

Issues in the assessment of continuous quality improvement implementation in health care organizations

MICHAEL A. COUNTE¹ AND STEVEN MEURER²

¹Department of Health Administration and ²Doctoral Program in Health Services Research, Saint Louis University, St Louis, MO, USA

Abstract

Objective. This paper has two primary aims. First, it examines the need for improved assessment of continuous quality improvement implementation. Second, it analyzes current worldwide measures and studies of continuous quality improvement implementation.

Method. A comprehensive literature review was conducted which included all published (English language) studies of organization-wide continuous quality improvement implementation.

Results. Analysis of the content and research methods incorporated into current measures of continuous quality improvement implementation used worldwide supports a strong consensus regarding the major criteria that need to be addressed. However, there are still promising areas for future research, namely increased use of criteria other than the Baldrige categories, increased focus upon financial variables, improved measures of implementation stage/phase and the use of different types of respondents from multiple organizational levels.

Conclusion. Increased understanding of the empirical benefits and costs of continuous quality improvement in health care organizations is heavily contingent upon the continued development and improvement of measures of continuous quality improvement implementation.

Keywords: criteria, quality improvement implementation, quality evaluation

Since the late 1980s, there has been continued interest in understanding and gradually implementing elements of the continuous quality improvement (CQI) management approach across diverse sectors of the American health care industry. CQI can be defined as a customer-driven leadership approach based on continual improvement of the processes associated with providing goods or a service. There are various types of such CQI approaches. However, when viewed together, their essential elements are widely acknowledged to include a managerial philosophy that favors a supportive organizational structure and culture and the widespread use of scientific methods of process understanding and enhancement [1–3].

The growing presence of ever escalating pressures to simultaneously increase service efficiency and effectiveness while decreasing their associated costs, largely explains the augmented concern with process improvement in the United

States [3] as well as other countries such as Australia [4], the Netherlands [5] and Canada [6]. In the United States much of the pressure for quality improvement has been market based while in other societies, government has played a more significant role and the impetus has been more regulatory in nature. Sustained interest in CQI and the search for quality improvement in complex health care delivery systems thus truly reflects global concern with the issues of health care costs and quality.

Certainly, the general topics of quality assessment and assurance are not new concerns to health care delivery organizations. However, in many respects, CQI, because of its distinctiveness from traditional approaches, continues to represent a form of managerial innovation in health care. As has been observed in other situations, such as the diffusion of another type of managerial innovation – standards based cost accounting systems – the adoption of managerial

Address reprint requests to M. Counte, Department of Health Administration, Saint Louis University, 3663 Lindell Boulevard, Room 406, St Louis, MO 63108, USA. Email: countem@slu.edu

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innovations is a common adaptive response to significant environmental change [7].

The continued spread of CQI among health care organizations in the United States and elsewhere around the world, or what has been called ‘the quality revolution’, has not as yet been consistently associated with higher levels of service quality. Also, we are probably only beginning to understand the major issues regarding which factors mitigate the actual effects of CQI implementation. For example, even in manufacturing organizations where there are relatively clear cut success stories of quality improvement, many other organizations continue to experience a great deal of difficulty in introducing or sustaining CQI because of the challenges that CQI poses to traditional management principles and practices [8]. The National Roundtable on Health Care Quality [9] also recently focused on why the positive results of CQI have been difficult to demonstrate at the health care industry level. This group of expert observers noted that:

- (i) Market-based competition that drives the search for persistently higher quality has been slow to emerge in health care. Thus, many organizations have been unwilling to commit to major quality improvement projects that involve process redesign.
- (ii) Purchasers have yet to create a market for quality. Thus, health care organizations are very reluctant to obligate the resources needed to fully implement CQI.
- (iii) Clinicians have been slow to understand and support CQI.
- (iv) Consumer pressure for increased health care quality is gradually emerging as anticipated. However, it is expected to rapidly increase in the years ahead due to the spread of a major technological advance-networked consumer health information systems.
- (v) CQI in many health care organizations has not been well integrated into everyday, mainstream business operations.

It seems, then, that CQI is experiencing the same dilemma that other managerial innovations (e.g. management information systems, standards based cost accounting systems, re-engineering) have encountered, that of implementation without further in-depth evaluation. In fact, the effects of this problem may be more apparent in the case of CQI than other innovations where systematic evaluation is incorporated into their business plan. There is no doubt that considerable scarce resources are necessary to implement CQI in an organization. However, despite evidence that a properly implemented management strategy based on CQI can have positive results [10], there are still many skeptics of the effectiveness of the CQI approach. It appears to be difficult to translate the potential benefits of CQI into actual gains. Currently, reports of successful implementation of CQI to the outside world are largely based on leadership perceptions. However, in most cases, the rhetoric does not equal the reality [11].

Additionally, with consumers becoming more active in the health care industry, stakeholders will increasingly demand

factual information rather than simply rhetoric in order to be fully satisfied with an innovation’s value. Different innovations will require different levels of proof. The effects of a new surgical instrument will probably only need the assurance of the vendor through experiential studies. However, a programmatic innovation, such as CQI, will also require systematic evidence of its effects. Such studies will be much more difficult to design and conduct. Before the effects of CQI can be determined major methodological issues will need to be resolved so that its major attributes and impacts can be measured. We will never be able to understand the extent of CQI’s effects unless we can perform investigations at the institutional level across multiple organizations. The first step, therefore, is effective measurement of CQI’s implementation within an organization.

Given the acknowledged importance of the concept of CQI implementation, this paper will explore and contrast alternative views of its major dimensions and possible measurement. First, the basic notion of innovation implementation in complex organizations will be reviewed. Second, major approaches to the assessment of CQI implementation that have been reported in the literature will be systematically compared. Finally, recommendations for future research on the topic of CQI implementation will be offered.

Innovation–implementation concept

Understanding the diffusion dynamics of innovative technologies among organizations has been a long-standing area of interest to organizational researchers. Lawrence [12] published one of the earliest studies in this general area in the Harvard Business Review nearly 50 years ago. This study focused on behavioral and attitudinal resistance to technical changes in organizations. This general issue of understanding how and why organizations respond differently to the introduction of planned change is very important because it is rarely known in advance how well innovations will actually work once they are adopted by organizations. As Hirschheim and Feeny [13] observed:

The goal is to ensure that effective and efficient new technologies diffuse rapidly while ineffective and inefficient ones do not diffuse at all. At present, however, most new technologies appear to diffuse rapidly, without a prior demonstration of their effectiveness.

Given the clear significance of innovation adoption to the growth and very survival of organizations, researchers have had a long-standing interest in this complex topic. This has included theoretical attempts to explain why organizations need to successfully introduce managerial innovations [14–16].

According to Rogers [16], there are distinct stages in the innovation–decision process whereby an organization (or any other type of decision-making unit) moves from initial awareness/knowledge of an innovation to eventually either successfully incorporating the innovation into ongoing

organizational operations or rejecting the innovation. These steps include:

- (i) Knowledge stage – acknowledgement of felt needs/problems, access to communication channels
- (ii) Persuasion stage – evaluation of the perceived attributes of an innovation
- (iii) Decision stage – initial decision to adopt (try) or reject an innovation
- (iv) Implementation stage – use of an innovation
- (v) Confirmation stage – continued adoption and discontinuance and rejection

Thus, in Rogers' model of innovation diffusion, implementation occurs when an organization actually tries to put an innovation into use. This is a complex phase of the innovation decision process because as he cogently observed:

'Until the implementation stage, the innovation decision-process has been strictly a mental exercise. But implementation involves overt behavior change, as the new idea is actually put into practice. It is often one thing for an individual (or any other decision unit) to decide to adopt a new idea but quite a different thing to put the innovation into use.'

During early studies of organizational innovation diffusion in the early 1970s, most of the emphasis was on the study of variables that affected decisions to initially adopt innovations. However, during the last 25 years, the focus has largely shifted away from why organizations variably respond to the introduction of an innovation toward trying to better understand problems that arise in the implementation of an innovation.

In summary, the general consensus is that innovation implementation at the organizational level is a complex process to understand. Thus, any attempt to accurately assess the eventual consequences or outcomes of a specific type of innovation (such as CQI) is dependent on knowledge of the breadth and depth of an innovation's actual implementation within a specific organization. Given the contemporary strong level of interest in measuring the effects of CQI in health care organizations described earlier, it is increasingly important at this time to develop improved measures of actual CQI implementation.

Evaluation of CQI implementation initiatives

Growing interest in the topic of CQI implementation assessment

To understand why there is growing interest in assessing the implementation of CQI, it is necessary to understand the financial, access and quality developments that have led to CQI's diffusion in health care. The financial scarcity issue that currently exists in health care is likely to continue. The United States' national Health Care Financing Administration (HCFA) reported in 1997 that the average Medicare inpatient

profit margin was 16.1% for hospitals. In response, the 1997 Balanced Budget Act was projected to reduce increases in federal health care spending from \$20 to \$41 billion dollars for each of the next three years (United States Congressional Budget Office, 1998). Whether or not a health care organization accepts these estimates as valid, providers will be faced with a difficult financial situation. As this occurs, the focus for industry leaders will become one of greater accountability. Rather than simply reacting to these spending cuts with arbitrary cuts of their own (as has been the main strategy in the past), health care organizations must begin to understand and improve their work processes in order to reduce as much waste as possible.

Additionally, American society has come to expect that its health care system, albeit expensive, will meet their every need to stay healthy, from drugs that will lower blood pressure to drugs that will enhance performance. Americans not only want to fight death, they want to beat it [17]. No other society asks for more from their health care system than America [18].

Finally, these same consumers who want an all inclusive health care system demand that it works all of the time. Clients believe that the outcome of each interaction with a health care provider shall be that the patient gets better. They do not want to become one of the estimated 90 000 people which the 2000 Institute of Medicine report as dying each year due to hospital error [19]. Health care organizations will experience increased consumerism demanding physical proof of efficiency and value. Although these pressures may not currently be as intense as they are in America, they exist around the world [20]. Therefore, any managerial innovation that has the possibility of resulting in lower cost and higher quality will have a global interest [21].

Those health care organizations that effectively survive these financial, access, and quality pressures will be the ones that employ a clear strategy of accountability to their stakeholders for high quality, low cost processes and outcomes. To do this, organizations must assess the technologies they decide to implement. Such innovation assessment seems to be missing in most organizations. In the current climate of public accountability, many health care leaders have become uncomfortable with any efforts to create measurement systems for evaluation [22]. This is unfortunate because these systems are necessary for improving processes of medical care [23].

CQI is a managerial strategy that places a major emphasis on joint responsibility for process quality and costs. When properly implemented, it offers an organization the ability to potentially reduce waste in its processes, as well as increase the quality of its outcomes [24]. Although it is only one of a growing number of ideas that promise increased quality at a lower cost, CQI provides a health care organization with an opportunity for a higher level of increased competitiveness over a sustained period of time [3]. It also creates a customer and employee friendly environment [25]. A major problem is that contemporary health care systems around the world currently face such a strong emphasis on cost-reduction that

this may in turn serve as a barrier to implementing quality improvement efforts.

Analysis of CQI initiatives

Unfortunately, there are very few in-depth case studies in health care that offer empirical findings to support the value of CQI. Although most American health care organizations would report that they already practice CQI, this probably is not true [10]. Instead, these organizations are more likely to be at Rogers' adoption stage, since they have implemented only a few of the components of CQI. To implement CQI properly throughout an organization may take in the region of 5–7 years [26]. Because of the resources needed for proper implementation, American health care organizations have been reluctant to fully implement CQI. Whether this is a result of health care's stakeholders wanting to see quick results, or industry leaders not being able to focus on any one strategy for a long period of time, it may have diluted the potential benefits of CQI. Other countries, however, have been more willing to allocate the resources necessary to properly implement CQI. This may well result from the greater governmental versus market based emphasis on quality improvement in health care systems outside of the United States that was described earlier.

In Denmark, for example, there is a national quality of care development policy that articulates five principles based on CQI [20]. In Norway, the government has legally mandated the implementation of quality systems based on consumer focus, process improvement, and total involvement by the year 2000 [20]. In German hospitals, extra funding is available for participating in a government based QI program [19]. While individual American health care leaders are beginning to understand the value of spending the resources needed to properly implement CQI, a much more rapid diffusion rate appears to be occurring in Europe. While some European countries are at the implementation stage, America is more often at the adoption stage. However, America does have the advantage of being able to examine how CQI diffuses in other parts of the world and use this information to effectively implement CQI within their own organizations.

With worldwide interest increasing, any implementation assessment strategy must use evidence-based, scientific evaluation to document that CQI actually results in higher quality and lower cost services. In order for this to occur, a common understanding of what CQI is and how to implement it must be developed [26]. From Donabedian's structure-process-outcome model [30] to the pioneering efforts of Deming [26] and Juran [27], to the more recent works of McLaughlin & Kaluzny [25], Berwick [1,24], Shortell [2,28,29] and Blumenthal & Kilo [31] there is no shortage of literature discussing quality assessment and improvement.

There are few studies, however, of actual CQI implementation and its subsequent evaluation. One basic issue is that there are both micro and macro levels of analysis (process, departmental, organizational, system etc.) that can appropriately be used to study an intervention such as CQI [32]. In addition, because of variability in local cultures,

there are no universal quality standards in health care. Also, in different systems of care, there may be different actors involved in clinical processes. Add to this the immediate joint accountability of lowering costs while increasing quality and there is little wonder why researchers are still searching for the elusive best methods to evaluate the implementation and outcomes of CQI in health care organizations [31].

To determine an organization's level of CQI implementation, many studies have used the American 'gold standard' in this area, which is the Malcolm Baldrige Award [33]. This award is based on eight categories of activity including: leadership, human resources, process evaluation, planning, results, information and customer focus. Unfortunately, very few health care organizations apply for the award, and only one has ever made it to the interview stage; the Sisters of Mercy Health care System in St. Louis, Missouri in 1999. The UK standard for defining and implementing CQI is the King's Fund [34], now the UK Health Quality Service, while the European standard is the European Foundation for Quality Management (EFQM) award [35]. Both are based on the ISO9000 criteria. These standards incorporate methods that can be implemented in an organization to assure that the customer requirements are fully met. Moreover, the organization's requirements will be met both internally and externally and at an optimum cost. This is a result of effective utilization of resources available. The combination of ISO9000 and CQI constructs has been suggested for the last decade in the literature and has been the main topic of conferences [36]. Each of these three approaches to measuring levels of quality improvement had to be modified slightly in the early 1990s when the evaluative focus was enlarged to include both manufacturing and service (especially health care) organizations. This results from the fact that health care organizations and their constituent processes are often highly complex and this complexity presents many measurement problems.

When all three awards are examined, seven additional categories emerge: innovation, supplier partnership, public responsibility, product control, contract requirements, inspection/audit and servicing. For a definition of these concepts, see Appendix A. No matter if it is a small hospital or a large country wanting to implement CQI the main issue is the same, namely, how can these areas be addressed to effectively implement CQI so that it will result in the greatest benefit?

Given the abundance of descriptive information regarding basic concepts and methods in CQI, why hasn't it been easier to implement? First, the resources needed to fully implement CQI are clearly a barrier to its diffusion [37]. Second, the substantive categories listed above are not specific enough to provide an organization step-by-step instruction for implementation. Thus, criteria such as those addressed by the Baldrige, EFQM and King's Fund awards, represent emerging consensual standards versus a singular gold standard. Further, as Rogers' [16] points out, each innovation and host organization often needs to change for the innovation to provide its potential benefits. CQI will not succeed in an organization unless conventional practices are transformed

[8]. It is necessary to examine an organization's attempts to define and implement CQI before an organization can effectively measure its effects.

Because CQI is now a popular topic, its implementation may seem straightforward to many organizations. However, very few studies have examined the implementation of CQI. The basic problem may be an organization's inability to evaluate CQI. A systematic method of understanding CQI and its effects in an organization would entail a randomized control trial. However, the feasibility of such a study seems unlikely because of the widespread diverse nature of improvement programs using the CQI philosophy [2]. Instead, an alternative is a survey with statistical controls that measure the contribution of constructs in a CQI program [37].

Relative strengths and weaknesses of CQI implementation strategies

Six studies that did attempt to measure the implementation of CQI in health care organizations are examined in this article. These articles were obtained from an extensive literature search of all reported health care CQI implementation evaluation studies. They do not include the numerous studies in which a single functional area within an organization is evaluated. An example of this type of study is the work that Fischer *et al.* [38] conducted in primary care clinics. Most organizations will implement CQI in a single process before they decide to spend the resources necessary to implement it throughout the organization [22]. Unfortunately, an organization cannot simply assume that CQI will be successful throughout the organization if it showed beneficial results in one area [39].

Another broader search of business (largely manufacturing organizations) databases added implementation evaluation studies from other industries. After keeping only those studies that attempt to evaluate implementation of CQI in an entire organization, we were left with a total of 11, including the six health care studies. In order to understand the strengths and weaknesses of these studies, it is necessary to examine how each measured CQI implementation. To do so, a determination was made as to how many CQI domains from the Baldrige, EFQM and King's Fund awards each study adequately measured (see Table 1). Because these domains are conceptually independent of each other, the most complete implementation assessment study would be the one that adequately covered the highest number. Therefore, the health care organization with the best score on the survey covering the most domains would have the highest level of CQI implementation.

Both the American and European studies seem to include a large number of the Baldrige constructs, while containing relatively few from the EFQM and King's Fund awards. No one study covers all constructs. Five of the studies cover eight of the 14 constructs. Only two cover all of the Baldrige criteria, those of Shortell *et al.* [28] and Gaucher & Coffey [40]. Yet these two do not address any of the additional European award concerns. This is a weakness of the studies we examined. Any tool that intends to fully understand the

implementation of CQI should include measures that will objectively portray an organization's practice in each of these areas.

As the number of domains addressed by a measurement tool increases, so does the importance of reliability and validity. As Table 2 displays, about half of the surveys have appropriately dealt with these issues. These are very important concerns in the measurement of CQI. Since CQI implementation measurement has been so difficult, it is important to be confident that a survey used for this purpose is measuring what we want it to measure, and that respondent answers are stable. For the most complete discussion on reliability and validity, see articles by Zeitz *et al.* [41] and Saraph *et al.* [42]. These articles describe the development and validation of a scale that measures CQI implementation and related cultural dimensions through the use of factor analysis, structural equation modeling, index scores, correlations and discussions of bias.

Other characteristics of the CQI implementation studies are reported in Table 2. Although most of the measurement tools have been developed in America, there are also a total of three examples from Australia, Canada, and the Netherlands. These tools are for use in health care organizations. By contrast, only two of the eight American surveys were designed for health care organizations. Because quality experts have similar knowledge and skills worldwide, and organizations throughout the world experience the same performance pressures, there are few notable differences in questionnaires based upon the location developed. One notable difference is in the definition of quality management (QM) versus quality assurance (QA). The Netherlands study reports that the concepts are equivalent whereas the United States studies see QM as necessary for CQI, but not QA.

Of the three studies completed outside the United States, the studies conducted in the Netherlands and Canada are especially noteworthy. The goals of these surveys were to: (i) develop a tool that could be used worldwide for health care organizations, (ii) pay more attention to quality as a result of the pressures discussed above, (iii) utilize the method for comparative purposes and (iv) to be a monitor of progress [5]. The Canadian survey, in particular, seems to be comprehensive when compared with the other surveys examined. The strength of this study is that it asks the most objective questions. It is also the most recent [6] study.

Another very important characteristic of CQI implementation surveys is their respondents. There is potential for respondent bias when measuring CQI implementation for two reasons. First, the understanding of CQI constructs varies significantly between individuals [10]. For example, the idea of a quality council could have multiple meanings for different people [24]. Second, since quality is viewed as ultimately the responsibility of top management [11], there is a possibility that answers may be influenced by pressure from stakeholders who want to hear their organization emphasize high quality care. Some health care organizations will undoubtedly report using CQI, even though they have not fully implemented the strategy [43]. Solutions could include the following:

Table 1 Topical areas addressed by the major international quality awards

Author(s) (date)	Common to all three awards	Common to Baldrige and King's Fund	Common to Baldrige and EFQM	EFQM only ¹	King's Fund only ²
	Leadership	Human resources, training	Results	Innovation	Product Inspection
	Process	Planning	Customer	Supplier	
	Information	Supplier	Product	Inspection	
Wagner, DeBakker & Groenewegen (1999)	X	X	X		X
Carr (1994)	X		X		
Rondeau & Wagar (1999)	X	X	X	X	
Zeitiz, Johannesson & Ritchie (1997)	X	X	X	X	X
Shortell <i>et al.</i> (1995)	X	X	X		X
Lammers, Cretin, Gilman & Calingo (1996)	X				
Hunt (1992)	X	X	X	X	
Saraph, Benson & Schroeder (1989)	X	X		X	X
Gaucher & Coffey (1993)	X	X	X		
Easton & Jarrell (1998)	X	X	X	X	X
Ahire & Golhar (1996)	X	X	X	X	X

¹ An additional topic area, 'public' was addressed by the EFQM alone but was not covered by any of the authors listed. ² Two additional topic areas, 'contract requirements' and 'servicing' were addressed by the King's Fund alone but were not covered by any of the authors listed.

Table 2 Measures of CQI implementation

Author(s) (date)	Location	Industry ¹	Method ²	Respondents	Reliability	Validity	Scoring matrix (No. of levels)	No. of topical areas	Questions
Zeitiz, Johannesson & Ritchie (1997)	US	M, S-G, S-E	S	886 employees and graduate students	Y	Y	N	12	56
Easton & Jarrell (1998)	US	M, S-G	I	Key quality executives from 108 firms	N	N	Y (2)	0	n.a.
Ahire & Golhar (1996)	US	M	S	499 plant managers	Y	Y	N	10	n.a.
Saraph, Benson & Schroeder (1989)	US	M	S	162 general managers and quality managers of 89 divisions	Y	Y	N	8	78
Shortell, O'Brien, Carman, Foster, Hughes, Boerstler & O'Connor (1995)	US	S-H	S & I	Approximately 7000 employees	Y	Y	N	8	81
Lammers, Cretin, Gilman & Calingo (1996)	US	S-H	S	36 quality coordinators and 168 team leaders	N	N	N	5	n.a.
Rondeau & Wagar (1999)	Canada	S-H	S	N/A	N	N	N	13	192
Wagner, Debakker & Groenewegen (1999)	The Netherlands	S-H	S	Managers in 1594 health care organizations	Y	Y	Y (4)	5	35
Carr (1994)	Australia	S-H	S	Quality practitioners in 118 hospitals	N	N	N	0	22
Hunt (1992) ³	US	All	S	All	N	N	N	7	215
Gaucher & Coffey (1993)	US	All	S	All	N	N	Y (10)	7	70

¹ M = manufacturing, S-E = service—education, S-G = service—general, S-H = service—healthcare. ² I = Interview, S = Survey. ³ Survey not yet administered.

- (i) Using more than one group of respondents in each organization (e.g. top management, physicians and employees)
- (ii) Follow-up site visits to an organization with the focus on assessing whether the respondents reported correctly the extent of CQI implementation
- (iii) Develop an objective measurement tool that requires organizations to provide empirical evidence of CQI implementation.

Only two of the studies utilized any of these approaches. Shortell *et al.* [28] conducted follow-up site visits while Lammers *et al.* [37] utilized multiple groups of respondents. Lammers *et al.* used two similar groups (quality coordinators and team leaders) to assess implementation whereas the results of Shortell *et al.*'s site visits were not clearly defined.

Three of the studies categorized organizations into developmental groups after responding to the questionnaires. This is an important issue because of the rapid CQI diffusion that has occurred across the world [21]. The practice of CQI may mean something completely different to different organizations. For example, one hospital may perceive that it has fully implemented CQI by simply utilizing the statistical tools provided by such authors as Plsek [23] and Juran [27]. These tools are definitely important to introduce, but they are only one component of a multitude of CQI constructs. The three studies which explicitly use maturational stages have a gradient scale where one is 'no implementation' and 4 is 'full implementation'.

Of these 11 studies, only two attempted to measure both the level of implementation of CQI and its effects [28,44]. In the study by Shortell *et al.*, a large number of employees from multiple hospitals responded to a questionnaire based on the Baldrige categories. The survey was lengthy and measured employee's perception of CQI within his/her own hospital. The study used regression to examine the relationship between the perceived degree of CQI implementation and objective measures of clinical efficiency (e.g. charges and length of stay). The principal findings were that: (i) a participative, flexible, risk-taking organizational culture was significantly related to CQI implementation, and (ii) CQI implementation, in turn, was positively associated with positive perceived patient outcomes and human resource development [40]. This was an excellent study which demonstrated beneficial results when employees believed that CQI was implemented appropriately in their hospital.

However, a more recent study by the same author showed no association between risk-adjusted mortality and CQI among coronary bypass surgery patients [29]. The researchers do note the need for further examination of the relationships between CQI and culture, leadership, decision support systems, and incentives – all of which have some effect on the appropriate implementation of CQI – and specific improvements of processes [29].

In Easton & Jarrell's [44] study, interviews of senior quality executives were conducted to determine the extent of CQI implementation. Then control firms were identified that had not implemented CQI. The two groups were then compared

across a series of very well developed, objective measures of performance (e.g. stock price and accounting variables). The findings indicated that performance had improved for the firms that implemented CQI. The improvement is consistently stronger among firms with more advanced CQI implementation.

A final characteristic of the studies examined is similar to studying the effects of a drug. CQI implementation measurement strategies could examine Armstrong's [45] levels of what is available, administered, absorbed or active. The most complete approach would be to determine to what extent the CQI constructs are actually incorporated in an organization. The least complete strategy would be to determine how many of the CQI constructs are simply available. Most of the studies examined in this paper would fall into the administered or absorbed categories, where questionnaire responses support that money, training and systems are available and used. For example, the study by Ahire and Golhar [46] looks at what is available, whereas the questionnaire used by Hunt [47] tries to get at what is actually active in an organization. It is only possible to ascertain causality for CQI measured at the active stage. No such study currently exists at the organizational level.

In summary, the studies examined in this article possess the following strengths: (i) most, at a minimum, assess the Baldrige categories (ii) validity and reliability testing is satisfactory, particularly in Zeitz *et al.* [41], and Saraph *et al.* [42] and (iii) there are few notable differences in studies conducted in different countries. The studies possess the following weaknesses: (i) there is less incorporation of the EFQM and King's Fund categories, (ii) there is high potential for respondent bias, (iii) there is very little information across types of employees in a single organization, (iv) there is very little use of face-to-face interviews, (v) most studies do not utilize scaled levels of CQI implementation, (vi) there is rare examination of economic or financial data, (vii) there is very little examination of the effects of CQI and (viii) the focus is currently on whether CQI is absorbed in an organization and not on whether CQI is active in the organization.

Discussion

The major goals of this study were to develop an improved understanding of the meaning of the concept of CQI implementation and to describe alternative approaches to its assessment. The investigators used Rogers' [16] Model of the Innovation-Decision Process and thus view implementation as part of a larger process that gradually unfolds as complex organizations attempt to incorporate new technologies into their ongoing organizational operations. As is often the case, our analyses uncovered a number of significant conceptual and methodological questions that need to be addressed in future studies of CQI implementation.

Four conceptual issues are clearly worthy of attention. First, there needs to be greater consensus regarding the basic meaning of the concept of CQI in organizations and perhaps a comparative taxonomy that outlines different types of such

initiatives based upon the types of activities and resources that are involved. Second, more attention needs to be focused upon what conceptual criteria (such as the Baldrige categories) need to be examined in order to develop a full understanding of how much CQI is actually being used by an organization and its members in everyday operations. Third, assuming that we achieve a better understanding of what CQI implementation actually means, greater attention needs to be directed toward identifying specific factors that serve as barriers or facilitators within and across different types of health care organizations. And fourth, conceptual frameworks need to be devised that offer a theoretical explanation of how CQI directly and indirectly affects important organizational outcomes.

Additionally, it has been difficult to justify CQI's impact in business organizations because of methodological concerns regarding its implementation [48]. In order to appropriately implement and measure CQI, the following factors need to be understood and appropriately addressed. First is the need for a developmental perspective when implementing CQI. Deming [26] describes a likely time frame of 5–7 years for adequate implementation of CQI amidst ever-changing processes. Unfortunately, many organizations that implement CQI as a strategy believe its implementation is a yes/no question. Either they have it, or they don't. However, CQI implementation is best viewed on a lifecycle continuum. Therefore, any attempt to measure CQI should utilize this continuum to place organizations at different levels of implementation.

A second methodological concern is the need for multiple indicators and types of respondents in implementing and measuring CQI. Because it is easy to measure, a team's effective use of statistical tools to analyze a process is often equated with full CQI implementation. However process evaluation is only one of many topical areas that need to be addressed in CQI. Additionally, using the results of a mailed survey of quality directors to assess the use of CQI techniques will not provide an unbiased picture of CQI implementation throughout an organization. It will be necessary to gather information from other types of people in an organization. CQI is a managerial approach that should be pervasive throughout an organization. To measure this in an unbiased manner, surveys, site visits, telephone conversations and public records may all be necessary to assess CQI implementation. A good example of this is in the study by Shortell *et al.* [28], where surveys were used to gather information from employees and then site visits were conducted with the organizational leaders.

A third factor is the need for CQI implementation to be reliable and valid. Most of the surveys use correlations, Cronbach's alpha or test-retest coefficients to determine reliability, and factor analysis or expert panels to test for validity. Cronbach's alpha (internal consistency) is the best method for reliability testing because it requires only one administration and is the most general form [42]. Of the three types of validity testing (content, criterion-related and construct), content is the most widely used in these studies because of its ease of administration. Because validity is so

important with a concept that is difficult to measure, it's necessary that a CQI measurement tool test for criterion-related and construct validity as well.

A final issue is the need for controlled studies and a decreased reliance on case and descriptive studies. A comprehensive study of CQI implementation would involve controls and random assignment. The feasibility of such a study seems unlikely because of the widespread heterogeneity of organizations utilizing QI techniques and the diversity of such methods. An alternative is to use the quasi-experimental methods of surveys and site visits with statistical controls to measure the relative contribution of aspects of a quality management program [37].

Quality improvement concepts certainly offer a great deal of potential benefit to health care organizations across the world. However, without an improved understanding of variation in the level of CQI implementation, organizations will find it difficult to evaluate the value of CQI in their facilities. We hope that this article identified the major issues regarding CQI implementation that have been addressed thus far and remaining questions that require attention.

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Appendix A. Definitions of quality award criteria

Leadership: Measures the senior leader's ability to create and sustain a clear and visible unity of purpose within the organization along with a management system that guides company activity towards quality excellence.

Process: Measures the organization's ability to understand and systematically manage all of its inter-related activities; also measures the integration of process control with continuous quality improvement.

Human resources, training: Measures the organization's ability to develop and realize the full potential of its workforce, including management; and to maintain an environment conducive to full participation, quality leadership and personal and organizational growth.

Planning: Measures the organization's ability to develop and integrate short- and long-term quality plans consistent with the organization's quality system.

Information: Measures the organization's scope, validity, use, and management of data and information that underlie its overall quality system.

Results: Measures the organization's ability to develop and utilize objective quality indicators derived from the analysis of relevant stakeholder expectations and business operations.

Customer focus: Measures the organization's understanding of and ability to meet the requirements and expectations of its current and potential customer.

Innovation: Measures the organization's ability to manage and share

knowledge within a culture of continuous learning, innovation and improvement.

Partnership development (mainly with suppliers): Measures the organization's ability to develop mutually beneficial relationships, built on trust, sharing of knowledge and integration.

Public duty: Measures the organization's ability to adopt an ethical approach and to exceed the expectations and regulations of the community at large.

Product control: Measures an organization's ability to develop effective product design procedures and processes, as well as ensuring the identification and proper tracking of products.

Contract ideals: Measures an organization's ability to develop and document procedures to coordinate the review of orders and contracts ensuring the use of the customer in the process of review.

Inspection, audits: Measures an organization's ability to develop procedures to inspect, test and verify that incoming, in-process, and final products meet all specified requirements.

Servicing: Measures an organization's ability to develop and document how products should be serviced, reported and verified.

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