

Variations in the delivery of primary diabetes care in Malaysia Lessons to be learnt and potential for improvement

Feisul Mustapha (✉ feisulidzwan@gmail.com)

Disease Control Division, Ministry of Health Malaysia <https://orcid.org/0000-0003-3497-341X>

Jens Aagaard-Hansen

Steno Diabetes Center Copenhagen

Shiang Cheng Lim

Steno Diabetes Center Copenhagen

Nazrila Hairizan Nasir

Ministry of Health

Tahir Aris

Institute for Public Health, Ministry of Health

Ulla Bjerre-Christensen

Steno Diabetes Center Copenhagen

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Abstract

Background The paper describes variations in the organisation of clinical services for diabetes patients in ten public primary health clinics in Malaysia with the view to learn from current innovations and improve diabetes service provision.

Methods This study combined the use of secondary data and a qualitative multi-case study approach applying observations in ten randomly selected MOH health clinics in Kuala Lumpur and Selangor, and semi-structured interviews of the Family Medicine Specialists from the same clinics.

Results Although there are specific Ministry of Health guidelines for diabetes care, some clinics had introduced innovations for diabetes care such as the novel 'personalised care', 'one-stop-centre' and utilisation of patients' waiting time for health education. Analysis showed that there was room for improvement in terms of task shifting to free precious time of staff with specialised functions, streamlining appointments for various examinations, increasing continuity of consultations with same doctors and monitoring of performance.

Conclusion We contend that there is a potential for increased effectiveness and efficiency of primary diabetes care in Malaysia without increasing the resources – a potential that may be tapped into by systematic learning from on-going innovation.

Background

1.1 Burden of Non-Communicable Diseases in Malaysia

Malaysia has made great strides in providing quality healthcare for its people since the 1960s. Life expectancy has increased for women from 65.6 to 77.2 years and men from 61.6 to 72.6 years between 1970 to 2016 (Malaysia, 2017; WHO, 2012). Current life expectancy is above that of upper middle-income countries, but below high-income countries (WHO, 2017). Public healthcare indicators are almost at par with levels of developed countries (Malaysia, 2017).

Despite these achievements, there is a number of remaining public health challenges. Malaysia is undergoing an epidemiological transition with causes of mortality shifting from communicable to Non-Communicable Diseases (NCDs). Malaysia has successfully reduced under-nutrition amongst children but has gradually seen an increase in obesity, not only amongst children, but also amongst the public in general with a prevalence of 47.7% (MOH, 2015c; Mohammed et al., 2015). In 2014, communicable, maternal, perinatal and nutritional conditions contributed 16% to total deaths, whereas NCDs contributed 73% (WHO, 2014). In particular, the prevalence of diabetes (DM) increased drastically in the past 10 years, from 11.6% in 2006 to 15.7% in 2015 for population 18 years and above (MOH, 2015c). This translates to about 3.6 million adult Malaysian with diabetes.

1.2 The Malaysian primary health care system

Malaysia has a widespread healthcare system comprising of a comprehensive public sector complemented by an active private sector. There is access to universal free healthcare system from primary care to tertiary treatments, and basic healthcare is delivered even to the most remote settlements (WHO, 2012). Primary health care has been declared as the thrust of health services since the documentation of 7th Malaysia Plan in 1996 (WHO, 2012).

The major provider of primary health care services is the public sector. There are currently about 1,061 Ministry of Health (MOH) health clinics evenly distributed throughout Malaysia, with smaller clinics in the more remote areas (MOH, 2016). The bigger health clinics are headed by Family Medicine Specialists (FMSs), and have resident doctors (called medical officers or MOs), and complete in-house facilities that range from medical laboratory tests, plain x-rays and pharmacies. Thus, the MOH primary care service takes a multi-disciplinary team approach to patient care (Chan, 2015). It includes nurses, assistant medical officers, nutritionists, dieticians, pharmacists, physiotherapists and occupational therapist. Some of the nurses and assistant medical officers have undergone specialised training in diabetes education, obstetric ultrasonography, eye care and emergency care. These health clinics are linked to MOH hospitals with an established referral system (WHO, 2012).

The second major provider of primary health care services is the private sector including private general practitioners and private primary care clinics that have been mushrooming throughout the country, especially in urban areas, to a total of 7,146 in 2015 (MOH, 2016). These clinics are largely run either singlehanded or a by group of two to three general practitioners, often without the complement of allied health care staff. Payments for the services provided are largely borne by the patients, their employers or health insurance schemes (WHO, 2012).

1.3 Diabetes care in Malaysia

In Malaysia, most people diagnosed with chronic diseases are already receiving their care at the primary care level and for patients diagnosed with diabetes, almost 80% of these seek treatment at Ministry of Health (MOH) health care facilities, with the majority at MOH health clinics (Klinik Kesihatan - KK) (MOH, 2015c). These clinics can be divided into three categories of “service delivery package”; universal, intermediate and advanced, defined by the availability of human resources and services available at the health clinics (Ismail) (*Table 1*).

(Insert *Table 1* here)

Diabetes has been used by the MOH as the entry point for improving the delivery of care of chronic diseases in the Malaysian primary health care system. Various initiatives have been introduced since the late 1990s and early 2000s to improve the delivery of care for patients with diabetes. These included the

establishment of a multi-disciplinary approach in managing diabetes patients; setting up of “diabetes resource centres” (DRCs) in MOH hospitals and MOH health clinics to function as “one-stop-centres” for diabetes patients; establishing a post-diploma six-month structured training for nurses and assistant medical officers in diabetes management leading to the title “diabetes educators” after a passed examination; and setting up the use of clinic-held and patient-held diabetes records (called “green cards” since the covers are green in colour) to enable clinical audit and for continuity of care of patients across different service provider, e.g. between different clinics and hospitals, and across public and private facilities (Hussein, Taher, Singh, & Swee, 2015).

More recent diabetes-related quality initiatives included the implementation of a nation-wide Diabetes Clinical Audit for type 2 diabetes (T2D) patients in MOH health clinics in 2009, as well as the Quality Assurance (QA) Program called the “Quality of care of diabetes care in MOH health clinics: Glycaemic control”, both starting in 2009 (MOH, 2009a, 2009b). To support the implementation of both the Diabetes Clinical Audit and the QA Program, the National Diabetes Registry (NDR), a web-based application, went live on 1 January 2011 (Chan, 2015).

The MOH has published several clinical practice guidelines (CPGs) relating to the management of diabetes (both Type 2 and Type 1) and the major complications relating to diabetes (MOH, 2011, 2015a, 2015b). These CPGs apply to both primary and secondary care. In addition, a Standard Operating Procedure (SOP) document on the management of diabetes patients in MOH health clinics was also published in 2005 (MOH, 2005). This SOP document describes the patient flow in the various types of health clinics (clinics without MOs, clinics with MOs and clinics with Family Medicine Specialists (FMSs); delivery of the various components of diabetes care; and the roles and responsibilities of each of the healthcare providers involved with the diabetes care.

The objective of this paper is to describe the variations in the organisation of clinical services for diabetes patients in ten public primary health clinics in Malaysia with the view to learn from current innovations and make service provision more effective and efficient. Organisation of clinical services for diabetes management is defined as the flow of services or algorithm that a patient has to go through in order to receive the necessary services provided at the clinic with regards to diabetes care.

Methods

- ◦ Study design

The study combined the use of secondary data and a qualitative multi-case study approach comprising ten randomly selected MOH health clinics in Kuala Lumpur and Selangor. The study took place within the framework of a larger educational evaluation study entitled Impact Evaluation of the Steno REACH Certificate Course in Clinical Diabetes Care for Health Care Providers in Malaysia: Study Protocol for a Quasi-Experimental, Mixed-Methods Research, the details of which are being reported elsewhere (*under review*).

2.2 Clinic selection

Ten MOH primary health clinics located in the states of Selangor and Kuala Lumpur were randomly sampled from a sampling frame of 43 health clinics with a minimum of 1,000 active diabetes patients registered. Both these states are located in the central region of peninsular Malaysia. The capital city of Malaysia as well as several big cities and towns are located in these two states and therefore the health clinics on average would have a higher patient load overall as well as diabetes patients as compared to the other states in peninsular Malaysia. Data were collected for a period of three months from June 2016 to August 2016.

2.3 Data collection

The study combined primary and secondary data. Primary data were collected in the form of observations of the health clinics based on an observation guide and in-depth interviews of the ten FMSs of these clinics using a question guide. Both the observation format and the semi-structured interview guide for the FMSs contained items and questions relating to key steps in the organisation of clinical services for diabetes management in the health clinic, in particular understanding the patient flow in each clinic and the points where various services relating to diabetes care were received by individual diabetes patients. A single senior researcher conducted the observations and all of the in-depth interviews with FMSs. During the observations, the researcher was able to move around to all the various contact points that the patients passed during the visit to the clinic, thereby getting a first hand impression of the interaction.

Secondary data were obtained from the Family Health Development Division (FHDD), MOH Headquarters in Malaysia, on specified characteristics of the health clinics. The FHDD kept a database, including data on the type of clinic, size of clinic, average patient load per day for general out-patient attendances, number of new patients and repeat attendees, number of healthcare providers by category and the “service delivery package” available at each health clinic.

The results of the Diabetes Clinical Audit for year 2015 were obtained from the National Diabetes Registry (NDR), facilitated by the Disease Control Division, MOH Headquarters. Data were available at the individual clinic level, that included number of diabetes patients registered and on regular follow-up, proportion of patients achieving the HbA_{1c} target of <6.5% and mean HbA_{1c} levels.

2.4 Data analysis

Interview transcripts with the FMSs were analysed using thematic content analysis relating to the organisation of clinical services for diabetes management in each health clinic. As the main purpose of this analysis was to identify the key components of the local DM-related health systems, these formed à

priori domains for coding into which sub-categories were generated. In addition, the analysis allowed for the inclusion of themes not pre-defined in the template.

The observation notes were analysed to identify common themes and to paint a picture of the organisation of the clinical services within which diabetes care was offered based on the items in the observations guide. As the observational data and the data from the in-depth interviews were derived from guides addressing the same points, it was possible to combined the two sets of data in order to achieve triage of perspectives.

Results

3.1 General characteristics of the selected clinics

Out of the ten MOH health clinics, seven were located in Selangor and three in Kuala Lumpur. It was a diverse group of clinics, in terms of location, size of clinic, type of building, average daily out-patient attendances and the number of diabetes patients registered. *Table 2* provides a summary of some of the main characteristics of these ten clinics, including the average HbA_{1c} results from their Diabetes Clinical Audit for year 2015. Eight of the ten health clinics were located in urban areas, and of these all except one were located in purpose-built buildings. Only two clinics were located in relatively new buildings. The clinics located in old buildings have had extensive renovations, particularly those in urban areas, to accommodate the increasing number of patients and the increasing services provided at the primary care level. All clinics apart from two provided the advanced diabetes service delivery package. These clinics cover an estimated local population that ranges from about 27,000 to 290,000. In terms of average daily out-patient attendances, they range from about 150 patients per day, up to about 750 patients per day. The number of registered diabetes patients on regular follow-up at these health clinics ranged from about 1,100 up to 4,000 patients.

(Insert *Table 2* here)

The mean HbA_{1c} results from the annual Diabetes Clinical Audit showed some variations, ranging from 7.8% to 8.5%. However, the 95%CI valued showed considerable overlap between most of the health clinics (*Table 2*).

According to the ministerial guidelines, the FMSs were the administrative as well as the clinical heads of each health clinic, and in principle, they are supposed to be based full time in a particular health clinic. However, in some cases FMSs have to cover other health clinics if cases where the FMS post are vacant, or there isn't any post in that particular health clinic. In clinics where the FMS is a visiting FMS, there is usually a senior Medical Officer (MO) who will undertake the day-to-day administrative duties, but he/she is still answerable to the visiting FMS.

Table 3 shows the characteristics of the FMSs responsible for the ten health clinics. It is a diverse group of people, from very junior FMSs who have just been gazetted as a clinical specialist, to the very senior FMSs with 19 years' experience as a clinical specialist. All except one FMS was based full-time in the health clinics.

(Insert *Table 3* here)

3.2 Organisation of delivery of primary diabetes care

The patient flow from the point of registration to discharge from the clinic, and the points of organisation of service delivery with roles and responsibilities of the various healthcare providers in the clinic, is mapped out in *Figure 1* to which reference is made in the various sections of the result section.

(Insert *Figure 1* here)

This study showed that there were variations in the way diabetes patients were managed within the ten study clinics, partly because of availability of specialised clinical functions and personnel, and partly because of the way work was organised.

3.2.1 Registration

In general, all out-patients were registered at a common registration counter at the health clinic. All ten health clinics practiced a staggered or block appointment system for diabetes patients who were on regular follow-up, or who were newly diagnosed. Diabetes patients might come at any working day outside of the appointment time, however, these patient would be assigned to the general out-patient services and any diabetes medication would only be prescribed up to the date of the new follow-up appointment.

All ten MOH health clinics used a standard clinic-held diabetes record called the "green book", and each patient kept a summary record in a corresponding patient-held "green book" as well. The use of the green books was established in year 2000. Upon registration, the clinic-held green books were retrieved from the records room and be made available to the nurses and MOs.

The variations noted were:

- Although the usual opening hours for MOH health clinics are from 8 am to 5 pm, Mondays to Fridays, five clinics had extended hour services lasting until 9 pm and half day Saturdays. However, no diabetes services were provided during the extended hours.
- The number of days in the week that appointments were given to diabetes patients for newly diagnosed and on regular follow-up varied. Seven out of the ten clinics have diabetes appointments

four days a week, from Monday to Thursday, one clinic five days a week, one clinic three days a week (Tuesday to Thursday) and one clinic only two days a week (Wednesday and Thursday).

3.2.2 Screening counter

After registration, diabetes patients would then move on to the “screening counter” (in Malaysia called “triage counter”) or “screening room”. In all ten health clinics, the counters were staffed by nurses, usually two per counter. The nurses stationed at these screening counters might include certified “diabetes educators”. Only six out of the ten health clinics had the services of a diabetes educator (*Table 4*).

At all counters, patients would have their blood pressure, weight (and height when required), and blood sugar checked. These counters were all located in common areas, and all procedures were done in full view of other patients in the clinic. This may explain why waist circumference measurements were not conducted although this is part of the screening protocol, as this meant some degree of exposure of the patients.

The nurses at these counters were also responsible for reviewing the completeness of the blood investigation results as well as the diabetes-related complication screenings, and documenting them in the green cards, both clinic-held and patient-held, prior to the consultation with the MOs. At seven clinics, the nurses also completed the routine blood investigation forms for the next visit, which essentially reduced the administrative tasks for the MOs, enabling them to spend more of their contact time with patients doing actual medical consultation.

“Since the nurses are helping review availability of results (of screening of complications) and fill up the necessary forms, the MOs can spend more time engaging the patients. Before this, the MOs had to search for results and fill up all investigation forms... it was very distracting.” (FMS, KK 1)

In contrast, in three health clinics, the nurses were not responsible for reviewing the completeness of results and investigations. In these clinics, the MOs were fully responsible for ensuring all results were available, documenting them in the green cards and even completing all of the investigations forms for the subsequent visit.

The MOH has published a guideline on the roles and responsibilities of diabetes educators (MOH, 2005). However, due to the current high work burden in the respective health clinics, these diabetes educators were also responsible for other out-patient clinical duties such as work at the Registration counter. Only in three health clinics we observed that the diabetes educators were able to conduct one-to-one consultations with diabetes patients.

However, in one clinic, it was observed that the diabetes educator was singly responsible of all diabetes patients, with minimal assistance of other nursing staff. She had to conduct patient counseling, foot examination, tracing blood investigation results (if missing) and also providing patients with their subsequent follow-up appointment dates. In this clinic, patients would also engage the diabetes educator

from multiple points of contact at the clinic e.g. referred by the nurses at the triage counter, referred by the MO for further management as well as after the MO consultation for patients to get their next appointment.

In another clinic, because this clinic did not have a diabetes educator, a nurse was assigned this responsibility. In a small, enclosed space that provided some degree of privacy, this nurse was responsible for ensuring that all of the complications screening including foot examination were conducted, blood investigations results made available and all of the information in the records was updated before the MO saw the patient. The nurse also conducted foot examinations in the same space.

“This is an old clinic with very limited space, but I felt it was important that the diabetes nurse had her own “space” to do her work. Despite the limited space, she is able to do her job well and get most of the screening examinations done...” (FMS, KK 2)

In summary, the variations noted were:

- Either there was a common screening counter for all out-patients or a dedicated space for diabetes and/or hypertension patients only.
- Whether these nurses were only tasked in performing specific clinical examinations, or include assisting the MOs on administrative tasks relating to patient care.
- The availability of diabetes educators in the health clinics, and in their absence, whether a specific nurse was assigned that responsibility.
- Roles and responsibilities of the diabetes educators and nurses functioning as diabetes educators also differed between health clinics.

(Insert *Table 4* here)

3.2.3 Consultation with Medical Officer

The mainstay of diabetes management of the health clinic is the responsibility of the MO, from the history taking, examination, diagnosis and treatment. In three health clinics, the MOs had full responsibility for ensuring that all of the results of investigations were available for the current consultation, ordering the necessary investigations for the next follow-up and were fully responsible for the patient education on adherence to therapy, dietary advice and physical activity advice. In clinics where some of these tasks were shifted to the nurses, including the diabetes nurses, the MOs were able to spend a larger proportion of their consultation time to focus fully on clinical duties.

In eight health clinics, two MOs shared a single consultation room due to space limitations. This was not very conducive for effective consultation due to lack of privacy and high level of background noises.

“Our patients have no privacy... the consultation room is noisy... but what can we do? Our patient load is high and we don’t have enough consultation rooms... and I wonder how much our patients are sharing with the doctors...” (FMS, KK 7)

In eight out of the ten health clinics, consultations for diabetes patients were either conducted in dedicated consultation room(s) with dedicated MOs, or a variation of the “Family Doctor Concept” (FDC) described further under the “Innovations” section of the discussion below. The dedicated MOs were either permanently assigned to see diabetes patients, or rotated on a weekly, monthly, or three-monthly basis; or a combination of one permanent MO and one or more rotating MO(s). In the remaining two health clinics, it was observed that diabetes patients were seen in between other common out-patient cases, by all of the MOs in the health clinic.

“Implementation of the FDC would require a larger clinic space, that is not possible (in my clinic). So when I moved to this clinic over a year ago, I started this new system (of assigning specific rooms for diabetes consultation on specific days) since I felt it is important for diabetes patients to have continuity of care (seeing the same MO).” (FMS, KK 3)

“I have started the system (of assigning patients to specific MOs) since two years ago when I had enough MOs... because I can now monitor the quality of care for each MO, I find that they are more accountable for their work...” (FMS, KK 5)

Variability was observed for the following activities:

- Dedicated MOs for diabetes patients versus diabetes patients being seen by all MOs in between other out-patients.
- In addition to clinical management of diabetes patients, the MOs in some clinics were fully responsible for ensuring completeness of screening investigations and completeness of documentation, while in some clinics these tasks were shifted to nurses.
- Single or sharing consultation rooms due to space limitations.

3.2.4 Consultation with FMSs, dieticians, nutritionists and pharmacists

Based on the current status and needs of the patient, he/she might then be referred to the FMS (or other specialisation at the hospital level) for further management, to the dietician or nutritionist (where available) for specific dietary advice; the diabetes educator (where available) for more general diabetes care advice; or the Diabetes Mellitus Therapy Adherence Clinic (DM-TAC) services run by the pharmacists.

Referral to the FMS and dietician or nutritionist would usually mean separate appointments, whereas the DM-TAC referral would be made to the pharmacist before the patient collects his/her medications at the pharmacy. All MOH health clinics have their own in-house pharmacies to dispense medications.

Several big clinics in urban areas lack the services of a dietician (*Table 4*). Although the dietician may be based in a particular clinic, they are essentially “visiting” since they have to cover multiple clinics within the same district. Therefore they have a monthly visiting timetable for each health clinic that they cover with their own separate appointment system. In clinics where dietetics services were not available, the function was taken over by nutritionists. Some of these nutritionists have additional training in dietetics, but this is not a pre-requisite.

“We are lucky now to have dieticians posted in health clinics... although we only have one for the whole district, at least some of my patients now can see a dietician. Previously I had to refer my patients to see the nutritionist, and luckily, my nutritionist had formal training in dietetics, but she already has a heavy work burden in managing childhood malnutrition issues.” (FMS, KK 1)

Variability was observed regarding:

- The availability of the FMS at the health clinic; they are either full-time or visiting.
- The availability of either dieticians or nutritionists, and the frequency of their visits to any particular health clinics.

3.2.5 Examinations and Investigations

The Malaysian T2D CPG clearly states the examinations and investigations required for T2D patients together with the time intervals for each examination and investigation. As per common practice for MOH health clinics, for blood investigations that required venous blood taking, patients were given an appointment specifically for blood taking usually conducted by a nurse about 2 weeks prior to their doctor’s appointment. This means that diabetes patients would have to attend the clinics at least once prior to the consultation appointment date.

Depending on the health clinic, some investigations were done at the laboratory at the clinic itself and some would need to be sent to another clinic equipped with the necessary laboratory services. Regardless of whether the tests were done on- or off-site, the results would be made available during the upcoming follow-up appointment. Except for two health clinics that used an electronic medical record system called “Tele-Primary Care” (TPC), the results were recorded and made available manually.

As part of the screening for diabetes complications protocol, ECGs and foot examinations were also mostly conducted at the same clinic on a separate appointment also prior to the consultation appointment date. These appointments were usually during the afternoon clinic session when the clinics were less busy, and conducted by the nurses in the treatment room.

The use of fundus camera is the method of choice for screening for diabetes retinopathy. The fundus camera may be permanently located and available in a health clinic, or patients are referred to the nearest health clinic with a fundus camera (*Table 4*). In Selangor and Kuala Lumpur, the ophthalmology services

have developed a mobile fundus camera service, whereby a single fundus camera is placed in different clinics based on a fixed timetable, manned by the staff at that particular clinic. During the period when the fundus camera is available, the health clinic would then schedule fundus examination for as many patients as possible.

“When we had to refer patients to the nearest clinic with a fundus camera to have their fundus checked, our coverage for screening (for diabetes retinopathy) were low. Patients were not going because it was inconvenient for them. Since we started rotating the fundus camera in each KK every three months and scheduled fundus examinations around these rotations, our annual screening rates showed drastic improvement...” (FMS, KK 5)

The variations that were observed:

- Laboratory services were available on-site versus off-site, depending on the type of blood investigations.
- The availability of funduscopy, either it is available on-site permanently or during specified time periods (as part of a mobile fundus camera service), or available off-site at another clinic or nearby MOH hospital.
- The availability of chest X-ray services, either on-site versus off-site.

Discussion

4.1 Innovations introduced

The KK 3 has a unique family doctor’s concept (FDC) and personalised care that was introduced by the FMS, when she started working in this clinic one and half years ago. This is unique in the sense that it is not part of current MOH SOP. A diabetes patient is assigned a specific day of the week for all of his/her regular follow-up appointments and a specific consultation room is also assigned a specific day to receive diabetes patients. Although two MOs share each consultation room, with this system, a patient either sees the same MO or at least the same MO is present in the same consultation room.

The KK 5 employed a similar family doctor’s concept (FDC) that was introduced by the FMS over the past two years. A diabetes patient was assigned a specific day of the week for all of his/her regular follow-up appointments and a specific MO is assigned a specific day to receive diabetes patients. The FMS was only able to implement this new system about two years ago when the number of MOs increased to four. The other innovation introduced in KK 5 was the HbA_{1c} charting of patients being seen by the MOs. Since each MO has their own set of patients, the FMS is able to assess individual performances of each MO based on the HbA_{1c} achievements.

Another innovation done in KK 5 was that while the patient was waiting to be seen by the MO, the DM-TAC pharmacist would select patients with poorly control diabetes for counseling. The counseling not

only covered issues on adherence, but also touched on dietary and physical activity aspects. This innovation was done on the own initiative of the DM-TAC pharmacist.

The last innovation observed was in KK 7 that had a unique “diabetes one-stop-centre” where nurses and MOs shared the same space that also functioned as the diabetes resource centre. With chairs arranged along a wall in the room, patients waited for their turns to be firstly reviewed by one of the two nurses. The nurses ensured that all of the necessary screening investigations were ordered and reviewed for completeness before the MO sees the patient. The nurses also checked the blood pressure, weight (and height when required), and blood sugar, together with the foot examination. The nurses working in this room were rotated within the clinic on a daily basis. Patients would then wait to see one of the two MOs. One of the MOs was dedicated to diabetes management, while the other MO was rotated on a daily basis.

4.2 General issues

This is to our knowledge the first paper that describes in detail the delivery of primary diabetes care in MOH health clinics in Malaysia. Based on the Malaysian T2D CPG, almost all of the required examinations and investigations were made available to the T2D patients. However, in spite of a well-defined set of guidelines, the study has shown that there were much variability in the delivery of primary diabetes care within key areas.

One common feature was that T2D patients were required to have multiple visits to the clinic outside of their “main” consultation appointment with the MO to obtain related “services”, such as blood taking, foot examination, fundus examination, ECG, or consultation with the FMS or dietician (*Figure 1*). Although it is possible that some of these investigations or additional consultation may happen on the same day as the main consultation, by and large this was the exception rather than the rule. As Malaysia moves towards “patient-centred care”, MOH must re-engineer the work processes at the health clinics to reduce the number of visits outside of the main consultation appointment. Ideally, all relevant examinations such as chest X-ray and fundoscopy should be conducted at the same appointment. This would not only reduce the time and financial burden for patients and carers, but is also likely to increase the coverage of screening for diabetes-related complications due to less defaulters of these additional clinic visits (Abu Dabrh, Gallacher, Boehmer, Hargraves, & Mair, 2015; Rosbach & Andersen, 2017; Tran, Barnes, Montori, Falissard, & Ravaud, 2015).

One ethical and clinical issue that was observed was the lack of privacy for patients at the screening counter and consultation with the MO. All of the screening counters or rooms were located in public areas or sharing the same room, and this may explain why waist circumference measurements were not observed. In addition, the high level of noise made any conversations between the nurses and patients difficult. Patients also lacked privacy during the consultation with the MO because of the shared consultation rooms. Although physical examinations can be conducted in suitably private curtained areas, conversations between the MO and patient were not private. This limited the ability of the MO to

build rapport and trust with the patient. This also made it very difficult for patients to share more intimate or sensitive health issues, such as incontinence or sexual dysfunctions.

In line with the “patient-centred care” theme, continuity of care by the same healthcare provider has been shown in studies to improve patients’ adherence to follow-up, treatment regimes, quality of care and quality of life for the patients (Barry & Edgman-Levitan 2012; Inzucchi et al., 2015; Nutting et al., 2007; Stellefson, Dipnarine, & Stopka, 2013). In the current delivery of primary diabetes care in MOH health clinics, patients do not get to see the same MO during their follow-up visits. This was observed in eight out of the ten health clinics. However, in two clinics, the FMSs have introduced a unique family doctor’s concept (FDC). This innovation has the advantages, that it ensured continuity of care by the same MO, and furthermore the system worked within existing resource constraints of consultation rooms or space and existing number of MOs.

It should be highlighted that the innovative patient-centred initiatives instituted by the FMS and the pharmacist in KK 5, working around their existing local health systems and resources. Due to their personalised care system, KK 5 was able to institute monitoring the performance of individual MOs based on the HbA_{1c} achievement of their patients. This was not possible for the other health clinics since diabetes patients do not see the same MO for repeated visits. Studies have shown the improvement of quality of care for diabetes patients when the appropriate indicators are monitored on a regular basis (Inzucchi et al., 2015; Tricco et al., 2012).

Other studies have shown the importance of specialised diabetes teams and clinics or services in managing diabetes patients in increasing quality of care and reducing the risks of diabetes-related complications (Nutting et al., 2007; Stellefson et al., 2013; Tricco et al., 2012). We found that eight out the ten health clinics adopted different strategies to ensure the delivery of dedicated diabetes services by the MOs for patients on scheduled appointments. Therefore, it was possible within current resource constraints and in compliance with existing CPGs to re-engineer the delivery of primary diabetes care. In the remaining two health clinics that still managed diabetes patients in between general out-patient attendees.

Task shifting from the MOs to the nurses for primary diabetes care has the potential to contribute to addressing the issues of insufficient number of MOs (Brent D. Fulton et al., 2011; WHO, 2007, 2008). This in turn can improve health delivery systems where the procedures are well defined and HCPs work in a coordinated and organised manner (Labhardt, Balo, Ndam, Grimm, & Manga, 2010; Lekoubou, Awah, Fezeu, Sobngwi, & Kengne, 2010). We observed that task shifting was already happening for the pharmacists through the DM-TAC services, providing counseling not only for adherence to oral medications, but counseling on the use of insulin including injection techniques. Re-engineering the delivery of primary diabetes care should also involve re-examining the roles and responsibilities of nurses in the clinic. Traditionally the MO is the primary care-giver with the other HCPs playing a supporting role, particularly the nurses. It was observed that in most clinics the nurses undertook very routine tasks e.g. taking blood pressure, blood taking or routine dressings. They were not observed to conduct any patient

counseling. In clinics where the nurses were diabetes educators, they were mostly unable to conduct patient counseling because they were over-burdened with routine tasks due to inefficient task division between the nurses. The provision of adequate training and supervision of the nurses would be important in order to improve their knowledge and skills before additional tasks are assigned to them so that the quality of care would not be compromised (B. D. Fulton & Scheffler, 2010; Scheffler, Waltzman, & Hillman, 1996).

Another innovation at KK 5 involving the DM-TAC pharmacist circumvented the need for the patient to spend additional waiting time at the pharmacy. Not only did this save time for the patients, it also utilised the time of the patient already spent waiting in the clinic before seeing the MO, which is usually substantial. These innovations hardly cost additional resources to institute.

Though the selected KVs provided a variation in location, size of clinic, type of building, average daily out-patient attendances and the number of diabetes patients registered, we could not identify any influence on organisation of services based on these parameters. Neither did we find any differences according to whether the KVs are situated in urban or rural areas. There was some difference in the availability of human resources and services provided, though this does not seem to determine the extent to which innovations were implemented. The conspicuous factor seemed to be the managerial decisions of the FMSs. Being both the administrative and clinical head of a health clinic, the FMS is in a key position to make changes to the delivery of primary diabetes care in the health clinic. Although it would be expected that such changes would revolve within existing CPGs and SOPs, it was observed that several FMSs made changes outside of these recommended procedures, as described in the innovation section of this paper. Unfortunately, the FMSs didn't conduct any evaluation of the outcome for the patients as a result of the changes and innovations. Neither does the MOH systematically collect the various innovations thereby reaping the potential for improvement of primary health care services.

The findings of this study lead to other research questions: what do the patients think about the varieties of delivery of primary diabetes services?; Do the different delivery of primary diabetes services actually affect patients' adherence to their overall follow-up appointments?; Does improved monitoring of the diabetes care in relation to FDC lead to better services?; and not least, does re-engineering and streamlining of primary diabetes care lead to improved glycaemic control and reduced incidence of complications?

Conclusions

In spite of a centralised MOH healthcare system supported by a common national framework that includes an organisational structure, CPGs and SOPs, there is scope for further streamlining the diabetes services in MOH primary health clinics. The study illustrates that existing innovations at individual clinics may potentially improve services at no extra cost. While standardised national-level guidelines are important, they should be treated as guidelines and provide the overall framework for implementation.

The FMSs must be empowered to make changes and introduce innovations to improve quality of care for diabetes patients.

The MOH is advised to more systematically collect and disseminate experiences about current constraints as well positive innovations made at various health clinics with the view to further increase effectiveness and efficiency. Such a stance of the MOH as being a ‘learning organisation’ is likely to have concrete impact not only on diabetes care, but even health care in Malaysia more generally.

Abbreviations

CPG Clinical Practice Guideline

DM Diabetes Mellitus

DM-TAC Diabetes Mellitus—Therapy Adherence Clinic

ECG Electrocardiogram

FDC Family Doctor Concept

FHDD Family Health Development Division

FMS Family Medicine Specialist

KK “Klinik Kesihatan”—Health Clinic

LFT Liver Function Test

MO Medical Officer

MOH Ministry of Health

NCD Non-Communicable Diseases

NDR National Diabetes Registry

NHMS National Health and Morbidity Survey

QA Quality Assurance

SOP Standard Operating Procedure

TPC Tele-Primary Care

Declarations

Ethics approval and consent to participate

Approval to conduct the research in MOH health clinics was provided by the Medical Research and Ethics Committee (MREC), Ministry of Health Malaysia, reference NMRR-16-449-29909 (IIR), dated 7 April 2016. Ethics exemption was provided since the research did not involve collecting data from patients, and only based on observations and interviews of FMSs. All interviewees were provided with an informed written consent form prior to participation in the in-depth interview.

Consent for publication

Consent for publication was obtained from the Ministry of Health, Malaysia.

Availability of data and material

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Competing interests

None declared.

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Authors' contributions

FIM, JA-H and UB-C conceived and contributed to the design of the study. FIM and LSC contributed to the acquisition, analysis and interpretation of data. FIM, JA-H and LSC involved in drafting the manuscript. NHN, TA and UB-C critically revised the manuscript for intellectual content. All authors have read and approved the final manuscript.

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Tables

Table 1 Definition of the three categories of “service delivery package” for MOH primary health clinics.

Service delivery package	Definition
1. Universal	Services are provided by medical officers (permanent or visiting), assistant medical officers and nurses
2. Intermediate	Services are provided by medical officers and other categories of HCP, with no FMS
3. Advanced	Services are provided by FMS, medical officers and various other categories of HCP, including “specialised HCP”, i.e. nutritionists, dieticians, physiotherapists and occupational therapists, assisted by high technology support systems. Advanced health clinics will receive referrals from Universal and Intermediate health clinics.

Table 2 Selected characteristics of the study’s ten MOH Health Clinics in Selangor and Kuala Lumpur, Malaysia.

	Health clinic	Brief description	Service delivery package	Estimated population served	Average daily number of out-patient attendance	Estimated number of active diabetes patients	Mean HbA _{1c} (95%CI) (%), 2015
1.	KK 1	Urban Located in a housing area Old building - extensive renovation	Intermediate	63,520	~450	~2,500	8.1 (7.57-8.56)
2.	KK 2	Rural Located at the edge of town Old building	Intermediate	45,746	~200	~1,100	7.8 (7.49-8.51)
3.	KK 3	Urban Located on a major city road Old building - extensive renovation	Intermediate	112,926	~850	~4,000	8.5 (8.00-8.98)
4.	KK 4	Urban Located on the second floor of an office and shop complex	Advanced	288,680	~600	~3,300	7.8 (7.59-7.95)
5.	KK 5	Rural Located at the edge of town Old building - with renovation	Advanced	26,859	~200	~1,200	8.2 (7.89-8.45)
6.	KK 6	Urban Within city centre Old building - extensive renovation	Advanced	171,612	~750	~3,000	8.0 (7.62-8.45)
7.	KK 7	Urban Within housing area Old building - with renovation	Intermediate	70,580	~410	~1,600	7.9 (7.48-8.25)
8.	KK 8	Urban Next to a main road. New building	Advanced	85,207	~620	~2,100	7.9 (7.75-8.09)
9.	KK 9	Urban Within housing area Old building - extensive renovation	Advanced	85,500	~250	~1,800	7.6 (7.46-7.75)
10.	KK 10	Urban Edge of city New building	Advanced	182,650	~900	~3,300	8.2 (7.82-8.67)

Table 3 Characteristics of the interviewed Family Medicine Specialists (FMSs) by health clinics

	Health clinic	Full time or Visiting	Age (years)	Sex	Duration in service (years)	Duration as FMS (years)	Duration at clinic (years)
1.	KK 1	Visiting	34	Female	10	1	1
2.	KK 2	Full time	35	Female	10	1	1
3.	KK 3	Full time	37	Female	13	4	1.5
4.	KK 4	Full time	47	Male	21	11	3
5.	KK 5	Full time	44	Female	18	10	7
6.	KK 6	Full time	44	Female	18	7	1
7.	KK 7	Full time	53	Female	27	19	1
8.	KK 8	Full time	47	Female	18	5	2
9.	KK 9	Full time	46	Female	20	11	7
10.	KK 10	Full time	55	Female	29	14	1

Table 4 Availability of selected diabetes-related services in the ten MOH primary health clinics.

		Diabetes educator	Dietician	Blood Investigations	Funduscopy	Chest X-ray
1.	KK 1	Nil	Nil (service provided by a nutritionist)	HbA _{1c} - on-site Others - off-site	At other facility & mobile	At other facility
2.	KK 2	Nil	Nil (service provided by a nutritionist)	All off-site	At other facility & mobile	At other facility
3.	KK 3	One	Yes	All on-site	At other facility & mobile	At other facility
4.	KK 4	Nil	Yes	All on-site	On site	On-site
5.	KK 5	One	Yes	All off-site	At other facility & mobile	At other facility
6.	KK 6	One	Yes	Liver Function Test (LFT) - off-site Others - on-site	At other facility & mobile	At other site (on-site damaged)
7.	KK 7	Nil	Nil (service provided by a nutritionist)	All on-site	At other facility & mobile	At other facility
8.	KK 8	One	Yes	All on-site	On-site for 6 months in a year	On site
9.	KK 9	One	Yes	All off-site	At other facility & mobile	At other facility
10.	KK 10	One	Yes	All on-site	On-site	On site

Figures

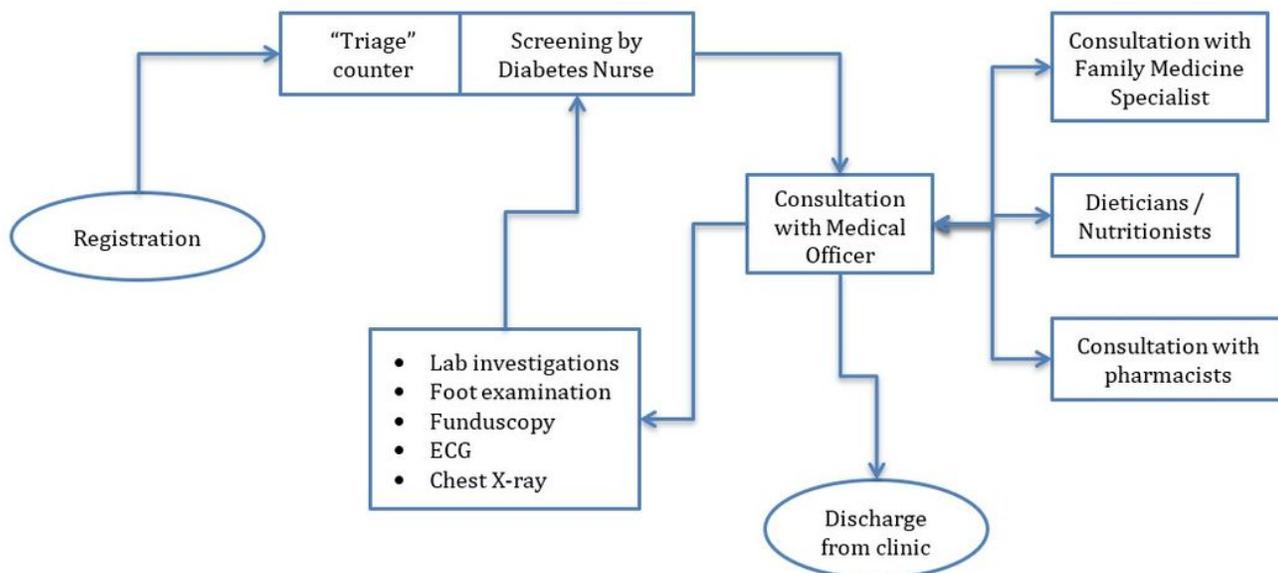


Figure 1

Typical T2D patient flow in an MOH health clinic