Rethinking Specialist Outpatient Type 2 Diabetes Care using eHealth

Initiative Type

Model of Care

Service Improvement

Status

Deliver

Added

27 August 2019

Last updated

10 September 2024

URL

https://test.clinicalexcellence.qld.gov.au/improvement-exchange/rethinking-specialist-outpatient-type-2-diabetes-care-using-ehealth

Summary

REMODeL is an innovative care model for people with type 2 diabetes that challenges the concept of ‘routine’ clinic visits to the specialist diabetes service through remote monitoring, automated tailored text-based feedback and periodic online patient self-reporting. The study showed there were significant improvements in glycaemic control, was highly acceptable to patients, and this was achieved with fewer in-person visits. The project has successfully navigated healthcare system challenges to deliver change, improvement and innovation in the health service and has presented at the Clinical Excellence Queensland Showcase 2019.

Key dates

Jul 2017

Feb 2019

Partnerships

UQ Centre for Health Services Research, Australian eHealth Research Centre (AEHRC), CSIRO.

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Aim

To examine if the new model of care for complex type 2 diabetes patients attending a metropolitan specialist outpatient diabetes service improves glycaemic control, and patient experience with fewer in-person visits through innovative eHealth strategies, as compared with traditional care.

Benefits

If improvement in glycaemic control is sustained in the long-term we know that 1 per cent reduction in HbA1c (marker of glycaemic control) reduces 21 per cent of diabetes-related deaths, 14 per cent myocardial infarctions and 37 per cent of microvascular complications. This is likely to reduce diabetes-related potentially preventable hospitalisations. There are expected cost-savings from a patient perspective and in the long-term potential cost-savings from a health care provider perspective as high-value care replaces low-value care.

Background

Type 1 and type 2 diabetes are lifelong conditions that can affect every part of an individual's life. Living well with these conditions can reduce the risk of diabetes-related complications, and improve the quality of life and life expectancy. While type 2 diabetes is largely preventable and can often be managed by healthy eating and exercise alone, type 1 diabetes is an autoimmune condition that attacks the cells in the pancreas that produce insulin.

Solutions Implemented

We developed a Mobile Diabetes Management System (MDMS) to support specialist outpatient diabetes care at the Princess Alexandra Hospital, Brisbane, Australia. The MDMS-enabled model of care incorporates the following elements: (1) targeting of intensive MDMS use to patients with suboptimal glycaemic control; (2) short or long-term remote monitoring of blood glucose level (BGL) and insulin dosage based on clinical need; (3) optional automated tailored text-messaging feedback to patients based on BGL and self-monitoring frequency; (4) periodic patient online self-report; (5) improved clinical data availability for clinicians and (6) deferment or substitution of conventional in-person follow-up consultations with telephone or video consultations.

The MDMS comprises three main interconnected sub-systems: a smartphone App for the person with diabetes that wirelessly connects to a Bluetooth glucose meter, a web application and an online clinician portal . Users receive regular tailored text-message alerts based on the frequency of BGL testing and BGL values. Messages focus on BGL monitoring and key diabetes lifestyle behaviours and include links to Diabetes Australia factsheets. The web application stores data in the cloud, controls access, enables data exchange, runs algorithms and queries, hosts the clinical decision support system, and provides messaging. The clinician portal presents the uploaded data in graphical

or tabular formats for credentialled diabetes educators (CDEs) and endocrinologists to monitor and manage a person's condition. It highlights out-of-range BGLs to facilitate monitoring and clinician interventions.

Using the MDMS, the diabetes service model functioned in the study as follows:

After enrolment into the intervention group, each participant was trained to use the MDMS by the CDE. Subsequently, BGLs, insulin dosages, manual note entries and text-message alerts sent to the participant became available on the clinician portal. In advance of each subsequent planned “review” or follow-up appointment , the endocrinologist reviewed participant clinical notes, data on the portal, pathology results and the standardised online participant self-report, and then determined the form of review mode of consultation to recommend: traditional in-person at the clinic; video-conference; telephone; or text only. For example, the text message might suggest deferral to a later clinic because progress has been satisfactory: “Well done, your BGL and most recent lab tests are at target. We can postpone your next clinic visit to xxx. Call the diabetes clinic on xxx if you have any concerns”. When a transition from oral medication to insulin or an adjustment to insulin dosage was required, the CDE managed it using the MDMS, under the supervision of an endocrinologist.

The primary outcome measure was change in HbA1c. Secondary outcome measures were clinical outcomes—percentage of participants achieving target HbA1c, change in blood pressure, lipid profile, body mass index and mean self-reported number of hypoglycaemia events; patient satisfaction; quality-of-life assessed using the AQOL-8D (Assessment of Quality-of-Life) questionnaire. For the participants in the intervention group, patient acceptance was assessed using the Service and User Technology Acceptability Questionnaire (SUTAQ).

Evaluation and Results

The initiative was evaluated by a randomized controlled trial (RCT) with the control group receiving traditional care. Prior to the RCT we had undertaken a proof of concept trial (publication attached). We then used the user feedback to improve the system and conducted a feasibility trial in a real-life setting for a nurse-led insulin dose adjustment service.

Data at 6-months from the RCT showed a significant improvement in HbA1c from baseline of 1.1 per cent in the intervention arm compared with a 0.1 per cent worsening in the control group (p-value < 0.05) and a 30 per cent substitution of routine in-person visits.

The participants in the intervention group was highly satisfied - this was assessed using a 22-item questionnaire service user technology acceptance questionnaire (SUTAQ). All the sub-scale mean scores (1) enhanced care (2) increased accessibility (3) the model as substitution to routine care (4) satisfaction (5) privacy and discomfort and (6) care personnel concerns favoured the intervention arm.

Qualitative feedback were generally positive towards MDMS with the main themes of convenience (ease of access to the diabetes educator, time and effort saved in managing diabetes) and improved self-awareness, leading to better diabetes management emerging. Areas that could be improved included predominantly technical issues (Bluetooth connectivity and App related), more feedback regarding monitored data, and tailoring the automated text message feedback to the knowledge level

of the participant. Most participants felt strongly that the overall experience with the new care model was positive and is captured in this quote from one participant – “I am very happy with the service speaking to only three people makes it more personal, not having to write down records is a major plus and less time coming into clinic as most of the help can be given over phone”.

Lessons Learnt

1. eHealth solutions for management of diabetes is acceptable to the patients, improve clinical outcomes (glycaemic control) as compared with traditional specialist care and can improve the efficiency of the outpatient clinics by substitution of routine in-person visits.
2. The role of the care-coordinator is crucial in getting this model to work.
3. Culture change is essential for clinicians to embrace this innovative model.
4. Technology should work smoothly for increased uptake by clinicians and should be embedded within existing electronic health records to decrease physician workload.
5. Need to change from existing fee-for-service models for adoption is essential.
6. Sustainability in the long-term might require constant adaptation of technology to address consumer needs through co-design and 'digital phenotyping'.

References

This model was an innovative concept that rethinks the traditional clinic-based visit model and based on previous studies showing eHealth interventions for diabetes are effective.

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