

EBMeDS Quality Plan

Defining the concept of quality

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This document defines the concept of quality for the purposes of the EBMeDS Quality Plan.

Introduction

The notion of quality is in common use in today's society, but no precise and objective all-purpose definition seems to exist. Generally speaking, quality is perceived as a desirable trait, but when a more concrete definition is pursued, the diversity and value-dependence of the concept quickly become apparent.

When assessing the quality of an information system like EBMeDS, whose general purpose and specific objectives can be expressed with some degree of accuracy, the degree to which these goals are achieved becomes a natural yardstick for this purpose.

Objectives of the EBMeDS system and the concept of quality

One could attempt to express the general purpose of EBMeDS as follows:

The purpose of EBMeDS is to enable *available resources* to be used to produce a *maximum amount of added health-related quality of life* – both for individuals and entire populations – by providing context-sensitive medical knowledge to support decision making, or by otherwise making resource use more effective.

This includes e.g. the following more specific objectives:

- providing information on reliable and relevant medical research and treatment guidelines when they are likely to be needed in clinical decision-making
- enabling more efficient execution of workflow elements that are part of treating a patient (e.g. retrieval of information needed for medical certificates and forms, speeding up or enabling the use of computationally intensive tasks)
- alerting about potential dangers and mistakes
- harmonising various practices and processes within the health care system (e.g. to support local care chains)
- where possible, dissemination of safe and reliable context sensitive information directly to citizens seeking it
- avoiding unnecessary or erroneous reminders

The degree to which these objectives are accomplished can be used as a concept of quality for EBMeDS.

Context-dependence

It is worth to note that, *quality thus defined, is still highly context-dependent*: quality provided by a given set of functionalities will vary across different health care settings. The most obvious quality-modifying factors that come into play relate to the Health Care Organisation where EBMeDS is deployed; the clinicians who use it; and the patient population that they treat.

Dynamic quality

Due to the changing nature of medical knowledge and the organisation of care, achieved quality is not permanent. Because of this, it may be useful to use separate concepts of *static* and *dynamic* quality, where the latter is a measure of the ability of EBMeDS to uphold or improve on the former over time. Dynamic quality is determined essentially by *how much effort in relation to available resources is required to maintain the current level of quality*. The required workload, and thus dynamic quality, is affected by at least

- maintenance planning (e.g. systematic monitoring of changes in evidence)
- systematic collection and optimal utilisation of quality data (feedback, quality measures)
- flexibility and ease-of-use of the EBMeDS Framework

Good dynamic quality can also be seen as a sign of a good and well-functioning work environment, which may be beneficial in recruiting additional resources.

The quality of an individual script

Speaking of the quality of an individual script may be misleading, because EBMeDS in fact consists of several complementary functionalities that together determine its quality in an interrelated way. Script-ideas, however, are often submitted independently of each other, and therefore a concept of quality for individual scripts is also needed to guide script development. For such purposes, *script quality* can be thought of as *the increase in quality it produces for EBMeDS as a whole*, assuming other parts of EBMeDS remain unchanged. Even when working on a single script, however, one should consider whether it may be easier to produce added quality by harmonising existing scripts than by concentrating solely on a new one.

Factors affecting the quality of an individual script:

1. *Quality potential* of the script-idea, i.e. its (context-dependent!) potential to produce a health benefit assuming it could be implemented exactly as envisioned
2. *Implementability or technical quality potential* of the envisioned functionality, i.e. the extent to which technical limitations restrict the script-idea's quality potential
3. *Quality of implementation*, i.e. the extent to which misunderstandings, mistakes and other problems prevent the script from reaching its technical potential.
4. *Compatibility*, i.e. the extent to which the script's functionalities are complementary and consistent with other existing EBMeDS functionalities
5. *Dynamic quality* of the script (ease of maintenance, susceptibility to become obsolete with changes in medical knowledge, organisation of health care, or various components of EBMeDS)

Compatibility and dynamic quality could be considered to be included in the first three factors, but they have been listed separately to emphasise their importance.

1. Quality potential of the script-idea

The quality potential of the script-idea refers to the quality which would be achievable in ideal circumstances, if it was possible to implement the idea exactly as envisioned without limitations or boundary conditions. Quality potential is affected by:

- *strength of the evidence* behind the script's recommendations (can be assessed e.g. by GRADE-criteria)
- *efficacy* of the recommended interventions
- *actionability* of the information that can be delivered (i.e. how clear, unambiguous and easy to assess and apply any recommendations are)
- *status quo* regarding the targeted activities (e.g. to what extent does actual care differ from the suggested optimal care)
- *resources saved* for individual health professionals or the entire organisation

- *cost of addressing the objective* (additional resources used, adverse effects of the treatment)
- *compatibility and dynamic quality*

One way to conceptualise the quality potential is by the following equation (adapted from the HIMSS 2009 CDS guidebook, p. 42):

$$Q(c) = I_P N_P G + I_C N_C + I_O N_O - (C_D + C_E)$$

where $Q(c)$ stands for the quality potential in a certain context c , subscripts P , C and O stand for patient, clinician and organisation respectively; I stands for the unit impact of the script's suggested intervention; N for the number of affected entities; G for the gap between the suggested and actual treatment; C_D is the opportunity cost of developing and maintaining the script; and C_E the cost related to the actual execution of the script (e.g. resulting added resource use, adverse effects of suggested treatment, etc.).

It should be noted that a script idea usually targets - either explicitly or implicitly - a specific health care setting (or context). The quality potential of the script outside of this context is usually worse than originally envisioned, or even negative.

2. Implementability or technical quality potential

The operation of EBMeDS is completely dependent on structured data. Thus, the range of useful script-ideas that can be realistically implemented is limited by the coverage and quality of structured data that EBMeDS receives via the request message. The quality of the information is a decisive factor for how well a script can be matched to its optimal *context*, i.e. how well it can target those patients, professionals, parts of the health care organisation and other context factors where it is likely to be most useful. This ability of context targeting is important in determining the script's cost-to-benefit ratio and therefore its quality.

Availability and quality of structured data is affected by at least:

1. *ease of recording* structured data entries (depends on the EHR user interface)
2. *ease of use* of the classifications coding structured data (e.g. many ICD-10 codes are not well known and therefore not used, one example being codes for "soft" interventions like health education)
3. *local and individual recording habits* (e.g., data may be entered into the EHR with delays or incompletely due to time constraints, use of dictation, or old habits)
4. *resolution and coverage* of the coded classifications with respect to information that is essential for CDS functionalities (e.g. the ATC classification that is used for coding medications does not allow references to some specific combinations or administration routes)

In addition to data availability and quality considerations, the operating principles of EBMeDS itself impose certain limitations. EBMeDS obtains its data passively, i.e. it receives information and reacts to it, but it cannot at present actively request additional information from the user or the EHR. This could be a problem in some cases, as it has been necessary to restrict the amount of data passed to EBMeDS via the request message in order to limit the time it takes for EHRs to build the request message to acceptable levels.

3. Quality of implementation

The quality of an otherwise viable script may suffer e.g. due to misunderstandings concerning the desired functionality or complexity of programming. Even if the script functions according to plans, its dynamic quality - or maintainability - may suffer from complex and opaque code.