Chapter 57
Evaluation Considerations for E-Health Systems

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ABSTRACT

E-health evaluation, which involves different dimensions, has increased. In traditional healthcare, quality dimensions exist but these are not sufficiently exploited for e-health. Reliability is often examined regarding technology, software, demand and survival. This chapter reviews the reasons that e-health systems need to be evaluated, the methods followed for conducting e-health evaluation studies and the main points that characterize an evaluation procedure as successful. Many researchers have presented evaluation considerations for e-health. Herein, the emphasis is on analyzing a series of ideas mined from the scientific literature that allows drawing up practical considerations for e-health evaluation. These considerations focus both on quality and reliability assurance as well as on quality and reliability improvement.

INTRODUCTION

Quality assurance and quality control are different both in the meaning and nature. Quality assurance consists of activities undertaken before data collection to ensure the data are of the highest possible quality at the time of collection (Arts et al., 2002). It involves techniques used to assure the quality requirements and should include prevention, detection and action (Arts et al., 2002). Selecting and training the workforce and designing a data collection method are essential aspects of prevention. Detection of data errors can be achieved through routinely recording the data, which means comparison with data in another independent data source. Finally, action implies correction of data errors and determination of their causes (Arts et al., 2002). Quality control takes place during and after data collection. It aims at identifying and correcting sources of data errors (Arts et al., 2002). Quality control involves activities, which ensure that the product will reach

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its quality requirements. Overall, quality measurements include (1) performance measurement, (2) outcome evaluation based in the standards, and (3) performance improvement if the standards are not satisfied (Donabedian, 1988).

However, traditional retrospective methods of quality assessment are not enough to meet the needs of current health care, especially those that involve the practice of medicine in an electronic environment (Kangarloo et al., 1999). Nevertheless, the standard measurements of quality assurance can be strengthened applying process models in a telehealth environment (Kangarloo et al., 1999). Product manufacturing has much bibliography for Total Quality Management (TQM) with the beginnings, directives and techniques on product quality (Wang, 1998). Therefore, in order to acquire the highest benefit from the new e-health services it is essential to establish an explicit method to describe the Quality of Service (QoS) requirements for the transferred information and the network management (Fortino & Nigro, 2000). Applications for electronic payment transactions, telemedicine, computerized medical records and open line access about newer treatments and prevention can help in quality improvement, access expansion and expenses management (AMIA, 1997).

On the other hand, reliability analysis in telemedicine networks requires theoretical knowledge and practical experience from the field of reliability engineering. A summary of reliability modeling in telemedicine networks includes various reliability assessment issues such as network, system, software and diagnosis (Kastania et al., 2008a). The robustness is also useful in determining the effectiveness during a reliability analysis (Dellaca et al., 2009).

Finally, Health Technology Assessment is necessary for quality improvement and for assuring the effectiveness in the health care (Leys, 2003; Stevens et al., 2004; Gagnon et al., 2006). Evaluation of existing interfaces and standards is complex and complicates the research questions related to adaptivity, safety and quality- preserving integration (Ras et al., 2007).

Therefore, the chapter collects and analyzes a series of ideas mined from current scientific literature related to quality and reliability in e-health. Another goal is to use these ideas to develop frameworks for evaluation purposes. These frameworks are expected to be useful for quality and reliability assessment in e-health.

BACKGROUND

Quality Assurance

Information technologies improve health care access and lower cost (Bashshur et al., 2000; Perednia & Allen, 1995; Kastania & Papadhmhtriou, 2008b) but increase risk. Overall, e-health technologies place serious questions for quality assurance. Therefore, in the e-health discourse, prominent questions include access and quality assurance.

Quality assurance depends on anyone practicing medicine as well its demand from the patients, the pharmaceutical companies and the health insurers. Moreover, quality assurance of clinical coding (including vocabularies and classifications) includes: simple data requirements, automated testing for cohesion, human inspections and field-testing (Schulz, et al., 1998). Service quality is also crucial (Hu, 2003; Pitt et al., 1995). Finally, the traditional definition of software quality relates quality to "fitness for use". In this context, the formal methods for requirements analysis (Fraser & Vaishnavi, 1997) demonstrate three software quality indices: correctness, maintainability, and integrity (Troster et al., 1993).

On the other hand, the inadequacy of traditional qualitative measurements has led scientists to seek new methods for improving the quality of care (Kangarloo et al., 1999; Hebert, 2001). They concluded that two components form the quality of medical care: quality of medical personnel and the technical quality about equipment (Sanazaro, 1980). Finally, the qualitative management of medical information on the Internet requires