

eHealth indicators: results of an expert workshop

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Abstract. eHealth indicators are needed to measure defined aspects of national eHealth implementations. However, until now, eHealth indicators are ambiguous or unclear. Therefore, an expert workshop "Towards an International Minimum Dataset for Monitoring National Health Information System Implementations" was organized. The objective was to develop ideas for a minimum eHealth indicator set. The proposed ideas for indicators were classified based on EUnetHTA and DeLone & McClean, and classification was compared with health IT evaluation criteria classification by Ammenwerth & Keizer. Analysis of the workshop results emphasized the need for a common methodological framework for defining and classifying eHealth indicators. It also showed the importance of setting the indicators into context. The results will benefit policy makers, developers and researchers in pursuit of provision and use of evidence in management of eHealth systems.

Keywords. Evaluation, implementation, national monitoring, indicators, methodology

Introduction

National eHealth policies and strategies are increasingly common in several countries [1]. While they often include similar elements, there is still a lack of commonly agreed criteria on follow-up of the eHealth implementations from the perspectives of different stakeholders. However, different measures used to monitor eHealth implementations have made it difficult in the past to compare and cumulate results on success and impact of eHealth projects. This was also found when presenting national surveys that have been conducted in all Nordic countries [2]. A common agreed minimum set of eHealth indicators could be helpful, but is still missing [e.g. 3]. The objective of this paper is to present the results of an expert workshop aiming at identifying and discussing eHealth indicators.

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1. Methods

Experts were invited to participate in a workshop "Towards an International Minimum Dataset for Monitoring National Health Information System Implementations" that was arranged at the MIE2011 conference in Oslo [2]. The workshop was organized by the working group "Assessment of Health Information Systems" of EFMI (<http://iig.umit.at/efmi>). The workshop was based on work reported in previous MIE and Medinfo conferences [e.g. 4, 5], as well as on longstanding eHealth monitoring work in Finland [6-7] Denmark [5, 8], Norway [9-10] and Sweden [11-12]. The workshop was organized in three phases: First an introduction to the topic; second a group work including guided brainstorming and third a presentation and discussion of group results. The workshop started with an overview of national surveys conducted in Finland, Sweden, Norway and Denmark [available at 13]. The key material from these presentations had been distributed on the 4 tables, around which all the workshop participants were seated. There were also post-it-notes and blank sheets of paper and pens available for group work on each table. The instruction for the group work was:

- Each participant writes on separate post-it-notes 1-3 items or issues related to eHealth systems that they find most urgent to monitor nationally. Additional questions to be answered are: what items or issues are already being monitored? How should the work be continued?
- Each participant then presents his/her notes to the group. The moderator of each group then organizes the post-it-notes thematically on the big paper sheet available on the table.
- When all participants in the group have presented their notes, the sheets are taped on the walls, and the moderator of each group presents the end results to other groups.

After the workshop the notes were transcribed and analyzed using qualitative and quantitative content analysis. The data was classified in three main categories emerging from the group work results: background/context of indicator usage; most relevant eHealth indicators; and methods for indicator development. The texts were further classified into subcategories with help of the 9 main assessment domains and topics from the EUnetHTA-model for evaluation of medical and surgical interventions [14]. DeLone & McLean's IS success model [15] categories on IS system, information and support service quality were added as subcategories of the EUnetHTA-model technology-domain in order to classify contents of those notes that focused on these aspects of technology.

2. Results

43 European experts attended the workshop, with an average of 10 people per group (Figure 1). Participants' backgrounds varied and included human factors researchers, evaluation researchers, and representatives of national health IT bodies. The discussion in the groups was very vivid to the extent that it had to be interrupted due to the time constraints. The group work resulted in 98 hand-written post-it-notes. Most of the groups had arranged the notes in a manner emphasizing the need for baseline data collection and repeated data collection after implementation.



Figure 1. Group work during the workshop.

Table 1 presents the grouping of the notes by EUnetHTA domains [14], with corresponding categories from DeLone & McLean [15] and Health IT evaluation categories [16]. Relative importance of different categories is expressed as frequency of statements. Information quality was the most frequently mentioned indicator (N=10) in the “context” group of indicators, followed by utilization (N=7) and user satisfaction (N=6). Total number of statements (43) in this group emphasizes the importance of setting the indicators in context by analysis of eHealth-related policy or strategy objectives, technologies and their use – different eHealth systems cannot be expected to have similar impacts, and diffusion is essential for utilization, utilization is needed before impacts can emerge [c.f. 15].

In the “eHealth impacts” -group (in total 42 statements), clinical effectiveness was seen as the most important domain (N=13), followed by changes in work processes (N=12) and patient safety (N=6).

In the “methods” -group (in total 13 statements), user participation was mentioned most often (N=8), raising a question of need for developing indicators also for health IT development process quality.

3. Discussion

The workshop provided an interesting set of preliminary items (indicators) regarded as important by eHealth experts for monitoring eHealth implementations. Views of the workshop participants were influenced by the quick overview of the Nordic examples, and in this sense the data was “contaminated”. On the other hand, the workshop could be compared e.g. with the RAND-method for creating indicators, which includes an expert panel to rate a list of indicators provided by e.g. a literature review [17].

The results show gaps in each of the classifications used to group workshop results, as well as gaps in initial indicators proposed by the expert, indicating the need for a more

Table 1. Number of statements issued by the 43 experts in different categories for measuring eHealth success: comparing three classifications

Individual items presented by experts	Nr of statements	EUnetHTA domain; topic nrs. [13]	DeLone & McLean [14]	Health IT studies category [3]	Examples of notes
eHealth intervention and context variables		43			
Context	Analyze national objectives/strategies	5			90. What are the national objectives in relation to the realities
	Analyze the type of HIT-system for basis of indicators				
	Features, functions and users of technology	4	2; 1-2, 4-5		46. Functional specifications 1. Who are the different stakeholders and users? needs,
Intervention quality	Phase of technology	1	1; 15, 2; 3		51. Co-existence (or not) of the newly implemented HIT
	Training/ knowledge	1	2; 12-15	Structural quality	28. Do you have training available
	Usability, system quality	4		System quality	59. % of systems with formal usability assessments. No of use
	Information quality	10		Info quality	52. Clinically relevant information, interoperability,
	User acceptance	6	2; 17-18	User satisfact.	71. Acceptance of the device
	IS support quality; investments needed [13]	1	2; 7-11	IS service quality	32. Support level in house
	health problems affected, current use (of technology)				
Intervention use	IT penetration and extend of use	7	1; 9-10	System quality; System use	5. IT penetration: how much % of processes are supported? 75. Primary care: nr of eprescriptions, referrals, adoption
	Regulatory status, certification	4	1; 16-17		75. Primary care: nr of eprescriptions, referrals, adoption rates
Health care impacts, net benefits [14]		9			
	patient safety	6	3	Customer benefits	77. Impact on patient safety (errors, patient harm)
Impacts on health outcomes	clinical effectiveness	13	4		43. Impacts on effectiveness, quality and outcomes of health
	costs and economic evaluation : resource utilization	2	5; 1-2	Productivity, org. benefits	85. How much must I invest in these applications and what are the benefits?
Impacts on processes	work processes	12	7; 1-4	System use	38. Current workflow in processes influenced by functionality
	ethical analysis	1	6		27. Ethicsweb.eu
Impacts on health care structures	social aspects - communication	3	8; 7-9		29. Improvement of communication: patient-health care staff,
	legal aspects			Process quality	
	privacy	4	9; 9-10		82. Privacy, security perception (clinicians + patients)
	secondary use	1	9; 9-10		31. Secondary use of data for research
Methods for data collection (sum of statements)		13			
	learn from work done	3			94. learn from work done
	user participation (in eHealth system development)	8	information sources listed		34. User-driven HIT-development: do you feel you can
	software monitoring	1	per topic		97. software monitoring
	qualitative, ethnographic methods, process	1			98. qualitative, ethnographic methods, process
Total nr of individual statements		65			

formal methodology to define and rate the key indicators. Future work is also needed to harmonize a classification for eHealth indicators. Future work of a core group of experts will comprise: 1) generating a methodology suitable for developing indicators sensitive to eHealth interventions for measuring progress and impacts of eHealth initiatives, 2) implementing the methodology to develop indicators for selected eHealth interventions, and 3) collecting feedback on usability and usefulness of the indicators for local and national decision making [18].

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