Is There a Quality Linkage of E-Health?

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Complex quality issues within complex systems rarely have one root cause. As a result, random activities with one piece of a process can provoke unexpected results. For example, technology solutions may improve some patient safety factors but may also cause unexpected problems. Therefore, although the vigorous pursuit of technology advancements is absolutely vital, the emergence of new interactions cannot be overlooked.

In this context, it is vital to realize that we still cannot capture all the multidimensional variables that run parallel to, intersects with, diverge from and converge with the evolution of e-health. Small deviations are being carried through the interaction and result in magnified impact, which is amplified when the incompatible worlds of patient, family, and visitor meet the world of healthcare professionals. On the other hand, quality movement needs to advocate for the free flow of information in order to fertilize organizational learning and nourish worker intelligence (Wheatley, 1999).

However, information cannot be disentangled from e-health initiatives. Information technology provides alternative methods for making health information accessible to consumers while research shows an improvement of health awareness, high user satisfaction, evidence of greater benefit for under-served people and beneficial impact on health behavior (Gaston & Mitchell, 2005; Murray et al., 2005; Santo et al., 2005; Wofford et al., 2005).

But do all this translate into a quality linkage of e-health?

Understanding the linkage between e-health and quality is a complicated task because no definitional consensus exists for either of these terms. The lack of shared definition can present challenges from both practical and academic perspectives (Pate & Turner-Ferrier, 2010; Kastania, 2010). Academically, the lack of shared definition can serve as a motivating force for a meaningful dialogue to promote knowledge. From a pragmatic point of view, different conceptualizations held by different stakeholders can also lead to serious dialogue with the intention of arriving at definitional resolution. On the other hand, the lack of consensus can cause inter and intra-organizational dysfunctions as organizations adhere to and try to leverage their own positions for self-gain (Pate & Turner-Ferrier, 2010). Therefore, establishing a common language may serve as a powerful platform that enables e-health to more effectively enable organizations to achieve quality improvement.
However, what is clear about healthcare is that the interdependent and complex nature of healthcare delivery calls for structured ways to analyze the strategic goals, processes, technologies, outcomes, and other features of the healthcare system. Systems theory is a theoretical framework that serves as a starting point for analysis (Austin & Boxerman, 1998; Ginter et al., 1998).

In its essence, systems theory provides a straightforward way of viewing the relationship between inputs and outputs. In its most basic form, system inputs are converted to and drive outputs, which in turn provide a feedback mechanism to the size and amount of inputs needed. On the other hand, Donabedian’s (2005) well-known structure-process-outcome (SPO) framework provides a meaningful way of viewing the concept of quality. In this context, e-health technologies and supporting equipment clearly fall under the domain of structural measures of quality, which constitute ‘input measures of an organization’s capacity to permit or promote effective work’ (Flood et al., 2000).

On empirical grounds, in a systematic review of the relationship between health information technology and quality, Chaudhry et al. (2006) found two main topics about the relationship. First, health information technology has been shown to increase adherence with clinical guidelines, based upon the associated decision-making processes and functions, which are inherently built into adherence. Second, health information technology has also increased the ability of organizations to improve the quality of care by increasing monitoring through ‘large scale screening and aggregation of data’.

On the other hand, the quality linkage of e-health can be traced in the patient safety and patient-centered care thinking. Patient safety could be described as a discipline that applies safety science methods in order to achieve trustworthy health care delivery. However, it is also thought as an attribute of the health care system that minimizes the incidence and impact of adverse events. Preliminary evidence of interaction with e-health could be found in safety culture, data mining, and medical simulation. Specifically, a prerequisite for the realization of the key dimensions of patient safety culture (Ginsburg et al., 2009; Singer et al., 2008) is the collection, analysis, and dissemination of information deriving from incidents and near misses as well as the adoption of the reporting, just, flexible and learning cultures (Ruchlin et al., 2004). Data mining is becoming an increasingly indispensable tool in mining a wide range of health records (Norén et al., 2008). It can maintain quality assurance, simplify the automation of data retrieval, facilitate physician quality improvement (Johnstone et al., 2008), and accurately represent patient outcomes if combined with simulation (Harper, 2005).

Recently, there is interest in switching to algorithms and database development for microarray data mining (Cordero et al., 2007). Finally, medical simulation bridges the knowledge gap by representing certain key characteristics of a physical system. Quality improvement, patient safety, and the evaluation of clinical skills have impelled medical simulation into the clinical arena (Carroll & Messenger, 2008) while there is conclusive evidence that simulation training improves provider self-efficacy and effectiveness (Nishisaki et al., 2007) and increases patient safety. It is also accepted that the process of iterative learning creates a much stronger learning environment and computer simulators are an ideal tool for evaluation of students’ clinical skills (Murphy et al., 2007).

However, a great potential of interaction has to be established through the evaluation of biobanking, biochips, disease modeling, genomics, molecular imaging, nanotechnology, ontologies, and proteomics (Mountzoglou, 2010).

Taking into account the patient-doctor encounter as an element of a good outcome, we turn to the idea of patient centeredness. Although definitions of patient-centered care vary, patient-centered care is the provision of care that is ‘respectful of and responsive to individual patient preferences, needs and values and ensuring that patient values guide all clinical decisions’ (IOM, 2001). In this context, Kilbridge (2002) suggested that twelve information technology applications, which
involve the management of health care information, empower patients: 1) technologies which provide access to general and specific health care information 2) technologies capable to handle data entry and tracking of individual self-management data. The applications included personal health records, patient access to hospital information systems, patient access to general health information, electronic medical records (EMRs), pre-visit intake, inter-hospital data sharing, information for physicians to manage patient populations, patient-physician electronic messaging, patient access to tailored medical information, online data entry, and tracking, online scheduling, computer-assisted telephone triage and assistance, online access to provider performance data.

Finally, if we think that all health professionals should be educated to deliver patient-centered care (IOM, 2003) a theoretical interaction between e-health and quality could be established. A key way to think e-health and educational linkage relates to the ways in which e-health applications and technologies can be introduced into educational settings taking into account the missing foci of healthcare delivery education.

Having said that, we have to admit that there is relatively little empirical evidence to substantiate many of the theoretical claims made in relation to the linkage of quality and e-health, and a lack of robust research on the risks of implementing e-health technology (Black et al., 2011). The reasons are multi-faceted, including lack of primary research, methodological limitations, inappropriate timeframe of study, failure to involve patients, and inadequate attention to socio-technical factors.

However, despite the substantial gap in evidence, the theoretical linkage of quality and e-health has been established. Therefore, an evaluation framework of e-health has to be established, taking into account the six dimensions of quality, namely, patient safety, effectiveness, timeliness, patient-centeredness, efficiency and equitability.

There is a substantial body of research, describing shortfalls in the current provision of healthcare. Key issues emerging from this literature are significant variations in the quality of healthcare and risk of iatrogenic harm. On the other hand, there has been considerable progress in information technology effectuating a high capacity to exploit technological developments in relation to aspects of healthcare provision. Moreover, glimpses of future healthcare establish a wider use of nanotechnology, individualized drugs, cell-based computing and microchip-enhanced brains.

Notwithstanding the previously mentioned prospects, there has not been a systematic research and evaluation of the empirical literature on e-health applications and their impact on the quality and safety of healthcare delivery. Relevant theoretical, technical, developmental and policy literature has not been synthesized with a view to producing a definitive overview of the interaction.

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