BMJ Quality Improvement Reports

BMJ Quality Improvement Reports 2014; u201918.w1006 doi: 10.1136/bmjquality.u201918.w1006

Improving waiting time and operational clinic flow in a tertiary diabetes center

Emily Tse Lin Ho
Singapore General Hospital

Abstract

The Singapore General Hospital Diabetes Centre (DBC) is a multidisciplinary specialist outpatient clinic which aims to provide an integrated one-stop service for diabetes. As with many tertiary academic centre clinics, DBC encounters an expanding patient load, greater patient expectations and increasingly complicated patients who require services from a multitude of health providers. Such rising demands amidst limited resources cause inefficiencies and long waiting times to consultation. This result in low patient satisfaction and an unpleasant clinic experience. A multidisciplinary team was formed to reduce the waiting time at DBC and improve communication and work processes of staff.

Addressing wait-times is complicated as multiple stakeholders and operational processes are involved and interlinked. By systematically breaking down processes and identifying problem areas, targeted changes were implemented. This included a revised model of appointment scheduling, a patient reminder system, more effective communication sheets and work reassignments.

The primary aim of this project was to improve the patient turn-around time (duration a patient spends at the centre for a visit). There was no documented improvement in turn-around time after project implementation (108.23 minutes versus 106.6 minutes) but other secondary aims were achieved. These included an increase in the percentage of patients seen by the doctor within 60 minutes from 80% to 84%, a reduction in wait-time for payment and reappointment at the cashier by 36.6% and a reduction in non-attendances of new cases to the clinic from 30.2% to 21.3%. Staff satisfaction and communication were greatly improved. To aid sustainability, personalized reports of individual doctor's waiting times and workload were produced quarterly and tracked.

As this is a first step quality improvement project, efforts to track, examine and further improve turn-around times are on-going. Future initiatives are directed at time-efficient appointment scheduling between care providers for same day appointments, a reactive SMS system for reminders and reappointments and optimization of processes and manpower allocation for clinics.

Problem

Diabetes Mellitus is one of the most prevalent chronic diseases in Singapore with 11.3% of its adult residents having the condition in 2010. Singapore General Hospital is the largest and oldest restructured hospital in Singapore. At our academic tertiary diabetes centre (DBC), we advocate to provide a world class, one-stop centre for diabetes care. Aside from physician consultations, we house other allied health services such as diabetes nurse educators, podiatrists, dieticians, foot screening, and eye screening nurses.

Due to increasing patient loads, higher patient expectations, evolving new subspecialty services, and on-going research and teaching activities, clinic operations became complicated and inefficient. There were increasingly negative sentiments from patients, with many encountering long periods of waiting, often spending nearly a day at the center when they came for appointments. Confusion and disorder arose when patients had multiple same day appointments, as there was a lack of coordinated workflows between care providers. Doctors, nurses, allied health, and service staff felt stressed with the increased load and chaotic work processes. Clinics often overran into lunch and after hours affecting the general morale of staff.

A project was initiated by a multidisciplinary team from DBC to improve the waiting time of patients, engage better communication and workflow between the various healthcare providers, and improve the overall clinic experience for both patient and staff.

Background

Public health centres are currently facing higher operating costs as treatment, diagnostics, and patient care become more specialized. More and more patients seek care and have greater expectations from the tertiary specialist settings whilst funding, resources, and infrastructure remain limited.

Clinicians often pride themselves in delivering the best patient care but fail to acknowledge the need to improve systems and operations surrounding this administration of care. In large academic teaching hospitals, patients are often left waiting for long periods when they come in to see the physician. The perception of inactivity whilst waiting is largely due to the multiplicity of providers that have varying methods, training, and habits of seeing patients without recognising how such uncoordinated variability contributes to the patient experience. There is often poor hand-off from one provider to another with no overall coordination. Patient experience often does not take priority. Such phenomena are not uncommon

and multiple improvement projects using various methodologies have been reported to improve patient satisfaction both in the inpatient and ambulatory setting [1-9].

Purposeful planning, streamlining workflows, and demand-orientated scheduling are crucial to optimize and increase efficiency of patient care. Outpatient scheduling has been studied extensively and multiple models recommended to improve access, wait-times of patients, reduce non-attendance, and improve efficiency [10-13]. However, it is important to recognise that any model will need to specifically address locally encountered problems.

Baseline Measurement

To understand the actual processes and problems faced on the ground, an actual state analysis was performed. A global assessment of all work processes and a time motion study was conducted over a week. This allowed us to analyse and understand the bottlenecks and problem areas within the clinic operations.

A spaghetti diagram helped with examination of personnel flow (both patient and staff) and highlighted areas of congestion within the clinic. It was not uncommon for patients to have multiple same day appointments. Hence there was a lot of patient movement, medical records movements and searching of patients by staff as the exact patient location at any time is not known. This created inefficiency to workflow and confusion.

A value stream map detailed the various process flows and time elements. A time motion exercise was performed for a week where staff manually recorded time taken or spent by each patient at various points, the service time of each service provider and the waiting time in between. This allowed the team to understand our various patient profiles in depth.

On an average clinic day, patients who attended 1 appointment made up 77% of the total patients and 23% came for multiple appointments. Figure 1 shows the value stream map and a breakdown of patient types (based on number of services attended per visit) seen in DBC.

To understand the patient's needs, 33 face to face patient interviews were conducted over two days to obtain feedback. It was found that the majority of patients preferred to complete all investigations and consultations within one visit to optimize their hospital visit. Patients felt that an acceptable waiting time to see the doctor was between 30-60 minutes.

To determine the baseline of how we were doing and to monitor the progress upon implementation of the project, we tracked three outcome measures:

Patient turn-around time (TAT)

Efficiency of service is important. Patients want to receive good care in the most efficient manner. We tracked the patient turn-around time (TAT). TAT acts as a surrogate of the length of time a patient spends at DBC. TAT was calculated by obtaining the time difference from time of registration to time of payment captured through the electronic queuing and billing system. Baseline TAT 6 months before the project commencement was computed. TAT was documented for each patient type (Type A-E). The average TAT ranged from 103 mins (1 hour 43 mins) to 189 mins (3 hours 9 mins) depending on the number of appointments the patient has for that day. The average consult time spent with the doctor or healthcare provider would be between 15 to 40 minutes, therefore any other additional time spent would be idle waiting time for the patient.

Waiting time to doctor's consultation (WTC)

A major component contributing to the long TAT was waiting for the doctor's consult. WTC is defined as the time difference between the appointment time given to the patient to the actual time the patient is called into the doctor's consult room. The aim is for a zero WTC where patients are seen promptly at the appointment time given. We tracked outcome based on the % of patients with a WTC of 60 minutes or less (this was a key parameter already tracked throughout our institution). At baseline, the median WTC at DBC (over 6 months) was 26.5 minutes. On average over this same 6 month period, 80% of patients from DBC were seen within 60 minutes. This percentage was lower compared to the hospital average of 83% and division of medicine average of 85% . The aim of the project was to increase the percentage of DBC patients seen within 60 minutes to more than 85%.

Patient satisfaction

Patients fill in feedback forms at our specialist clinics. We tracked the number of compliments and complaints received from patients for six months as a baseline and compared this to six months after implementation of the project.

Sustainability

To ensure the sustainability of the project, a quarterly report with detailed analysis on workload, waiting times, and service times would be tabulated and printed for individual doctors. With this information, doctors can monitor their personal waiting time to consult (WTC) and postulate causes and trouble shoot for deviations, if any. The department tracks these performances on a quarterly basis and the team hoped to sustain the gains using this performance-driven reinforcement loop.

See supplementary file: ds2653.xls - "Value Stream Map DBC at baseline"

Design

An analysis of the time motion study and feedback from staff and patients showed that the overall time spent for each patient visit and the overall patient experience relied on the interplay of factors. These ranged from appointment scheduling, patient load, overall patient and doctor punctuality, time spent waiting for laboratory testing and results, registration processes, medical record retrieval, actual service time of the care provider, and coordination between

service providers.

The design and strategy of this project centred around addressing three key areas that were crucial to improve efficiency and reduce the overall time a patient spends at DBC (TAT). These include:

1. Reducing patient's waiting time to the doctor's consultation (WTC)
2. Improving workflow and communication between staff
3. Reducing waiting time for bill payment and appointment scheduling at the end of consult

Contributing root problems were identified and prioritized based on the likelihood of occurrence, ease of implementation, and impact. Interventions were planned and carried out simultaneously for maximal impact.

Strategy

A. Reducing waiting time to doctor's consultation (WTC)

a) Optimise Physician's Appointment Scheduling

Suboptimal appointment scheduling was a key problem. There were variable workload amongst doctors and a mismatched demand and supply of appointment slots. High overbooking and force-in rates were common. Besides that, there were inconsistencies in service time (duration each doctor spends in consult with a patient) and poor utilization of scheduled appointment slots (few patients in morning versus too many during midday). Quite often, workload or number of patients booked per clinic session was greater than the doctor's capacity to see them.

Appointment scheduling was re-examined to optimize slots and match supply with demand. Four doctors with the longest WTCs were identified for the pilot run.

Analysis and optimization of appointment set-ups for these physicians were performed. This included:

i) Matching supply to demand by converting unused new appointment slots to follow up ones which are of higher demand

ii) Matching the doctor's appointment slot set up duration to the actual service time of individual doctors

iii) Redesign set ups to maximise time. More realistic patient appointment times were given to match the doctor's service time and minimize waiting.

Leading on to this pilot of three months, all other individual doctors had their clinic appointment schedules refined and tailored to maximize efficiency.

b) Patient reminders and education

Patients may have their consultations delayed and disrupt the subsequent patient's appointments by arriving late for same day blood tests. Patients who are late may not have their test results processed in time before the doctor's appointment. This is especially so for new cases as they will only be informed of the need for blood taking at arrival in clinic that day. To remind and educate patients, two interventions were implemented:

- Outpatient Appointment Reminder System (OARS)

The Outpatient Appointment Reminder System (OARS) is a telephone reminder system where dedicated staff would contact new cases one week before the scheduled appointment dates to remind them of their appointments and the need to arrive earlier for preliminary blood investigations. From a simulation analysis, patients should arrive 1.5 hours earlier for a full panel of laboratory tests or 0.5 hours if only an HBA1c result was needed. Staff could cancel or reschedule appointments if patients contacted were unable to attend and this helped free up slots for other patients.

- Educational and information pamphlets

A new concise educational sheet was prepared in four major languages and handed out to patients. This included information and instructions for

- Patients to arrive 1.5 hours earlier for same day laboratory testing before consult

- Locations of alternative health clinics within the community where laboratory testing can be performed up to a week earlier

- Preparations needed for certain blood investigations eg fasting and timing of blood tests

B. Improving workflow and communication between staff

Appointment communication sheets were standardized to streamline the flow of case notes. It was observed that during the time motion study there was a lot of searching and transporting of medical case notes between consult rooms. For patients with multiple same day appointments, the counter registration staff had to manually scribble the various appointment times and sequence on a small slip of queue ticket upon registration. This often led to miscommunication. A standard template was created to replace this which allowed for more accurate documentation and easier location of patients.

C. Reducing waiting time for payment and appointment scheduling at the end of consult

There was often a long queue waiting for payment and appointment scheduling at the cashier counter during late mornings and near lunch time. This contributed to a lot of time wasted on waiting. Due to insufficient manpower and limited counters, a review of responsibilities and streamlining of work schedules of the counter staff was performed. The 'floater' who assisted with miscellaneous duties was reassigned as a second cashier and counter staff were given early alternate lunch breaks to ensure sufficient manpower during peak patient hours.

Results

The primary aim of this project was to improve the patient turn-around time (TAT). There was no significant documented improvement in TAT before and after project implementation (108.23 minutes versus 106.6 minutes). The patient group TAT and overall TAT are documented in Figure 2.

However there were some secondary improvements in other areas that were tracked.

The waiting time to consult (WTC) was improved. Though falling short of the 85% target, the percentage of patients seen by the doctor within 60 minutes increased from 80% to 84% (Figure 3).

The Outpatient Appointment Reminder System achieved a secondary aim by reducing the non-attendance rates of new cases. This allowed the clinic to schedule in patients who required an earlier appointment date. The non-attendance rate of patients had decreased from 30.2% to 21.3% after implementing the OARS (Figure 4). This is below the hospital's average of 23.4%.

The most significant improvement seen was in the wait-time for payment and reappointment at the cashier. By redefining and streamlining the roles of counter staff, a remarkable reduction in waiting time for payment and appointment rescheduling was achieved. An overall reduction of 36.6% in waiting time to payment was achieved (Figure 5).

95% of staff interviewed (n=22) expressed satisfaction at the increased clinic efficiency, work flow and overall productivity.

From patient satisfaction feedback of overall clinic and staff performance, the mean number of compliments received six months after the project was increased from a baseline mean of 21.4 compliments per month to 27.1 compliments per month (Figure 6). There were minimal complaints during the six months post project though this was not different from baseline.

Lessons and Limitations

As this project involved multiple work processes contributed by different levels of staff, it was overwhelming initially to know where the problems were and which initiatives should take precedence. A multidisciplinary team that comprised not only doctors and allied health staff but also clinic clerks and cashier staff, allowed a true overview of all processes. Patient feedback was also taken seriously in strategizing the initiatives. This high level of involvement from all staff with a strong patient centred approach, helped engage the buy in and cooperation that was necessary to make the project successful.

A systematic and structured review of baseline data and tracking of many small indicators along the way allowed us to understand and evaluate the interventions. This was important as we had carried out multiple interventions concurrently. These indicators allowed us to refine interventions that has most impact and drop those that did not.

The greatest challenge that we faced was manpower instability both in terms of doctors and allied health professionals. There were several doctors who had left during the period of the project leaving a large load of patients behind. This greatly affected the workload and increased waiting times despite the best appointment scheduling that we could implement. Changes in clinic set up for new training requirements had affected the numbers of patients that can be seen for certain doctors.

Having constant personal reminders via quarterly reports were useful as doctors mostly were not aware of their waiting times or operational performance otherwise. Having individual performances charted along a department average does promote a performance driven competitiveness that helped sustain the project in a way.

Conclusion

Delivering the best patient care not only relies on the clinical expertise of the health provider but also involves the interplay of the clinical set up, workflow, communication, and the seamless integration of these in a busy tertiary clinic setting.

We systematically approached the problem of clinic operations and were able to identify key areas that contributed to care inefficiency. Poor appointment scheduling remains a key component that contributes to delays and long waiting times for patients in an outpatient clinic. By analysing this and tailoring appointment set-ups to individual doctor's working style and demand, the waiting time to consult can be improved. This, however, relies heavily on the stability of staff strength as sudden workload changes seem override these scheduling initiatives.

The primary endpoint of this project which was to improve overall patient turn around time was not met. This was likely due to fluctuating manpower resources and more recently changing clinic set-ups where patient numbers seen per resident or trainee is capped due to new training requirements. Once such shifts in manpower and patient numbers are stabilized, a reanalysis of slot supply and demands will be performed, and solutions to address them implemented and tracked using similar methodology. Another postulated cause for long turn around times were poor hand over of patients from one provider to another within a visit. The appointment communication sheet helped informed of the various appointments but there was still a lack of coordination in the booking of timing for such consecutive appointments. A more seamless appointment scheduling system between providers would be beneficial.

Although the project did not show any improvement in its initial objective, it had made significant improvements in other areas within the clinic operations

Reviewing work processes and carefully reassigning work responsibilities at identified critical areas had assisted remarkably in reducing waiting time at the clinic counters. This had successfully reduced patients waiting time to payment by 36.6%.

Patient appointment-reminders through a telephone call a week before appointments had reduced no show rates of our clinic from 30.2% to 21.3%. This success has convinced our institution to adopt the OARS system as a standard operating procedure for all outpatient clinics.

As this is still a preliminary quality improvement project, efforts to continually track, examine, and further improve turn-around times are on-going. Future initiatives will be directed at more time-efficient appointment scheduling between care providers for same day appointments, a real-time patient tracking system which can facilitate hand over and a more seamless patient flow, a revised appointment scheduling model for the allied health professionals and a reactive SMS system for patient reminders and reappointments.

References

1. Kallen MA, Terrell JA, Lewis-Patterson P, Hwang JP. Improving wait time for chemotherapy in an outpatient clinic at a comprehensive cancer center. Journal of oncology practice / American Society of Clinical Oncology 2012;8(1):e1-e7.
2. Singh K, Sanderson J, Galarneau D, Keister T, Hickman D. Quality improvement on the acute inpatient psychiatry unit using the model for improvement. The Ochsner journal 2013;13(3):380-384.
3. Soliman A, Riyaz S, Said E, Hale M, Mills A, Kapur K, et al. Improving the quality of care for medical inpatients by placing a higher priority on ward rounds. Clin Med 2013;13(6):534-538.
4. Kalanithi L, Coffey CE, Mourad M, Vidyarthi AR, Hollander H, Ranji SR, et al. The effect of a resident-led quality improvement project on improving communication between hospital-based and outpatient physicians. Am J Med Qual 2013;28(6):472-479.
5. O'Neill S, Calderon S, Casella J, Wood E, Carvelli-Sheehan J, Zeidel ML, et al. Improving outpatient access and patient experiences in academic ambulatory care. Acad Med 2012;87(2):194-199.
6. Waldhausen JHT, Avansino JR, Libby A, Sawin RS. Application of lean methods improves surgical clinic experience. J Pediatr Surg 2010;45(7):1420-1425.
7. Helbig M, Helbig S, Kahla-Witzsch HA, May A. Quality management: reduction of waiting time and efficiency enhancement in an ENT-university outpatients' department. BMC Health Serv Res 2009;9:21.
8. Lin SY, Gavney D, Ishman SL, Cady-Reh J. Use of lean sigma principles in a tertiary care otolaryngology clinic to improve efficiency. Laryngoscope 2013;123(11):2643-2648.
9. Prentice JC, Davies ML, Pizer SD. Which Outpatient Wait-Time Measures Are Related to Patient Satisfaction? Am J Med Qual 2013.
10. Premarathne US, Han F, Khalil I, Tari Z. Preference based load balancing as an outpatient appointment scheduling aid. Conf Proc IEEE Eng Med Biol Soc 2013;2013:1298-1301.
11. Kaandorp GC, Koole G. Optimal outpatient appointment scheduling. Health Care Manag Sci 2007;10(3):217-229.
12. Sickinger S, Kolisch R. The performance of a generalized Bailey-Welch rule for outpatient appointment scheduling under inpatient and emergency demand. Health Care Manag Sci 2009;12(4):408-419.
13. Tai G, Williams P. Optimization of scheduling patient appointments in clinics using a novel modelling technique of patient arrival. Comput Methods Programs Biomed 2012;108(2):467-476.

Declaration of interests

Nothing to declare

Acknowledgements

Dr Goh Su-Yen (Head of Department, Endocrinology, SGH),

Loo Shin Yi (Service Operations, SGH),

Matthew Han Jiangchou (Service Operations, SGH),

Geoffrey Gui Kah Tack (Service Operations, SGH),

All Staff and Doctors at SGH Diabetes Center