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Patient-centred care in type 2 diabetes mellitus – Key aspects of PDM-ProValue are reflected in the 2018 ADA/EASD consensus report

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ABSTRACT

In 2018, the American Diabetes Association (ADA) and the European Association for the Study of Diabetes (EASD) published a consensus report on the management of hyperglycaemia in type 2 diabetes, recommending, amongst others, a patient-centred decision cycle to prevent complications and optimise quality of life. The PDM-ProValue study program which focused on the assessment of integrated personalised diabetes management provided evidence for the efficacy of its implementation. In this comparative review, we identified the standardised decision cycle as well as individualised patient assessment as the overarching elements of the ADA/EASD consensus report and the PDM-ProValue study. The decision cycle, investigated in PDM-ProValue and similarly recommended by the 2018 ADA/EASD consensus report, can benefit diabetes management in persons with type 2 diabetes. This is reflected in improved glycaemic control as well as patient and physician communication and satisfaction.

Contents

Abbreviations: ADA, American Diabetes Association; ASCVD, atherosclerotic cardiovascular disease; CKD, chronic kidney disease; CGM, continuous glucose monitoring; CNL, control; DSMES, diabetes self-management education and support; EASD, European Association for the Study of Diabetes; GLP-1, glucagon-like peptide 1; iPDM, integrated personalised diabetes management; OADs, oral antidiabetics; PROs, patient-related outcomes; SMBG, self-monitoring of blood glucose; SGLT-2, sodium/glucose co-transporter 2; T1DM, type 1 diabetes; T2DM, type 2 diabetes

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1. Introduction

Diabetes mellitus, a chronic and progressive disease, is a high burden for patients. Patients with diabetes have a much higher risk for cardiovascular disease and other complications and comorbidities [1]. International guidelines support the treatment of diabetes with specific algorithms such as lifestyle modifications and tailored therapeutic approaches. In contrast to patients with type 2 diabetes (T2DM), insulin therapy is imperative in patients with type 1 diabetes (T1DM) [2]. Even though the progressive nature of diabetes, specifically T2DM, is well known, intensification of therapy is often hindered by clinical inertia. Reasons for clinical inertia are multifactorial, occurring at the level of physicians, patients, and/or health care systems [3]. A retrospective study showed that a substantial proportion of patients with T2DM and poor glycaemic control waited several years until intensification of therapy was initiated [4,5]. As intensification of – specifically insulin – treatment is often directed by physicians' and patients' choice [6], factors such as fear of hypoglycaemia and weight gain as well as objection to using injectable therapy are considered major causes for clinical inertia [7–9].

Not only clinical inertia but also treatment adherence plays a considerable role in poor glycaemic control. A systematic review in patients with T2DM showed that adherence to oral antidiabetics (OADs) ranged from 36 to 93%, whilst adherence to insulin therapy was around 62 to 64% [10]. The same review highlighted that electronic monitoring systems supported adherence of individual patients [10]. Good adherence was shown to have a positive impact on glycaemic control, the rate of hospitalisation events, and the rate of all-cause mortality [11,12].

Monitoring and treatment of patients with diabetes are the basis of good disease management. The use of continuous glucose monitoring (CGM) and insulin pumps has increased in recent years, especially in young patients with T1DM, resulting in improvements in glycaemic control. Nevertheless, the utilisation of downloaded data by patients is negligible. In contrast to CGM, other mobile medical applications have not been adopted frequently [13]. In recent years, standardised, patient-centred approaches for diabetes management have been suggested [6,14]. In 2018, the American Diabetes Association (ADA), together with the European Association for the Study of Diabetes (EASD), published an updated version of the consensus report on management of hyperglycaemia in T2DM [3]. In this commentary, we compare aspects of the 2018 consensus report with the PDM-ProValue study which investigated the impact of standardised, patient-centred diabetes management in clinical practice and discuss the implementation of such approaches.

2. The 6-step cycle for personalised diabetes management

To improve diabetes management, a 6-step feedback loop has been suggested. In this initial cycle for personalised diabetes management, patients with diabetes receive (1) a structured education to be informed about glucose measurement in order to (2) monitor their glycaemic control. (3) Obtained glucose values are documented and stored and (4) analysed cooperatively by patients and physicians. (5) Required treatment changes are initiated and (6) their efficacy assessed on a regular basis [14]. These recurring sequences were suggested to improve glycaemic control by supporting the physician-patient-relationship and their therapeutic decisions with a structured process and – where possible – with digital technology.

3. iPDM – PDM-ProValue: Study outcomes

On the basis of the above-mentioned 6-step cycle, the PDM-ProValue study was designed to evaluate the effect of integrated personalised diabetes management (iPDM) on glycaemic control, therapy adaptations, patient-related outcomes (PROs), clinician satisfaction, and efficiency of outpatient management processes in patients with T2DM. The prospective 12-month study program included patients with T2DM, age $\geq$ 18 years, HbA1c $\geq$ 7.5% (58 mmol/mol), with subcutaneous insulin therapy for $\geq$ 6 months who were willing and able to follow the study procedure. The medical team involved in the iPDM process received training based on a structured curriculum [15,16]. 907 participants met the inclusion criteria (iPDM n = 440; control (CNL) n = 467). Mean age

was 64.5 years (CNL 64.9 years) with a mean time since diagnosis of 14.4 years (CNL 14.3 years) and a mean baseline HbA1c of 8.5% ([69 mmol/mol]; CNL 8.4% [68 mmol/mol]). The study population was comparable to other trials in T2DM and overall representative of the average patient in clinical practice [17]. After 12 months, improvement of glycaemic control (HbA1c reduction) was greater in the iPDM group (−0.5% [−6 mmol/mol], $p < 0.0001$) compared to the CNL group (−0.3% [−4 mmol/mol], $p < 0.0001$), with a between-group difference of 0.2% ([2 mmol/mol], $p = 0.0324$). More participants of the iPDM group achieved reductions in HbA1c > 0.5% [6 mmol/mol], compared to the CNL group. No (serious) adverse events were reported during the study period and the reduction in HbA1c was more pronounced in participants with higher baseline HbA1c. In the iPDM group, a higher percentage of participants received the recommendation to adjust their insulin therapy and their behaviour/lifestyle. Adherence to treatment regimens was also higher in the iPDM group than in the CNL group. iPDM showed a clear benefit versus CNL with regard to PROs and physician satisfaction [16].

4. ADA/EASD consensus report 2018

In 2018, ADA and EASD presented an update of their previous position statement on the management of hyperglycaemia in adults with T2DM. The consensus report considers literature published since 2014 and includes aspects of both lifestyle and therapeutic intervention to recommend adequate management of T2DM. The most pronounced difference between the consensus report 2018 and the previous edition is a highly patient-centred view on the management of T2DM, an early consideration of comorbidities when choosing treatment options, and the integration of therapeutic interventions with proven cardiovascular safety/benefit into the treatment algorithm [3].

5. PDM-ProValue and the ADA/EASD consensus report 2018: A comparative review

5.1. *Decision cycle for patient-centred glycaemic management in T2DM*

The ADA/EASD decision cycle for patient-centred glycaemic management in T2DM includes 7 steps to prevent complications and optimise quality of life: (1) assessment of a patient's key characteristics, (2) consideration of specific factors that impact the choice of treatment, (3) shared decision making to create a management plan, (4) agreement on the management plan, (5) implementing the management plan, (6) continuous monitoring and support, and (7) review of the management plan (Fig. 1). Importantly, a regular repetition of the cycle enables patients with T2DM and their physicians to improve glycaemic control and overall diabetes management. The consideration of comorbidities as well as factors that might impact choice of treatment before creating a management plan convey a patient-centred approach rather than focusing on fixed, predetermined treatment targets only. Shared decision-making as well as education are very important aspects to ensure a patient's treatment adherence and empowerment; diabetes self-management, education, and support (DSMES) is an integral part in establishing and implementing the principles of such a care/management plan.

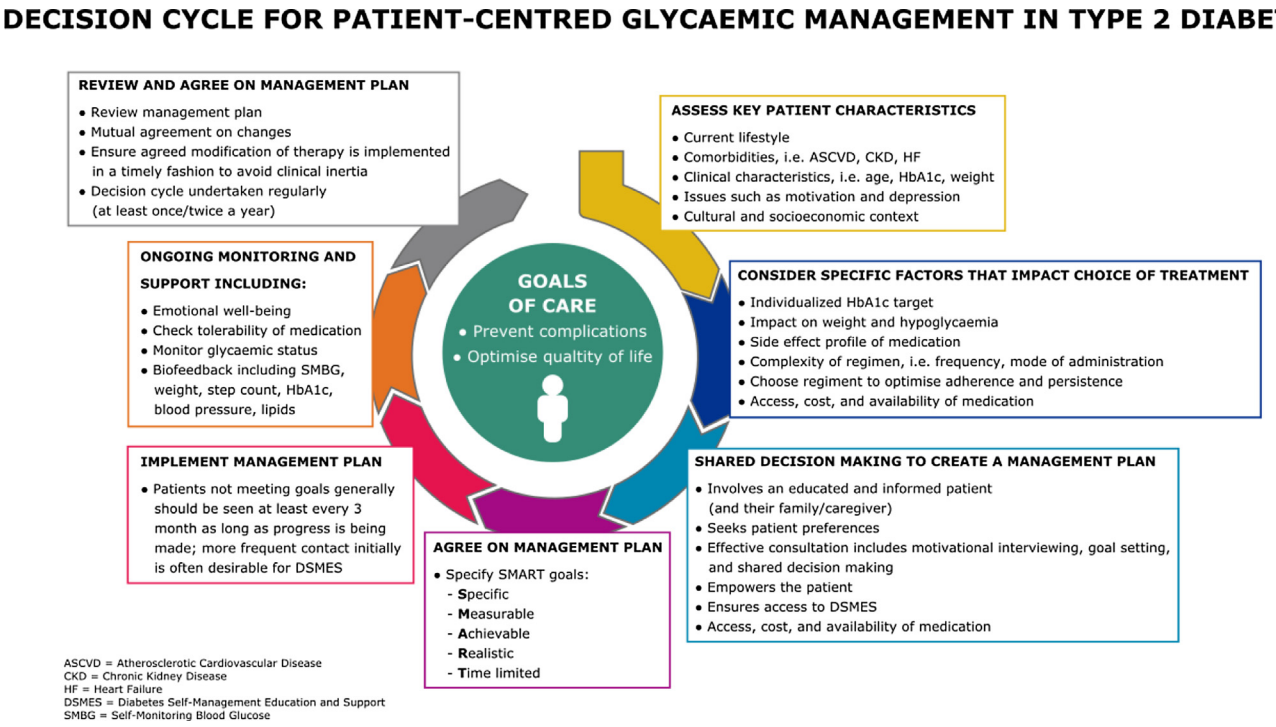

Fig. 1 – Decision cycle for patient-centred glycaemic management in T2DM. "American Diabetes Association [Management of Hyperglycemia in Type 2 Diabetes, 2018. A Consensus Report by the American Diabetes Association (ADA) and the European Association for the Study of Diabetes (EASD), American Diabetes Association, [2018]. Copyright and all rights reserved. Material from this publication has been used with the permission of American Diabetes Association."

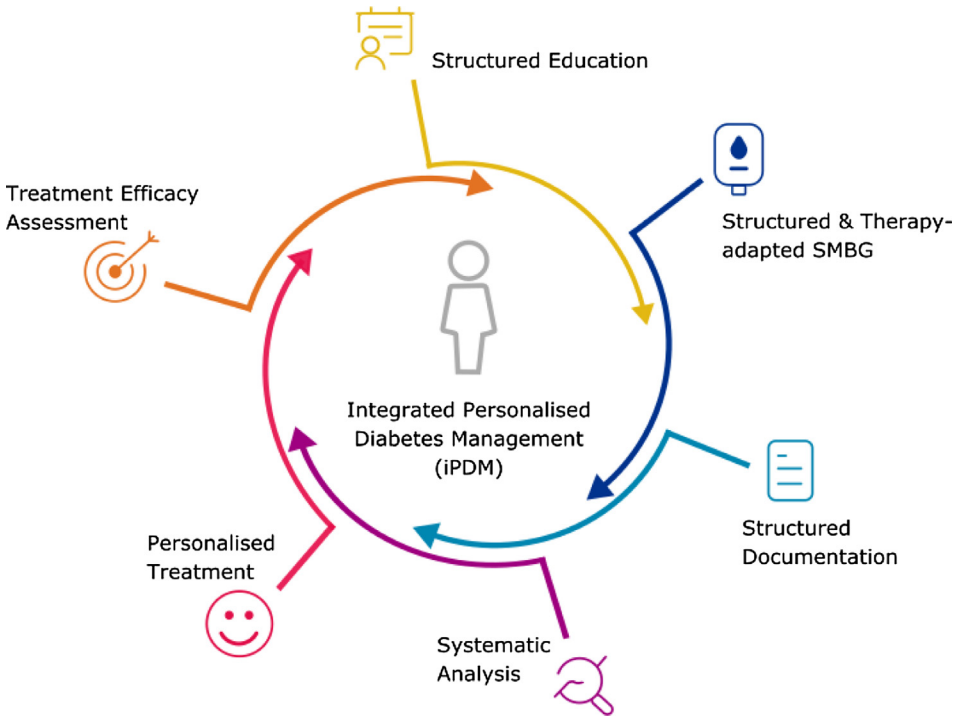

Fig. 2 – iPDM, defined as an interactive, 6-step structured intervention process, contains the following components: (1) structured assessment and patient education, (2) structured and therapy-adapted SMBG, (3) structured documentation, (4) systematic analysis, (5) personalised treatment, and (6) treatment efficacy assessment.

After implementing a patient's management plan, not only treatment targets should be considered regularly when monitoring progress, PROs should also weigh in the process of review and assessment [3].

In the PDM-ProValue study, iPDM was defined as an interactive, 6-step structured intervention process containing the following components: (1) structured assessment and patient education, (2) structured and therapy-adapted self-monitoring of blood glucose (SMBG), (3) structured documentation, (4) systematic analysis, (5) personalised treatment, and (6) treatment efficacy assessment (Fig. 2).

Both, the PDM-ProValue Study and the recommendations of the ADA/EASD consensus report strongly focus on patient-centred management of hyperglycaemia in patients with T2DM. Similarly to the consensus report, the PDM-ProValue study highlights a repetitive multi-step cycle to improve communication and cooperation between patients and physicians. Even though exact designations vary – all aspects of the PDM-ProValue approach can be found in the decision cycle of the ADA/EASD consensus report. Thus, PDM-ProValue could be considered a test of efficacy of the ADA/EASD decision cycle. As suggested by the consensus report, the PDM-ProValue study examined PROs such as treatment satisfaction and verified the impact of iPDM on patient and physician satisfaction. The ADA/EASD consensus report addresses clinical inertia and results of the PDM-ProValue study could show with the fast onset of therapy adaptations and HbA1c improvements, that some aspects of clinical inertia may be overcome by adapting diabetes management to a patient-centred decision cycle.

5.2. *Glucose monitoring*

The importance of individualised patient-centred treatment is a major focus of the consensus report. It is regularly highlighted that patient preference, individual glycaemic targets, and patient history should be predominantly considered compared to plain efficacy in reducing hyperglycaemia, tolerability, and safety. Regular SMBG and CGM are considered a major support for self-management and medication adjustments. Especially CGM can provide insights into the impact of lifestyle and medication on glucose level, thus promoting knowledge, education, and patient empowerment. With increased digitalisation, utilisation of SMBG and CGM can be combined with e.g. telemedical approaches to further improve the patient's health. Especially CGM-related software can provide in-depth insights into glucose profiles, trends, and treatment efficacy. As lifestyle interventions are considered first-line therapies in individuals with T2DM, they should be included in the ongoing discussions between physician and patient. Independent of chosen therapeutic approach, a regular review of progress is recommended [3]. In the PDM-ProValue study, glucose monitoring was a central contributor to the iPDM cycle; execution of the six steps was based on regular SMBG [15,16]. iPDM supported the evaluation and visualisation of blood glucose measurements and

physicians assessed the benefit of blood glucose values much higher in the iPDM group compared to the CNL group [16].

5.3. *Consideration of glucose-lowering medications in T2DM*

Compared to the 2012/2015 consensus report, the recent edition presented a treatment algorithm for glucose-lowering medications in T2DM. Apprehensive lifestyle modifications and metformin remain first-line therapy. Should HbA1c still be above target, consideration of comorbidities comes into account. If a patient has established atherosclerotic cardiovascular disease (ASCVD) or chronic kidney disease (CKD) treatment options vary depending on the predominating disease. If a patient has no established ASCVD or CKD factors such as a compelling need to minimise hypoglycaemia, a compelling need to minimise weight gain or promote weight loss, or costs as major issue may be considered when choosing the treatment [3]. In recent years, many glucose-lowering medications were tested for cardiovascular safety, with some showing cardiovascular benefits. The recommended treatment algorithm of the ADA/EASD consensus report mainly includes glucose-lowering agents with proven cardiovascular safety/benefit, specifically highlighting the importance of sodium/glucose co-transporter 2 (SGLT-2) inhibitors and glucagon-like peptide 1 (GLP-1) receptor agonists in the treatment of patients with T2DM, before initiating insulin therapy. Insulin therapy should be considered if glycaemic control remains poor despite dual/triple therapy with OADs and/or GLP-1 receptor agonists [3].

In the PDM-ProValue study it was observed that iPDM reinforced recommendations for behavioural/lifestyle modifications, physical activity/exercise, and nutrition counselling, compared to the CNL group. All participants of the PDM-ProValue study used insulin therapy for a mean of 7 years, rather than OADs or GLP-1 receptor agonists. It may be possible that the new recommendations of the ADA/EASD consensus report might lead to a reduction of the number of insulin treated patients with T2DM [5]. The iPDM group of the PDM-ProValue study had more frequent changes in insulin therapy compared to the CNL group. This was not true for adaptations with regard to OADs – 1/3 of the study population were treated with OADs in addition to insulin therapy. This should be considered when translating the efficacy of iPDM to a population with participants primarily treated with OADs and/or GLP-1 receptor agonists.

5.4. *Hypoglycaemia*

The ADA/EASD consensus report frequently highlights the importance of minimising the risk of adverse effects of therapy, such as hypoglycaemia. The report provides a treatment algorithm specifically supporting the choice of glucose-lowering medication with regard to a compelling need to minimise hypoglycaemia [3]. In the PDM-ProValue study, no differences between the iPDM and the CNL group were observed with regard to the incidence rate ratio of hypoglycaemic episodes defined as blood glucose level < 70 mg/dl [3.9 mmol/l] [16].

5.5. *Patient-physician relationship*

Regular monitoring and support as well as review of patients is a helpful tool to improve glycaemic control and promote involvement and active participation of patients in the therapy process. It can also be seen as a burden for patients as they might feel overly controlled by physicians, governed by the disease, and the frequent visits may become an imposition. Physician initiative as well as implementation of telemedical approaches might be able to prevent or work against these sentiments. It was shown that the quality of physician-patient communication is positively associated with adherence to therapeutic regimens [18]. It could be suggested that positive communication could also reduce fear and neglect of treatment intensification. Implementing repetitive concepts for primary care settings and integrating telemedical approaches could further improve physician-patient relationships, by establishing a positive, trust-based routine based on good communication, frequent visits, and therapeutic progress as suggested by the ADA/EASD consensus report [3]. One pillar of the PDM-ProValue study was the focus on improved patient-physician interaction and collaborative decision-making. During training sessions, these topics were intensively discussed with the physicians. Combining iPDM with improved patient and physician education and advancements in clinical decision-making cannot only improve glycaemic control, as observed in PDM-ProValue, but also reduce rates of cardiovascular complications, thus providing a basis for the optimisation of quality of life [16,19,20].

5.6. *Patient satisfaction*

Even though PDM-ProValue revealed an increase in patient satisfaction, it should be considered that a prerequisite for study inclusion was for the participants to be willing and able to follow the study protocol [15,16]. This indicates a participant population with an interest in their diabetes management and should not be translated to the overall T2DM population. It would be of interest to investigate the benefit of iPDM in a more diverse population – not only with regard to medication but also duration of diabetes, age and comorbidities. Implementation of iPDM in daily practice could be used to provide real-world evidence. Treatment satisfaction, which strongly relies on good communication between patient and physician, likely is a key contributor to improve clinical outcomes [18,21]. The ADA/EASD consensus report highlights the importance of patient satisfaction by suggesting to take patient preferences, empowerment and emotional well-being into account [3].

5.7. *Key knowledge gaps*

The consensus report highlights key knowledge gaps in the management of patients with T2DM: (1) implementation of available tools with proven benefit in preventing and treating diabetes is lacking; (2) paradigms on how to target, individualise and sustain effects of lifestyle management and DSMES are needed; (3) pragmatic studies should be

implemented to provide insights into costs, measures of patient preference and other PROs to complement clinical trials. The consensus report also points out the challenge of clinical inertia, which could be addressed by multidisciplinary teams [3].

6. Overarching elements of PDM-ProValue and the ADA/EASD consensus report 2018: Focus on individual patient needs

Both, the ADA/EASD consensus report and the PDM-ProValue study are of great relevance for the management of hyperglycaemia in patients with T2DM. On the one hand, the consensus report provides a standardised approach to improve glycaemic control with regard to treatment targets and safety. On the other hand, the report aims at individualising diabetes management. A major part in this approach is the consideration of a patient's individual needs with regard to comorbidities, complexity of regimen and personal preference. Other important patient-related factors included in the consensus report are access, cost, and availability of medication or impact on weight and frequency of hypoglycaemia. It is important to consider that many patients are reserved towards initiation of insulin therapy. Psychological insulin resistance is often based on perceptions regarding the nature and consequence of insulin therapy [22–24]. It was discussed that guidelines supported the reluctance to initiate insulin therapy by advocating insulin therapy as a final strategy [25]. Thus, providing alternative treatment options such as SGLT-2 inhibitors and GLP-1 receptor agonists can highly improve a patients overall motivation towards diabetes management.

7. Conclusion

iPDM can be considered as an implementation of the patient-centred recommendations of the ADA/EASD consensus report, revealing the effectiveness of a standardised decision cycle for the management of T2DM. Both, the new treatment algorithm of the ADA/EASD and iPDM have a strong focus on personalised and tailored therapeutic approaches. As suggested by both publications, this may substantially aid the higher-ranking goal of improvement of individual glycaemic control. As outline here, implementation of a patient-centred care and decision cycle has evident beneficial effects on patient-physician communication, clinical inertia and more rapid response to necessary therapy adaptations, and overall patient and physician satisfaction. These aspects must not be neglected when considering best available treatment options and play major roles in the individual achievement of the patients' personal treatment goals. The patient-centred treatment cycle emphasised in the ADA/EASD recommendations is supported by trial data obtained from PDM-ProValue. More diverse study approaches are recommended to provide further in-depth insights into the value of such decision cycles for patient-centred glycaemic management in T2DM.

8. Authors' contribution

KF and CS wrote the manuscript, OS conceptualised and revised the project.

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Declaration of Competing Interest

None.

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