## **POLICY PERSPECTIVE**

# IMAGE guidelines: potential impact for diabetes primary preventive care in the EU



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**Practice Points** 

- Diabetes risk is often hidden if we expect the patient to be healthy.
- Visceral obesity together with inactivity is the driving force behind increased diabetes risk.
- Self-assessment risk scores to identify diabetes risk are easy to handle in clinical practice.
- The Finish Diabetes Risk Score (FINDRISK) is the most practical and best evaluated risk score available globally to evaluate diabetes risk.
- The Implementation of A European Guideline and Training Standards for Diabetes Prevention (IMAGE) Toolkit provides practice guidance regarding how to identify and how to intervene in those people's lives who have an increased diabetes risk.
- Behavior modification, such as increasing physical activity and changing nutritional habits to consume less fat, is a successful strategy to prevent Type 2 diabetes. Quality management in diabetes prevention can be based on monitoring blood pressure and waist circumference twice a year.
- The IMAGE project provides practice guidance of how to prevent Type 2 diabetes in practice.

**SUMMARY** The Implementation of A European Guideline and Training Standards for Diabetes Prevention (IMAGE) guidelines are structured standards for diabetes prevention. The IMAGE Toolkit, which is based on these standards, gives useful recommendations for preventive care programs. In brief, based on systematic reviewing of the evidence, the guidelines recommend that case-finding should follow a step-wise procedure using risk questionnaires and oral glucose tolerance testing. Interventions supporting lifestyle changes should be supported by intersectoral strategies that create health-promoting environments. In order to implement the guidelines and to advance international correspondence, a web-based network known as 'who is active in prevention' was established, which facilitates the exchange of knowledge and experience in the field of prevention.

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#### Urgent need for intervention

Today, the world is faced with a growing epidemic of diabetes that affects 285 million people. By 2030, according to the fourth edition of the International Diabetes Federation (IDF) Diabetes Atlas, the number of people with diabetes will have risen to 438 million, and if those people with the metabolic syndrome (or prediabetes) were included in this statistic, these figures would be more than doubled [101]. The statistics regarding the growing number of children and adolescents developing Type 2 diabetes (T2D) are also of great concern.

Clinical studies have proven that lifestyle interventions can halt, or at least delay, the onset of T2D and evaluations of interventions in a practical setting have supported this fact. Unfortunately, a high number of diabetes cases have not yet been diagnosed or are diagnosed too late. Furthermore, late diagnosis leads to a high number of complications, which is why the costs of diabetes are enormous for the healthcare system and society. This is why we must get active regarding prevention before these problems emerge. The keys to prevention are changes in lifestyle: for example, weight reduction (if the participant is overweight), increased physical activity and dietary modifications in order to increase dietary fiber and to reduce total and saturated fat intake.

However, prevention cannot be managed individually. Effective diabetes prevention for individuals needs to be embedded in a supportive social environment. Therefore, all societal partners should aim to create a less obesogenic/diabetogenic environment to facilitate lifestyle changes and sustainability of these changes. In order to assist patients at risk in a more structuralized way, guidelines for preventive programs have been formulated by the Implementation of A European Guideline and Training Standards for Diabetes Prevention (IMAGE) group in form of the IMAGE Toolkit.

The IMAGE Toolkit for diabetes prevention provides practical information for anyone involved in healthcare, and prevention activities for adults at risk of developing diabetes. This includes those working in primary and specialized healthcare services, physicians, physical activity experts, dieticians, nurses and also others planning, or who are already involved in, diabetes prevention interventions (e.g., teachers and business partners). The IMAGE Toolkit also contains useful information for local and national politicians and health policymakers who are interested in creating an environment that facilitates healthy aging, and discusses the implementation of the WHO recommendation that 'we must make the healthy choice the easy choice' [1].

# Excursus: significant steps towards diabetes prevention in Europe

The oral glucose tolerance test is the gold standard in diabetes screening. However, the test is invasive and also quite time- and cost-intensive. Therefore, questionnaire-based screening methods appear to be a less demanding and more accessible way of risk assessment. Using the population-based data of diabetes risk factors, Finnish researchers, for example, were able to create the FINDRISK diabetes risk score, an eight-item questionnaire that has now been validated in several countries and allows simplified screening of large numbers of individuals [2–4].

In 2001, the Finnish Diabetes Prevention Study and, in 2002, the US Diabetes Prevention Program as well as the Da Qing IGT and Diabetes Study [5-7] demonstrated that lifestyle modifications that are focused on weight loss, increased physical activity and improved diet could reduce the risk of progression to diabetes by nearly 60% [8-10]. There is also a strong dose-response effect for those who adopted four or five lifestyle changes and the progression rate after 7 years was reduced by 80% compared with individuals who made no changes [11]. The cost-effectiveness of diabetes prevention through both lifestyle change and (to a lesser extent) pharmaceutical intervention has also been well demonstrated [12].

The next stages were nationwide or regional diabetes prevention programs that translated the research findings to the real-life healthcare settings. Finland has led the way with FIN-D2D, a large-scale implementation covering a quarter of the Finnish population [13]. Another landmark was a profusion of published implementation trials including GOAL and the Saxon Diabetes Prevention Program in Europe [14], the Greater Green Triangle Diabetes Prevention Program in Australia, and programs in Indianapolis, Pittsburgh and Montana in the USA [15,16]. A great challenge will be the scaling up from these implementation trials to sizeable regional and national programs. This will require health service professionals and health economists who are able to work with policymakers.

Political support is indeed needed and this requires the development of a national or international action plan for diabetes prevention, which needs involvement of a number of stakeholders on a governmental and nongovernmental level, as well as scientific and practical input. Furthermore, practical guidance is needed and this includes presentation of the evidence in the field for diabetes prevention on the scientific and also practical level, as well as the training of people to deliver preventive interventions. The two European-funded projects Diabetes in Europe - Prevention Using Lifestyle, Physical Activity and Nutritional Intervention (DE-PLAN) [17] and IMAGE [18] have been addressing the implementation process, and the IMAGE project in particular was able to take a step ahead and to collate this information in a systematic manner. These projects include evidence-based guidelines on T2D prevention [19], a toolkit for prevention [20] and a paper on quality indicators in T2D prevention [21]. Furthermore, IMAGE developed a curriculum for the training of prevention managers. This training includes a 7-day curriculum for educators to become qualified and learn the necessary skills to deliver preventive interventions.

The IMAGE Toolkit 'take action to prevent diabetes': a toolkit for the prevention of T2D in Europe

The IMAGE Toolkit for the prevention of diabetes is one of the products developed by the European study group of the IMAGE project (Figure 1). It is based on the IMAGE evidence-based guidelines and the IMAGE training curriculum. For more information, see the IMAGE website [102]. The Toolkit refers to the latest evidence in the science of diabetes prevention and allows translation of this knowledge into practice. It contains practical examples and worksheets, which facilitate the implementation of a prevention program and can be taken directly from the Toolkit. The Toolkit aims to provide a good balance between clear, accurate information and practical guidance. Some important guidelines taken from the IMAGE Toolkit are summarized below.

How to budget & finance a prevention program

To finance a prevention program, one should make a realistic budget. This section in the Toolkit provides a good summary of which aspects should be taken into account. The Toolkit addresses diverse cost aspects, for example, salaries, administration, materials, travel costs and possible sources of income (please also see **Box 1**), which are important when considering implementation of prevention programs. The costs vary substantially between the individual countries and depend on the setting, mode and the intensity of the offered intervention. This chapter also contains a checklist on 'How to start', which comprises useful stepping stones for the preparatory phase, a project description and information regarding planning, recruiting project team



**Figure 1. Diabetes Prevention Toolkit.** Reproduced with permission from [103].

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#### Box 1. Budget calculation of program costs of the IMAGE Toolkit.

Administrative costs:

- Rental fee for use of office, meeting rooms, and so on
- Project management (e.g., clerical and/or accountant)
- Recruitment of participants
- Information, advertising, written presentations and Internet access
- Overhead costs
- Salary costs:
- Project coordinator
- Personnel at test stations
- Prevention managers multidisciplinary team (full-/part-time)
- Interpreters
- Overhead costs
- Travel and subsistence:
- Meetings (e.g., program management, networking and education)
- Travel and transport for project workers
- Costs for risk assessment:
- Premises and equipment for testing (e.g., blood test, analyses and questionnaires)
   Costs for the intervention program:
- Premises and equipment for testing (e.g., blood tests and analyses)
- Premises and equipment for the different interventions
- Office equipment (from computers to pencils)
- Telephones and communication tools
- Quality management

Possible sources of income:

- Alternative public funding
- Health insurances
- Contributions from collaborating partners
- Private funding and legacies
- Contributions from participants in seminars
- Other incomes

IMAGE: Implementation of A European Guideline and Training Standards for Diabetes Prevention.

members, recruiting participants and the practical project work. Furthermore, this chapter contains a spreadsheet for the budget calculation of program costs (**Box 1**).

#### How to identify people at risk

Diabetes risk factors are divided into modifiable (e.g., a lack of physical activity and an unhealthy diet), nonmodifiable, (e.g., age and family history of diabetes) and environmental (e.g., environment promoting inactivity and an unhealthy diet) risk factors. An overview of appropriate screening tools and an example of a diabetes risk questionnaire, the Finnish FINDRISC, serve as practical elements in this chapter [3]. In addition, this chapter briefly describes the challenges of working with special consideration groups (e.g., ethic minorities/immigrants and individuals on a low income). Both groups often face an increased risk for diabetes.

#### How to change behavior

The chapter on how to change behavior describes elements of an effective lifestyle intervention program and is the core of the Toolkit. A process model for supporting lifestyle behavior change is presented and described in phases (e.g., initiating motivation, taking action and maintaining motivation) [22]. Ultimately, the responsibility for behavioral change lies with the individual; however, it is the concern of the healthcare providers to support this endeavour. The focus of the intervention is on empowering the individual. It should always be the individual's choice to change their behavior. The amount of support individuals need depends strongly on the participants themselves and the Toolkit describes further how to realize effective communication.

#### Physical activity

Physical activity is a key factor in diabetes prevention. The Toolkit describes why it is necessary to increase physical exercise and gives recommendations on how to encourage clients to advance their physical activity. The frequency, intensity, time, type (F.I.T.T.) principle illustrates how to reach training benefits through a combination of endurance and strength training (Table 1).

The F.I.T.T. recommendations are general guidelines for individuals of moderate fitness levels and are based on 'optimal figures'. However, sometimes the targets may not be reached by everyone in the target group. Pedometers or movement meters might help to stimulate and encourage physical activity. Hence, on an organizational level, it may also be necessary to break down the recommendations into gradual steps in order to avoid physical and mental overload.

#### Diet

A balanced, nutritious, enjoyable diet is essential for health. This section describes the goals for food intake, for example, consuming fruit, vegetables and legumes in abundance and limiting sugar, and goals for long-term nutrient intake. Sustained weight loss of 5% or more in overweight individuals as well as dietary fiber intake of up to 25–35 g/day and a total fat intake of 25–35% of the daily energy consumption lowers diabetes risk substantially (**Box 2**). Modification of the diet towards a healthier composition further reduces the risk and also improves risk factors for cardiovascular diseases.

Table 1. The F.I.T.T. recommendations: general guidelines for individuals of moderate fitness.		
F.I.T.T. principle	Aerobic endurance training	Resistance training
Frequency: how often?	Three-times per week (minimum) Maximum 2 days gap between training sessions	Two- to three-times per week
Intensity: how hard?	Light to moderate: - e.g., brisk walking - 5-6 km/h - 40-60% VO <sub>2max</sub> /50-70% HR <sub>max</sub> - Slightly increased breathing rate Vigorous: - e.g., jogging - 8-10 km/h - Increased breathing rate and sweating	Light to moderate (slight muscular fatigue)
Time: how long?	Light to moderate: 45–60 min (in total >150 min/week) Vigorous: 30–40 min (in total >90 min/week)	One to three sets of eight to 15 repetitions for each exercise
Type: what kind?	Walking, jogging, cycling, swimming, hiking and skiing	Approximately eight different strength exercises using the major muscles of the body (e.g., with fitness machines, resistance bands or just with your own bodyweight)
F.I.I.I.: Frequency, Intensity, time, type; HK: Heart rate.		

The plate model visualizes the portions of fruit and vegetables versus rice, pasta and potatoes versus fish, meat, eggs, legumes and nuts. This model underlines that approximately 50% of the daily food intake should be based on fruit and vegetables. The EAT CLEVER principle provides brief practical advice for counselors regarding what to consider when talking about dietary guidance (Box 3).

Other behaviors to consider in diabetes prevention are smoking, stress/depression and sleeping patterns. An example behavior-change session plan is explained as a practical illustration. In addition, an action plan worksheet (how to reach and maintain goals), a physical activity diary ('when did I exercise and for how long?') and a food diary ('when and what did I eat and drink?') are introduced.

#### Box 2. Nutrition and dietary guidance for sustained diabetes prevention.

Goals for food intake:

- Consume fruit, vegetables and legumes in abundance (≥500 g or five portions per day)
- Choose whole grain in all cereal products
- Limit sugar to ≤50 g/day, including sugar in food and beverages
- Consume vegetable oil and/or soft margarines and/or nuts as the primary source of fat
- Limit butter, other saturated fat and partially hydrogenated fats
- Choose low-fat milk and meat products
- Consume fish regularly (≥twice per week)
- Consume alcoholic beverages in moderation (≤two drinks/day for men and ≤one drink/day for women) if at all
- Other goals according to individual needs (e.g., bodyweight, diseases, medications and age)
- Goals for long-term nutrient intake:
- Energy intake balanced with physical activity levels to achieve or maintain a healthy bodyweight
- Total fat 25–35 E%<sup>+</sup> (60–80 g/day with 2000 kcal daily intake level), of which saturated or trans fat are ≤10 E%
- Dietary fiber 25–35 g/day
- Salt (NaCl) ≤6 g/day
- Alcohol ≤5 E%<sup>†</sup>

E% = Proportion of total energy.



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#### Box 3. The EAT CLEVER principle.

Estimation of the dietary pattern compared with the recommendations:

- Use the food diary or interview to help your client to become aware of his/her dietary pattern and food consumption. Compare dietary intake to the recommendations. Consider special needs, resources and readiness to change food habits
- Aims in the long and short term:
- Discuss both short- and long-term goals: what is your client willing and able to do at the moment? Help to set practical, achievable targets
  and proceed with small steps. Make a plan with your client
- Tools, guidance and support:
- Which kind of tools, guidance, support or skills are needed and available? Involving the family and friends and group counseling are all worth considering

Composition of the diet:

- A diet with high sugar and other refined carbohydrates and low fiber content, or a high saturated and trans fat content may increase the risk for diabetes and other related disorders. Whole grains and moderate amounts of coffee and alcohol may decrease the risk. Encourage the use of herbs and spices to reduce salt. Refer to your national nutrition recommendations but consider the special requirements of people with a high diabetes risk, such as improvement of the components of the metabolic syndrome. Take into account any additional diseases your client may have
- Lifestyle for the whole life:
- Diet is influenced by culture, religion, ethical, physiological, psychological, social and economical aspects, availability, and individual likes and dislikes. Help your client to find his/her own healthy way of life. Lifestyle change is a process and relapses are part of it. Help your client to learn from these experiences to develop successful strategies over time

#### Energy:

- Excessive energy intake causes weight gain. If the client is overweight, make a plan with him/her to support gradual weight loss (step-by-step). Focus on substituting foods with high saturated fat and/or refined carbohydrate content with lower-energy items. How many meals, snacks and beverages (alcohol included) does he/she have during a day and night? Some regularity in the daily meal plan helps to control over-eating
- Variety:
- Emphasize variety instead of restriction. A health-promoting diet provides satiety and pleasure as well as protective nutrients. Encourage clients to try new foods. Give advice on how to read food labels. This can help your client to feel more confident and expand their healthy food choices
- Evaluation:

Evaluation and self-monitoring help in achieving and maintaining new food habits. Bodyweight and/or waist circumference should be measured regularly. Encourage your client to use a food diary or some other methods to monitor eating habits, such as the number of meals and snacks, the amounts of certain food stuffs, such as vegetables, whole grains, sugar, alcoholic beverages, vegetable oil and/or fat and so on

- **R**isks management:
- Dietary guidance must be based on evidence from nutrition and behavioral sciences. Focus on the big picture; changing one aspect in the diet affects many others. Strict restrictions and 'crash dieting' may lead to an unhealthy diet and can cause damage in the long term as well as psychological and social harm. A multidisciplinary team, including a registered dietician and a psychologist, can provide essential support to avoid these risks

The EAT CLEVER principle provides brief practical advice for counselors to be applied within the framework of national dietary recommendations. The bold letters highlight the EAT CLEVER acronym.

#### **Evaluation**

The Toolkit finishes with an overview on how to evaluate intervention programs and how to establish quality assurance. Core and additional items that need to be collected to evaluate the quality of the program are described.

# IMAGE implementation: the network 'who is active in diabetes prevention'

As outlined before, the number of T2D patients is likely to increase during the forthcoming years, but with the implementation of the aforementioned recommendations, it is anticipated that the increase of the T2D epidemic will eventually be controlled and the burden of diabetes will be gradually diminished [23]. These recommendations should now be adopted in various national and other international guidelines. Although these recommendations are targeting the European populations, it is apparent that many of them are also valid for other parts of the world, at least if certain modifications are made. However, sufficient implementation of preventive initiatives requires a multiprofessional and multidisciplinary cooperation across the sectors in care and this is only achievable in network structures. One of the most current new initiatives is therefore the development of an international network 'who is active in diabetes prevention' (Figure 2). The aim of this network is that all people who are interested in the prevention of diabetes and those who want to start being active in the field come together in one professional network. The network is meant to enable the users to exchange knowledge and recent intervention materials as well as standards in education. The network is also thought of as a platform to exchange scientific information such as recent scientific articles or up to date study information. Furthermore, it is an ideal platform to share information regarding the training and work of prevention managers. The entire network will be developed as a tool to initiate correspondence between research groups and everyone who is interested in diabetes prevention as well those who are active in practice.

We believe that an international exchange of ideas will significantly help to develop a better prevention program and to avoid barriers and mistakes. In the last months, more than 3000 people worldwide from over 130 countries have registered. Many network members come from low- and middle-income countries. This is a very hopeful sign, because, unfortunately, diabetes prevention is still not at the top of the agenda in these countries. In the past, the network was able to distribute information regarding more than 60 prevention programs worldwide and this won the network an international research award. In the future, the network can build the basis for an international organization for the prevention of diabetes. Therefore, we would like to invite you to become one of the new members of the international network 'who is active in diabetes prevention' [103].



#### **Figure 2. Network: who is active in diabetes prevention.** Reproduced with permission from [103].

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#### **Future perspective**

Over the next 5–10 years, prevention of diabetes will be the major challenge in diabetes management owing to increasing prevalence and increasing cost pressure in the management of the disease. Therefore, preventive activities that are successful in practice will generate fast growing interest. The proof of concept will be the practicality in and the implementation into clinical practice. Therefore, a guideline for the prevention of T2D in practice, as presented in this article, is a major milestone in addressing this future challenge. Another aspect will be the quality management. Funders and payers of healthcare services or preventive activities will increasingly ask in the future for information regarding what they are paying for. Therefore, we are asked to express and present the outcome quality of diabetes management and preventive activities. We hope that in the future, disease management can be more multisectorial, individualized and patientcentered. The prevention of T2D in practice following the Toolkit recommendations, combined with practice-based quality management, has the potential to reach this goal.

#### Financial & competing interests disclosure

The author has no relevant affiliations or financial involvement with any organization or entity with a financial interest in or financial conflict with the subject matter or materials discussed in the manuscript. This includes employment, consultancies, honoraria, stock ownership or options, expert testimony, grants or patents received or pending, or royalties.

No writing assistance was utilized in the production of this manuscript.

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- The Implementation of A European -Guideline and Training Standards for Diabetes Prevention (IMAGE) Toolkit is the practice guideline for diabetes prevention. In this article, which is also available as a booklet, you will find every step in clinical practice, and how to manage diabetes prevention for those with increased risk is practically described and easy to understand. The Toolkit also includes the management of barriers and challenges and difficulties in the intervention process. Therefore, the IMAGE Toolkit is the state-of-the-art guideline for the prevention of Type 2 diabetes in practice.
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- Describes how you can measure your intervention effect to prevent Type 2 diabetes. The article also describes the relevant indicators, how to measure them and how to evaluate an intervention effect based on those indicators. It is the first time that this information and evidence has been put together and, therefore, the article can be called a landmark in its field.
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