

# Software Evaluation From the Perspective of Patients and Healthcare Professionals

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## INTRODUCTION

Healthcare software evaluation is a complex process. Specifically, in the health information systems, focusing on the patients' health and on the healthcare professionals' motivation is particularly important.

Doctors, nurses and other healthcare professionals use software that indirectly affects the patients. Does software improve the patients' health, their satisfaction, or the healthcare professionals' commitment/job satisfaction? How can the impact of an information system be measured from the perspective of the patients, the doctors, the nurses or the supporting staff? Some relevant efforts have been made in the last years to measure healthcare software impact. Nevertheless, the decision to extend a study to different fields may lead to many difficulties as far as its conclusions are concerned. By identifying the research questions and the most relevant works, as well as indicating the open research issue, this article is a revision of the literature on the subject. This work may be expected to be useful to all those wishing to contribute by their research in this field. The article provides a historical perspective of the field, followed by the main research works, their goals, instruments and key results. A thorough discussion of the results, advances and challenges will also be developed, finishing the manuscript with fruitful research directions.

It is believed that this article will be of great value for those who need a solid insight in the

field and want to contribute for advances in the research questions identified.

The next section introduces the concepts related with the evaluation of the software, patients' satisfaction evaluation, and the healthcare professionals' satisfaction. The following section presents the dimensions of evaluation, tools and approaches used, ending with a discussion of issues and challenges of the assessment of patients' and healthcare professionals' satisfaction. Solutions and recommendations are preceding the discussion of future and emerging trends. Finally, the last section provides discussion of the overall coverage of the chapter and concluding remarks.

## BACKGROUND

According to the World Health Organization (World Health Organization, n.d.), e-health can be defined as the providing of services and resources per electronic means either for health professionals, health consumers or for health systems management. Software plays in this way a central role in the healthcare systems because it can interact with the patients or doctors, or being embedded software in medical instrumentation, and other healthcare-oriented life-critical systems. Software is becoming more pervasive in all facets of medical device design and development. As transitions from hardware to software controls occur, there is a growing need for formalized software assurance processes (Cooper & Pauley, 2006).



Table 1. Challenges encountered at the intersection of healthcare services, information systems and evaluation technologies (Alalwany, 2010)

The Research Field	The Challenges Encountered
Healthcare services	<ul style="list-style-type: none"> <li>• Healthcare services are characterized by having many stakeholders who are working in different disciplines and pursuing different goals.</li> <li>• Healthcare services are dictated by complex regulations.</li> <li>• The medical knowledge is an enormous and dynamic field.</li> <li>• The main aspects of medical knowledge require an interactive environment to be transferred or practiced.</li> </ul>
Information Systems	<ul style="list-style-type: none"> <li>• The multiple perspectives involved.</li> <li>• The difficulties of quantifying benefits.</li> <li>• The nature of information systems investments is changing both in terms of technological capability and the benefits they can deliver, as well as in terms of diffusion in most aspects of society.</li> <li>• Consider the social and technical context of use.</li> </ul>
Evaluation Methodologies	<ul style="list-style-type: none"> <li>• The limited experience of using methods.</li> <li>• The unfamiliarity with evaluation techniques.</li> <li>• The difficulty in interpreting results.</li> </ul>

The use of the modern information technology in health offers tremendous opportunities: 1) to reduce clinical errors, e.g., medication errors, diagnostic errors; 2) to support health care professionals, e.g., availability of timely, up-to-date patient information; 3) to increase the efficiency of care, e.g., less waiting times for patients; 4) or even to improve the quality of patient care (Elske Ammenwerth, Gräber, Herrmann, Bürkle, & König, 2003)(Walker et al., 2005). According to Alalwany (2010), e-health supports disease allows people to better manage their own health and provides more accessible and consistent healthcare services, besides improving the efficiency of healthcare systems. Despite the opportunities, e-health presents some challenges namely considering that modern information technology systems are costly (Drouin, Hediger, & Henke, 2008)(Deloitte Touche Tohmatsu Limited, 2015) and that their failures may cause negative effects on both patients and staff. Adopting e-health applications is also highly complex. Finally, the privacy and security concerns in e-health applications are other key challenges. Therefore, a rigorous evaluation of IT in health care is recommended (Brender et al., 2013) and of great importance for decision makers and users (Kaplan & Shaw, 2004). Evaluation is likewise of some importance considering the high rate of failed IT projects in public sector where 35 percent of IT government projects have

been classified as total failures, and 50 percent as partial failures (Heeks, 2006).

As for evaluation it can be defined as the decisive assessment of defined objects, based on a set of criteria, to solve a given problem (Elske Ammenwerth et al., 2003). It is challenging evaluating software in health. The complexity and difficulty lie in the challenges faced at the intersection of three areas all well-known for their complexity (Hamid & Sarmad, 2010): healthcare services, information systems, and evaluation methodologies. Table 1 sums up the challenges encountered at the intersection of healthcare services, information systems and evaluation methodologies (Alalwany, 2010).

Ammenwerth *et al.* (2003) identify the typical problems in evaluation of IT in health care considering the complexity of the evaluation object, the evaluation project, and the motivation to perform evaluation.

E-health evaluation involved many stakeholders, the most important of them being the users (Gustafson & Wyatt, 2004). Therefore, assessing e-health from the users' perspective should address all the key factors that influence the users' acceptance of the new adopted technologies including the risks and benefits associated with the design and implementation of the e-health initiative in specific contexts. Two types of users, direct and indirect users, may be distinguished. In the first

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