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WJD mainly publishes articles reporting research results and findings obtained in the field of diabetes and covering a wide range of topics including risk factors for diabetes, diabetes complications, experimental diabetes mellitus, type 1 diabetes mellitus, type 2 diabetes mellitus, gestational diabetes, diabetic angiopathies, diabetic cardiomyopathies, diabetic coma, diabetic ketoacidosis, diabetic nephropathies, diabetic neuropathies, Donohue syndrome, fetal macrosomia, and prediabetic state.

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Patient-centered care in diabetes care-concepts, relationships and practice

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Abstract

We still do not have comprehensive knowledge of which framework of patient-centered care (PCC) is appropriate for diabetes care, which elements of PCC are evidence-based, and the mechanism by which PCC elements are associated with outcomes through mediators. In this review, we elaborate on these issues. We found that for diabetes care, PCC elements such as autonomy support (patient individuality), cooperation and collaboration (system-level approach), communication and education (behavior change techniques), emotional support (biopsychosocial approach), and family/other involvement and support are critically important. All of these factors are directly associated with different patient outcomes and indirectly associated with outcomes through patient activation. We present the practical implications of these PCC elements.

Key Words: Diabetes mellitus; Patient-centered care; Autonomy support; Patient activation; Patient adherence

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Core Tip: We still do not have comprehensive knowledge of which framework of patient-centered care (PCC) is appropriate for diabetes care. In this review, we found that PCC elements such as autonomy support, cooperation and collaboration, communication and education, emotional support, and family/other involvement and support are critically important. All of these factors are indirectly associated with outcomes through patient activation.

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INTRODUCTION

Chronic diseases are defined as conditions that last one year or more and that require ongoing medical attention, limit activities of daily living or both[1]. Over the past decade, as a result of the rapid aging of the population and the extended life expectancy of individuals with chronic illnesses, the importance of caring for people with chronic diseases has increased significantly[2]. Diabetes mellitus (DM) is one of the major chronic diseases of the 21st century, primarily due to its increasing prevalence and elevated risk of morbidity and mortality[3,4]. In 2021, the International Diabetes Federation estimated that one in 10 adults aged > 20-79 years had DM, accounting for 537 million individuals worldwide[5]. Micro- and macrovascular complications resulting from elevated blood sugar levels in individuals with type 2 diabetes significantly impact their functional ability, quality of life (QoL), and demand for healthcare services, leading to a substantial economic burden on healthcare systems and national economies[6,7]. Currently, patients play a crucial role in the management of chronic diseases because patient-level factors significantly influence the quality of care[8,9]. This phenomenon demonstrates the importance of patient-centered care (PCC), which emphasizes individualized care, participation and empowerment in self-care.

Evidence-based guidelines suggest that the progression of type 2 diabetes can be delayed and that serious complications might be avoided by adopting a healthy lifestyle through improved self-care behaviors with medication as needed [10]. However, self-management requires patients' full commitment and ability to perform self-care activities, including maintaining healthy dietary habits, engaging in physical activity, monitoring blood glucose, and regularly ingesting medicines. Patients need to make a concerted and self-motivated effort to adopt a healthy lifestyle because pharmacotherapy alone cannot achieve these goals[11]. In addition, type 2 diabetes is complex because it involves multiple risk factors, particularly behavioral or social components that individuals, their families, and society must struggle to implement. Finally, the competence and knowledge of patients and physicians are asymmetric. It is important to aspire to a shift in physician-patient relationships from patient-child relationships to mutual participation (*i.e.*, relationships between adults)[12]. Hence, the consensus report of the American Diabetes Association advocated PCC to enhance patients' engagement in self-care activities for type 2 diabetes self-management[13] and to provide individualized care regarding patients' values, needs, and beliefs[14], which is linked to better health outcomes[15,16]. However, there is a lack of comprehensive knowledge of which PCC frameworks are appropriate for diabetes treatment, which PCC elements are more strongly related to diabetes care, the mechanisms by which they are associated with patient outcomes, and how to apply these PCC principles in outpatient clinical settings. In this review, we further address the above 3 issues.

Critical PCC elements for different health conditions

Overall, the effectiveness of PCC has been suggested through its application to different chronic conditions, such as diabetes, chronic heart failure, hypertension, and cancer, for different patient outcomes, including clinical outcomes, patient satisfaction, and QoL[17-19]. However, patients with different diseases or conditions may have different dominant needs concerning PCC[20]. An analysis of the correlation between perceptions of eight PCC domains and the uptake rate of preventive services revealed that only patient-physician communication was significant, while other aspects of the PCC were not[21]. Three PCC elements for stroke intervention design include delivery in homes, the involvement of families and tailoring to individual needs and priorities[22]. However, most intervention designs for rehabilitation focus on goal setting and shared decision-making (SDM)[23]. The technology used to support the participation of people living with dementia is SDM and collaboration[24]. However, for heart failure, the core PCC domains include professional-patient collaboration, identification of patient preferences, patient-identified goals and patient motivation[17]. Of these, the most important PCC in the home setting involves balancing older adults' needs against professional standards[25]. A recent report revealed that only three out of five examined PCC factors (*i.e.*, communication, emotional support, and goal setting) were correlated with increased patient satisfaction among individuals with schizophrenia[26], but those PCC elements still constitute a paucity of evidence for traumatic brain injury[27]. Hence, discussing which PCC elements are critical for diabetes care is highly important.

PCC frameworks and elements

PCC was first introduced for psychotherapy in the 1950s by Rogers *et al*[28]. Until recently, the definitions of PCC elements have remained inconsistent across the fields of nursing, medicine, and healthcare[14,29], although some concepts have overlapped in some domains. Many articles discuss the PCC framework, systematic reviews of PCC

intervention, and important PCC elements. Below, we will describe these PCC elements.

In 2000, Mead and Bower proposed the PCC framework, which consists of a biopsychosocial perspective, the concepts of patient-as-person (a compound leg fracture may cause more distress to an athlete than to an office worker), sharing power and responsibility (encouraging individuals to take part in decisions), therapeutic alliances and doctor-as-person (the mood of a physician affects the relationship with patients)[30]. The final element was replaced with coordination care in Langberg *et al*[12] framework[31]. In addition, since 1988, the Picker Institute has diligently monitored patients' experiences[32]. The seminal book "Through the Patient's Eyes: Understanding and Promoting Patient-Centered Care," published in 1993[33], is based on research conducted by the Picker/Commonwealth Program for PCC. The Picker Institute/Commonwealth Fund revealed that patients generally define the PCC framework in terms of eight dimensions of inpatient care: Respect for patients' preferences, values, and expressed needs; information, education, and communication; coordination and integration of care and services; emotional support; physical comfort; involvement of family and close others; continuity and transition from hospital to home; and access to care and services[34]. The Institute of Medicine (IOM) proposed the use of the PCC as one of its six objectives for improving health care in the 21st century; PCC involves providing care that is compassionate, empathetic and responsive to the needs, values and expressed preferences of each individual patient and that patients should be informed of decision-makers in their care[35], as inspired by the 8 dimensions of the Picker Institute and Gerteis's definition[33,34]. The IOM proposed 6 dimensions of the PCC framework, including respect for patients' values, preferences, and expressed needs; coordinated and integrated care; providing information, communication, and education; ensuring physical comfort; providing emotional support; relieving fear and anxiety (uncertainty); and involving family and friends[35].

Other studies have proposed important PCC elements. Eigeland *et al*[36] reported that critical physician behaviors in the formation of a good physician-patient relationship can be grouped into six domains: (1) Valuing the whole person, (2) investigating and planning for the future, (3) collaboration and empowerment, (4) validation and emotional support, (5) politeness and courtesy, and (6) professionalism. Abdel-Rahman *et al*[37] proposed important domains for people with diabetes, including challenges living with diabetes; mental health issues, including depression, distress, anxiety, frustration, and loneliness; self-management ability; and patient-clinician relationships. Zeh *et al*[38] assessed PCC among patients with chronic diseases and proposed that PCC elements include the appropriate length of access to care, competence, empathy, individual consideration of each patient's situation, taking a holistic perspective of the patient, patient-centered communication, the integration of multidisciplinary treatment, transparency regarding waiting time and the reduction of unequal access to care. Santana *et al*[39] identified important PCC elements, including cultivating communication and respectful and compassionate care, engaging patients in managing their care, and providing integrated care. Finally, the demand for multimorbid elderly individuals includes eight dimensions: Individual care needs related to aging and chronic disease, biopsychosocial perspectives, clinician-patient communication, characteristics of the clinician, clinician-patient relationships, involvement of family and friends, coordination and continuity of care, and access to care[40]. Regarding different points of view, Jaensch *et al*[41] proposed that the agreement of PCC elements achieved by healthcare professionals and patients be identified for easily accessible, supportive and accommodating environments where information sharing occurs.

Grover concluded that several systematic reviews have identified 11 PCC elements, including patient individuality (individualized care considering patients' experiences, values, needs/concerns, beliefs, priorities, and goals in their current life situation)[30]; engagement (participation and managing their care)[22,41]; empowerment (involving patients in healthcare decisions through activation and motivation)[17,23]; family/caregiver involvement and support; provider training and characteristics; and respect through behavior change techniques (patient education, goal setting, and support), biopsychosocial care (a holistic approach for considering the patient as a person through psychological and social aspects)[23,42,43], SDM, communication (verbal and nonverbal interaction)[41], and a systems-level approach (care coordination)[17].

Based on the above frameworks, a systematic review, and other articles, we analyzed the evidence on PCC elements for diabetes care in the outpatient setting, including autonomy support (patient individuality), goal setting (behavior change techniques), SDM, cooperation and collaboration (system-level approach for integrated care), communication and education (respect, behavior change techniques), emotional support (biopsychosocial approach), family/caregiver/close friends/peer group involvement and support, and patient activation (PA), engagement and empowerment[44]. In this review, we treated PA as a mediator because many studies have shown that PCC elements can achieve this intermediate outcome (see below). Below, we describe the potential PCC elements for diabetes care in detail, including evidence that they influence patient outcomes and the mediators through which they do so.

PA

PA emphasizes patients' willingness and ability to take independent actions to manage their health and care[45]. Hibbard *et al*[46] categorized four stages of activation: The belief that an active role is important, confidence and knowledge in taking action, taking action, and staying the course under stress. The term activation overlaps with many other relevant terms, including belief, self-efficacy, self-competence[47,48], engagement[14], self-management/self-care[47], and empowerment[14]. PA is significantly associated with patient outcomes in diabetes care[49,50].

Autonomy support

According to Williams *et al*[51], autonomy support in healthcare settings refers to providers fully considering patients' perspectives during their interactions, affording choices, offering information, encouraging self-initiation, providing a rationale for recommended actions, and accepting patients' decisions. The goal of autonomy support is to help patients become good managers of their chronic conditions[52]. Studies have shown that person-centered diabetes support has a positive impact on A1C[51,53], health-related QoL[47,53], patient satisfaction[51], and diabetes distress in adults with

type 1 diabetes[54].

Mediators of autonomy support: PA, patient adherence: A previous study revealed that perceived autonomy support is positively correlated with self-management[47]. Another study showed that perceived competence partially mediated the influence of autonomy support on A1C[47]. In addition, autonomy-supportive communication by providers and parents is associated with better treatment adherence in patients with type I diabetes[55].

Goal setting

The goal-setting dimension involves identifying personal goals and designing a specific action plan to motivate and guide individuals toward goal achievement. In this way, individuals modify their behaviors and achieve their goals[56]. Goals for diabetes care can be divided into 7 domains: Optimizing daily self-care, optimizing long-term health, learning about diabetes, achieving measurable goals, managing medications, managing diet and utilizing medical/professional services. Of these, personal and life goals are usually considered, whereas medical-related goals are not[57]. In diabetes care, goal setting is generally conducted by physicians who collaborate with patients to set short-term and specific goals[58], such as diet-related goals[59], and feedback is also provided by physicians. Patients and doctors are usually involved in established partnerships and collaborations[60]. Evidence has shown that a patient-empowerment approach using collaborative goal setting improves A1C[61]. However, other studies have shown that shared goal setting through target A1C has no significant impact on goal achievement[62,63] and that telephone-delivered, collaborative goal setting does not significantly reduce A1C[64] but can reduce diabetes distress levels[65]. Some articles argue that goal setting is not inherently superior to other methods of behavioral change[58].

Mediators of goal setting: PA and trust in physicians: Studies have shown that engaging patients in collaborative goal setting enhances trust in patient-clinician relationships, increases patients' perceived competence, and improves A1C[48].

SDM

In SDM, to inform and empower patients, providers share control of decisions about interventions or the management of health problems with patients through relevant information[22,23,43]. In theory, SDM aligns with the principle of respecting patients' autonomy[66] and can facilitate the life- or medical-related goals described above[59]. This approach is similar to a partnership between the provider and the patient[14]. Several studies have shown that SDM can reduce A1C levels in patients with diabetes[62,63,67] and improve satisfaction[68,69]. However, a systematic review demonstrated that the effects of partnerships between patients and providers are still uncertain due to a lack of high-quality evidence[70].

Mediators of SDM: PA, trust in the physician, adherence: Patients' trust and SDM are bidirectional[71], as is the relationship between PA and the SDM process[72]. In addition, established partnerships and collaborations between patients and doctors can improve adherence[60].

Cooperation and collaboration (system-level approach for integrated care)

Patients with diabetes typically experience multifaceted morbidities[73], where morbidity refers to the simultaneous occurrence of one or more chronic health symptoms[74]. Multiple morbidities may lead to poorer health outcomes, such as worse health-related QoL or higher mortality, in patients with diabetes[75,76]. Additionally, because current clinical practice still follows guidelines for treatment[77], adhering to guidelines for a single disease may result in repetitive and unnecessary services for patients with multiple morbidities[78]. In response to the complex needs of patients with multiple morbidities, the concept of integrated care has emerged. Integrated care involves the coordination of various services by integrating a wide range of specialties[79]. For example, due to the complex nature of diabetes and chronic kidney disease management, patient-centered collaborative care (*i.e.*, including a clinical pharmacist in a medication management program) is needed[80]. The WHO definition of integrated care is broad and encompasses health promotion, disease prevention/diagnosis, disease treatment/management, rehabilitation, and end-of-life care and allows for cross-organizational and hierarchical professional coordination based on patients' needs[81]. This integration includes organizational, funding, and implementation methods for health-related activities, with the common goal of achieving better patient outcomes, experiences, and resource utilization across different units[82]. Fundamentally, the WHO's definition of integration covers both vertical integration (care across different organizations in community and hospital settings) and horizontal integration (improving overall health from a patient-centered perspective within the same organization through professional or peer collaboration)[83].

What are the effects or benefits of integrated care? Previous research indicates the following: (1) According to systematic reviews, collaborative care is effective at reducing depression and improving QoL in patients with diabetes and comorbid depression[84]. Integrating metabolic specialists into primary care can lead to moderate improvements in A1C, blood pressure, and weight management in diabetic patients[85]. Other studies on diabetes suggest that primary care physicians experience significant improvements in their knowledge, skills, and management of diabetic patients through case discussions with metabolic specialists, effectiveness assessments, and educational training. However, time constraints limit the implementation of integrated care[86]; (2) administrative database studies suggest that utilizing multidisciplinary group meetings to discuss high-risk patients can shorten hospital stays and post-emergency department stays compared to a control group; however, no reduction in other outcomes, including costs, has been observed[87]; and (3) according to survey research, integrated care may impact overall satisfaction[88], which may be related to patient outcomes[89,90].

Mediators of integrative care: PA: Studies have shown that integrated care influences patients' participation in treatment [91], which can lead to positive outcomes [52]. For example, integrated care can promote patients' self-management of their diet [92], and this proactive self-management may result in better A1C outcomes [52].

Communication and education

Patient-centered communication has been defined as hearing individual preferences and empowering patients to control conversation topics and decision-making [18]. Patient-centered communication is often related to the concept of education [34]. Person-centered diabetes self-management education has been shown to improve A1C values and QoL and reduce the incidence of microvascular diseases/hospitalizations [53,63,93-95]. However, attendance at a greater number of educational sessions is not associated with improved QoL [94]. Similarly, higher-quality provider-patient communication is associated with perceived personal control and diabetes distress [63,96], satisfaction [69], and impaired communication is associated with poor A1C control [97]. However, one study related to physician education about patient-centered communication and SDM found that this kind of education cannot improve the A1c levels of patients with poorly controlled diabetes [63]. The authors explained that this is probably due to physician education quality with respect to techniques used to evaluate patients' views, attitudes, and behaviors.

Mediators of communication and education: PA, patient adherence: Better adherence was achieved through more patient-centered communication [60,96-98]. Higher-quality provider-patient communication was also associated with improved self-management/self-efficacy [96]. A study that used a realistic evaluation approach demonstrated that education contributes to PA [99]. In addition, PCC between parents and health care providers is important for patients to achieve self-care and self-efficacy during early adulthood [100].

Emotional support

More than 40% of people with diabetes experience diabetes distress [101], which is defined as a negative emotional response to living with and managing diabetes [102]. However, emotional support is not part of the routine in diabetes care [103]. PCC places significant importance on viewing the patient as an individual [12], emphasizing biopsychosocial aspects [30], and considering the personalized context of patients in their daily lives [104]. Thus, emotional support for patients facing daily challenges is crucial, as research suggests that emotional support contributes to positive patient outcomes [17,34,88]. Studies have shown that diabetes-related distress is associated with poor glycemic control, increased complications and increased mortality [105-107]. These factors may interact with spousal influences and are associated with poor glycemic control [108].

Mediators of emotional support: PA, patient adherence: Diabetes distress is associated with poor diabetes self-management [109-111], especially for disadvantaged adults [112]. For individuals with diabetes, addressing emotional distress and concerns about the anticipated negative effects of treatments may be important for improving adherence [110, 113-115].

Family/caregivers/close friends/peer group involvement and support

Dyadic (family and close others) patient-support interventions lead to increased family involvement in diabetes self-management and increased use of support techniques without increasing caregiver stress [116]. Over time, patients gain experiences of social and emotional support, which generates self-awareness in the short term, improves self-care skills, and enhances the utilization of healthcare services and active participation in the therapeutic process [117]. However, findings suggest that dyadic interventions may need to address both peer supporters' harmful involvement and their diabetes distress [118].

Peer support refers to social, emotional, and practical assistance provided by nonprofessionals to help people maintain health behaviors. There is a growing trend toward utilizing peer support to assist health care systems in supporting diabetes management plans [119]. Although PCC-related studies often call for the involvement of family and close others [14,34], in this review, we extended family/caregiver/close others involvement and support to peer group support because patients with diabetes can benefit from learning from individuals with similar experiences [120]. A systematic review and meta-analysis conducted in 2021 suggested that peer support can lead to improved A1C control in diabetic patients. Specifically, peer support provided in small group settings, short-term interventions, and weekly meetings may yield more favorable outcomes [120]. Empirical studies of peer support programs indicate that prolonged participation in peer support is beneficial for reducing A1C levels and improving QoL [121] and distress [122], especially among individuals with a lower socioeconomic status [120,123-125]. Additionally, volunteers who serve as peer supporters (those who themselves have diabetes) may achieve better health outcomes due to their involvement in relevant activities [126].

Mediators of involvement of family and others: PA: Studies have shown that peer group support interventions successfully engage patient-supporter dyads or informal health supporters and lead to improved PA and self-efficacy [117,127,128].

The effectiveness of PCC for diabetes patients in special conditions

QoL factors for adolescents with type 1 diabetes are associated with glycemic control and their parents [129,130]. The International Society for Pediatric and Adolescent Diabetes emphasizes the right of young people and their parents to receive structured, person-centered, and empowerment-based education to help them manage their diabetes [131]. A patient-centered communication and reflection education model for young people with type 1 diabetes has been proven to have a successful effect on glycemic control [132]. Furthermore, the collaborative involvement of caregivers is also

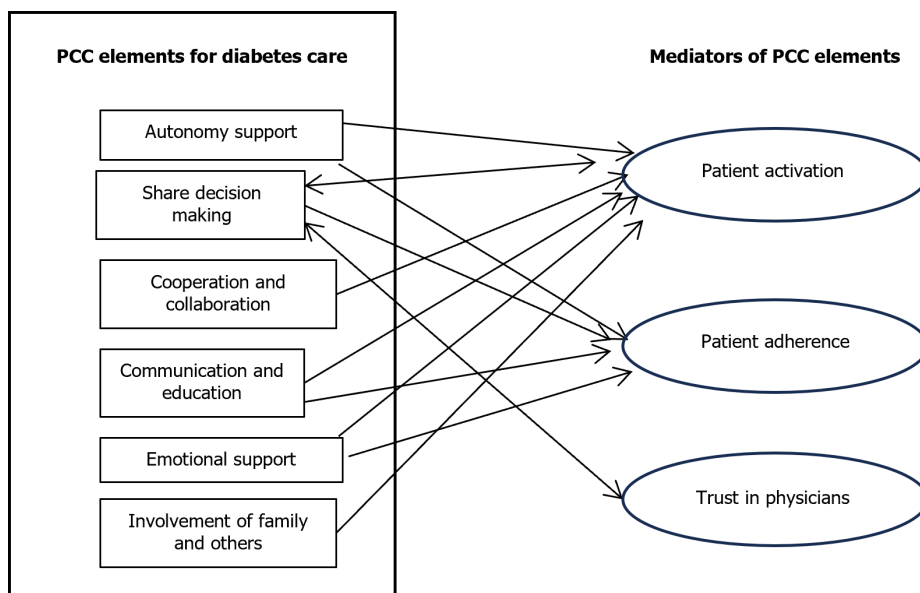


Figure 1 The mechanism by which patient-centered care elements are associated with outcomes through mediators. All patient-centered care (PCC) elements are associated with outcomes, but the bold square indicates that this PCC element may have more evidence of its effect on outcomes. PCC: Patient-centered care.

important for better glycemic control[133]. Parents’ trust and shared responsibility are significantly associated with better diabetes outcomes[133,134].

Diabetes can lead to several conditions, such as chronic kidney disease and peripheral vascular disease (PVD), and some patients progress to end-stage renal disease, while others undergo amputation[135]. PCC also draws attention to the care of these patients[136,137]. The important aspect of leg amputation, which is caused by severe PVD, has been recognized for patients’ perceived SDM[137]. For dialysis patients, current guidelines suggest team-based integrated care that enables access to a patient-centered multidisciplinary care team consisting of dietary counseling, medication management, education, and ethical, psychological, and social care for people with chronic kidney disease[138]. In addition, evidence of the effectiveness of self-management interventions for dialysis patients has been reported across a wide range of patient-reported outcomes, including QoL, depression, and self-efficacy[139].

Finally, we also arranged the above studies related to control trials in Table 1. Most studies address goal setting, SDM, and the involvement of family and peers.

Discussion

In this review, we have shown that 6 PCC elements of diabetes care, namely, autonomy support (patient individuality), SDM, cooperation and collaboration (system-level approach), communication and education (behavior change techniques), emotional support (biopsychosocial approach), and family/caregivers/close friends/peer group involvement and support, are significantly associated with patient outcomes. Among the original PCC elements, goal setting still presents conflicting evidence, which demonstrates that it may not significantly drive improvement in outcomes for diabetes care[62,64]. Support for patient autonomy and goal setting are two relevant concepts[41,140,141], which means that autonomy support partially overlaps with the meaning of goal setting; therefore, it is unlikely that this matters if we ignore goal setting as a PCC element of diabetes care. In addition, evidence of the influence of SDM on diabetes care outcomes is not very strong compared to that of other PCC elements[70]. Figure 1 demonstrates the mechanism of these 5 PCC elements. A bold square indicates that this PCC element may have more evidence of its effect on outcomes.

The mechanism by which these PCC elements affect outcomes is described above in detail. Figure 1 shows that all 6 of these factors influence outcomes through PA, and 4 of these 6 factors influence outcomes through patient adherence, which is consistent with the findings of Rathert *et al*[88]. Trust in physicians is an important concept, but only one PCC element, SDM, is associated with this factor.

Research has emphasized the crucial role of PA as a mediator between PCC factors, trust, and outcomes in the context of chronic care[142]. Furthermore, autonomy support, SDM, communication and education, and emotional support can improve outcomes through patients’ adherence to diabetes care, and the associations between SDM or PA and trust in physicians are likely bidirectional. Hence, based on our review, we suggest important PCC elements and potential mediators through which these elements influence outcomes in diabetes care. We reveal the black box of the mechanism by which PCC elements influence outcomes and provide a PCC framework for diabetes care for further study. However, the present study was not a systematic review, and hence the framework of diabetes care may involve bias. Additional studies, including studies that evaluate the associations between mediators, are needed.

Practice and future implications: In practice, when treating patients with diabetes, medical staff should focus on patients’ needs (autonomy support) in terms of listening to what patients want to do or before suggesting a new lifestyle.

Table 1 Studies reporting controlled trials

| Ref. | Country | PCC-related activities | Detailed intervention | Primary outcome | Result summary |
|---|---------------|--|---|---|---|
| Goal setting, SDM | | | | | |
| Swoboda <i>et al</i> [1] | United States | Goal setting, SDM | In-person goal setting and decision coaching session to encourage lifestyle change, followed seven biweekly coaching calls delivered by registered dietitian | Diet quality/decision, empowerment, self-efficacy and diabetes-related outcomes | A significant increase in diet quality, decision confidence to achieve diet-related goals, empowerment, self-efficacy, and a significant decrease in diabetes distress and depressive symptoms |
| Naik <i>et al</i> [2] | United States | Collaborative goal-setting | Healthy Outcomes Through Patient Empowerment (HOPE) group received 9 coaching sessions with a trained health professional: biweekly (for 30-40 min) from months 1 to 3 and monthly (for 15 minutes) from months 4 to 6 | A1C level and depression symptoms (Patient Health Questionnaire-9 scores, PHQ-9) | Repeated-measures analysis found no significant improvement in HOPE group in PHQ-9 or A1C compared to enhanced usual care group |
| Vaughan <i>et al</i> [3] | United States | Collaborative goal-setting | As the interventions above | Diabetes distress levels measured by the Problem Areas in Diabetes (PAID) | Between-group analysis revealed greater improvements in HOPE for PAID total score, emotional, and social subscales compared to enhanced usual care group |
| Woodard <i>et al</i> [4] | United States | Collaborative Goal Setting | Empowering Patients in Chronic Care (EPICC) participants attended 6 bimonthly group sessions and motivational interview during a 3-month period | A1C level | EPICC group is significant improvements in A1C levels compared to enhanced usual care group |
| SDM, communication and education, goal setting | | | | | |
| Wollny <i>et al</i> [5] | German | SDM, patient-centered communication, shared goal setting | General practitioners (GPs) were encouraged to evaluate their patients' views, attitudes, and behaviors; An electronic decision-aid was provided to GPs to increase SDM | A1C level | The intervention and the control group the decline of the A1C level was statistically significant. However, there was no statistically significant difference between both groups |
| Family/caregivers/close friends/peer group involvement and support, communication and education | | | | | |
| Castillo-Hernandez <i>et al</i> [6] | Mexico | Peer support | All participants and peer leaders (PLs) attended a four-month Diabetes Self-Management Education (DSME) delivered by a dietitian and diabetes educator. Participants in the peer support and DSME Group (PSEG) attended peer support meetings facilitated by PLs for 8 months | A1C level, quality of life | The PSEG group had a more pronounced clinical improvement, but no statistical improvement, in A1C compared to the education-only group. PSEG participants exhibited statistically significant improvement in diabetes-related quality of life |
| Rosland <i>et al</i> [7] | United States | Patient-family dyads | Dyads assigned to the CO-IMPACT arm received a health coaching session focused on dyadic information sharing and positive support techniques, then 12 months of biweekly automated monitoring telephone calls to prompt dyadic actions | Patient Activation Measure-13 (PAM-13) and United Kingdom Prospective Diabetes Study (UKPDS) 5-year diabetes-specific cardiac event risk scores | CO-IMPACT patients had greater improvements in PAM-13 scores but nonsignificant differences in UKPDS cardiac risk compared to standard care |

PCC: Patient-centered care; SDM: Shared decision making; A1C: Hemoglobin A1C.

Additionally, medical staff should attempt to understand patients' opinions[51]. Second, at the minimum level of action, physicians should refer patients to nonphysician professionals, such as dietitians or health educators, and address inquiries or treatment plans provided by other medical professionals (cooperation and collaboration)[140]. In the future, this integrated care could span different stages, not only disease treatment/management but also health promotion, disease prevention, rehabilitation, and end-of-life care for diabetes patients[81]. Third, medical staff should explain things in a way that patients can comprehend, respect patients' expressions, and be willing to spend time communicating (communication and education)[88]. Fourth, regarding emotional support, medical staff should discuss patients' anxieties and fears with them[88]. Finally, medical staff should involve family and others and not only provide all the necessary information, including patient symptoms and treatment conditions but also have more opportunities to discuss this topic with them (involvement of family and others)[88]. In addition, medical staff can help build peer support in small group settings and weekly meetings[120]. All of these PCC elements help patients participate in and manage their care and empower and motivate them to support their health care (PA). In the future, system design to help the PCC involved in

diabetes care could include incentives for PCC elements (*i.e.*, patient education by providers), adapting medical curricula, and managing patient data exchanges to enhance collaboration between providers[143].

CONCLUSION

For diabetes care, PCC elements such as autonomy support (patient individuality), cooperation and collaboration (system-level approach), communication and education (behavior change techniques), emotional support (biopsychosocial approach), and family/caregivers/close friends/peer group involvement and support are critically important. All of these factors are directly associated with different patient outcomes and indirectly associated with outcomes through PA.

FOOTNOTES

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