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REVIEW

Discovering Elements and Developing Strategies to Implement the Tailored Care Education for Patients with Diabetes through A Systematic Review

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Abstract

Background: The popular intervention in avoiding diabetes complications in several countries is health education. However, a tailored care education approach based on the phenotyping of patients' abilities, preferences, cultural orientation is still unclear.
Purpose: To discover elements and develop strategies to implement tailored care education for patients with diabetes through a systematic review.
Methods: This two-stage systematic review was conducted. The first stage was primary search and assessed the quality of articles followed by discovering elements and developing strategies of tailored care education for patients with diabetes in the second stage.
Results: This review included 44 out of 1421 articles that were published in English and focused to discuss on tailored care education for patients with diabetes. Self-management, patient preferences, patient value, interprofessional collaboration, tailored support, glycemic control, and patient centre were among the elements. These factors were utilized to develop seven step strategies for providing diabetes patients with tailored care education.
Conclusion: Traditional clinical intervention, decision-making, and future research trends are predicted to be transformed into a personalized care approach. Establishing the effectiveness of tailored care education programs in reducing the risk of diabetes complications among diabetic patients is needed.

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1. Introduction

Compared to other people, diabetics have a higher risk of developing numerous complications. Every 30 seconds, people with diabetes are two to three times more likely to develop cardiovascular disease, and ten times to get end-stage renal disease, as well as a lower limb amputation (WHO, 2016). The International Diabetes Federation (IDF) estimates that total healthcare expenditure for diabetics aged 20 to 79 years is USD 966 billion in 2021; it will become USD 1.03 trillion by 2030 and USD 1.05 trillion by 2045 (IDF, 2021).

In numerous nations, health education is a popular intervention for preventing diabetes complications. However, a standardized approach to health education does not serve all patients equally (Hertroijs et al., 2018a). The education have to tailor-made to the specific patient's needs (social–cognitive determinants, intention, and behavior) (Pranata et al., 2021). Furthermore, people have the right and obligation to participate in the planning and delivery of their health care (Pranata, Shing, et al., 2021). Patient-centered is related with better levels of patient satisfaction and more effective patient education (Sassen, 2018). Clinical guideline recommendations that require more specific identification based on demands and treatment goals are now being

hampered by the availability of health data relevant to diabetic patients in particular (Pranata, Wu, et al., 2021).

The term "tailored care education" has been used to describe those research approach. The Vedas, India's ancient books, first described tailored care 4000 years ago (Dekkers & Hertroijs, 2018). It was originally known as Ayurvedic medicine, and its goal was to adapt therapy to each individual in order to keep the body, mind, and spirit in harmony. The goal of tailored care education currently is to improve patients' health goals by incorporating the specific requirements and preferences into the plan of treatment (Dekkers & Hertroijs, 2018; Hertroijs et al., 2018a). Education-based on phenotype is considered. Such considerations are able to group patients by their care needs and preferences for achieving personalized goals (Dekkers & Hertroijs, 2018; Hertroijs et al., 2018a; Lutes et al., 2020; Osborn et al., 2010). Modifying the program for patients with diabetes which includes a tailored care education can help reduce the number of complications (Cimo et al., 2020). Patient centre, preference, and cultural orientation refer to tailored care education (Cimo et al., 2020; Dekkers & Hertroijs, 2018; Hertroijs et al., 2018b; Lutes et al., 2020; Osborn et al., 2010; Solano et al., 2020). Education approaches by using flexibility in teaching to match personal needs, and empowering clients in self-management are examples of tailored care education implementations (Cimo & Dewa, 2019).

Although there have been many studies on tailored care interventions in diabetic patients, the strategy for implementing tailored care education is still unclear. One study mentions strategies for implementing tailored care education (Van de Velde et al., 2016), but another study also mentions other strategies with different way (Van de Velde et al., 2016; Wensing et al., 2014). The various implementation strategies are closely related to the unclear elements that involved the concept of tailored care education. The aim of this study was to discover elements and develop strategies to implement tailored care education for patients with diabetes through a systematic review.

2. Methods

2.1 Research design

This study qualifies as a systematic review because of the discovery, selection, assessment, and synthesis of high-quality research material relevant to the research issue. A systematic review entails the identification, selection, evaluation, and synthesis of high-quality research evidence (Bettany-Saltikov, 2012). Moreover, systematic review is undertaken in answer to a specific research issue using a rigorous research technique (Polit, 2017).

2.2 Search methods

We combined the keywords: tailored care, tailored care education for diabetes using the Boolean logic operators "AND" and "OR". EBSCO Host engine search included MEDLINE Complete, MEDLINE With Full Text, Academic Search Complete, Computers & Applied Sciences Complete, Education Research Complete, SPORTDiscus With Full Text, Professional Development Collection, OmniFile Full Text Select (H.W. Wilson), Newspaper Source, and APA PsycArticles were databases searched in this study.

2.3 Inclusion and exclusion criteria

We discovered studies in the literature that were clearly focused on tailored care education for diabetes and published in English from January 2016 to December 2021. On the other hand, articles not aligned with tailored care, incomplete, participants not having diabetes, and unrelated with tailored care education concepts were exclusion criteria of this study.

2.4 Screening of articles

As many as 1421 relevant papers about tailored care education for diabetes were found. Members of the study team (SP, SFVW, and KK) reviewed the title and abstract, then excluded articles based on the following criteria: duplication (n = 678), article not aligned with tailored care (n = 406), incomplete (n = 87), participants not having diabetes (n = 121), and unrelated with tailored care education concepts (n = 77). Following the exclusion criteria, the number of articles excluded were (n = 1369). The full texts of all 44 articles that matched the inclusion criteria were obtained, reviewed for the level of evidence and quality before study extraction (Figure 1).

2.5 Data extraction

In this stage, we assessed the tailored care education elements after summarizing the derived literature search findings in Table 1, further developed clinical strategies to implement tailored care education for patients with diabetes in Table 3. Every paragraph that referenced tailored care education was highlighted, split, and suggestions were generally marked by punctuation. We also created coding roles and coding sheets based on the study protocol, which comprised a list of mutually exclusive and exhaustive ideas (e.g., patient centre, and phenotype). The two specialists (SFVW and TJTW) coded, extracted, and combined the data separately, and then established a final consensus following discussion.

2.6 Quality appraisal

Researchers (SFVW, TJTW, SYL, YHC, and KCL) used the Joanna Briggs Institute Validity Scale 2011 to review level of evidence and assessed the quality of articles (Higgins & Deeks, 2011). The result is presented in Table 1.

Table 1. Extraction of the elements, level of evidence and quality of articles

No		Method	Population	Level of evidence	Summary of appraisal	SM	PP	PV	IC	TS	GC	PC
1.	(Berkowitz et al., 2020)	QS	Diabetes	6	Fair		✓	✓				
2.	(Benavides-Vaello et al., 2017)	QS	Diabetes	6	Fair	✓						
3.	(Berkowitz, Terranova, et al., 2019)	RC	Diabetes	4	Good							
4.	(Hedderson et al., 2018)	RCT	Diabetes	2	Good					✓		
5.	(Lake et al., 2018)	MM	Diabetes	2	Good		✓		✓			
6.	(Kassavou et al., 2020)	RCT	Diabetes	2	Good					✓		
7.	(Hu et al., 2016)	RCT	Diabetes	2	Good							
8.	(Solano et al., 2020)	RCT	Diabetes	2	Good						✓	
9.	(Tervaskanto-Mäentausta et al., 2017)	CS	Diabetes	7	Fair				✓			
10.	(Goodfellow et al., 2016)	RCT	Diabetes	2	Good				✓			
11.	(Campmans-Kuijpers et al., 2015)	RCT	Diabetes	2	Good					✓		✓
12.	(Huang et al., 2019)	RCT	Diabetes	2	Good			✓				
13.	(Choi et al., 2017)	CS	Diabetes	7	Fair			✓				
14.	(Brown et al., 2015)	CS	Diabetes	7	Fair			✓				
15.	(de Sequeira et al., 2019)	QS	Diabetes	6	Fair			✓				
16.	(Navodia et al., 2019)	SR	Diabetes	1	Good			✓				
17.	(Nelson et al., 2016)	CS	Diabetes	7	Good	✓	✓			✓		

Table 1. Continued

No		Method	Population	Level of evidence	Summary of appraisal	SM	PP	PV	IC	TS	GC	PC
18.	(Krishna & Provenzano, 2019)	QS	Diabetes	6	Good	✓			✓	✓		
19.	(Lake et al., 2020)	RCT	Diabetes	2	Good	✓						
20.	(Caro-Bautista et al., 2021)	SR	Diabetes	1	Good	✓	✓					
21.	(Patel et al., 2017)	QE	Diabetes	4	Fair	✓				✓		
22.	(Nelson et al., 2021)	RCT	Diabetes	2	Good	✓				✓		
23.	(Joo & Liu, 2021)	SR	Diabetes	1	Good	✓		✓		✓		
24.	(Berkowitz, Terranova, et al., 2019)	RCT	Diabetes	2	Good	✓						
25.	(Ballotari et al., 2017)	SR	Diabetes	1	Good	✓					✓	
26.	(Nijpels et al., 2019)	LR	Diabetes	5	Fair							✓
27.	(Camacho et al., 2015)	CS	Diabetes	7	Fair			✓	✓			
28.	(Alamer et al., 2020)	QE	Diabetes	4	Fair	✓				✓	✓	
29.	(Lim et al., 2016)	RCT	Diabetes	2	Good	✓					✓	
30.	(Piombo et al., 2020)	MM	Diabetes	2	Good	✓		✓				
31.	(D. F.L. Hertroijs et al., 2018)	MM	Diabetes	2	Good	✓	✓			✓		
32.	(Liddy et al., 2016)	QS	Diabetes	6	Fair				✓			
33.	(O'Neil et al., 2016)	RCT	Diabetes	2	Good	✓						
34.	(Cummings et al., 2019)	RCT	Diabetes	2	Good	✓						
35.	(Dorijn F.L. Hertroijs et al., 2018)	SR	Diabetes	1	Good		✓		✓			
36.	(Keramat, 2018)	QS	Diabetes	6	Fair	✓	✓	✓				
37.	(Gold et al., 2019)	MM	Diabetes	2	Good				✓	✓		
38.	(Holmen et al., 2017)	SR	Diabetes	1	Good	✓						
39.	(Dekkers & Hertroijs, 2018)	LR	Diabetes	5	Fair		✓					
40.	(Iovane et al., 2017)	QE	Diabetes	4	Fair	✓				✓	✓	
41.	(Kasteleyn et al., 2016)	RCT	Diabetes	2	Good					✓		
42.	(Munsour et al., 2020)	RCT	Diabetes	2	Good					✓	✓	
43.	(Afandi et al., 2020)	LR	Diabetes	5	Fair	✓	✓					
44.	(Jeon et al., 2016)	CS	Diabetes	7	Fair					✓		

Note: SM: self-management; PP: patient preferences; PV: patient value; IC: interprofessional collaboration; TS: tailored support; GC: glycemic control; PC: patient centre; SR: systematic review; RCT: randomized controlled trial; MM: mix method; QE: quasi experiment; RC: retrospective cohort; CS: case study; QS: qualitative study; LR: literature review.

2.7 Data analysis

This review could not perform a meta-analysis due to heterogeneity in the methods and statistical values of the outcomes. Therefore, a thematic analysis was conducted (Nowell, 2017). The elements of tailored care education were discovered. These findings are illustrated under the themed headings in Table 2.

3. Results

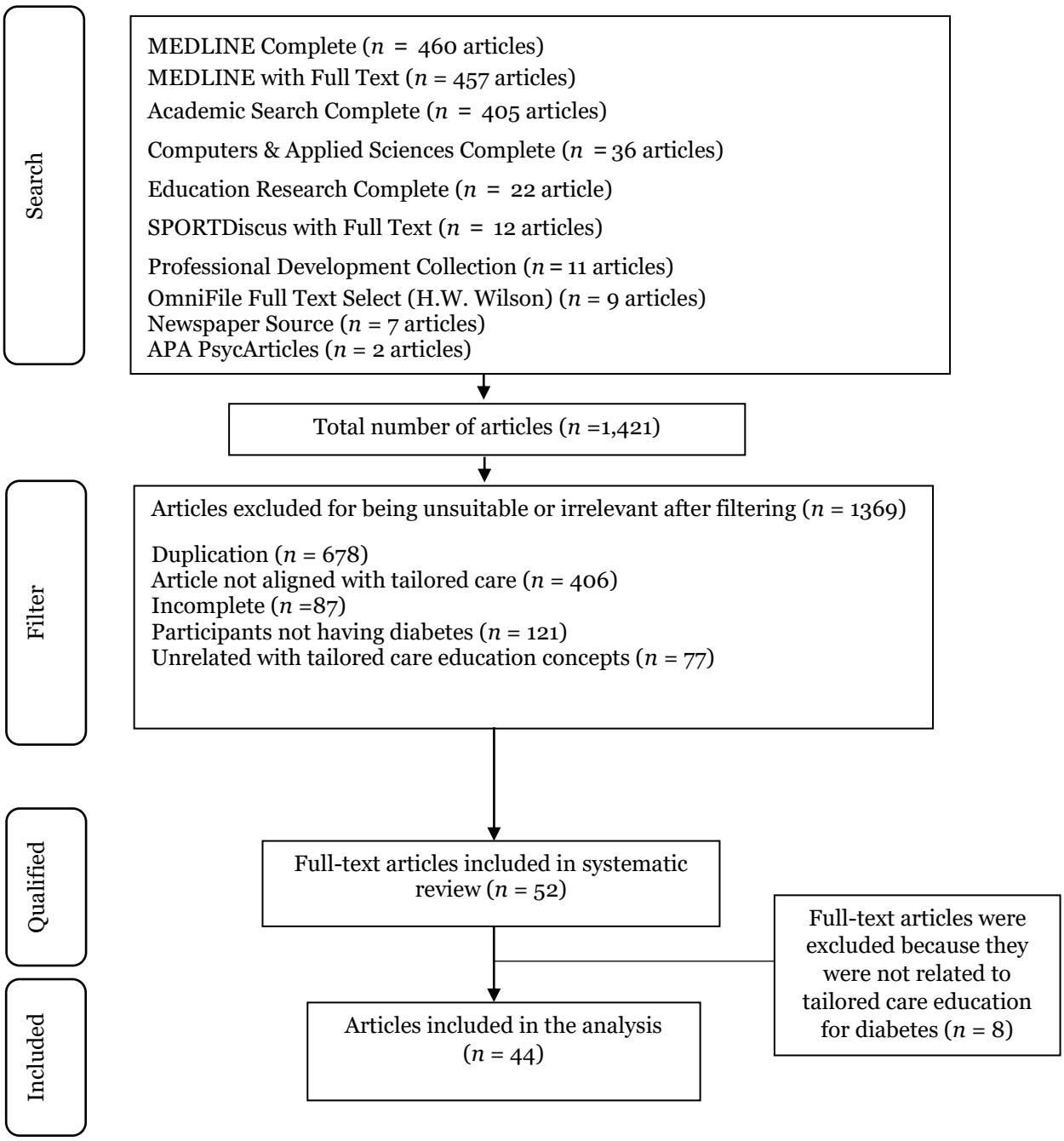

Figure 1. Flowchart of screening articles on tailored care education for diabetes

3.1 Discovery elements of tailored care education and concept description

We outlined the tailored care education elements for patients with diabetes were self-management, patient preferences, patient value, interprofessional collaboration, tailored support, glycemic control, and patient centre. By extracting data from each article and comparing definitions, we were able to identify the concepts and then combine the results. As a result, after

consulting with the research team, we reached to a final decision. Table 2 shows the concept descriptions for each element, which are detailed below.

3.2 Definition of tailored care education for patient with diabetes

Related with tailored care education elements, tailored care education definition was an approach in interdisciplinary collaboration among health professionals, patients, and families in which patients became the center of service through personalized consideration of patient preferences, values, ethnicities in the achievement of personalized goals in self-management and glycemic control (Caro-Bautista et al., 2021; Choi et al., 2017; Cimo & Dewa, 2019; Cummings et al., 2019; Iovane et al., 2017; Prato et al., 2010; Van de Velde et al., 2016).

Table 2. The concept description of tailored care education elements

No	Elements	Concept description
1.	Self-management	Reflecting the cognitive, emotive, and behavioural areas within the context of the culture.
2.	Patient preferences	Phenotyping and biopsychosocial characteristics were consideration to identify various health-care needs of patients
3.	Patient value	Diabetes patient impressed with medically adjusted meals, emphasizing the value of culturally acceptable food
4.	Interprofessional collaboration	Through culturally targeted diabetes education, health providers primarily offered information and used knowledge reinforcement to induce behavioral change
5.	Tailored support	The community will benefit from the support of an interdisciplinary team as well as family members in achieving optimal metabolic control
6.	Glycaemic control	Effects on diabetes control (e.g., haemoglobin A1c) and patient lifestyles should be evaluated in longer-term evaluation
7.	Patient centre	Several professional recommendations divide individuals with diabetes into three risk groups: very high/high, moderate, and low. This classification was based primarily on the kind of disease, metabolic control level, and therapy type, with the presence of other comorbidities and situational factors being adjusted.

3.3 Strategies of tailored care for patients with diabetes

Broadly, the main strategy in applying tailored care education is to make various efforts, such as 1). Brief deducting teaching; 2). Assessment of patients' self-management levels and characteristics; 3). Writing a list of patients' needs, glycemic control and difficulties; 4). Rank a personal priority; 5). Setting a goal and drafting an action plan using brainstorming and a support group to archive patients' unique objective behaviors; 6). Follow-up; and 7). Goals-attempted report (Afandi et al., 2020; Ballotari et al., 2017; Campmans-Kuijpers et al., 2015; Caro-Bautista et al., 2021; Choi et al., 2017; Hertroijs et al., 2018b; Iovane et al., 2017; Joo & Liu, 2021; Navodia et al., 2019; Nelson et al., 2021; Nijpels et al., 2019; Patel et al., 2017; Van de Velde et al., 2016; Wensing et al., 2014). The development of strategies adopted from the elements of tailored care education can be read in Table 3.

Table 3. Developed clinical strategies of tailored care education based on elements

No	Elements	Clinical strategies
1.	Self-management	Within the scope of the culture, self-management reflected cognitive, emotional, and behavioral aspects (Benavides-Vaello et al., 2017; Krishna & Provenzano, 2019; Lake et al., 2018; Nelson et al., 2016, 2021).
2.	Patient preferences	Phenotyping of a patient's biopsychosocial characteristics can help health professionals to identify patients with various health-care needs (Berkowitz et al., 2020; Berkowitz, Terranova, et al., 2019; Caro-Bautista et al., 2021; Nelson et al., 2016).
3.	Patient value	Diabetes patient pleased with medically adjusted meals, emphasizing the value of culturally acceptable food (Choi et al., 2017; de Sequeira et al., 2019).

Table 3. Continued

No	Elements	Clinical strategies
4.	Interprofessional collaboration	Through culturally targeted diabetes education, health providers primarily offered information and used knowledge reinforcement to induce behavioral change (Goodfellow et al., 2016; Krishna & Provenzano, 2019; Tervaskanto-Mäentausta et al., 2017).
5.	Tailored support	The community will benefit from the support of an interdisciplinary team as well as family members in achieving optimal metabolic control (Alamer et al., 2020; Joo & Liu, 2021; Nelson et al., 2016).
6.	Glycaemic control	Glycaemic control referes to HbA1c level and patient's lifestyles (Alamer et al., 2020; Ballotari et al., 2017; Solano et al., 2020).
7.	Patient centre	Several professional recommendations divide individuals with diabetes based on the kind of disease, metabolic control status, therapy type, and the existence of other comorbidities and contextual factors, as well as continued follow-up and reporting of each patient's personalized goals into three risk groups were very high/high, moderate, and low (Campmans-Kuijpers et al., 2015; Nijpels et al., 2019).

4. Discussion

The main purpose of this study was to discover tailored care education elements and developed strategies to implement tailored care education for patients with diabetes. Seven elements of tailored care education for patients with diabetes has its own meaning to translate the overall tailored care education concept. These elements serve as a foundation for evolving seven-step strategies for facilitating the implementation of tailored care education for patients with diabetes.

Self-management solutions that were culturally relevant and addressed cognitive, emotional, and behavioral aspects in control desire to eat, advice in diet adjustment (Benavides-Vaello et al., 2017). More specific and realistic instruction is essential in self-management (Benavides-Vaello et al., 2017). In addition, grasp of which phenotype in the identification of patients with various health-care needs related with patient preferences. Only by taking into account the care preferences of patients, the health professionals can an efficient in tailored care education implementation (Hertroijs et al., 2018b). Patients' biopsychosocial characteristics are utilized to identify their care needs, abilities, and preferences for customizing solutions using a tailored care education approach (Dekkers & Hertroijs, 2018).

Diabetes patients impressed with medically adjusted meals, emphasizing the value of culturally acceptable food, refer to patient values. A transcultural intervention based on clinical and socio-cultural factors and tailored to the patients' lifestyles improves adherence to dietary restriction (Piombo et al., 2020). Through interprofessional collaboration, health professionals can provide group didactic teaching. Patients were given individual clarification at the end of an education session in order to create their own management plan. Through culturally tailored diabetes education, health providers primarily offered information and employed knowledge reinforcement to facilitate behavioral change (Choi et al., 2017). The consultations, emotional support, and technique of lifestyle teaching are the most significant factors of diabetes care (Hertroijs et al., 2018b). Resource center, motivator, and outside perspective are crucial roles of health professionals. Clinical information systems, decision support tools, flow sheets, and delivery system design are the examples of these advances (community resources) (Liddy et al., 2016).

Moreover, community health centre will benefit from tailored support from an interdisciplinary team, including training and technical assistance, to enable patients' action, which will give timely recommendations to primary care providers (Gold et al., 2019). The tailored support intervention improves health status and well-being, which are both promising (Kasteleyn et al., 2016). In addition, the help of their family members can be supporting system among diabetic patient to achieve their adequate metabolic and glycemic control (Iovane et al., 2017). Glycemic control included HbA1c should be evaluated in longer-term evaluation (Berkowitz, Delahanty, et al., 2019). The effects will be greater if medically adjusted meals are accompanied with diabetes self-management education or lifestyle changes (Berkowitz et al., 2020). Medically customized meals improved dietary pattern then decreased hypoglycemia. A transcultural

intervention based on clinical and socio-cultural factors and tailored to the patients' lifestyles improves adherence to dietary restriction (Piombo et al., 2020). For tailored care education, several professional recommendations are divided diabetic patients into extremely high/high, moderate, or low risk groups. It is referred to patients centre. The classification of patients centre is based on metabolic control level, and therapeutic type. Taking into account the hours of fasting during the day, weather, resources, personal eating, sleeping, and activity patterns, prior fasting experience, and patient preferences are example of tailored diabetes management in Ramadhan fasting context. Encourage clinicians to think outside the box when deciding whether or not to fast and how to change treatment regimens efficiently if fasting is deemed safe (Afandi et al., 2020).

In the early phases of implementing a tailored care education plan, brief deducting instruction is required. The application of brief deduction instruction is based on two key components. Self-management and interprofessional collaboration are two of these elements (Benavides-Vaello et al., 2017; Choi et al., 2017; Hertroijs et al., 2018a; Liddy et al., 2016). Sharing information through health seminars between health professionals together with diabetic patients might be used to provide brief deducting instruction (Choi et al., 2017). Health education, such as brief deducting teaching, will help patients with diabetes manage their health at home. As we have discovered, one of the crucial element of diabetes education was self-management (Benavides-Vaello et al., 2017). Self-management entails emphasizing a specific treatment plan for patients (Ballotari et al., 2017; Liddy et al., 2016; Navodia et al., 2019; Solano et al., 2020). Furthermore, patients with diabetes should practice self-management due to stresses precise problem solving and reduces the need of unnecessary treatments (Liddy et al., 2016). For health literacy, it is critical to confirm and clarify this understanding. It is vital to validate and explain this understanding in the context of health literacy. In a nutshell, medical experts, nurses, nurse specialists, and dietitians should all build multidisciplinary communication platforms and collaboration models (Benavides-Vaello et al., 2017). Health care professionals must disseminate patient information. It would help patients better comprehend the plans while they were at home (e.g., test, medicine, procedure, behavior modification).

Other processes in assessing patients' self-management level and characteristics include guiding the construct lists of their requirements, prioritize, personalized purpose, and personalized plans to achieve their objective (Holmen et al., 2017; Liddy et al., 2016; O'Neil et al., 2016; Piombo et al., 2020). This process can provide diabetic patients with specialized care and allow for the creation of a treatment plan based on more accurate diagnosis and care, resulting in improved treatment and care efficacy (de Sequeira et al., 2019).

A patient center that takes into account not only medical care but also glycemic monitoring, preferences, and values (Berkowitz, Delahanty, et al., 2019; Berkowitz, Terranova, et al., 2019; Dekkers & Hertroijs, 2018; Hertroijs et al., 2018a; Piombo et al., 2020). The agreement between health providers and patients on tailored glycemic control goals is based on tailored care education (Benavides-Vaello et al., 2017).

The aim for individualization was set based on the risk of hypoglycemia episodes among patients. Patient-centered tailored care education solutions for diabetic patients in clinical practice must include dynamic personalized glycaemic control and strategies produced by a care team (Berkowitz, Delahanty, et al., 2019; Piombo et al., 2020). The patient and health care team's goals can help to lessen an error in intervention, foster collaboration among health professionals with patients, improve patient goals, quality of life, and evade pointless medical treatments as well as lowering the medical burden (Berkowitz et al., 2020; Berkowitz, Delahanty, et al., 2019; Berkowitz, Terranova, et al., 2019; Piombo et al., 2020; Purwadi et al., 2021).

Strategies to rank the priorities of each patient, create goals, and write action can be accommodated by brainstorming and support groups to achieve glycaemic control and specific target behavior (Berkowitz, Delahanty, et al., 2019; Piombo et al., 2020). This strategy is known as personalized support based on patient value and desire (Dekkers & Hertroijs, 2018; Gold et al., 2019; Hertroijs et al., 2018a; Iovane et al., 2017; Kasteleyn et al., 2016; Piombo et al., 2020). Through brainstorming, patients able to learn each other and work together to solve individual health problems. The capacity to solve problems is thought vital for patients because it can assist them in making the best decisions, which are methodical, rational, and take into account diverse perspectives as a patient-centered approach (Afandi et al., 2020). Furthermore, brainstorming makes it easier for patients to communicate also obtain information they require, particularly

when it comes to establishing glycemic control and specific target behavior (Afandi et al., 2020; Choi et al., 2017; Hertroijs et al., 2018a; Liddy et al., 2016; Piombo et al., 2020).

5. Implications and limitations

Tailored care education is a new approach in the clinical setting and potentially improves self-management and reduce the risk of complications among patients with diabetes. However, the impact on patient outcomes is still debatable, as several studies in this analysis had design flaws that made it difficult to make conclusions. As a result, before presence evaluated on a large sample using the randomized controlled trial (RCT) approach, this strategy must first be examined on a small sample using a pilot study to identify impediments to implementation.

6. Conclusion

Elements to develop strategies for implementing tailored care education for diabetes are needed. Tailored care education strategies are an approach that emphasizes consideration of patient preferences, values and phenotypes. Intervention considerations based on the patient personal goals followed by a collaboration between health professionals and patients through tailored care education might be expected to minimize conflict recommendations of health professionals.

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Author contribution

SP conceptualized, designed, wrote the first draft and framework as well as evaluated the data. SFVW conceptualized, interpreted the data and supervised. TJTW, SYL, YHC, KCL, KK conceptualized and interpreted the data. The published version of the manuscript has been read and approved by all authors.

Conflict of interest

The authors have reported no conflicts of interest.

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