



Can new technologies really improve diabetes self-management and health outcomes?

Brian Oldenburg

Professor and Director, Centre for Health Equity
School of Population and Global Health,
University of Melbourne, Australia

Can new technologies really improve diabetes outcomes?

- The promise is great
- The evidence is still quite modest
- In health, we are not very good at co-developing, implementing and **scaling-up**, **well integrated** digital health solutions that are really person-centred

New Health Communications “Landscape”



YouTube



facebook



The
Wiki Way
Quick Collaboration on the Web



twitter

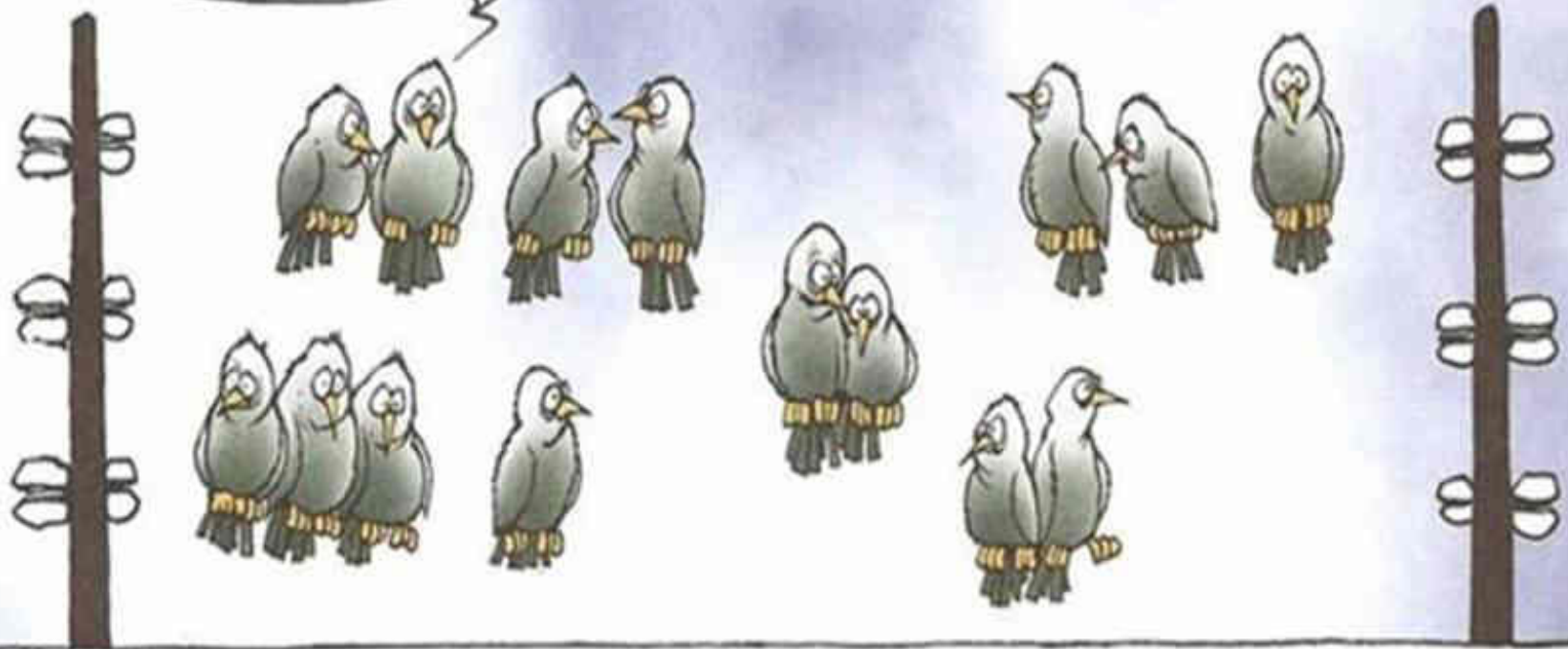


- Create content on the Web using a standard browser
- Build Internet communities through self-organizing and organic growth of content
- Support idea keeping for the connected community
- Leverage your socially aware with resources only a click away



Adapting to wireless??

It is a bit freaky with this wireless technology



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The problem is not lack of innovation...

Clinical Admin (66 Companies)
 ABILITY, MINDBODY, nextdocs, Kareo, MedHOK, TALYST, QSI, imprivata, ClearDATA, AuthenticDate

Digital Med Devices (67 Companies)
 proteus, integrity, sensible, patientsafe, iRhythm, Sotera, OrSense, Genaps, vitalconnect

EHR/EMR (65 Companies)
 patientkeeper, practice fusion, LifeNEXUS, ShareableInk, dr, medivo, OSI, CoreCloud, simplifyMD, CASHHEALTH, AkaiLex

Population Health Mgmt (50 Companies)
 R. Ante, keas, wellcentive, WisFi, Jiff, agile, limeade, ZeOmega, KINNSER, TANGO

Online Health Communities (21)
 WisFi, omada, Glow, patientslikeme, sharecare

Gamification (7)
 Om, SuperBetter

Patient Engagement (46)
 WellDoc, WellFX, eliza, Silverlink, SRFLIGHT, AXIAL, simple, LINCOR, glooko

Genomics (29 Companies)
 GUARDANTHEALTH, SVBio, genophen, CARDIO, 1eq, NEXT, GDX, Khoros, Counsyl

Medical Big Data (51 Companies)
 STATION, APIXIO, HUMEDICA, ZEPHYR, Predilytics, TREAT, FLATIRON, bina, HealthCatalyst, NEXTCODE, AYASDI

Services Search (26)
 ZocDoc, vitas, GoHealth, pd, Brighter, CHANGE, UNWELLHEALTH, CU

Digital Health
771 Companies
 Contact info@venturescanner.com to see all companies

Doctor Networks (26 Companies)
 sermo, DICOM, Grid, QuantiaMD, CUMS Interactive, perfectserve

Mobile Fitness / Health Apps (53 Companies)
 LARK, Netpulse, mindbloom, Mango Health, endomondo, gainfitness, Sway

Payments & Insurance (21)
 oscar, boom, ZENEFIT, TC

teleHealth (55 Companies)
 VGO, Teladoc, Breakthrough, corventis, DOCTOR ON DEMAND, LAKENA, CoreCarr, iagnosis, health

Remote Monitoring (30)
 eCaring, Lively, motherknows, QMedic, Care.com, Caring.com, vitalconnect

Online Health Sites (22 Companies)
 Lumosity, Great, HealthCentral, Healthguru, HealthiNation, hoppify, Healthine

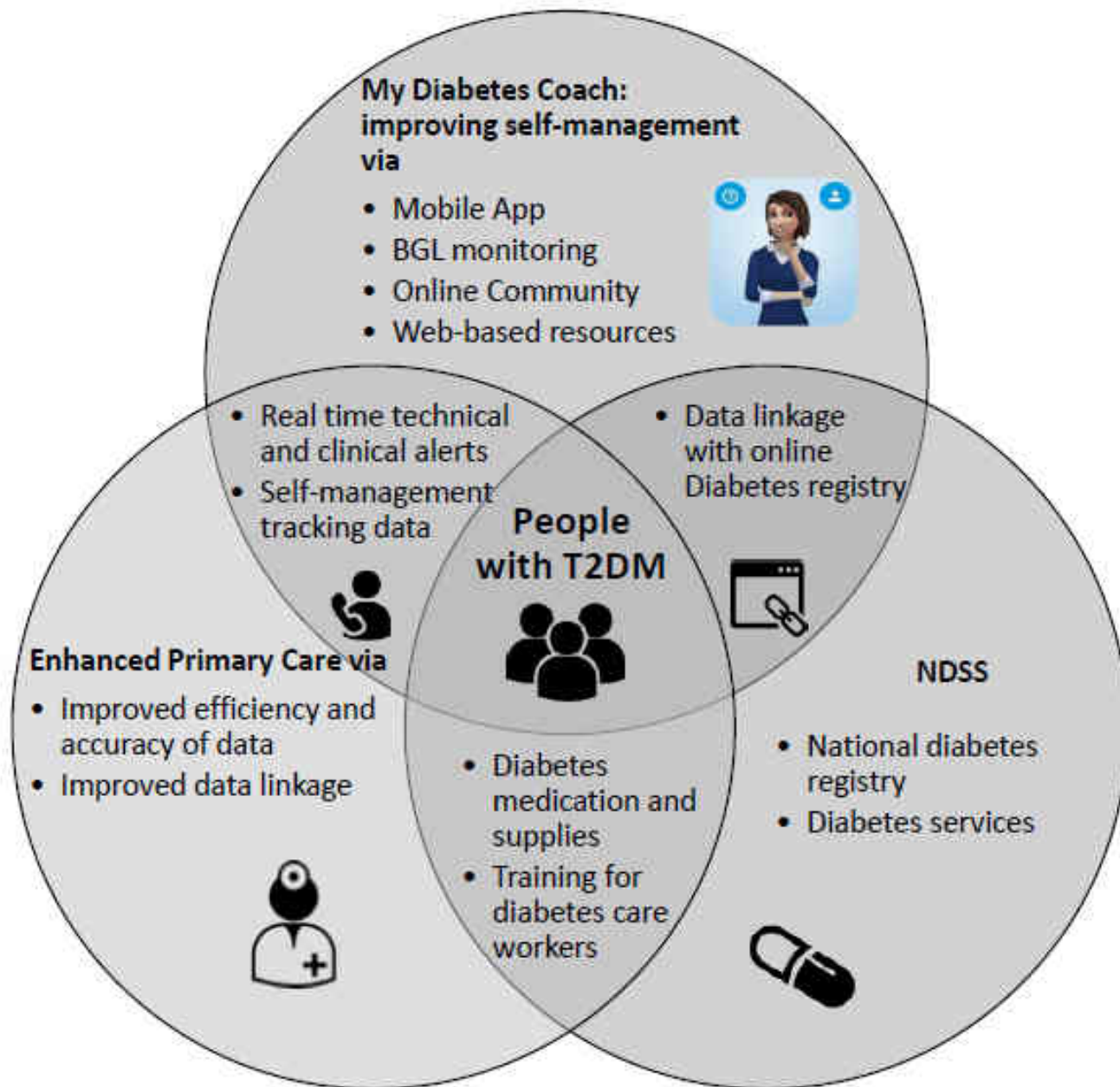
Healthcare Mobile Communications (13)
 voalte, IQMAX, tigertext, mVisum, vocera

IOT Fitness (90 Companies)
 fitbit, BASIS, BODYMEDIA, Withings, striv, mc10

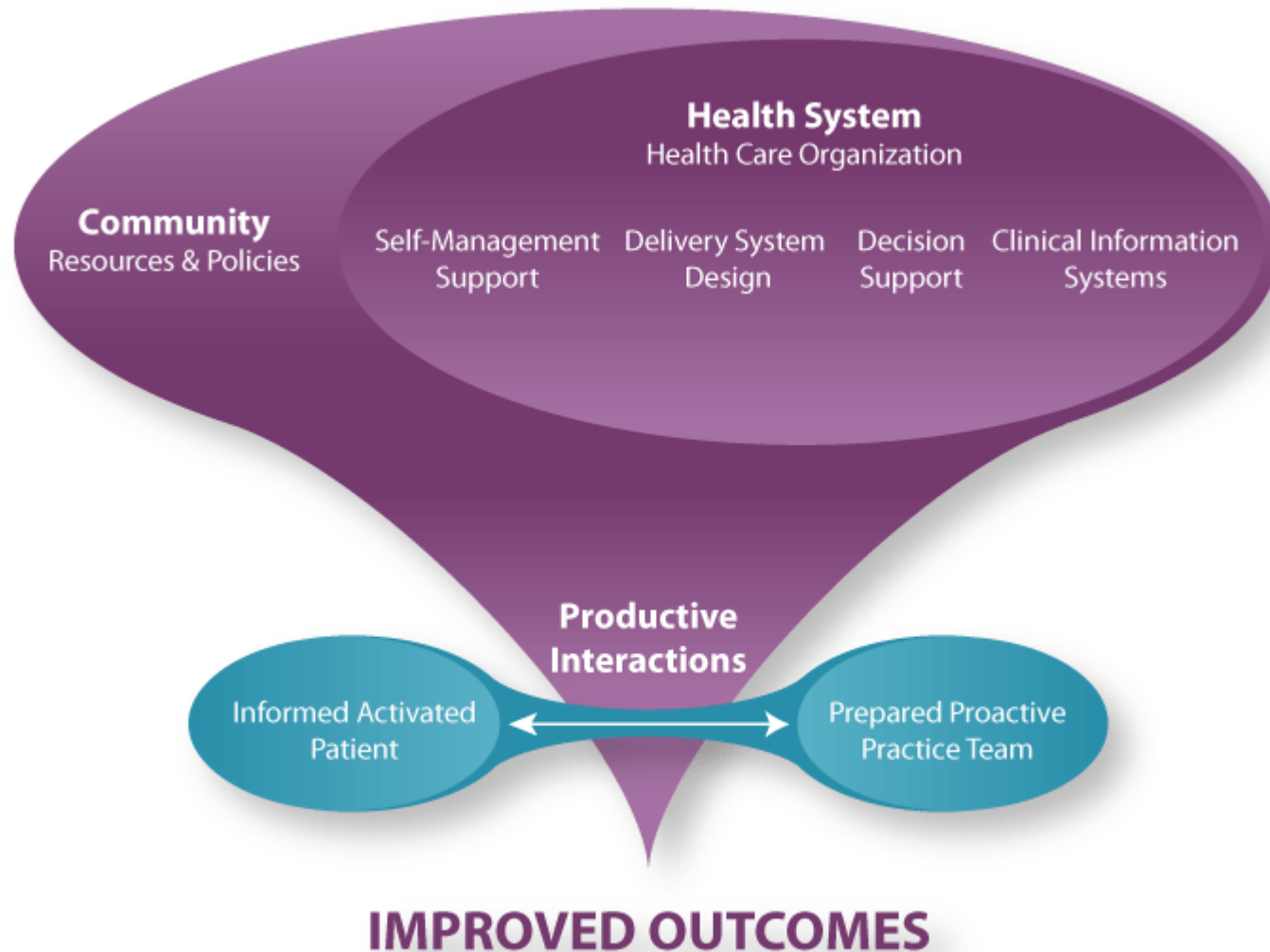
Robotics (10)
 ekso, myomo

Healthcare Marketing (12)
 evariant, appature, brightwhistle

The Health Ecosystem for Diabetes Management and Care



Wagner's Chronic Care Model (CCM)



Digital technologies to enable SM to improve diabetes outcomes



- Ubiquitous internet access
- AI (artificial intelligence)
- Automated program delivery
- Machine learning
- Mobile (mhealth)
- Apps
- Wearable devices
- Analytics and Big Data
- Personalised/tailored programs

Potential of new technologies to improve diabetes and other chronic disease self-management

Key Features:

- Accessible at any time, 24/7
- Can be delivered/accessed as often as required/wanted
- Self-tailoring for “me”
- High consistency of program delivery
- Potential for low cost when “scaled up”
- Complements role of health professionals

- ✓ Reach large numbers at relatively low cost;
- ✓ Address multiple health behaviors;
- ✓ Generate large data useable in “real time” to guide dynamic, adaptive and more effective and sustainable interventions;
- ✓ Reduce amount of direct, human contact required for delivery

Using New Technologies to Improve the Prevention and Management of Chronic Conditions in Populations

Brian Oldenburg,¹ C. Barr Taylor,²
Adrienne O’Neil,^{3,4} Fiona Cocker,¹
and Linda D. Cameron⁵

¹School of Population and Global Health, University of Melbourne, Parkville, Victoria 3010 Australia; email: brian.oldenburg@unimelb.edu.au

²School of Medicine, Stanford University, Stanford, California 94304

³IMPACT Strategic Research Centre, School of Medicine, Deakin University, Geelong, Victoria 3220, Australia

⁴School of Public Health and Preventive Medicine, Monash University, Melbourne, Victoria 3004, Australia

⁵School of Social Sciences, University of California, Merced, California 95343

Keywords

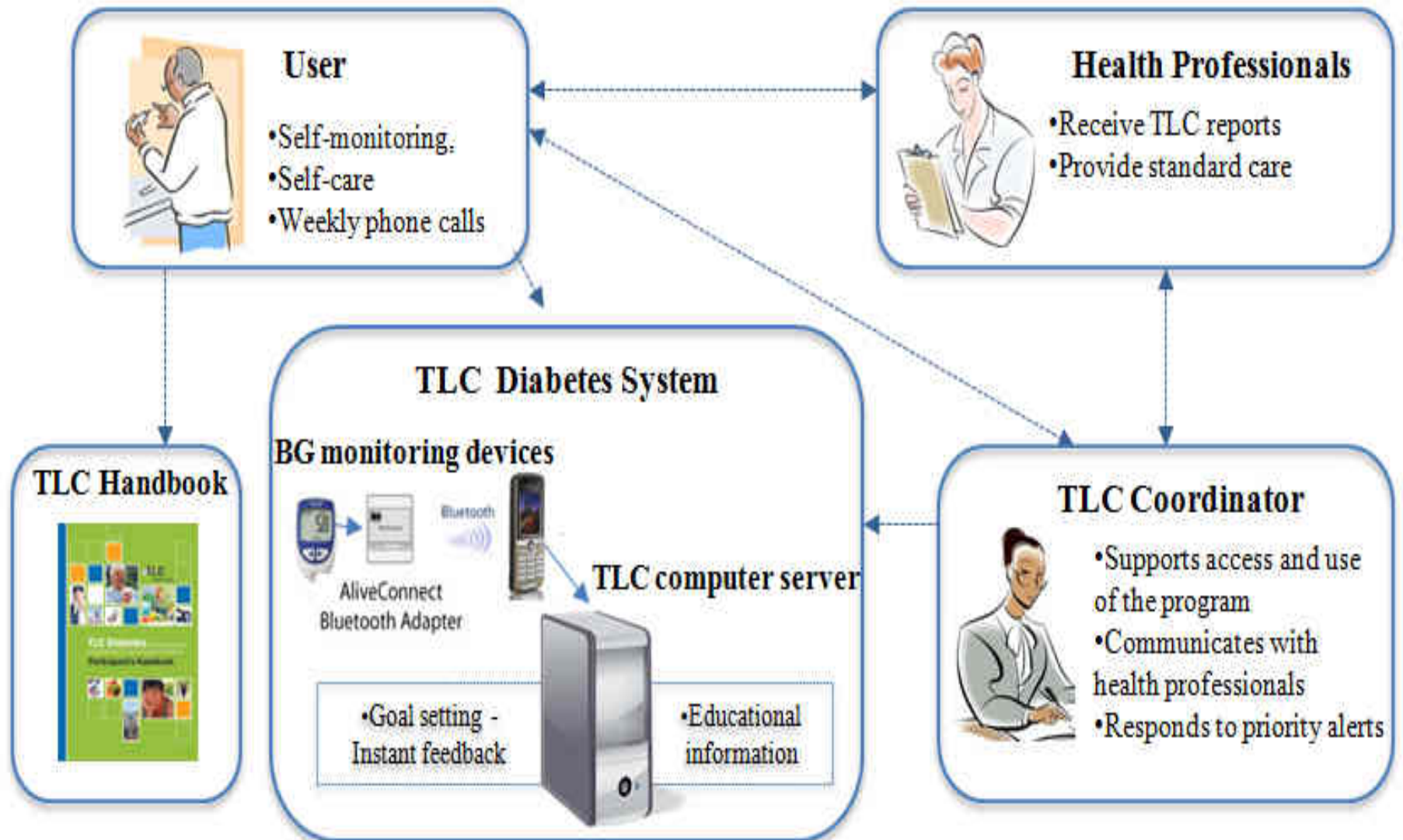
health, behavior, technology, intervention, chronic disease, prevention, self-management, noncommunicable disease

What we want to know about digital health programs & platforms?

- **Do they work?**
- Usability and engagement?
- Feasibility for mass delivery?
- Sustainability of program delivery?
- Scalability?
- Affordability? The business model?

Some examples.....

Australian TLC Diabetes Program



- PC connected to phone lines and equipped with speech recognition software and database
 - Interactive Voice Recognition (IVR)
- Converses over the phone
 - 2000+ pre-recorded scripts
- Listens to answers from ‘user’, records them in the database to provide tailored feedback to each user
- **Automated conversation + Artificial Intelligence**

TLC program acts as monitor, educator, and coach

- Promotes and supports self-management of Type 2 diabetes
- Targets key diabetes self-care behaviours:
 - Blood glucose testing
 - Nutrition
 - Physical activity
 - Medication taking
 - Foot care
 - Mental health



AliveConnect transmitter with glucose meter



Glucose Meter



Serial
Cable

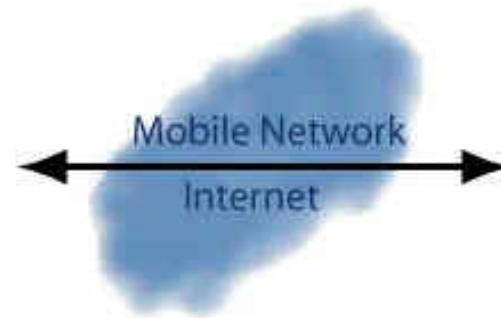


AliveConnect
Bluetooth Adapter

Bluetooth



Mobile Phone



Server



TLC



- *“It’s very important that you try to check your blood glucose more often. You set a goal with your doctor to test your blood glucose at least ...”*

Setting individualized goal



- *“... times per week. If that sounds like a lot, you could try working up to it in smaller steps. For starters, you might try testing once a day varying the time: before breakfast, lunch and dinner. Once you’re used to that, you can start doing it twice a day. If you build up gradually, you’ll reach your target in no time. But even if you don’t, testing a few times a week is still better than no testing at all. Now, let’s go on to the next part of the call.”*



- “Let’s talk about some of **the reasons why you may not be testing your blood glucose as often as you should.** I am going to list 14 common reasons why people have trouble checking their blood glucose regularly. This will help me to suggest some strategies that will help you to test more regularly. After each statement please tell me how much it applies to you. You can say Often, Sometimes, Hardly Ever, or Not Sure. Or say Repeat if you want to hear it again. OK, here is the first statement.”

TLC Diabetes

Williams et al. *BMC Public Health* 2012, **12**:602
<http://www.biomedcentral.com/1471-2458/12/602>



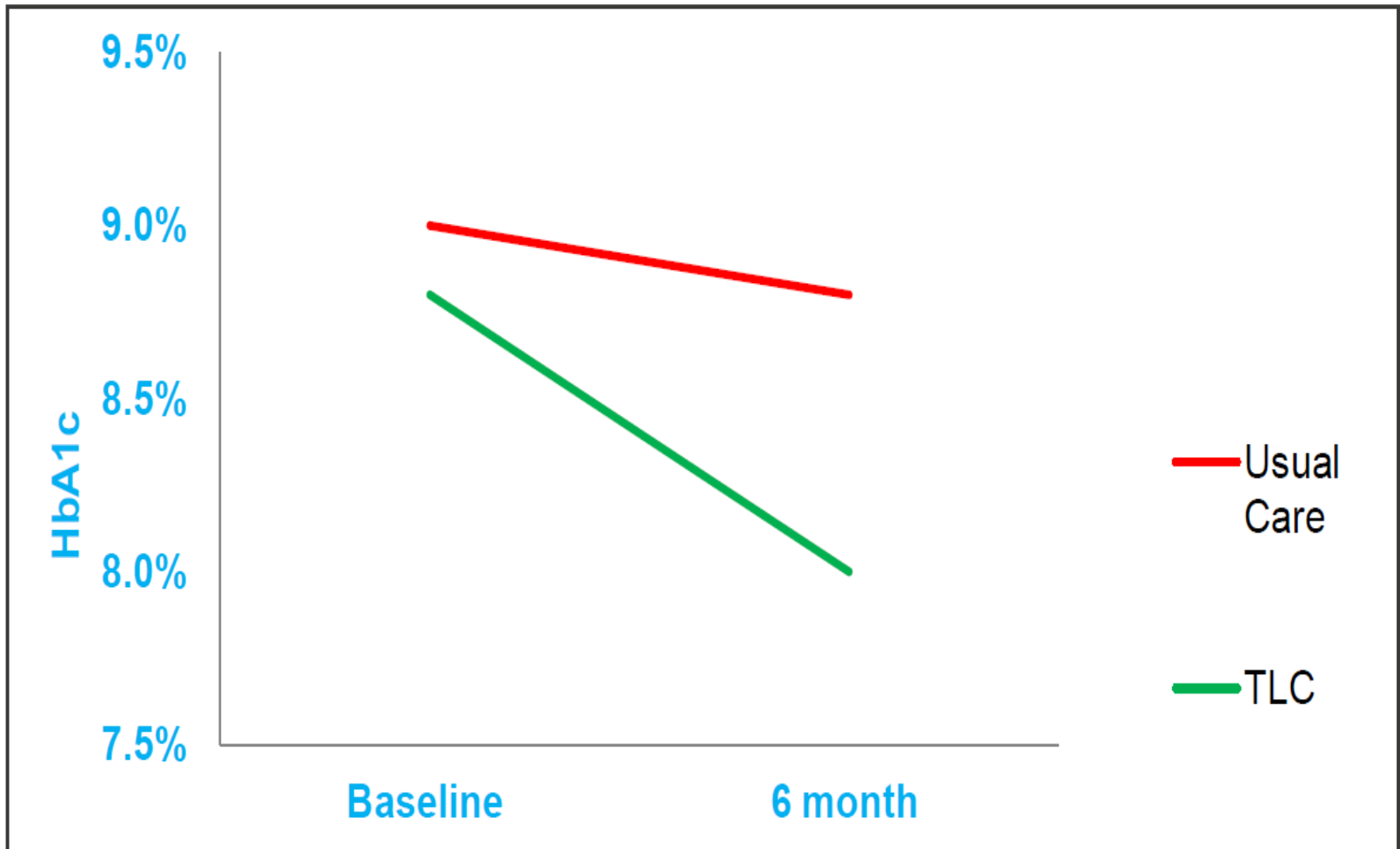
RESEARCH ARTICLE

Open Access

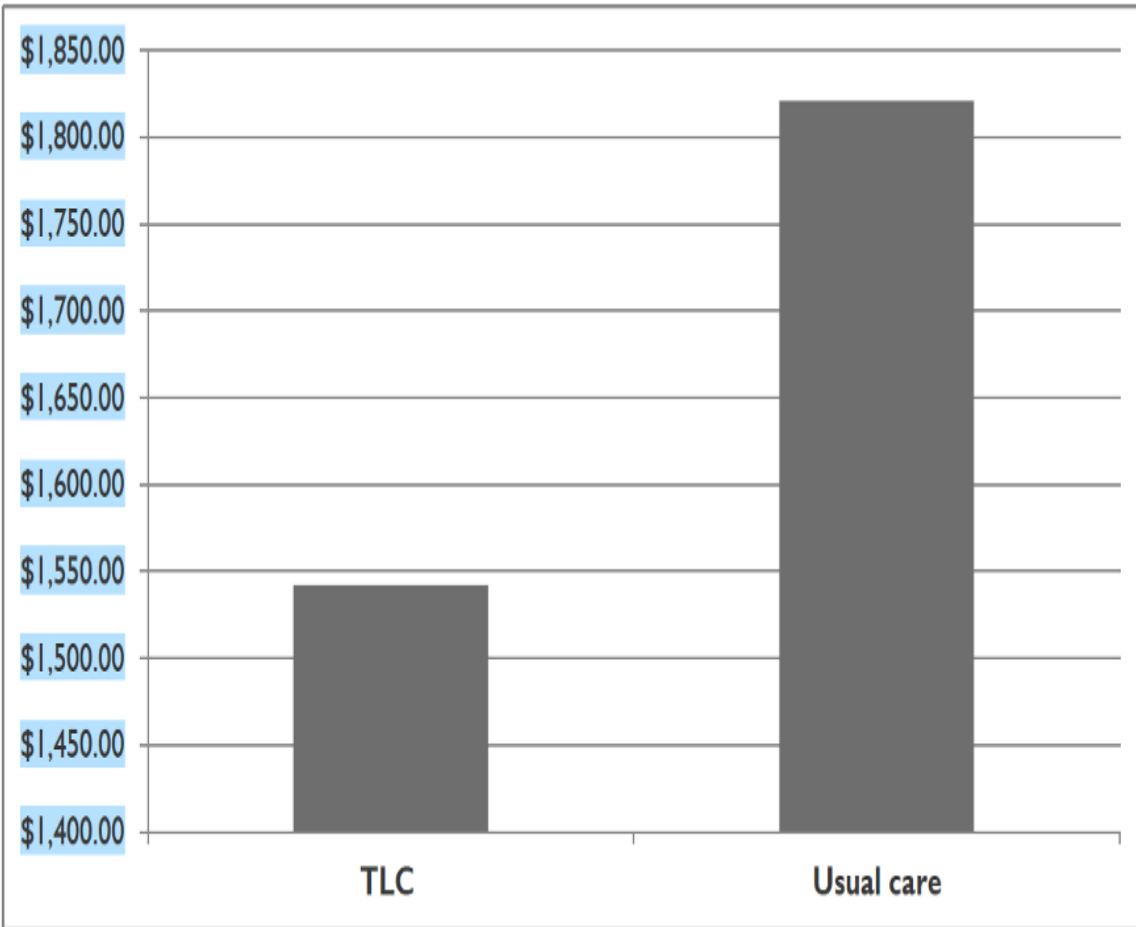
Randomised controlled trial of an automated, interactive telephone intervention (TLC Diabetes) to improve type 2 diabetes management: baseline findings and six-month outcomes

Emily D Williams^{1*}, Dominique Bird¹, Andrew W Forbes¹, Anthony Russell^{2,3}, Susan Ash⁴, Robert Friedman⁵, Paul A Scuffham⁶ and Brian Oldenburg¹

Efficacy of TLC Diabetes



Cost effectiveness



- High acceptability
- Convenient
- Consistent delivery of information
- Relatively low cost
- Excellent potential to be 'scaled up'

Variable	Mean (SD)	Range
No. of completed calls	17.82 (6.1)	2-27
% calls/expected	75.9 (21.7)	19-100
Average duration of call (minutes)	10.82 (.99)	8.7-14

“It is good to know “someone” is keeping an eye (on my management). It is making me dot my i’s and cross my t’s because I don’t know what it is going to ask me next”

– Christopher, 55

“Speaking with a computer is good because it reminds you that you are managing diabetes for yourself”

– Mary, 48

“For a diabetic living out on a remote farm, a program like yours is absolutely ideal...it makes my husband more aware of blood glucose levels and everything else”

– Mary, 75

“With TLC, it’s a ‘motivation thing’, someone holding you accountable but when it comes down to it, it’s really up to you”

– Kerrod, 62



Advice, education, support.
Anytime.



My Diabetes Coach

- “Laura” – Animated interactive virtual agent
- Multiple modalities – **speech**, text and visual
- Convenient access – 24/7, anywhere, anytime
- Engagement - Ability to send reminder alerts
- Clinical Alerts – Notifications to coordinator/others
- Human support – Program Coordinator



Advice, education, support.
Anytime.



Australian Government

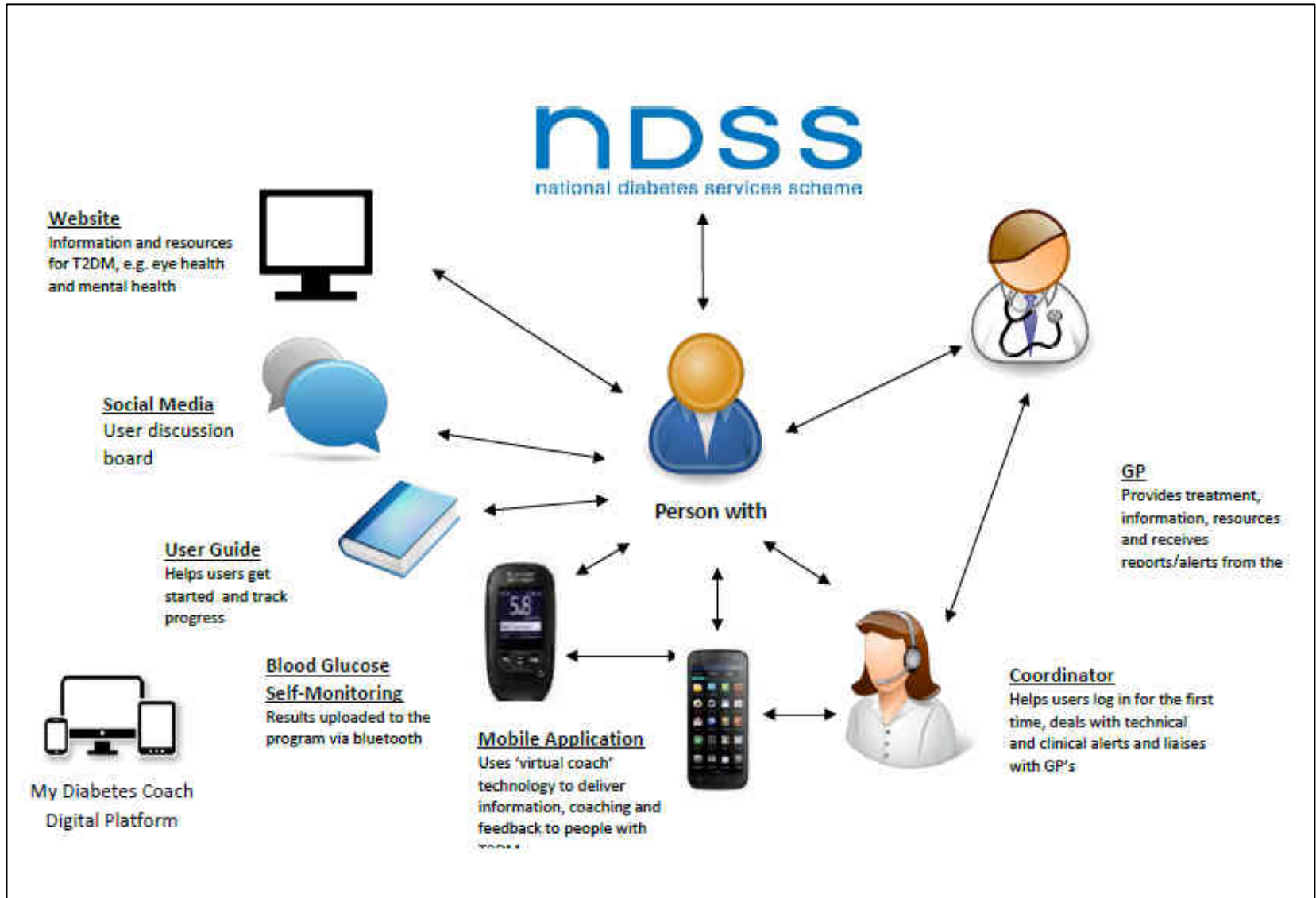
National Health and Medical Research Council

- Project Name: “Improving the health of people with type 2 diabetes using ICT”
- Partners: Diabetes Australia, Diabetes Queensland, Diabetes Victoria, Diabetes WA, National Diabetes Services Scheme, Roche Diagnostics Australia, University of Melbourne
- Funded by NHMRC Partnership Project (ID: GNT1057411)
- Years: 2014-2017/18

Research aims:

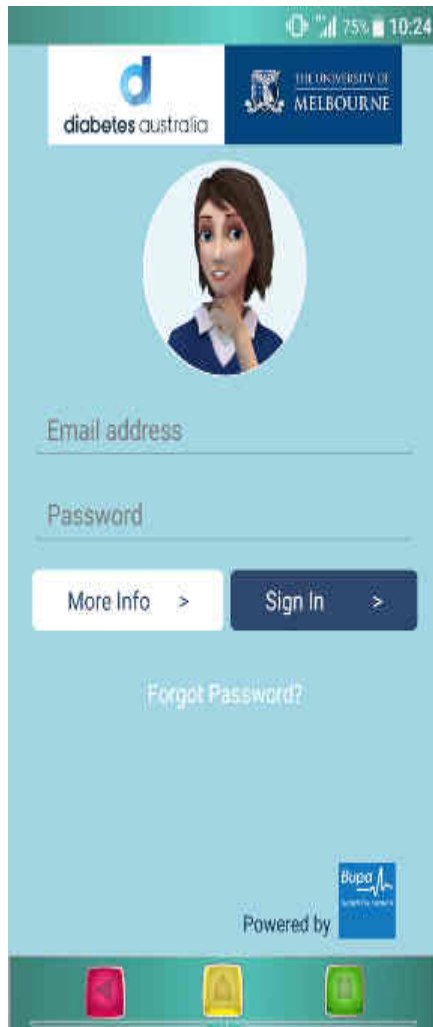
- To evaluate the benefits of the My Diabetes Coach program for people with diabetes recent registered with NDSS from Queensland, WA and Victoria
- To conduct an economic evaluation
- To evaluate the usability of the program
- *(Lessons learnt in developing, implementing and evaluating technology interventions to improve chronic disease self-management)*

My Diabetes Coach Program

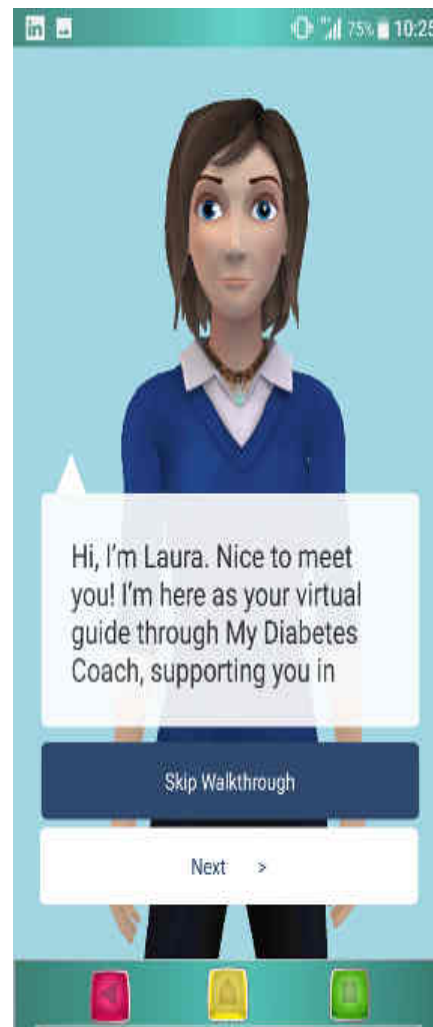


- **Key Features**

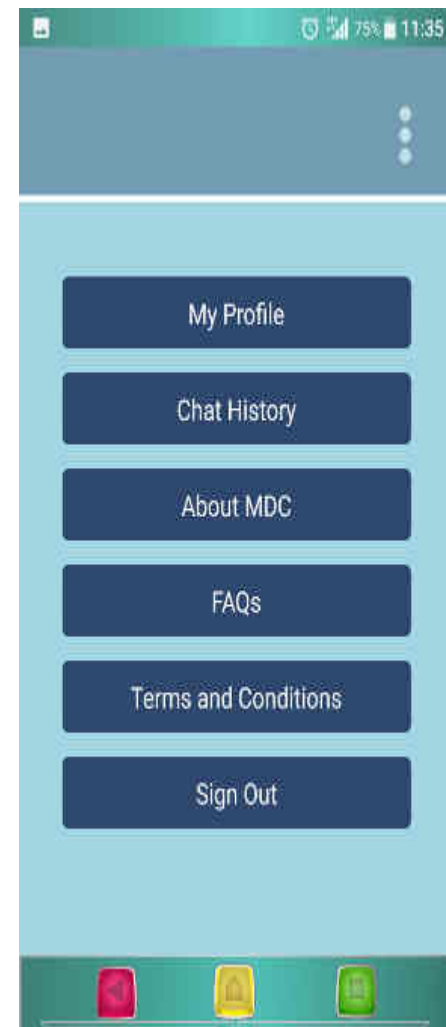
- Supported on iOS and Android smart devices
- Laura – animated interactive virtual agent
- Multiple modalities – **interactive voice recognition**, text and visual
- **Convenient access** – 24/7, anywhere, anytime
- **Personalised** user experience
- **Engagement** – Ability to send reminder alerts and messages
- **Clinical and Technical Alerts** – Notifications to coordinator



“Sign-in” screen

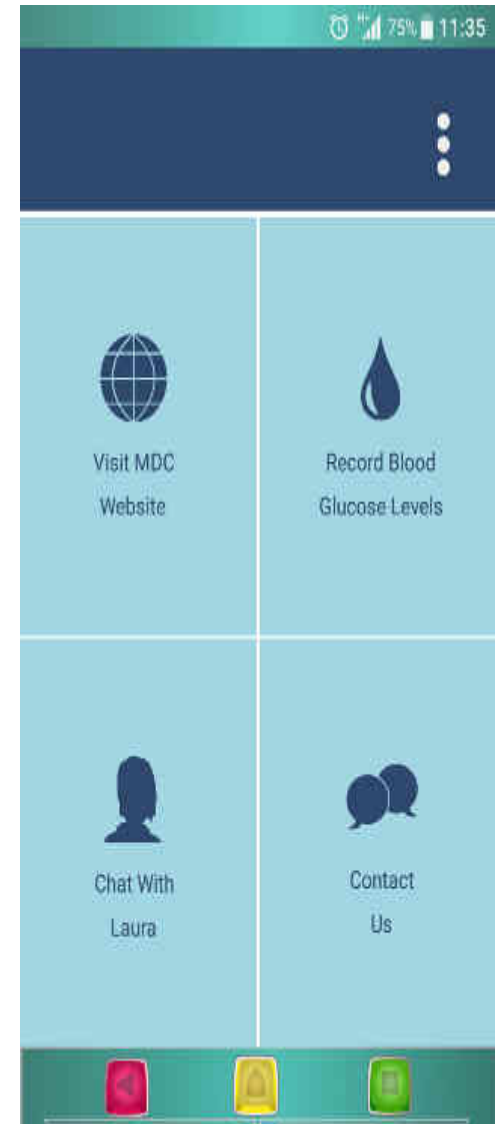


“Welcome message”



“Menu” screen

- Animated health coach, Laura, has weekly “chats” with users
- Each chat lasts for 10 – 30 mins
- Laura provides coaching, monitoring and feedback on:
 - ✓ Self-management
 - ✓ Healthy eating
 - ✓ Physical activity
 - ✓ Blood glucose monitoring
 - ✓ Medication taking
 - ✓ Foot care



- **Video clip - Introduction**



My Diabetes Coach

SEARCH

MENU



Type 2 diabetes and depression

Did you know that people living with type 2 diabetes are more than twice as likely to have regular feelings of sadness and depression, compared to people without diabetes?

Type 2 diabetes and depression can also interact negatively with one another: if you are feeling sad and depressed, this can also make it harder to manage your diabetes and your blood glucose control.

Have you struggled with depression at any time? Did you seek help? Please share your story.

(Remember, you can comment anonymously to this thread by submitting under another name if you would like)

Events

Posted June 1, 2017 by Laura (13 Comments)

Search



RECENT POSTS

- [Type 2 diabetes and depression](#)
- [Type 2 diabetes and stress management](#)
- [How well did you manage your type 2 diabetes over Easter or during other holiday times? What can we learn from such experiences to help us to us on track through earlier's sweet temptations?](#)
- [What tactics or strategies have you used to increase and maintain your level of physical activity?](#)
- [What strategies do you use or what experiences have you had when travelling with type 2 diabetes?](#)



World-class research trial to improve management of Type 2 diabetes

Australians with Type 2 diabetes are invited to trial a new digital health program to help them stay on top of their condition.

The University of Melbourne's [My Diabetes Coach](#) program aims to simplify the management of Type 2 diabetes and to reduce the risk of developing serious diabetes-related complications.

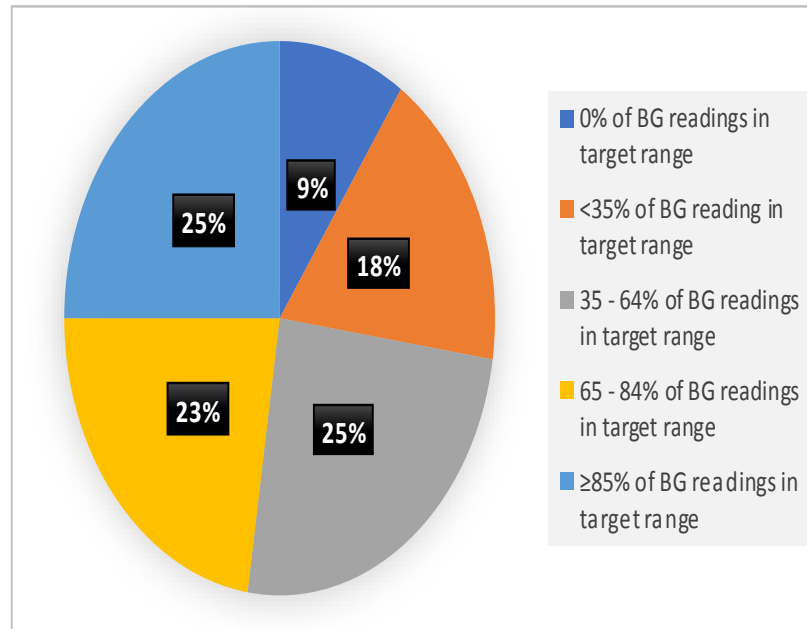
My Diabetes Coach is an innovative e-health solution which supports existing health service provision by providing a platform to help people manage their Type 2 diabetes anytime, anywhere.

"For our trial, people with diabetes are invited to access *My Diabetes Coach* from their smart phones, tablets or PCs. We will monitor how effective this is for them to self-manage their condition" Professor Oldenburg said.

"By improving self-management, this kind of program will also improve the health and wellbeing of Australians with Type 2 diabetes."

- Google Analytics:
 - Only 2.4% of MDC users are experiencing technical crashes.
 - Participants have responded to a total of 57,265 statements and questions asked by Laura.
 - An average of 622 statements per participant.
 - Users prefer tapping over interactive voice recognition interface.

- 90% of MDC participants self-monitor their pre-prandial BG levels.



Percentage of blood glucose readings in target range for participants that are self-monitoring (n = 84).

- MDC app use and exposure – 6 months**
(preliminary results)

	MDC	TLC Diabetes
Average number of sessions completed	19	18
Minimum number of sessions completed	3	2
Maximum number of sessions completed	45	27
Average duration of sessions	17 mins	11 mins



Benefits of this approach

- Informative, personalized, patient-centered approach
- Complementary to health care delivery, rehabilitation
- Informed by clinical guidelines
- Accessible anytime, anywhere via everyday device (“BYO-D”)
- High degree of connectivity with other digital devices
- High potential to adapt for other conditions



Key learnings

1. Consumers/users 'hungry' for resources
2. MNT – use 'minimal necessary technology'
3. BYOD – 'Bring your own device'
4. User-centred design
5. Need for constant re-invention of programs and delivery – “standardization of functions”
6. Use of adaptive study designs for evaluation vs traditional RCTs - *Agile Science and Iterative Evaluation*

Acknowledgements

Many students, collaborators, organisations
and others.....

Thank you!