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Exploring a methodology for eHealth indicator development

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Abstract. Indicators provide a practical method to monitor and benchmark eHealth progress towards objectives set in local, national and international policies, and to offer evidence for eHealth management. There is no agreed methodology to develop and define these indicators. The purpose of this paper is to present a proposal for an indicator development methodology and indicator classification. This proposal combines expert-led top–down and community-based bottom–up approaches. It offers a holistic approach for developing indicators for measuring progress and impacts of eHealth development consisting of four phases: (1) defining the context for measurement, (2) defining the goal of measurement, (3) defining the methods for indicator selection and indicator categorization and (4) defining the data to be collected and analyzed to calculate the indicator. Our preliminary results will be used as a starting point for developing a more detailed description of methods for indicator development and for identifying and classifying eHealth indicators and on testing them in practice.

Keywords. eHealth, evaluation, method, quality indicator

Introduction

Both the European Union and the World Health Organization (WHO) have recognized ICT-facilitated solutions in health care (eHealth solutions) as key enablers for modern, patient-centered and efficient healthcare services [e.g.1, 2]. Diffusion of these solutions has increased importance of monitoring the progress and impacts of them to learn from these initiatives, to see if it is worth the money, and to make informed decisions needed in management of eHealth. For this, adequate valid indicators are needed. An indicator can be defined as a measurable element of practice or system for which there is evidence or consensus that it can be used to assess a defined aspect of the practice or system in question (based on [3]). The literature presents many indicators on health- or information-society related issues. However, eHealth related indicator-work is lagging behind, which results in eHealth indicators either being ambigious or missing. [4][5]

The objective of this paper is therefore to present preliminary results on developing a methodology for defining and classifying eHealth indicators. Indicator classification is an essential part of the methodology to harmonize and organize indicators per purpose. This work is initiated by the IMIA Working Group on Technology Assessment and Quality Development and the EFMI Working Group on Assessment of Health Information Systems (http://iig.umit.at/efmi)

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1. Methods

The first explorative approach for defining a methodology for eHealth indicator development (the "first round" in iterative development of the methodology) has followed a two-step process:

1. Quick desk-top-review of literature on existing indicator methodologies and related processes on defining indicators (also outside the field of eHealth)
2. Review of literature on eHealth studies and conduction of an expert meeting in order to generate a proposal for the classification of eHealth indicators

The first step was done using two sources: web search and key references from the authors' own archives. The retrieved sources were searched for specific information on methodologies to develop indicators and on existing eHealth indicator sets.

In the second step, to provide a basis for grouping of the needed indicators, we identified classifications used so far, including the eHealth evaluation criteria published in [6], EUnetHTA-classification [7], used also to classify telemedicine indicators [8], and used them to classify data produced during the MIE 2011 indicator workshop. Detailed outcomes of this classification is reported separately [9].

2. Results

2.1 Step one: Quick desk-top-review of existing indicator methodologies

The literature resulting from the quick desk-top review contained

- Articles discussing suitability of specific indicators as measures in a specific field (e.g. drug treatment data as an epidemiological indicator)
- Articles describing a methodology for defining indicators for a specific assessment topics (e.g. care process quality indicator)
- Articles describing a framework for defining indicators for specific policy goals (e.g. eHealth or sustainable development)

The last group was reviewed in more detail. One systematic review of indicator methodologies was found[10] (in the field of sustainable development) that described two main approaches for indicator definition: Expert-led top-down and community-led bottom-up methodology. Top-down methodology seemed to be predominant in indicator work that focuses on defining measures with which to monitor implementation of policies and their impact on society level (e.g. economic growth, main aim also in European level eHealth indicator work [1]). This approach is expert-led and predominantly science-based. Bottom-up methodology seemed to be used especially in the fields where the aim is to monitor or assess policy or strategy implementation and impacts on micro level – e.g. on local environment. It was regarded important to tailor the indicators to the needs and resources of the indicator users, but still to remain rooted firmly in the fundamental principles of policy in question (e.g. sustainable development in environmental policy) The top-down and bottom-up indicator frameworks shared four common phases of indicator development [10]:

1. Defining the **context** (human and environmental) for measurement with two primary components: (1) identifying key stakeholders and (2) defining the area or system that is relevant to the problem being studied.

2. Defining the **goals**. Top–down approaches rarely include this step formally, as the goals are pre-determined by funding agencies or Government offices.
3. Defining **methods for indicator selection and categorization**. Indicators are often chosen qualitatively, by reviewing expert knowledge, peer- reviewed literature or existing indicator work [see e.g. 2].
4. Defining the **data**. This step tests the indicators by applying them. In all indicator initiative data are collected, analyzed, reported and feedback is acquired from different user groups.

The first two phases call for operationalization of goals of the policies and strategies as well as description of the eHealth systems and their impact mechanisms. These phases are not always well documented [see e.g. 11-14, 2, c.f. 15]. This finding indicates a need for more transparence in these aspects of eHealth indicator work. Health technology assessment (HTA) has developed a methodology for describing technologies and their context of use [7]. This methodology has been tested in the Finnish eHealth indicator work [16]. It has potential to be tested also in the wider international eHealth indicator work in phases one and two.

For phase three, a procedure developed by the Rand Corporation [17] is often used. This procedure combines scientific evidence and expert opinion using a consensus technique. In this procedure, preliminary indicators are extracted from the literature and anonymously rated by individual experts of an expert panel. In a next round the panel meets to discuss, rerate and gain consensus. Criticisms of the Rand procedure include the lack of transparency in applying the definition of concepts (e.g. 'appropriate care' in case of quality of care indicators), and weak reliability of the rating and consensus procedures. To overcome these criticisms, the Rand procedure has been modified by van Engen et al [18] with successful elements of rating and consensus procedures from other quality development methods.

Phase four includes defining the possible sources of indicator-related data by reviewing (and improving if possible) existing data from statistics, surveys etc. Development of national repositories of patient data will increase possibilities for secondary use of real-time health data. Before this can be done, several questions of transparency, access, privacy related to data use need to be answered [15].

2.2 Step two: literature review and expert opinion on classification of indicators

Corresponding to the third phase of the indicator development methodology, we searched for a suitable classification of eHealth indicators to be used to group the indicators for expert rating. As basis, we used a classification of health IT evaluation criteria developed by Ammenwerth and de Keizer [6] that was based, among others, on earlier work of Donobedian [19], Krobock [20] and van der Loo [21]. This classification described four main categories of IT evaluation criteria:

1. Structural quality: Technical quality, software quality, computer knowledge and acceptance of the users;
2. Quality of information logistics: Information quality; costs of information processing; user satisfaction; usage patterns;
3. Effects of eHealth on quality of processes: Efficiency of processes, appropriateness of care, organizational and social issues;
4. Effects of eHealth on outcome quality of care: Patient outcome, costs of care, patient satisfaction, patient-related knowledge or behaviour.

Categories 1 and 2 correspond to the quality of structures as proposed by Donabedian, category 3 to the quality of processes, and category 4 to the quality of outcomes. This classification was successfully used to classify the outcome criteria of more than 1.500 evaluation studies [6].

In an indicator workshop at MIE 2011 [22], 96 statements on indicators were provided by eHealth experts. Almost half of them focused on the context and goals, indicating importance of phase 1-2 of the proposed methodology, half described possible eHealth impact indicators (phase 3), and 13 focused on data collection methods. The impact statements were initially classified into seven domains using two classifications, and then mapped against the four health IT evaluation categories presented above [9]. The four categories for IT evaluation criteria [8] appeared compatible with the EUnetHTA classification, providing a generic grouping for EUnetHTA domains as well as variables for specifying the intervention (EUnet HTA technology domain). The EUnetHTA classification provided detailed topics and issues especially for grouping impacts as well as suggestions for data collection methods.

3. Discussion

The suggested four-phase indicator methodology (with focus on goals/context/methods/data) seems to provide a transparent process to define context-sensitive eHealth indicators for measuring progress, identifying problems, setting development goals and supporting evidence-based change management on international, national and local level. The phases got support from experts in the MIE 2011 indicator workshop [9]. The methodology is also compatible with general guidelines for health IT evaluation practice as reflected in the GEP_HI guidelines [23], which emphasize definition of the goals (in the form of the audience and information needs) and the context (including the stakeholders) as basis of definition of suitable evaluation methods.

The four-phase methodology should still be validated with a systematic review of indicator methodologies. For phase three, literature reviews are needed as indicated by the modified Rand-method, to create a long list of indicators on different eHealth technologies for expert rating, and to further develop the indicator classification with rigorous content analysis of the existing integrating e.g. EU ICT indicator work (supply, use and impacts) [1].

Our preliminary results helped identify starting points to develop evidence base on a transparent indicator development methodology, methods for identifying and classifying eHealth indicators and on testing them in practice. Participatory development of the methodology will continue with all interested parties invited to collaborate in a public virtual workspace (www.issuccess.pbworks.com) and in conferences. First experiences on piloting the proposed methodology on Nordic eHealth adoption indicators will be collected during spring 2012 and reported to the eHealth community in due course.

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