

SELF-CARE SUPPORT IN DIABETES CARE

- A literature review of intervention effects

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Abstract

Background: Diabetes Mellitus Type 2 as a disease is growing at an alarming rate globally. The growth is seen in all countries and in all socioeconomic areas. The National Board of Health and Welfare of Sweden (2015), in its national guidelines for diabetic care, indicated that nursing interventions are the central part of diabetes care. However, as a survey done by Healthcare Analysis presented, these interventions were not applied as indicated. Orems' Self-Care Deficit Nursing theory aims to empower and guide patients in the self-care process through different nursing interventions. Previous research on what effect nursing interventions has on Diabetes Type 2 patients has had mixed results and are outdated. **Purpose:** The aim of this study was to describe the effects nursing interventions had in supporting self-care in Type 2 Diabetes patients, in research conducted over the last 5 years. **Method:** A literature review was conducted based on 13 articles found on the databases CINAHL and PubMed. The articles were chosen through different inclusion and exclusion criteria. **Result:** Analysis of the results generated four different themes: clinical outcomes, self-care capacity, quality of life and other effects. The effect of the different interventions varied to some extent. **Conclusions:** Interventions that included in central recommendations from National Guidelines for Diabetic Care showed positive outcomes, either applied alone, or combined with other interventions; however, we found no evidence that support persistence of these effects. Further research is required to examine more exactly which interventions had the most clinical effect on patients.

Keywords: nursing intervention, effect, diabetes type 2, self-care, self-management

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Introduction

Diabetes Type 2 as global phenomena continues to grow at a high rate in all socioeconomic classes around the world. It is becoming one of the major impact on not just individual people's lives, but on society as a whole (WHO, 2016). Since the start of the 21st century , our life patterns, with unhealthier diets, less need for daily exercise and other life choices, all contribute to the risk of developing Diabetes Type 2 (WHO, 2016).

The National Board of Health and Welfare of Sweden (2015), in its national guidelines for diabetic care, indicated that nursing interventions are part of the center of diabetes care. Furthermore, in order to enhance treatment outcomes and patient safety, the new Patient Law of Sweden (2014:821) has defined that it is nurses' duty to apply these interventions. However, as a survey done by healthcare analysis presented, these interventions were not applied as indicated (Vårdanalys, 2015).

Although the importance of nursing has highlighted and emphasised, the poor performance in reality, which brought up curiosity on the effectiveness of nursing interventions in supporting self-care of type 2 diabetes patients in clinical practices.

Background

Epidemiology of diabetes

According to the Global Diabetes Report, more than 422 million people, worldwide, suffered from diabetes in 2014. That's approximately 8.5% of global population. In 2012, 1.5 million people died from diabetes and diabetes complications. Additionally, 2.2 million people died of higher-than-optimal blood sugar related health problems in the same year. Among those cases, 43% of the patients who died were under the age of 70. The World Health Organization estimates that diabetes will become one of the highest killing disease by the year 2030 (WHO, 2016).

There are about 60 million people with diabetes in Europe, of which 10.3% of the men and 9.6% of the women diagnosed with diabetes are patients between 25 and 70 (WHO, 2016). Among those diabetes patients, 80-90% of diabetes patients have Type 2 Diabetes. Unlike Diabetes Type 1, Diabetes Type 2 has a very close relation to lifestyle. More than 80% onset of the Type 2 Diabetes Mellitus (T2MD) and diabetes complications can be prevented and delayed by adherence to a healthier lifestyle such as healthy diet, regular exercise, maintaining weight, reducing alcohol intake and avoiding tobacco (WHO, 2016).

Type 2 diabetes mellitus is associated with high risk of complications, premature death, reduced quality of life and significant healthcare costs (WHO, 2016).

Diabetes

In a normal glucose metabolism it takes approximately fifteen minutes for the body to increase the blood sugar levels after intake of food and drink. When the blood sugar concentration gets to a certain level, the beta cells in the pancreas are stimulated to secrete insulin. What happens next can be divided into two phases: In the first step, a little insulin is secreted in order to prepare the muscles and the liver for the intake of sugar. Then the beta cells continue to secrete insulin, so that the blood sugar can pass through into every cell in the body, including the muscles and liver, as an energy source for the body, which leads to a normalized blood sugar level (Hedner, 2010).

With diabetes patients, the body either does not produce insulin at all (type 1) or has a decreased capacity to produce insulin or insulin receptors are less sensitive than normal people (type 2). Both of these two types cause a chronically higher blood sugar level (Hedner, 2010). However, only the second type of diabetes has a strong relation to lifestyle (WHO, 2016).

Diabetes Complications

If diabetes is not managed properly, patients are likely to become progressively more ill and experience more and more symptoms over time. High blood sugar concentration can cause a lot of serious diseases, such as damage to the heart, blood vessels, kidneys, eyes and nerves (Hedner, 2010). According to the World Health Organisation (WHO) (2016), around 50% of patients who died of diabetes related cardiovascular diseases, while 10-20% of diabetes death cases are related to diabetes kidney failure.

Furthermore, many complicated health problems are caused by high blood sugar. Around 50% of all diabetes patients suffer from diabetic neuropathy. Neuropathy together with reduced blood circulation, leads to foot ulcers and eventual limb amputation (Fowler, 2008; WHO, 2016). Meanwhile, chronically high blood sugar also damages the small blood vessels in the eyes, which leads to diabetic retinopathy (Henricsson et al., 2003). That is the major cause of diabetes related blindness. After 15 years of diabetes, approximately 2% of patients suffer from diabetic retinopathy, and about 10% develop severe visual impairment (Henricsson et al., 2003).

According to WHO (2016), the risk of sudden death is two times higher among diabetes patients than people without diabetes. A study by Rhodes (2012) found that patients that had a diabetes Type 2 Diagnosis for a duration of 15 to 24 years, have a 15 year shorter life expectancy than the reference group who did not suffer from diabetes. For some of the patients, dangerous chronic complications had arisen only 5 years after the diagnosis. For these patients, Rhodes (2012) noted, life expectancy had become even shorter.

Risk factors

High risk factors for developing diabetes is overweight and obesity. It's estimated that it accounts for 65-80% of new cases of diabetes according to WHO (2016). Other risk factors for developing diabetes type 2 include an unhealthy diet with a high fat and carbohydrate count and low amounts of fruit and vegetables, smoking, high consumption of alcohol and lack of physical exercise (WHO, 2016).

A commonly used index for measuring and classifying if a person is overweight is the body mass index (BMI). It's defined as a person's weight divided by the square of that person's height (kilogram/meters²). For adults, being overweight is defined as more than or equal to 25 while obesity is greater than or equal to 30 on the Body Mass Index scale (WHO, 2016).

Diagnosis

The diagnostic criteria of diabetes is based on glucose level in the blood (WHO, 2016). Diagnosis of Type 2 Diabetes can not simply be done by one time or based on occasionally higher than the threshold. It should be completed with at least another one of the criteria, which are known as the oral glucose tolerance test, urine glucose leakage and HbA1c level.

When one of the values above showed higher than standard, further examination will be necessary to form a correct diagnosis. Diabetes can be diagnosed when at least 2 criteria are fulfilled (WHO, 2016).

Table 1-1: Current WHO recommendations for the diagnostic criteria of diabetes and intermediate hyperglycaemia

Criteria	Reference value
----------	-----------------

*Fasting P-glucose (FPG)	≥ 7 mmol/L (126 mg/dl)
Glucose tolerance test (OGTT)	≥ 11.1 mmol/L (200 mg/dl)
HbA1c (long time blood sugar)	≥ 6.5%
*Fasting defined as no caloric intake for at least 10 hours	

Source: (Global Diabetes Report, 2016 p.85)

Diabetes Report (2016) indicated that patients without diabetic symptoms fulfill one of the criteria above, requires 2 positive test results from different date for diagnosing.

Despite well developed knowledge of and clinical experiences with diabetes, almost 50% of diabetes patients do not receive a diagnosis until symptoms from the complications show (1177vårdguide, 2016). Type 2 Diabetes is a successive disease, it often has no notable symptoms. That's why most of the patients are unaware of being affected until complications show symptoms or are accidentally discovered by other symptoms that may or may not be related to high blood sugar. Many patients also contact medical services due to the well known symptoms of increased thirst and the need to urinate more than usual (1177vårdguide, 2016). Because of the delayed diagnosis of diabetes, many patients miss the optimal time for treatment (WHO, 2016).

Treatment

Treatments for diabetes are always aiming to decrease HbA1c level regardless of diabetes type and duration (WHO, 2016). Optimistic HbA1c level can be achieved and enhanced by guiding and supporting Type 2 Diabetes Mellitus (T2MD) patients to develop and improve self-care capacities (Socialstyrelsen, 2015; WHO, 2016).

The relationship between HbA1c and incidence of diabetic complications has been described by Currie (2010). There is a significantly higher increase in risk of a diabetes complication with every 1% increase in HbA1c. A connection between HbA1c levels and incidence of cardiovascular diseases in T2DM indicated that HbA1c is associated with mortality and cardiac complications (Currie et al., 2010).

Nevertheless, the most effective way of treating is to prevent. As stated before, Type 2 Diabetes is a lifestyle related disease, which means it can be prevented by taking care of the risk factors. Prevention oriented treatment is highly recommended by the WHO, and is being widely applied in clinical practices all over the world (Socialstyrelsen, 2015; WHO, 2016).

Consequences of Diabetes

Quality of Life

A study of Lohri-Posey (2006) addressed the challenges and the difficulties that patients with diabetes have experienced in their daily lives. Most of the participants described a deteriorated quality of life. Feeling ill and weak, tired and having a lack of energy were the most common symptoms among diabetes patients. Other common symptoms that were mentioned among diabetes patients were an increase in thirst, the need to urinate often, and a higher rate of being affected by infections, diabetes ulcers, and eye problems (Li, Drury, & Taylor, 2013; Lohri-Posey, 2006; West & McDowell, 2002).

West (2002) issued that depression is common among diabetes patientes. Decreased mental quality of life is related to life changes caused by the disease. While Li (2013) found a generally higher stress and anxiety level among people with diabetes than non-patients. Not being able to live a

normal life, expecting and worrying about an unstable blood sugar level all the time, was the most frustrating feeling the participants experienced (Li et al., 2013). Participants expressed a feeling of frustration while they were trying to live by all the guidelines and still not succeeding in maintaining optimized blood sugar levels. Frustration got worse while new symptoms arose and that made patients want to give up (Li et al., 2013). Patients with Type 2 Diabetes are often affected by stress and fear of diabetes complications, they are often worried if their strategies for handling the disease are correct, and become panicked if their blood sugar levels become a bit higher than usual. One of the participants described "As far as I am concerned, [in the] beginning it was a bit difficult you know. I find it very tedious, I got to check and check and check. It's been 30 years you know. So after a little while I simply...because it goes up and down...really I almost give up and just pray." (Li et al., 2013, p. 192). Similar descriptions are common among patients with chronic diseases which brought the attention as well as urgency for support to maintain mental health of diabetes patients (Tabak, Akbaraly, Batty, & Kivimaki, 2014).

Socio-economic consequences

Type 2 diabetes incidences are predicted to grow along with the medical and economic burden of the disease, indicating an urgent need for prevention of complications and novel interventions.

Patients with diabetes require many resources from the healthcare system. It is due to the higher risk of serious diseases they have compared to non-diabetics (WHO, 2016). Serious complications of diabetes are very dangerous and painful for both patients and families. Moreover, the need for regular medical intervention and annual or even tighter contact with healthcare systems is extremely expensive and takes up a lot of social resources (Socialstyrelsen, 2015).

In 2014 the European Union consisted of 28 countries, which combined had around 400 million people, half of which were overweight. Of these 400 million, 32 million were affected by Diabetes Mellitus Type 2. That is around 8% of the whole population. One in three doesn't even know they are affected (WHO, 2016). In 2013, 271 000 people in the EU passed away due to complications from diabetes. Complications included Cardiovascular disease (50%) and Kidney failure (10-20%) to name the most common ones and 50% of all the patients with diabetes had contracted nerve damage. Diabetes also increased the risk for patients to contract heart disease, blindness, and require extremity amputations (WHO, 2016).

In 2014 around 9.2 % of the EU's combined Healthcare budget was spent on diabetes mellitus type 1 and 2 with each patient costing around 2450 euros (WHO, 2016).

Diabetes Type 2 is not just a major cost for the healthcare system. It's also a big impact on people's personal lives. It often affect the patients families and friends and leads to more workforce loss (WHO, 2016).

People in the EU do not exercise enough, eat unhealthily and eat excessive portions. All this contributes to the prevalence of Diabetes Mellitus Type 2 in the European Union. Diabetes type 2 sees an increase in all countries and in all socio-economic areas of the population (WHO, 2016).

For the European Union, the work to decrease the prevalence of Diabetes Mellitus Type 2 is of utmost importance, due to the fact that diabetes combined with other chronic diseases will have a major impact on the EU's future budget and the lives of it's citizens (WHO, 2010).

Nurse's role in patient self-care

The Swedish National Board of Health and Welfare has created special guidelines for Diabetes Mellitus (Socialstyrelsen, 2015). Nursing interventions that focused on preventing incidence of diabetes, or aiming for diabetic treatment support are included in the central recommendations of

the Swedish National Guidelines for Diabetic Care. Such interventions include medication management and glucose monitoring, as well as diabetic complication preventing interventions like foot care and eye control (Socialstyrelsen, 2015). Follow-up is also mentioned in the central recommendations (Socialstyrelsen, 2015). Moreover, according to the Guidelines, nurses play the leading role in patient follow-up (Socialstyrelsen, 2015).

In other words, nursing interventions like patient education, patient support and regular follow-up to enhance patient's self-care capacity in disease prevention, disease treatment and complication prevention are regarded as some of those most important methods for diabetic care in Sweden (Socialstyrelsen, 2015).

Self-care theory

The Swedish Nurse Association (2008) applies Orem's Self-Care Deficit Nursing Theory as the baseline for leading nursing interventions in practice. The Theory emphasizes that self-care is a conscious learning process which starts when nursing interventions such as patients' education begins, and is the most important method for guiding patients to the right direction in the self-care process (Orem, 1991).

Self-care is a process that is started by nursing intervention and the process progresses as patients becomes more and more empowered. In the beginning, it requires resources and support from different directions, but needs for social resources decrease as the empowerment process continues (Orem, 1991).

Orem also highlights patient empowerment in Self-Care Theory (Orem, 1991). There are a number of perceived benefits of empowerment presented in different research. Benefits such as better control in health situation and increased mental quality of life (QoL) for patients has highlighted (Henshaw, 2006). For healthcare staff, on the other hand, patient empowerment has reduced their workload in the long term (Henshaw, 2006). Furthermore, patient empowering interventions are effective in postponing diabetic complications, together with increasing patient satisfaction and improving quality of life (QoL) (Henshaw, 2006). Another benefit that had been noted is that the healthcare staff have developed in their own professional areas. A good and stable relationship between professionals and patients has been established along with the empowerment process (Svensk Sjuksköterskeförening, 2010).

The Swedish Nurse Association developed nursing intervention guidelines based on Self-Care Theory. Guidelines emphasize that patients are the central point in their own treatment so a treatment plan should always be made in a collaboration between the patient and their nurse (Svensk Sjuksköterskeförening, 2010). Nursing interventions should be able to support patients both physically and mentally, as well as help patients and their families by creating a good learning environment for developing and enhancing self-care capacities (Svensk Sjuksköterskeförening, 2010).

Interventions aiming to fulfill the expectations and needs of patients are essential under the self-care developing process (Orem, 1991). However, since individuals come from different social backgrounds, psychical stability and physical strength, it is important to develop a patient-centered caring plan based on clinical stages, patient's needs for life and resources such as self-efficiency for learning and capacity for carrying out self-management activities, to optimize the effectiveness of diabetes care (Svensk Sjuksköterskeförening, 2010).

Furthermore, in order to enhance patient-centered caring, access to information regarding to one's health situation, knowledge of the disease are required in the health care law (2017:30), later on, the Patient Safety Law (2010: 659) guaranteed patient's right to make decisions about one's own care

plan. The Patient Law (2014: 821) states that it is included in nurses' duty to provide patients with information regarding to one's health situation, knowledge, available treatment and medication alternatives.

In contrast to Self-Care Theory, Lorig (2003) has pointed out that in the traditional healthcare process, patients are regarded as a passive caretaker, expected to follow the professional's recommendations without question (Lorig, 2003). It is the medical professionals that make the decisions in traditional health care, choose the treatment method and take responsibility for the results. Since patients do not take any responsibilities for their own health care, patients do not consider managing their disease as a high priority in life (Lorig, 2003).

Problem Identifying

The Swedish National Board of Health and Welfare has published national guidelines in which nursing interventions are among their highest priorities (Socialstyrelsen, 2015) However, traditional care is still the focus of both patients and healthcare staff in practice (Vårdanalys, 2015).

As described by Healthcare Analysis, most healthcare professionals feel confident and comfortable while implementing patient education in a more traditional way (Vårdanalys, 2016). However, many patients regard information full of medical terms as difficult to understand and low in value (Vårdanalys, 2016).

Similarly, patients tend to be more interested in medicine related questions such as new types of medicine, dose adjustment, and side-effects of the medicine (Vårdanalys, 2016).

Meanwhile, in the science community, the same focus seems to reflect their research initiative. When searching for "medicine AND Diabetes Type 2" in PubMed, there were 1730 clinical trails in the last 5 years, while only 43 clinical trails in 5 years were published related to "nurs* interventions AND Diabetes Type 2".

As pointed out by Self-Care Theory, such self-care supportive interventions are carried out mainly by nurses (Orem, 1991). The gaps found between indications and clinical implementation, as well as the low attention it receives in the science community, has motivated this literature review to gather the evidence of the success of nursing interventions on diabetes care.

Purpose

The purpose of this literature review is to identify nursing interventions and their effects on self-care capacity for type 2 diabetes patients.

Methodology

.A literature review guided by Friberg (2012) is used to serve our purpose. A literature review is described as a summary of previous research within a subject or area. Literature reviews also work as method- and quality check-up of the existing research. Systematic literature searches are conducted and the method and result of different studies are presented to make it reproducible, and for the validity of the study to be confirmed for future research (Friberg, 2012). We gather the results from clinical studies from the most recent 5 years to explore the effects of nursing interventions in supporting self-care among T2MD patients. Document analysis is used for induction and categorization of results from research papers (Friberg, 2012). Beskriv kort något mer vilka metodstegen från Friberg är

Searching strategies

The searching process began with scanning for laws and national guidelines that were related to nursing and self-care in Type 2 Diabetes. Laws and guidelines give a range of intervention methods to be applied by qualified nurses.

Keywords identified from the objective were "nursing intervention", "effect", "Diabetes Type 2" and "self-care". However, considering objectivity and transferability of research results, "self-management" was used in the search words instead of "self-care" (SBU, 2014).

"Nurse" and "Nursing" took the place of "nursing interventions" in keywords to elicit more search results. To optimise sampling variation, "effect" was taken away from the keywords used in the searching process (SBU, 2014).

In order to search efficiently, "abstract and full text" were defined in text availability and only studies that were published in English are included in this review.

Systematic reviews were scanned using the search criteria, inspirations retrieved from reviews were used for forming this document's structure and synthesizing result themes (SBU, 2014). Since the systematic reviews include results from research in the most recent 10-15 years, the range of articles for this paper was narrowed down to clinical studies published from the last 5 years. Search results are presented in Appendix 1

Selection

During the first filter, duplicate articles and articles of other species were excluded. Moreover, studies of certain specific patient groups or single patient cases were also excluded, so that the focus would stay on the interventions for the interests of the majority of Type 2 Diabetes patients (SBU, 2014).

Abstracts were looked through to determine whether or not the article is relevant to the purpose. The remaining articles were scanned and the quality of the articles was assessed based on the article evaluation tool from SBU (2014). Criteria for quality evaluation includes aspects such as context description, sampling process, data presentation, result discussion, and bias. The complete SBU tool is presented in Appendix 2-1.

Articles were then defined into three classes: High (H), Moderate (M) and Low (L) (SBU, 2014). Articles of low quality (class L) are excluded, while those of high quality (class H) and moderate quality (class M) are then weighed and chosen together with evidence strength.

In order to enhance the strength of this paper, the evidence strength evaluation tool from SBU (2014) was used to determine the strength of the results from the articles. Primary strength was determined by the type of study (SBU, 2014). As determined by the tool, randomized studies have the strongest evidence in the primary evaluation.

During the secondary assessment, factors such as analysis methods, result objectivity, consistency in the results are considered for either raising the primary grade or lowering it (SBU, 2014). The full version of the tool can be found in Appendix 2-2 and 2-3. Quality assessment of chosen articles can be found in Appendix 3. The search process is presented as follows:

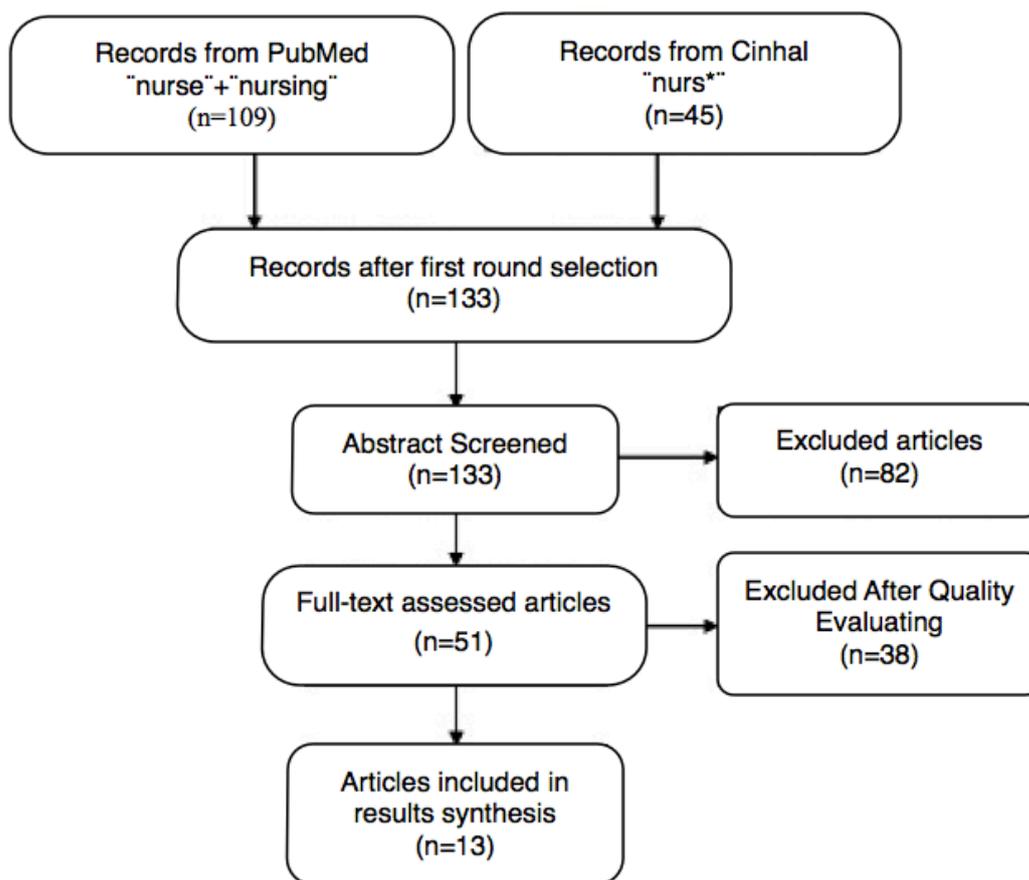


Figure 2-1 Overview of searching process

Synthesis

After selection, document analysis is used for studying the chosen articles (SBU, 2014).

The synthesising process begins with coding results, which means pick up a keyword from result content. For example, Wichit (2017) presented in his paper that "...better self- management and significantly increased self-efficacy, both physical and mental components of quality of life, knowledge, and significantly improved glycemic control by decreasing HbA1c levels... ", codes from this sentence are "self-management", "self-efficiency", "physical components of quality of life", "mental components of quality of life", "knowledge", and "HbA1c".

Coding groups were then categorized into four different themes: clinical outcomes, self-care capacity, quality of life and other effects. Coding and themes overview can be found in appendix 5.

Ethical considerations

Of thirteen studies, nine studies presented an approval of an ethical committee and also signed consent from all of the participants. The other four studies do not present an ethical approval. However since all articles are published in scientific journals and are retrieved from scientific databases PubMed and CINAHL, and to be able to be published in a scientific journal, studies need to be peer reviewed and approved by both the scientific ethics communities (WHO, 2011). Furthermore, ethics authorization is a precondition for a clinical study involving human subjects (Kjellström, 2012). Based on the reasons above, we believe that articles used in our paper have a valid ethics permission.

Result

The interventions from different articles were categorized into five groups.

The groups of interventions are in consistency with those interventions from the Swedish National Guidelines (Socialstyrelsen, 2015). The intervention groups are "education, support, motivation, cognitive therapy and follow-up". Definitions for each intervention group are displayed as follows:

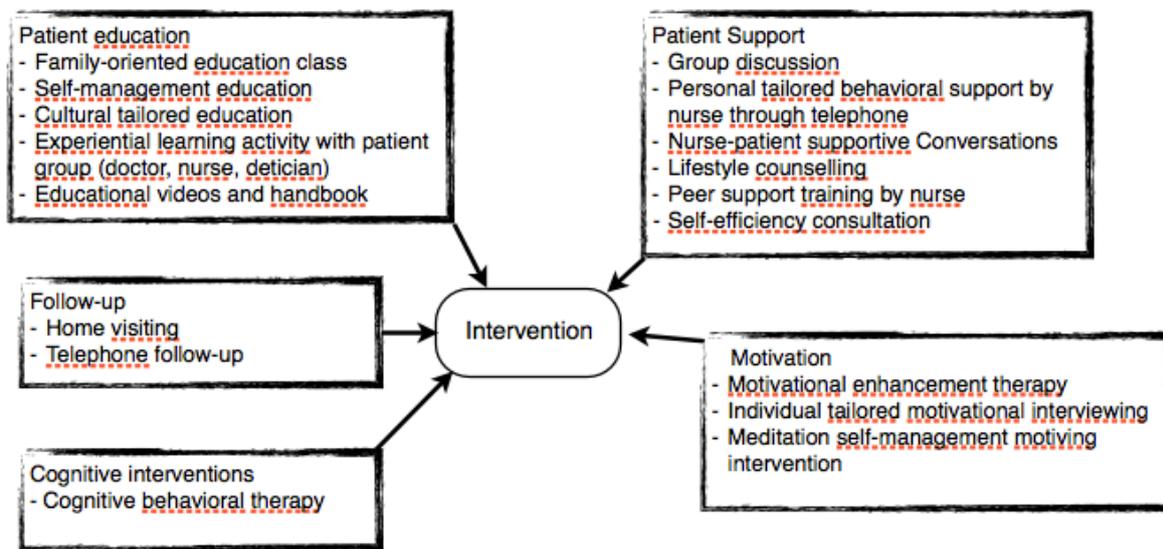


Figure 3-1 Intervention overview

Intervention groups are defined as follows:

- Education refers to all tailored education used in articles that is pursuing its aim in self-care support. For exemple: culture tailed education, individual tailored education program,
- Support includes individual support, group support and all kinds of supports that is interfered by nursing interventions
- Motivation means motivation interviewing that used in the articles in the purpose for initiating and enhancing adherence to self-care process
- Follow-up consists of telephone follow-up, home visit and patient contact with healthcare providers for follow-up interventions with the aim of developing self-care
- Cognitive behaviour therapy is the intervention for improving patients' self-efficiency and improving mental quality of life

From the five interventions four themes were identified and their effects are presented as follows:

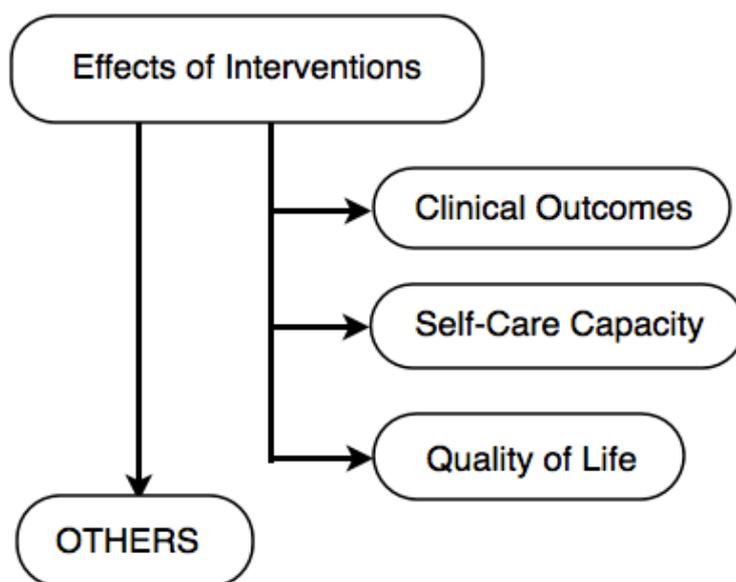


Figure 3-2 Result themes

Clinical Outcomes

Patient education has been determined to have a positive effect on glucose control by all articles that were applicable (Collins-McNeil et al, 2012; Huang et al, 2016; Jessee et al, 2012; Vincent et al, 2014; Wichit et al, 2016 & Wu et al, 2013). Additionally, Collins-McNeil (2012) also observed effects on other metabolic parameters such as reduced blood pressure, low-density lipoprotein cholesterol (LDL) and triglycerides (TG) and increased high-density lipoprotein cholesterol (HDL). Furthermore, better handling of risk factors such as BMI, waist circumference and weight has been highlighted as well.

Patient support, on the other hand, painted another picture. There was little or no effect in clinical outcomes with patient support as the main intervention in research from Edelman (2015) in the USA, Jutterström (2016) in Sweden and Vermunt (2012) in the Netherlands. Furthermore, in Vermunt’s report (2012), clinical outcomes fell back or even got worse than the baseline values in the intervention group. However, patient support alone in Deng’s research (2016) in China showed significant improvement not only in metabolic parameters, but also in handling risk factors like BMI and TC.

When patient support was combined with education programs, a significant decrease in HbA1c was observed in the intervention groups by Jeese (2012). Dramatic decreases in HbA1c, as well as lowered BMI and waist circumference, has been highlighted while patient support and education in combination with regular follow-up are applied at the same time in the intervention group (Wichit, et. al., 2016; Wu, et. al., 2013). Moreover, education and patient support applied together with motivational interviewing and cognitive therapy showed similar impact on HbA1c as well as fasting glucose level (Huang, et. al., 2016).

Cognitive therapy studied alone by Inouye (2015), resulted in only mild effects on clinical outcomes like HbA1c, blood pressure, and lipid profile when compared with traditional care.

Motivational interviewing, which applied to only two of the articles, also showed promising results in clinical outcomes (Chen et al, 2012 & Farmer et al, 2012). Both conclude the effectiveness in lowering HbA1c levels through motivational interviewing by nurses.

Self-care capacity

Two articles discussed the effects of patient education (Collins-McNeil, et al., 2012; Vincent, et al., 2014). Collins-McNeil (2012) addressed a similarity in the effectiveness of patient education and standard care in physical activities and self management activities while Vincent (2014) observed a significant increase in physical activity self score in his research. Both studies were carried out in the USA. The previous one was a pilot-research project, their 12 participants are included in the study (Collins-McNeil et al., 2012), while the last one is a randomized study that includes 58 patients (Vincent et al., 2014). However, when it comes to physical exercise and self monitoring glucose, no difference between the intervention group and control group was found by Collins-McNeil (2012).

There are four articles that used patient support as the main intervention, among which, one was done in China (Deng et al., 2016), two were carried out in Europe (Jutterstrom et al., 2016; Vermunt et al., 2012) and one in the USA (Edelman et al., 2015). Deng (2016) concludes that patient support in general has good effects on self-care, while Edelman (2015), Jutterström (2016) and Vermunt (2012) found only moderate effects on self-care development. However, Vermunt (2012) has also observed that risk factor handling in the intervention group fell back to the baseline at the end of the research, and some of the values, such as weight, BMI, waist circumference, physical activities and fiber intake, are marked worse than the baseline level.

Cognitive interventions studied by Inouye (2015), has marked a progress in self-efficiency and an increase in mental quality of life. Cognitive management together with patient education, support and follow-up provides significantly increased self-efficiency.

Variation in the results are found while addressing the effect of motivational interviewing on self-care capacity. Two articles have their focus on motivational interviewing in this paper (Chen, et al., 2012; Farmer, et al., 2012). While the research from China showed significant improvement in self-care capacities in the intervention subjects, the same intervention applied in the UK study seems to have made no difference in medication adherence between intervention subjects and control subjects.

Quality of Life

Effects on participants' quality of life had also been observed and discussed in several studies. The most addressed point was mental quality of life, which was determined by symptoms and level of depression, anxiety and stress in this review. Effects of interventions resulted in increased mental quality of liferesulting from experiencing fewer symptoms of depression (Chen et al., 2012; Huang et al., 2016; Inouye et al., 2015; Wu et al., 2014), leading to lowered stress and anxiety levels (Chen et al., 2012; Collins-McNeil et al., 2012; Wu et al., 2014) and enhanced capacity for maintaining a good mental state (Wichit et al., 2017).

Patient education gives promising effectiveness by handling stress and depression related to diabetes (Collin-McNeil, et al., 2012; Vincent et al., 2012). Furthermore, Vincent (2012) also concludes a steady improvement in quality of life in the intervention group.

Huang (2016) found that combined interventions of patient education, patient support, motivational interviewing and cognitive therapy had significantly reduced the depression symptoms, while other mental and physical components had the same effectiveness noted as in standard care.

Patients gave higher scores on both physical and mental quality of life with combined interventions of education and support together with follow-up (Wichit et al, 2016) while Wu (2013) recorded a

reduction in depressive symptoms and decreasing in anxiety level when using patient education, patient support and follow-up together in her study.

Interventions such as cognitive therapy had similar positive effects on patients' mental quality of life (Inouye et al, 2012).

Other effects

Other effects, such as consistent satisfaction with communication with healthcare providers, were observed by Farmer (2012) while studying the effects of motivational interviewing. Support from healthcare providers even leads to shifting treatment focus from medicine prioritized to risky lifestyle and risk factors oriented (Jutterström et al, 2016).

Vermunt (2012) studied patient support in the intervention group, which not only gave higher patient satisfaction for treatment, but also enhanced beliefs in intervention of both patients and healthcare providers. As a result of increased belief in the methodology, healthcare providers showed increased enthusiasm for the project and confidence to apply the interventions, while patients showed increased adherence to the treatment and belief in the effectiveness of the ongoing treatment (Vermunt et al, 2012). Vermunt (2012) also observed an improved relationship between healthcare providers and patients as the result of nursing intervention.

Effects in Supporting Self-Care

Interventions applied were either aimed at a better self-efficiency (Huang et al., 2016; Inouye et al., 2015; Jessee & Rutledge, 2012) or intended to reinforce patient self-management capacities (Collins-McNeil et al., 2012; Deng et al., 2016; Edelman et al., 2015; Farmer et al., 2012; Jutterstrom et al., 2016; Vincent et al., 2014; Wu et al., 2014) or focus on both self-efficiency and self-management (Chen et al., 2012; Vermunt et al., 2012; Wichit et al., 2017).

Most of the articles showed effects on enhancing self-care capacity among participants of intervention groups (Chen et al., 2012; Deng et al., 2016; Inouye, Li, Davis, & Arakaki, 2015; Vincent et al., 2014; Wichit et al., 2017; Wu et al., 2014). Improvements observed were better self-management and significantly increased self-efficacy as a result of interventions that combine education, support and follow-up both in Thailand (Wichit et al., 2017), and in China (Wu et al., 2014). The same effects showed in Chen's report (2012) while applying motivational interviewing in China.

Interventions benefited participants with improved self-care capacity like medication management (Collins-McNeil et al., 2012; Deng et al., 2016), footcare (Collins-McNeil et al., 2012), risk factor management and lifestyle changes (Chen et al., 2012; Collins-McNeil et al., 2012; Deng et al., 2016; Vermunt et al., 2012; Vincent et al., 2014; Wichit et al., 2017).

Self-efficacy is regarded as another aspect of self-care capacity. Intervention effects on self-efficacy appears as significant improvement in knowledge of the disease and self-management techniques (Deng et al., 2016; Wichit et al., 2017), health beliefs (Inouye et al., 2015), and other aspects such as enhanced confidence, self-efficiency score, etc (Chen et al., 2012; Vincent et al., 2014; Wu et al., 2014).

However, the same effectiveness of interventions and traditional caring in some aspects of self-care capacity were also observed. Equal effectiveness was found in managing risk factors like physical activity (Collins-McNeil et al., 2012; Edelman et al., 2015; Jutterstrom et al., 2016), diet managing (Deng et al., 2016) and physical components such as BMI, weight and waist circumference (Edelman et al., 2015; Huang et al., 2016; Inouye et al., 2015; Jutterstrom et al., 2016). Little or no difference was observed between intervention arms and control arms in adherence to medication

(Farmer et al., 2012) and glucose self monitoring (Collins-McNeil et al., 2012). Moreover, Deng (2016) noted a decreasing trend in attendance for interventions.

Good effects showed in research that applied combined interventions of patient education, self-care support and follow-up (Wichit et al., 2017; Wu et al., 2014). According to the articles, improved self-care capacities reinforced the effects on quality of life.

Discussion

Method discussion

Searching strategies

We used “self-management” instead of “self-care” for the article search.

Self-management can not only be defined by concrete numbers or descriptions from clinical symptoms, treatments, lifestyle changes and so on, but also be described according to individual's feelings and experiences (Lorig, 2003). That is why searching results of self-management gave more concrete and measurable results while qualitative descriptions and expressions can also be gathered. “Self-care”, on the other hand, has its focus on individual experiences and feelings. It is influenced mainly by the characteristics of individuals (Orem, 1991) Because of this, the strength of evidence is weakened and difficult to generalized.

As stated before, systematic reviews in the area have been read throughly. The review has covered studies that published in the last 10 to 15 years, this is the reason we decided to focus on the most recent 5 years of studies to make a comparison between the earlier studies.

However, we would like to narrow down our focus even more on one or two interventions and embrace a larger range of search results with different keywords and different types of studies.

Selection of articles

The whole quality evaluation process is subjective, where authors have huge influence on the selection process. Since we have read National Guidelines for Diabetic Care and systematic reviews in similar areas, we developed a preference for results that are conclusions presented in chosen articles that should be consistent with the reviews and serve as evidence to confirm that the interventions from the National Guidelines are effective. Although we have used the quality evaluation tool form SBU (2014), articles that presented positive results from nursing interventions are most likely to get higher scores. Several rounds of reevaluating and discussing had been done inside the group, but bias still affected the selection of articles.

Regional distribution of the articles are uneven. Articles in this review are mostly done in Asia and the USA while only 3 articles are from Europe. Regional differences showed a big impact on the outcomes. Articles that used the same intervention are good for comparing. However, comparison between articles from the same part of the world had a smaller evidence strength than comparison of articles from different regions of the world (SBU, 2014).

While selecting articles, we prioritized the studies according to strength of evidence (SBU, 2014). However, a pilot study (Collins-McNeil et al., 2012) and two quasi-experiments (Jessee & Rutledge, 2012; Wu et al., 2014) are included.

Collins-McNeil (2012) has its focus on individuals. She addressed the different reactions of the individuals. A deeper understanding of both internal and external factors on individuals was gained from this study. Furthermore, this article presents effects of interventions from different clinical aspects, and is of great value for further research in individual-centered care.

The article by Jesse (2012) was chosen because it presented a good example of how different professionals can work in a nurse-led team, with detailed description of how cooperating with each other and using each profession's unique strengths in a research process. This article gave us a good example of how teamwork and team composition could be used to further increase the effectiveness of an intervention.

The other, quasi-experiment, article by Wu (2014) used standard treatment for both of the groups to decrease the difference between control and intervention groups. That had significantly enhanced the reliability of the findings and reduced the bias between the groups.

Result synthesising process

Codes/ keywords categorization has a big space for discussion. Even information for each category and keyword can be found in person-centered care (Svensk sjuksköterskeförening, 2010), some of the definitions are very similar to each other, it is difficult to put a clear boundary between each category and theme. Take self-efficiency and mental quality of life for example. Self-efficiency is, in other words, to enhance mental strength by empowering patients with knowledge and information (Orem, 1991). It is difficult to distinguish these two sub categories. Some of the codes can be considered suitable for more than one category. Weight, BMI and waist circumference for example, these three codes can also be regarded as indications for clinical values other than self-care capacities. However, based on our argument, these codes were included in risk factors according to the definition from the WHO (2016). As the WHO (2016) pointed out, it is one of the most important purposes of self-management that patients be able to handle risk factors. That's why they were categorized in the theme of self-care capacity.

Interferences between categories are also well-known. One of the most important interferences is that, according to Orem's Self-Care Theory, a well developed self-care capacity can contribute to better clinical outcomes, as well as improve the quality of life (Orem, 1991).

There are several effects that have been addressed by some of the articles, such as relationships between healthcare providers and patients, change of treatment focus, and attitudes of patients and healthcare providers towards the interventions. These changes have presented the effects of self-care supportive intervention from another perspective, and we determined those are also relevant to our purpose, and categorized these effects to "others".

Result discussion

Findings

The purpose of interventions addressed in this paper are, according to Orem's Self-Care Theory, initiating a self-care process (Orem, 1991). As Orem (1991) has pointed out that self-care is a continuous process, all the interventions that were addressed in this paper are self-care supportive interventions that are published by the Swedish Nurse Association (svensk sjuksköterskeförening, 2008). The indications of self-care supportive interventions which apply Self-Care Theory as a framework are of different priority levels based on their clinical evidence strength (socialstyrelsen, 2017).

Clinical Outcomes

All of the interventions in our articles addressed effects on clinical outcomes. It has been shown that tailored empowerment education, either group-based or individual-based, are efficient on HbA1c control (SBU, 2009). While only tailored group education showed strong evidence in reducing HbA1c levels from diabetes intervention reviews from the National Board of Health and Welfare (Socialstyrelsen, 2017).

Fitzgerald (2015) noted that patient support has positive effects on HbA1c reduction. Enhanced clinical outcomes have been shown in the diabetes intervention review (Socialstyrelsen, 2017). In difference to these findings, three of four articles that used patient support in this review claim that they have observed the same efficiency as traditional care in clinical outcomes, while only one concluded that there were promising effects. This inconsistency in results lowers the strength of results related to patient support (SBU, 2014).

Patient support together with patient education has greatly lowered the HbA1c levels in the intervention group, and similar effects on clinical outcomes also presented in a review by the SBU (2009). Similar positive effects were noted in earlier studies where patient support was combined with patient education and follow-up (Henshaw., 2006). The National Board also confirmed that these combinations have certain effects on HbA1c (Socialstyrelsen, 2017).

Two articles addressing motivational interviewing in this review have different findings from articles addressing intervention. Farmer (2012) found that intervention had little effect while Chen (2012), on the other hand, highlights a significant improvement in diabetes care. Effects of motivation in clinical outcomes, on the other hand, have not been stated in any of the systematic reviews we have read. While The National Board, has addressed an uncertainty from the effects in clinical outcomes that were observed in motivational intervention (Socialstyrelsen, 2017). The discrepancy from this review is interesting for further research.

However, the combination of education, patient support, motivational interviews and cognitive therapy has not been found in either systematic reviews, nor documents from The National Board. Cognitive therapy applied alone, on the other hand, has been discussed by Sumlin (2014), but with its focus on mental enhancement.

Self-care capacity

Patient education has proved to have positive impacts on many aspects of diabetes care. A review exploring effectiveness of patient education from the SBU (2009) concludes it is efficient in increasing patient engagement in self-care. The National Board also concluded that development in self-care capacities was insignificant (Socialstyrelsen, 2017). Additionally, patient education has also proved to be an efficient method in diabetes prevention by empowering and leading patients to better handling of risk factors (Agneta, A., P., 2004).

As indicated by the Theory, self-care is a process that requires both physical and mental support to strengthen and improve patients' capacities (Orem, 1991). It is important that patients can get support from healthcare professionals, such as feedback regarding self-management activities and updated health stage information, such as risk factor assessment and mental support (Svensk Sjuksköterskeförening, 2008). The importance of patient support in enhancing self-care capacity has been observed as increased self-efficiency and better abilities for carrying out self-management activities, by Fitzgerald (2015). Similar conclusions can be found in the Review from The National Board (Socialstyrelsen, 2017).

Patient support together with patient education has also been assessed by Henshaw (2016). Effects observed included better control in metabolic parameters and developed self-management skills with higher self-efficiency (Henshaw., 2006)

Patient support has been addressed together with education and follow-up in two of our articles, and they prove to have higher effectiveness in self-care capacities. Fitzgerald (2015) reviewed similar effectiveness in increasing self-care capacities. However this combination has mild effect on self-care capacity, according to The National Board (Socialstyrelsen, 2017).

Self-care is a continuing and long-term process, which makes adherence to the process crucial for good treatment results (Agneta, 2004; Orem, 1991). Motivational interviewing is recommended by The National Guidelines to enhance patient adherence (Socialstyrelsen, 2015). Sumlin (2014) has also concluded in her review that motivational interventions have good effects on adherence to the self-management activities and regarded it as an effective method for patient empowerment. Different results are present in two of the articles that studied motivational interviewing. Farmer (2012) found the intervention had little effect while Chen (2012), highlights a significant improvement of diabetes care. Inconsistency in the result has reduced the evidence strength related to the effects of motivational interviewing (SBU, 2014) in our article. It showed that Cognitive therapy gives patients enhanced health beliefs, while none of the systematic reviews nor The National Board has discussed effects of cognitive therapy in self-care.

Quality of Life

Participants of patient education reported a significantly improved mental quality of life (SBU, 2009). Increased control over life, fewer depression symptoms and reduced stress levels were observed by Adolfsson (2004). Identical improvements in quality of life were also stated by Fitzgerald (2015). Nevertheless, The National Board has not concluded on any effects related to quality of life (Socialstyrelsen, 2017).

The SBU (2009) indicates a significant improvement in quality of life with combined interventions of patient support and patient education. While only mild or no benefits were detected in quality of life by The National Board (Socialstyrelsen, 2017).

Cognitive behavior therapy leads to reduction in diabetes related mental problems which leads to increased mental quality of life as confirmed by Sumlin (2014) in her review.

Other effects

Other effects that have been observed from two of our articles were not addressed specifically in any of the reviews nor from The National Board. The issue can be addressed in further research.

Interventions discussion

We compare and identify the consistencies and differences of the findings from our articles and early studies and the Review of The National Board of Healthcare and Social Welfare, then clinical indications and potential research areas are presented at the end of this paper based on the comparison.

Central recommendations in National Guidelines for Diabetes Care set preventing incidences of Type 2 Diabetes and diabetic complications as the primary goal for interventions, which means that risk factor management is of the highest priority for diabetic care (Socialstyrelsen, 2015).

However, certain lifestyle related risk factors such as alcohol, smoking and sleeping problems were not addressed in any of our articles (Socialstyrelsen, 2015; WHO, 2016). Meanwhile, foot care, as emphasized by The National Guidelines, was mentioned by only one of the articles (Collins-McNeil et al., 2012).

Reducing mental problems in diabetes patients is regarded as an important aspect to assess the effectiveness of an intervention on quality of life. But such interventions are not recommended by The National Guidelines (Socialstyrelsen, 2015). This is due to the low evidence strength from the results of early studies that evaluated effects on mental health (Socialstyrelsen, 2017). Mental components are mostly dependent on individual characters and life experiences, which restrict the generalization of the results (Tabak et al., 2014).

Depression, anxiety and stress are mostly personal feelings. Due to this, information sources are mainly from self scoring and self descriptions (Tabak et al., 2014). Many factors, both internal and external, can have an influence on patients' feelings. Even the weather of the day can have noticeable influence on a patient's mood, Tabak (2014) pointed out that this kind of influence generates deviation. Another problem was the stability and persistence of the mental statement. Since mood goes up and down all the time, it is difficult to draw a solid conclusion on the effects (Tabak et al., 2014).

Adherence discussion

In our articles, higher drop off numbers appeared in those intervention groups. Moreover, the only study that had a 20% or higher drop off rate was Edelman (2015), the authors did acknowledge this in their discussion. However, the results of this study showed little difference between the intervention group and control group, which in theory could strengthen the studies that had a significant difference between the intervention group and the control group.

In this review, the longest research interval is 2.5 years (Vermunt et al., 2012). However, diabetes is a lifetime chronic disease, interventions for just short periods of time may have the same function and influence as intensive treatments, which weaken the reliability of findings and decrease their values.

Efficiency discussion

Vermunt (2012) addressed time efficiency in his paper from two aspects, which are time to deliver the intervention and time needed for healthcare professionals to give feedback. In this 2.5 year long research project, the average time for giving interventions was 31 minutes longer than the traditional treatment. Moreover, time for giving feedback in the intervention arm was twice as long as the traditional care (Vermunt et al., 2012). However, whether or not the time efficiency will be reduced in the future is unknown.

Socio-economic efficiency, on the other hand, was not specifically mentioned in any of our articles. This may be due to the relatively short research period. However, socio-economic efficiency is an important aspect when taking an intervention into clinical practice (WHO, 2016). Long-term and short-term investment efficiency is as important as clinical outcomes when it comes to the decision as to whether or not to introduce an intervention.

Nevertheless, the Socio-economic impact that Diabetes Mellitus Type 2 has on a country can be hard to estimate according to Economic Costs of Diabetes (WHO, 2016). Often it can be underestimated due to intangibles, like pain and suffering, and the unreported increase in usage of government services, like dental care and sickness compensation from the inability to work. It's also hard to estimate the costs of what the family and friends of the patient suffers. They might be psychologically affected or have to dedicate time and money to support the patient. Some countries, like Sweden, have social welfare that covers most of the medical cost for patients, which makes socio-economic efficiency an extremely important factor for implementing an intervention (Socialstyrelsen, 2015). Restricted resources must be planned carefully, every investment is aiming not only for good outcomes, but also for gaining the maximum efficiency. That is why The National Guidelines exclude those interventions that are difficult to apply in practice and are expensive with uncertain effects (Socialstyrelsen, 2015). Further research on long term effects on socio-economic efficiency would be necessary for policy makers.

We believe that in the long run the economic cost of diabetes would be significantly lower with the help of self-care supporting interventions, as well as reducing the work load on healthcare staff.

This is not only due to the lowered cost in the healthcare system, but also to enhance the labor force of the global economy. Along with the health benefits from self-care, enhanced physical and mental strength give patients the possibility to go back to work. More importantly, those empowered patients can influence other people around them to live a better lifestyle which spreads the effect of the interventions to prevent lifestyle related disease in non-patients.

Limitation

This review has several limitations. First of all, time limitation is one of the main reasons that we had not searched enough databases when choosing our articles. Secondly, our topic was not focused enough, which leads to the big variety in results. We would rather have focused on one or two interventions, and applied a wider search range for more articles with higher quality.

Furthermore, authors have a lot of influence on the evaluations of the articles. Since we have read the National Guidelines for Diabetic Care and systematic reviews, we have had an expectation that our findings should be consistent with those from previously published papers. Although we employed the quality evaluation tool to enhance the quality, articles that presented positive results from nursing interventions were more likely to get higher scores and be chosen for further study (SBU, 2014). Even when reevaluation and discussion had been done inside the group, bias still affected the selection process.

Articles in this review were mostly carried out in Asia and the USA with only 3 articles of 13 from Europe. A strong relationship was observed between outcomes and regions, and inconsistency of results was indicated by the SBU (2014), having a negative impact on our results quality.

In the result discussion, conclusions related to interventions' effects are from systematic reviews we read before starting the writing process. We did not go to the original articles that were included in the reviews, but used the results direct from the review. Since we did not know the quality of those articles used in the reviews, it is difficult to assess the quality of the evidence and results (SBU, 2014). Furthermore, that systematic reviews are regarded as secondary sources brought up ethical concerns (Kjellström, 2012).

Clinical implications and further research suggestions

While comparing the drop-off rate between intervention groups and control groups, we found in most of our articles that patients in control groups were most likely to attend their treatment than those in intervention groups. Drop off could be affected by a lot of facts, such as it takes too much time to attend the interventions, research interval, cultural background, group demographics, and so on. Despite the bigger amount of resources that are invested in intervention groups, the drop off rate was higher than control groups in general. The reason for that would be an interesting research topic for further research.

Low time efficiency and high cost were detected when applying tailored interventions either in groups or with individuals, and a worse long-term effect than traditional care was addressed in the study with the longest interval (Vermunt et al., 2012). Further study could be done in the direction of enhancing the persistency and increasing both time and economic efficiency for the nursing interventions.

As stated before, patient education and patient support proved effective with strong clinical evidence. There is a new urgency for implementation and laws as well as education programs to enhance and support the clinical implementation process. For those interventions with weaker evidence, on the other hand, whether it is cultural and regional difference that caused the variation can be an interesting topic for future studies. For clinical practices, this variation indicated the importance of a tailored treatment plan for patient care.

Since diabetes is a chronic disease, research over longer periods or continuous studies from previous papers would be able to provide more reliable and valuable results for guiding the clinical practices.

Positive feedback from patients and good clinical outcomes were observed while applying prevention interventions. This has proven the importance of risk factor management, which means to identify the risk factors is not only the responsibility of healthcare professionals, but more importantly, it is a responsibility that should be taken seriously by everyone in the society. Awareness of a good lifestyle, physical activities, and healthy diet should be brought up in the whole society.

Patient support such as education, guidance and consultation should be implanted into the communities so that everyone in the community can have access to these resources. That requires governmental support and long-term investment.

At the same time, scanning for risk factors such as BMI, weight, waist circumference, blood pressure, LDL and blood glucose should be done in certain time intervals like for breast cancer and uterine cancer in order to get correct diagnosis and proper treatment as early as possible.

Conclusions

Patient education proves to consistently have positive effects on both clinical values and self-care capacity, while used together with patient support, evidence for an improved quality of life gets stronger. Regular follow-ups, together with other interventions such as education and patient support, also presented promising results on both clinical values and self-care capacity, while improvement in quality of life remains uncertain.

In regards to motivational interventions that have been recommended by The National Guidelines, evidence retrieved from this paper was moderate, further research is required in this area. The same applies to cognitive management. Even if it has been proved of good effectiveness, a standard evaluation tool is necessary when determining the effects.

Nevertheless, those interventions that focused on enhancing lifestyle changes for preventing incidences and complications should be taken into consideration even though the clinical evidence is not as strong as for other interventions.

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Appendix

Appendix 1 Searching Table

Database	Keywords	Restriction	Result	Abstract read	Article read	Chosen
PubMed	diabetes type 2 AND self-management AND nurs*	systematic review, abstract+full text, English	61	28	17	
PubMed	diabetes type 2 AND self-management AND nurs*		99			
	diabetes type 2 AND self-management AND nursing	clinical study, abstract+full text, 5 years, English	60	26	24+1	8
	diabetes type 2 AND self-management AND nurse		49	11	9+2	3
Cinahl	diabetes type 2 AND self-management AND nurs*	Abstract, full text, 5 years, English, peer review, adult.	45	13	13	3

Appendix 2 Quality Assessment

2-1 Article Quality Assessment

Hög kvalitet	Medhög kvalitet	låg kvalitet
Klar beskrivet sammanhang (kontext)	Sammanhanget ej beskrivet tydligt (kontext)	Oklart beskrivet sammanhang (kontext)
Väldefinierad frågeställning	Frågeställning ej beskriven tydligt	Vagt definierad frågeställning
Välbeskriven urvalsprocess, datainsamlingsmetod, transskriberingsprocess och analysmetod	Några otydligheter i beskrivningen av urvalsprocess, datainsamlingsmetod, transskriberingsprocess och analysmetod	Otydligt beskriven urvalsprocess, datainsamlingsmetod, transskriberingsprocess och analysmetod
Dokumenterad metodisk medvetenhet	Några otydligheter i den dokumenterad metodisk medvetenhet	Dåligt dokumenterad metodisk medvetenhet
Systematisk, stringent presentation av data	Otydligheter i presentationen av data	Osystematisk och mindre stringent dataredovisning
Tolkningars förankring i data påvisad	Några otydligheter om tolkningars förankring i data	Otydligt förankring av tolkningarna i data
Diskussion om tolkningarnas trovärdighet och tillförlitlighet	Några otydligheter om tolkningarnas trovärdighet och tillförlitlighet	Diskussion om tolkningarnas trovärdighet och tillförlitlighet är bristfällig eller saknas
Kontextualisering av resultat i tidigare forskning	Otydlig Kontextualisering av resultat i tidigare forskning	Kontextualisering av resultat i tidigare forskning saknas eller är outvecklad
Implikationer för relevant praktik välformulerade	Implikationer för relevant praktik är otydligt beskrivna	Implikationer för relevant praktik saknas eller är otydliga

2- 2 Primary Assessment of Evidence Strength

Evidensstyrka	Studiedesign
Stark	Randomiserade studier
Måttligt stark	
Begränsad	Observationsstudier; kohort- och fall-kontrollstudier
Otillräcklig	Fallstudier m.m

2-3 Secondary Assessment of Evidence Strength

Sänk gradering om	Höj gradering om
<ul style="list-style-type: none">• Brister i studiekvalitet (maximalt -2)• Bristande överensstämmelse mellan studierna (maximalt -2)• Brister i överförbarhet/ relevans (maximalt -2)• Bristande precision (maximalt -2)• Hög sannolikhet för publikationsbias (maximalt -1)	<ul style="list-style-type: none">• Störa effekter och inga sannolika confounders (maximalt +2)• Tydligt dos-respons samband (maximalt +1)• Confounders som inte är med i analysen borde leda till bättre behandlingsresultat i kongrollgruppen, dev hög sannolikhet att effekten underskattas (maximalt +1)

Appendix 3 Article Quality Overview

Article	Wichit et al 2017	Huang et al 2016	Vincent et al 2014	Chen et al 2012	Collins-McNeil et al 2012	Edelman et al 2015	Farmer et al 2012	Inouye et al 2015	Jutterström et al 2016	Vermunt et al 2012	Deng et al 2016	Jessee et al 2012	Wu et al 2013
Sample size control/intervention	140 70/70	65 32/33	58 20/38	250 125/125	12	377 184/193	211 85/126	207 103/104	195 54/141	1065 522/543	208 111/94	26	228
Sample quality	H	M	M	H	L	H	H	H	H	H	H	L	H
Purpose formulating	H	H	H	H	H	H	H	H	H	H	H	H	H
Research design	H	H	H	H	M	H	H	H	H	H	H	H	H
Data reliability	H	H	H	H	H	H	H	M	H	M	M	H	H
Analysis Method	H	H	H	H	H	H	H	H	H	H	H	H	H
Result Quality	H	H	H	H	H	M	H	H	H	H	H	M	H
Objectivity	M	H	H	H	H	H	H	H	H	H	M	M	L
Drop off rate % control/intervention	4.3/ 4.3	6.25/6.06	X	12/16.8	-	29.9/30.6	4.7/9.5	7.8/17.3	13/12.1	11.3/12.9	3.6/7.4	0	0
Attendance rate	H	H	L	M	-	L	M	M	L	M	H	H	H
Drop-out analysis	L	L	L	M	-	H	M	H	H	H	N	-	-
Ethical factors	YES	YES	NO	YES	NO	NO	YES	NO	YES	YES	NO	YES	YES
Scientific Background	H	M	M	H	H	M	H	H	H	H	H	H	H
Follow-up	N	Y	N	Y	N	Y	Y	N	Y	Y	Y	Y	N
Strength of evidence	A	A	A	A	A	A	A	B	A	A	A	A	B
Evaluating class	H	H	M	H	M	M	H	M	H	H	M	M	H

H (high quality) : no more than 3 values score lower than "H", of which no more than 1 value score "L",
M (moderate quality): no more than 3-5 values lower than "H" of which no more than 3 values score "L"
L: low quality is not included in this review

Appendix 4 Article Overview

Author	Purpose	Research	Method	Intervention	Intervention group	Result
Wichit et al 2016 Thailand	To evaluate a theoretically-derived family-oriented intervention that aiming to improve care of type 2 diabetes in Thailand	Randomized study	Mixed	Family-oriented program: education classed, group discussion, home visit and telephone follow-up	Education Support* Follow-up	No significant difference showed in clinical values from baseline, neither from control groups. However, positive outcomes found from self-efficacy, self-management, beliefs in interventions and diabetes knowledge.
Huang et al 2016 Taiwan	To evaluates the effects of therapies that focused on enhancing motivation and cognitive behaviour on diabetic care	Randomized study	Quantative	Medical nutritional therapy, self-management education and support together with motivational enhancement therapy and cognitive behaviour therapy	Education Support Motivation Cognitive	Good effects showed both in blood sugar control outcomes and psychological adjustment.
Chen et al 2012 China	To evaluate the effectiveness of a motivational interviewing on self management, psychological and glycemic values for people with type 2 diabetes	Randomized study	Mixed	Mothivational interviewing with personal tailored content and delivered with a variety of interviewing techniques	Motivation	The intervention improved self-management, self-efficacy, QoL as well as HbA1c significantly in intervention group. However no difference observed in depression, anxiety and stress between groups
Vincent et al 2014 USA	To present the effect of a of a community-based, culturally tailored diabetes prevention program on diabetic risk factors	Randomized study	Quantative	Cultural tailored educaton program from aspects as language, communication method culture adjusted diet therapy and family engagement	Education	Results from weight reduction, waist circumference, BMI showed significant improvement as well as diet self-efficacy. And effects was evaluated with good persistence
Collins-McNeil et al 2012 USA	To show the effectiveness of culturally targeted diabetes self-management education on over middle-aged T2DM African American	Pilot study	Quantative	Cultural tailored educational program focused on diet, exercise, monitoring blood glucose, medication adherence, problem solvning, risk reducing and healthy coping	Education	Self-management such as medication adherence, diet and foot care had greatly improved, as well as better clinical values like SBP, Blood lipids. Higher activity level and reduction in waist circumference had observed
Edelman et al 2015 USA	To assess the effectiveness of nurse community-based behavioral management among patients with both DM and HTN	Randomized study	Quantative	Personal tailored behavioral support focused on DM and HTN from nurses through telephone 1-2 times/week	Support	No difference observed between intervention group and control group
Farmer et al 2012 UK	To determine the effects of nurse-led consultation-based intervention in diabetic medication adherence	Randomized study	Mixed	Inovative consultation based intevention to motivate patients for medication self-management	Motivation	Result support the effect of intervention in increasing medication adherence without negatively affect patients satisfaction on treatment

Inouye et al 2015 HAWAI	To identify the effects of cognitive behavioral therapy on diabetic care from aspects of QoL, clinical outcomes and depressive symptom.	Randomized study	Mixed	Cognitive behavioral therapy that facility patients with self-management support such as bio-feedback, breathing exercises and stress relieve	Cognitive	Less depressive symptom and good result in misguided support scores, with growing health beliefs in intervention arms. Well controlled HbA1c in both groups. However persistent of all improvements was less than 12 months
Jutterström et al 2016 Sweden	To evaluate the effect of a patient-centered self-management support for T2DM in HbA1c control	Randomized study	Quantative	Group discussion (GI) or individual conversations with pretrained nurses (II)	Support	Control of HbA1c improved significantly in the intervention groups.
Vermunt et al 2012 Dutch	To determine the effectiveness of a 2.5 - years' lifestyle intervention for preventing type 2 diabetes in Dutch	Randomized study	Quantative	2.5-year lifestyle intervention consisted of lifestyle counselling from healthcare providers	Support	Modest improvement in diet, exercising, weight and glucose control. But rebound to baseline at the end of the research. Improved relations between patients and healthcare providers as well patient satisfaction were observed.
Deng et al 2016 China	To identify the efficacy of peer support in diabetic care for Chinese T2MD patients	Randomized study	Mixed	3 months traditional diabetes interventions followed with peer support training	Support	Intervention group patients showed better results in HbA1c control as well as significantly improved self-management capacity
Jessee et al 2012 USA	To study the effectiveness of multidisciplinary nurse practitioner coordinated team group visits in medically underserved Appalachia on the health, knowledge, and self-efficacy of T2DM	Quasi study	Quantative	Group meetings with multidisciplinary team and a experiential learning activity with a detician	Support Education	Both the mean blood sugar levels and the mean HbA1c were lower in the intervention group but not significantly
Wu et al 2013 Taiwan	To analyse efficacy of improving disease management after implementing a self-management programme for T2MD administered by special trained healthcare workers	Quasi study	Quantative	watching educational videos, reading a diabetes self-care handbook. self-efficiency consultation, positive reinforcement and telephone follow-up	Education Support Follow-up	Significantly lower BMI, waistline circumference, HbA1c, degrees of anxiety and depression and a higher significantly higher degree of self-efficacy and self-care

- Education refers to all tailored education used in articles that is pursuing its aim in self-care support. For example: culture tailed education, individual tailored education program.
- Support includes individual support, group support and all kinds of supports that is interfered by nursing interventions
- Motivation means motivation interviewing that used in the articles in the purpose for initiating and enhancing adherence to self-care process
- Follow-up consists of telephone follow-up, home visit and patient contact with healthcare providers for follow-up interventions with the aim of developing self-care
- Cognitive behaviour therapy is the intervention for improving patients' self-efficiency and improving mental quality of life

Appendix 5 Coding and Synthesising

Article	Result	Code	Code group	Theme
Vincent et al, 2014 USA	There were significant decreases from for weight, waist circumference, BMI, ...significant increases in the diet self-efficacy score, the physical activity self-efficacy score, and the frequency of fruit and vegetable intake.	Risk factors (BMI, weight, waist) (+) Diet self-efficacy score (+) Physical activity self-efficacy score (+) fruit and vegetable intake (+)	Risk factors Diet Self-management	self-care capacity
Collins-McNeil et al, 2012 USA	there was a mean change in SPB, a reduction in LDL, an increase in HDL, and a reduction in TG	SPB (+) Cholesterol (HDL,LDL) (+) TG (+)	metabolic parameters	Clinical outcomes
	Participants also had an average reduction in waist circumference and an average weight loss	Waist circumference (+) Weight loss (+)	risk factors	self-care capacity
	They had lower perceived stress levels post-intervention	Stress level (+)	mental effects	quality of life
	participants showed significant improvements in adherence to diabetes self-management practices, including medication and insulin administration, diet and foot care self-care practices ...no significant differences in physical activity and glucose monitoring ...	Adherence to self-care management (medication, diet and foot care) (+) Physical activity (0) Glucose monitoring (0)	diet self- management risk factors	self-care capacity
Farmer et al, 2012 UK	No patients were identified as stopping their medication during the period of twelve weeks. There were no significant differences between groups for secondary outcomes including self report medication adherence, SF-12 (physical, mental), diabetes treatment satisfaction, HbA1c, satisfaction with communication with the nurse, or hypoglycaemia.	medication adherence (0) SF-12 (0) treatment satisfaction (0) HbA1c (0) Communication Satisfaction (0) hypoglycaemia (0)	self- management metabolic parameters quality of life relation	Clinical outcomes self-care capacity quality of life other
Chen et al, 2012 China	In the experimental group, the HbA1c significantly reduced from the baseline to 3 months follow-up	HbA1C (+)	metabolic parameters	clinical outcomes
	the motivational interview did improve participants significantly in diabetes self-management and self-efficacy among diabetes people.....	self-management (+) Self-efficacy (+)	self-management Self-efficacy	self-care capacity
	Quality of life increased steadily in the experimental group...decreased in depression anxiety stress mean score...	QoL (+) depression anxiety stress (+)	mental Quality of life	quality of life
Jessee et al, 2012 USA	Both the mean blood sugar levels and the mean HbA1c were lower in the intervention group but not significantly due to the small sample size. Interesting results nevertheless since the study were using a multidisciplinary team	HbA1c (+) Blood sugar level (+)	Metabolic parameters	clinical outcomes

Vermunt et al, 2012 Dutch	Cumulative diabetes incidence was not significantly different between the intervention group and the usual care group. Fasting plasma glucose significantly decreased, Two-hour plasma glucose improved over the first half year, but increased to levels higher than at baseline	Cumulative diabetes incidence (0) Glucose (FG,2h-PG) (+)	Metabolic parameters	clinical outcomes
	Both groups showed small but significant reductions in weight and BMI over 2.5 years. In both groups, waist circumference decreased during the first half-year, but thereafter increased to levels comparable to baseline. Participants in both groups reported lower levels of total physical activity after 2.5 years Total energy intake significantly decreased over 2.5 years in both of the groups. In both groups, dietary fibre intake was lower after 2.5 years than at baseline. However, reductions were more pronounced in the usual care group	Risk factors management (Weight, BMI, Waist circumference and Physical activity) (-) Total energy intake (+) Fat intake (standard, saturated) (+) Dietary fibre decreasing (-)	Risk factors Diet	self-care capacity
	Seventy percent of the participants was satisfied and 25 % was moderately satisfied with the guidance from their nurse practitioner. Of all providers, 81 % reported medium or high satisfaction with individual counselling.	Patient satisfaction (+) Providers' confidence (+)	relation	other
Deng et al, 2016 China	...the levels of HbA1c, FPG, 2h-PG, TG, incidence of hypoglycemia, BMI and TC were significantly decreased in the peer group compared with the control group ...	Body weight, BMI (+) Glucose (HbA1c, FG, 2h-PG) (+) TG (Triglyceride) (+) hypoglycemia incidence (+) TC (total cholesterol) (+)	Metabolic parameters Risk factors	clinical outcomes self-care capacity
	Peer group exhibited significant improvement in knowledge related to the insulin usage.. Diet control, sports therapy, and blood glucose self-monitoring...the peer training group showed more significant improvement... Attendance of intervention-group participants at group-consultations gradually decreased from 72 % to 38 %.	Knowledge related to insulin usage Diet control Sports therapy Glucose self-monitoring Intervention adherence (-)	self-management risk factors treatment	self-care capacity
Edelman et al, 2015 USA	Similar results were found for both HbA1c and SBP	HbA1c (0) SBP (0)	metabolic parameters	Clinical outcomes
	no significant differences between arms in DBP, weight, or leisure time physical activity throughout the two-year study period	physical activity (0) DBP (0) Weight (0)	risk factors self-management	self-care capacity
Jutterström et al, 2016 Sweden	A significant difference in HbA1c between the GI and EC groups, and a difference in total cholesterol between GI and IC groups at baseline. No other changes in metabolic parameters (BMI, Waist circumference, Cholesterol, HDL, LDL, Triglycerides, Blood pressure systolic, Blood pressure diastolic) were found	HbA1c (+) Cholesterol (HDL,LDL) Triglycerides (0) Blood pressure (0) Risk factors (BMI, waist) (0)	metabolic parameters Risk factors	clinical outcomes self-care capacity
	There was also a significant difference in treatment, where the EC group had the most participants with diet and/or insulin treatment	Treatment (+)	intervention focus	other

Inouye et al, 2012 Hawaii	A significant difference between the CBT and DES groups was found for depressive symptoms...	Depressive symptoms (+)	mental quality of life	quality of life
	statistically significant difference was detected for susceptibility in the health beliefs..at 12 months, no significant change in susceptibility..no significant differences observed for weight, body mass index, and BP changes ..	Health beliefs (+) Weight, BMI (0) BP (0)	mental effects metabolic parameters Risk factors	clinical outcomes self-care capacity
	There was a small improvement in A1c levels in both CBT and DES groups, but there was no change after 12 months Changes in lipid profile from PreSession were similar in the two groups, but not significant between groups post-intervention.	HbA1c (0) Lipid profile (0)	metabolic parameters	clinical outcomes
Wichit et al, 2016 Thailand	diabetes self-efficacy, self-management, quality of life and diabetes knowledge improved over time in the intervention group at Week 13 the intervention arm scored higher than the controls in the mental component of quality of life	diabetes knowledge (+) mental quality of life (+)	self-efficacy self-management quality of life mental effects	self-care capacity
	Better self- management significantly increased self-efficacy, both physical and mental components of quality of life, knowledge, and significantly improved glycemic control by decreasing HbA1c levels.	HbA1c (+) physical component (+) Knowledge (+)	metabolic parameters Risk factors Self-efficiency	Clinical outcomes self-care capacity
Wu et al, 2013 China	Significantly lower BMI, waistline circumference, HbA1c	HbA1c (+) Risk factors (BMI, Waist) (+)	Metabolic parameters Risk factors	clinical outcomes self-care capacity
	degrees of anxiety and depression, and a significantly higher degree of self-efficacy and self-care.	Mental effects (anxiety, depression) (+) Self-efficiency (+)	Mental effects Self-efficiency	self-care capacity quality of life
Huang et al, 2016 Taiwan	HbA1C and fasting glucose in the experimental group were significantly lower	HbA1c (+) fast glucose (+)	metabolic parameters	Clinical outcomes
	depressive symptoms in the experimental group were significantly lower than in the control group ...BMI and physical and mental QoL in the experimental group did not differ ...	depressive symptoms (+) BMI (0) Physical quality of life (0) Mental quality of life (0)	Risk factors Physical QoL Mental QoL	self-care capacity quality of life