

Incorporating Integrated Personalised Diabetes Management (iPDM) in Treatment Strategy: A Pragmatic Approach

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Abstract

Diabetes is a global public health concern. Vigilant monitoring and effective management of glycaemic variations are essential to prevent complications of diabetes. Effectively incorporating monitoring strategies in management of diabetes is a serious challenge. Patient-centered approach is necessary to customise monitoring and therapy of diabetes. This has been made possible by integrating technology with personalised therapeutic strategy. The integrated personalised diabetes management (iPDM) is a holistic, patient-centered approach that focuses on personalising diabetes management to streamline therapy and improve outcome. iPDM helps strengthen the care process, facilitates communication between patients and their healthcare team, and integrates digital tools that visualise and analyse data. The five E's which includes enthusiasm, education, expertise, empathy and engagement are the key pillars of a strong foundation for the iPDM model. iPDM model is a convenient and easily accessible tool that shifts the management paradigm from an "algorithmic" to "personalized" care to optimise treatment outcomes. Structured self-monitoring of blood glucose (SMBG) should be available as part of the self-management process for people with sub-optimally controlled type 2 diabetes, including those not on insulin therapies. Different SMBG regimens should be followed based on factors such as diabetes type, treatment approach (diet, oral antidiabetic medication, or insulin), glycaemic control, available resources, and patient's level of education.

Keywords: Blood glucose monitoring, communication, diabetes management, iPDM, patient education, patient empowerment, personalised care, structured SMBG

INTRODUCTION

Emerging as one of the major public health concerns, diabetes has affected nearly half a billion people worldwide. This number is projected to escalate to 578 million by 2030 and 700 million by 2045.^[1] India has 77 million people with diabetes (PWD) according to the International Diabetes Federation (IDF) 2020. Real world evidence reveals that 76.6% of the patients have glycated haemoglobin (HbA1c) above the target range.^[2,3] Fluctuation in plasma glucose values over long term, can damage the vital organs, leading to disabling and life-threatening health complications such as cardiovascular diseases (CVD), neuropathy, nephropathy and retinopathy.^[1]

Despite the continuous evolution of new therapies and technologies, many PWD are not able to achieve their diabetes

management goals. Attaining optimal glycaemic control while reducing the risk of hypoglycaemia remains a critical hurdle.

Significant challenges associated with chronic medical disorders are:

- Therapeutic inertia
- Therapeutic non-adherence
- Non-compliance with guidelines.

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The causes of clinical inertia or non-adherence could be many including lack of insight or acceptance of the disease, health illiteracy, cost and adverse effects of medications, poor doctor–patient communication and even distrust in the doctor.^[4]

Since diabetes arises from a complex interaction of genetic, environmental, and lifestyle factors, the American Diabetes Association (ADA) and the European Association for the Study of Diabetes (EASD) recommend a patient centered and personalised approach for PWD.^[4] Instead of a “one-size-fits-all” approach, personalization is imperative, balancing the benefits of optimizing glycaemic control with its potential risks such as hypoglycaemia or other preexisting conditions. Doctor and patient collaboration with an individualised patient-centered therapy plan has evolved as a key approach to improve outcomes and optimise the care process.

Integrated personalised diabetes management (iPDM) approach combines structured self-monitoring of blood glucose (SMBG) with the aid of newer generation connected glucometers, use of diabetes data management software, collaborative patient–physician communication, and support of therapeutic decision-making in a structured intervention process.^[5-7] This has been depicted in Figure 1.

The iPDM concept involves six recurring steps.

1. Initial step involves imparting education and training on “Structured Testing”. Is given to the patient.
2. SMBG is carried out by the patient with respect to a particular testing regimen as prescribed by the health care professional.
3. Electronic devices or software tools collect and store the blood glucose data from the blood glucose meter wirelessly.
4. Graphical presentation of the data in a simpler format ensure effective analysis for well-informed decisions.

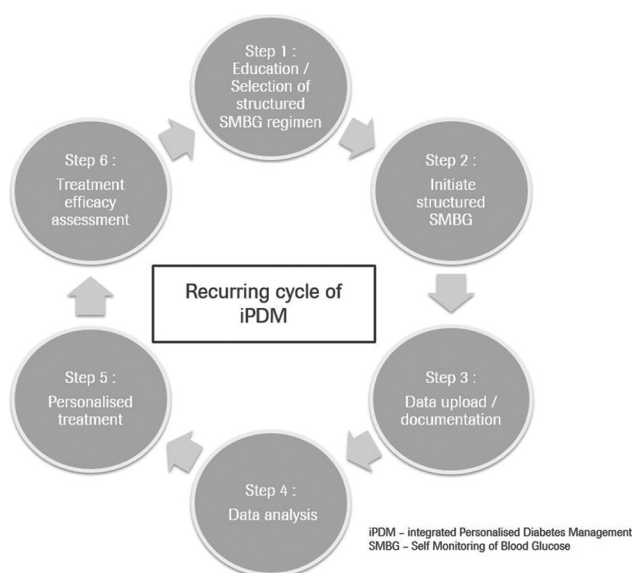


Figure 1: Cycle of integrated personalised diabetes management

The patient can also receive targeted decision support messages about his/her daily self-care.

5. Therapy adjustments are done based on the characteristics of the patient and his/her SMBG profile to achieve personalised treatment goals.
6. Treatment efficacy should be regularly assessed, approximately 3–6 months after the initial change in therapy.

Thus, personalised diabetes management (PDM) becomes a continuous revolving circle which is repeated in every patient, at varying time periods.

Kulzer B *et al.*^[7] demonstrated that iPDM led to a greater reduction in HbA1c after 12 months versus usual care (–0.5%, $P < 0.0001$ vs. –0.3%, $P < 0.0001$), (Diff. 0.2%, $P = 0.0324$). Majorly the HbA1c reduction occurred after 3 months and remained stable afterwards. The percentage of patients with therapy adjustments, patient adherence was greater in the iPDM group. Patient treatment satisfaction and physician satisfaction were more in the iPDM group [Table 1].

“5E’s” – KEY PILLARS

The essential components of iPDM can be summarised as “5Es”, as illustrated in Figure 2 and elaborated further in this article.

THERAPEUTIC PATIENT EDUCATION

As per the WHO, therapeutic patient education (TPE) involves training patients to help them learn and maintain all the essential skills required to optimally self-manage their daily living with a chronic disease. For diabetes, education has been expressed as a systematic intervention demanding active patient participation both in self-monitoring and decision

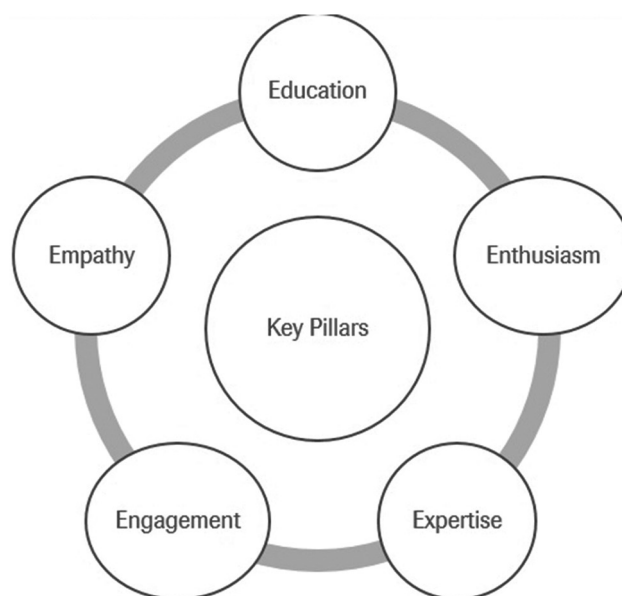


Figure 2: “Five E’s” of integrated personalised diabetes management

making.^[8] One of the central elements for the management of diabetes is TPE.

Several reports have demonstrated the efficacy of TPE and it has been adapted to other chronic disorders such as bronchial asthma, chronic obstructive pulmonary disease (COPD), CVD, etc., (ref). TPE has also shown to benefit individuals with diabetes. A significant improvement in several lifestyle, clinical and psycho-social outcomes in PWD have been attributed to structured TPE.^[9] Enrichment of patients' quality of life (QOL) is an early outcome of TPE. Health care providers (HCPs) often tend to focus on therapeutic compliance, preventing complications and issues about QOL that can remain addressed.

TPE in addition to enhancing the persons' skills also targets to modify their behaviour. A critical pre-requisite for effectively imparting TPE is information about the recipient, including their opinion, knowledge and perception of the medical condition. An insight of the patients' understanding and beliefs, enables the care-giver to integrate the medical and emotional needs while planning the therapy.^[10]

Lack of time is the usual hurdle for delivering TPE. A study by Pétré *et al.*^[11] demonstrated that a patient-centered approach and collaborative care can improve health outcomes without prolonging patient visits. A patient-centered approach to diabetes self-management education (DSME) should begin at diagnosis, and provides an appropriate foundation for current and future decisions.^[12]

The model for education has progressed from an information-based to more proactive and focused approach addressing the daily experiences of living with a disease.^[13] TPE programmes can change the attitude of the HCP which in turn helps in strengthening the educative practices.^[12] TPE plays a significant role in reducing mortality, morbidity, and disability if administered consistently in the clinic.^[9]

ENTHUSIASM

Chronic non-communicable diseases such as CVD, cancer, diabetes, and pulmonary chronic disorders are responsible for major proportion of death and disability worldwide. The importance of patient-centered management and personal engagement in the treatment pathway is fundamental to not only improve outcomes but also can reduce the cost.

The person-centered Chronic Care Model (CCM), that includes informed, empowered patient as an essential constituent, is recognised as an effective organizational system to ensure optimal results. Funnell *et al.*^[14] defined empowerment as the discovery and development of one's inherent ability to be responsible for one's own diabetes.

Among PWD, those with higher levels of motivation tend to be more actively engaged in self-management and have better glycaemic outcomes. The challenge for healthcare systems is to provide DSME and support to teach the interplay between healthy lifestyle, medications, emotional/physical stress, and

behaviour-change strategies. It will teach PWD to respond appropriately and continually to the factors regulating optimal metabolic control. Evidence shows that patient education yields positive results, reaffirming a potential impact on public health if it is implemented throughout health care systems.

In spite of this evidence, few PWD receive adequate education and support that can help to self-manage critical aspects of diabetes.

Ten years after the first diabetes attitudes, wishes and needs (DAWN) study,^[15] the diabetes attitudes, wishes and needs second (DAWN2) study was conducted in 17 countries. The results revealed a lack of self-management education, as well as critical resources, particularly skill, time, and adequate referral sources for delivering appropriate self-management support.^[16] Qualitative analyses of testimonials from the global DAWN2 study has highlighted the importance of PWD feeling able to manage their own disease.^[17] The integration of patient educational programmes in the local care system and community services can increase access to DSME and enhance optimal care delivery.

Empowerment is a measure of centrality of the patient and represents the core of cultural and organizational changes diabetes care is expected to undergo in the coming years. Data from the BENCH-D study suggests that empowerment, as measured by the Diabetes Empowerment Scale-Short Form (DES-SF), can conveniently be measured in the routine clinical practice. The study also provided innovative information about the interaction between empowerment and a wide range of factors regulating diabetes. The findings reconfirm the role of DSME programmes in improving quality of diabetes care and QOL.^[18]

EXPERTISE

The application of SMBG requires PWD to be competent to carry out glucose testing and interpret its results, to guide regarding lifestyle choices and therapy. SMBG instructions can be offered in a variety of settings by a wide array of HCPs. However, PWD often do not receive formal SMBG training.^[19,20]

The two skills sets are required to successfully integrate SMBG into diabetes management.

1. Operational skills
2. Interpretive skills.

SMBG provides instant feedback that help PWD to assess how their food choices, physical activities, and medications affect glycaemic control. SMBG results can aid PWD in evaluating their current diabetes management efforts. During DSME, it is important for the HCPs to assess both of these skill sets to reveal the obstacles to using the glucometer and SMBG data.

Operational skills

During training sessions it is important that trainers explain the method of performing a blood glucose test and then ask participants to demonstrate it back.

Table 1: Four C's of iPDM

Title	Description
Characteristics	Patient centred approach Easy-to-use interface Real time communication of data between patient and provider Accurate and time-efficient interpretation of glucose data Data security and privacy ensured Collaboration and shared decision-making
Confidence	More informed treatment decisions Improved treatment adherence Better treatment satisfaction for patient and provider Greater patient understanding and empowerment Reduced therapeutic inertia Improved glycaemic control and clinical outcomes Better monitoring of clinical data Earlier identification of hypoglycaemia and hyperglycaemia Fills void between patient and provider
Caveats	Lack of enthusiasm Insufficient literacy and skills Lack of adequate training Fear to use technology Non-compliant patients All E's need to be established
Contraindications	Patient refuses to consent Poor numeracy skills

In addition, patients should learn how to use a lancet device, properly dispose lancets and strips, use control solution, obtain an adequate blood sample, rotate testing sites, clean the meter, and document their SMBG results in a logbook or download the blood glucose data from the glucometer.^[19]

Other aspects that should be educated are:

- How to select the correct meter?
- Ensuring meter accuracy
- Documentation of SMBG data.

Interpretive skills

One of the self-care techniques of great importance is the skill to interpret the SMBG results. The SMBG data should be utilised meaningfully to institute lifestyle changes by the patient and clinical decision making by HCP.^[19]

Proper utilization of SMBG data depends on:

- Knowing blood glucose targets
- Knowing the appropriate frequency and timing of glucose tests
- Using glucose pattern management (GPM) in therapeutic decision-making by both the patient and the HCP.

Successful SMBG requires expertise. All patients who are prescribed a glucometer should also be provided with DSME. It is inadequate to understand how to operate a blood glucose meter and also successfully perform a test. Effective SMBG should translate to better diabetes management.^[20]

ENGAGEMENT

Despite of continuous evolution over the years, the relationship between patient and physician remains a vital component of effective health care delivery.^[21] Engagement initiated by the HCP is pivotal for optimal outcomes in diabetes. This will enhance treatment satisfaction and ensure compliance. Information sharing should be followed by bidirectional communication between the patient and the HCP where the concerns get addressed and key message gets delivered.^[22] Continuous training on the art and science of communication to the HCPs should be encouraged.^[23]

Telemonitoring has emerged as a useful adjunct over the recent years. It provides opportunity to PWD residing in remote areas, to connect to HCPs far away. Telemedicine and telemonitoring has been used efficiently for management of diabetes during the coronavirus disease 2019 (COVID-19) pandemic. Rapid growth in technology has made it possible to transmit relevant data via audio, video and other telecommunication technologies to ensure timely intervention.^[24]

Diabetes telemonitoring has witnessed remarkable advancement in modern times. The continued rise in the number of PWD across the globe and growing need for universal access to healthcare have fostered the growth of alternate ways of communication, such as telemedicine.^[24]

EMPATHY

Empathy remains the corner-stone of physician–patient relationship. Empathy refers to care that incorporates:

- Understanding of the patient's perspective
- Shared decision-making between the HCP and the patient
- Consideration of the broad context in which illness is experienced.^[25]

Empathy and reflection of the patient's perspective empowers, encourages, and motivates the patient for self-management and improve adherence to treatment, diet and exercise. Empathy also improves patient satisfaction, which is independently associated with better outcomes and enhanced QOL.^[26,27]

Effective communication, empathy and following a treatment plan can ultimately translate to better glycaemic control and reduced complications. A cohort study by Dambha-Miller *et al.*^[26] suggested that demonstration of empathy by HCP early in the course of type 2 diabetes mellitus was associated with favourable long-term clinical outcomes. Findings from this study provides the rationale for including more empathetic, personalised medicine into treatment strategy.

Different SMBG regimens should be followed based on factors such as diabetes type, treatment approach (diet, oral antidiabetic medication, or insulin), glycaemic control, available resources, and patient's level of education.^[28]

CONCLUSION

Diabetes has consistently been a cause of increasing morbidity and mortality all over the globe. The role of patient

self-management has been identified as a key parameter in overall management of diabetes mellitus. The iPDM is a holistic, patient-centered approach that focuses on personalizing diabetes management to streamline therapy and improve outcome. iPDM helps strengthen the care process, facilitates communication between patients and their healthcare team, and integrates digital tools that visualise and analyse data. The five E's are the key pillars of a strong foundation for the iPDM model which can assist in shifting the management paradigm from an "algorithmic" to "personalised" care to optimise treatment outcomes.

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Conflicts of interest

Roche Diabetes Care uses the term "iPDM" (Integrated Personalised Diabetes Management) in its internal and external communications. The authors have received honorarium and speaker fees from Roche Diabetes Care in the past for various events but have not received any honorarium for writing of this manuscript.

REFERENCES

- International Diabetes Federation. IDF Diabetes Atlas. 9th ed. Brussels, Belgium: International Diabetes Federation; 2019. [Last accessed on 2021 May13].
- Borgharkar SS, Das SS. Real-world evidence of glycemic control among patients with type 2 diabetes mellitus in India: The TIGHT study. *BMJ Open Diab Res Care* 2019;7:e000654.
- Reach G, Pechtner V, Gentilella R, Corcos A, Ceriello A. Clinical inertia and its impact on treatment intensification in people with type 2 diabetes mellitus. *Diabetes Metab* 2017;43:501-11.
- Inzucchi SE, Bergenstal RM, Buse JB, Diamant M, Ferrannini E, Nauck M, *et al.* Management of hyperglycaemia in type 2 diabetes: A patient-centered approach. Position statement of the American Diabetes Association (ADA) and the European Association for the Study of Diabetes (EASD). *Diabetologia* 2012;55:1577-96.
- Lange K, Ziegler R, Neu A, Reinehr T, Daab I, Walz M, *et al.* Optimizing insulin pump therapy: The potential advantages of using a structured diabetes management program. *Curr Med Res Opin* 2015;31:477-85.
- Ceriello A, Barkai L, Christiansen JS, Czupryniak L, Gomis R, Harno K, *et al.* Diabetes as a case study of chronic disease management with a personalized approach: The role of a structured feedback loop. *Diabetes Res Clin Pract* 2012;98:5-10.
- Kulzer B, Daenschel W, Daenschel I, Schramm W, Messinger D, Weissmann J, *et al.* Integrated personalized diabetes management improves glycemic control in patients with insulin-treated type 2 diabetes: Results of the PDM-ProValue study program. *Diabetes Res Clin Pract* 2018;144:200-12.
- Coppola A, Sasso L, Bagnasco A, Giustina A, Gazzaruso C. The role of patient education in the prevention and management of type 2 diabetes: An overview. *Endocrine* 2016;53:18-27.
- Gazzaruso C, Fodaro M, Coppola A. Structured therapeutic education in diabetes: Is it time to re-write the chapter on the prevention of diabetic complications? *Endocrine* 2016;53:347-9.
- Golay A, Lagger G, Chambouleyron M, Carrard I, Lasserre-Moutet A. Therapeutic education of diabetic patients. *Diabetes Metab Res Rev* 2008;24:192-6.
- Pétre B, Gagnayre R, De Andrade V, Ziegler O, Guillaume M. From therapeutic patient education principles to educative attitude: The perceptions of health care professionals - A pragmatic approach for defining competencies and resources. *Patient Prefer Adherence* 2017;11:603-17.
- Powers M, Bardsley JK, Cypress M, Funnell MM, Harms D, Hess-Fischl A, *et al.* Diabetes self-management education and support in adults with Type 2 diabetes: A consensus report of the American diabetes association, the association of diabetes care & education specialists, the academy of nutrition and dietetics, the American academy of family physicians, the American Academy of PAs, the American Association of Nurse Practitioners, and the American Pharmacists Association. *Diabetes Care* 2020;43:1636-49.
- Debono M, Cachia E. The impact of diabetes on psychological well being and quality of life. The role of patient education. *Psychol Health Med* 2007;12:545-55.
- Funnell MM, Anderson RM, Arnold MS, Barr PA, Donnelly M, Johnson PD, *et al.* Empowerment: An idea whose time has come in diabetes education. *Diabetes Educ* 1991;17:37-41.
- Barnard KD, Peyrot M, Holt RI. Psychosocial support for people with diabetes: Past, present and future. *Diabet Med* 2012;29:1358-60.
- Nicolucci A, Kovacs Burns K, Holt RI, Comaschi M, Hermanns N, Ishii H, *et al.* Diabetes attitudes, wishes and needs second study (DAWN2TM): Crossnational benchmarking of diabetes-related psychosocial outcomes for people with diabetes. *Diabetes Med* 2013;30:767-77.
- Stuckey HL, Mullan-Jensen CB, Reach G, Kovacs Burns K, Piana N, Vallis M, *et al.* Personal accounts of the negative and adaptive psychosocial experiences of people with diabetes in the second diabetes attitudes, wishes and needs (DAWN2) study. *Diabetes Care* 2014;37:2466-74.
- Rossi MC, Lucisano G, Funnell M, Pintauro B, Bulotta A, Gentile S; BENCH-D Study Group, *et al.* Interplay among patient empowerment and clinical and person-centered outcomes in type 2 diabetes. The BENCH-D study. *Patient Educ Couns* 2015;98:1142-9.
- Austin MM. The two skill sets of self-monitoring of blood glucose education: The operational and the interpretive. *Diabetes Spectr* 2013;26:83-90.
- Mensing C, Austin MM, Powers MA, *et al.* Monitoring. In: Mensing C, editor. *The Art and Science of Diabetes Self-Management Education Desk Reference*. 2nd ed. Chicago: American Association of Diabetes Educators; 2011. p. 167-94.
- Noseworthy J. The Future of care - preserving the patient-physician relationship. *N Engl J Med* 2019;381:2265-9.
- Kalra S, Unnikrishnan AG, Baruah MP. Interaction, information, involvement (the 3I strategy): Rebuilding trust in the medical profession. *Indian J Endocr Metab* 2017;21:268-70.
- Kalra S, Baruah MP, Das AK. Diabetes therapy by the ear: A bi-directional process. *Indian J Endocr Metab* 2015;19:4-5.
- Jaana M, Paré G. Home telemonitoring of patients with diabetes: A systematic assessment of observed effects. *J Eval Clin Pract* 2007;13:242-53.
- Elather SM, Rashid A, Mahdy AW, Mohamed Lotfy AM. Physicians' empathy and its effect on adherence to treatment diabetic patients in Al-Qassim region, Saudi Arabia. *Ann Trop Med Public Health* 2020;23:SP231638. doi: 10.36295/ASRO.2020.231638.
- Dambha-Miller H, Feldman AL, Kinmonth AL, Griffin SJ. Association between primary care practitioner empathy and risk of cardiovascular events and all-cause mortality among patients with Type 2 diabetes: A population-based prospective cohort study. *Ann Fam Med* 2019;17:311-8.
- Parsons SN, Luzio SD, Harvey JN, Bain SC, Cheung WY, Watkins A, *et al.* Effect of structured self-monitoring of blood glucose, with and without additional TeleCare support, on overall glycaemic control in non-insulin treated Type 2 diabetes: The SMBG Study, a 12-month randomized controlled trial. *Diabet Med* 2019;36:578-90.
- Rao PV, Makkar BM, Kumar A, Das AK, Singh AK, Mithal A, *et al.* RSSDI consensus on self-monitoring of blood glucose in types 1 and 2 diabetes mellitus in India. *Int J Diabetes Dev Ctries* 2018;38:260-79.