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U.S. hospital culture profiles for better performance in patient safety, patient satisfaction, Six Sigma, and lean implementation

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ABSTRACT

This study identifies prevalent organizational culture profiles in U.S. hospitals based on the Competing Value Framework and examines the relationship between these cultures and quality-related performance. Cross-sectional survey data from 215 U.S. hospitals were merged with secondary data from the Centers for Medicare and Medicaid Services and the Hospital Compare website. Cluster analysis identified two different culture profiles: Strong Multidimensional Culture (SMC) and Weak Multidimensional Culture (WMC). T-tests were then employed to find significant differences between the groups. The SMC group outperformed the WMC group across a variety of quality-related performance measures, such as patient safety outcomes, patient satisfaction scores, Six Sigma, and Lean implementation. This study contributes to previous literature by being the first to propose an empirical taxonomy of hospital culture, based on the Competing Values Framework. This study also reveals that hospitals should employ a more comprehensive approach to organizational culture in order to enhance overall hospital quality performance, rather than focusing on one dominant culture type.

1. Introduction

Over the last several decades, there has been a surge of interest among healthcare organizations, and scholars alike, regarding the role of organizational culture to improve hospital performance. The notion is that an organizational culture aligns its members around a common set of values, norms, and attitudes, thereby developing a highly motivated and well-coordinated workforce (Lim, 1995). Schein (1984, p. 3) formally defines organizational culture as "the pattern of basic assumptions that a given group has invented, discovered, or developed in learning to cope with its problems of external adaption and internal integration, and that have worked well enough to be considered valid, and, therefore, to be taught to new members as the correct way to perceive, think, and feel in relation to those problems." Organizational culture plays a critical role in improving processes (Schein, 1996) and has been identified as one of the most important factors in the successful implementation of quality management practices, such as Lean and Six Sigma (Patyal and Koilakuntla, 2018), and healthcare performance improvement (Scott et al., 2003). For this study, we adopted the sociological perspective of organizational culture that assumes that cultures can be empirically measured, changed, or manipulated in a system to improve organizational performance (Cameron, 2008).

Improving the quality performance in hospitals has become increasingly more important and multifaceted as the U.S. healthcare landscape has shifted emphasis away from volume-based, fee-for-service systems and more towards value-based care (Aroh et al., 2015). This paradigm shift is attributed to the establishment of the value-based purchasing (VBP) reimbursement program by the Centers for Medicare and Medicaid Services (CMS). The reimbursement payment amount a hospital receives from the CMS is dependent upon the hospital's total performance score on quality measures, such as clinical quality, efficiency, patient safety, and cost reduction (Dobrzykowski et al., 2016). Although the VBP reimbursement program is a Medicare program, the quality measures it entails are applicable to all patients regardless of insurance type (Aroh et al., 2015). The VBP program requires healthcare providers to maintain an innovative management system that enhances standardization in patient care to ensure process improvements, higher quality, and cost reduction (Aroh et al., 2015). Due to this revised reimbursement structure, hospitals are incentivized to exhibit strong performance on a variety of performance measures (Aroh et al., 2015; Ponsignon et al., 2015; Dobrzykowski et al., 2016). This has resulted in an environmental setting characterized by multiple, and often divergent,

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objectives, and raises questions about what would constitute an ideal culture orientation within hospitals.

The Competing Values Framework (CVF) (Cameron and Quinn, 1999) is the leading organizational culture typology and it addresses two competing value dimensions; each characterizing how an organization approaches its challenges. The first set of values represents focus (i.e. either internal/organizational or external/environmental) and the second set of values represents control (i.e. either for stability or flexibility). These two competing value sets generate four possible culture types for an organization: Clan, Developmental, Hierarchical, and Rational (see Fig. 1). Our study used the CVF because of its solid theoretical foundation and acceptance in numerous prior research studies (Scott et al., 2003). Nonetheless, there are at least two research gaps in the CVF hospital literature: 1) Prior studies have focused on identifying a dominant culture type while failing to examine an ideal culture configuration for U.S. hospitals that could achieve multiple hospital objectives and 2) prior research has failed to reach a conclusion regarding which specific CVF type or combination of types is superior. A meta-analysis of 84 empirical research studies also found that CVF culture types are related to organizational effectiveness, but not always as expected (Hartnell et al., 2011).

Regarding the first gap, although the CVF assumes that organizations possess a combination of these four culture types (Denison and Spreitzer, 1991; Jones and Redman, 2000), prior healthcare studies have instead focused on identifying a dominant hospital culture out of the four culture types in CVF. These findings are very inconsistent. For instance, a study of 40 U.S. hospitals showed that 37.5% had a dominant Hierarchical culture, 37.5% a dominant Clan culture, and 25% resulted in a mix of different cultures (Speroff et al., 2010). However, another study of 52 U.S. hospitals reported that 32.7% had a dominant Rational culture, 25% a dominant Clan culture, 25% a dominant Developmental culture, and only 17.3% a dominant Hierarchical culture (Gerowitz et al., 1996). Although the differences in cultural profiles of the U.S. hospitals may be due to either limited sampling or different time periods, it is necessary to take a more comprehensive approach to examine the cultural profiles of U.S. hospitals.

Prior studies in other countries have also identified different dominant hospital cultures. The Clan and Hierarchical cultures were found to be more common than the Rational and Developmental cultures in a study of Japanese nurse and physician groups in Neonatal Intensive Care Units (NICU) (Sasaki et al., 2017). The Rational and Hierarchical cultures were the most prevalent among Italian healthcare organizations (Calciolari et al., 2018). Among studies conducted in the U.K., either the Hierarchical culture (Ovseiko and Buchan, 2012) or the Clan culture (Wagner et al., 2014) were reported to be dominant. However, Jacobs et al. (2013) identified a changing cultural landscape for U.K. hospitals over time. Although the Clan culture was dominant in all three of the time periods studied, it is declining, while the Hierarchical and Rational culture types were on the rise. Although there are differences among national frameworks that influence hospital culture, these studies illustrate that there has been no consensus on the dominant culture type of hospitals, not only across, but also within, nations.

Regarding the second research gap, prior healthcare literature has also failed to reach a conclusion regarding which specific culture type is superior (see Table 1). For instance, there is some evidence in the literature that a Clan culture is associated with the reduction of medical errors (Stock et al., 2007), improved safety climate (Singer et al., 2009), increased job satisfaction, and organizational commitment (Goodman et al., 2001; Davies et al., 2007). The Developmental culture has been associated with quality improvement practices (Shortell et al., 1995; Valmohammadi and Roshanzamir, 2015), greater intellectual capital (Rondeau and Wager, 2017), and higher nurse salaries (Davies et al., 2007; Jacobs et al., 2013). The Hierarchical culture, on the other hand, has been linked to higher management salaries (Jacobs et al., 2013), lower nurse turnover rates (Banaszak-Holl et al., 2015), and reduced hospital readmission rates (Lee et al., 2018). Previous research showed the Rational culture exhibits improved knowledge management capabilities (Stock et al., 2010), increased job engagement (Mijakoski et al., 2015), and positive financial outcomes (Hartnell et al., 2011). As shown in Table 1, prior studies have differed in terms of the type of healthcare

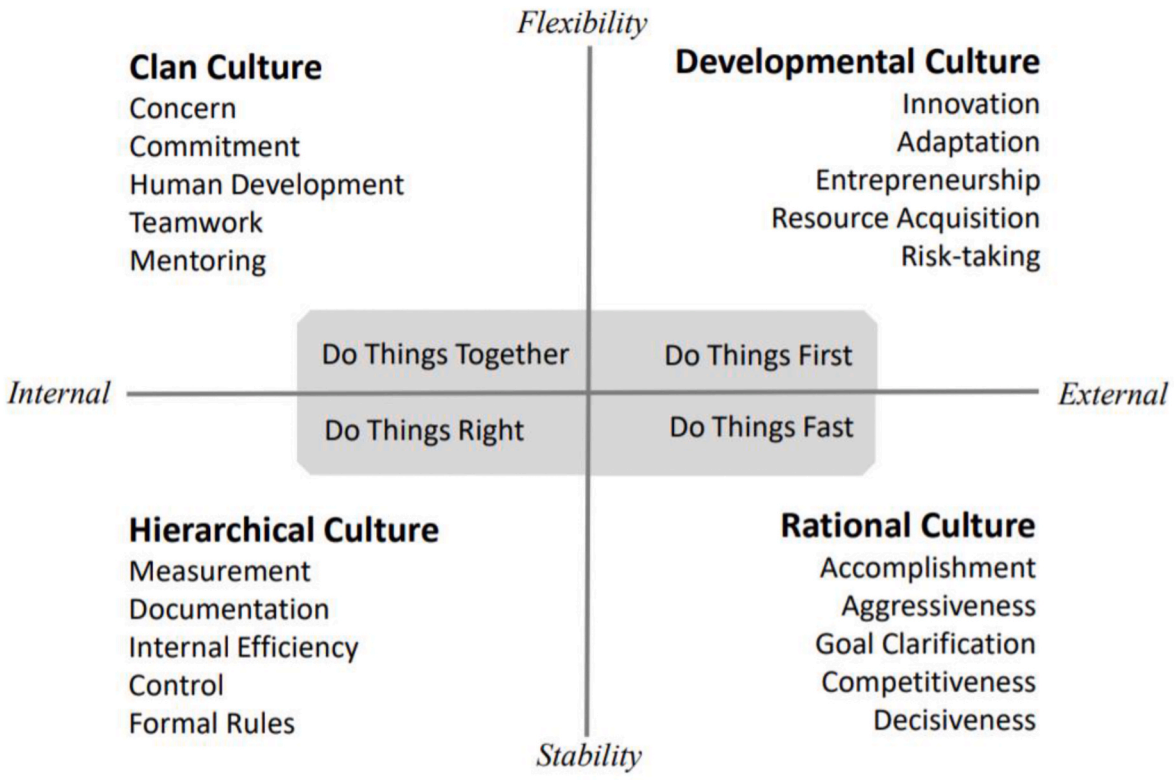

Fig. 1. Competing values framework of organizational culture (adapted from Jacobs et al., 2013, Stock et al., 2007, and Stock et al., 2010).

Table 1
Literature review on competing values framework in health care.

Author(s), Year	Primary Focus	Method	Outcome			
			Clan	Developmental	Hierarchical	Rational
Ancarani et al. (2009)	To explore the link between organizational culture and patient satisfaction	Survey of nurses and physicians in 47 Italian hospital wards	(+): patient satisfaction	(+): patient satisfaction		(−): patient satisfaction
Banaszak-Holl et al. (2015)	To explore the impact of organizational culture on nursing staff turnover in nursing homes	Survey of Directors of Nursing and nursing home administrators	(+): lower licensed practical nurse turnover	(+): lower licensed practical nurse turnover	(+): lower registered nurse turnover	
Calciolari et al. (2018)	To determine the relationship between dominant culture, and competitiveness, and financial performance.	Survey responses from 529 senior managers at 59 Italian healthcare organizations	(+): financial performance		Most dominant culture (+): financial performance	(+): Competitiveness
Cash et al. (2018)	To evaluate the extent of association of workplace and social incivility with organizational cultures.	Survey of 2815 Emergency Medical Service professionals	(−): emergency medical services staffs experienced the higher incivility	(−): emergency medical services staffs experienced the highest incivility		
Davies et al. (2007)	To examine the relationships between cultures and overall organization performance.	Survey of 899 senior managers at 189 hospital trusts in England.	(+): fewer complaints and better staff morale	(+): higher nurse salaries	(+): higher management salaries	
Gerowitz et al. (1996)	The role of top management team cultures in hospitals	Data from 52 U.S. hospitals, 36 England hospitals, and 34 Canada hospitals.	(+): organizational performance	(+): organizational performance	(−): organizational performance	(+): organizational performance
Gifford et al. (2002)	To examine CVF culture links with factors for nurse retention.	Survey of labor/delivery units at seven hospitals in the U.S.	(+): nurse organizational commitment, empowerment, job satisfaction, lower intent to turnover			
Goodman et al. (2001)	To identify the nature of CVF culture type linked to job-related outcomes.	Survey of 276 respondents in obstetrics units at 7 hospitals.	(+): nurse commitment, job involvement, empowerment, job satisfaction, lower turnover intent		(−): nurse commitment, job involvement, empowerment, job satisfaction, lower turnover intent	
Hung et al. (2014)	To explore the effect of culture types on providers' compliance to recommended treatments for reducing tobacco use.	Survey of 500 providers in 60 clinics in New York City.	(+): greater compliance with recommended guidelines for treatment		(+): greater compliance with recommended guidelines for treatment	(+): greater compliance with recommended guidelines for treatment
Jacobs et al. (2013)	To examine culture type association with hospital performance at three time periods.	Survey of 140 English NHS acute care hospitals at three-time points.	Most dominant in all three time periods (+): fewer complaints and better staff morale	(+): higher nurse salaries	(+): higher management salaries	
Knapp (2015)	To assess the links between CVF culture types and three Lean Six Sigma (LSS) factors.	Survey of human resource and quality managers at 223 hospitals	(+): higher LSS management support	(+): higher LSS management support		
Lee et al. (2018)	To analyze the relationship between culture types and readmission rates, and their link to customer satisfaction and Facebook ratings	Survey of 173 hospitals and combined with secondary data			(+): lower readmission rates which lead to patient satisfaction and higher Facebook ratings	
Mijakoski et al. (2015)	To examine associations among organizational culture, employee burnout, job engagement, and work demands.	Survey of 286 nurses and physicians at an academic Macedonian general hospital	(+): job engagement (+): less physician burnout	(+): less nurse burnout	(+): less nurse burnout	(+): job engagement (+): less nurse burnout
Ovseiko and Buchan (2012)	To assess current and preferred future CVF culture types.	Survey of 436 scientists and physicians working at both the University of Oxford and its affiliated health system	Moderate for the health system; moderate-to-strong for the health system	Not dominant but strong for the university	Dominant for the health system; moderate-to-strong for the health system	Moderate for the health system; Not dominant but strong for the university
Pasricha et al. (2018)	To address the link between ethical leadership and corporate social responsibility. CVF cultures are mediators.	Data from 350 senior and mid-level managers at 28 Indian social healthcare enterprises	(+): corporate social responsible behavior	(+): corporate social responsible behavior		
					Dominant culture	

(*continued on next page*)

Table 1 (*continued*)

Author(s), Year	Primary Focus	Method	Outcome			
			Clan	Developmental	Hierarchical	Rational
Prenestini et al. (2015)	To examine the link between Clan culture and clinical governance in an Italian health care organization.	Data from a survey of CEOs from 61 healthcare organizations		(+): positive attitude toward clinical governance		(+): positive attitude toward clinical governance
Rondeau and Wager (2017)	To study the impact of culture on intellectual capital	A survey from Directors of Nursing at 254 Canadian nursing homes	(+): intellectual capital	(+): intellectual capital		
Sasaki et al. (2017)	To examine organizational culture types in the Japanese neonatal intensive care units (NICUs).	Data from over 2000 physicians and nurses at 40 Japanese neonatal units	Dominant culture (+): higher work engagement among nurses.		Dominant Culture	
Scott et al. (2003)	To review the link between culture and healthcare outcomes.	Qualitative review of 10 different studies of culture and health care performance.	All four types of cultures are equally important. There is some evidence to prove that a relationship exists between culture impact and hospital performance, but it is difficult to articulate.			
Singer et al. (2009)	To examine the link between CVF culture types and patient safety climate.	Survey of senior managers and physicians at 92 U.S. hospitals	(+): safety climate		(−): safety climate	
Speroff et al. (2010)	To examine culture variation across U.S. hospitals and patient safety climate	Survey of staffs and participants of 40 U.S. hospitals	(+): safety attitudes (+) Safety climate (−): Information and analysis		(−): safety attitudes (−) Safety climate (−): Information and analysis	
Stock et al. (2007)	To investigate how organizational culture can lower medical errors	Survey of Quality, Patient Safety and other Directors from 549 U.S. hospitals	(+): reducing medical errors	(−): patient safety outcome		(+): reducing medical errors
Stock et al. (2010)	To examine the relationship between culture, knowledge management, and patient safety in U.S. hospitals.	Data from 202 U.S. hospitals	(+): patient safety performance, knowledge acquisition, dissemination, and responsiveness		(+): knowledge dissemination.	(+): knowledge acquisition and dissemination
Valmohammadi and Roshanzamir (2015)	To study the links among culture, TQM and performance.	Surveys were received from 209 CEOs, and senior managers of Tehran pharmaceutical companies	(+): TQM and organizational performance	(+): TQM and organizational performance	Most dominant culture (+): TQM and organizational performance	Most dominant culture (+): TQM and organizational performance
Wagner et al. (2014)	To explore the relationships between organizational culture, management structure, and quality management in European hospitals.	Data from 158 hospitals, completed by c-level managers, quality managers and hospital trustees	Among participating hospitals, 33% had a clan culture as their dominant culture, 26% developmental culture, 16% hierarchical culture and 25% rational culture. Culture types had no statistically significant relationship with hospital performance.			

organization investigated, methodologies used, and performance measures assessed (Scott et al., 2003).

The research gaps mentioned above might be due to an oversight of the underlying assumption of the CVF typology. While the four cultures are theoretical archetypes, organizations can possess all four cultures to some degree (Denison and Spreitzer, 1991; Cameron, 2008). Previous literature successfully validated the four CVF culture types as individual constructs with their own effectiveness but has not articulated ideal combinations of them. To our knowledge, this is the first study that has attempted to empirically verify the assumption by exploring existing combinations of the CVF cultures in hospitals. In addition, to improve our understanding of the ideal culture characteristics, this study investigated the relationship between the possible culture combinations and quality-related performance. Therefore, our research questions were as follows: Is a multidimensional CVF culture more prevalent than a single dominant CVF culture in U.S. hospitals? What is the relationship between the multidimensional culture and hospital quality performance?

The multidimensional culture research question necessitated adopting the cluster analysis, a research methodology that had not been previously used to study hospital cultures. The beauty of this technique is that it allowed us to identify groups of prevailing culture combinations empirically. To obtain generalizable insight for the research question on the relationship between culture type and performance, we collected survey data from U.S. hospitals. The survey asked questions about CVF culture types, various quality performance-related factors (i.e. Lean implementation, Six Sigma implementation, and patient safety outcome), and contextual factors (i.e. hospital size and teaching status). We then combined the survey data with archival data (e.g., readmission rates, hospital acquired condition rates, patient satisfaction, and health information technology) which resulted in a final sample size of 215 U.S. hospitals.

The cluster analysis identified two groups of hospital cultures. After interpreting each of the cluster's culture profiles, and based on the previous literature, we labelled them as Strong Multidimensional Culture (SMC) and Weak Multidimensional Culture (WMC). These two groups can serve as a new taxonomy of U.S. hospital culture. We also show that the SMC group outperforms the WMC group on various hospital quality outcomes. The SMC group implements Lean and Six Sigma quality improvement programs more systematically and experiences higher patient safety and patient satisfaction levels than the WMC group.

Overall, our paper advocates for the CVF's overlooked assumption that incorporating all competing organizational values would be most effective in improving hospital outcomes. Given that today's value-

based program requires quality improvement in various aspects, pursuing a SMC would be an advisable approach for U.S. hospitals. Therefore, our paper attempts to rectify prior issues regarding contextual factors studied, methodology used, and performance measures assessed to provide a clearer answer to the question of which CVF culture types are prevalent and superior.

2. Literature review and theory development

2.1. Competing Values Framework for organizational culture

The process perspective of organizational culture posits that certain assumptions lead to values and then to behaviours and visible artefacts (Lim, 1995). These organization-specific assumptions, values, and behaviours propose the existence of discernible and measurable differences among cultures (Cameron and Quinn, 1999). As discussed previously, a review of organizational culture approaches in healthcare reveals that the CVF is a leading typology (Scott et al., 2003). The four basic culture types proposed by the CVF are derived from the combination of two dimensions, the value focus and the control orientation (Cameron and Quinn, 1999). The first dimension, value focus, describes the degree to which the organization engages in internal or external activities. The second dimension, control orientation, indicates the degree in which the organization focuses on making changes (flexibility) or maintaining stability. These two dimensions generate the following four types of culture: 1) Clan culture, for internal and flexibility values, 2) Developmental culture, for external and flexibility values, 3) Hierarchical culture, for internal and stability values, and 4) Rational culture,

Table 2
Instruments for key factors.

	Measurement Items	References
Clan Culture	• Our organization is a very personal place - It is like an extended family. People seem to share a lot of themselves. (dropped) • The leadership in the organization is generally considered to exemplify mentoring, facilitating or nurturing. • The management style in the organization is characterized by teamwork, consensus, and participation • The glue that holds the organization together is loyalty and mutual trust - Commitment to this organizational runs high. • The organization emphasizes human development - High trust, openness, and participation persists. • The organization defines success on the basis of the development of human resources, teamwork, employee commitment, and concern for people.	Cameron and Quinn (1999); Mannion and Davies (2016); Stock and McFadden (2017)
Hierarchical Culture	• Our organization is controlled and structured place - Formal procedures generally govern what people do. (dropped) • The leadership in the organization is generally considered to exemplify coordinating, organizing, or smooth-running efficiency. • The management style in the organization is characterized by security of employment, conformity, predictability, and stability in relationships. (dropped) • The glue that holds the organization together is formal rules and policies - Maintaining a smooth-running organization is important. • The organization emphasizes permanence and stability - Efficiency, control and smooth operations are important. • The organization defines success on the basis of efficiency - dependable delivery, smooth scheduling, and low-cost production are critical.	Cameron and Quinn (1999); Mannion and Davies (2016); Stock and McFadden (2017)
Rational Culture	• Our organization is results oriented - A major concern is with getting the job done. People are very competitive and achievement oriented. • The leadership in the organization is generally considered to exemplify a no-nonsense, aggressive, results-oriented focus. • The management style in the organization is characterized by hard-driving competitiveness, high demands, and achievement. • The glue that holds the organization together is emphasis on achievement and goal accomplishment - Aggressiveness and winning are common themes. • The organization emphasizes competitive actions and achievements - Hitting stretch targets and winning in the marketplace are dominant. • The organization defines success on the basis of winning in the marketplace and outpacing the competition - competitive market leadership is the key.	Cameron and Quinn (1999); Mannion and Davies (2016); Stock and McFadden (2017)
Developmental Culture	• Our organization is dynamic and entrepreneurial place - People are willing to stick their necks out and take risks. • The leadership in the organization is generally considered to exemplify entrepreneurship, innovating, or risk taking. • The management style in the organization is characterized by individual risk-taking, innovation, freedom, and uniqueness. • The glue that holds the organization together is commitment to innovation and development - There is an emphasis on being on the cutting edge. • The organization emphasizes acquiring new resources and creating new challenges - Trying new things and prospecting for opportunities are valued. • The organization defines success on the basis of having the most unique or newest products. It is a product leader and innovator.	Cameron and Quinn (1999); Mannion and Davies (2016); Stock and McFadden (2017)
Lean	• '5 S' workplace organization: Sort, Set in Order (Straighten), Shine, Standardize, and Sustain • Process mapping (flow chart, process map, etc.) • Value Stream Mapping (VSM) • Kaizen or Kaizen Blitzes • Redesign for continuous flow (Cell design, pull system, etc.) • Just-In-Time (JIT) process management or inventory management	Arthur (2011); Graban (2011),
Six Sigma	• Process improvement tools: Statistical process control chart, check sheet, histogram, Pareto chart, Fishbone diagram, etc. • Process improvement method: DMAIC (Define, Measure, Analyze, Improve, and Control) • Training in process improvement tools for employees, such as change agent, Green Belts, Black Belts, Champions, etc. • Process improvement projects, review, and closure	Gowen et al. (2008)
Patient Safety Outcomes	• Reduced frequency of errors (dropped) • Reduction in the severity of errors (dropped) • Increased understanding of errors • Heightened awareness of errors • Reduction in the impact of error	McFadden et al. (2009).

Chi-square value = 810.198 (p-value<0.001); Degrees of freedom (d.f.) = 499; Comparative fit index (CFI) = 0.93; Tucker Lewis index (TLI) = 0.93; Bollen's incremental fit index (IFI) = 0.93; Steiger-Lind root mean square error of approximation (RMSEA) 90% interval = (0.047, 0.061).

for external and stability values (see Fig. 1). Awareness of the organization's CVF culture type can assist managers in developing their own skill set so they can manage complexity better.

Previous studies on CVF posits that organizations occupy multidimensional space with competing values but tend to have a dominant orientation or pull towards a certain CVF quadrant (Davies et al., 2007). The strength or magnitude of CVF culture can be assessed by the number of points awarded, or the absolute score received, on the Organizational Culture Assessment Instrument (OCAI) survey (Cameron and Quinn, 1999, p. 63). For each of the four culture types, the OCAI includes six dimensions or items: 1) organizational dominant characteristics, 2) leadership, 3) employee management, 4) glue, 5) strategic emphases, and 6) success criteria. For each of the four culture types, the instrument offers a descriptive statement for every one of the six dimensions (see Table 2). For example, the organizational dominant characteristics item statement for Clan culture reads "The organization is a very personal place. It is like an extended family. People seem to share a lot of themselves" (Cameron and Quinn, 1999, p. 20).

In the past two decades, there has been a growing body of research regarding the relationship between CVF culture types and hospital performance. In examining the CVF literature in healthcare, we found that the majority of articles focus on: 1) finding the most prevalent or dominant culture type (i.e. the most prevalent type, or the highest score among the four); and/or 2) linking dominant culture types with performance). Table 1 provides a summary of our literature review of empirical healthcare studies that use the CVF.

The Clan culture focuses on human affiliation, and can be described as a collaborative culture, where employee involvement, loyalty, commitment, and communication are highly valued (Jacobs et al., 2013; Valmohammadi and Roshanzamir, 2015). The Clan culture assumes that employees behave appropriately when they feel committed to the organization (Hartnell et al., 2011). A study of acute care hospitals in England, showed that the "Do things together" culture (Jacobs et al., 2013) exhibited highly significant associations with employee satisfaction, less patient complaints, and higher worker morale than any other culture type (Davies et al., 2007). The Clan culture has also been found to be related to a reduction in hospital errors (Stock et al., 2007), effective knowledge acquisition and responsiveness capabilities (Stock et al., 2010), and improved safety climate (Singer et al., 2009). An empirical study of 42 Intensive Care Units revealed that risk-adjusted mortality rate is also related to the degree of Clan culture (Shortell et al., 1994).

Likewise, Developmental culture (also called Adhocracy) emphasizes organizational innovation, vision, agility, entrepreneurship, and transformation (Jacobs et al., 2013). The Developmental culture assumes that employees behave appropriately when they understand the importance and impact of the task and are encouraged to be creative and take risks (Hartnell et al., 2011). The Developmental culture is associated with higher nurse salaries at acute care hospitals in England (Davies et al., 2007), possibly due to its focus on rewarding innovative ideas. Also, the "Do things first" culture (Jacobs et al., 2013) is critical for, and linked to, the implementation of quality improvement programs at U.S. hospitals (Shortell et al., 1995) and in New England hospitals (Knapp, 2015).

The Hierarchical culture is a controlling culture, for which processes are optimized for greater efficiency, predictability, and consistency (Jacobs et al., 2013). The Hierarchical culture assumes that employees behave appropriately when roles are clearly defined, and procedures are formalized through rules and regulations (Hartnell et al., 2011). The "Do things right" culture (Jacobs et al., 2013) is associated with better dedication among physicians, likely due to maintaining a smooth-running hospital with strict guidelines (Mijakoski et al., 2015). Lower nurse turnover occurs in healthcare facilities with the Hierarchical culture, which seems to suggest that more rigid rules and formal polices increase nurse retention (Banaszak-Holl et al., 2015). This culture is reported as the only culture type that is associated with lower readmission rate (Lee et al., 2018).

Finally, the Rational (also called Market) culture is a competitive culture that focuses on market share, goal attainment, aggressiveness, customer-focus, and winning (Jacobs et al., 2013). The Rational culture assumes employees behave appropriately when goals are clear, and they are rewarded for their achievements in a competitive environment (Hartnell et al., 2011). The "Do things fast" culture (Jacobs et al., 2013) has been associated with lower physician and nurse burnout and greater job engagement by clinical staff (Mijakoski et al., 2015). The Rational culture type was also linked to reduced hospital errors (Stock et al., 2007), and increased knowledge acquisition and dissemination in U.S. hospitals (Stock et al., 2010).

In summary, there has not been any within or across nation consensus on which CVF culture type is dominant and superior to the others. This result seems reasonable after recalling the CVF's underlying assumption on the co-existing competing values (Denison and Spreitzer, 1991; Jones and Redman, 2000). Quinn (1988) actually suggests that incorporating all competing organizational values would be better for achieving overall effectiveness. Nonetheless, the healthcare literature has been silent on the discussion of possible combinations of CVF cultures. Although Speroff et al. (2010) reported that among the 40 U.S. hospitals studied, 25% had a mix of cultures, the authors did not specify the culture combination profile.

2.2. Organizational culture profile, strength, and hospital quality performance

Prevailing empirical research about a dominant culture within hospitals was based on the numerical comparison of each CVF culture value (i.e. the most prevalent type, or the highest score among the four CVF cultures), but didn't address the degree of dominance. To be a legitimately dominant culture, scores in other CVF culture types should be low. However, the close examination of previous research results reveals that this might not be the case. For example, a study of 40 Japanese NICUs found that Clan and Hierarchical cultures were more dominant than Rational and Developmental cultures (Sasaki et al., 2017). Put differently, for each NICU unit, both Clan and Hierarchical culture scores were reasonably high. At a university healthcare organization in the U.K., a multidimensional culture was reported with strong Rational and Developmental culture, and moderate-to-strong Hierarchical and Clan culture (Ovseiko and Buchan, 2012). A longitudinal study of more than 140 acute care hospitals in the U.K. reported that "organization tended to have reasonably balanced culture types (a blend of cultures) rather than a wholly dominant culture … and indeed are becoming increasingly more so over time" (Jacobs et al., 2013, p.119). An empirical study of 92 U.S. hospitals reported that both high- and low-performing hospital groups in the sample show a mix of CVF cultures (Singer et al., 2009). Finally, studies of U.S. hospitals reported statistically significant positive correlations among the four CVF cultures (e.g., Stock et al., 2007; Lee et al., 2018), although their focus was not on identifying a dominant culture and did not provide within-organization culture profiles. The reported correlation values among CVF cultures ranged between 0.1 and 0.7. Although the CVF theory does not provide the most effective culture's normative prescription, it recognizes the inclusion of all four CVF cultures as a more realistic option for an organization (Denison and Spreitzer, 1991).

Several papers on the CVF also predicted that an overemphasis of a single CVF culture would be detrimental for an organization (Quinn, 1988; Denison and Spreitzer, 1991; Gifford et al., 2002). For example, too much control, or internal focus, can lead to rigidity, and too much flexibility, or external focus, can become chaotic (Denison and Spreitzer, 1991). Therefore, we propose the following hypothesis:

H1. More hospitals will be characterized as having a multidimensional CVF culture as opposed to a single dominant CVF culture type.

A primary assumption of organizational culture research is that a strong culture enhances performance over a weak culture (Sorensen,

2002). The concept of culture strength addresses the issue of the magnitude, instead of the dominance of any type of organizational culture (Cameron and Quinn, 1999). A strong culture is defined as a set of norms and values "widely shared and strongly held; that is, people throughout the organization must be willing to tell one another when a core belief is not being lived up to" (O'Reilly, 2008, p. 14). A strong culture is said to: 1) enhance coordination and control within an organization; 2) improve goal alignment between organizations and its members; and 3) increase employee effort (Sorensen, 2002). The facilitated behavioural consistency leads to better performance of an organization.

Having said that, embracing multiple elements of CVF cultures might not be enough: a strong score in all CVF types would be necessary for a hospital to achieve better quality performance. Although there has been little consensus on which CVF culture type is superior for improving hospital performance overall, a "strong culture" addresses some aspects of higher quality performance.

First, it has been shown that incorporating multiple CVF cultures, to a large extent, could help hospitals implement quality improvement practices more systematically. In a study of the relationship between organizational culture and Total Quality Management (TQM), Prajogo and McDermott (2005) tested two competing views: perspectives of a single dominant culture (unitarist) and multiple heterogeneous cultures (pluralist). Their study supports the pluralist view, wherein the various cultural dimensions are associated with TQM practices, arguing that TQM practices include various elements that should be enhanced and supported through an organization's multidimensional culture (Prajogo and McDermott, 2005). Bortolotti et al. (2015) explored the role of organizational culture in Lean practices at manufacturing plants and found that the existence of multiple cultures, such as a higher level of collectivism, future and humane orientation, and a lower level of assertiveness blended in harmony, facilitated the effective application of tools and practices for quality improvement. These findings indicated that a diverse set of cultural values enhance various types of quality practices.

Second, some studies have examined the link between organizational culture and quality performance, specifically patient safety and patient satisfaction, where organizational culture is operationalized using the CVF. None of the studies to date have taken a multidimensional approach to analyze the relationship between the CVF and either patient safety or patient satisfaction. Nonetheless, prior studies have established that the CVF culture types are related to improved safety and patient satisfaction. For example, after analysing data from over 500 U.S. hospitals, Stock et al. (2007) found that both the Clan and Rational cultures were positively associated with improving patient safety. Similarly, Singer et al. (2009) found that higher levels of Clan culture were linked to better patient safety outcomes. Stock et al. (2007) also found a direct link between Clan culture and patient safety performance, but stressed that improving patient safety starts with creating and nurturing effective knowledge management practices. Regarding patient satisfaction, prior studies have assumed that the Developmental culture, with its focus on innovation and the external environment, should be linked to improved patient satisfaction. Prenestini et al. (2015) found partial support for this positive association. Ancarani et al. (2009) also adopted the CVF model to explore the link between culture and patient satisfaction. Their study found that the flexible Developmental and Clan cultures were both associated with patient satisfaction. The findings presented above, related to the relationship between CVF culture types and improved quality performance, and coupled with the aforementioned studies related to a strong multidimensional CVF culture, lead us to the following research hypothesis:

H2. Hospitals with a strong multidimensional CVF culture will exhibit better quality performance than hospitals with a weak multidimensional CVF culture.

3. Methodology

3.1. Data collection

Data for this study was obtained in two different ways. First, we collected CVF culture data via a survey instrument approved by Northern Illinois University's institutional review board. We also gathered data on hospitals' involvement level in Lean and Six Sigma programs via the survey. Lim (1995) argued that an organization's behaviours and artefacts (e.g., physical and social environment) are the most manifest level of culture. Therefore, different cultures and values would lead to different actions or decisions with regards to implementing quality improvement programs like Lean and Six Sigma (Lim, 1995; Zu et al., 2010).

For the survey, high-level hospital administrators (e.g., Directors and Chief Executive Officers) were the target population since they are the most capable of evaluating cultures, behaviours, and artefacts of their organizations. A stratified sample of 500 administrators was produced from the website *Hospitallink. com*. We conducted phone interviews to personally request hospital administrators to participate in our study, and to explain the purpose of the survey. A total of 307 administrators agreed to provide input. The survey process was designed and executed by following Dillman's (1978) Total Design Survey method and distributed via email. Three email reminders were sent to request participants to complete the survey. A total of 215 completed surveys were received, resulting in a 70% response rate. 105 out of the 215 hospitals had multiple raters completing the questionnaire. After checking satisfactory inter-rater reliability with all the intra-class correlation coefficient (ICC) estimates above 0.7, the responses from multiple raters were averaged.

Although the response rate was satisfactory, possible non-response bias was assessed more systematically. Following Armstrong and Overton (1977), the responses of 50 early respondents and 50 late respondents were compared in terms of hospital size (i.e. the number of beds) and the CVF cultural types (Armstrong and Overton, 1977). The t-tests performed yielded no significant mean difference between the two groups at the $p < 0.01$ level. In addition, we collected data on the size of the hospitals for those that did not respond. Again, the mean comparison test yielded no statistically significant difference between the respondent group and non-respondent group at the $p < 0.01$ level. Overall, these results suggest that non-response bias is not a problem in this study.

Second, the primary data from the survey was combined with data from the CMS archives and the Hospital Compare website. Specifically, we obtained measures to address a hospital's structural and infrastructural characteristics (e.g., hospital size and health information technology measures) and various quality performance dimensions (e.g., readmission rates, hospital acquired condition scores, and patient satisfaction scores). The final sample consisted of 190 non-teaching hospitals (88.4%) and 25 teaching hospitals (11.6%). According to the American Hospital Association (AHA) (2020), about 16% of hospitals in the U.S. are teaching hospitals. In addition, in our sample, at least 124 hospitals (57.8%) were located in urban areas, while 17 hospitals (7.9%) had a missing Urban Influence Code (UIC). AHA (2020) estimates that 64% of hospitals are urban hospitals. Therefore, our sample seems to represent the entire population well in terms of teaching status, as well as location.

3.2. Measurement instruments

We conducted an extensive literature review and adopted well-validated CVF measures. Table 3 shows all six measurement items for the four cultural types (i.e. *Clan, Developmental, Hierarchical, and Rational*), in terms of: 1) dominant characteristics, 2) leadership, 3) management of employees, 4) organizational glue, 5) strategic emphases, and 6) criteria of success. For each item, respondents at the hospitals

were asked to what extent their organization resembles each cultural description item presented, based on a 0 to 5 scale (0-None; 1-Very low; 2-Low; 3-Moderate; 4-High; 5-Very high).

In order to assess the extent of *Lean* and *Six Sigma* implementation, we also adopted empirically well-validated measures from the literature (Gowen et al., 2008; Arthur, 2011; Graban, 2011). Table 3 shows six measurement items for Lean program and four measurement items for Six Sigma. For each item, hospitals were asked to what extent they have implemented that specific tool or practice. The level of deployment was measured on a 0 to 5 scale (0-None; 1-Very low; 2-Low; 3-Moderate; 4-High; 5-Very high).

We measured *Patient Safety Outcome* to examine the extent to which a hospital reduced the frequency, severity, and impact of medical errors and increased the awareness and understanding of medical errors. These items were also adopted from prior research (Stock et al., 2007; McFadden et al., 2009). Five items in Table 3 were measured on a 0 to 5 scale (0-None; 1-Very low; 2-Low; 3-Moderate; 4-High; 5-Very high).

In addition, we identified several objective measures for hospital quality performance from secondary sources. *Readmission Rates* are from the Hospital Compare website and represent the reported rates of unplanned hospital readmissions within 30 days of discharge. *Hospital Acquired Conditions* (HAC) data are obtained from the CMS's HAC reduction program report. The overall HAC score is a measure of the extent to which hospitals reduce the number of hospital-acquired conditions. The total HAC score is a weighted average of CMS Patient Safety Indicator (PSI 90) composites (a total of 8 measures including post-operative hip fracture rates, wound dehiscence rate, accidental puncture and laceration rate, etc.), and the Centers for Disease Control and Prevention (CDC) National Healthcare Safety Network (NHSN) Healthcare-Associated Infections (HAI) measures (a total of five measures including central line-associated blood stream infection rate and catheter-associated urinary tract infection rate). Each individual measure was assigned points on a 1–10 scale. Lower HAC scores indicated better performance. *Patient Satisfaction* is obtained from CMS's Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) patient survey. For each hospital, it measured the percent of patients who reported they are willing to recommend that hospital to friends and family with 9 or 10 for overall satisfaction rating on a 0 to 10 scale. Therefore, it is on a 0–100 percent scale.

Finally, we also collected various measures to explain structural and infrastructural characteristics of hospitals. The *Number of Hospital Beds* (proxy for hospital size) (Stock et al., 2007) and *Hospital Case Mix Index* (CMI) (index of the severity of the patient's medical condition) were collected from HealthData.gov. Two *Hospital Information Technology* (HIT) variables were obtained from the CMS's archives: 1) The hospital is able to receive lab results electronically (Yes/No) (OP-12) and 2) The hospital is able to track patients' lab results, tests, and referrals electronically between visits (Yes/No) (OP-17).

Table 3
The sample distribution by urban influence code (UIC).

UIC	Description	Frequency (%)
1	Large-in a metro area with at least 1 million residents or more	53 (24.7)
2	Small-in a metro area with fewer than 1 million residents	57 (26.5)
3	Micropolitan adjacent to a large metro area	4 (1.9)
4	Noncore adjacent to a large metro area	3 (1.4)
5	Micropolitan adjacent to a small metro area	7 (3.3)
6	Noncore adjacent to a small metro with town of at least 2500 residents	19 (8.8)
7	Noncore adjacent to a small metro and does not contain a town of at least 2500 residents	12 (5.6)
8	Micropolitan not adjacent to a metro area	18 (8.4)
9	Noncore adjacent to micro area and contains a town of 2500–19,999 residents	7 (3.3)
10	Noncore adjacent to micro area and does not contain a town of at least 2500 residents	4 (1.9)
11	Noncore not adjacent to a metro/micro area and contains a town of 2500 or more residents	9 (4.2)
12	Noncore not adjacent to a metro/micro area and does not contain a town of at least 2500 residents	5 (2.3)
	Missing values	17 (7.9)

3.3. Reliability and validity

Our measurement items in the survey were adopted from previous research, establishing content validity. We also evaluated the reliability, validity, and unidimensionality through confirmatory factor analysis (Anderson and Gerbing, 1988). Out of 39 items, five items were dropped due to their high cross-loadings (Hair et al., 2006), but all the constructs kept 3 to 6 measurement items, showing satisfactory content validity. The measurement model fit results are summarized in Table 3. Fit indices were satisfactory with Chi-square value = 810.198 (p-value<0.001), degrees of freedom (d.f.) = 499: Comparative fit index (CFI) = 0.93; Tucker Lewis index (TLI) = 0.93; Bollen's incremental fit index (IFI) = 0.93; Steiger-Lind root mean square error of approximation (RMSEA) = 0.05.

Table 4 shows more detailed descriptive information. All factor loadings are greater than 0.5 and the t-values are significantly greater than 2.0. In addition, all of the average variance extracted (AVE) values are above 0.5, ensuring convergent validity (Bagozzi et al., 1991). All of the Composite Reliability (CR) values are well above the recommended cut-off, 0.7, and indicate appropriate reliability (Hair et al., 2006). The square root of AVE values are greater than all possible inter-construct correlations, which provides strong evidence of discriminant validity (Hair et al., 2006).

3.4. Common method bias

Common method bias could be a potential problem for empirical studies, but is not a major concern for this study. First, items in the questionnaire were carefully designed to minimize social desirability, ambiguity, and positive/negative wording (Podsakoff et al., 2003). Second, while our predictor variables were measured using the survey, many of our criterion variables were adopted from secondary archival sources. This approach is effective in mitigating common rater effect and measurement context effect (Podsakoff et al., 2003). Third, common latent factor method was used to capture the common variance among all observed variables in the measurement model following Podsakoff et al. (2003). There was no noteworthy difference in the significance of the structural parameters between the models with, and without, the introduced latent common methods variance factor.

3.5. Classification

Cluster analysis was used to explore and identify hospital culture clusters. Two traditional methods of cluster analysis are hierarchical (e.g., Ward's algorithm) and non-hierarchical (e.g., K-means algorithm). Hierarchical methods require researchers' subjective decisions on the number of clusters after analysing data. In contrast, non-hierarchical methods require researchers' priori conclusion on the expected number of clusters before data analysis (Brusco et al., 2012). To overcome these limitations, we followed a two-stage cluster analysis procedure adopted by Frohlich and Dixon (2001) and Qi et al. (2009). In the first stage, a hierarchical cluster analysis was used to determine the candidate number of clusters with Ward's method and squared Euclidean distance measure (Punj and Stewart, 1983). The generated agglomeration schedule table was examined. In the second stage, we employed K-means clustering technique to compare two and three cluster solutions. While both options supported our hypotheses in a consistent manner, we preferred the two-cluster solution (i.e. strong and weak multidimensional culture groups) over the three-cluster solution (i.e. strong, medium, and weak multidimensional culture groups). In the

Table 4
Descriptive statistics and correlations.

	CLAN	DEVP[a]	RATN[a]	HIRC[a]	PSO[a]	SS[a]	Lean	PS[a]	RR[a]	(HAC)[a] Scores
CLAN	**0.820**[c]									
DEVP[a]	0.611**	**0.746**[c]								
RATN[a]	0.182*	0.716**	**0.782**[c]							
HIRC[a]	0.531**	0.511**	0.452**	**0.733**[c]						
PSO[a]	0.390**	0.342**	0.167*	0.279**	**0.782**[c]					
SS	0.175*	0.258**	0.254**	0.205*	0.082	**0.836**[c]				
Lean	0.092	0.191*	0.184*	0.128†	0.140†	0.404**	**0.784**[c]			
PS[a]	0.156*	0.214**	0.066	0.086	0.149	0.029	0.050			
RR[a]	−0.100	−0.053	0.017	−0.154*	−0.061	−0.008	−0.010	−0.283**		
HAC	0.184	0.095	0.060	0.051	0.206*	0.141	0.128	0.127	0.026	
Mean	3.61	2.74	2.85	3.47	3.50	3.52	1.65	72.44	15.20	5.28
SD[b]	0.82	0.83	0.90	0.70	0.73	1.03	1.42	7.97	0.82	1.87
CR[b]	0.911	0.882	0.903	0.822	0.819	0.903	0.903			
AVE[b]	0.672	0.556	0.611	0.537	0.611	0.700	0.615			

**$p < 0.01$; *$p < 0.05$; †$p < 0.1$.
[a] Developmental (DEVP), Rational (RATN), Hierarchical (HIRC), Patient Safety Outcome (PSO), Six Sigma (S.S.), Patient Satisfaction (P.S.), Readmission Rate (R.R.), Hospital Acquired Condition (HAC) scores.
[b] S.D. (Standard Deviation), Cronbach's α[b] (C's α), composite reliability (C.R.), average variance extracted (AVE).
[c] Bold numbers are the square root of AVEs of constructs.

three-cluster model, medium and weak multidimensional culture groups were statistically different only in Developmental and Clan culture scores. While the strong multidimensional culture group clearly outperformed both medium and weak multidimensional groups, there was less performance difference between the medium and weak group. Since the literature on strong culture has not addressed the so-called medium culture profile (or its difference between a weak culture), we believe that the two cluster model (just strong versus weak) provided a better interpretation of our results based on theory.

To cross-validate the cluster solution, we used the two-step approach available in SPSS (SPSS, 2001) that combines the advantage of the hierarchical clustering and K-means clustering yet overcomes some of their problems. The SPSS approach automatically selects the number of clusters. Using simulations, Bacher et al. (2004) encouraged the use of SPSS two-step approach if variables are not mixed types of continuous and categorical variables, as in our study. Pre-clusters are calculated with randomly entered cases, and then a statistical model-based hierarchical technique is applied to cluster the reduced number of cases (i.e. pre-clusters). The final number of clusters are automatically determined using a two-phase estimator, including Bayesian Information Criterion (BIC) or Akaike's Information Criterion (AIC) and the ration change in distance. More detailed algorithms are available in Chiu et al. (2001). In addition to strong culture literature, our two-step approach and the SPSS two-step approach algorithm also support the decision to articulate two clusters of U.S. hospitals.

4. Results

4.1. Results of cluster analysis and hospital characteristics

The two-stage cluster analysis with four CVF culture variables yielded two clusters. The size and profile information of each group is summarized in Fig. 2 and Table 5. To access cross-group differences, we conducted t-tests for differences in group means. To compare within-group differences, we conducted paired sample t-tests.

As depicted in Fig. 2, instead of having clusters that are explicitly dominant in a certain CVF culture, we identified only multidimensional clusters that included all of the CVF culture characteristics, which supports Hypothesis 1. Based on a 0–5 scale, the difference between the maximum culture score and the minimum culture score was 0.64 for Cluster 1 (i.e. Clan – Developmental) and 1.11 for Cluster 2 (i.e. Clan – Developmental). Therefore, Cluster 1's culture profile is more balanced than Cluster 2. Hospitals falling into Cluster 1 have statistically higher values for all CVF culture types than hospitals in Cluster 2. Therefore, we name Cluster 1 *Strong Multidimensional Culture* (SMC). Hospitals in Cluster 2 have statistically lower mean values for all of the culture types. We label Cluster 2 *Weak Multidimensional Culture* (WMC).

To further illustrate each cluster's characteristics, we conducted chi-square tests and t-tests over multiple factors that are related to both structural and infrastructural characteristics of hospitals. First, the two clusters were compared based on teaching status. Results from Table 6 show that there is no statistical difference between the groups related to teaching status: Chi-square statistics value was 1.485 and its *p*-value was 0.223. The non-significant effect of the teaching versus non-teaching status on hospital cultures is consistent with previous empirical studies on hospital innovation orientation, patient safety culture, and transformational leadership (see McFadden et al., 2009; Dobrzykowski et al., 2016).

Second, the two clusters were compared in terms of the two HIT measures, including OP-12 (able to receive lab results electronically) and OP-17 (able to track patient's lab results, tests, and referrals electronically between visits) using chi-square tests. Since not all hospitals reported OP-12 and OP-17 to CMS, 129 hospital cases were included for this analysis. Table 6 summarizes these results. All the chi-square statistics' *p*-values were over 0.1. Overall, we concluded that there is no significant difference between the two clusters in terms of the information technology implementation level or infrastructure.

Third, we also compared the two clusters with respect to the number of beds and hospital CMI values. Table 7 shows these results. There was no significant difference in terms of the number of beds. Therefore, hospitals in the two clusters show no difference with respect to their size. However, there was a significant difference in terms of the CMI. Since a higher CMI indicates a more complex and resource-intensive case load, hospitals in the SMC group tend to deal with more clinically-complex patient cases than hospitals in the WMC group.

4.2. Impact of culture clusters on hospital quality performance

To examine the relationship between CVF culture clusters and quality-related outcomes of U.S. hospitals, we conducted t-tests. The results are summarized in Table 7. It is evident that the SMC group implements quality improvement programs such as Lean and Six Sigma more systematically, therefore exhibiting better quality improvement outcomes. In addition, patient safety outcomes were significantly better for the SMC group. Similarly, patient satisfaction was significantly higher for the SMC group. Patients seem to be more satisfied with hospitals in the SMC group, as a larger percentage of patients indicated they would recommend these hospitals. There was no statistically significant

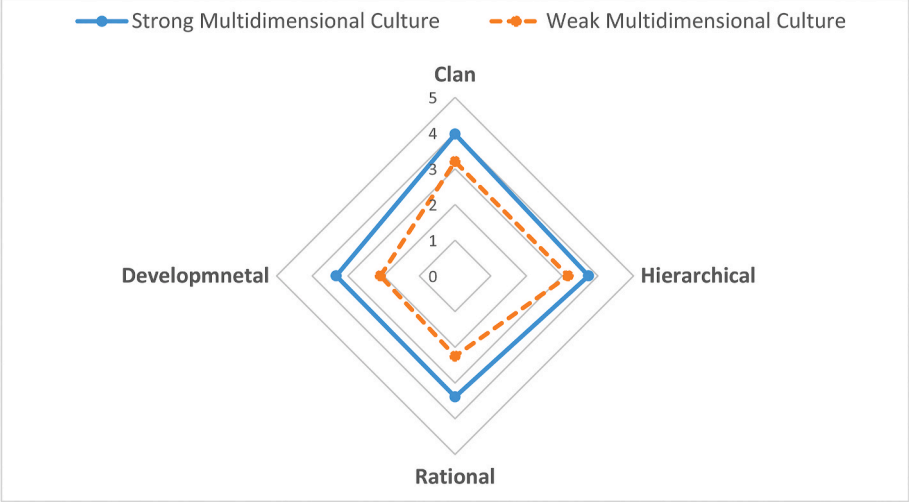

Fig. 2. US hospital culture clusters.

Table 5
U.S hospital culture cluster profile.

Cluster Groups and Culture Variables	Clan (C)	Developmental (D)	Rational (R)	Hierarchical (H)
Cluster # 1	3.97[a]	3.33 (0.55)	3.39	3.74 (0.58)
Strong	(0.64[b])	(C, H)	(0.63)	(C, D, R)
Multidimensional	(D, R,	4	(C, H)	2
Culture (n = 113)	H)[c]		3	
	1[d]			
Cluster # 2	3.20	2.09 (0.56)	2.25	3.17 (0.72)
Weak	(0.81)	(C, R, H)	(0.77)	(D, R)
Multidimensional	(D, R)	4	(C, D, H)	2
Culture (n = 102)	1		3	
t-value	7.74**	16.42**	11.85**	6.36**

**$p < 0.01$; *$p < 0.05$; †$p < 0.1$; n.s: not significant.
[a] Cluster mean.
[b] Standard deviation.
[c] The letters indicate each culture variable from which this variable was significantly different at the .01 level as indicated by the Tukey pairwise comparison procedure.
[d] The numbers indicate the culture variable ranks in each cluster.

difference in terms of the readmission rates or the HAC rates, although the SMC group shows lower readmission rates and higher HAC scores than the WMC group. These findings support Hypothesis 2 that a strong multidimensional CVF culture will be more positively associated with quality performance of U.S. hospitals.

5. Discussion

Our study explored organizational culture profiles for better quality performance in U.S. hospitals. Our findings indicated that U.S. hospitals exhibit a multidimensional culture, tapping into all four distinct competing value types, rather than falling into one dominant culture type. In particular, the clustering procedure yielded two groups of hospitals: hospitals with a Strong Multidimensional Culture (SMC) and hospitals with a Weak Multidimensional Culture (WMC). Notably, hospitals represented within each particular group reveal distinct characteristics in terms of a varying degree of norms and values, not particularly showing a dominant culture profile.

5.1. Theoretical implications

The first theoretical contribution of this empirical study is that it offers a taxonomy of organizational cultures that support the CVF's underlying, but overlooked, assumption that incorporating all competing values is possible. Specifically, we identified the existence of multidimensional cultures in U.S. hospitals rather than the identification of a single dominant culture type. Our findings suggest that the pursuit of a broader approach to organizational culture may help organizations become more successful, especially within hospitals that require specific skills from a variety of specialists (Quinn, 1988; Gifford et al., 2002). Support from studies show that organizations that tend to embrace the characteristics of all four quadrants of values are positively related to achieving individual effectiveness and well-being (Quinn, 1988), operational effectiveness (Hartnell et al., 2011), and quality group techniques (Gambi et al., 2015). In addition, these organizations are also more likely to comply with guidelines for treatment (Hung et al., 2014), and embrace Lean and Six Sigma implementation (Knapp, 2015). A combination of the culture types may also be favourable because it allows the organization to respond to a variety of environmental conditions (Jones and Redman, 2000). Our study provides empirical evidence to support this pluralist view with hospital data.

The second theoretical contribution of our study is the finding that a strong multidimensional CVF culture performs better than a weaker multidimensional CVF culture within U.S. hospitals. Previous research indicated that the presence of a strong culture served as a distinct characteristic of the organization, which made it unique from other organizations, and thereby positively associated with organizational performance (Lim, 1995; Kwan and Walker, 2004). Although one dominant culture may distinguish an organization from others, no single cultural mechanism can fully capture the culture-performance links due to the influence of other variables, such as organizational structure and leadership, or organizational environments (Saffold, 1988; Sorensen, 2002). Our research complements the extant strong culture literature by showing that hospitals that embrace a culture that is strong in all four of the CVF culture types tend to achieve better performance than hospitals with weaker CVF cultures. The strong multidimensional culture profile seems to work so that co-existing competing values do not offset each culture's effectiveness, but provides balanced perspectives to respond well to various environmental requirements. These findings have practical implications for healthcare administrators as discussed in the next section.

5.2. Practical implications

5.2.1. Organizational culture characteristics in U.S. Hospitals

This study not only provides healthcare professionals with a more nuanced understanding of the current culture configuration present in

Table 6
Chi-square test results on hospital teaching status and healthcare information technology measures.

	Teaching Status of Hospitals			OP-12[a,c]			OP-17[b,c]		
	Teaching	Non-Teaching	Total	Yes = 1	No = 0	Total	Yes = 1	No = 0	Total
Cluster #1	16[d]	97	113	64	5	69	59	10	69
Strong Multidimensional Culture	13.1[e]	99.9	113.0	63.1	5.9	69.0	59.9	9.1	69.0
	(14%)[f]	(86%)	(100%)	(93%)	(7%)	(100%)	(86%)	(14%)	(100%)
	(7%)[g]	(45%)	(53%)	(50%)	(4%)	(53%)	(46%)	(8%)	(53%)
Cluster #2	9	93	102	54	6	60	53	7	60
Weak Multidimensional Culture	11.9	90.1	102.0	54.9	5.1	60.0	52.1	7.9	60.0
	(9%)	(91%)	(100%)	(90%)	(10%)	(100%)	(88%)	(12%)	(100%)
	(4%)	(43%)	(47%)	(42%)	(5%)	(47%)	(41%)	(5%)	(47%)
Total	25	190	215	118	11	129	112	17	129
	25.0	190.0	215.0	118.0	11.0	129.0	112.0	17.0	129.0
	(12%)	(88%)	(100%)	(91%)	(9%)	(100%)	(87%)	(13%)	(100%)
	(12%)	(88%)	(100%)	(91%)	(9%)	(100%)	(87%)	(13%)	(100%)
Chi-Square Statistics	$1.485^{n.s}$			$0.312^{n.s}$			$0.224^{n.s}$		
Likelihood Ratio	1.508			0.311			0.225		

$^{**}p < 0.01$; $^{*}p < 0.05$; $\dagger p < 0.1$; n.s: not significant.
[a] Able to receive lab results electronically.
[b] Able to track patients' lab results, rests, and referrals electronically between visits.
[c] Since these variables were collected from the second source database, not from survey, not all hospitals have the values. The reported cases for Cluster #1 was 69 and Cluster #2 was 60.
[d] Count.
[e] Expected count.
[f] % within cluster = count/row total.
[g] % of total = count/total.

Table 7
U.S hospital culture cluster comparison.

Cluster Groups and Other Measures		# of bed[a]	CMI[a]	Patient Satisfaction[a]	Readmission Rate[a]	Lean	Six Sigma	Patient Safety Outcomes	HAC Score[b]
Cluster # 1	Mean	192.32	1.42	73.58	15.18	1.92	3.69	3.68	5.45
Strong Multidimensional Culture	SD	(199.68)	(0.34)	(7.50)	(0.80)	(1.43)	(0.92)	(0.74)	(1.80)
	n	92	92	92	92	113	113	113	64
Cluster # 2	Mean	151.56	1.32	71.11	15.23	1.34	3.34	3.29	5.04
Weak Multidimensional Culture	SD	(185.66)	(0.32)	(8.35)	(0.84)	(1.36)	(1.11)	(0.67)	(1.94)
	n	79	79	79	79	102	102	102	48
t-value		$1.374^{n.s}$	1.98*	2.03*	$-0.394^{n.s}$	3.11**	2.58**	4.09**	$1.14^{n.s}$

$^{**}p < 0.01$; $^{*}p < 0.05$; $\dagger p < 0.1$; n.s: not significant.
[a] Since these variables were collected from the second source database, not from survey, not all hospitals have the values. The reported cases for Cluster #1 was 92 and Cluster #2 was 79.
[b] Since these variables were collected from the second source database, not from survey, not all hospitals have the values. The reported cases for Cluster #1 was 64 and Cluster #2 was 48.

U.S. hospitals, but also illustrates the importance of embracing all four of the values identified in the four quadrants of the CVF for better hospital performance. We found that SMC hospitals significantly outperform WMC in many aspects: greater implementation of quality improvement programs, better patient safety outcomes and higher patient satisfaction. These results suggest that hospitals should strive to simultaneously strengthen all four CVF culture types and capitalize on the benefits provided by each type.

In addition, our study reveals different degrees of cultural prevalence within cluster groups. Among the balance of the four cultural dimensions, Clan culture was the most prevalent cultural type followed by Hierarchical, Rational, and Developmental culture for both clusters (see Table 5). Clan and Hierarchical cultures both have an internal focus, which is vital for hospital performance. Clan culture is important since hospitals must create an environment of teamwork and trust, where leadership, empowerment, and employee dedication are strongly needed in caring for patients (e.g., Davies et al., 2007; Mijakoski et al., 2015). In order to maintain operational stability and consistency in hospitals with the size and scope of today's U.S. healthcare systems, compliance with clearly established procedures, rules or policies, associated with Hierarchical culture, is also key (Hung et al., 2014; Knapp, 2015; Lee et al., 2018).

Although not as prevalent as Clan or Hierarchical culture types, the externally-focused Rational and Developmental culture types are still important for better hospital performance. Hospitals operate in a very complex and changing environment that is becoming more competitive and demanding of greater service innovations for patient care, such as artificial intelligence-driven smart healthcare services (Pan et al., 2019). Prenestini et al. (2015) found that both the Rational and Developmental cultures were linked to more positive attitudes towards clinical governance than the Clan or Hierarchical cultures. Their external focus to satisfy stakeholders helps hospitals form a resolute leadership so that they can make rapid changes in strategic planning (Goodman et al., 2001).

5.2.2. *Relationship between cultures and quality performance of U.S. Hospitals*

Another important finding of our study is that hospitals with a SMC implement more Lean process and Six Sigma initiatives than those with WMC (see Table 7). The success of Lean and Six Sigma implementation not only depends on structural tools for process management, but also highly depends on customer focus, empowerment, and strategic planning (Knapp, 2015; Pakdil and Leonard, 2015). Hospital operations involve the integration of proficiency in multiple areas and a wide range

of responsibilities and issues related to direct and indirect interactions with patients. Therefore, the coexistence of different cultures within the hospital may lead to the efforts to enhance the quality of healthcare service in several ways. Each culture type will guide managers implementing Lean and/or Six Sigma with a holistic perspective, which can significantly improve the process performance, tackle unnecessary complexity in the system (Saurin et al., 2013), and reduce operating costs, thereby creating higher customer satisfaction (Honda et al., 2018).

Hospitals should strive towards developing all four of the CVF culture types for improved deployment of quality management practices, such as Lean and Six Sigma. More emphasis on the Development culture, that values innovation and entrepreneurship, will help managers build leadership skills in quality improvement (Parast and Golmohammadi, 2019); while more emphasis on the Rational culture, such as accomplishment with clear goal clarification, will facilitate a platform for consistent and effective application of Six Sigma practices (Zu et al., 2010). Also, embracing the values of the Hierarchical culture, such as the development of professional protocols or national standards of care, will create an internally controlled system that can help hospitals improve the accuracy of the medical diagnosis and treatment for patients (Jacobs et al., 2013). The enhancement of Clan culture will help team members build cohesive power of sharing a common goal and personal responsibility to become committed to optimizing the healthcare performance.

One of the most important operational outcomes in healthcare to evaluate the quality of hospital performance is the measurement of medical errors (McFadden et al., 2006, 2009; Gowen et al., 2008). Our results reveal that hospitals with SMC show statistically higher understanding, awareness, and reduction of errors than those hospitals with WMC (see Table 7). The cause of the majority of medical errors are related to dysfunctional organizational culture and management of healthcare delivery process (Edmondson, 2004). For example, research evidence suggests that innovations of technological solutions, or tools alone, are not going to contribute to the reduction in medical errors, or the prevention from the majority of patient safety incidents unless there is a significant transformation of cultures and systems in healthcare (Khatri et al., 2006; Stock and McFadden, 2017). Tasks in healthcare require sufficient integration, collaboration, coordination, and communication among the participants in healthcare (Khatri et al., 2006), thus, the need for accommodating multiple cultural values is inevitable in delivering quality of care in healthcare and pursuing the competitive benefits (Prajogo and McDermott, 2011).

Hospitals with higher CMI scores indicate a greater need for resources in the hospital, due to higher clinical complexity, reflecting the severity of the patient's medical condition. Our results show that hospitals with statistically higher CMI scores tend to pursue a stronger balance in all four quadrants of cultural values compared to the hospitals with lower CMI scores (see Table 7). In a similar vein, as other quality management strategies in hospitals such as Lean, Six Sigma, or patient safety outcomes mentioned above, hospitals should develop a wide range of integrated supportive cultures depending on their needs, medical conditions, and contingencies (Wagner et al., 2014) to be able to cope with intense or non-static environments (Nabelsi and Gagnon, 2017).

Taken together, our findings imply that better quality improvement strategies performed in hospitals with an SMC may result in higher patient satisfaction (see Table 7). The expected benefits will be greater for the hospitals that implement Lean and Six Sigma practices embedded in a strong multidimensional culture. The holistic approach to the quality improvement practices will help managers achieve lower operating costs, create a more efficient process flow, and develop better service design, which will contribute to higher customer satisfaction (Hicks et al., 2015; Miao et al., 2019). Although a certain degree of control and adherence to rules and regulations is absolutely necessary in a hospital setting to ensure the quality of healthcare service, supportive organizational cultures that assure efficiency and quality care reinforce higher patient satisfaction. In addition to the stability within the organization, strong internal teamwork with healthcare practitioners and externally with stakeholders, also enhances patient satisfaction (Meterko et al., 2004).

6. Conclusion and future research

This paper is the first attempt to empirically examine the cultural patterns embedded in U.S. hospitals using CVF for higher quality performance. The resulting taxonomy reveals the existence of multidimensional cultures. A strong multidimensional CVF culture outperforms a weak multidimensional CVF culture in Lean and Six Sigma implementation, patient safety outcomes, and patient satisfaction.

Our study provides support for the pluralist view of the CVF assumption, suggesting that hospitals do not appear to have a single dominant culture embedded in their organizations. Moreover, hospitals with an SMC tend to perform better in terms of their adoption of quality measurements. The clusters developed here can help researchers understand the dynamic nature of organizational culture and facilitate its application in the U.S. hospitals in a more structured way. Although four cultural values in the framework may appear to be isolated, disconnected, or contradictory from each other, they co-exist and are not mutually exclusive. The balance of cultural dimensions in organizations could lead to better capabilities in responding to unexpected situations and absorbing the fluctuations in dynamic environments.

These findings also have important implications for practitioners. The pursuit of multidimensional cultural orientations is critical to achieve sustainable benefits both for hospital management teams and patients. The effective operational process in hospitals requires multiple aspects of management practices from control to flexibility, or from internal focus to external focus. The challenge for practitioners is the identification of the optimal balance in organizational culture infrastructure. For example, adaptability in a rapidly changing business environment will support the current quality management system so that the quality initiatives work at their full capacity, resulting in maximum positive outcomes (Fundin et al., 2018). Another challenge might be the development of a strategy to make the organizational culture well-balanced and well-managed to prevent the organization from having one single dominant cultural dimension (Pakdil and Leonard, 2015).

The basic CVF only includes two dimensions to classify organizational cultures. While this framework has been widely adopted by previous research, cultural values could be far more complex than the commonly used two dimensions. Therefore, we suggest that future research should include the implicit third dimension in the CVF, organizational *means-ends* defined as "from an emphasis on important processes to an emphasis on final outcomes" (Quinn and Rohrbaugh, 1983, p. 369) to explore if the new dimension plays a critical role in determining clusters among hospitals.

Despite the significant effect of diverse cultural values on hospital quality performance captured in this study, a myriad of other factors can intensify or deteriorate the magnitude of the effect. For example, patient involvement should be recognized in the production of culture, since the degree of their participation in the delivery process is significant for broadening the scope of healthcare and improving the quality of service (Scott et al., 2003). Other important factors, including financial performance or environmental dynamism, can be considered in evaluating the relationship between a cultural pattern within the hospitals and its performance (Prajogo and McDermott, 2011). Considering that possible national level factors, such as national cultures or policies, could influence healthcare systems in different countries, non-U.S. data should be analysed to validate our taxonomy. Finally, to examine whether the ideal culture profile changes over time, this research should be replicated in the future.

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