Journal of Information System and Technology Management
JISTM
EISSN: 0128-1666
Volume 10 Issue 39 (June 2025) PP. 89-101
DOI: 10.35631/JISTM.1039006

JOURNAL OF INFORMATION SYSTEM AND TECHNOLOGY MANAGEMENT (JISTM)
www.jistm.com

DIABETES UPDATE WORKSHOP – 'ENHANCING MANAGEMENT WITH DIABETES TECHNOLOGIES'

Fatimah Zaherah Mohamed Shah[1*], Nur 'Aini Eddy Warman[2], Mohd Hazriq Awang[3], Aimi Fadilah Mohamed[4], Rohana Abdul Ghani[5]

[1] Endocrine Unit, Universiti Teknologi MARA, Selangor, MALAYSIA.
Email: fatimah521@uitm.edu.my
[2] Endocrine Unit, Universiti Teknologi MARA, Selangor, MALAYSIA.
Email: nuraini_eddy@uitm.edu.my
[3] Endocrine Unit, Universiti Teknologi MARA, Selangor, MALAYSIA.
Email: hazriq@uitm.edu.my
[4] Endocrine Unit, Universiti Teknologi MARA, Selangor, MALAYSIA
Email: aimifadilah@uitm.edu.my
[5] Endocrine Unit, Universiti Teknologi MARA, Selangor, MALAYSIA
Email: rohana1773@uitm.edu.my
[*] Corresponding Author

Article Info:

Article history:
Received date: 27.03.2025
Revised date: 14.04.2025
Accepted date: 15.05.2025
Published date: 10.06.2025

To cite this document:

Shah, F. Z. M., Warman, N. A. E., Awang, M. H., Mohamed, A. F., & Ghani, R. A. (2025). Diabetes Update Workshop – 'Enhancing Management With Diabetes Technologies'. *Journal of Information System and Technology Management, 10* (39), 89-101.

DOI: 10.35631/JISTM.1039006

Abstract:

Introduction. The rapid rise of diabetes mellitus (DM) in Malaysia, and its associated multitude of complications is increasingly concerning. As DM complications are generally attributed to poor and erratic glycemia control, the need for convenience is paramount, and reflected in the surge of modern devices for monitoring. Although modern technologies for diabetes control is increasingly available, the utilization in this country is inadequate, notably due to insufficient exposure in primary-care facilities. This program aimed to educate health-care workers on the utility of modern devices in diabetes management in a practical manner. **Method**. A diabetes management update workshop was designed for practical information dissemination among frontline health-care practitioners from various training backgrounds on the use of modern technologies in DM management. Information sharing was structured with lectures interspersed with case discussion and practical sessions. **Program outline**: Knowledge-sharing was initiated by an overview on diabetes technologies by an endocrinologist, followed by sessions on optimal management of diabetes in elderly and kidney disease, during pregnancy and in Ramadhan, delivered by content experts. A clinical case panel discussion ensued with robust interaction. Subsequently, small-group sessions on specific topics encompassing proper handling of insulin, lifestyle modification with the aid of modern software, and medication titration during illness were orchestrated. As a special feature, a hands-on workshop on the use

Journal of Information System and Technology Management
EISSN: 0128-1666
JISTM
Volume 10 Issue 39 (June 2025) PP. 89-101
DOI: 10.35631/JISTM.1039006

of continuous glucose monitoring (CGM) system was conducted with actual patient-volunteers, and with active involvement from the participants. **Result.** This program was successful with numerous positive feedback and requests for regular training programs. **Conclusion**. Adequate use of diabetes technologies in the community requires proper education of relevant health-care workers and dissemination of information to various levels of clinical practice. Similar structured programs should be conducted in various centres to enhance knowledge transfer and improve patient care.

Keywords:

Continuous Glucose Monitoring (CGM); Diabetes Mellitus; Diabetes Technologies; Education Program; Insulin

Introduction

Diabetes Mellitus (DM) is characterised by high blood glucose levels in the blood, or hyperglycaemia, and though it has a few categories, Type 2 Diabetes Mellitus is the commonest type in Malaysia, accounting for more than 90% of cases (Chandran et al., 2020). Malaysia has the highest rate of diabetes in Western Pacific region and one of the highest in the world, accounting for significant healthcare costs (Saeedi et al., 2019). The prevalence of diabetes increased from 11.2% in 2011 to 18.3% in 2019 (Institute for Public Health [IPH], 2020), with a 68.3% increase (Akhtar et al., 2022), and although this trend had a plateau, with the latest prevalence in 2023 being 15.6% (IPH, 2024), the overall trend is still concerning, especially considering that almost 84% of adult in the younger age group of 18 to 29 years did not know they had DM (IPH, 2024).

The burden of diabetes in Malaysia encompasses complication-related morbidities, challenges in maintaining adequate disease control and rising healthcare costs, all contributing to reduced quality of life (Tan et al., 2023; Shalihin et al., 2022; Cheah et al., 2012). Advances in diabetes technologies have vastly improved treatment options in improving patient care, and many of these advances are becoming increasingly viable options in Malaysia (Ministry of Health, 2020). However, feasibility of use of these technologies in the general public will need enhanced practical knowledge among relevant health-care workers (Patil et al., 2022), and hence it is crucial for an effective training program to provide proper education to the pertinent medical practitioners.

Literature Review

The impact of DM goes far beyond glycaemic values, as the complications of this condition affect many other organs, be it organs supplied by small vessels, known as microvascular complications, such as diabetic eye disease (retinopathy), diabetic kidney disease and nephropathy, as well as peripheral nerves (neuropathy), or structures receiving large vessels supply, which are macrovascular complications such as stroke, coronary heart disease and peripheral artery disease, or complications involving both, such as diabetic foot pathologies. In a survey of the Malaysia Diabetes Registry in 2018 (Muhamad et al., 2018), it was found that the prevalence of diabetic complications, particularly microvascular, was fairly high, with a reported 1-4% prevalence of cerebrovascular and ischemic heart disease, and a 1-7% prevalence of microvascular complications, predominantly nephropathy and retinopathy. Beyond these complications, the rising risk of diabetic foot ulcer, with a reported prevalence of almost 1.2%, and more worryingly, the incidence of amputation, reports in Malaysian

Journal of Information System and Technology Management
EISSN: 0128-1666
JISTM
Volume 10 Issue 39 (June 2025) PP. 89-101
DOI: 10.35631/JISTM.1039006

population ranging from 0.6% (Muhamad et al., 2018) to 4.3% (Letchuman et al., 2010), deserves appropriate focus, as the increase of morbidity and healthcare costs, and a reduction of quality of life was described at a higher rate than the other associations (International Diabetes Federation, 2017).

In Malaysia, the significant impact on quality of life (QOL) can be attributed to the increasing prevalence, myriad of complications, and the ever-enlarging burden of care. Factors associated with significant reduction in QOL in Malaysia include presence of foot ulcer, particularly amputation, severe heart failure and frequent hypoglycaemia (Tan et al, 2023). While optimal glycaemic control and self-management can improve quality of life, factors like the complexity of treatment, insulin injections, and related complications can negatively affect patients (Shalihin et al, 2022; Cheah et al, 2012). Interestingly, adequate family support and access to quality care have been related to improving the quality of life of individuals living with diabetes (Azizah & Sansuwito, 2022), which may give an edge to enhancing management in this country, as compared to westernized societies. (Table 1)

These concerns underline the need for good glycaemic control and illustrate the need for proper and convenient monitoring for target achievement in the management of DM. The achievement of therapeutic goals in type 2 DM is notably challenging, however, integrating modern technologies into the management strategies have shown potential in improving diabetes care (American Diabetes Association [ADA], 2024). Diabetes technologies, which encompasses hardware, devices, and software that can be used in the management of DM, have been shown to have a wide range of benefits, ranging from improving health outcomes to advancing quality of life (Fauzi et al, 2022). The main categories of the involved technologies include insulin administration devices such as syringe, pens and pumps (specifically - continuous subcutaneous insulin infusion), glucose monitoring devices, either glucometer, or more recently the continuous glucose monitoring (CGM) machine, or a combination, such as the automated insulin delivery (AID) systems, where algorithms from CGM modulate insulin delivery. The broad range of diabetes self-management software have also greatly impacted the understanding, and hence the adherence to treatment in people with DM. Diabetes technology, when coupled with education, follow-up, and support, can improve the lives and health of people with diabetes (ADA, 2024).

In a systemic review by Russell-Minda et al (2009), it was shown that while self-monitoring of capillary glucose is effective in improving glycaemic control, newer technologies may enhance the efficiency of disease and lifestyle adjustment. In the local setting, studies assessing patient acceptance to newer diabetes technologies in Malaysia were mainly positive, with one study reporting the effects of an investigator-designed ‘Diabetic Care’ app, deeming it suitable for community use, with suggested solutions for drawbacks encountered (Firdaus et al. 2022), while another study assessing patient perspectives on health technology devices, performed in a tertiary hospital in Malaysia, revealed encouraging feedback, with participant-touted benefits of CGM including improved glycaemic control and enhanced quality of life by reducing anxiety and the burden of frequent finger-prick testing by glucometer (Mohamad et al. 2025). (Table 1). In the latest Malaysian Clinical Practice Guidelines on the Management of Type 2 Diabetes Mellitus (Ministry of Health, 2020), continuous glucose monitoring (CGM) was acknowledged as a useful tool in glycaemic monitoring which has the potential to facilitate better treatment of diabetes as well as promoting self-engagement.

Journal of Information System and Technology Management
JISTM
EISSN: 0128-1666
Volume 10 Issue 39 (June 2025) PP. 89-101
DOI: 10.35631/JISTM.1039006

Although the vast increase in diabetes technological advancement is promising, it is imperative to emphasize that education forms a large part in ensuring the success of these methods, especially as studies have shown that those with more education regarding device use have better outcomes (Yoo et al. 2022). Although end-user knowledge was the most commonly assessed parameter, improvement in outcomes cannot be achieved without the training and education of health care professionals (Patil et al. 2022; Philip et al. 2023). Hence, edification and assessment of competencies in diabetes technology is crucial for prescribers, certified diabetes and education specialists, pharmacists, nurses, and anyone involved in the care of people with diabetes.

Table 1: Summary Of Relevant Literature In Malaysian Population

Author (year of publication)	Study population	Outcome
Diabetes complication burden		
Muhammad et al (2022)	Adults with Type 2 diabetes mellitus (secondary data from Malaysian Diabetes Registry)	Prevalence of complications: ▪ Macrovascular (cerebrovascular, ischemic heart disease): 1-4% ▪ Microvascular (nephropathy, retinopathy): 1-7% ▪ Diabetic foot ulcer: 1.17%, ▪ Amputation: 0.62%
Letchuman et al., (2010)	Adults with Type 2 diabetes mellitus – population-based study	Prevalence of amputation: 4.3%
Quality of life		
Tan et al (2023)	Adults with Type 2 diabetes mellitus - tertiary hospital outpatient clinic, cross-sectional study	Factors affecting QOL: ▪ Main contributor of reduced QOL: pain ▪ Significant contributing factors: foot ulcer, amputation, severe heart failure, frequent hypoglycaemia ▪ Other factors for low QOL: Older age, lower education level, longer duration of T2DM, urine protein creatine index (UPCI) > 0.02 g/mmol, injection therapy ▪ Most significant contributors after adjustment: amputation, frequent hypoglycaemia, myocardial infarction, obesity
Azizah & Sansuwito (2022)	People with diabetes mellitus – literature review	Positive family support – improves QOL by: ▪ Increase in self-management

Journal of Information System and Technology Management
EISSN: 0128-1666
Volume 10 Issue 39 (June 2025) PP. 89-101
DOI: 10.35631/JISTM.1039006

		▪ Increase in perception of high life expectancy ▪ Reducing stress and anxiety ▪ Better coping strategies - social and environmental aspects to improve coping. Family support that has the most influence on reducing complications: - dietary control, physical activity for at least 30 minutes per day, monitoring blood sugar levels.
Shalihin et al (2022)	Elderly people with Type 2 diabetes mellitus – primary care clinic, cross-sectional study	Predictors of QOL: ▪ Clinic location, diabetes control status, old age Improve QOL: ▪ Reduction of HbA1c ▪ Clinics with family medicine specialist
Cheah et al (2012)	Adults with diabetes mellitus – primary health clinic, cross-sectional study	Reduce QOL: (SF-36) ▪ Education level - no education – lower vitality emotional health scores ▪ compared to tertiary education. ▪ Work place - private sector better physical functioning compared to pensioners and unemployed. ▪ DM control - uncontrolled diabetes lower score in role-emotional domain ▪ Medication – oral medication better role-physical and lower bodily pain compared to insulin
Diabetes technologies		
Ministry of Health (2020)	Clinical practice guidelines	Continuous glucose monitoring (CGMS) - useful tool in glycaemic monitoring for better treatment of diabetes and to promote self-engagement
Muhd Helmi et al (2021)	Type 1 diabetes mellitus - single centre, randomised, parallel-group controlled trial	CGMS versus self-monitoring blood glucose (SMBG): ▪ Similar efficacy in optimising glycaemic control, more effective in detecting hypoglycaemia
Fauzi et al (2022)	Review article	Diabetes technologies - hardware, devices, software – potential to improve health outcomes and quality of life

Journal of Information System and Technology Management
EISSN: 0128-1666
JISTM
Volume 10 Issue 39 (June 2025) PP. 89-101
DOI: 10.35631/JISTM.1039006

Firdaus et al (2022)	Expert team – validation of mobile health application	Diabetic Care app: ▪ appropriate for clinical use ▪ solutions for drawbacks proposed.
Sze & Kow (2023)	Adults with diabetes mellitus – semi-structured online interviews	Perception of mHealth app support: ▪ Benefit – improve self-management ▪ Barrier - lack of awareness and recommendations from health care professionals.
Mohamad et al (2025)	Diabetes mellitus – qualitative study	CGMS: ▪ Benefit - transformative tool, real-time data, improve control, enhancing quality of life by reducing anxiety and the burden of frequent glucose checks. ▪ Barrier - high costs, limited access, technical issues, and social stigma (adolescents).

Reasoning, Scope and Objectives

A broad range of diabetes technologies is available in Malaysia, however its wide-spread utilization in community setting is markedly deficient, which may contribute to the suboptimal DM control in a large population in this country. This inadequate uptake in use may be partly attributed to insufficient knowledge among frontline health workers regarding the accessibility of modern diabetes technologies in the local setting. An action plan is critical to address this gap in knowledge (Figure 1), and led to the foundation of this workshop.

This diabetes update program was designed with the aim of educating health-care practitioners on the utility and utilization of modern devices in the management of DM in a practical and engaging manner.

Methods

An update in management of diabetes workshop was created for practical information dissemination among frontline health-care practitioners from various training backgrounds. Information sharing was designed with lectures interspersed with case discussion and practical sessions, delivered by specialized content experts (Figure 2). This program utilized local and international guidelines underlining the comprehensive framework of diabetes approach and management, and impressively, the information was largely tailored to local practice.

This program was designed to educate every level of health-care practitioner, from doctors to pharmacists to nurses, with seats allocated accordingly. At the conclusion of the program, all the attendees participated in a feedback survey on the effectiveness of this program, which was subsequently analysed by utilizing the IBM SPSS (version 28.0) program.

Journal of Information System and Technology Management
JISTM
EISSN: 0128-1666
Volume 10 Issue 39 (June 2025) PP. 89-101
DOI: 10.35631/JISTM.1039006

Program Framework – Theoretical To Practical

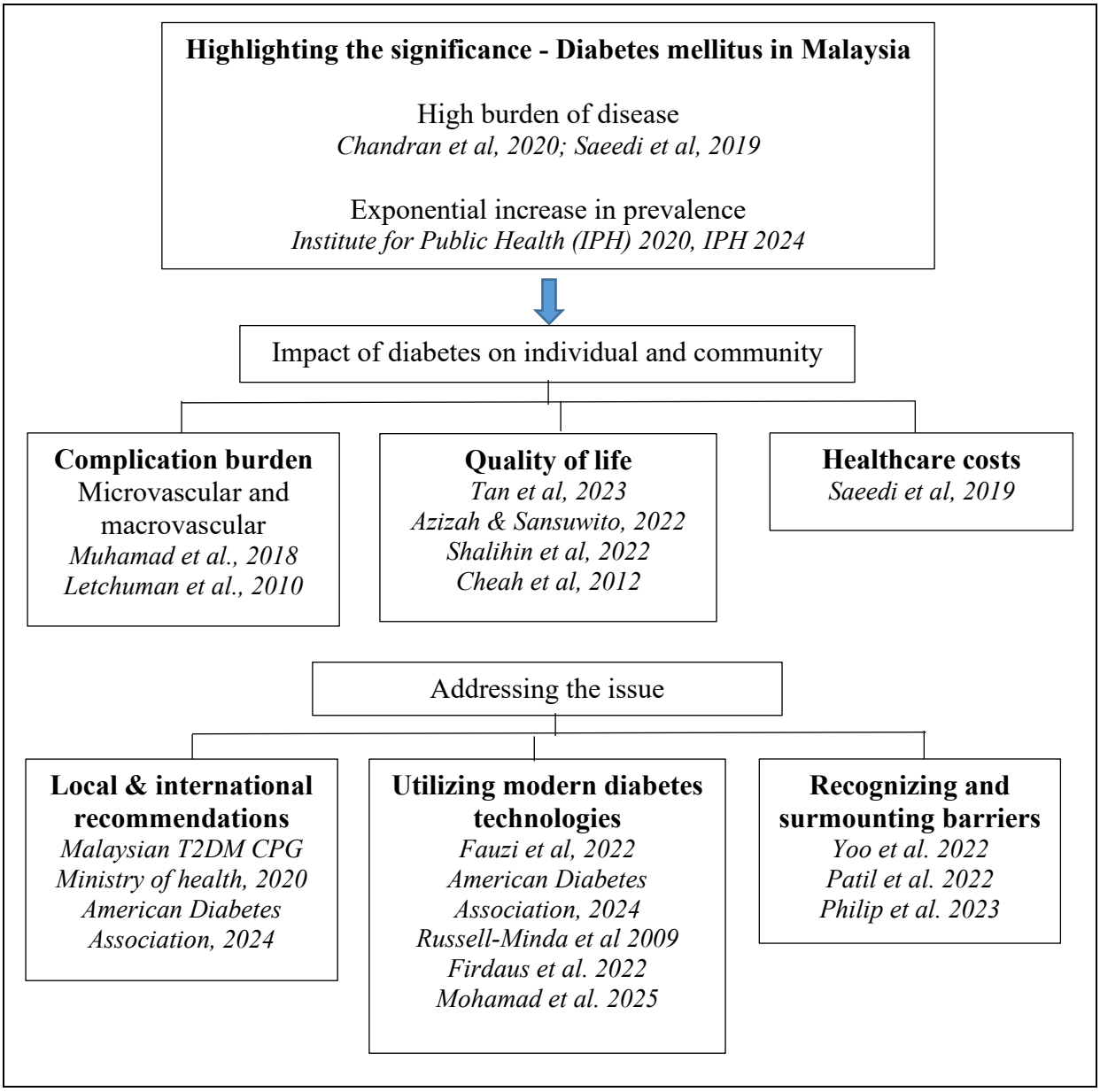
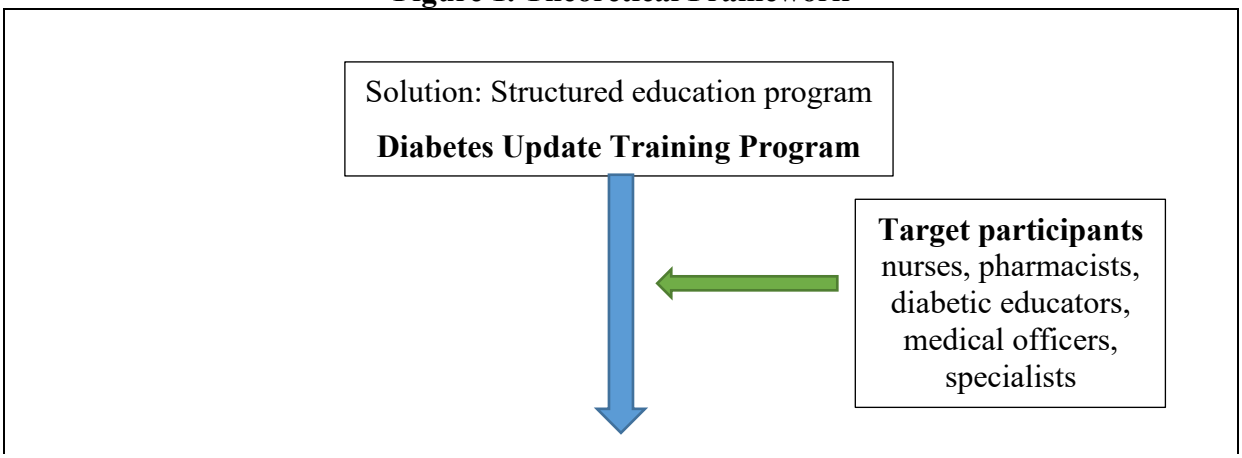


Figure 1. Theoretical Framework



Journal of Information System and Technology Management
JISTM
EISSN: 0128-1666
Volume 10 Issue 39 (June 2025) PP. 89-101
DOI: 10.35631/JISTM.1039006

Program theme: **Aligning Innovation with Tradition**

Program structure

Specialized lectures:

Focus	Education goals
Overview of diabetes technologies	❖ Different types of insulin, newer insulin pens ❖ Advanced insulin delivery devices, eg continuous subcutaneous insulin (insulin pump), continuous glucose monitoring systems (CGMS) ❖ Indications and contraindications
Targets and monitoring	❖ Overview on targets of monitoring and control ❖ Titration of medication to glucose values
Interactive question and answer session	
Diabetes in specific populations: Kidney disease, elderly Ramadhan Pregnancy	❖ Treatment options ❖ Therapeutic targets ❖ Indications and utility of diabetes technologies, CGMS

Multidisciplinary panel
Team of endocrinologists and content experts
Focus: Challenging clinical scenarios, monitoring and management approaches, guideline adherence.

Break-out sessions

Insulin practicalities
Anchored by: nurses, diabetic educators
Focus: insulin handling and storage, during travel and pilgrimage

Lifestyle modification
Anchored by: dietitian & rehabilitation physician
Focus: optimal lifestyle, aided by use of apps and software technologies

Diabetes management – special situations
Anchored by: physicians, endocrinologists
Focus: approach & treatment during acute illness, on specific medications eg steroids

Journal of Information System and Technology Management
EISSN: 0128-1666
Volume 10 Issue 39 (June 2025) PP. 89-101
DOI: 10.35631/JISTM.1039006

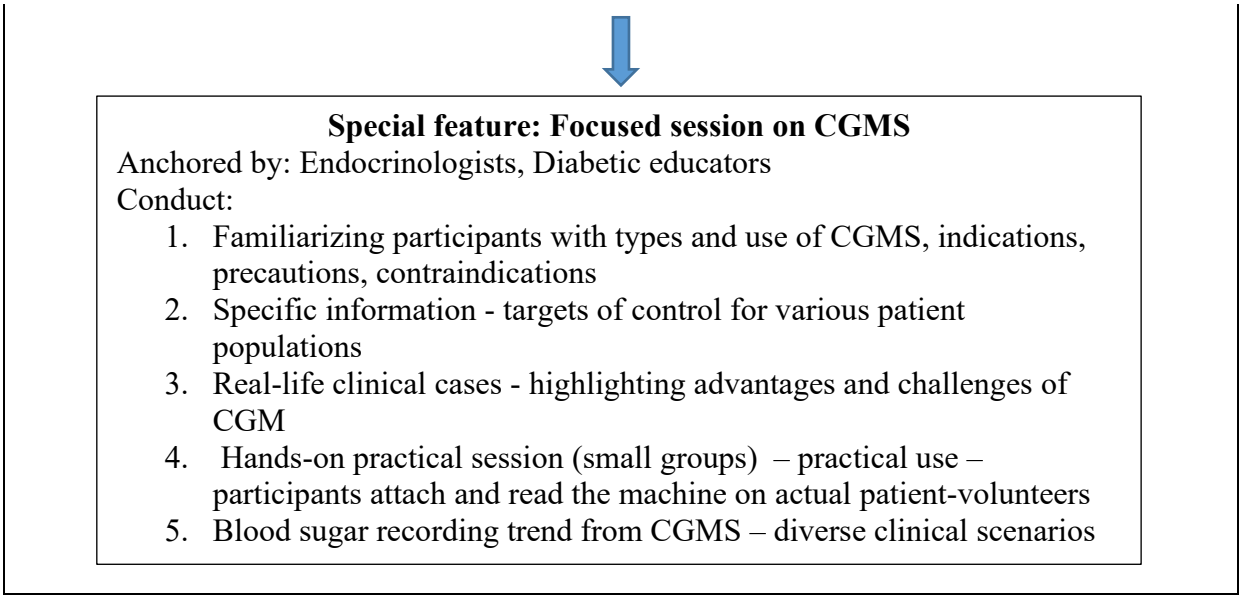


Figure 2. Practical Framework – Education Program

Program Overview

Themed 'Aligning Innovation with Tradition', this workshop was structured by information lectures and hands-on case management clustered around the use of diabetes technologies in various diabetes populations and diverse clinical scenarios. (Figure 2)

Specialized Lectures

The program was initiated with an introductory session by an endocrinologist, highlighting the different diabetes technologies available, and its use in the landscape of rapidly shifting diabetes targets and approach to management. The different types of insulin and newer insulin pens were delineated, ranging from short and rapid acting insulin to ultra-long acting insulin and its use in different patient populations. Advanced insulin delivery devices such as continuous subcutaneous insulin infusion was also introduced, with its indications and contraindications. An overview on targets of monitoring and control, the available options, and titration of medication to glucose values was then delivered, followed by a robust question and answer session.

The next few topics concentrated on specific patient populations, encompassing diabetic kidney disease and elderly, diabetes in pregnancy and diabetes management in Ramadhan, each delivered by the respective content experts. Given that different patient subgroups have varying therapeutics targets, timing of monitoring and targets for control, each lecture concentrated on the approach for these special clusters of patients.

Panel Case Discussion

A dedicated panel discussion ensued, consisting of endocrinologists and content experts, discussing various clinical scenarios, the monitoring and management approaches as well as guideline adherence. Boosted by considerable interest and participation from the attendees, a wide range of cases was discussed, enhanced by different perspectives in approach and management in a variety of clinical settings.

Journal of Information System and Technology Management
JISTM
EISSN: 0128-1666
Volume 10 Issue 39 (June 2025) PP. 89-101
DOI: 10.35631/JISTM.1039006

Cosy Break-Out Sessions

Next on the agenda was the small-group break-out sessions where participants were divided into a few groups for a more personalized discussion and knowledge-sharing on topical issues. These groups were rotated, so that the participants had the opportunity to experience all the highlighted topics. The themes consisted of (1) a session by nurses and diabetic educators on insulin practicalities, handling and storage, especially during travel such during Umrah or Hajj pilgrimage; (2) an assembly anchored by dietitian and rehabilitation physician on optimal lifestyle modifications for people with diabetes, including use of apps and software technologies to aid in calculation of carbohydrate in diet as well as energy expenditure and recommendations on medication titration during exercise; as well as (3) a session on diabetes management during acute illness and while taking specific medications such as steroids, comprising of what to do, when to monitor and how to approach the management of these conditions. (Figure 2)

Special Feature – Focused session on Continuous Glucose Monitoring

A special feature of this workshop was a practical session on the use of continuous glucose monitoring (CGM) devices in the management of DM. This featured session was initiated by familiarizing the participants with types of CGM machines available in general and locally, its use in clinical practice, the indications, precautions and contraindications, as well as proper use of the device. Specific information was shared on targets of control for various patient populations, including the elderly and in pregnancy.

Following that, a few real-life clinical case illustrations were presented, with the cases chosen and handled particularly for this workshop, highlighting the advantages and challenges of using the CGM device in clinical practice.

Subsequently, a hands-on practical session was conducted, with participants divided into groups, and given the opportunity to attach and read the machine as shown. A few actual patient-volunteers attended the workshop by invitation, to demonstrate proper handling of the device. The participants were given the chance to fix the sensor on these volunteers, and had the chance to scan the device for recording of blood sugar readings. Each group experienced glucose monitoring in different scenarios, such as glycaemic variation with meals, exercise and after medications. They were the able to interpret the trend and fluctuations in the readings and share their management approach.

Results and Discussion

This workshop was successful, attended by over 150 participants from different places of practice, across primary care clinic settings to tertiary hospitals, and from diverse training levels, ranging from nurses, pharmacists and diabetic educators to medical officers and physicians. The extensive positive feedback (85%) was encouraging, with about 70% requesting regular workshops, and a subset of attendees (30%) suggesting longer and multi-day workshops. The most beneficial sessions voted were the panel case discussions and hand-on practical session on CGM.

Journal of Information System and Technology Management
JISTM
EISSN: 0128-1666
Volume 10 Issue 39 (June 2025) PP. 89-101
DOI: 10.35631/JISTM.1039006

Table 2. Summary Of Feedback Result

Feedback	Outcome
Method: Online survey form	Filled in by all participants at the end of the program
Result	❖ Positive feedback – 85% ➔ Useful in clinical practice, novel information, ability to institute in associated medical facility ❖ Most helpful sessions: case discussions, hands-on CGM feature
Suggestion/Request	Regular workshops – 70% - Longer, multi-day workshop (30%)

This program provided education for health-care workers on updates in the management of diabetes, handling diabetes in specific patient populations and treating to target. Additionally, this education platform provided theoretical and practical training to facilitate the use of diabetes technologies in clinical practice. This has a huge contribution in enabling healthcare workers to establish this service for the community at large. As previous studies in Malaysia have shown that the general public is fairly receptive to the use of these technologies to improve disease control (Mohamad et al, 2025;Firdaus et al, 2022; Muhd Helmi et al, 2021), provided that the relevant parties, including patients and care-givers are given advice and encouragement by the practicing clinician (Sze & Kow, 2023; Shalihin et al, 2022; Cheah et al, 2012), this education program should propagate more extensive utilization of the available modern devices with the target of disease modification for better patient care.

Given the encouraging feedback from this workshop, this program has realised its goal of cultivating knowledge among health-care workers on the updates and state-of-art treatment options in the management of diabetes mellitus. Further education programs organized at diverse medical facilities should be advocated, with practical training provided centred on enhancing treatment and improving quality of life at every community level.

Conclusion

Management of diabetes mellitus is rapidly evolving with many technological advancements designed to improve disease control and quality of life. Although increasingly available, proper training of relevant health-care practitioners in the clinical utility of these devices is essential for translation to clinical practice. A structured education program is hence imperative to spread awareness and knowledge regarding the use of technologies in DM. Given the success of this workshop, similar programs held at various health centres from primary care to tertiary settings and focused on separate specialty backgrounds would be hugely beneficial in controlling DM and improving patient care.

Acknowledgement

We would like to acknowledge and thank everyone involved in organization and conduct of this program, including the diabetic educators, research assistants, nurses, medical officers, masters' students and patient-volunteers.

References

Akhtar, S., Nasir, J.A., Ali, A., Asghar, M., Majeed, R., Sarwar, A. (2022). Prevalence of type-2 diabetes and prediabetes in Malaysia: A systematic review and meta-analysis. *PLoS One*. 2022 Jan 27;17(1):e0263139. doi: 10.1371/journal.pone.0263139

Journal of Information System and Technology Management
EISSN: 0128-1666
JISTM
Volume 10 Issue 39 (June 2025) PP. 89-101
DOI: 10.35631/JISTM.1039006

American Diabetes Association (ADA) (2024). Diabetes Technology: Standards of Care in Diabetes. *Diabetes Care* 2024;47(Supplement_1):S126–S144. https://doi.org/10.2337/dc24-S007

Azizah, F., Sansuwito, T. (2022). Family Support in Improving Quality of Life of Diabetes mellitus Sufferer: Literature Review. Mal J Med Health Sci 20(SUPP7): 200-204, Aug 2024

Chandran, A., Abdullah, N., Abdul, F. (2020). National Diabetes Registry Report 2013 – 2019. Ministry of Health Malaysia

Cheah WL, Lee PY, Lim PY, Fatin Nabila AA, Luk KJ, Nur Irwana AT (2012). Perception of Quality of Life among People with Diabetes. Malaysian Family Physician 2012; Vol 7(2&3)

Fauzi, A., Chia, A.Y.Y., Tang, Y.Q. (2022). Current Diabetes Technology and its Challenges. *Turk J Endocrinol Metab*. 2022;26:38-47

Firdaus, M.K., Jittanoon, P., Boonvasopun, U. (2022). Developing, validating, and pre-testing of a diabetic care self-management mobile health application: A technology-based intervention for patients with diabetes in Malaysia. *Belitung Nurs J*. 2022 Aug 18;8(4):365-371 doi: 10.33546/bnj.2127

Institute for Public Health (2024). National Health and Morbidity Survey (NHMS) 2023: Non-communicable Diseases and Healthcare Demand - Key Findings

Institute for Public Health (IPH), National Institutes of Health, Ministry of Health Malaysia. (2020). National Health and Morbidity Survey (NHMS) 2019: Vol. I: NCDs—Non-Communicable Diseases: Risk Factors and other Health Problems.

International Diabetes Federation. (2017) IDF Diabetes Atlas 2017. International Diabetes Federation, Brussels, 150.

Letchuman, G., Wan Nazaimoon, W., Wan Mohamad, W., Chandran, L., Tee, G., Jamaiyah, H., Isa, M., Zanariah, H., Fatanah, I. and Ahmad Faudzi, Y. (2010) Prevalence of Diabetes in the Malaysian National Health Morbidity Survey III 2006. *Medical Journal of Malaysia*, 65, 180-186

Ministry of Health Malaysia (2020). Clinical Practice Guidelines for the Management of Type 2 Diabetes Mellitus 6th edition. 2020. MOH/P/PAK/447.20(GU)-e

Mohamad NF, Abdullah Sani AF, Ahmad Nizam NA, Sze-Shir F, Mohamed Ghazali IM, Sarimin R. (2025). Patient perspectives on continuous glucose monitoring system (CGMS) for diabetes in Malaysia: a vital voice in health technology assessment (HTA) informing decision-making. *Int J Technol Assess Health Care*. 2025 Feb 6;41(1):e13. doi: 10.1017/S0266462325000078. PMID: 39910989; PMCID: PMC11894388.

Muhamad, N.A., Mutalip, M.H.A., Mustapha, N., Dali, N.S.M., Aris, T., Ismail, F., Murad, S., Sulaiman, L.H. (2018). Association between Comorbidities and Selected Sociodemographic Factors with Complications of Diabetes: Results from the National Diabetic Registry Malaysia. *Journal of Diabetes Mellitus 8*(3). DOI: 10.4236/jdm.2018.83009

Muhd Helmi, M. A., Bachok, N., & Hussain, S. (2021). Continuous Glucose Monitoring System Versus Self-Monitoring Blood Glucose in Type 1 Diabetes Mellitus Children: A Randomised Controlled Trial (RoSEC). *Malaysian Journal of Paediatrics and Child Health*, *27*(2), 51–68. https://doi.org/10.51407/mjpch.v27i2.152

Patil SP, Albanese-O'Neill A, Yehl K, Seley JJ, Hughes AS. (2022). Professional competencies for diabetes technology use in the care setting. *Sci Diabetes Self Manag Care* 2022;48:437–445

Journal of Information System and Technology Management
EISSN: 0128-1666
JISTM
Volume 10 Issue 39 (June 2025) PP. 89-101
DOI: 10.35631/JISTM.1039006
Phillip M, Nimri R, Bergenstal RM, et al. (2023). Consensus recommendations for the use of automated insulin delivery technologies in clinical practice. *Endocr Rev* 2023;44:254–280

Russell-Minda, E., et al (2009). Health Technologies for Monitoring and Managing Diabetes: A Systematic Review. *J Diabetes Sci Technol*. 2009 Nov;3(6):1460–1471. doi: 10.1177/193229680900300628

Saeedi P, Petersohn I, Salpea P, Malanda B, Karuranga S, Unwin N, et al. (2019) Global and regional diabetes prevalence estimates for 2019 and projections for 2030 and 2045: Results from the International Diabetes Federation Diabetes Atlas. Diabetes research and clinical practice. 2019. Nov 1;157:107843. doi: 10.1016/j.diabres.2019.107843

Shalihin, MSE., et al (2022). Diabetes Quality of Life Among Elderly Diabetic Patients and Its Associations. Mal J Med Health Sci 18(SUPP19): 22-31,Dec 2022

Sze, WT., Kow, SG. (2023). Perspectives and Needs of Malaysian Patients with Diabetes for a Mobile Health App Support on Self-Management of Diabetes: Qualitative Study. JMIR Diabetes 2023;8:e40968. doi: 10.2196/40968

Tan MHP, Ong SC, Vasan Thakumar A, Mustafa N. (2023). Quantifying health-related quality of life in Malaysian type 2 diabetes: focusing on complication types and severity. Qual Life Res. 2023 Jul;32(7):1925-1941. doi: 10.1007/s11136-023-03360-x. Epub 2023 Feb 13. PMID: 36781810.

Yoo JH., Kim G., Lee HJ., Sim KH., Jin SM., Kim JH. (2022). Effect of structured individualized education on continuous glucose monitoring use in poorly controlled patients with type 1 diabetes: A randomized controlled trial. *Diabetes Res Clin Pract* 2022;184:109209