team avoid medical errors, check schedules and room/equipment availability in advance of patients' medical procedures, take steps to prevent infections in hospitals and keep the patients' care at the forefront of their decision making (Grumbach & Bodenheimer, 2004). These activities make patient care safer and more accurate, improving PCQ. Thus, our first proposition suggests:

*P1: Healthcare team effectiveness is positively associated with patient care quality.*

For any PCQ measurement framework to be effective, it must also address associated issues such as reducing hospital waste, preventing medical errors and increasing operational performance of hospitals (Byrnes, 2004; Kowalski, 2009; Shih, Rivers, & Soya Hsu, 2009). In a recent study, Goldstein and Iossifova (2012) investigated the quality practices of U.S. general acute care hospitals and found differing effects that are dependent on hospital slack. In hospitals with high slack, quality practices predict three of four studied process performance measures, but in hospitals with low slack, quality practices predict only one of the four process performance measures while other factors outweigh the effects of quality practices. Their study supported hospital senior management taking a long-term perspective related to implementation of quality management systems.

Many hospitals today are not doing too well financially and their margins are under stress (Garson, 2000; Schneller & Smeltzer, 2006). Therefore, most U.S. hospitals would like to know how PCQ improvement effort could help them improve their overall hospital quality profile

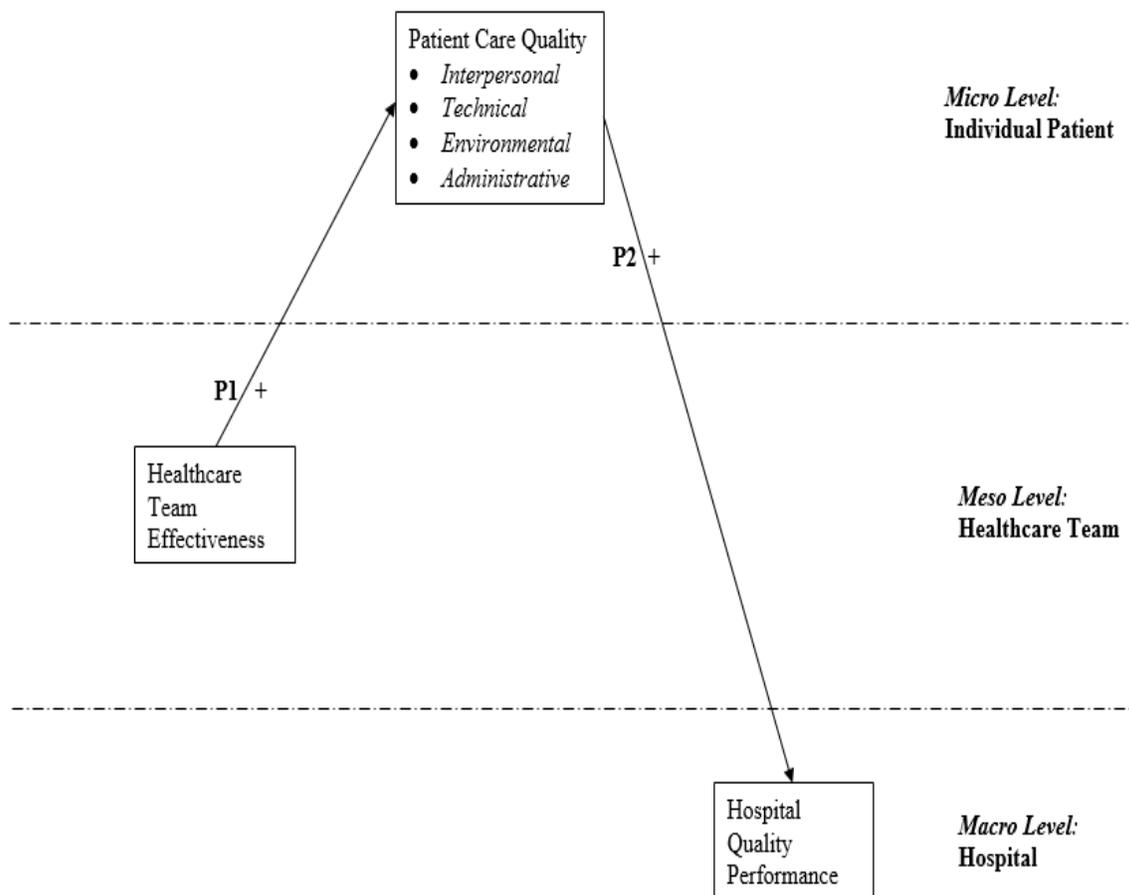
and hem them save cost and become efficient in the process. After all, while hospitals are all meant to serve the suffering public and cure them of their ailments, they too like other service firms, need to be concerned about financial performance. It would be thus a win-win for all parties if the PCQ improves because all the following three effects are inter-linked. First, patients can be medically treated faster and effectively and can leave the hospital sooner after their treatment. Second, doctors and nurses can become more satisfied with faster and effective recovery of their patients who do not need to come back for the same ailment. Third, hospitals can enjoy superior overall quality performance and thereby better financial performance due to the ability of patients to quickly pay off their lower hospital bills, which would be possible due to the improved quality of care and shorter stay in the hospital. Therefore, our second proposition notes:

*P2: Patient care quality is positively associated with hospital quality performance.*

In sum, our expected relationships among the three variables, one each drawn from the three layers of the U.S. healthcare ecosystem identify a crucial antecedent to and an outcome of PCQ that hospital senior management must focus their energies on to sustain a culture of high quality to improve their financial performance. Figure 2 depicts the proposed triadic PCQ measurement framework.

**FIGURE 2**

**U.S. Healthcare: A Triadic PCQ Measurement Framework**



## DISCUSSION AND CONCLUSION

Only a handful of published healthcare studies (Dagger et al., 2007; Gill & White, 2009) have used the three dimensions of patient care quality—interpersonal, environmental and administrative quality, other than the technical quality dimension that has been used in some form or the other by most studies. As a result, many studies may have missed having the comprehensive picture of patient care quality in the hospital while focusing only on the technical quality (Boyer, Gardner, & Schweikhart, 2012; Chandrasekaran, Senot, & Boyer, 2012; Isaac, Zaslavsky, Cleary, & Landon, 2010; McFadden, Stock, & Gowen, 2006; Nair, Nicolae, & Narasimhan, 2013). Many academicians in the field of healthcare operations would acknowledge that there are quite a few dimensions of PCQ being left out, when we consider the elaborate metrics that CMS has developed to measure specific aspects of technical quality.

In marketing and healthcare literature, there are quite a few studies that have already considered patient satisfaction with a cure and patient safety and other quality related issues only from a patient's perspective (Altman, Clancy, & Blendon, 2004; Chang et al., 2009; Dagger et al., 2007; Ma et al., 2009; Nelson & Niederberger, 1990; Van Ess Coeling & Cukr, 2000; Ware et al., 1983). Future studies could link both patient and hospital administrator perspectives together in a single study. In other words, future studies could collect data from patients released from hospitals after their admission stay and gather their views on quality related issues that they faced in the hospital and also data from the hospital's executive about the same issues in the hospital. Using a measurement instrument similar to SERVQUAL (Parasuraman, Zeithaml, & Berry, 1985, 1988, 1991) in healthcare, such a study would help clearly pin-point the gaps in the quality demanded by patients and those being administered in the hospital. Such micro level studies would help the hospital administrators realize the specific areas that they need to improve in their hospital.

Although we have proposed elaborate measures to comprehensively measure PCQ and have suggested specific metrics for each levels of the U.S. healthcare ecosystem, we recognize that it may be quite a while before they are ingrained. Currently, empirical studies are being planned to test the proposed PCQ triadic measurement framework using scales available in extant literature. Healthcare team effectiveness could be measured using scales adapted from Poulton and West (1993, 1999). PCQ could be measured as a second-order construct along with all four of its dimensions—interpersonal, technical, environmental and administrative quality using scales modified from Dagger and colleagues (2007) while hospital quality performance could be measured using scale adapted from Jha and colleagues (2007). Given the multi-level nature of the framework, HLM software (Raudenbush, Byrk, & Congdon, 2004) can be used effectively for the empirical to address methodological concerns related to different level interchanges.

Although the conceptual framework offered in this paper has been drawn up keeping the U.S. healthcare system in mind, it can be extended to other countries that have a more direct government intervention in healthcare like in Australia, Canada and the U.K. In these countries, there are no separate health insurance providers, government provides all payment to hospitals, and healthcare is mandated by law and free to the patient. Future studies could be conducted to compare and contrast the U.S. healthcare research model with all the variables studied and its applications could be investigated in such countries.

In closing, more than two centuries of research have been already undertaken in the area of PCQ improvement for healthcare in general, and there are still challenges being faced by current U.S. hospitals (Boyer & Pronovost, 2010). A reason for the lack of a holistic framework for healthcare performance measurement is the too narrow and detailed focus of every entity on only their own domain of PCQ improvement without paying enough attention across layers. A triadic PCQ measurement framework, such as the one proposed herein, could help alleviate this problem by considering all related concerns of each of the three pillars of the

triad—the patient, the healthcare team and the hospital, and CMS and other stakeholders by analyzing the inputs obtained from the entities in each layer to comprehensively address PCQ measurement. Extending the PCQ measurement framework to include other aspects of hospital performance such as financials and human resource utilization is a futuristic step that can be incorporated by hospitals in the U.S. and elsewhere.

## **REFERENCES**

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