

Patient Education in Managing Diabetes

A Systematic Review

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Summary and Conclusions of the SBU Report:

Patient Education in Managing Diabetes

A Systematic Review

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Educating patients in self-care plays a key role in diabetes treatment and is routinely included in the care of people with diabetes. Patient education can be provided individually or in groups and addresses patients' rights and ability to influence and participate in their own care and treatment. This report summarises the scientific evidence for individual- and group-based patient education programmes and psychological interventions involving supportive programmes based on cognitive behavioural therapy (CBT) and motivational interviewing methods (MI, AMI, MET)¹. In this report, when we refer to motivational interviewing or MI methodology, we include one or more of the following three types: MI, AMI and/or MET. These methods are compared with usual care, ie, the prevailing practice at the care unit in question.

Within the framework of the Swedish National Board of Health and Welfare's work on national guidelines for diabetes care, SBU was commissioned to provide systematic literature reviews in several important areas. This literature review addresses patient education for people with diabetes. Other SBU reports address intensive glucose-lowering therapy in diabetes, systematic self-monitoring of blood glucose in noninsulin-treated diabetes, and dietary treatment of diabetes.

Conclusions

- The most important measure for long-term control of mean blood glucose is HbA_{1c}, which is also strongly linked to the prevalence of long-term complications. Group education programs for people with type 2 diabetes, led by people with expertise in the subject matter who are well versed in the educational methods of the programme, can substantially

¹ Motivational interviewing (MI); adaptations of motivational interviewing (AMI); motivational enhancement therapy (MET).

reduce HbA_{1c} after 1 to 2 years. Individual education for people with type 2 diabetes yields a small reduction in HbA_{1c} after 1 year. In estimating socioeconomic costs, SBU found that group education costs more than individual education due to more educational sessions over longer periods and the resulting differences in time and travel costs for participants. However, the costs are low in relation to the effect that group education has on HbA_{1c}.

- ❑ The scientific literature reveals no differences in effects on HbA_{1c} between usual care and motivational interviewing methods (MI, AMI, and MET) in monitoring people with diabetes up to 1 year.
- ❑ It is essential to study the effects on HbA_{1c} and quality of life from both individual- and group-based education in patients with type 1 diabetes.
- ❑ Controlled trials are needed to study the effects on HbA_{1c} and quality of life resulting from behavioural-oriented patient education through support programmes based on cognitive behavioural therapy (CBT) and motivational interviewing methods.

Fact Box 1 HbA_{1c}

HbA_{1c} molecules are formed when glucose (sugar) binds with hemoglobin (the red pigment in blood cells).

Depending on the blood glucose level, varying amounts of HbA_{1c} form during the lifetime of red blood cells (120 days), thereby reflecting the average blood glucose level.

HbA_{1c} shows, with good precision, glucose control during the past 4 to 6 weeks.

HbA_{1c} is the most important indicator of long-term average glucose control, which is measured at each clinical visit for diabetes.

HbA_{1c} is expressed as a percentage of total hemoglobin in blood. The normal range has an upper boundary of 5.0%.

A change of one percentage point in HbA_{1c} corresponds to 1.6 mmol/L change in mean blood glucose.

A persistently high HbA_{1c} level is closely associated with the development of complications in diabetes and is generally accepted as a surrogate measure.

SBU's Summary

Background and Purpose

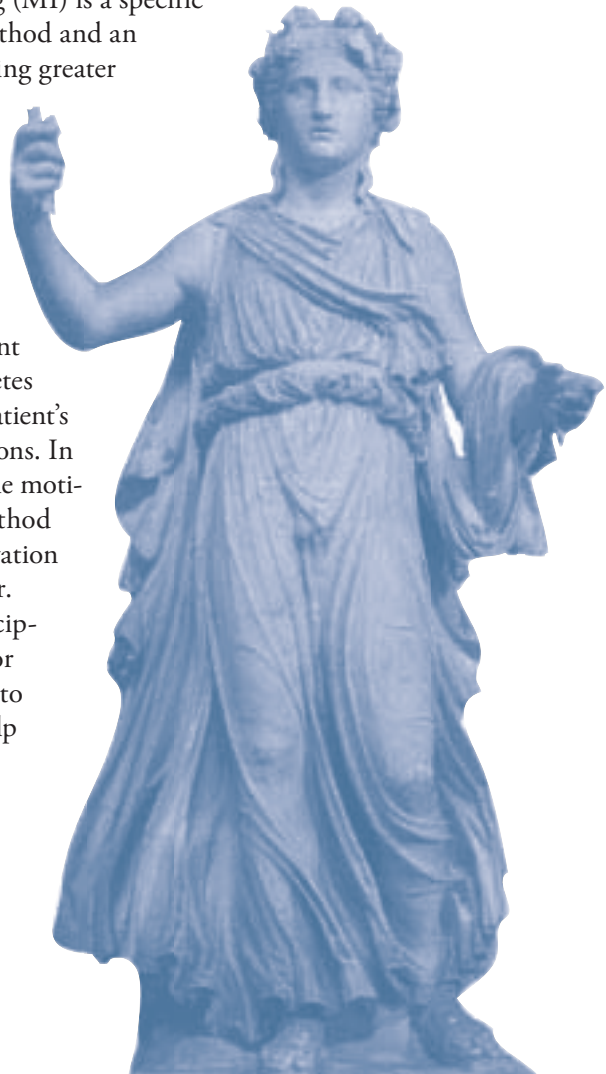
The prevalence of diabetes in Sweden is approximately 4%. The most common types of diabetes are type 1 diabetes and type 2 diabetes respectively. In type 1 diabetes, the body's insulin production is partially or totally impaired. The insulin-producing cells in the pancreas are destroyed, eventually leading to total pancreatic insulin deficiency. This deficiency requires life-long insulin treatment.

In type 2 diabetes the sensitivity to insulin, eg, in muscle and fat cells, is reduced (insulin resistance), leading to an increased need for insulin. With time, one's own insulin production is insufficient to meet the body's need, and diabetes develops. Genetic predisposition, combined with overweight and inadequate physical activity, appears to pave the way for this disease. Type 2 diabetes comprises 80 to 90% of all diabetes. Treatment is based on reducing insulin resistance. The patient must balance diet, exercise, and diabetes medication to achieve an optimum blood glucose level. Both high and low blood glucose levels must be avoided to avoid the complications of diabetes, eg, retinal damage, renal failure, loss of sensation in the extremities, and cardiovascular disease. A prerequisite for success is that the patient has adequate knowledge to make goal-oriented decisions in their self-care programme. Hence, patient education is necessary to maintain good self-care.

Patient education can be provided individually or in groups, and it aims at enhancing the patients' opportunities to influence and participate in their own care and treatment.

Cognitive behavioural therapy (CBT) is a type of psychological therapy used to treat depression, anxiety syndrome, panic syndrome, social phobias, and also overweight and obesity. The method is grounded in theory building within psychology of learning, cognitive psychology, and social psychology.

Motivational interviewing (MI) is a specific type of conversational method and an approach aimed at achieving greater motivation for behavioural change. It is important to distinguish MI from the counselling that is a prerequisite for patient-centred care in diabetes. Such counselling is an important aspect of traditional diabetes care and starts with the patient's specific needs and conditions. In contrast to counselling, the motivational interviewing method focuses on patients' motivation to change their behaviour. MI is based on four principles: to express empathy for the patient's perspective; to develop discrepancy to help



the patient appreciate the value of change; to support self-efficacy to strengthen the patient's ability to change; and to reduce the patient's resistance to change.

Motivational interviewing may include brief, individual discussions to achieve behavioural change. The method can also be combined with other interventions, ie, adaptations of motivational interviewing (AMI). Motivational interviewing combined with individual feedback is referred to in the literature as motivational enhancement therapy (MET).

By systematically reviewing the literature, this report aims to describe the current state of knowledge regarding patient education. The report addresses four different types of patient education: individual patient education, group-based patient education, supportive programmes based on cognitive behavioural therapy (CBT), and motivational interviewing (MI, AMI, and MET).

Limitations

The project has been limited to patient education and psychological interventions involving supportive programmes based on cognitive behavioural therapy (CBT) and motivational interviewing (MI) in type 1 and type 2 diabetes. CBT and motivational interviewing methods (MI, AMI, and MET) were selected for study because of the growing interest in these methods within diabetes care in Sweden. Lifestyle interventions without educational components were not included since this assessment focuses on describing the effects of education on HbA_{1c} and quality of life.

Questions

- Do individual and group-based educational programmes have favourable effects on HbA_{1c} and quality of life after 6 months and after 1 to 2 years respectively?
- Does the competence of the person who leads the educational programme influence the effects on HbA_{1c}?
- Are individual- and group-based educational programmes cost effective?
- Does behavioural-oriented patient education (support programmes based on CBT) lead to improving HbA_{1c} values and quality of life in comparison to standard practice?
- Do motivational interviewing methods (MI, AMI, and MET) have better effects on HbA_{1c} and quality of life than standard practice does?

Methods

SBU uses thorough and systematic methodology to search bibliographic databases for relevant literature on the issue being studied. Included studies are assessed individually for quality, and specially designed methodology is used to summarise key information in table format. Findings are graded to reflect the strength of the evidence, and the assessment aims to cover medical, economic, social, and ethical perspectives.

Fact Box 2 Study Quality and Strength of Evidence.

Study quality refers to the scientific quality of an individual study and its ability to provide a valid answer to a specific question.

Strength of the evidence refers to a judgment of the total strength of all scientific evidence and its ability to provide a valid answer to a specific question. SBU uses GRADE, an international grading system for the body of evidence. Study design is a key element in the overall judgment of each outcome measure. Other factors that can weaken or strengthen the power of the evidence are: risk of bias, inconsistency of results, indirectness of evidence, data precision, risk of publication bias, and other aspects, eg, effect size and the dose-response relationship.

Grading the strength of the evidence – four levels:

Strong scientific evidence (⊕⊕⊕⊕) is equivalent to high quality of the body of evidence according to GRADE.

Moderately strong scientific evidence (⊕⊕⊕○) is equivalent to moderate quality of the body of evidence according to GRADE.

Limited scientific evidence (⊕⊕○○) is equivalent to low quality of the body of evidence according to GRADE.

Insufficient scientific evidence (⊕○○○) is equivalent to very low quality of the body of evidence according to GRADE.

The stronger the evidence, the less likely it is that the results presented will be affected by new research findings within the foreseeable future.

Conclusions

SBU's conclusions represent our overall judgment of benefits, risks, and cost effectiveness.

Results

Patient Education

Individual Educational Programmes for People with Type 1 Diabetes

As scientific evidence is lacking about individual educational programmes for people with type 1 diabetes, no conclusions can be drawn regarding the effects on HbA_{1c} and quality of life.

Group-based Educational Programmes for People with Type 1 Diabetes

Scientific evidence is insufficient to draw conclusions regarding the effects of group-based educational programmes on HbA_{1c} and quality of life in people with type 1 diabetes (Insufficient scientific evidence ⊕○○○).

Individual Educational Programmes for People with Type 2 Diabetes

Individual educational programmes for people with type 2 diabetes show a 0.16 percentage point improvement in HbA_{1c} in follow-up after 12 months (Moderately strong scientific evidence ⊕⊕⊕○). Improvement of this magnitude probably has minor clinical relevance.

Scientific evidence is insufficient to draw conclusions regarding the effects of individual educational programmes on quality of life in people with type 2 diabetes (Insufficient scientific evidence ⊕○○○).

Group-based Educational Programmes for People with Type 2 Diabetes

Group-based educational programmes for people with type 2 diabetes show a 0.66 percentage point improvement in HbA_{1c}

in follow-up after 6 months (Moderately strong scientific evidence ⊕⊕⊕○). Improvement of this magnitude probably has clinical relevance.

Group-based educational programmes for people with type 2 diabetes show a 0.83 percentage point improvement in HbA_{1c} after 12 to 24 months, under the assumption that such programmes are led by people qualified in the subject and who are well versed with the educational methods of the programme (Moderately strong scientific evidence ⊕⊕⊕○). Improvement in HbA_{1c} is similar to that achieved by oral medications for diabetes.

As the scientific evidence is insufficient, conclusions cannot be drawn regarding the effects of group-based educational programmes on quality of life in people with type 2 diabetes (Insufficient scientific evidence ⊕○○○).

Table 1 Summary of findings on patient education.

Outcomes	Number of participants (no of studies) & study design	Mean value in standard group (min–max)
HbA _{1c} 12 months after individual educational programme on type 2 diabetes	2 751 (6 RCTs)	7.9% (7.2–8.3)
HbA _{1c} 6 months after group-based educational programme on type 2 diabetes	336 (3 RCTs)	8.0% (6.3–8.9)
HbA _{1c} 12 to 24 months after group-based educational programme on type 2 diabetes led by persons qualified in the field and versed in the pedagogic methods used in the programme	530 (3 RCTs)	7.5% (6.4–8.3)

CI = Confidence interval; RCT = Randomised controlled trial

Absolute effect (95% CI)	Quality of evidence	Comments and study limitations
-0.16 percentage points (-0.26, -0.06)	Moderately strong ⊕⊕⊕○	Risk of bias -1 (Randomisation process, nonblinded studies)
-0.66 percentage points (-0.88, -0.44)	Moderately strong ⊕⊕⊕○	Risk of bias -1 (Randomisation process, nonblinded studies)
-0.83 percentage points (-1.04, -0.61)	Moderately strong ⊕⊕⊕○	Risk of bias -1 (Randomisation process, nonblinded studies)



Twenty-nine publications met the inclusion and exclusion criteria. From these 29 publications, 25 different educational programmes were evaluated. Sixteen studies were found to have sufficiently high scientific quality for inclusion in meta-analyses.

Effects on HbA_{1c}

Individual patient education demonstrated very little effect on glucose control. Assessment of group-based education demonstrated a significant short-term effect (6 months) on glucose control, but a long-term effect (12–24 months) could be demonstrated only in programmes led by people qualified in the subject matter and well versed in the educational methods of the programme.

Effects on Quality of Life

Very few studies have assessed quality of life. A further problem is that different instruments have been used to measure quality of life, making it difficult to compare studies. Assessing effects on quality of life is important to determine whether or not education affects patient well-being. The choice of measurement instrument is important for comparability.

Cognitive Behavioural Therapy (CBT) and Motivational Interviewing Methods (MI, AMI, and MET) in Type 1 and Type 2 Diabetes

Scientific evidence is insufficient to comment on whether behavioural-oriented patient education, ie, support programmes based on CBT, affects HbA_{1c} and quality of life (Insufficient scientific evidence ⊕○○○).

Comparing motivational interviewing methods (MI, AMI, and MET) against standard practice reveals no differences in effects

on HbA_{1c} in treatment and control groups of patients with diabetes, measured after 6 months and up to 1 year (Moderately strong scientific evidence ⊕⊕⊕○).

Scientific evidence on motivational interviewing methods (MI, AMI, and MET) is insufficient as regards their effects on quality of life in people with diabetes (Insufficient scientific evidence ⊕○○○).

Table 2 Summary of findings on motivational interviewing (MI).

Outcomes	Number of patients (no of studies) & study design	Mean value in standard group (min–max)	Absolute effect (95% CI)	Quality of evidence	Comments and study limitations
HbA _{1c} 6 to 12 months after MI	783 (3 RCTs)	8.1% (7.0–9.5)	–0.00 percentage points (–0.13, 0.19)	Moderately strong ⊕⊕⊕○	Indirectness and risk of bias –1 (Randomisation process)

Applies to both type 1 and type 2 diabetes.

CI = Confidence interval; MI = Motivational interviewing; RCT = Randomised controlled trial

A literature search identified 698 abstracts on psychological interventions (MI and CBT). Of these, 16 were read in full text. In addition, 7 were added via the reference lists. Two randomised trials on CBT and 5 randomised trials on MI met the inclusion criteria.

Cognitive Behavioural Therapy (CBT)

Only two studies have been included in this systematic literature review. The studies differ substantially in study design, sample, and design for intervention. Generalisability of the studies to the entire diabetes population is low since both studies include a small sample and patients were selected based on unsatisfactory glucose control or on their motivation to actively manage their own care.

Scientific evidence is insufficient to comment on the short- and long-term effects of CBT on HbA_{1c} and on quality of life.

Motivational Interviewing (MI, AMI, and MET)

The three studies having the highest scientific value included 783 people with diabetes, yielded consistent results, and showed no improvement in HbA_{1c}.

Although 3 of the 5 included studies measured quality of life, the researchers had used different measurement instruments. None of these studies showed improved quality of life with MI. No differences were reported between the treatment and control groups.

Health Economics

There is no evidence base from which to assess the cost effectiveness of educational programmes for people with diabetes.

Concerning people with type 1 diabetes, scientific evidence on individual patient education programmes is lacking. Scientific evidence on group-based patient education programs is insufficient. Hence, the health economics concerning this issue have not been analysed.

Given the absence of economic studies on patient education programmes for people with type 2 diabetes, we compared the costs of individual patient education with the costs of group-based patient education led by people qualified in both the subject matter and the educational methods. The premise was that the choice is between two active educational approaches. We did not compare the option of not using structured education. From a socioeconomic perspective, group education is more expensive than individual education. For the two programme options, the per-person costs to the health services (ie, time of a diabetes nurse) are similar. However, there are substantial differences in the cost of time and travel for the participants. Given the effects achieved regarding HbA_{1c}, however, the socioeconomic costs of group education are low.

A general problem could be the short time perspective in the studies on patient education. For instance, we expected the effects of education to remain for a longer period, and that deficient knowledge could lead to worse glucose control, with consequences of developing complications from diabetes in the long term. Although these associations are difficult to measure, they are important to consider when interpreting results from the studies.

The literature review showed no difference between treatment and control groups in terms of quality of life and HbA_{1c} values, as regards behavioural-oriented patient education consisting of support programmes based on motivational interviewing (MI, AMI, and MET). Scientific evidence on CBT-based support programmes is insufficient. Hence, we did not analyse the health economics of these methods.



Ethical and Social Aspects

An established condition for true self-determination is that a person is well informed, otherwise he or she is at risk for making decisions on faulty premises. Hence, patient education is an important element in health care – not only to enable people to take greater self-responsibility for their disease, but also to assure their opportunity for true self-determination.

Health services must consider the conditions under which people participate, the content and methods selected, the economic defensibility of patient education in relation to greater quality of life, integrity, self-determination, and improved capacity for self-responsibility. Using staff knowledgeable in educational methods for group-based education has good evidence for effects and thereby has strong ethical legitimacy.

Practice Studies

Statistics in Sweden are incomplete as regards the annual number of people with diabetes who are offered patient education. A national primary care survey in Sweden, conducted in 2007, showed that one fifth of the community health centres provide group education to people with type 2 diabetes. To more accurately survey practices in Sweden concerning the use of motivational interviewing in primary and specialised care, a survey of practices was conducted within the framework of the project. It included a random sample of diabetes nurses at different units, with 165 of 255 responding. All regions were represented. The questionnaire responses showed that 6 of 10 diabetes nurses had attended some type of education (course, workshop, etc) in motivational interviewing (MI). Over half of them work with MI, but there were wide regional variations. Of the diabetes nurses who do not use the MI method today, just over 40% have discussed the possibility

of beginning to use the method. Very few of the diabetes nurses have evaluated whether or not the use of MI at their workplaces has produced effects, eg, on patients' HbA_{1c} or quality of life.

Consequence Analysis

Findings from the systematic literature review could have several consequences for diabetes care. When supported by people with educational knowledge, group-based educational programmes result in improved HbA_{1c} values in type 2 diabetes. Currently in primary care, relatively few diabetes nurses have pedagogic qualifications. Hence, continuing education in educational methods would be one way to improve the effects of patient education.

Another consequence is that group education is essential for patient groups with unsatisfactory glucose control, since the greatest effects of education are found in this group. Considering that unsatisfactory glucose control increases the risks for late complications in diabetes, group education should be a good investment in people with unsatisfactory glucose control.

Since group education (as currently provided) reaches relatively few patients, the standard individual advice given to patients during a visit to the diabetes clinic is important. This type of advice should be assessed given the deficient scientific evidence concerning individual education.

Current services to address diabetes include so-called day-care weeks, where patients receive group education on diabetes and self-care. The quality of this group education, however, varies. Assessing these programmes should help in designing scientifically supported educational programmes. Furthermore, inclusion of information on patient education in the National Diabetes



Registry (NDR) may provide good support for quality improvement efforts in diabetes care, which could assure good educational quality in the future.

No studies found via the systematic literature review showed whether cognitive behavioural therapy (CBT) or motivational interviewing (MI, AMI, and MET) had additional effects, compared to standard practice, in controlling patients' blood glucose. Nevertheless, there is considerable interest in using motivational interviewing in Swedish diabetes care. Given this situation, CBT and MI should not be used routinely in diabetes care until controlled trials have demonstrated their effects in treating diabetes. It is essential to assess MI methods in diabetes care before these methods become too widely disseminated.

Knowledge Gaps and Research Needs

There is a great need for studies that assess individual and group-based patient education in type 1 diabetes. The so-called day-care weeks constitute the most common approach in Sweden today. Randomised controlled trials should assess these programmes to identify the best educational design.

Studies should assess the effects of patient education on patients' quality of life.

Studies that thoroughly describe the educational programme and the pedagogic premise are necessary to make recommendations concerning what type of patient education should be offered.

Several, larger, randomised control trials must be conducted to determine the effects of CBT and MI in diabetes care.

Current knowledge on the cost effectiveness of group educational programmes compared to individual education can be improved by including the results of the meta-analysis in this SBU report in a model study. Ideally, to assess health economics, the assessment should have access to data that enables assessments of costs and effects in the short, mid, and (life) long perspective. In general, clinical studies usually cover only short follow-up periods of one or a few years, limiting the opportunities to predict more long-term consequences.

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SBU Evaluates Health Care Technology

Below is a brief summary of the mission assigned to SBU by the Swedish Government:

- SBU shall assess healthcare methods by systematically and critically reviewing the underlying scientific evidence.
- SBU shall assess new methods as well as those that are already part of established clinical practice.
- SBU's assessments shall include medical, ethical, social and economic aspects, as well as a description of the potential impact of disseminating the assessed health technologies in clinical practice.
- SBU shall compile, present and disseminate its assessment results such that all parties concerned have the opportunity to take part of them.
- SBU shall conduct informational and educational efforts to promote the application of its assessments to the rational use of available resources in clinical practice, including dental care.
- SBU shall contribute to the development of international co-operation in the field of health technology assessment and serve as a national knowledge centre for the assessment of health technologies.

Patient Education in Managing Diabetes

SBU's report on patient education in managing diabetes builds on a systematic, critical review of the scientific literature in the field.

The report is one in a series of reports published by SBU (Swedish Council on Technology Assessment in Health Care).

This document presents the summary and conclusions of the full report, which has been approved by SBU's Board of Directors and Scientific Advisory Council.