



# Quality indicators for diabetes prevention programs in health care targeted at people at high risk

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## Abstract

**Objective.** Type 2 diabetes can be efficiently prevented by lifestyle intervention provided for people at high diabetes risk. The aim of this paper was to conduct a literature search on existing quality indicators for type 2 diabetes prevention and to collate and present a set of indicators that could be applied in European countries with different health care systems and cultures.

**Methods.** Scientific and grey literature was searched for relevant studies using electronic databases. We also hand searched previous systematic reviews and reference lists of relevant articles.

**Results.** The only publication identified was the report presenting the results from the IMAGE project. The IMAGE indicators were used as the basis for the proposed indicators.

**Conclusions.** Publications on quality indicators of diabetes prevention programmes are scarce. The quality indicators presented here are a first step toward the definition of a core set of European indicators to monitor and improve the quality of diabetes prevention.

## Key words

- diabetes
- health care
- high risk
- prevention
- quality indicator

## INTRODUCTION

Diabetes is acknowledged by the World Health Organization to be one of the four major non-communicable diseases along with cardiovascular diseases, cancers, and respiratory diseases [1]. The need for actions and society-wide efforts to tackle the world-wide diabetes epidemic is well-recognized, and the role of prevention to contrast diabetes is stated “fundamental” [2].

Numerous clinical studies completed in different parts of the world and within differing ethnic populations and cultural frameworks have proven that type 2 diabetes is preventable. A lifestyle intervention aiming at relatively modest lifestyle changes provided to high-risk individuals has been shown to halve the risk of diabetes [3-5]. These efficacy trials have been followed by translational “real world” trials which have given further evidence about the effectiveness of diabetes prevention [6].

International Diabetes Federation (IDF) proposes opportunistic identification of undiagnosed type 2 diabetes by undertaking stepwise screening program including risk identification based on individual risk factors or a risk score, followed by diagnostic testing. Opportunistic screening to facilitate early identification of diabetes is recognized as part of good quality care of type 2 diabetes. IDF does not support non-targeted screening for unidentified diabetes, especially in low-resource settings [7].

In practice, screening to identify undiagnosed cases of diabetes inevitably leads also to identification of individuals at high diabetes risk but no diabetes (yet). We know that the development of diabetes via various stages of insulin resistance and hyperglycaemia into overt diabetes can take 10 years or longer. This “lag period” is an important window of opportunity for preventive ac-

tions. It offers the time to prevent or delay the development of diabetes among these individuals at risk by lifestyle modifications. Importantly, screening for impaired glucose tolerance followed by appropriate intervention has been suggested to be cost effective in a modelling study based on the results from published clinical trials and epidemiological studies [8] and in a recent systematic review on diabetes prevention interventions [9].

Therefore, interventions to prevent the development of diabetes in these high-risk individuals should be an integral part of a comprehensive diabetes plan and included in clinical guidelines for diabetes management. However, clinical guidelines have been shown to improve disease management only when introduced in the context of evaluation, and for that, quality indicators are needed.

Quality assurance should be an integral part of all prevention programmes. Quality indicators for diabetes care have been developed and published by several organizations in different countries [10]. However, publications on quality management of diabetes prevention programmes are rare. As a result, prevention strategies and programmes frequently lack comprehensive, systematic follow-up and monitoring.

The aim of this paper was to conduct a literature search on existing quality criteria and indicators for type 2 diabetes prevention and to collate and present a preliminary set of criteria that could be applied in European countries with different health care systems and cultures.

## METHODS

A review of the scientific literature and grey literature was performed to identify existing quality criteria and indicators for type 2 diabetes prevention. The following electronic databases were searched:

- Academic Search Elite;
- CINAHL;
- Web of Science Core Collection;
- MEDLINE (Ovid);
- The Joanna Briggs Institute EBP Database;
- Cochrane Database of Systematic Reviews;
- Database of Abstracts of Reviews of Effects;
- Cochrane Central Register of Controlled Trials;
- Health Technology Assessment;
- Applied Social Sciences Index and Abstracts (ASSIA);
- ProQuest Health Management;
- Social Services Abstracts;
- Worldwide Political Science Abstracts;
- Google;
- Google Scholar;
- NICE Evidence Search.

To identify potentially relevant quality criteria and indicators, a search strategy was developed in consultation with an information specialist. The literature search strategy included the terms “quality assurance”, “quality indicator”, “good practice”, “best practice”, “quality standard”, “quality management” combined with “diabetes” and “prevention” and covered the time from 2000 to February 2015. Only publications in English were included. The titles, abstracts (when available), and the web sources were scanned, in order to

identify relevant publications by two reviewers (JL and KW). We also hand searched reference lists of relevant articles and previous systematic reviews. Publications that presented specified quality indicators for type 2 diabetes programs completed in health care setting were considered eligible.

In addition, some generally acknowledged diabetes management guidelines, e.g. the NICE guidance [11] that includes detailed recommendations also about how diabetes prevention should be arranged and what should be the targets for e.g. lifestyle change were consulted for reference. The guidelines were reviewed in order to check whether any important points that should be considered when proposing the quality indicators had been omitted.

## RESULTS

Publications specifically presenting quality indicators for diabetes prevention proved to be scarce. The only publication identified was Pajunen *et al.* The “Quality and Outcome Indicators for Prevention of Type 2 Diabetes in Europe – IMAGE” [12]. These indicators had been developed by a group of specialist representing different professional groups from several European countries. Indicators were produced by the expert group in consensus meetings and further developed by combining evidence and expert opinion.

Indicators of IMAGE (Development and Implementation of a European Guideline and Training Standards for Diabetes Prevention) were developed along with the European evidence-based guideline for the prevention of type 2 diabetes [13] and the Toolkit for diabetes prevention [14]. Therefore, the IMAGE indicators are closely linked to the guideline standards and are intended to be used in conjunction with them. These products of the multidisciplinary consortium IMAGE were used as the starting point for the definition of the indicators in this project. This is a first step toward the definition of a core set of European indicators to improve the quality of diabetes prevention with different health care systems and cultures.

The suggested quality indicators for diabetes prevention are presented in *Table 1*. As in the original IMAGE publication, the indicators are arranged according to operational level and categorized as structure/process and outcome indicators, as suggested by Donabedian [15]. The structure indicators relate to material and human resources, as well as organizational structure. The process indicators describe how activities are undertaken to implement prevention. The outcome indicators are related to the actual clinical results of the preventive interventions. These classifications help the user to perceive that good quality is a multifaceted phenomenon and that there are different level operators that have differing responsibilities, and good practices in all levels are needed for good overall outcome.

The role of the “macro” level (national-level decision makers) is to generate the prerequisites for diabetes prevention. Five of the 10 macro-level indicators proposed by IMAGE are included also in the present set of indicators even though they are not under the control of health care operators (such as “Prevalence of dia-



**Table 1**  
Quality indicators for diabetes prevention programmes and activities

Type	Description
<b>Macro level</b>	
Structure/Process	In activities of diabetes prevention, ethnic minorities and low socio-economic groups are considered
Outcome	Prevalence of diabetes in the population
Outcome	Percentage of the population physically inactive
Outcome	Prevalence of overweight, obesity and abdominal obesity in population
Outcome	Percentage of population following national recommendations on nutrition
<b>Meso level</b>	
Structure/Process	Screening protocols to identify high-risk persons have been evaluated at national level
Structure/Process	Validated diabetes risk assessment tools are available to health care providers
Structure/Process	Information technology systems supporting the implementation of screening are available at health care provider level
Outcome	Proportion of the population screened (by health care provider) per year
Outcome	The percentage of identified high-risk individuals remitted to diagnostic procedures
Outcome	The percentage of identified high-risk individuals remitted to lifestyle interventions
Structure/Process	High-risk prevention strategies are included in the education of the health care professionals
Structure/Process	Defined clinical pathways exist for the health care provider to deal with individuals at risk for diabetes
Structure/Process	Multidisciplinary approach for interventions is supported by the health care provider
Structure/Process	Health care providers are collaborating with other players in health promotion
Structure/Process	Medical record system supports interventions for chronic disease prevention
Outcome	The percentage of remitted high-risk individuals participating in lifestyle interventions
Outcome	Proportion of individuals dropping out of interventions
Outcome	Proportion of high-risk individuals in interventions achieving clinically significant changes in risk factors at 1 year follow-up
Outcome	Diabetes incidence rate among high-risk individuals in interventions at health care provider
<b>Micro level</b>	
Structure/Process	Individual's risk factor profile is assessed
Structure/Process	Individual's motivation for behavioural changes is discussed
Structure/Process	Structure and content of the interventions have been defined at individual level
Structure/Process	Individualized targets for interventions have been established
Structure/Process	Plan for follow-up is defined
Outcome	Proportion of planned intervention visits completed over 1 year
Outcome	Weight change over 1 year
Outcome	Change in waist circumference over 1 year
Outcome	Change in glucose over 1 year
Outcome	Change in the quality of nutrition over 1 year
Outcome	Change in physical activity over 1 year

betes in the population” or “Prevalence of overweight, obesity and abdominal obesity in population”). The reason for the inclusion is that they are vital information for example to estimate personnel needs and to direct resources where they are most needed. The responsibility of the “meso” level (primary health care level) is the organization of the activities on diabetes prevention in municipalities, health districts, health care centers, occupational care, private sector, local level non-governmental organizations. Altogether 15 of the 19 meso-level indicators from IMAGE were included. The

indicators are frequently interconnected, for example “Validated diabetes risk assessment tools are available to health care providers” is a prerequisite for “Proportion of the population screened (by health care provider) per year”. The responsibility of the “micro” level (individual-level prevention work) is the conduct of actual preventive work in different sectors (public, private and occupational health). For example, the assessment of individual’s risk factor profile is a prerequisite for successful intervention, as well as the definition of the structure and content of the interventions. In addition,

plans for individual follow-up have to be defined before their achievement can be recorded. All 11 indicators were included also in the current set of criteria.

## DISCUSSION

Evidence-based clinical guidelines are important in order to harmonize practices in health care, but their existence does not necessarily lead to good quality care. Intuitively, quality indicators can be deduced from clinical guidelines. However, clinical guidelines have been shown to improve disease management only when introduced in the context of evaluation [16]. As presented in a recent systematic review and meta-analysis by Dunkley, *et al.*, prevention of type 2 diabetes is effective also in the “real world”. Furthermore, they showed that adherence to the IMAGE guideline recommendations indeed is associated with the effectiveness of the diabetes prevention interventions [6].

Our literature review showed that there are not many published quality indicators specifically focusing on type 2 diabetes prevention. It is possible that our literature search protocol failed to identify relevant publications. For example, we had to limit our search to include only indicators published in English language. However, more likely is that as diabetes prevention especially in real-life health care setting is a relatively young research field, there simply are no published quality indicators. We decided to focus on published indicators as it is recommended that whenever possible, existing indicators should be reviewed, adapted, and tested rather than going through the whole process of creating new indicators [17, 18]. Also, we chose not to present absolute standards or cut-off values for indicators, as these needs to be decided according to local contexts and circumstances. IMAGE project revealed challenges to assign the target values for indicators because of lack of data on the general population [12].

The indicators are not meant to give definitive answers but provide tools to achieving better understand-

ing of the system and to alert about possible areas of improvement. It should also be noted that even good indicators cannot capture all domains of quality and especially the qualitative and subjective elements need to be explored by other methods.

The quality indicators presented here are a first step toward the definition of a core set of European indicators to monitor, evaluate, and improve the quality of diabetes prevention. The quality indicators were developed for different prevention strategies: population-level prevention strategies, screening for high risk and high-risk prevention strategies. They may constitute a tool for decision makers, health care providers and health care personnel to assure the minimum level of quality assurance recommended for diabetes prevention programmes. The adoption of an agreed core set of quality indicators might help to decrease inequalities in health and to improve diabetes prevention within and between European countries.

## Authors contribution

JL and KW acquired the data and drafted the manuscript. MM, AI, SK, UR, MS, and JZ reviewed the manuscript critically and approved the final version.

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## Conflict of interest statement

None.

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