

Organization's Quality Maturity as a Vehicle for EHR Success

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Abstract In health care industry, EHR has been advocated to improve care quality. The journey toward the development and adaptation of EHR should be holistic and integrate all the EHR's building blocks-health record management, business process improvement (BPI), collaboration and innovation, change management, user governance, etc.—that are intertwined together as like the links of a chain to improve quality of health care services. These cornerstones that shares common features with quality principles will pave the way for implementing EHR. To go along with quality features and take advantage of quality principles namely “quality maturity” builds a solid foundation for adaptation of EHR. Therefore, the recent theories of EHR success go far beyond technical rationales and focus on organizational and managerial factors in quality improvement. The milestone of quality concept in information system success is revealed in Delone and Mclean's model which launches system quality, information quality, service quality, as distinct elements of the IS success. EHR is a means to an end -to improve quality within enterprises- based on quality approaches. In this regards, more research should be conducted to investigate the

relationship between of organization's quality maturity and EHR development success.

Keywords Electronic health record (EHR) · Information system · Paper-based record · Quality · Business process improvement (BPI) · Business process reengineering (BPR) · Innovation · Change management

Introduction

Radical discontinuous change has become a critical issue for organizational adaptation and survival [1, 2]. To cater to the ever-changing environment, enterprises need to adopt quality-centered strategies to sustain adaptation and survival [3].

Quality management is a systematic quality improvement strategy for enterprises to promoting performance. ISO/TC 176, defined the eight quality management principles including customer focus, leadership, involvement of people, process approach, system approach to management, continual improvement, etc. [4–6].

The health care industry has not been invulnerable of these changes and faces a myriad of pressures to cut costs and offer high quality care [7–10].

IOM have promoted EHR as key strategy to implementing quality and it has recently become a pressing issue for medical practices [11–14].

EHR is part of the operating core of the organization and its adaptation involves the design, delivery and use of the software system in the organization; The systems uses information technology, manual system (paper-based record), organizational context, innovation, support of stakeholders and customers to improve efficiency and effectiveness in health care [15, 16].

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From strategic viewpoints, EHR adoption goes beyond EHR and the EHR system [17]. As Alder has stated, “*learning how to use an EHR is a lot like learning a musical instrument. You do not just pick it up the first day and expect to be a virtuoso*” [18].

Although the journey toward the development and adaptation of EHR sometimes neglects traditional business processes, organizational, and social factors. Holistic EHR system integrates all the building blocks—health record management, business process improvement (BPI), collaboration and innovation, user governance and participation—that are intertwined together as like the links of a chain to improve quality of health care services. Without meeting these building blocks, the full benefit of EHR—leverage quality—is unlikely to be realized [19]. These cornerstones that shares common features with quality principles [4–6] will be debated based on literatures relating to how lay the grounds for successful implementing EHR.

Extinction of PBR? Rebirth of paper-based record in electronic cradle

ISO defines EHR as a longitudinal collection of personal health information concerning a single individual entered or accepted by health care providers and stored electronically. The hybrid of paper-based record (PBR) and electronic system has been envisioned in this definition [20]. EHR is a burden which is easy and straightforward to handle if its ingredient (electronic and health record) are kept balanced. While information technology has undergone an evolutionary process, the health record is lagging behind in this competition. While we have been bombarded with numerous informatics standards in the e-world, paper-based record is suffered from the absence of evidence-based standards and the attitude of valuing patient information [21–25]. Studies show that existing paper records are fat and disorganized and focus on episodes rather than continuum of patient care. The outcome is usually shortcomings in documentation in terms of accuracy, availability and legibility [26, 27].

Incredible is to expect this immature paper trail to keep up in the marathons of the e-world. The problem arises because of the unsymmetrical development of EHR’s wings’ hard (technology) and soft (paper trails).

This golden dream requires a witch to wave a magic wand and put spell on this garbage and mess to turn it into a computerized medical record. EHR’s fascination has seduced the organizations to neglect the quality of paper based record—a symbol of quality care rendered- and concentrate on EHR’ technical shell exempt from soul of quality. Automating the medical record in their current status seems to come close to a catastrophic failure: “*a mess computerized is a computerized mess*” [19]. To realize the full benefit of EHR needs to rely

on not only on the data processing capacity of IT but also on redesigning the workflow, methods of doing business and business process improvement [28, 29]. It is time that enterprises recognized that business process improvement (BPI) “*is not an option; it is given*” [30].

Keep your organization kicking and alive: Role of BPI

Business process improvement (BPI) is a broad term that covers a continuum from continuous process improvement (CPI) at one end to business process re-engineering (BPR) [31]. The management techniques related to quality principles recognized as CPI (also called incremental continuous improvement) are often used interchangeably with BPR.

Business process re-engineering (BPR) is characterized as “the fundamental rethinking and redesigning of process to achieve drastic improvement” [32].

BPR is arranged around phases—planning, designing and implementing. Each of these three phases shares common aspects—management techniques, change management, team building, effective communications, human involvement, and continuous process improvement (CPI) initiative [30, 33].

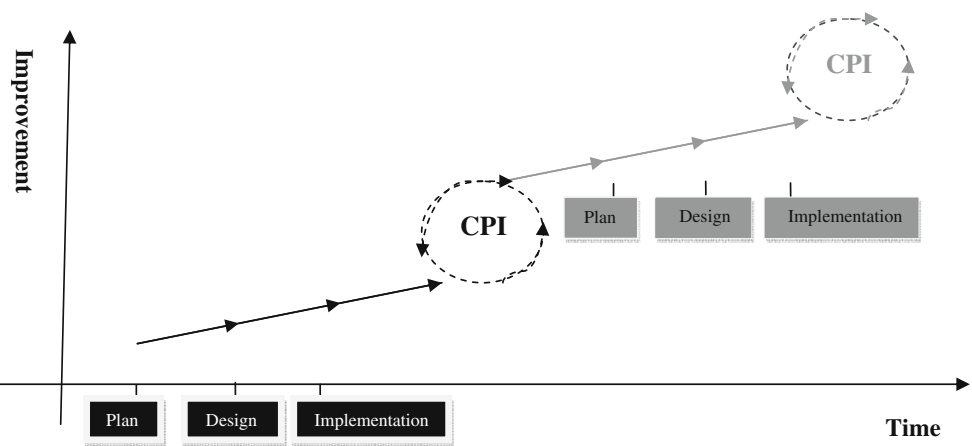
CPI such as TQM, CQI which concentrates on narrowly defined and minor processes shares many of the same tools and techniques to drive breakthroughs (significant advances) in organizational performance.

Conducting BPR efforts within and alongside a CPI program make a synergistic effect on prevailing quality; continuous process improvement not only soften the enterprise to deploy BPR but also sustains ongoing dramatic improvement from BPR. Therefore, the last phase of BPR relies on CPI to ensure that the established processes make great headway [34, 35]. The interrelation of the two approaches is illustrated in Fig. 1.

In the health care arena, EHR is an action-centered and process-oriented, adopting an extensive IT network to interconnect numerous of health care settings [36, 37].

The information system technology of EHR is usually deployed as part of re-engineering processes and like its origin has a great potential for improving quality [38]. Successful EHR adaptation needs to focus on the development of EHR work flows rather than prevailing technology and automating existing processes. Organizations that have executed EHR in along side with process redesign gain significant benefit from IT investment [29].

The sole automation of inefficiently designed process often leads to failure. Studies indicate that underestimating the role of BPR and not reengineering is one of the critical factors in EHR’s failures [39, 40]. Information system development supports the existing business process and their alignment with IT strategy goals is one of the critical

Fig. 1 The interrelation of BPR and CPI

success factors of EHR. Implementing EHR through the process reengineering keep your organization kicking and alive and ensure its survival [41].

Disguising to electronic environment: Role of change management

EHR achievement will more likely be revolution with significant role changes within organization [42]. These clashes address through the behavior change and is achieved by helping people understand and internalize change [43]. This process which is called change management foster readiness for an EHR and its cultivation diminishes resistance to computer use. Determine the readiness state what needs to be done to ensure adoption by all [42] and its key ingredient is user participation. The organization change must target user need analysis as a crucial factor of EHR success factors [44–47]; 70% of information system fail or not provide end user satisfaction [48]. To underestimate user acceptance leads to boycott 40% of newly installed system.

In health care organizations many different user groups (physicians, nurses, administrators, managers, researchers, etc.) with variety of backgrounds and conflicting interest exit. Therefore, to address staff awareness and contribution to the EHR implementation, health care providers must be participated and oriented with the system [49].

To deal with this dilemma to be straightforward if the organizations have been equipped with management techniques. BPI has been established as one of the most attractive change management option for fostering system wide change. The outcome of successful application of PBR and CPI are measured by the radical change in the organizations.

Furthermore, the organization-wide process improvements are undertaken by teams and user involvement [33, 50, 51]. In these approaches all people openly and actively involves; these process-oriented strategies let users to find their way

through the process and specify their requirements. Human participations not only eliminate user resistance, but also provide a place for process owner to pose their needs regarding to newly invested system [37].

EHR is a mere shell of IT: Together EHR and innovation are winners

EHR is an innovation process that requires the efforts and expertise of organization to sustain it; this long lasting and never ending effort is innovation [52–54].

EHR systems are becoming more and more sophisticated and a highly interconnected Frankenstein network is afoot. This monster is riding the chariot of improvement to shatter enterprises that are far behind the re-everything world and do not benefit from innovation and creation. To thrive in this environment, the organization needs to rely on creativity and innovation to make a quantum-leap improvement [55].

Review of literature indicates that there is deep and complex relationship between BPI and innovation. The management techniques related to quality principles recognized as CPI such as TQM, CQI are pioneer of business innovation capability (BIC) and drastically fosters enterprises' innovation culture and [56–59]. More over, innovation constitutes the integral part of BPR and neglect creative part of process reengineering lead to its failure [60]. Therefore, many literatures introduce reengineering process as “process innovation” [61]. Business process improvement consisting of quality techniques such as TQM, CQI will pave the way for EHR adoption and ensure organizations' success to overpower EHR Frankenstein.

The oversight of innovation part of EHR development leads only to replacement of paper environment with electronic environment. The challenges of transitioning from a manual system to automatic system involve refreshing and reinventing the workflow, method of doing things, resources, staff skills, and culture of an organization.

Conclusion

Since the literature review indicate the majority of EHR's success factors rely on cater the management techniques in terms of quality approaches. The recent theories of EHR success go far beyond technical rationales and focus on organizational and managerial factors; Socio-technical prevail motto of "technical requirements of the system need to fit into the operational, organizational and cultural processes"; Organizational theories focus on user involvement, change management, business processes; Sauer's exchange framework reflect analysis the information system as a innovative process—based on three interdependent components of project organization, the information systems and its supporters [52–54, 62–64]. Information success criteria debate in theories rationales share common cornerstones with quality features in terms of business process, team building and user involvement, innovation, change management, etc. The milestone of quality concept in information system success is revealed in Delone and Mclean's model of information system success. It launches system quality, information quality, service quality, etc. as distinct elements of the IS success [65, 66].

For these positions, the critical evaluation of the theories and literature rise to specific theme we called it "Quality Maturity". Quality maturity emphasize on go through the quality continuum within the organization; go along with quality features; and take advantage of quality principles as a solid foundation for adaptation of EHR called "quality foundation". As debated quality principles recognized as CPI, BPR, change management, innovation interwoven like a links of chain; precedent one make the foundation for next generation, and this inherent feature goes on. CPI to be catalyst for BPR, process reengineering is an enabler for rest of the quality approaches like six sigma [67]. Both PPR and CPI foster innovation culture and pave the way for change management; the heritage is never ending, as well as quality concept.

The best and the most optimal EHR implementation must be holistic and enumerate all the links of chain; its missing link makes its failure inevitable. Beginning implementing state-of-the-art technology and then attempt to align it with operational, organizational and cultural processes make "complexity synergism" [68, 69]. Complexity synergism arise since shortcut of quality continuum happens; Do not let the organizations get accustomed to given quality approach and getting ready for moving to next step. To merge steps of quality ladder before implementing EHR causes the enterprises experience multitude of clashes in term of information technology, change management, innovation culture, team building and user participation, etc. synchronously.

The sole automation of inefficiently designed process often leads to failure. It helps to "redoing the wrong things automatically". Thus, EHR as well as its ancestor—

Quality-act as a vehicle to steer the health care enterprises on the road of improvement, quality and excellence. When organizations go through the continuum of improvement and aligning to best practices, EHR snap your invitation deliberately. If the enterprises take the right direction, the next step will be packing for EHR journey. Implementing EHR within enterprises do not reach maturity in quality culture, is like to build a skyscraper on a shanty.

Almost all EHR implementation pitfalls occur because of failing to pave the way for its advent. We try to "force the implementation" whereas just the focus on processes that represent best practices through the innovation, creation and sharing alliance help EHR find its way into the enterprises [60].

The challenge is to perceive that EHR is a means to an end—to improve quality within enterprises based on quality approaches- but not a magic wand to scrape the organization through the shortcomings to enable the enterprises make a quantum-leap transition. If the EHR adoption is the ultimate goal, then what will be happened when EHR system comes to our reach? It is advisable more research be conducted to study the effect of organization's quality maturity on EHR development success.

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