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Diabetes-Related Complications

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From the Editor

Dr Kate Marsh, BSc, MNutrDiet, PhD, Grad Cert Diab Edn & Mgt
Advanced Accredited Practising Dietitian & Credentialled Diabetes Educator

This is the third edition of the ADE on our new online platform and we hope you are enjoying the new format. You can read it on any digital device and can also print, share and comment on articles as well as being able to browse or search for past articles. The ISSUU version you are reading will continue to be available for those who prefer to read without being connected to the internet, but if you haven't already, we still encourage you to take a look at the online platform at https://ade.adea.com.au.

The theme for this edition is **Diabetes-Related Complications** and we have a great range of articles, covering areas including the dietary management of diabetes and renal disease, sexual dysfunction in women with diabetes and impaired hypoglycemia awareness. We have two articles on footcare and diabetes, highlighting what diabetes educators should know about this important area, and an interesting case study about an integrated nurse practitioner clinic aimed at improving the management of individuals with multiple complex chronic conditions. Finally, we've included an inspiring consumer article about the challenges of living with diabetes and other complications.

Following on from their case study in the June edition of the ADE, Rasmussen and colleagues present the findings of their research exploring the perspectives of young adults and their diabetes educators regarding the utility of the Guided Self-Determination online program.

Also included in this edition is an update on the current evidence and guidelines for subcutaneous injection technique and an interesting case study from a member of the ADE Editorial Advisory Group (EAG), Michelle Robins, on interdisciplinary mentoring.

For those in private practice, our business article from Maida Learning is a must read. Discussing the Australian Privacy Principles, the article explains how they apply to health professionals and what you need to do to ensure you are adhering to these guidelines in your practice.

Finally, if you are feeling overwhelmed with keeping up with the latest diabetes research, we've put together an article outlining some of the great resources available to help you keep up to date. You might also like this edition's book review on the AADE publication 'The art and science of diabetes self-management education desk reference'. If you're looking for a single, comprehensive resource for everything you need to know about diabetes self-management education, this book could be the solution.

We have recently welcomed two new members to our EAG – Marlene Payk and Daisy Do. Together with our existing members, Michelle Robins, Penny Barker, Nicole Duggan and Anne Marks, I would like to thank them for their help in bringing this edition together. From planning theme and topics to finding suitable authors and reviewing articles, there's a lot of work that goes on behind the scenes to bring you each edition of the ADE, and we certainly couldn't do it without such a great team volunteering their time.

I hope you enjoy reading the September ADE and welcome your feedback on this edition as well as the new online format.

Original research

An online self-management intervention for young adults with type 1 diabetes:

Guided Self-Determination program

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Judy Currey, Professor, RN, BN(Hons), GCertHEd, GCertSc(AppStats), PhD
Bill Haigh, B.Cog.Sci GCERT(Health Professional Education)
Trisha Dunning, Professor, AM, RN, CDE, MEd, PhD
Vibeke Zoffmann, Associate Professor, RN, MPH, PhD

Abstract

Aim: This study aimed to engage young adults with type 1 diabetes (T1D) who have self-reported low motivation and suboptimal blood glucose control in a specifically tailored Guided Self-Determination online program, and to explore the perspectives of the young adults and their diabetes educators regarding the utility of the Guided Self-Determination program on an online platform.

Methods: An exploratory descriptive design with four stages involving:

1. developing the Guided Self-Determination program online
2. training diabetes educators to use the Guided Self-Determination program in an online format
3. implementing and pilot testing the Guided Self-Determination program
4. evaluating the online version.

Results: Eight diabetes educators and eleven young adults with T1D participated in the study. Both groups of participants found the Guided Self-Determination program online promoted reflections that created solutions, and facilitated an expedient client journey based on the young adults' needs/goals, which in turn, changed the way they collaborated with each other. Participants identified website design issues relating to an inability to save material and not being mobile friendly, although this did not impact participation or outcomes.

Conclusions: The online Guided Self-Determination format is a suitable, convenient and advantageous way to communicate and engage with young adults with T1D. All participants found the online communication expedient, flexible and particularly suitable for the young adults who had lost motivation. The Guided Self-Determination program online is worth further technological development to improve the life skills and self-management of young adults with T1D.

Key words: Self-determination, diabetes, self-management, online education, empowerment, life-skills.

Introduction

Living with T1D requires lifelong self-care, achieving blood glucose management to optimise well-being and prevent complications. Psychosocial stress and the ability to adjust to change influence a person's self-management potential and consequently metabolic control, clinical outcomes and mental health.[1-4] Learning to self-manage diabetes is vital for optimal health outcomes.

Current educational interventions to achieve glycaemic control are not successful if people lose motivation to self-manage their diabetes.[5] Suboptimal glycaemic control is associated with lack of motivation[6] when psychological and social factors impact on people's lives.[7, 8] Motivation to manage diabetes is particularly affected when people are experiencing life changes, particularly in younger adults aged 18-40 years when competing commitments make diabetes management more difficult.

The Guided Self-Determination (GSD) method, developed by Zoffmann[5] improves personal, social, physical and cognitive skills of young adults with diabetes (YAWD).[2, 6] These skills are important for young people to direct their daily activities and to develop the ability to navigate through changes in their lives.[9-10]

The GSD method was designed to guide both participants with persistent suboptimal glycaemic control and professionals managing participants with diabetes, using mutual reflection. YAWD are prompted to systematically explore and express their personal difficulties and experiences with diabetes through words and drawings on shared worksheets, which in turn enables them to discover their potential for change.[11] Reflections are recorded on these worksheets, designed to assist YAWD to express their views and prepare them to actively participate in self-care processes.[6]

Suboptimal diabetes self-management can result in serious complications in individuals with T1D. In Victoria, Australia, there are 5,962 people aged 21 to 39 years living with T1D.[12] Some YAWD report that current health services in rural and regional Victoria do not meet their information and support needs due to access issues, travel/time constraints and limited choice of health professionals.[13]

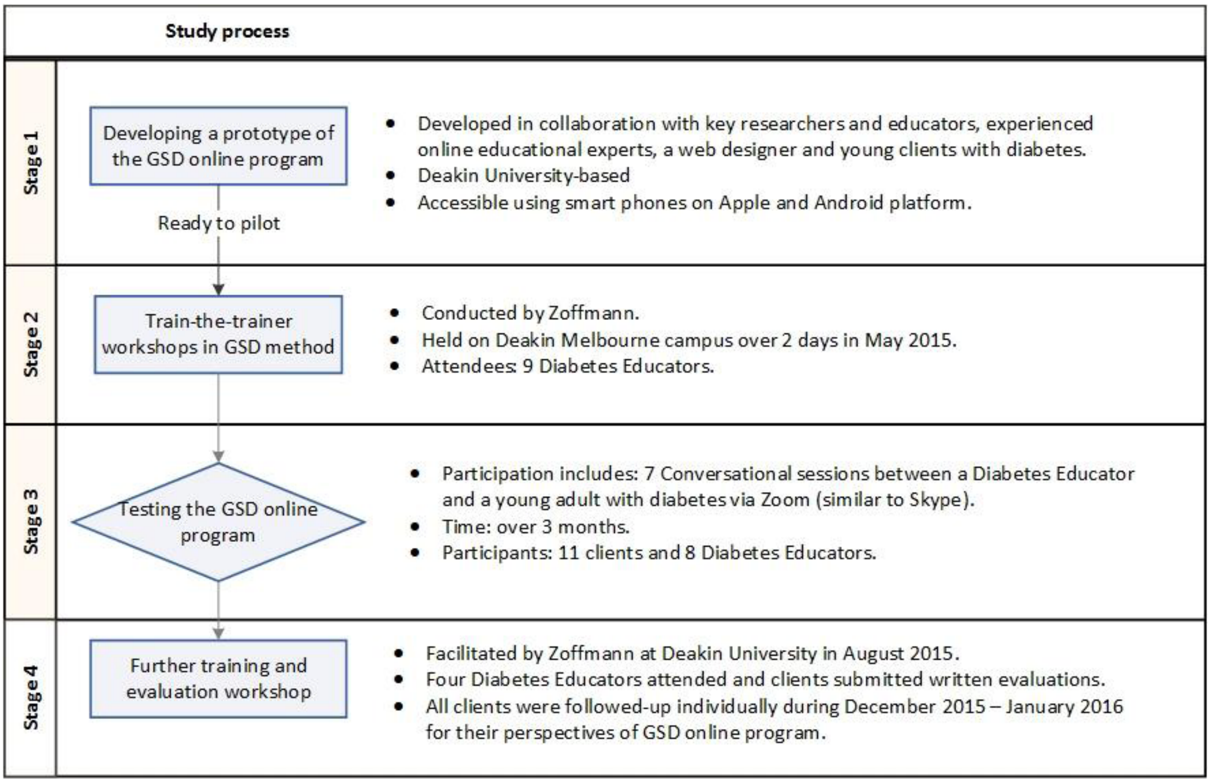
The vast majority of young Australians have internet access and use the internet daily.[14] Novel strategies, for example online health services, are required to assist those with limited access to health care. Technology can supplement current care by providing educational and motivational support.[15] Increased access to the internet via mobile devices has created opportunities for health professionals to leverage this communication mode. Access to the GSD program online platform may help YAWD improve their self-management skills and gain a greater sense of control over their lives, as it has for those completing it in-person. This study aimed to engage YAWD who report low motivation and suboptimal blood glucose control in a specifically tailored GSD online program, and to explore the perspectives of YAWD and diabetes educators (DEs) regarding the utility of the GSD online program.

Methods

A multi-stage exploratory descriptive design was used to develop and implement the online GSD program at Deakin University, Melbourne, Australia. Details of study stages and processes are presented in Figure 1.

The reflection sheets are discussed and exemplified in another publication.[16]

Figure 1: Study design and process



- Developed in collaboration with key researchers and educators, experienced online educational experts, a web designer and young clients with diabetes.
- Deakin University-based
- Accessible using smart phones on Apple and Android platform.

- Conducted by Zoffmann.
- Held on Deakin Melbourne campus over 2 days in May 2015.
- Attendees: 9 Diabetes Educators.

- Participation includes: 7 Conversational sessions between a Diabetes Educator and a young adult with diabetes via Zoom (similar to Skype).
- Time: over 3 months.
- Participants: 11 clients and 8 Diabetes Educators.

- Facilitated by Zoffmann at Deakin University in August 2015.
- Four Diabetes Educators attended and clients submitted written evaluations.
- All clients were followed-up individually during December 2015 – January 2016 for their perspectives of GSD online program.

Eight DEs and 11 YAWD aged 20-39 years participated in the study and provided written informed consent. Recruitment took place through third party organisations: Australian Diabetes Educator Association (ADEA) and Diabetes Victoria support groups. For DEs, participation involved undertaking two training workshops in the GSD method, seven sessions conducting the GSD online program, and participating in an evaluation workshop (for all participants). Three DEs each conversed with two clients; the remaining five DEs each conversed with one client.

Following institutional ethics approval (HEAG-H 27_2015) all participants agreed to have their conversations with the research team digitally recorded for transcription and thematic analysis. Demographic and self-reported data on skill and experience with online technologies were collected prior to commencement of the GSD online program. At the end of the program the participants completed an online anonymous questionnaire about GSD regarding (1) their experience using the GSD program, (2) the online delivery of the program, and (3) the barriers and facilitators to using communication devices and the GSD program online. Questionnaire data were thematically analysed using content analysis methods.

Results

Overall, the GSD online program was well received by both groups. Findings regarding participants' perceptions of the program yielded four main themes: *Reflection Created Solutions; Expedient Client Journey; Professional Reward;* and *GSD on My Terms.*

Reflection created solutions

A core element of GSD is deep reflection by the individual to identify problems that may be affecting their ability to self-manage their diabetes while negotiating ongoing life events. The GSD method guided participants through conversations that facilitated reflection, which reportedly benefitted the YAWD and DEs. The conversations prompted YAWD to consider plans for managing their diabetes in a more structured way. The emotional support was important to participants and reflections were enhanced by the flexibility of the program. One participant living in a regional area far away from diabetes education services commented:

> *"It [GSD online] helped me to feel like I was receiving emotional support to achieve my goals instead of just focusing on physical aspects of diabetes management. It helped me to consider short and long term goals. I was able to reflect on the bigger picture of my diabetes since diagnosis and to see how well I have managed myself over the last 10 years which I had lost sight of during a recent rough patch. Being able to complete the program in my own home was also extremely convenient for someone who lives in a regional area" (Client_01).*

The DEs indicated reflections changed their practice because the solutions or strategies for managing diabetes were created by the individual, and thus, were more likely to be incorporated into their self-care.

> *"The traditional consult is where the client is coming to look for a solution from you and you need to provide that, and if asked 'Are there any other concerns?' they can't [come up with anything] but when you start using this [GSD method] and asking questions and for their reflections and using clarification and it opens up [conversation] and you get a totally different person and you get a lot of other questions come up and then they become the solution giver, they can solve their own problems" (DE_01).*

It was evident that writing notes and being able to follow trends by backtracking to previous conversations documented online created opportunities for DEs to develop/suggest more personalised client-centred plans.

Expedient client journey

The GSD online program saves time because it can be used 24/7. Most participants worked on reflection sheets in preparation for the next session or for their own benefit at their convenience. The YAWD often accessed the program outside allocated sessions with their DEs, up to 40 times for a particular client. Being online reduced the need to take time off work to attend specialist appointments, thus helping participants to manage competing commitments more efficiently.

The flexibility of online GSD meant participants formed relationships with DEs faster than they would with conventional face-to-face diabetes consultations, which in turn assisted the individual's self-management and facilitated immediate life changes. Participants reported that practical solutions and outcomes enhanced their sense of control and empowerment.

Professional reward

The DEs indicated that the GSD method involved a change in their professional relationship with participants. The guided conversations helped the DEs to focus more on the situation from the client's perspective and in turn changed the relationship towards a collaborative approach. Both groups of participants agreed that the GSD method is an empowerment tool:

> *"It is about empowerment, about respect for the client, that's why it works so well… you're just walking along beside them, holding their hand to tease out what their issues are and then helping them or offering them practical solutions that's why it's been so well received" (DE_04).*

The DEs highlighted the flexibility in scheduling appointments. The frequency with which the YAWD could access the GSD program was vital for proving reassurance to YAWD in a focused and timely manner, and to keep them motivated and confident while they made self-care and life changes.

GSD on my terms

The participants reported that GSD was particularly attractive to them because it is need-focused. The YAWD reported they felt 'in control' of the conversations with their DE:

> *"I have finished all my sessions, I really enjoyed them. Each session was relevant for me, the tool was simple and easy to follow. It didn't try to complicate our discussion, it just made us more focused and gave some direction" (Client_01).*

> *From the YAWD perspective, the way GSD online program was implemented shifted the role of 'expert' from the DE to client. "The way it [GSD] ran was different because usually they [the health professionals] tell you what to do, you have to just tell them about your sugars, how you feel physically and they tell you what to do. With my DE [in the GSD program online] they ask me about my experiences and emotions, and I can suggest things that might work, and find something that actually might work for me instead of something that someone else has come up with" (Client_04).*

Through GSD, YAWD learnt new aspects about themselves and their diabetes, which enabled practical solutions to be implemented. Having 24 hour access to the program also dissipated some of the stress associated with waiting to discuss such issues until the next consultation, if at all, in usual diabetes care.

Online experience and issues

Both groups of participants reported similar experiences regarding technological aspects of the GSD online program. The main issues were related to system design, downloading the communication program (Zoom) and uncertainty about how to commence using GSD online. Participants were encouraged to contact the web designer/researchers throughout the study and to provide feedback whenever required.

Issues

Getting started

Although a web designer was available online to provide prompt technical support, participants experienced difficulties in initiating access to the conversation session due to perceived ineffective written instructions. Participants who attended on-site sessions did not experience access problems. It thus became apparent that a face-to-face session to explain how to use the technology was warranted, to enable a smooth set-up process for participants to avoid time wasting and frustration.

Design

Adherence to the paper-based GSD program was necessary to keep the GSD training consistent but also limited 'web style' finesses when transferring to an online version. Application alterations were required, as expected in a pilot study, and were challenging at times for participants in the early stages of implementation. More ongoing issues such as a session not saving meant delays in progression and frustration when sessions had to be repeated.

Researchers responded promptly to participant feedback. The team recorded short instruction videos for each conversation session. The videos were regarded favourably because they reduced concerns about remembering the content of sessions accurately. Better audio solutions for videos are needed for future iterations of GSD online. Information to develop participants' computer skills could also be useful because technical difficulties were often easily solved if the participants had relevant computer knowledge and skills. Some participants' small screens could not accommodate all the information needed for some conversations. Consequently, participants had to scroll up and down to locate information which seemed to affect the conversation flow.

Benefits

Saving time and free of cost

A significant benefit of the GSD online program was that it was free to participants and saved time for participants by reaching solutions to their identified issues expeditiously. It was surprising to the participants how effective the conversations were due to the reflective preparations.

Discussion

Our findings demonstrate that the GSD program is transferrable to an online platform and was readily accepted by both groups of participants. Indeed the findings showed GSD online was preferable to traditional face-to-face consultations for YAWD, especially if they had lost motivation, rarely reach out for support or had little access to health services due to geographic distances. The online version of GSD improved YAWD self-management, which is likely to improve health outcomes. The YAWD regarded the GSD online program as a tool to empower them to make their decisions and solve problems on their own terms according to their individual priorities.

Decision making and problem solving are powerful self-management strategies. Health professionals and clients need to be repeatedly involved in these activities in all clinical settings. Using GSD is beneficial for clients and health professionals because GSD is grounded in theory and evidence based.[11, 17] Thus, GSD is tailored to achieving changes and targets unproductive behaviour patterns and focuses on decision making and problem solving strategies between clients and professionals.[17-19] Our study demonstrated that the online version of GSD effectively developed confidence in YAWD and DEs to work in partnership to share decision making and problem solving; hence, empowered both parties.

Most YAWD accessed GSD online multiple times between scheduled appointments and both participant groups left information online anytime they desired. This practice was considered essential to the reflection and decision making. The GSD online program captured client information that may otherwise have not been shared with DEs and was used to inform management strategies. Rereading the reflection sheets multiple times helped YAWD and DEs see patterns of behaviours, recurring issues or difficulties in lifestyles. Health professionals need detailed knowledge of the barriers and enablers of self-management to empower their clients. Participants also need to understand their own roles in these barriers/enablers, find ways to overcome them, and acknowledge when common goals are achieved.[17, 19]

We involved YAWD from the commencement of the study because involving end-users in the design is crucial. Documentation on the website by YAWD provided insights that helped the DEs and researchers understand client needs, which is critical to develop a usable and effective online product and system.[20] In the healthcare context, Kayser et al.[20] provided a framework comprising user dimensions and a task dimension. These dimensions emphasise the need for end-users/clients to have good knowledge about their own health, and the ability to engage with technology that is beneficial, secure and controllable. End-users/clients need access to technologies that work and suit their needs. These factors were considered when developing the GSD online program. Results suggest YAWD and DEs were prepared for the conversations and moved between documents together during conversation sessions.

Completing the reflection sheets kept the YAWD on track and facilitated their conversations with the DE about changes they were making. This echoed the finding in other studies using the face-to-face GSD method with paper-based reflection sheets[2, 19] and aligned with the purpose of the GSD method. That purpose is to discover and express personal difficulties and priorities related to the chronic condition, enabling people to discover their potential for change.[21] In our study, online conversations generally were shorter, more focused and more frequent compared to face-to-face GSD using paper-based reflection sheets. This suggests that an online GSD version will further the translation of changes into practice.

An important finding of our study was how essential training DEs was to enable them to use the GSD method effectively. At times, technology issues distracted from the main purpose of the conversations. One DE found it nerve-wracking to use new technology at the same time as a new therapeutic method. It is therefore of utmost importance to ensure health professionals receive thorough training in the GSD program method as well as computer skills. Other researchers who addressed the model of building capabilities using technology also indicated that it is integral for users to believe the technology is beneficial, engaging and manageable.[20] Translating the GSD program to an online platform clearly helped YAWD improve their capacity to self-monitor their health and facilitated access to a highly responsive health care system.

Limitations and strengths

Study findings are limited by the pilot nature of this project and small sample. However, the study was designed to explore and describe the phenomena under investigation, and generalisation is neither sought nor claimed. Despite these limitations, the study findings mirror that of research into the hardcopy, in-person versions of GSD, giving strength to the potential impact of GSD online in a second iteration of the website. The strengths of this study are that it has shown that GSD, as an evidence-based program, was able to be transferred to an online environment to enable greater access to individualised support for those who may rarely reach out for support.

Conclusion

Transferability of the GSD method to an online platform provided demotivated and geographically isolated participants with a novel, inexpensive and readily accessible therapeutic intervention to improve their diabetes self-management. The GSD online program improved YAWD self-management, and communication processes between DEs and YAWD. Further development and inclusion of new technologies is required for the GSD on an online platform to fully realise its capacity to engage clients to improve diabetes self-management and health outcomes. Health professionals using the GSD online program require extensive education and training in GSD methods to optimise their capacity to use the program competently to help people with diabetes realise their diabetes self-management potential.

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We sincerely thank all participating young adults and diabetes educators for their time and for sharing their experiences; Diabetes Victoria staff, Caroline Hines and Karen Crawford, for supporting and promoting the project; Educational Developer Dr Ian Story, Faculty of Health, Deakin University for constructive consultations; Research Fellow Elizabeth Stewart for project management; and Australian Diabetes Association Victoria for support of advertising the project.

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Mentoring outside your 'comfort zone'

Michelle Robins, NP CDE

Professor Trisha Dunning was my first mentor when I began as a diabetes educator in 1993. It is a strong collegial relationship that continues today. Following my credentialling in 1997, I have had the opportunity of not only being able to support students in their diabetes clinical placement, but also many diabetes educators seeking ADEA credentialling.

Initially that involvement was always with nurses aspiring to be diabetes educators. Before the variety of electronic forms of communication we now have, it involved a lot of face to face commitment for the mentor and mentee. Email and tools such as Skype then allowed such collegial relationships to occur at more convenient times, often over great distances. Credentialled diabetes educators (CDEs) and those health care professionals (HCPs) aspiring to meet this standard are now made up of many different disciplines. Registered nurses (RNs) still make up of the majority of ADEA members, yet I have frequently heard of CDE RNs voice their concerns about feeling ill-equiped or apprehensive about providing clinical placements for diabetes educator students or being mentors for HCPs who are not RNs. I would like to share with you my own experience around this often difficult and uncomfortable 'elephant in the room' issue.

Two years ago, an experienced community pharmacist from our catchment area, Diane Gargya, requested a clinical placement with the team at Northern Health. We welcomed that opportunity as part of our commitment and core business to make available our team and service for a unique experience of caring for people with diabetes in the northern suburbs of Melbourne. This one week clinical placement, however, was the start of what continues to be a very positive and mutually beneficial relationship for Northern Health and Diane. During her clinical placement, our team learnt just as much from her as she learnt from us. We were provided with an amazing insight into the workings of a community pharmacy, the challenges, and more importantly the opportunities. After completing her graduate certificate in diabetes education, I then became Diane's mentor as part of her ADEA credentialling process. It became an opportunity for me to continue to learn more about how a diabetes educator pharmacist can provide a very real and important contribution to the care and ongoing management of people with diabetes within my region. It has allowed our team to build a very strong relationship that is mutually beneficial for HCPs and people with diabetes; to break down silos and stop the often toxic turf wars that I see develop, not only within but externally with many health services. Diane is now a CDE and undertaking studies towards a Masters in Clinical Pharmacy with a focus on diabetes management.

When I hear CDE RNs report that they refuse to accept clinical placements requests from allied health diabetes educator students, it reminds me of the barriers I faced starting out as a Nurse Practitioner (NP). Yes, there was support at the time, but there was also a lot of indifference and outright hostility not just from doctors but also from CDE RNs. A decade later, I feel most of those battles have been fought and won, that the role of the NP in diabetes is well established and respected. I would hate to think that allied health CDEs have the same long challenge ahead of them. The diabetes team is a broad church today made up of many disciplines that bring unique skills, knowledge, experience and perspective to a challenging and complex group of health conditions. The landscape of diabetes management is always moving and always changing. Diversity in the clinical placements we offer and the HCPs we mentor, not only helps us as diabetes educators, it more importantly will help people with diabetes. Today my mentoring not only extends to diabetes educators of many disciplines, but to NPs both endorsed and candidates. In doing so, I am continually challenged, often moved outside my comfort zone, and yet find the process incredibly humbling and gratifying.

Australian Privacy Law and the disclosure of personal information

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Director, Maida Learning, Riverina Hand Therapy, Riverina Kids Therapy

Introduction

The Privacy Act was legislated in 1988 in Australia and provides rights to individuals about how their personal information is used and managed. In 2014, Australia introduced new privacy principles that govern how a business can collect, store and share information. These are known as the Australian Privacy Principles (APPs) and these 13 principles not only apply to the management of client data in our rooms, but also to the use and storage of employee data and information. We will look at some of the APPs in more detail and outline important considerations for diabetes educators.

What is personal information?

The APPs talk frequently about the management of a client's personal information. What is personal information? Under the Privacy Act, information can be classified into sensitive and personal information.

PERSONAL information means information or an opinion forming part of a database (e.g. name, address, date of birth, next of kin). It also includes bank details, photos and credit card information. You need to ask yourself "could someone find out to whom the information refers to and could a person identify the individual from the information"? If the answer is yes, then it is personal information.

SENSITIVE information is information or an opinion on a person's race, ethnicity, origin, political opinion, professional trade, religion, as well as health information (where health information includes information collected to provide, or in providing, a health service). Sensitive information under the Privacy Act is considered a component of personal information, so the terminology of 'personal information' in the Privacy Principles also includes someone's health information that you have collected.

Focus: Australian Privacy Principles

APP 1 - Open and transparent management of personal information

When we look at the first APP, we need to ensure we have open and transparent management of personal information. Essential to this is an up-to-date policy in your practice or service that describes how you will manage personal information. The things you need to consider including in your privacy policy are:

- The kinds of personal information you will collect and keep
- How it will be collected
- How it will be held
- The purposes for which it is used and disclosed to others
- How individuals may access the information
- How individuals may complain about a breach of the APP
- Whether you are likely to disclose information to overseas recipients and if so, in which countries

You need to make sure the policy is available to clients should they wish to look at it, and you should provide the policy to them free of charge. How you do this is not defined under the APPs, so it may be electronic or written. If you have administration staff and other practitioner staff, it is important that they know where to find it, and know what's in it. This is important for two reasons. Firstly, if they are not aware of what it contains it is harder for them to understand what their obligations are. Staff training is extremely important to preventing a breach of privacy in your practice. Secondly, it is important that people know the whereabouts of the policy so they can locate it easily when a client requests to read it. You may also choose to have a copy of it on your website for people to read as they wish.

If you do not have a privacy policy, start writing one now! If you have one, but have not looked at it for a while, block some time into your diary to review what you have already in place.

APP 6 - Use or disclosure of personal information

This principle outlines when you, as a practitioner, may use or disclose personal information about your clients. The intent is that you will generally use and disclose an individual's personal information only in ways the individual would expect you to.

Under APP6, the following terms are applicable:

- Holds: This applies when you, as a practitioner, have possession or control of a record that contains a client's personal information. This includes any records that are not physically stored with you, for example if you are renting a room and your written notes are stored in a secured area when you are not there, you still have responsibility to ensure no one else is accessing them. If you are in shared premises using a shared electronic practice management system, you need to be aware of who has access, and where the information is stored (as it is often in the cloud, which might be in another country).

- Use: As a practitioner, we are using a client's information when we handle or undertake an activity with the information. This may include accessing and reading the client notes and information, searching records for the personal information, making a decision based on the personal information or passing information from one place to another (for example from an office to home, or to another location).

- Disclosure: You are disclosing personal information as a practitioner when you make the information accessible to others outside your individual service (for example providing information to another practice when referring onwards or when communicating back to a referrer).

- Purpose: Where you hold personal information that was collected for a particular purpose, (known as primary purpose) you must not use or disclose the information for another purpose (secondary purpose) unless the client has given consent for you to do this or the client would reasonably expect that this would take place. For example, if you were to collect information regarding a client's health status and progress for the purposes of providing advice and education, that information should then not be used for a research project, unless the client had provided consent for that. If consent was not gathered at the start, when they initially became a client of yours, you may go back and ask them if you wanted to use their information for another purpose down the track. Under this principle, as a healthcare provider, you are able to use the client's information for a secondary purpose that relates to their health, for example, sending information to their doctor, or using information to request access to past medical records from the local hospital if pertaining to their treatment.

As a practitioner in health care, we need to consider how we will transfer information to another service, and this often opens up a debate about which method is most secure to transfer information. If you are writing a letter back to a referrer, it is important that you take 'reasonable' steps to ensure that transfer of information is secure and cannot be intercepted in-between. Emailing information is most likely not the most secure method, however it is very common. It is my recommendation that if you are emailing a client's information, that the client is aware of that. A note about how you transfer information in your consent form that your clients sign when they first see you is a good idea. Faxing is another common method and is being slowly phased out. The most secure way is encryption of information electronically before it is sent. There are a few organisations that you can use for this such as HealthLink or Argus.

APP 7 - Direct marketing

If you hold information about an individual, you must not use or disclose this for the purpose of direct marketing, unless you collected the information directly from the individual and the individual would reasonably expect that you would use or disclose it for marketing, and you were to provide a way that the individual can request not to receive the communication. For example, if you collected a client's information for providing intervention, and then in four months' time you used their name and email address to send out an electronic newsletter to them about your services, an event they might be interested in attending locally, or new information about diabetes management, this would most likely be considered reasonable under the Privacy Act. A client would reasonably expect that you would update them on those types of information. The electronic newsletter would need to have an 'unsubscribe' option where the client could choose to not receive that type of correspondence from you again. If on the other hand, after seeing you as a client, you passed their information onto another company (for example a supplier of diabetes equipment) and they marketed to your client, this would not be considered reasonable. A client would not expect you to do that when they were coming in the first place as a client for a consultation with you.

If you are not sure, then it is wise to ask clients on your consent form if they are happy for you to send them information via email (or post if that is preferable to you) about the service. APP7 does not relate to sending out appointment reminders via email or text message, as this is not considered marketing, and it does not relate to letters that are sent about their appointments or items related to their care, as this again is not considered to be marketing.

APP 8 - Cross border disclosure of personal information

This relates to the disclosure of information overseas. For example, if a client is moving overseas and you need to provide information to other organisations who are taking over their care, you need to be satisfied that the organisation meets the privacy principles in Australia, and if you feel they don't, you must advise the client that you cannot provide the information. You may get further consent from the client to send it anyway, or you may choose to ask the client to take the information with them. This APP also relates to practitioners who use cloud based software for client management. This could be accounting cloud based software that you use for invoices, or practice software programs. If you are using one of these, you will need to ascertain in which country the cloud based system servers are located and let your clients know if this is not Australia.

APP 12: Access to personal information

If you hold personal information about an individual you must, on request, give the individual access to that information. You do not have to do this if you think that it would pose a threat or injury or serious harm or health and safety concern; it would impact on the privacy of other individuals; the request is frivolous; the information is related to existing or anticipated legal proceedings between the individual and your practice; or giving access would be against a law or a court order. It is suggested that you seek legal advice before denying the release of records.

When releasing information to a client you must provide the information in a reasonable timeframe, however there is no definition of what that is. It can depend on how large the file is, or what form it is in, so it is recommended that you include this in your own practice policy. People do not have to give you a reason for why they want access to their personal information, nor do they have to write a request for it. They may just have a verbal conversation with you. Things you may discuss with a client about access to their information includes: How they would like to receive it (electronically or printed); when they need it by (it does not have to be that day, but should not really exceed 30 days); and which parts of the file they need (all of it or just parts, such as the letters or accounts information).

Auditing your service

It is a good idea for healthcare services to regularly review their compliance with the Privacy Act by conducting an audit of what they are currently doing. This could involve:

Stage 1: Building on existing good practices. Make a list of what is already being done in your practice so you can build on this. For example, you may already have a consent form in place.

Stage 2: Conduct a review to work out what sort of information your practice/service collects, holds, uses and discloses.

Stage 3: Familiarise yourself with the APPs and how they might affect the way your service handles information.

Compare what you are currently doing with the principles to highlight what you need to work on.

Stage 4: Develop a plan of how these things will be achieved and break it down into action steps.

Stage 5: Work out when, and how often, your privacy policies and procedures related to the APPs will need reviewing.

Conclusion

It is vitally important for diabetes educators, as health service providers, to understand their range of obligations under Privacy Law in Australia. You are considered a health service provider if 'you provide a health service and hold health information, even if providing a health service is not your primary activity' (www.oaic.gov.au). Through knowledge of the 13 APPs under the Act, and how they can be addressed in the private practice setting, providers can minimise the likelihood of civil penalty through reported breach of the APPs.

Further information

For further information about the privacy principles please refer to the Office of the Australian Information Commissioner www.oaic.gov.au

For information on privacy for any employee information, you can also visit the Fair Work Ombudsman website at www.fairwork.gov.au

The Australian Diabetes Educators Association wants to congratulate the following members who have achieved the status of ADEA Fellows in recognition of their outstanding contribution and expertise in diabetes leadership, education and management as a Credentialled Diabetes Educator

Marita Ariola
George Barker
Jane Giles
Collette Hooper
Carolien Koreneff
Heike Krausse
Kate Marsh
Giuliana Murfet
Peta Tauchmann

Feature article

Sexual dysfunction in diabetes: Not just a man's problem

Adriana Ventura, BA, GDipPsych, DPsych(Health), MAPS
Jane Speight, MSc, PhD, CPsychol, AFBPsS

Introduction

Sexual dysfunction is a common comorbidity and long term-complication of diabetes, among both men and women.[1] Several studies have documented the prevalence and risk factors associated with sexual dysfunction among men with diabetes.[2-4] Despite women experiencing the same vascular and neurological complications thought to be instrumental in the development of sexual dysfunction among men, female sexual dysfunction (FSD) in diabetes has received considerably less attention.[5,6]

Prevalence and characteristics of female sexual dysfunction in diabetes

Although the prevalence of sexual dysfunction is lower among women than men with diabetes, it is consistently and significantly higher than in the general female population.[7,8] The prevalence of FSD in type 1 (T1D) or type 2 diabetes (T2D) is reported to be between 14-85%.[9] The large variation in prevalence rates can be accounted for by the lack of standardised definitions of sexual dysfunction in women, varying age of study participants, and the relatively small number of women included in studies.[10] Furthermore, the strictly physiological classification of SD has implications for identifying FSD, which is complex and multifactorial, combining biological, psychological and social factors.[11]

FSD in diabetes typically comprises a mixed pattern of symptoms, including a reduction or loss of sexual interest or desire, arousal or lubrication difficulties, dyspareunia (i.e. recurrent or persistent genital pain associated with sex), and loss of the ability to reach orgasm.[12] A sexual dysfunction *disorder* should only be diagnosed when symptoms cause psychological distress or interpersonal problems.[13] While there are some conflicting findings about how diabetes might affect various aspects of female sexual functioning, the following biomedical and psychosocial risk factors have been considered.

Biomedical factors

Past studies suggest that women with T2D tend to experience more sexual problems than women with T1D, potentially because of their older age, age-related factors such as menopause, greater likelihood of being overweight, and higher rates of complications, which are known biomedical risk factors for FSD.[10,14]

Specifically, vascular disease and neuropathy are diabetes-related complications that can lead to sexual dysfunction.[1] In women, vascular damage may lead to changes in the blood flow and inhibition of the engorgement of the clitoris and lubrication of the vagina during arousal, resulting in dyspareunia or decreased sexual arousal.[15] Neuropathy impacts the normal transduction of sexual stimuli and the sexual response, which may cause changes to the vaginal wall and pelvic floor dysfunction as a result of weakened muscular tone.[16] Other common comorbid endocrine disorders (e.g. polycystic ovary syndrome (PCOS)) may also contribute to FSD in diabetes.[17]

Furthermore, it has been hypothesised that hyperglycaemia, by reducing hydration of mucus membranes (including those in the vaginal tissue), may result in reduced vaginal lubrication and dyspareunia.[18] It may also lead to dyspareunia via its association with increased incidence of infections.[19] Genitourinary infections, thrush and cystitis are more common among women with diabetes and can lead to vaginal discomfort (e.g. burning, itching, dryness), often requiring sexual abstinence, thus significantly interfering with sexual activity.[19] *Hypo*glycaemia can also impair sexual function in the immediate/short term, as arousal, foreplay, intercourse and orgasm require energy and physical ability that is lacking after a hypoglycaemic event.[11] These issues can evoke psychosocial distress, contributing to further dysfunction.

Psychosocial factors

Studies consistently show psychosocial factors, including depressive symptoms and difficulty adjusting to diabetes, as well as 'low-quality' marital relationships, are stronger predictors of FSD than metabolic risk factors.[4,5,7] Depression, in particular, is well-recognised as the major predictor of FSD in diabetes.[4,5,10]

Our findings in the Diabetes MILES – Australia (Management and Impact for Long-term Empowerment and Success) study,[20] add support to past studies. Depression was significantly and independently associated with sexual dysfunction among women with T1D and women with T2D (Ventura AD, 2017, unpublished data). Our study also examined, for the first time, the relationship with anxiety and diabetes distress among these two groups. We found that anxiety and diabetes distress were significantly associated with sexual dysfunction among women with T1D and T2D (Ventura AD, 2017, unpublished data). While the effect sizes observed were modest, these findings suggest that psychological factors, not limited to depression, appear to be associated with FSD in diabetes.

Identifying female sexual dysfunction in diabetes

The Royal Australian College of General Practitioners recommends health professionals enquire about sexual problems among women with T2D on an annual basis.[21] Despite these and other similar recommendations,[6] many clinicians do not address sexual issues in consultations, potentially due personal taboos about sex,[11] or a lack of adequate training and confidence to address sexual problems.[13] It is likely that this leads to under-diagnosis and treatment.[22] Women with diabetes may also be reluctant to initiate a conversation about sex. Importantly, a compassionate clinician who is comfortable discussing sex, and who is familiar with and concerned about the woman's health, is required to initiate the conversation and conduct a thorough biopsychosocial assessment.[13] If the clinician feels uncomfortable exploring this issue, referral should be made to another clinician with an interest in managing sexual problems.[23] If the woman with diabetes feels her concerns are ignored or dismissed, she is likely to feel discouraged in seeking help, which can delay treatment/support and intensify feelings of distress. An important component of the assessment phase is the clinician's ability to provide a safe and open space for the woman to disclose her concerns, through normalising and acknowledging that the sexual problem is a relevant clinical issue.[23]

When sexual problems *are* raised by the woman with diabetes, it may be necessary to conduct a detailed interview with her to elicit in-depth information about her sexual life, practices, and satisfaction with sex life.[11] Pelvic and gynaecological examinations, as well as laboratory investigations may be necessary. Importantly, FSD does not necessarily have a strict medical origin, therefore clinicians need to be careful when characterising all FSD as organic, as this may lead to a mistaken diagnosis, further complicating medical management.[11] Even a minor episode of depression can affect a woman's sexual desire, and may be related to suboptimal diabetes self-management and the presence of other complications.[19] Therefore, it is essential to take a thorough medical history, addressing a range of biopsychosocial factors associated with FSD (Figure 1).

To assist clinicians, structured interviews and self-reported validated questionnaires for measuring FSD are available, ranging from brief screening tools to comprehensive structured questionnaires. In their review, Giraldi et al.[24] report on a variety of measures, including the Female Sexual Function Index (FSFI).[25,26] The FSFI is a 19-item questionnaire, measuring overall female sexual function. It has a cut-off score indicating symptom severity only, where higher scores indicate better sexual function. It takes approximately 15 minutes to complete, is easy to administer and score, and has sound psychometric properties. However, it has only been validated with heterosexual women with a partner, and is not diabetes-specific. Importantly, it is not a substitute for conducting a detailed sexual history,[23] thus clinical judgemental must always be exercised when evaluating sexual health. Nevertheless, FSD in diabetes is a complex issue and will likely require the assistance of appropriately trained specialists for assessment and management.[13]

Figure 1: Biopsychosocial factors to be assessed through a clinical interview

Biological	Psychological	Social
» Older age » Longer diabetes duration » Complications / comordibities (e.g. neuropathy, PCOS) » Frequent hypoglycaemia/ hyperglycaemia » Surgical history (e.g. urinary incontinence, pelvic organ prolapse) » Medications (e.g. anti-depressants, blood-pressure tablets) » Hormonal changes (e.g. menopause, pregnancy)	» History of sexual abuse or other traumatic sexual experiences » Depressive symptoms or disorder » Stress and anxiety » Diabetes-related distress » Lowered quality of life » Poor body image and self-esteem » Unresolved sexual orientation issues » Excess alcohol and other drug use	» Interpersonal relationship issues (e.g. disatisfaction with sex life, conflict in relationship) » Lack of privacy to be sexually active » Absence of relationship » Religious and/or cultural beliefs (e.g. societal taboos about sex) » Inadequate sexual education

Treatment of female sexual dysfunction in diabetes

Currently, there are no specific guidelines for the treatment of FSD in diabetes. Achieving and maintaining glycaemic levels in the recommended range, however, is regarded especially important in order to reduce the risk of genitourinary infections and avoid complications.[19] Some lifestyle interventions have shown promising results for FSD in diabetes.[27,28] For example, one recent trial where women with newly diagnosed T2D were randomised to a Mediterranean diet showed a lower-age related reduction in FSFI scores after 8 years' follow-up, as compared to those randomised to a low-fat diet.[28]

Generic guidelines for the treatment of FSD emphasise the importance of psychological therapy for addressing the underlying cause of the FSD.[13] The cause will vary depending upon the specific type of FSD. For example, a diagnosis of female orgasmic disorder is often associated with a history of trauma or abuse. Psychological therapy addressing the abuse is recommended. In another example, the most effective treatment for vaginismus (a sexual pain disorder) is cognitive behavioural therapy, specifically systematic desensitisation. This form of therapy involves deep muscle relaxation, with the goal of desensitising the woman to her fear of pain and increasing her sense of personal control so that the vaginal muscle contractions are no longer an automatic response to penetration.[13]

Conclusion

Sexual dysfunction is a relevant clinical issue for women with T1D and T2D. Studies have identified consistent associations between FSD and psychosocial factors, which are stronger predictors of FSD than metabolic risk factors. Best practice guidelines recommend routine screening for FSD in diabetes; this needs to be undertaken by a compassionate clinician who is skilled and confident to discuss this sensitive issue. A thorough biopsychosocial assessment is warranted, and validated measures can also be used to assist with diagnosis. Appropriate identification of FSD in women with diabetes will enable timely and effective care. Evidence-based guidelines for the treatment of FSD in diabetes are needed.

Acknowledgments

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Board profile

Tracey Tellam

Tracey joined ADEA as a member in 2002 and first credentialled in 2005. Currently she is the Clinical Nurse Consultant at the Ipswich Diabetes Service and has a strong focus on service delivery, the ongoing education of diabetes educators, mentoring and growing of new diabetes educators and to ensure that people with diabetes receive the right care, in the right place and in the right timeframe.

Tracey also sits on the steering committee member of the State-wide Diabetes Clinical Network in Queensland for the past eight years. This network is responsible for many excellent clinical improvements that have improved the care for people with diabetes across Queensland.

In this edition, we talk to Tracey about what sparked her interest and involvement in a leadership role in ADEA.

How long have you been a member of ADEA ?

I have been a member since 2002.

What made you join the ADEA Board?

I have been a registered nurse for a long time and I have worked in a variety of roles, with a wide range of experience. Through this time, I have realised how fortunate diabetes educators are to be supported by such a progressive association and I wanted to give back to this association and to be part of its future.

What is your role on the board?

As a board director, I provide industry knowledge relevant to the ADEA.

What is your vision for the ADEA during your term as a board member?

My vision is to help promote the role of the ADEA and the great work that is done by this association, to support the ADEA in continuing to develop and provide quality evidenced-based diabetes education and standards and to continue to move diabetes education forward in health care.

What do you do in your professional life outside your role on the board?

I hold the position of Diabetes Clinical Nurse Consultant for the Ipswich Diabetes Service, West Moreton Hospital and Health Service. I work with a dynamic team, providing diabetes care to the people of Ipswich.

The Ipswich Diabetes Service has a training position for diabetes educators, which enables them to work towards credentialing in a supportive environment.

I am also on the steering committee of the Statewide Diabetes Clinical Network for The Department of Health, Queensland. This network provides expertise, direction and advice to healthcare administrators.

What sparked your interest in diabetes education?

Many years ago, when I worked in a large emergency department, I was surprised by the lack of knowledge of diabetes management and I felt I needed to learn more about diabetes to provide better care to the individuals we were caring for.

What is something new in diabetes and education that is taking your interest at the moment?

The advancements in technology are taking my interest at the moment. I think diabetes educators and diabetes services need to keep up with the advancements of technology in the healthcare sector. We need to prove we can be effective in delivering care to people with diabetes.

What is your favourite quote?

Remember to stop and smell the roses , enjoy every day.

Original research

Healthcare professionals' perceptions of diabetes-related practice in community-based multidisciplinary teams

Marysia Jarosch, Credentialed Diabetes Educator at Gold Coast Health Chronic Disease Program
Dr Susan Slatyer, Research Fellow, Faculty of Health Sciences, Curtin University;
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Abstract

Aims: The shift in the focus of diabetes care from acute to community-based care means that a broad range of community-based health professionals is required to provide effective evidence-based care. A team-based, multidisciplinary approach is essential for effective person-centred care. This study investigates multidisciplinary health professionals' perceptions of 2 diabetes (T2D) practice in community settings.

Methods: A cross-sectional web-based survey of health professionals (HP), using the Perceptions of Diabetes Questionnaire© was conducted in one community-based health service in Australia.

Results: Eighty-three nurses and allied health professionals responded to the survey (37% response rate). The HPs valued the medical aspects of diabetes much more highly than the personal aspects. They had limited confidence in their ability to manage diabetes and improve outcomes, particularly in relation to people with diabetes (PWD) integrating recommendations into their self-care practices. Respondents appeared to confuse guidelines with health service policies or standards.

Conclusions: Respondents valued person-centred care but did not value the personal aspects of diabetes that are important to individuals living with the condition. Addressing this paradox is critical to the implementation of guidelines for the care of PWD into practice. Alignment of the value of person-centred care with practices that focus on the person is recommended as a key area of professional development.

Introduction

T2D is considered to be an epidemic, with an estimated 382 million adults (8.3%) globally living with diabetes, set to escalate to 592 million by 2040.[1] Internationally, community-based multidisciplinary health services are expanding to meet the rising numbers of people living with T2D.[2,3] Diabetes educators, nurses and other health professionals including podiatrists, social workers, dietitians and physiotherapists collaboratively support people with diabetes (PWD) to achieve personal goals associated with making lifestyle changes, managing medicines and preventing complications.[3-5] The psychological aspects of living with T2D are substantial. In the Diabetes Attitudes Wishes and Needs 2 (DAWN2) study of 8596 people with diabetes across 17 countries, 44.6% (ranging from 17.2 to 67.6% among different populations) of participants reported psychological distress.[6] Psychological distress in PWD is significantly important, yet often overlooked in acute and primary care settings.[7]

Improved psychological well-being is associated with global satisfaction with diabetes treatment, quality of chronic illness care and support, and person-centred communication.[8] Person-centred communication is part of person-centred care, where self-determination, decision-making, choice, and dignity are key elements.[9,10] Effective person-centred care is multidisciplinary team-based, coordinating strategies to optimise physical health and supportive services and involving the person's family and wider social network.[10] However, the DAWN2 study reported that the availability of person-centred services was low, with little support for PWD to be actively involved in their own care.[6] One of the significant challenges faced by PWD is the complexity of self-management within the context of co-morbid chronic conditions and medications, as well as the effects of ageing, such as deterioration in sensory and cognitive function.

Consistent with other countries, Australia has published guidelines to inform health care teams of the evidence-based management of people with T2D.[11,12] Recommendations for managing T2D in primary care settings include screening, person-centred team care, self-management education, lifestyle modification, glycaemic monitoring, cardiovascular and neuropathic risk control and optimising medicine choices.[11,12]

However, the translation of evidence-based guidelines into practice is not always straightforward.[13] Barriers to diabetes care include access to health services, challenges in providing education, and practitioner expectations of immediate lifestyle change.[5] Health care providers have reported tensions between their perceived responsibilities to provide evidence-based diabetes care recommendations and the need to respect individuals' rights to make their own health decisions.[14] In one qualitative study of community-based provider perspectives, some clinicians preferred a personalised approach to care which incorporated individuals' preferences and goals, whilst others adopted more prescriptive disease management targeted to medically defined goals.[15] In a survey of Japanese clinicians (n=275) who provide multidisciplinary diabetes care, differences in professionals' perceptions of multidisciplinary teamwork were considered a main barrier to teamwork.[16]

These findings suggest that health professionals (HPs) have an important role in engaging people with diabetes in a range of strategies to enhance psychological and physical wellbeing. However, one qualitative study of Australian health professionals (n=88) highlighted that professionals' perceptions of the challenges of living with a chronic disease, including diabetes, were often at odds with the perspectives of the individual living with the condition.[17] While individuals with diabetes and their carers saw chronic illness and treatment through a lens of complexity and personal limitations, health professionals attributed individuals' reported difficulties to poor adherence and service fragmentation.[17]

As the number of people with T2D increases and care delivery expands within the community, the role of diabetes educators is well suited to partnering with the broader health care community to improve T2D management. Understanding HPs' perceptions of T2D practice can assist in implementing T2D guidelines across the broader health care community. This study aimed to identify community-based HPs' perceptions about T2D practice in one Australian jurisdiction.

Methodology

Overview

A descriptive study design was adopted using a cross-sectional on-line survey approach. The project was conducted as a single-centre study within one multi-campus health service in southeastern Queensland, Australia. Three organisational streams within the health service were targeted in order to access a variety of health professionals providing community-based services. The selected community-based rehabilitation, mental health and aged care teams predominantly care for an adult population with chronic health conditions including T2D.

Ethical considerations

Approval was granted from the Gold Coast Hospital and Health Service Human Research Ethics Committee (15/QGC/114). Participating in the survey was voluntary and consent to participate was implied by the participants' submission of the completed questionnaire.

Participants

Convenience sampling was used to recruit a diverse range of HPs from community-based settings, where multidisciplinary team care is provided to people with chronic health conditions, including T2D. The professional disciplines included nurses, pharmacists, dietitians, occupational therapists, podiatrists, physiotherapists, exercise physiologists, speech therapists, allied health assistants, social workers and psychologists. All non-nursing disciplines are referred to as 'allied health' in this study. The target population comprised nursing (n=110) and allied health (n=115) participants. All full-time, part-time, temporary, casual and permanent staff meeting the inclusion criteria were invited to participate. Diabetes educators were excluded on the grounds that their expertise in the field may have skewed the results.

Data collection

The Perceptions of Diabetes Questionnaire: PODQ©[18] was used (permission obtained from McDowell, pers.com. 6/10/2014) to measure HPs' perceptions of T2D practice. Minor amendments to some terminology in the PODQ© were required to enhance its transferability to the Australian study context. A list of amendments is provided in Table 1. In the survey, clinical guidelines were defined as 'any of the systematically developed statements to assist practitioner and patient decisions about appropriate health care for people with T2D'. The Australian Commission on Safety and Quality in Health Care policy definition for person-centred care was used: 'care that addresses each individual respectfully, being responsive to patient preferences and values…'[19] While some of the language used in the PODQ© is not consistent with the Diabetes Australia Position Statement[20] on language, terms such as 'adhere' were left unchanged in the interest of instrument reliability and validity.

Table 1: Modifications to survey terminology

Original PODC© term	Modified term
Driving and the Department of Transport	Driving and the DVLA
Blood samples taken	Blood samples e.g. HbA_{1c}, Lipids, LFTs
Diabetes UK	Diabetes Australia
Retinal Screening Team	Retinal Screening Optometrist
Practice Diabetes Register	Removed*

*Not available in this jurisdiction

The questionnaire comprises demographic information plus four sections with a total of 25 items pertaining to: perceptions about diabetes, attitudes to T2D, and use of clinical guidelines. Five point Likert scales were used for the knowledge and attitudinal components, measuring responses to a series of statements. In this study, the statements required scales with dichotomous end points such as 'very little support/ high support', 'strongly agree/ strongly disagree', 'not a benefit/very much a benefit', and 'not a barrier/very much a barrier'. Number three was a neutral response option. There were options for open-ended responses to some items but these are not addressed in this paper. The original questionnaire is available in McDowell and colleagues' publication.[21]

The questionnaire was formatted and delivered via the online platform SurveyMonkey Inc.[22] Team leaders distributed a generic invitation email containing the survey web-link to staff, using their contact lists. Potential participants' contact details were not provided to the researcher in order to protect their confidentiality. Completed surveys contained no identifying information and were accessible only to the lead researcher. Three weeks after the initial deployment, team leaders sent a further generic email to remind staff of the survey closing date. The planned four-week survey period was extended by one week.

Data analysis

Data were descriptively analysed using the SurveyMonkey descriptive statistic functions to generate frequencies (numbers and percentages) for the whole group of respondents. The data were exported into an Excel spreadsheet and SPSS Statistics v. 22[23] was used to assess differences in frequency across response categories. Not all respondents answered all questions. This was managed by calculating percentages using responses for each item rather than for the total number of participants.

Attitudinal responses were condensed to compare the percentage of responses at one end of the scale (points 1 and 2) against the percentage at points at the other end (points 4 and 5) to evaluate whether the respondents' views were more positive or negative. The neutral responses were not counted in the analysis. The data analysis was similar to that used in the previous study.[21] The chi-square test for goodness of fit was applied for analysis of the single categorical variables (health professionals' responses) to test associations between responses to different questions. The results were also analysed by professional group (nurses vs. allied health) but given the small numbers, the results were not statistically valid and therefore are not reported here.

Results

Of the 225 HPs invited to complete the web-based questionnaire, 83 (37%) completed the survey. Of these, 71 provided demographic information, with 25 responding as nurses and 46 as a variety of other health professions. Respondents were predominantly female (83%) and had more than five years experience (86%). Table 2 provides an overview of the participants' characteristics.

Table 2: Demographic characteristics (n=71)

Characteristics	Nurses (n=25) n (%)	Other health professionals (n=46) n (%)
Gender		
Male	2 (8)	10 (22)
Female	23 (92)	36 (78)
Years of experience		
≤ 5	2 (8)	8 (17)
6-10	7 (28)	12 (26)
>10	16 (64)	26 (57)
Postgraduate qualifications		
Yes	14 (56)	21 (46)
No	11 (44)	25 (54)
Diabetes–specific education*		
None	1 (4)	3 (6)
Workshops	20 (80)	20 (43)
Online learning	15 (62)	23 (53)
University course	0 (0)	8 (17)
Other diabetes education	6 (24)	14 (30)

*May have attended multiple education sessions

Perceptions about diabetes

All respondents considered T2D a serious condition regardless of treatment regimen, with the condition perceived to increase in severity according to treatment type (diet alone, tablets or insulin). A high percentage of respondents rated the fasting blood glucose test as important (94%). In regard to ongoing education and advice, there was high respondent agreement about the importance of education and advice regarding diet (99%), hypoglycaemia (95%), psychological aspects (94%), oral medications (92%), insulin (93%), blood glucose monitoring (92%), foot care (95%), and exercise (95%). Less importance was assigned to more personal aspects of education and advice such as contraception (22%), sexual function (12%), employment (12%) and driving (12%). These community-based HPs appear to value the medical aspects of diabetes management much more than the personal aspects that can be very important to individuals with diabetes, and person-centred care.

Attitudes to T2D

The findings relevant to attitudes to T2D are described in Table 3. Respondents expressed varying levels of confidence in their ability to manage diabetes. Almost half reported that their therapeutic actions or advice improve outcomes, indicating that another half may have doubts about their effectiveness. Most respondents agreed that a team approach in diabetes management was required. There was very high agreement that person-centred care can improve adherence to care. Almost half tended to agree that diabetes is difficult to treat because people do not adopt recommendations into their self-care practices, however this was not significant. These findings suggest that HPs in the community setting have limited confidence in their ability to manage diabetes and their ability to improve outcomes, particularly in relation to individuals with diabetes taking on recommended actions or advice.

Table 3: Attitudes to T2D care

	Likert rating: Number (%)						÷2 goodness of fit		
	1 = very confident to 5 = not confident								
	1	**2**	**3**	**4**	**5**	**N^**	**÷2**	**df**	**p**
Confidence in my management of patients	7 (9)	26 (35)	19 (26)	17 (23)	5 (7)	55	2.10	1	0.138
	1 = strongly agree to 5 = strongly disagree								
	1	**2**	**3**	**4**	**5**	**N^**	**÷2**	**df**	**p**
My therapeutic actions/advice improve diabetes outcomes	11 (15)	25 (34)	25 (34)	11 (15)	2 (3)	49	10.80	1	0.001*
Difficult to treat because PWD do not adhere to recommendations	10 (14)	24 (32)	19 (26)	13 (18)	8 (11)	55	3.073	1	0.080
I have enough training	10 (14)	17 (23)	24 (32)	19 (26)	4 (5)	50	0.32	1	0.572
I have adequate time & resources	5 (7)	19 (26)	28 (38)	16 (22)	6 (8)	46	0.087	1	0.768
Diabetes care requires a team approach	58 (78)	4 (5)	3 (4)	2 (3)	7 (9)	71	10.80	1	0.001*
Patient-centred care can improve adherence to care	60 (81)	3 (4)	2(3)	2(3)	7(9)	72	40.50	1	0.001*

^ Number included in the analysis; *P-value statistically significant

Use of clinical guidelines

Table 4 outlines responses to items concerning the use of clinical guidelines. Respondents indicated that the use of guidelines was highly supported by the organisation. Clinical guidelines were also highly rated in relation to 'keeping up to date with research findings', 'providing access to research findings' and 'saves time reading research papers'. Respondents were unanimous in their agreement that the use of guidelines benefits the application of research in practice and aids clinical decision-making.

Despite the perceived benefits, respondents identified several barriers to using clinical guidelines in practice (see Table 5). Specifically, they felt strongly that lack of time to 'read or access computer' and 'implement new ideas on the job' were barriers. Respondents felt that 'facilities are inadequate for implementation' and 'organisation will not cooperate fully' were not barriers, corresponding with the perception that organisational support was ranked highly. Respondents also ranked 'little understanding of statistics' as not being a barrier to implementing the guidelines. These findings indicate that HPs may be confusing guidelines with health service policies or national quality and safety standards.

Discussion

The predicted worldwide T2D epidemic requires intensive community-based solutions to care. In the current study, we were interested in community-based HPs' perceptions about T2D practice. Respondents expressed a range of confidence about their management of T2D, with most reporting an understanding of contemporary clinical guidelines for care. Clinicians who feel more confident about T2D management are more likely to be confident that their care and advice has resulted in improved patient outcomes.[21]

However, although respondents reported feeling confident, almost half found it difficult to support individuals who were perceived to not integrate recommended therapies into their self-care strategies. This finding is consistent with other

Table 4: Use of clinical guidelines

	Likert rating: Number (%)						÷^{2} goodness of fit		
	1 = very little support, to 5 = very high support								
	1	**2**	**3**	**4**	**5**	**N^**	÷^{2}	**df**	***p***
Organisational support for use of guidelines	4 (5)	4 (5)	14 (20)	29 (40)	22 (30)	59	31.339	1	<0.001*
	1 = strongly agree, to 5 = strongly disagree								
	1	**2**	**3**	**4**	**5**	**N^**			
Guidelines effect on patient centred care	5 (7)	18 (25)	21 (29)	20 (27)	9 (12)	52	0.692	1	0.405
	1 = not a benefit, to 5 = very much a benefit								
	1	**2**	**3**	**4**	**5**	**N^**			
Keeps you up to date with research findings	1 (1)	2 (3)	3 (4)	30 (41)	37 (51)	70	58.514	1	<0.001*
Access to research	1 (1)	3 (4)	5 (7)	32 (44)	31 (43)	66	51.955	1	<0.001*
Saves time reading research papers	0 (0)	1 (1)	8 (12)	33 (46)	29 (41)	63	59.063	1	<0.001*
Shows how to apply research in practice	0 (0)	0 (0)	3 (4)	33 (45)	37 (51)	70	na	na	na
An aid to clinical decision-making **P*-value significant	0 (0)	0 (0)	5 (7)	26 (36)	42 (57)	68	na	na	na

Table 5: Barriers to use of clinical guidelines

	Likert rating: number (%)						÷^{2} goodness of fit		
	1 = not a barrier, to 5 = very much a barrier								
	1	**2**	**3**	**4**	**5**	**N^**	÷^{2}	**df**	***p***
No time to read or access computer	10 (14)	8 (11)	11 (15)	31 (42)	13 (18)	62	10.90	1	0.001*
Relevant literature not accessible	12 (16)	20 (27)	21 (29)	13 (18)	7 (10)	52	2.77	1	0.10
Lack of time to implement new ideas on the job	3 (4)	7 (10)	23 (31)	24 (33)	16 (22)	50	18.00	1	<0.001*
Facilities are inadequate for implementation	13 (18)	18 (25)	26 (36)	15 (20)	1 (1)	47	4.79	1	0.029*
Organisation will not cooperate fully	16 (22)	23 (32)	23 (31)	8 (11)	3 (4)	50	15.68	1	<0.001*
Ability to evaluate quality of research	10 (14)	18 (25)	23 (31)	18 (25)	4 (5)	50	.720	1	0.396
Little understanding of statistics	17 (23)	18 (25)	21 (29)	16 (22)	1 (1)	52	6.23	1	0.013*
Adverse effect on patient relationship	22 (30)	20 (28)	26 (36)	4 (5)	1 (1)	47	29.12	1	<0.001*

^ Number included in the analysis; *P-value statistically significant studies where healthcare professionals struggle with individuals' perceived lack of adherence to their recommendations.[24,25] The HPs in this study rated clinical aspects of care as highly important and the personal aspects as much less important, raising concerns about their ability to make recommendations about lifestyle change. While the provision of information and motivational support for lifestyle change is considered to be part of the HP role in primary care settings,[24] the requirement to learn more about the person's life situations and values is often not attended due to time constraints associated with busy schedules[24] and lack of skills in lifestyle counselling.[24,25] Further investigation into the barriers to valuing individuals' personal matters as part of T2D practice in the community is required.

A paradox emerges between the respondents' ascriptions of low value to personal aspects of care and their view of high value for 'person-centred care improves adherence'. Adopting a more person-centred approach with a focus on overall wellbeing, may improve global satisfaction with diabetes treatment, quality of chronic illness care and support and person-centred communication.[8,9] The DAWN2 study demonstrates that psychological distress is a significant issue for people living with diabetes and is elevated in those people taking medication for their disease.[6] It is established that self-management is linked to glycaemic control,[8, 26, 27] and therefore health professionals need well-developed strategies to support effective diabetes self-management. Continuing professional education must focus on how HPs can support individuals as they negotiate the challenges associated with the clinical prescriptions for T2D.

In this study, there was agreement among respondents that multidisciplinary teams are most appropriate to provide diabetes care. This is congruent with studies acknowledging the benefits of multidisciplinary team care in meeting the complex health needs of individuals with diabetes and potentially improving clinical outcomes.[3,4,28]

The respondents valued organisational support for their practice and did not perceive the organisation or facilities as a barrier to implementing the guidelines. However, they did indicate that inadequate time and resources to provide diabetes-related care was considered a barrier to implementing the guidelines. Further investigation into the nature of nursing and allied health patient consultations and exploration of opportunities to collaborate across professions, is required to further promote multidisciplinary team practice.

In summary, the aim of this study was to identify community-based HPs' perceptions about T2D practice. The alignment of the value of person-centred care with practices that focus on 'the person' is recommended as a key area for professional education and development. The value of the multidisciplinary team can be translated to interprofessional approaches to continuing education. Clinicians could learn from and about the contributions of other team members, thereby enhancing the team approach, fostering mutual respect, collaboration and high quality care in the workplace.[29] Continued professional education should focus on strategies for person-centredness and balancing personal and clinical considerations in care.

Limitations

While the sample size may not have been representative of community-based health professionals more generally, the response rate of 37% is comparable to other surveys using similar methodology.[21,30] Convenience sampling with voluntary participation can be problematic and contribute to bias, with the respondents being the more motivated clinicians with a particular interest and knowledge of diabetes compared to non-respondents. It is acknowledged that the survey tool (PODQ©) developed in 2007,[18] may not meticulously reflect the current framework for diabetes care. However the tool framed questions about the importance that respondents attached to essential areas of diabetes care rather than current targets, enhancing its transferability to other settings. Following a review of similar diabetes attitudes surveys, the PODQ©[18] with its established validity and reliability was adopted as the best fit for the target population of multidisciplinary teams providing diabetes community-based care.

The definition of clinical guidelines was intentionally vague, consistent with the original survey. It is likely that the HPs in this study have not read guidelines specifically for the care of people with T2D, nor know where to access them. Future studies using the PODQ© should consider specifying the clinical guidelines in use for the jurisdiction.

Conclusion

Diabetes educators, general practitioners and multidisciplinary community-based teams are required to work together to meet the growing challenge associated with the global rise of people with T2D. In order to implement the guidelines for T2D care, HPs in the community will need further support to manage the personal, as well as clinical, aspects of T2D management. While HPs value being person-centred, future professional development programs should focus on how to ***do*** person-centred T2D care. In this study, the Perceptions of Diabetes Questionnaire (PODQ©),[18] was found to provide useful information about the perceptions of members of community-based healthcare teams in one area of Australia. It is recommended as a relatively quick and easy method to collect information about diabetes related perceptions in geographically distributed services, such as those found in the community.

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Conquering complications – a personal perspective

Rowena Dowling

My life is complicated. My life is complex. My life is challenging, and so I strive to live life with courage and determination. I have poly-glandular autoimmune insufficiency syndrome. I have type 1 diabetes (T1D), and I am blind.

Herewith is my account of managing the various challenges of diabetes whilst living with a disability.

I was born blind in one eye but this was never a disability as I had good vision in my other eye. Until I was diagnosed with glaucoma in my mid 20's and became blind from post-operative eye infection complications, surgically-acquired cataract, retinal detachments, and progressive vision loss from diabetic retinopathy.

I was fortunate to have low vision for many years but have been totally blind for around 20 years.

I have a complex medical history and my autoimmune conditions include being born with vitiligo, which is a lack of pigmentation in the skin. In my early teenage years, I was diagnosed with thyrotoxicosis, and in my mid 30's was diagnosed with diabetes.

At the time I was working as a Registered Nurse (RN). While at work, I remember receiving a phone call from my GP saying my blood glucose level (BGL) was elevated on a routine blood test and asking me to come in for a glucose tolerance test.

A few days later, my GP called me again at work to tell me that I had diabetes. We were both shocked. Like a true professional I had ignored the symptoms of diabetes for many months, as I was far too busy caring for my patient's health, rather than considering my own health care needs.

Because of my age it was presumed that I had type 2 diabetes (T2D) however months later, when diet, exercise and oral medication had little to no effect on my BGLs, I was referred to an Endocrinologist, who after taking a thorough medical history, and further blood tests, confirmed that I had T1D, as part of a complex autoimmune syndrome.

I recall the first and foremost challenge of learning to live with T1D: the struggle that I had with injecting myself with insulin. As a RN I had given many people injections but when it came to injecting myself, I was highly anxious and unable to find the courage to administer the insulin. It took counselling and every screaming shred of determination and resolve for me to actually inject myself, which seems an absurd reaction for a healthcare professional, for whom injecting medications is a routine part of the job.

Due to my vision loss it became difficult for me to reliably monitor my BGLs at home and I became complacent with self-managing my diabetes. I am sure that this complacency caused many diabetes specialists to turn pale with anxiety when contemplating my five doses of insulin each day with no blood glucose (BG) monitoring.

Checking my BG remains challenging. Although I have an accessible talking BG meter, which verbally provides the BG results to me, this does not solve the frustration of being unable to obtain a drop of blood and unable to transfer the blood sample from fingertip to test strip.

I arranged to have continuous glucose monitoring (CGM) for several weeks before seeing my endocrinologist, to provide results for adjusting insulin as required. During one of these CGM sessions, it became apparent that I was experiencing frequent and severe hypoglycaemic episodes, with no awareness and no symptoms of hypoglycaemia.

This prompted my diabetes educator to develop some innovative solutions to help me manage my diabetes independently. With the use of a BG meter that emits audible beeps for the BG result, and a finger guide to provide tactile indication of where to place my finger to get the drop of blood on the test strip, I was suddenly able to independently monitor my BGLs. I still recall with pleasure the excitement of this achievement, and an overwhelming sense of emotion, which made me laugh and cry at the same time!

My most memorable incident due to hypo unawareness was travelling by train with my guide dog, Faith, both myself and Faith fell between the platform and the train while trying to board. Faith fell onto the tracks, and I fell with my legs between the train and the platform, and broke my foot in the fall. I think the station staff who came to our assistance thought I was drunk or on drugs, as I was unsteady on my feet, and incoherent with speech. It did not occur to me until later that this accident was due to an undetected hypoglycaemic episode.

My diabetes educator later suggested that I consider having my guide dog trained as a Medical Alert Dog, to detect and alert me to hypoglycaemic episodes. Thus, I contacted *Paws for Diabetics*, which is a national charitable organisation that provides and trains Diabetes Alert Dogs for people with T1D.

So Faith, my a five year old black Labrador, now serves as both my guide dog and my assistance dog, enabling me to get out and about in the community confidently and independently. Since Faith has learned to reliably alert me to changes in my BGLs, I have not needed admission to hospital for diabetes management.

Recent research results from Cambridge University has identified that Diabetic Alert Dogs can detect the level of isoprene, a chemical compound in the breath, which rises as BGLs fall. These dogs can be trained to reliably detect and alert their handler to these changes.

As a current committee member for *Paws for Diabetics*, I have seen the difference that these dogs make to people's lives. A Diabetes Alert Dog provides a potentially life-saving service. These dogs are trained to alert their owner before they become hypoglycaemic, so that the episode can be treated, avoiding the potential complications of undetected hypoglycaemia.

One aspect of diabetes management that I am passionate about, is that many medical devices are not accessible for people who are blind or vision impaired. Diabetes often causes vision loss, and many people may struggle to read the digital display on diabetes devices, such as BG meters, insulin pumps and CGM devices. I would advocate that accessibility should not be an afterthought when manufacturing these devices, but that accessibility should be built into all devices from an early stage of manufacture. This refers to the inclusion of synthetic speech software, which makes the device talk, and enables a blind or vision impaired person to read and respond to the menus and settings on the device.

Research confirms that diabetes management and health care outcomes are greatly improved when people with diabetes have access to CGM and insulin pumps. I would welcome the opportunity to have complete independence with monitoring and managing my diabetes, with the use of accessible technology.

In conclusion, I take this opportunity to sincerely thank the diabetes healthcare team at Hornsby Hospital in Sydney for their professional and compassionate care. In particular many thanks to the diabetes educators who provide constant support and encouragement and inspire me to maintain the motivation to manage my diabetes, and thus conquer the complications of this chronic condition.

Original research

Ambulatory glucose profile versus handwritten blood glucose diary—results of a survey of registered diabetes specialists in australia

Neale Cohen, MBBS, FRACP

Introduction

When complemented with HbA_1c testing, self-monitoring of blood glucose (SMBG) has been proven effective for those with insulin-treated diabetes.[1] Ongoing self-monitoring of blood glucose (SMBG) is recommended in these individuals who have been trained to appropriately adjust their insulin dose, according to national and international guidelines for the treatment of diabetes.[2,3] Recommendations advise targeting SMBG levels of 6–8 mmol/L fasting and pre-prandial, and 6–10 mmol/L two hours postprandial.[2] The purpose of SMBG is to help avoid hypoglycaemia, regularly assess variations in blood glucose levels owing to changes in lifestyle or medications, and track the effects of foods on postprandial glycaemia and the changes in blood glucose levels during illness.[3]

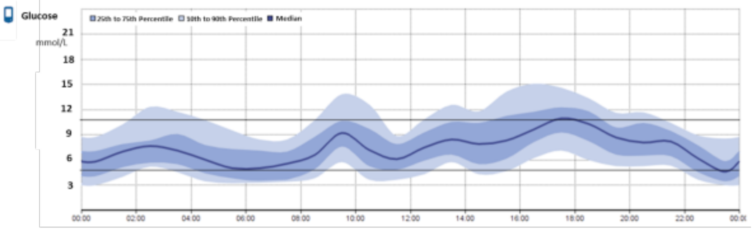
While the frequency of monitoring should reflect individual circumstances and therapeutic goals, even increased SMBG may not prevent hyperglycaemia or hypoglycaemia.[4] Nocturnal hypoglycaemia poses a particular challenge and often goes undetected as the necessity of disturbing one's sleep to conduct SMBG is not always practical or convenient, and ultimately reduces quality of life.[5] As a result, the recommended versus actual frequency of measurements is rarely the same.[6,7] The inconvenience and burden of using test strips and monitoring devices, the pain from the finger prick required to collect blood, the lack of discretion of the procedure, and time involved are all reasons cited for this inconsistency.[8] Ultimately, this can lead to delays or failure to make required therapy adjustments. The resultant gaps in documentation of blood glucose levels also make it very difficult for physicians to accurately assess an individuals' risk of hypoglycaemia.

Continuous glucose monitoring (CGM) is used in some cases to offset gaps in SMBG, and involves measuring the glucose concentration in the interstitial fluid (ISF) of the subcutaneous adipose tissue at regular intervals by means of a sensor and storing this data.[9] However, data evaluation is time-consuming and data interpretation requires considerable experience on the part of the attending diabetes team, owing to the wide variety of programs available for data evaluation and lack of an assigned standard.[10]

Flash Glucose Monitoring (FGM) represents a recent advance for people with diabetes and physicians. A small sensor filament continually measures the glucose concentration in the ISF of the upper arm, storing a reading every 15 minutes over a period of 8 hours. The values are then accessed by holding the reader over the sensor, thereby scanning the data to the reader and displaying the glucose level at that moment, the glucose pattern over the previous 8 hours, and the momentary glucose trend. It is, therefore, possible to continuously record glucose data if the sensor is regularly scanned at least once every 8 hours. The sensor can be worn for up to 14 days.[11]

As an alternative to handwritten documentation of blood glucose levels, the Ambulatory Glucose Profile (AGP) is a software product that enables evaluation of continuous glucose data via electronic documentation. Developed by Mazze, AGP tracks continuous glucose measurements over several days (at least five days) and displays them in the form of one standard day as percentile graphs (Fig 1), in contrast to the usual 'spaghetti plot' in which a series of standard days are grouped on top of each other. By revealing the median, the 25th to 75th percentiles, and the 10th to 90th percentiles, the percentile graphs provide an overall snapshot allowing for detection of patterns in the glucose curves.[12] The AGP essentially filters large quantities of data from the continuous glucose measurements into a standardised and easily understood diagram.[10]

Figure 1: Example of an Ambulatory Glucose Profile (AGP).



The median line (at center of profile), indicates the mean glucose value according to time of day. Fifty percent of all measured glucose values are captured within the 25th to 75th percentiles, with 80% falling between the 10th and 90th percentiles.

To gauge the practicality and likelihood of physician adoption of this method in daily practice, an online survey was targeted to registered diabetes specialists in Australia. The survey included an experimental part featuring two case histories in which participants were asked to evaluate the benefits of the AGP graph for monitoring, analysing glycaemic control, and implementing the required therapeutic adjustments, compared to the conventional handwritten documentation of blood glucose values in a diary.

Methods

Eighty diabetes specialists with practices registered in Australia participated in this 20-minute, 47-question online survey. Diabetes specialists who had been registered with their own practice for at least two years and had adjusted at least five patients per quarter to an intensive insulin therapy regimen were eligible to participate. The participants were recruited from a validated panel of medical doctors.

The 3 objectives of the survey were to:

1. Identify and rate the software tools currently used in practice for evaluating glucose data. Physicians were asked 23 questions about how their patients documented their glucose values and how the physicians themselves analysed these values in their diabetes practices.
2. Assess two real-life case histories with glucose values documented either by an AGP or a conventional handwritten diary (Fig 2a, b). The physicians were asked to evaluate statements regarding each of the cases as well as proposed treatment adjustments by indicating 'right' or 'wrong,' 'makes sense,' or 'doesn't make sense.' Their answers were then compared with the consensus opinion of an expert panel. The survey also evaluated which documentation method allowed for a faster assessment by the diabetes specialists.
3. Subjectively evaluate each form of documentation/presentation of glucose data.

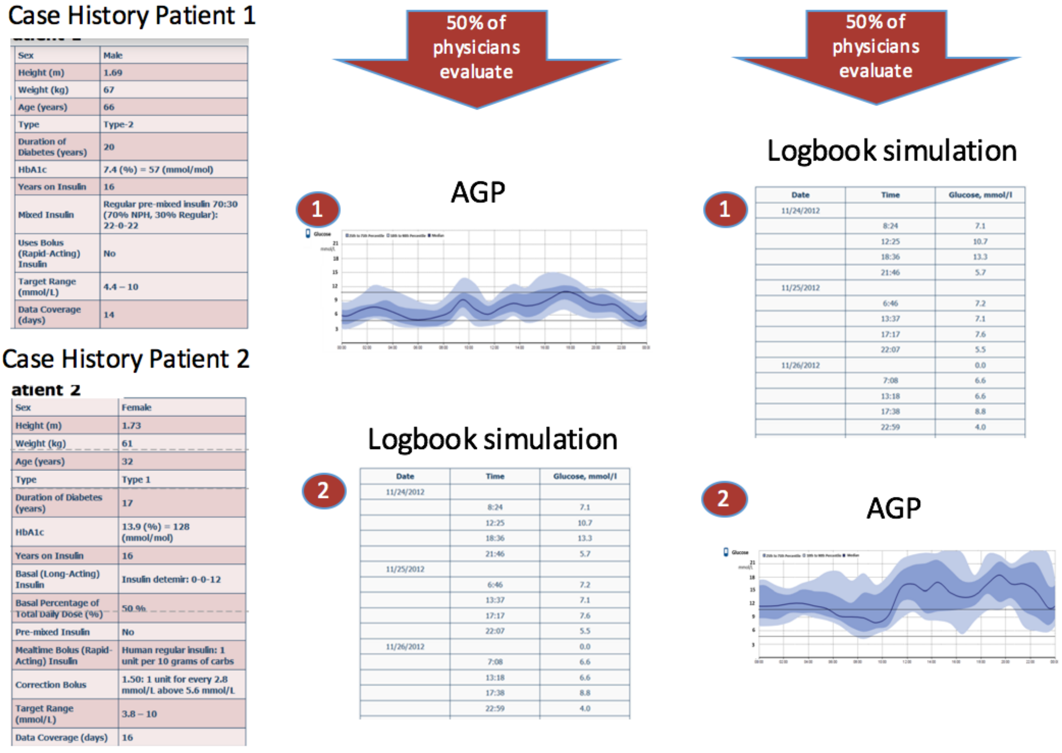
For the assessment of each case history, conventional handwritten blood glucose diaries were generated from available CGM by means of simulation software developed by Abbott. The simulated diaries included four daily blood glucose measurements, randomly selected by the simulation software from four defined time intervals (6:00 AM-9:00 AM, 11:00 AM-2:00 PM, 5:00 PM-08:00 PM, and 9:00 PM- 11:00 PM) (Fig 3).

The participating physicians were divided into two groups (Fig 2) in order to achieve 1:1 randomisation and ensure each had either one handwritten diary or one AGP per case history, but not both forms of documentation for each case. Participants who evaluated a case history by means of the AGP received a brief description of the basic concept beforehand. The data exhibited in the AGP profiles and handwritten diaries were derived over a total of 14-16 days. The survey included five statements regarding irregularities in the glucose profiles and four recommendations for potential treatment adjustments regarding the two case histories, to which the respondents could agree or disagree, or answer with "don't know." The answers were compared with the consensus opinion of the panel of experts (described below) and the agreement rates were determined. The amount of time taken to perform the assessment of the case histories was automatically recorded and stored for later evaluation. The Chi-square test (Fisher's exact test) was used to analyse quantitative parameters ('right' or 'wrong' answers and the processing time). All answers were statistically evaluated and the findings were presented as diagrams.

Expert consensus response

Five experts who were members of the Abbott Diabetes Care Advisory Board assessed both case histories, a questionnaire containing correct and incorrect statements about irregularities in

Figure 2: Case Studies 1 and 2 with evaluation



Case History Patient 1

Sex	Male
Height (m)	1.69
Weight (kg)	67
Age (years)	66
Type	Type-2
Duration of Diabetes (years)	20
HbA1c	7.4 (%) = 57 (mmol/mol)
Years on Insulin	16
Mixed Insulin	Regular pre-mixed insulin 70:30 (70% NPH, 30% Regular): 22-0-22
Uses Bolus (Rapid-Acting) Insulin	No
Target Range (mmol/L)	4.4 – 10
Data Coverage (days)	14

Case History Patient 2

Sex	Female
Height (m)	1.73
Weight (kg)	61
Age (years)	32
Type	Type 1
Duration of Diabetes (years)	17
HbA1c	13.9 (%) = 128 (mmol/mol)
Years on Insulin	16
Basal (Long-Acting) Insulin	Insulin detemir: 0-0-12
Basal Percentage of Total Daily Dose (%)	50 %
Pre-mixed Insulin	No
Mealtime Bolus (Rapid-Acting) Insulin	Human regular insulin: 1 unit per 10 grams of carbs
Correction Bolus	1.50: 1 unit for every 2.8 mmol/L above 5.6 mmol/L
Target Range (mmol/L)	3.8 – 10
Data Coverage (days)	16

Logbook simulation

Date	Time	Glucose, mmol/l
11/24/2012		
	8:24	7.1
	12:25	10.7
	18:36	13.3
	21:46	5.7
11/25/2012		
	6:46	7.2
	13:37	7.1
	17:17	7.6
	22:07	5.5
11/26/2012		0.0
	7:08	6.6
	13:18	6.6
	17:38	8.8
	22:59	4.0

Logbook simulation

Date	Time	Glucose, mmol/l
11/24/2012		
	8:24	7.1
	12:25	10.7
	18:36	13.3
	21:46	5.7
11/25/2012		
	6:46	7.2
	13:37	7.1
	17:17	7.6
	22:07	5.5
11/26/2012		0.0
	7:08	6.6
	13:18	6.6
	17:38	8.8
	22:59	4.0

glucose profiles, and a series of questions with either sensible or inappropriate recommendations regarding treatment adjustment. The experts' responses to statements and treatment adjustment recommendations were subsequently compared and, in each case, the most chosen response was selected and used for tallying the scores for the 'correct' answers and for the treatment adjustments which 'made sense.'

Results

The analysis included the responses of all 80 physicians surveyed. Seven cases were excluded owing to suspected interruption of the survey.

Documentation and analysis of blood glucose values in practice from the perspective of the participants

The study began with a question asking how individuals with insulin-treated diabetes document their blood glucose levels at home, whether they present this documentation to their physicians, and how easily these methods of documentation are analysed in actual practice. Eighty-one percent of the physicians responded that documentation of blood glucose values is relevant for optimal treatment outcomes during both clinic appointments and individual daily treatment adjustments at home. Yet only 67% of their insulin-treated individuals provide them with documentation of their glucose values. Nearly half of these individuals (47%) track glucose values with a handwritten diary, 17% use a blood glucose meter with data output to be scanned (without further diabetes software analysis) during the physician visit, 16% bring glucose value data in an electronic format to be analysed with diabetes software, 8% track the values individually (e.g. in an excel table), and only 5% track data with a continuous glucose monitoring (CGM) device.

Overall, physicians did not find handwritten documented data useful, with only 28% responding that they were completely satisfied or very satisfied with the diary entries. In contrast, CGM data was rated the highest, followed by the individuals' own data printout from diabetes software, with 86% and 53% either completely or very satisfied, respectively.

The majority of respondents (53%) had instituted at least one electronic program for blood glucose level analysis in their practice. On average, four programs are used, most commonly including Accu-Chek 360° (Roche), Care-Link (Medtronic), FreeStyle Auto Assist (Abbott), and Accu-Chek Smart Rx (Roche). Nearly half of respondents using diabetes software are satisfied with the quality of the data support in optimising treatment outcomes for individual therapy recommendations and adjustments (48%), with 38% very satisfied and 5% completely satisfied. In general, most diabetes specialists agree that diabetes software analysis provides useful support, with the benefit of use surpassing the cost of installation and training.

More than half (55%) of the diabetes specialists interviewed presently use CGM in their practices. Nearly 20% use it once a week, while others use CGM more than two to three times a month. Reasons for not using CGM mainly include lack of appropriate equipment (33%), having little or no experience (22%), and cost or lack of reimbursement (19%).

Experimental part: assessment of case studies based on the AGP or the handwritten diary record

For the second half of the survey, physicians assessed two patient case histories (Fig 2). Fourty diabetes specialists received either an AGP profile with Case History 1 and a handwritten diary with Case History 2, or vice versa.

The proportion of responses to irregularities in the glucose profiles, which are consistent with those of the experts, was significantly higher if the case histories were assessed on the basis of the AGP compared with the hand written diary. For Case History 1 and 2, almost all of the respondents indicated they were able to sufficiently assess the case history based on the AGP profile (95% and 90%, respectively), compared with only 50% of respondents using the handwritten diary data (for both case histories). The diabetes specialists reviewed the following statements on therapy adjustments (AGP vs handwritten diary) for the individual cases:

Case History 1:

- Selecting and adhering to a late meal could counteract the increased likelihood of hypoglycaemia occurring in the first half of the night* (agree: 48% vs 30%).
- The evening dose of regular premixed insulin should be reduced and the morning dose should be increased to compensate, e.g. 23-0-20* (agree: 90% vs 78%).
- Since the individual's glucose values are above the target area, the insulin dose should be increased altogether# (oppose: 63% vs 68%).
- Due to the elevated fasting levels in the morning, the evening pre-mixed insulin dose should be increased# (oppose: 80% vs 75%).

Case History 2:

- An additional morning dose of basal insulin (insulin detemir) could help improve overall treatment* (agree: 80% vs 80%).
- The ability of the person to estimate carbohydrate content in the diet should be verified and, if necessary, should be subject to renewed training* (agree: 100% vs 98%).
- Assessment of basal insulin needs during the day could help optimise basal insulin coverage* (agree: 90% vs 95%).
- In the first step, the person's hypoglycaemic episodes may be lowered by reducing the basal insulin component in the daily dose# (oppose: 73% vs 55%).

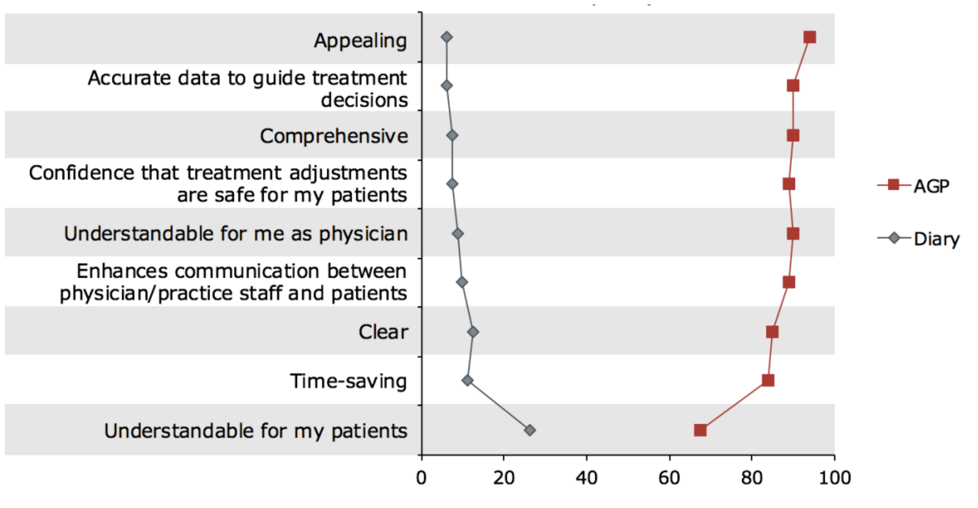
When evaluating consensus statements for both case histories, physicians consulting the AGP were more in agreement with the experts' consensus opinion than physicians consulting the handwritten diary: 88% vs 64%, respectively (*p*=0.001). When evaluating therapy adjustment recommendations for both case histories, there was no difference in the proportion of answers in agreement with consensus opinion between those using the AGP versus the handwritten diary: 78% vs 72%, respectively (*p*=0.584).

Looking at all the physicians' overall responses regarding the consensus statements and therapy adjustments, AGP fared significantly better (responses in agreement with the consensus: 83% vs 68%; *p*=0.026). Those diabetes specialists using the AGP needed significantly less time to process the case histories than those referring to the handwritten diary: 170 seconds vs 204 seconds (*p*=0.032).

Comparison of AGP and handwritten diary record with regard to handling and time consumed

Following the case history assessments, the diabetes specialists were asked to choose which form of data presentation they found more appealing: the AGP or the handwritten diary. A total of 90% of physicians surveyed preferred the data in the AGP format. For 39%, this preference was due to the clear presentation of the data. Consequently, 91% and 90% of physicians found the analysis and interpretation of the data and a corresponding treatment adjustment easy with the AGP, respectively. In contrast, 29% and 27% found the handwritten diary easy in these regards, respectively. Moreover, for 82% of physicians, analysis and treatment recommendations were done in a short or very short time with the AGP vs 23% with the handwritten diary.

Figure 3: Answers to the question, "In your opinion, to which documentation and analysis method do the following adjectives/attributes best apply?" The qualities could be assigned to either the AGP, the handwritten diary, or none of these.

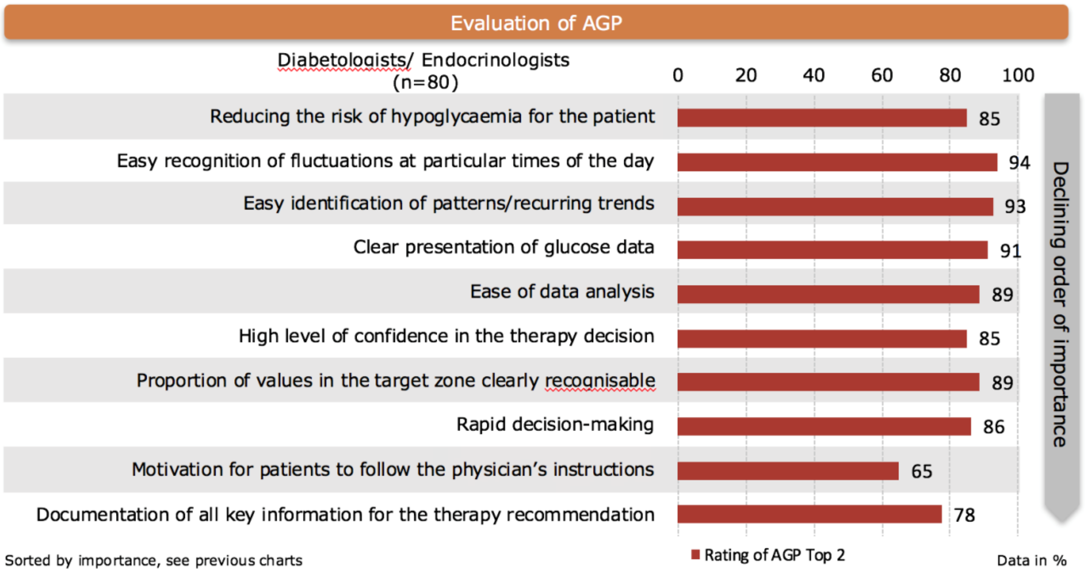


Sorted by size of the difference

Data in %

In general, the AGP is superior to the handwritten diary in all aspects assessed (Fig 3). A considerable majority of the physicians questioned agree that the AGP can support physicians in all aspects of diabetes treatment (Fig 4), including reducing risk of hypoglycaemia, promoting easy recognition of blood glucose fluctuations and easy identification of patterns and recurring trends in glucose values, and clear display of glucose values. Additionally, the majority of physicians agree the AGP promotes confidence in therapy choices and rapid decision-making, as well as encouraging patient engagement.

Figure 4: Proportion of agreement with respect to the statements mentioned, listed according to their relevance for the diabetes specialist. Please indicate how far you agree with the following statements.



Sorted by importance, see previous charts

Top 2 = (5) + (4) on 5-point scale; 1=do not agree at all; 5=agree completely

Data in %

Discussion

Handwritten diary entries have been the established standard for documenting SMGB values in diabetes care for years. The development of blood glucose meters with electronic storage capability and various software for the reading and analysis of the data output have not curbed the popular use of handwritten documentation of blood glucose values.

The results of this online survey of 80 diabetes specialists in Australia corroborated results of a similar survey given to 80 office-based diabetologists in Germany.[13] As with the German survey, the Australian survey results demonstrated that a large majority (67%) of those with insulin-treated diabetes bring some form of documentation to their clinic appointments. A handwritten diary is the most commonly used documentation method for just under a half (47%) of individuals, although less than a third (28%) of physicians are completely or very satisfied with this form of documentation.

Generating a valid AGP profile ideally requires the continuous measurement of glucose data over several days, and is a form of displaying and analysing blood glucose levels which the survey participants consistently rated positively. In particularly, the decision-making process was seen as faster with the AGP vs the handwritten diary. Despite these high ratings, just over half (55%) of the diabetes specialists surveyed use CGM in their own practice, but usually no more than 2 to 3 times per month.

Many of the diabetes specialists had no experience with the AGP until our survey. However, after a short tutorial on the AGP concept, they were prepared enough, within the scope of this online evaluation, to assess both case histories with ease. Interestingly, the diabetes specialists worked more rapidly with the AGP than with the handwritten diaries, a form of documentation with which they were very familiar.

Indeed, the AGP concept appeared to be easily understood and useful for most of the participants. Unlike the German survey, significant differences were observed in favor of AGP vs handwritten diary documentation in terms of greater agreement with expert consensus opinion, and rapidity of processing case histories. However, while AGP gained a higher proportion of answers in agreement with the consensus opinion regarding therapy adjustments compared with handwritten documentation, the difference was not significant, as was the case in the German study. In an attempt to explain these results, it may be argued that personal experience and preferences for adjustment of therapy may play a far greater role and are crucial for decision-making.

For the diabetes specialists questioned, the ability to reduce hypoglycaemia risk and recognise patterns in the glucose curves were of particular importance. The diabetes specialists saw these attributes as the greatest additional benefit of the AGP, which may explain the highly positive evaluation of the AGP in this online survey. As with the German study, the diabetes specialists especially appreciated the clear presentation of the glucose data and the readily understandable proportion of glucose values in the defined target range, allowing for rapid evaluation of glucose fluctuations. This positive evaluation of AGP prevailed, with or without the analysis of glucose data with diabetes software.

The diabetes specialists recognise how people with diabetes can benefit from AGP, compared with the handwritten diaries, by improving communication between themselves and physician/practice support staff and by facilitating their understanding and acceptance of physician treatment decision and recommendations, These results confirm a positive attitude among physicians toward AGP compared with the handwritten diary, and may translate into improved outcomes for individuals with diabetes.

The positive evaluation of the diabetes specialists in this survey regarding the important role AGP plays in the analysis of continuously measured data was previously confirmed by a group of European experts who rate the AGP as a useful, practicable procedure for analysing continuous glucose data.[14] Therefore, the AGP may play an important role in glycaemic optimisation, and diabetes education and training.

The process of CGM analysis could be made much more efficient by simplifying and standardising the procedure, enabling continuity in practices throughout the country. The AGP has proven itself to be a practicable and reliable procedure for analysing glucose data in several studies, and meets the prerequisites for establishing itself as a standard.[10,15,16,17,18]

This online survey was limited in that the handwritten diaries were simulated and standardised for the comparison with AGP in order that a simulated handwritten diary and an AGP could be generated based on identical glucose data (CGM). Undoubtedly, people with diabetes and medical professionals have preferences for certain types of handwritten diaries as well for the time-related structure of blood glucose measurements during the day—factors that could have an influence on the comparative evaluation of the AGP and handwritten diary described here. Also, the comparison of AGP with the standard day CGM software (i.e. ‘spaghetti curves’) was not evaluated within the scope of this online survey.

Conclusion

Based on the survey responses of the participating diabetes specialists, the AGP may facilitate evaluation of continuous glucose data, and is associated with additional benefits when compared with SMBG and the documentation of the values in handwritten diaries. These benefits include the clear presentation of data, which enables easier recognition of existing patterns, thereby potentially aiding in the reduction of hypoglycaemia risk. Subjectively perceived quantitative benefits of the AGP were demonstrated during the participants' assessment of the two case histories, via the rapidity of response and the rate of agreement with the expert panel in favor of the AGP. These quantitative benefits were later confirmed.

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Subcutaneous injection technique:

an update on the Australian guidelines and current evidence

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Rachel Freeman, APD CDE

The correct injection technique (IT) augments glycaemic management in people with diabetes (PWD) requiring injectable glucose lowering medicines: insulin/Glucagon-like peptide-1 analogues. The choice of needle length, avoiding intramuscular (IM) injection, regular review of IT and inspecting injection sites for lipohypertrophy (LH) promote healthy injection sites and optimise glycaemic management. Updated international IT recommendations were published in late 2016 for health care professionals who educate and assist PWD requiring and managing injection or infusion devices.[1,2] This article highlights the changes to the 2016 international IT recommendations and the subsequent revision to the ADEA injection technique clinical guiding principles.[3]

An increasing number of Australians are using injectable glucose lowering medicines. This is due to an increasing prevalence of diabetes, earlier initiation of insulin for people with type 2 diabetes (T2D) and the newer class of non-insulin injectable medicines for T2D.[3]

It is estimated that around 50% of people with T2D will require insulin within 10 years of diagnosis and this increases with duration of diabetes.[4] Insulin may also be required for women with gestational diabetes mellitus (GDM) who are unable to maintain blood glucose levels in the recommended range for pregnancy with dietary modification and exercise alone.[5] According to the National Diabetes Services Scheme (NDSS), in January 2017 almost 391 500 Australians with diabetes were registered as requiring insulin,[6] representing 32% of all people registered with diabetes. Of these, 31% were identified as having type 1 diabetes (T1D), 66% as having T2D and 3% as having GDM. The number of people with diabetes using CSII was recorded as being 20 265. Another 25 659 individuals were registered as using non-insulin injectable medicines.

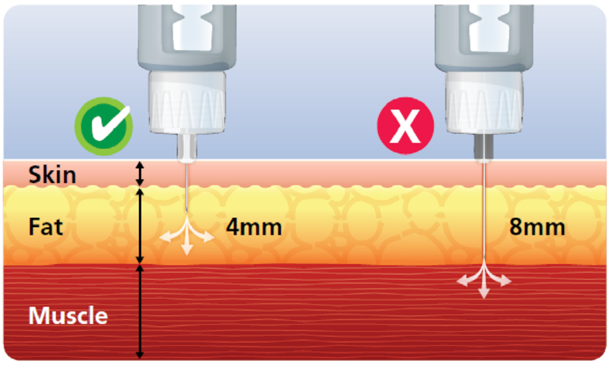
Appropriate IT is essential to reduce absorption variability, optimise the medicine effect and achieve desired glucose lowering effect.[3] Health care professionals, and particularly diabetes educators, play a crucial role in the education of individuals with diabetes regarding correct IT.[3]

The most recent survey (injection technique questionnaire [ITQ]) was conducted in 2014-2015 with 13 289 insulin injecting individuals from 423 centres in 42 countries taking part, including Australia for the first time.[2] Since the release of IT recommendations in 2010,[7] the main change in IT measured was the increased use of shorter length needles. For example, the use of 8mm length needles had reduced from 48.6% to 16%, whilst one in five respondents were now using 4mm needles (not available in 2009). However the ITQ 2014-15 sought more clinical information and diabetes self-management information from respondents compared to the previous ITQ 2009. This, plus an expanded methodology, has produced a set of recommendations, titled the Forum for Injection Technique and Therapy: Expert Recommendations (FITTER).[1]

Until recently it was thought that variability in skin thickness was influenced by weight, age, and race of individuals. However, current evidence consistently demonstrates that skin thickness is rarely more than 3 mm – much less than previously believed. Skin thickness is consistent, varying by less than 0.6 mm across all injection sites.[1,2] In children the skin is slightly thinner, but by adolescence it is characteristic of adults.[3]

Correct subcutaneous injection technique (SCIT) is defined as one that consistently delivers injected medicine into the subcutaneous (SC) space with minimal discomfort.[3]

Figure 1: Correct injection into SC space



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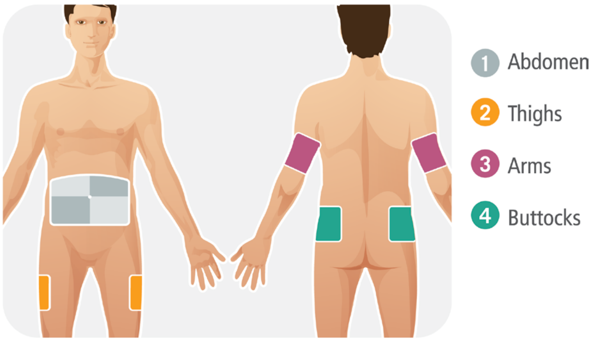
Reducing the risk of IM injection

IM injection accelerates drug absorption and alters the kinetics of the injected medicine, and may affect the severity of hypoglycaemic events. Clinical signs of IM injection include painful injection, bleeding and bruising, unexplained hypoglycaemia, and variable blood glucose management.[7]

Choice of injection site

Figure 2: Appropriate sites for injection



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In previous research, at all injection sites the minimum depth (skin thickness and SCT) was < 5mm, with the thigh only 2.9mm.. IM injection into the thigh with a 4mm needle occurred 1.6% of the time, while the incidence with a 5mm needle was 4.7%. Conversely, the incidence of IM injection with 8mm and 12.7mm was 25% and 63%, respectively.[7]

The upper limbs were similar, with 1 – 3.1 % of injections with a 4 or 5mm needle at 90 degrees being intramuscular. Using an 8 or 12.7mm needle increased IM injections to 19.5% and 55%, respectively. It should be noted that injections into the arms have consistent evidence of variable IT and a high risk of IM injection.[1] Injection technique should be carefully assessed for individuals who prefer to inject into the arms and injections should be given in the middle third posterior aspect of the upper arm into a lifted skin fold, with the assistance of a second person.[1]

In contrast, at the abdomen IM injection occurred only 0.3 – 2.8% with 4, 5, or 6mm needles, while the incidence increased to 38% when a 12.7mm needle was used.[7] The buttocks produced even fewer IM injections, but are more difficult for most individuals to reach for a successful SC injection.

Choosing the correct needle length

IM risk is directly affected by needle length.[1] The use of shorter needles (4 or 5mm length) reduces the risk of IM injection with a simpler single-handed injection technique by all adults when given into the abdomen. The use of needles longer than 6mm is no longer recommended.[1]

Recommendations

Recommendations for children include:

- Use of 4 – 5mm length needles for all children.
- Injection at 90 degrees is preferred.
- Insulin must be injected into healthy SC tissue, avoiding LH and scars.
- Children aged under 6 years must use a 4mm length needle and lift a skin fold.
- The use of syringes in very young children is not recommended, as we do not currently have 6mm syringe needles in Australia.

Recommendations for adults include:

- Use 4 – 5mm length needles.
- Injection at 90 degrees is preferred.
- Insulin and GLP-1 receptor agonists must be injected into healthy SC tissue, avoiding LH and scars.

- Consider injection into a skin fold for very slim adults.
- Injections into the arm or thigh will require injection into a skin fold.
- If needles ≥ 6mm are used they should be inserted at a 45 degree angle into a skin fold.

All of the **GLP-1 receptor agonists** currently available in Australia are supplied in disposable injection devices and have specific instructions for their preparation and administration. The recommended needle length is the same as that required to deliver a SC injection of insulin,[1] except for Bydureon, the new GLP-1 receptor agonist which has its own specific needle device. The same principles and recommendations apply for IT as they do for insulin injections.[1]

During pregnancy:

Women with GDM or pre-existing T2D may require insulin therapy to achieve glycaemic targets. Women with T1D will continue to inject but may require different insulin preparations.

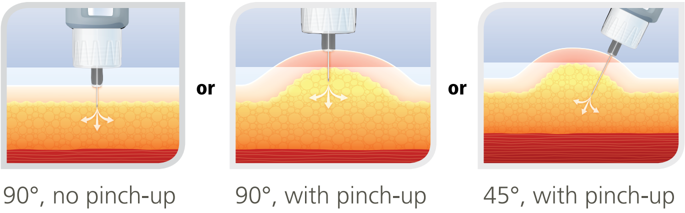
While there is a lack of research into the optimal injection technique during pregnancy, the following recommendations are made:[1-7]

- Shorter needles are preferred (pen: 4 or 5mm length) when injecting into the abdomen due to the thinning of adnominal fat from uterine expansion.
- First trimester: Women should be reassured that no change in insulin site or technique is needed.
- Second trimester: Insulin can be injected over the entire abdomen as long as properly raised skinfolds are used. Lateral aspects of the abdomen can also be used when not using a skinfold.
- Third trimester: Injections can be given into the lateral abdomen using a correct skinfold technique. Apprehensive clients may use their thigh, upper arm or buttock instead of the abdomen.
- Women can be reassured that insulin needles are not long enough to penetrate the uterine wall if insulin is injected abdominally.

Other considerations for injection technique are discussed further in the ADEA Clinical Guiding Principles for SCIT[3] and include:

- Volume of medicine. It may be desirable to divide large doses into smaller doses once the insulin dose reaches over 50 units due to prolonged absorption of larger doses, and reports of pain and leakage.
- Use of alcohol swabs to cleanse the skin is not usually required and increases the risk of toughening the skin.
- Site rotation. Rotation within one area rather than rotating to a different area is recommended to avoid variations across different sites and lipohypertrophy (LH).
- Needles are single use only.
- Angle of insertion and use of lifted skin fold. Determined according to needle length, injection site, age, size and body composition.

Figure 3: Correct pinch-up technique



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- Teaching SCIT and ongoing support. Consideration is required regarding the psychological hurdles the person with diabetes, their family and carers may face, to commencing and maintaining injectable glucose lowering medicine treatment.
- Evaluation and review of IT and insertion sites. Studies have demonstrated that knowledge regarding IT is not retained after 12 months following education, and another study showed improved glycaemic management if education was provided once per month for 4 months. Along with revision of IT, it is recommended that review of injection sites should occur at least annually and preferably at every diabetes visit. The assessment should include visual inspection and palpation of injection sites.
- Lipohypertrophy (LH). Injecting into LH-affected sites may lead to greater variability in blood glucose levels due to delayed or erratic insulin absorption.[7] Correct IT can decrease the likelihood of developing LH.

Conclusion

When performed correctly, SCIT consistently delivers injected medicine into the subcutaneous space with minimal pain. Proper IT promotes healthy injection sites and in turn promotes reliable and predictable bioavailability of the injected medicine, leading to improved glycaemic management and a reduction in unexpected hypoglycaemia. Variable blood glucose management without obvious cause should prompt a review of injection sites and technique.

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New CDEs

Congratulations to the following ADEA members who have recently achieved CDE status, up to 20 September 2017

Alison Amor
Pollyemma Antees
Bernadette Butler
Stacey Carden
Usha Chandra
Ashley Clark-Luccitti
Charlie Dirito
Natasha Diwakar
Veronique Doran-Bradley
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Therese Fletcher
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Christine Godwin
Nithya Gopalakrishnan
Vibashini Heyn
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Melina Tandy
Saba Tedla
Wai Ting
Ashley Watson
Jessica (Jeewon) Wilson So
Jaleesa Whitford

Challenges in dietary management of people with type 2 diabetes and chronic kidney disease

Shirley Chan, BSc, M Nutr & Diet

Introduction

Diabetes is the most common cause of chronic kidney disease. Diabetes and chronic kidney disease (CKD) each have unique dietary considerations. This articles aims to provide credentialled diabetes educators (CDEs) with insights into the key challenges in the dietary management of both conditions.

Diabetes and CKD

Data from the Australia and New Zealand Dialysis and Transplant (ANZDATA) registry showed diabetes mellitus (DM) was the most common cause of kidney disease requiring renal replacement therapy in Australia in 2014.[1] Approximately 1.7 million Australians(1 in 10) aged 18 years and over have indicators of CKD such as reduced kidney function and/or the presence of albumin in the urine.[2]

Due to the progressive nature of both type 2 diabetes (T2D) and CKD, it is important that individuals with both conditions are reviewed regularly and that dietary advice provided to them is appropriate to the stage of their disease. It is also important that these individuals are informed that their dietary requirements may change as a result of changing nutritional status, serum biochemistry or clinical presentation over the course of their condition.

Stages of CKD

Dietary advice for people with CKD and DM varies depending on the stages of CKD and the person's individual disease status. In CKD stages 1-3, the aim is to improve overall health and to reduce the progression of CKD. Dietary counselling should focus on optimising blood glucose levels,[3] blood pressure,[3] lipids[4] and weight.[3] As renal function declines and uremic syndrome becomes more apparent, such in CKD stages 4-5, dietary counselling should focus on ensuring adequate protein and energy intake[4] and managing fluid & electrolytes.[5]

Dietetic considerations for diabetes and CKD

People with diabetes have often received dietary advice from a variety of sources over the course of their condition, most typically at the time of diabetes diagnosis. However this advice may change once they develop CKD and it is important that individuals with diabetes and CKD be referred to an Accredited Practising Dietitian (APD) for nutrition assessment and individualised advice. In addition, the focus of dietary consultation should be on empowering the person to select food combinations that are suitable, rather than what is 'not allowed'.

Main goals of dietetic intervention:

- Eating a varied diet as recommended in The Australian Guide to Healthy Eating
- Optimising blood glucose levels using an individualised approach
- Optimising sodium intake
- Monitoring nutritional status and metabolic complications

Weight management

Evidence suggests a moderate weight loss of 5-10% can benefit overall health in individuals whose BMI is within the obese range, specifically glycaemic control, hypertension and lipid profiles.[8] A steady weight loss of 0.5-1 kg per week should be encouraged. A reduction in energy intake of 500 kcal per day would usually result in a loss of 0.5 kg of adipose tissue per week.[9] This can be achieved by a sensible eating program with appropriate portion sizes. Any psychological and/or lifestyle barriers should be identified and considered in the plan for sustainable weight managment.

Nutritional status

As renal function declines, some people may experience the uremic syndrome, including a range of symptoms such as nausea and taste changes, which can affect their appetite and contribute to malnutrition. The prevalence of malnutrition in CKD stages 4 and 5 is 48% and between 20-70% respectively.[6] Malnutrition is associated with increased morbidity and mortality.[7] Subjective global assessment (SGA) is one tool that is commonly used to assess nutritional status. The SGA takes into account clinical factors, weight changes and physical symptoms to determine an individual's nutritional status. SGA is low cost and quick to administer, making it an ideal screening tool in the outpatient setting, such as in outpatient diabetes centres and community dialysis units. If malnutrition is suspected or confirmed, referral should be made to an APD for assessment and nutrition support. Depending on the person's oral food intake, specialised electrolyte modified high energy high protein oral supplements may be useful. For those who are on peritoneal dialysis, an amino acid containing dialysate may be useful as an additional source of protein.

Carbohydrate

Carbohydrate distribution does not change for those with both diabetes and CKD. Carbohydrate distribution needs to be individualised and should be matched with medication or insulin therapy, where required[10]. Lowering the glycemic load of consumed carbohydrates can be beneficial, and has demonstrated HbA1c reductions of –0.2% to –0.5%.[11,12] Some carbohydrate foods such as potato, whole grain cereal foods and certain fruits are also rich sources of dietary potassium and/or phosphate, and may need to be restricted in the latter stages of CKD.

For individuals who are on peritoneal dialysis, absorption of dextrose-based dialysate is around 60%,[13] and this contributes to carbohydrate and energy. Specialist renal dietitians are able to advise the adjustment of oral intake to take this into account.

Protein

Protein is required for maintenance of lean body tissue and overall nutritional status. For CKD stages 1-4, the recommended daily protein intake is 0.75g-1g/kg BW which is the same as the general population without CKD or diabetes.[4] This would represent a protein intake of <70g daily. From data available in the National Health Survey 2011-12, most Australian consume on average 78-105g protein daily.[14] As a result, most people would consider this level of protein intake (at RDI level) a restriction.

For stage 5 CKD, the minimum protein requirement is 1.2 g/kg BW.[4] This level of protein intake may be difficult to achieve in some individuals due to several factors including clinical factors such as nausea and/or vomiting, disruption of daily life and presence of additional peritoneal fluids.

Potassium

Hyperkalemia can cause arrhythmia and cardiac arrest. Mean serum potassium rises when the creatinine clearance (CrCl) is less than 40 ml/min per 1.73 m^2.[15] Routine potassium restriction is not recommended in CKD stages 1-4, unless serum levels are elevated. A serum potassium level >6.0mmol/L[4] should prompt referral to an APD to commence a low potassium diet including advice on optimal food choices, portions and preparation methods. Potassium restriction is also necessary for individuals on haemodialysis but not for those on peritoneal dialysis. Nutritional panels on packaged foods do not usually contain information on potassium, so those who require a potassium restriction should be educated on food sources of potassium, particularly some marketed as low-sodium alternatives. Food sources of potassium include fruit, vegetables, meat, legumes and milk. Individuals with diabetes may have increased their vegetables and wholegrain foods intake over time to improve diet quality so will require education on the need to reduce intake of these foods. Other medical issues such as some antihypertensive drugs (such as ACE inhibitors and angiotensin-II receptor antagonists), diabetic ketoacidosis and metabolic acidosis should be considered as possible causes of hyperkalaemia.

Phosphate

Hyperphosphatemia is associated with cardiovascular morbidity and mortality in CKD.[16] It is one of the main factors associated with bone mineral disorder. Phosphorus is controlled through reduced dietary phosphorus intake and the use of phosphate binders. Sources of dietary phosphorus include most protein-rich foods (such a meat, chicken, fish and dairy foods), high fibre cereal foods, and some food chemical additives such as those in soft drinks. As for potassium, this may contradict previous dietary recommendations to choose high fibre carbohydrate foods for diabetes and will require re-education around suitable food choices. Food labels do not include the phosphorous content of foods so having the knowledge of foods higher and lower in phosphorous is important. Those requiring a phosphorus restriction should be given specialist advice to allow optimal protein intake whilst minimising overall phosphorus intake. Dietary phosphorus restriction should be initiated when serum phosphorus levels are above 1.49 mmol/L or 1.78 mmol/L (or elevated PTH) for stage 3-4 and stage 5 respectively.[17]

Blood pressure

Optimal management of blood pressure has been shown to help prevent complications of DM, particularly CVD and nephropathy.[18] Reducing sodium intake is an important factor in optimising blood pressure.[18] The upper level for sodium intake is 100 mmol per day, which is 6g of salt a day (1 teaspoon). The average intake of sodium in Australia exceeds this amount.[19] Most of the sodium consumed in the Australian diet comes from processed foods,[19] so meeting these recommendations would require limiting most processed foods such as some canned fish, processed meats, hard cheeses and some soft cheese, in addition to avoiding adding salt during cooking and on the table.

Fluids

For CKD stages 3-4, fluid recommendations are individualised, based on oedema and hypertension.[20] In stage 5, fluid requirements depend on the type of renal replacement therapy and the previous day's urine output.[21]

Conclusion

The dietary management of people with DM and CKD can be complex and referral to an APD with expertise in this area is important. Dietary needs will change as kidney function deteriorates, and for those with T2D the progression of their condition and changes in treatment may also necessitate adjustments to dietary management. It is therefore essential that individuals with both conditions are reviewed regularly so that timely and appropriate dietary education can be provided.

Table 1: Suggested dietary advice for CKD stages 1 - 5

	Goals of Nutrition Intervention	Dietary recommendations
Stage 1 – 3 (eGFR 30-59)	Delay the progression of CKD Optimise glycaemic control through an individualised eating plan Achieve optimal weight for the individual	No added salt General healthy eating
Stage 4 (eGFR 15-29) Pre-dialysis	Optimise nutritional status to prevent malnutrition Optimise glycaemic control Achieve optimal weight for the individual	No added salt Low potassium, low phosphate and fluid restriction as required
Stage 5 Renal replacement (dialysis)	Maintain and/or improve nutritional status during renal replacement therapy	Individualised advice depending on renal replacement therapy (hemodialysis versus peritoneal dialysis) and biochemistry.

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The risks of impaired awareness of hypoglycaemia (IAH)

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Introduction

Hypoglycaemia caused by diabetes treatment is one of the primary barriers to obtaining optimal glycaemic control in people with diabetes (PWD). While a lower HbA1c level over time is associated with reduced rates of diabetes complications, people can experience increased risk of hypoglycaemia when they try to intensify diabetes treatment.[1, 2] Severe hypoglycaemia may result in serious consequences such as seizures, coma, cardiac arrhythmias, and death. Hypoglycaemia can also contribute indirectly to morbidity and mortality through falls and accidents, including while driving. Impaired awareness of hypoglycaemia (IAH) may be caused by repeated exposure to hypoglycaemia, and is associated with a substantially higher risk of subsequent severe hypoglycaemia, thus creating a vicious cycle of dangerous hypoglycaemia. Increasing diabetes duration may also lead to IAH, through mechanisms that are not well-defined. This article will describe how to recognise and manage IAH.

Defining hypoglycaemia

The American Diabetes Association defines hypoglycaemia as 'all episodes of an abnormally low plasma glucose concentration that expose the individual to potential harm'.[3] There is no specific blood glucose threshold value in the definition for hypoglycaemia, because the threshold for hypoglycaemic symptoms varies between people and can also change in a person. It is generally higher in those with sub-optimal glycaemic control and infrequent hypoglycaemia, and lower in people with tighter glycaemic control and more frequent hypoglycaemia.[3]

Recently, the International Hypoglycaemia Study Group (2017) agreed that 'a glucose concentration <3.0 mmol/L is sufficiently low to indicate serious, clinically important hypoglycemia'[4] (Table 1). However, in clinical practice, it is recommended that individuals with diabetes use a glucose value of ≤3.9 mmol/L as the threshold to be alert to the potential for hypoglycaemia harm.[3] This takes into account accuracy limitations of blood glucose meters, flash glucose monitoring and subcutaneous continuous glucose monitors, particularly at lower glucose ranges, and also provides a safety margin to allow time for the individual to act to prevent further hypoglycaemia before symptoms restrict their ability to self-treat. 'Severe hypoglycaemia' is defined as hypoglycaemia causing cognitive impairment and which requires assistance from another person for recovery.[4]

Table 1: Hypoglycaemia glucose levels

Blood glucose level (mmol/L)	Description
≤3.9	Glucose alert level
<3.0	Serious, clinically important hypoglycaemia
Cognitive impairment due to hypoglycaemia requiring assistance from another person for recovery. No specific threshold.	Severe hypoglycaemia

Typical symptoms of hypoglycaemia

The symptoms of hypoglycaemia include:[5]

- autonomic symptoms: such as tremor, palpitations, sweating and hunger
- neuroglycopenic symptoms due to reduced glucose supply to the brain: impaired coordination, confusion, drowsiness, speech difficulty and change in behaviour
- malaise including nausea and headache.

The blood glucose threshold for these hypoglycaemic symptoms can vary between people, and also change in a person due to factors including diabetes duration, overall glycaemic control and recent hypoglycaemic events.

What is IAH?

IAH is an acquired syndrome where the ability to perceive the onset of hypoglycaemia becomes reduced or absent.[6] The recognition of hypoglycaemia onset requires four processes:[7]

1. A physiological response; involving the counter-regulatory hormone response
2. Physical symptoms; such as autonomic or neuroglycopenic symptoms
3. Detection of the symptoms
4. Accurate interpretation of the symptoms as being related to hypoglycaemia.

IAH often occurs in conjunction with impairment of the counter-regulatory hormone response to hypoglycaemia, known as hypoglycaemia associated autonomic failure (HAAF).[6] The usual hormone response to decreasing glucose involves the suppression of endogenous insulin secretion, followed by secretion of glucagon and then adrenaline. In people with type 1 diabetes (T1D) of greater than ten year's duration, the insulin and glucagon responses are often lost. Over time, in parallel with progressive beta-cell failure, the insulin and glucagon response can also diminish in a minority of people with type 2 diabetes (T2D).

In people with IAH, the glycaemic threshold for experiencing hypoglycaemic symptoms, the development of cognitive impairment from hypoglycaemia, and activation of the counter-regulatory hormone response to hypoglycaemia, all shift to a lower glucose level. Thus, these individuals may not experience the 'early warning' autonomic symptoms until a more severe degree of hypoglycaemia occurs. Neuroglycopenic symptoms may predominate, while the autonomic symptoms are diminished or absent. The term IAH is preferred over 'hypoglycaemia unawareness' to reflect that there is a spectrum of severity, rather than an all-or-nothing phenomenon.

Recent hypoglycaemia, and recurrent exposure to hypoglycaemia cause impaired awareness of hypoglycaemia symptoms, and also contribute to progressive hormonal counter-regulatory failure (HAAF). This then puts the individual at risk for further hypoglycaemia: 'hypoglycaemia begets hypoglycaemia'.[6]

Recognition of hypoglycaemic symptoms can also be adversely influenced by different circumstances such as sleep, exercise, stress, alcohol, and drugs (such as a sedatives and non-selective beta-blockers).[6]

Prevalence of IAH in people with diabetes

IAH is more common in people with T1D than T2D. Those with T1D are at higher risk of IAH due to their overall higher exposure to hypoglycaemia, their absolute requirement for insulin treatment for glucose control and their significant impairment of counter-regulatory hormone response to hypoglycaemia. The prevalence of IAH is around 20-25% in individuals with T1D.[8-10] Risk factors for IAH include previous exposure to hypoglycaemia, older age and longer duration of diabetes.[8, 10] People with T2D who are treated with medications which can cause hypoglycaemia (insulin and sulfonylureas) are also at risk of developing IAH. One study found a 10% prevalence of IAH in individuals with insulin-treated T2D.[11]

Why is it important to recognise IAH?

It is important to recognise IAH because individuals with the condition have a higher risk of hypoglycaemia and its associated adverse outcomes. In T1D, those with IAH have a 3 to 6-fold higher rate of severe hypoglycaemia than individuals with normal awareness of hypoglycaemia.[10, 12] This may be a result of the diminished ability to perceive the onset of hypoglycaemia, or the increased difficulty in self-treating hypoglycaemia when neuroglycopenic symptoms have developed. A study of people with T2D found there was a 17-fold higher incidence of severe hypoglycaemia in the preceding year in individuals with IAH compared to those with normal hypoglycaemia awareness. For biochemical hypoglycaemia, the incidence was 5-fold higher in those with IAH.[1]

People with IAH should be particularly vigilant in trying to minimise their risk of hypoglycaemia. By recognising IAH, management strategies can be implemented to help restore hypoglycaemic symptoms.

How can IAH be recognised?

People with T1D who believe they have an impaired ability to detect hypoglycaemia are usually correct.[7] IAH can be identified through clinical history-taking about hypoglycaemic events (hypo). Some useful questions are provided in Table 2.

Remember, IAH lies on a spectrum of severity.

There is no clear international consensus on how to classify hypoglycaemia awareness. The two most common validated scoring systems are the Clarke and Gold scores. These both use questionnaires, with a score of 4 or more being classified as having IAH.[7, 12]

Management of IAH

Hypoglycaemia awareness can be improved in some people with IAH after a period of scrupulous avoidance of hypoglycaemia. Individuals with IAH or recent clinically significant hypoglycaemia should be advised to raise their glucose targets, so that they avoid hypoglycaemia for at least a few weeks, in order to restore hypoglycaemia awareness and reduce their risk of severe hypoglycaemia.[13] Engaging in structured diabetes education on flexible insulin dosing to avoid hypoglycaemia is the cornerstone to improving hypoglycaemia awareness. The use of diabetes technology can also be helpful.

Diabetes education approaches

Diabetes education aiming to strictly avoid hypoglycaemia can cause significant reduction in severe hypoglycaemia and restoration or improvement of hypoglycaemia symptom awareness.[14] Diabetes education interventions include flexible insulin dose adjustment, raising glucose targets and more frequent contact with diabetes health care professionals by phone or clinic attendance. Some key diabetes education strategies are shown in Table 3.

Table 2: Questions to help identify impaired awareness of hypoglycemia

Question	Normal hypoglycaemic awareness	Impaired awareness of hypoglycemia (IAH)
What are your first symptoms when you have a hypo?	Typical first symptoms include shaking, palpitations, and sweating, which are part of the autonomic response.	There are minimal or absent autonomic symptoms and the person may experience the neuroglycopenic symptoms only: impaired coordination, confusion, drowsiness, and altered behaviour.
At what level of blood glucose do you start to experience hypo symptoms?	hypo awareness: symptoms typically start when blood glucose drops below about 3.0-3.5mmol/L.	Symptoms start at a lower blood glucose threshold.
Have you measured a low blood glucose without having any hypo symptoms?	No or only few occasions of measured low blood glucose without hypo symptoms.	May report increasing frequency of occasions of measured low blood glucose without hypo symptoms.

Table 3: Strategies to potentially improve hypoglycaemia awareness including through scrupulous avoidance of hypoglycaemia

Behavioural and educational approaches:
Avoid blood glucose <4.0mmol/L
Increase frequency of self-monitoring of blood glucose (SMBG), including overnight
Prompt treatment of hypoglycaemia if it occurs
Aim for higher glucose targets
Improve accuracy of carbohydrate counting
Improve understanding of insulin action profiles
Improve recognition of subtle hypoglycaemia symptoms
Appropriate use of carbohydrate-containing snacks
Recognise and manage situations of increased hypoglycaemia risk, such as after alcohol consumption, after exercise and delayed meals
More frequent diabetes clinic visits or phone contact
Improved individualised matching of bolus insulin dosing to carbohydrate intake
Educate family and carers to recognise hypoglycaemia and to treat
Wear an alert identification indicating diabetes history
Technological support approaches:
Use of continuous glucose monitoring (CGM) with trend alerts and hypoglycaemia alarms
Consider use of subcutaneous insulin pumps
Consider use of sensor augmented pump with low glucose suspend feature (with CGM)
In individuals with T2D, consider use of diabetes medications with a lower risk of hypoglycaemia.

Some formal education programs have included a psycho-educational approach to successfully improve hypoglycaemia awareness and reduce severe hypoglycaemia rates. One example of a structured education program is 'Blood glucose awareness training' (BGAT) which consists of a series of weekly classes, aiming to increase self-awareness of personal internal cues of hypoglycaemia symptoms and to more accurately anticipate blood glucose changes in response to external cues involving insulin, food and exercise.[15] BGAT has been shown to improve self-recognition of low and high blood glucose readings, reduce rates of severe hypoglycaemia, and reduce fear of hypoglycaemia without compromising overall glycaemic control.[16-18] At present, while semi-structured educational and behavioural programs for people with IAH appear to exist in some diabetes centres in Australia, the authors do not know of programs similar in duration and intensity to BGAT having been established in Australia.

Diabetes technology

The use of subcutaneous insulin pumps and real-time CGM can be helpful in people with IAH to reduce hypoglycaemia.[19-23] However, the HypoCOMPaSS trial showed that improvement in IAH can occur similarly with and without these technologies, when comprehensive diabetes education and support is provided. This multi-centre randomised controlled trial involved adults with T1D and IAH and aimed to see whether hypoglycaemia awareness could be improved over 24 weeks.[24] All participants received equal diabetes education and regular support (including weekly phone calls) aimed at rigorous avoidance of hypoglycaemia and appropriate insulin dose adjustment. They were randomised to either subcutaneous insulin pump therapy (IPT) or multiple daily insulin injection (MDI), and also randomised to either real-time CGM or conventional SMBG. The trial showed overall significant improvement in hypoglycaemia awareness and reduction in severe hypoglycaemia without deterioration in HbA1c, with no differences between the IPT and MDI groups, nor the CGM and SMBG groups. Thus, with comprehensive diabetes education and support, comparable favourable outcomes can be achieved regardless of the mode of insulin delivery and method of glucose monitoring. It is noteworthy that the HypoCOMPaSS study found that there was greater treatment satisfaction with IPT than MDI.[24]

Sensor-augmented pumps with automated insulin suspend features may reduce severe hypoglycaemia rate to a greater extent than conventional subcutaneous pumps.[20, 25] For people who continue to have IAH and severe hypoglycaemia despite expert diabetes care, pancreatic islet transplantation in clinical trials have consistently restored hypoglycaemia awareness, but occur with challenges of exposure to procedural risks and immunosuppression complications.[26] Pancreatic islet transplantation remains a very beneficial option to consider in this niche subgroup with persisting IAH and severe hypoglycaemia despite expert diabetes care.

Future directions

Diabetes care providers should undertake assessment of IAH as part of routine clinical care. It is likely that many people with IAH go unrecognised, and are subsequently at increased risk of severe hypoglycaemia without care being intensified in the presence of undiagnosed IAH. IAH is a dynamic syndrome which lies on a continuum of severity. Management strategies, particularly aimed at scrupulous avoidance of hypoglycaemia, can improve hypoglycaemia awareness and reduce severe hypoglycaemia risk in people with diabetes without necessarily compromising overall glycaemic management. In the future, it is likely that IAH screening tests will become routine in care and dedicated programs to reduce IAH will be instituted in those where it is indicated. In time, the realisation of the artificial pancreas is also expected to further support methods to minimise IAH and sequelae.

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Foot health and diabetes: What diabetes educators need to know and when to refer to a podiatrist

Olivia King, BPod, Grad Cert Diabetes Education

Diabetes-related foot complications

People with diabetes (PWD) are at increased risk of serious foot complications. Diabetes-related foot complications are the most common cause of non-traumatic lower limb amputation in Australia and a significant cause of morbidity. The majority of lower limb amputations are preceded by ulceration.[1, 2] It is estimated that one in four people with diabetes will experience a foot ulcer in their lifetime.[2] In up to 40% of cases, foot ulcers will recur within a year, with an annual recurrence rate of up to 80%.[3] Prevention of foot ulceration is a key aim for health professionals working in diabetes care, and relies on identifying individuals with risk factors for ulceration, and facilitating their access to appropriate and timely foot health services and education.

Diabetes educators (DE) are in a position to provide foot health education, identify those at risk of complications and refer to a podiatrist as appropriate. Early referrals may aid the early detection, management and prevention of diabetes-related foot complications.[1] DEs may also be the first to become aware of an active foot complication. This article aims to provide DEs with the knowledge needed to identify the early signs and symptoms and act on concerns regarding the foot health of the PWD they work with. By gaining knowledge about the pathophysiology of diabetes-related foot ulceration, health professionals become better equipped to recognise active foot complications and red flags which would warrant a referral to a podiatry service.

The National Health and Medical Research Council[4] recommends all PWD have an annual comprehensive foot health assessment. Podiatrists are health care professionals concerned with the prevention, diagnosis and management of medical and surgical conditions of the lower limbs in particular the feet.[5] Podiatrists are well placed to undertake diabetes foot assessments, and are able to provide education and advice on the management of modifiable risk factors and ongoing primary foot health care such as nail care and callus reduction. Unfortunately not all PWD will have access to a podiatrist for routine assessment. Some barriers to accessing podiatry include the cost, inadequate services in the geographical region and a lack of suitable transport. Other health care professionals trained in the assessment of diabetes-related foot complications including nurses, DEs, consulting pharmacists, GPs and endocrinologists are suitably qualified to assess PWD and refer to a podiatrist due to a higher risk of complications.[6]

Many PWD see a podiatrist on a regular basis to reduce the onset of complications. For the purpose of this article the term *refer,* will denote two processes: making a new referral to a podiatrist; and contacting a podiatrist about a person or client they provide service to, detailing the relevant concerns and requesting the podiatrist see them sooner than otherwise planned.

The pathophysiology of diabetes-related foot ulcers

The three most important clinical risk factors for the development of foot ulcers are peripheral neuropathy (PN), peripheral arterial disease (PAD) and structural foot deformity.[1, 4, 6, 7] Foot ulcers are likely to develop in the presence of any two of these risk factors and can be categorised according to the aetiology. There are three broad types of foot ulcers: neuropathic, which occur in the presence of neuropathy; ischemic, which occur in the presence of PAD; and neuro-ischaemic, which occur due to a combination of PN and PAD.[7]

Due to the absence of protective sensation, even extensive neuropathic ulcers are often painless. PN is the most common precipitating factor of diabetes-related foot ulcers, implicated in up to 50% of cases. The loss of protective sensation associated with sensory PN puts PWD at risk of sustaining undetected foot injuries such as a sprain, fracture, laceration, abrasion, cut, blister or callus; all of which can lead to serious ulceration if untreated or treatment is delayed. The most common cause of minor foot injury is ill-fitting footwear. Undetected injuries increase the likelihood of ulceration, infection and amputation.[1]

PAD is often due to accelerated atherosclerosis. PAD leads to poor perfusion of the lower limb, impaired wound healing and increased risk of infection.[7] When combined with a significant injury to the foot or repetitive micro-trauma such as barefoot walking, peripheral arterial disease often leads to painful and chronic ischemic ulceration.[1, 3]

Structural foot deformities with associated bony prominences on the feet such as bunions, claw toes and hammertoes are of particular concern. In the presence of PN, PAD or both, foot deformity further increases the risk of foot ulceration.[1] Foot deformity can lead to changes in the distribution of weight during walking, leading to focal areas of pressure, callus and subsequent ulceration. In addition, ill fitting foot wear can also lead to ulceration via friction pressure on bony prominence.[7]

Red flags requiring referral to a podiatrist

The following scenarios, clinical signs, symptoms and risk factors provide useful prompts for DEs to refer to a podiatrist. Health professionals with knowledge of diabetes-related foot ulceration and active foot complications have the capacity to identify PWD who are at risk and who require prompt referral to a podiatrist.

All people with diabetes require annual comprehensive foot health assessment

PWD with no current identifiable risk factors (PAD, PN, foot deformity) are deemed to be at low risk of foot complications. However, chronic disease management requires an annual comprehensive foot health assessment to determine the presence or progression of complications.[4, 6, 7] Diabetes foot health education, regular foot inspection and early interventions such as footwear improvement, innersoles and callus debridement are proven to reduce the risk of lower limb amputation.[6-8] Podiatrists are well-positioned to provide these services as well as in-depth education.

Neuropathy, PAD and structural foot deformity

Like many complications associated with diabetes, peripheral neuropathy is often silent. Some symptoms include numbness, burning, tingling, sharp sensations and pins and needles. Nocturnal symptoms are more prevalent, which can indicate early onset of PN. The absence of such symptoms does not exclude PN.

PWD may also experience pain in their lower limbs when walking a certain distance. This is known as intermittent claudication, a complication associated with PAD. The pain occurs due to the muscles' increased demand for oxygen which cannot be delivered with inadequate vascular supply. In very advanced PAD rest pain may occur, however even significant vascular disease can be asymptomatic. Signs of vascular compromise which can be observed by suitably qualified clinicians without specific equipment include: the absence of foot pulses; a cooler lower limb and a slow venous return time. Podiatrists often undertake further, more objective assessment of vascular supply, such as Doppler waveform evaluation, ankle brachial index or toe brachial index.[6,9] PAD, particularly in the presence of structural foot deformity, indicates a high risk of ulceration.

Other factors to consider

A history of previous ulceration or amputation indicates a high chance of subsequent ulceration, likely due to the persistence of precipitating factors and the progressive nature of diabetes. Ongoing regular podiatry is required. End stage renal failure (ESRF) has been established as a significant risk factor for foot complications.[7] Research has shown that PWD and ESRF have a significantly higher incidence of foot ulcers, PN and PAD than controls.[10] Friction pressure on bony prominences related to footwear can also cause ulceration. Some people have significant foot deformity and may require custom made footwear. Podiatrists are well-positioned to assess footwear adequacy, the need for custom footwear and to refer to a footwear specialist as required. It is also just as important to assess individuals' current lifestyle factors. For example, barefoot walking is considered unsafe, hence education is required to reduce this risk factor.[7]

Recent data reviewed as a part of the Western Australian Department of Health's Cardiovascular Health Network Initiative suggests that Aboriginal and Torres Strait Islander people are three times more likely to have diabetes and 38 times more likely to experience major lower limb amputations than people who are of non-Indigenous background.[8, 11] Until adequately assessed, those of Aboriginal or Torres Strait Islander background are considered to be at high risk of foot complications.[4] With the majority of multidisciplinary foot health services located in capital cities, access to these services is difficult for those living in rural and remote communities. Services which are located within rural and remote communities are often fragmented and poorly resourced.[8]

Recognising active foot complications

If active foot complications are suspected, urgent referral to a suitable foot health service is required. The most common types of foot complications likely to be encountered by a DE include pre-ulceration, ulceration, infected ulceration and Charcot's Neuroarthropathy (CN).

Pre-ulcerative signs on the skin of the feet include callus, blisters and subcutaneous haemorrhages. Subcutaneous haemorrhages appear as discrete darkened areas on any surface of the foot. These signs are indicative of imminent ulceration and urgent management, likely including debridement, is required.[3, 7] Thickened or involuted (in-growing) nails can precede ulceration under the nail or around the nail folds.

The presentation of foot ulcers varies depending on the site and aetiology or type of ulcer. Ulcers may appear as open sores or may present as areas of discoloration on the skin with overlying callus. They frequently appear on the plantar surfaces, including on and between the toes.[7] Subungual (under the nail) ulcers and in-growing toe nails are difficult to detect on visual inspection, but may present as erythema of the affected toe, bleeding or discharge under the nail. The hallmark features of soft tissue infection - erythema, oedema, increased temperature and pain - may be masked by ischaemia, and sensory and autonomic neuropathy. This may make it difficult to determine whether or not an ulcer is infected. If not managed promptly, infection can spread to deeper tissues including bone. Infection of the bone

Table 1: Red flags indicating referral to a podiatrist

Clinical scenario	Recommended frequency of podiatry reviews / urgency of referral	Most suitable referral destination / action
Symptoms of PN are reported and / or protective sensation is absent	Every six months	Refer to a community-based podiatrist
Symptoms of PAD are reported and / or there are signs of PAD	Every six months	Refer to a community-based podiatrist
Any two risk factors (PN, PAD or foot deformity)	Every three months	Refer to a community-based podiatrist
History of foot ulceration or amputation	Every three months	Refer to a community-based podiatrist
Presence of end stage renal failure	Every three months	Refer to a community-based podiatrist
Concern regarding foot deformity, the adequacy or fit of footwear	N/A	Refer to a community-based podiatrist
PWD of Aboriginal or Torres Strait Islander background	Every three months	Refer to the most appropriate and accessible foot health service
Presence of pre-ulcerative signs such as callus, blisters, subcutaneous haemorrhage, thickened or in-grown nails	Urgent referral	Refer to a community-based podiatrist or a hospital-based high risk foot service
An active foot ulcer is observed or suspected	Urgent referral	Refer to a community-based podiatrist (if already known to one) or a hospital-based high risk foot service
CN or an infection is suspected	Urgent referral	Refer to a hospital-based high risk foot service

Table 2: Types of podiatry services, settings and factors to consider when referring

Type of podiatry service / setting	**Cost to person with diabetes**	**Foot health conditions predominantly managed**	**Referral process**
Public hospitals. Podiatrists usually part of multidisciplinary team, often led by a medical officer or specialist.	Publicly funded; usually no cost to individual to attend service	Limb threatening conditions such as active ulcers which have been unresponsive to standard management, infected ulcers or active CN[6]	Referral from a medical officer often required; provide as much detail as possible to the podiatrist or high risk foot team
Community Health Centres (CHC) (or other publicly-funded primary health care services)	Government subsidies for people with low income; relatively low cost to those with low income	CHC podiatrists are usually involved in the management of current foot ulcers, pre-ulcerative signs, PN, PAD, nail pathologies and structural foot deformity and undertake routine diabetes foot health assessments	Due to the subsidies applied, referrals are prioritised based on clinical need and urgency of the situation. Hence, relevant and current clinical data including history and duration of diabetes and current foot health status, facilitates in accurate prioritisation and timely access to a podiatrist working in CHCs.
Private clinics, general practice settings.	Full cost usually borne by person with diabetes. Many Chronic Disease Management plans allow five consultations with allied health care professionals (including podiatrists), for PWD. These types of referrals allow access to private services, being subsidised via the Medicare Benefits Scheme.	Private podiatrists are involved in the management of a range of foot health conditions such as skin and nail pathologies, overuse and acute foot injuries and others and undertake routine diabetes foot assessments. Due to the ongoing costs associated managing foot ulcers (i.e. dressings, more frequent appointments) people with ulcers may be referred to a hospital or community-based publicly-funded podiatry service.	Relatively easy to access by contacting private clinic and making an appointment. Provide as much detail as possible to the podiatrist. GP may develop a Chronic Disease Management plan including podiatry referral if they deem appropriate.

(osteomyelitis) is a very serious, limb threatening condition and urgent multidisciplinary team management is required.[6, 7]

Charcot's Neuroarthropathy (CN) is a relatively uncommon, yet very serious and potentially debilitating foot complication, which occurs mostly in people with diabetes. Although the pathophysiology of CN is idiopathic, PN with a loss of protective sensation is always present and PAD is usually absent. It is understood that the insensate foot sustains an injury, such as a sprain or a repetitive micro-injury related to poor foot function. The injury goes undetected and therefore unmanaged. The clinical features typically include a deformed foot with a "rocker-bottom" appearance; oedema, increased temperature, erythema and occasionally mild pain.[12] Suspected CN prompts an urgent referral to a multidisciplinary high risk foot service,[6] usually based in a hospital setting. Immediate and prolonged offloading is required.

Summary

Table 1 summarises the red flags for a DE to refer to podiatry, the associated recommendations for frequency of podiatry reviews, level of urgency and most appropriate referral destinations.

Hospital or community-based podiatry? Public or private?

Podiatrists work in a variety of settings. Table 2 captures the details of the most common types of podiatry services and some useful information for referrers. The availability and accessibility of podiatrists working within these different settings vary considerably depending on the geographical location and the local health network. Accordingly, the information should be considered general and will be relevant when there are multiple options for podiatry referral and a decision about the most appropriate option needs to be made. This decision should be made in consultation with the person being referred and will depend on numerous factors including location, accessibility, cost of the service, cultural factors, personal preference and the clinical presentation.

Conclusion

Diabetes-related foot complications are relatively common, serious and potentially debilitating, however they can be prevented or managed successfully if detected early. Education and early intervention have been shown to prevent diabetes-related foot complications and improve outcomes. DEs who are aware of the risk factors for diabetes-related foot complications, the signs and symptoms of these risk factors, and the signs and symptoms of imminent or active foot complications are well-positioned to refer to a podiatrist or suitable foot health service.

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Case study

An integrated nurse practitioner approach to improving management for individuals living with complex multiple chronic diseases

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Introduction

Chronic disease affects 80% of Australians over the age of 45 years and accounts for 70% of national healthcare costs.[1, 2] *The Australian Institute of Health and Welfare 2014 data reports that in 2011-12, 3.7 million Australians aged 18 and over had one or more cardiovascular diseases such as hypertension, coronary heart disease, stroke or heart failure.*[3] *A further 917,000 had diabetes although 1% (700,000) of the adult population had unreported biomedical signs of diabetes. In addition, approximately 10% (1.7 million) Australian adults had biomedical signs of chronic kidney disease (CKD).*[3] *Overall one in four Australian adults had cardiovascular disease (CVD), diabetes or CKD, 1.2 million had at least two of these conditions, and 182,000 had all three conditions.*[3] *These three chronic diseases often have similar underlying causes and share common risk factors as well as prevention, management and treatment strategies.*

The management of multiple chronic conditions is one of our biggest healthcare challenges globally today. In public hospitals there are often lengthy waiting periods for an outpatient clinic appointment to see a specialist, and once at the clinic individuals frequently wait several hours due to medical staff being called away to attend to inpatient priorities.[4] There are also challenges with limited parking and/or long distances to walk from public transport to the clinic. If a person has multiple chronic conditions, treatment between speciality clinics can become complex with multiple medication changes (prescription and non-prescription) leading to adherence issues and an increased risk of adverse effects associated with polypharmacy.[5, 6] The growing burden of chronic disease underscores the need for a change in care provision.

A new model for the management of chronic disease

In Australia there are several-Nurse Practitioner (NP) clinics for individuals living with chronic disease. NPs have a Masters qualification and are authorised to practise autonomously, to order and interpret diagnostic investigations, to prescribe medications within their specific scope of practice, and refer to other clinicians.[7] These NP clinics unfortunately are often structured similarly to the medical model where people are seen within a siloed disease-specific approach to care.

In 2014 a novel community based integrated NP clinic was commenced for individuals with at least two chronic conditions. Chronic conditions included are diabetes, CKD, or heart failure (HF). The aim of the clinic is to provide person centred care, reduce clinic waiting times, integrate care into one clinic appointment and reduce the potential confusion that can arise when advice is received from multiple healthcare providers. People are seen in an outreach community-based clinic by NPs with expertise in diabetes, CKD or HF. The clinic is operated once a week and wherever possible those attending are seen by the same team of NPs at every appointment. The focus in the clinic is a comprehensive assessment, supporting self-management, (including education about lifestyle modifications), and medication review and adjustment. Collaboration with general practitioners and disease-specific speciality teams occurs. The NPs use nationally accepted clinical guidelines and targets (Australian Diabetes Society, Australian Heart Foundation and Kidney Health Australia) to set individual and meaningful goals with each individual.[8,9,10] Care planning is a collaborative process with the individual and takes into account their needs and wishes. Clinics are offered at multiple community sites thereby reducing the travel distance to appointments. Parking is generally easier offsite from the hospital and appointments are usually on time, minimising waiting time.

Case study

To illustrate the care provided in the integrated clinic, a case study of a 65 year old lady, 'Marian', with type 2 diabetes (T2D), CKD and HF is presented (see Table 1 for clinical information). Figures 1 and 2 indicate changes in health-related quality of life (HRQoL) scores (measured by SF-36[11]) and heart failure knowledge (measured by Dutch Heart Failure Knowledge scale[12]) between her first clinic appointment (baseline) and two years later.

Marian was overwhelmed when she first attended the clinic, and was frightened by her diagnosis of HF and CKD. She was trying to keep her blood glucose levels tightly controlled thinking this would reduce her risks of long term complications associated with cardiovascular disease and renal failure. Consequently she had an episode of severe hypoglycaemia which required medical assistance. Over a period of 12 months she gradually gained 9kg with her maximum weight being 110kg.

Marian was provided with support and self-management education and slowly regained her confidence in the ability to self-manage her multiple health conditions. As her HF medications were titrated, her exercise tolerance and kidney function improved. Her insulin doses were reduced and she was supported to think more broadly about the benefits and risks of tight glycaemic control, with more understanding of the risks of hypoglycaemia. The Australian Diabetes Society guidelines for the individualisation of HbA1c targets recommend that in the instance of recurrent severe hypoglycaemia, HbA1c targets can be relaxed, noting that severe hypoglycaemia is associated with significant morbidity and mortality.[13] In people with multiple co-morbidities tight glycaemic control is not recommended, and in the case of Marian it took considerable counselling and coaching over many months to convince her to re-set her goals regarding glycaemic control.

Weight loss was Marian's main priority, and initiating Exenatide was suggested.[14]When Exenatide was commenced her insulin dose was reduced by 20%. In collaboration with her endocrinologist a low dose of Metformin XR was introduced.[15] Metformin is associated with a significantly lower incidence of cardiovascular events and mortality compared to other hypoglycaemic agents and metformin associated lactic acidosis is rare.[15]A dose of 2000mg is possible with an eGFR of 30 -39ml/min. As her eGFR was 30ml/min we commenced her on 500mg titrating up to 1000mg over 4 weeks. She was advised to cease this if she had any vomiting or dehydrating illness.[15] Plasma lactate was measured as a precautionary measure to ensure that she did not develop lactic acidosis. A low dose of Glipizide was commenced as a third agent as she was initially hyperglycaemic after ceasing basal-bolus insulin and commencing Metformin XR and Exenatide. Glipizide was chosen due to the short half-life and reduced risk of hypoglycaemia.[16] Substantial education was provided to Marian with regard to the potential risks of hypoglycaemia, particularly as reduced renal function can impair the metabolism and excretion of sulphonylureas. Marian was advised that hypoglycaemia is more likely to occur when caloric intake is reduced or activity is increased.[16]

Over the next 17 months Marian reduced her weight by 30kg and maintained the weight loss through use of Metformin XR, Exenatide, healthy diet and increased activity. Glipizide was ceased and she no longer experienced any hypoglycaemia. She diligently attended HF exercise classes, her NYHA (New York Heart Association) class improved to class 1 and her kidney function improved to CKD stage 3B.

Marian was extremely happy with her weight loss and increased exercise tolerance. She became more confident playing with her grandchildren and gardening as she no longer had the constant fear of hypoglycaemia. Her Minnesota HF score improved from 73 to 24. The Minnesota HF questionnaire

Table 1

	First Presentation	Two Years Later
Medical History	» Initially admitted through cardiology following NSTEMI and subsequent heart failure	
	» T2D	» T2D
	» Hypertension	» Hypertension
	» Dyslipidaemia	» Dyslipidaemia
	» LV Systolic dysfunction EF 15 -20% with poor prognosis	» LV Systolic dysfunction EF 15 -20%
	» HF NYHA class 111-1V	» HF NYHA class 1
	» CKD stage 4 with nil albuminuria	» CKD stage 3B with nil albuminuria
Medications	» Glargine 28 units	» Glargine and Aspart replaced with Exenatide titrated to 10mcg bd
	» Aspart 10 units with meals	
		» Metformin 1g commenced
		» Glipizide 5mg daily commenced
	» Carvedilol 6.25 mane 12.5mg nocte	» Carvedilol 6.25 mane 12.5mg nocte
	» Perindopril 2mg bd	» Perindopril 2mg bd increased to 4mg bd then replaced with Sacubitril/valsartan
	» Nicorandil 5mg bd	» Nicorandil 5mg bd
	» Clopidogrel 75mg daily	» Clopidogrel 75mg daily
	» Aspirin 100mg mane	» Aspirin 100mg mane
	» Digoxin 62.5mcg mane	» Digoxin 62.5mcg mane
	» Atorvastatin 40mg nocte	» Atorvastatin 40mg nocte
	» Frusemide 80mg mane 40mg 2pm	» Frusemide decreased to 20mg
	» Vit D, Calcium and magnesium supplements	» Vit D, Calcium and magnesium supplements
Investigations	» HbA1c 7.0 %	» HbA1c 7.6%
	» eGFR 30mls/min/1.73m^2	» eGFR 42mls/min/1.73m^2
	» Creatinine 157	» Creatinine 129
	» Lipids TC 4.5, Trigs 3.1, HDL 1.0, LDL 2.1	» Lipids TC 4.2, Trigs 1.1 HDL 1.2 LDL 2.1
Examination	» Wt 96kg Ht 157cm BMI 38.95kg/m^2 (her weight peaked at 110kg before commencing Exenatide)	» Wt 80kg Ht 157cm BMI 32.5kg/m^2
	» Blood pressure 104/60mm/Hg sitting 122/70mm/Hg standing	» Blood pressure 120/60mm/Hg sitting 116/60 mm/Hg standing
	» HR 64 bpm	» HR 78 bpm
	» Lungs bilateral air entry, nil creps	» Lungs bilateral air entry, nil creps
	» HS 1 & II no murmur detected	» HS I & II no murmur detected
	» JVP Not elevated	» JVP Not elevated
	» Oedema nil	» Oedema nil
Quality of Life	» Very scared	» Increased exercise tolerance
	» Aiming for tight glycaemic control	» Has recommenced playing music
		» Takes grandchildren to school
	» Multiple hypoglycaemic episodes	» No hypoglycaemic episodes
	» Significantly reduced quality of life	» Significantly improved quality of life
	» Minnesota HF score: 73	» Minnesota HF score: 24

measures the effects of symptoms, functional limitations and psychological distress on a person's HRQoL using a six–point, zero to five Likert scale to measure how each of 21 facets prevent them from living as they desire. The higher the score, the greater the impact on the individual's HRQoL.[17] The reduction in Marian's score demonstrates how her HRQoL has improved over the last 2 years (Figure 1). While some domains decreased or remained the same, there were improvements in her physical domains (physical functioning, role limitations due to physical health problems, and bodily pain). When surveyed regarding her satisfaction with the clinic, Marian reported she was highly satisfied with the care provided by the NPs. She stated that the NPs always:

- Explained things in a way that was easy to understand
- Gave clear instructions about what to do to take care of health concerns
- Knew all the important information about her health history
- Spent time with her and gave her the help she need to make lifestyle change

Marian also reported that she felt very comfortable talking to the NPs about any issues.

Implications for practice

The integrated clinic combines the knowledge and skills of three NPs into one appointment and is held in settings outside of the hospital which has multiple benefits for the individuals who attend including:

1. Timely referral and symptom management
2. Reducing the number of outpatient appointments
3. Providing holistic management for people with highly complex comorbid chronic conditions
4. Providing early detection and intervention
5. Reducing hospital presentations, admissions and length of stay
6. Delivering a person centred model in a more convenient setting
7. Improving client outcomes

Figure 1: Health-Related Quality of Life (SF36)

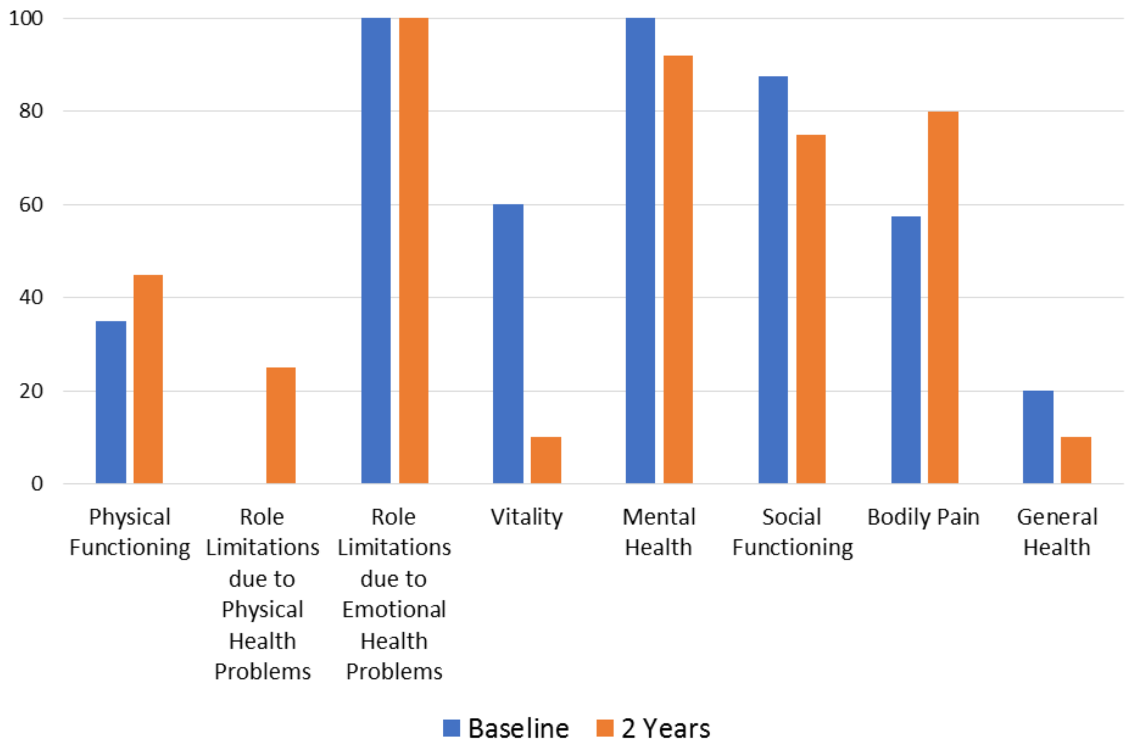
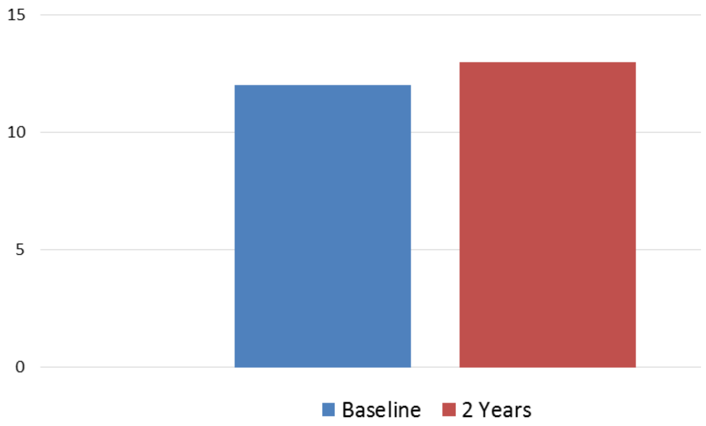


Figure 2: Heart Failure Knowledge (DHFKS)



Conclusion

It is evident that the care of people with comorbid, complex chronic conditions takes longer particularly as these conditions do not resolve and tend to worsen over time. When multiple chronic conditions are present it can be overwhelming for the person concerned. Motivated and engaged individuals are more likely to follow treatment recommendations, including lifestyle modifications, that are focused on reducing the burden and progression of these diseases. Ideally primary health care is the setting to manage those with chronic conditions, however when healthcare becomes more complex and speciality knowledge is required, an outpatient integrated chronic disease model can be more suitable than siloed medical services.

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Book review

The Art and Science of Diabetes Self-Management Education Desk Reference: Fourth Edition

Reviewed by: Dr Kate Marsh, AdvAPD, CDE

Publisher: American Association of Diabetes Educators (AADE)

I reviewed the third edition of this book early last year, but the fourth edition has recently been published by the American Association of Diabetes Educators (AADE), with a number of revisions and additions to the previous version.

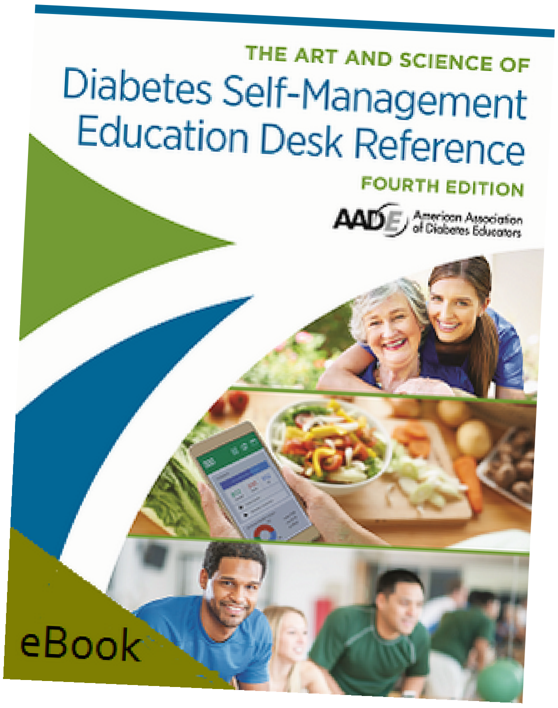
Like its predecessor, *The Art and Science of Diabetes Self-Management Education Desk Reference: Fourth Edition* isn't light bedtime reading but instead is a comprehensive resource covering the core knowledge and skills a diabetes educator needs to provide individualised education and support to people with diabetes.

The book is divided into two main sections: *The Art of Diabetes Self-Management Education* and *The Science of Diabetes Self-Management Education.*

Section 1, The Art of Diabetes Self-Management Education, starts with a brief introduction highlighting the important role that diabetes self-management education (DSME) plays in ensuring optimal care and outcomes for people with diabetes and emphasising the importance of a person-centred, team-based approach to diabetes care. This section of the current edition has been updated to better equip the diabetes educator with the tools needed to provide relevant and individualised education and care in the continually changing world of diabetes.

There are 12 chapters within this first section. Chapter 1 focuses on the challenges and opportunities for diabetes education, particularly as it relates the evolving healthcare systems in the US, but there are still some useful takeaways for Australian diabetes educators. Chapter 2 outlines the diabetes self-management education process, from assessment through to goal setting, planning, implementation and evaluation/monitoring. Chapter 3 discusses the theoretical and behavioural approaches to self-management of health and helps educators to choose the best approach to use with the clients they work with. Chapters 4 to 10 cover the key components of the AADE7 Self-Care Behaviours™ including healthy eating, being active, taking medications, monitoring, problem solving, healthy coping and reducing risks. The final two chapters cover diabetes education program management and transitional care.

Section 2, The Science of Diabetes Self-Management Education, addresses the science behind the practice of diabetes education, from diabetes pathophysiology to treatment and diabetes-related complications. The first three chapters cover pathophysiology, and the management of both type 1 and type 2 diabetes throughout the lifespan. Chapters 16 to 21 cover key elements of diabetes management including nutrition, exercise and pharmacotherapy, along with dietary



supplements and complementary health approaches. The remaining seven chapters cover the acute and chronic complications of diabetes and pregnancy.

Despite its size, the book is easy and enjoyable to read. Each chapter begins with a summary of key concepts and ends with take home tips under the headings 'Focus on Education' (with subheadings Teaching Strategies, Messages for Patients and Health Literacy) and 'Focus on Practice'. These help to take the information presented in the chapter and put it into practice. There are also plenty of tables, figures and boxes to break up the main text and numerous case studies throughout the book, showing exactly how the information can be used in practice. Each chapter is well referenced and there is a comprehensive index at the back.

For those who want easy access without carrying around the telephone book-sized publication (it's 845 pages in total) the new edition is available in electronic format, providing both an e-book version (for PC, Mac, Android, Kindle Fire or Chromebook) and an online password protected web portal version. The electronic copy is the same price as the print version but would save postage costs for Australian diabetes educators and gives you easy access whenever you have an internet connection.

If you are looking for an all-in-one reference guide to the art and science of diabetes self-management education, I would highly recommend this book.

The key details:

Title: The Art & Science of Diabetes Self-Management Education Desk Reference, 4th Edition

Publisher: American Association of Diabetes Educators (AADE)

Publication date: 2017

ISBN: 978-1-881876-42-7

Cost: US$249 (or $199 for AADE members)

To purchase: http://www.diabeteseducator.org/product/E991.

Top Tips

Keeping up with the latest diabetes research

Kate Marsh, AdvAPD, CDE

Do you feel overwhelmed with the number of diabetes-related research papers being published and wonder how you can possibly keep up?

This isn't surprising considering a 2010 paper published in PLOS Medicine reported that 75 trials and 11 systematic reviews were being published each day.[1] Significantly, a few years later in 2013 the authors updated these numbers reporting that up to 26 systematic reviews were being published each day. It's very likely these numbers have continued to increase.

So, as diabetes educators, how do we keep up with all of this research? And, how do we decide what makes worthwhile reading?

A great place to start is by taking advantage of others who are doing the work of finding relevant articles for us. There are plenty of options in the diabetes-related field and these are all free to sign-up for. Here are a few worth starting with:

- Diabetes Research Reviews http://www.researchreview.com.au/au/clinical-area/internal-medicine/diabetes-obesity/diabetes-and-obesity.aspx
- Diabetes Update https://www.medicalobserver.com.au/medical-news/diabetes
- The Limbic Endocrinology http://thelimbic.com/endocrinology/
- Medscape Diabetes & Endocrinology http://www.medscape.com/diabetes-endocrinology
- DiabetesPro SmartBrief (American Diabetes Association) https://www.smartbrief.com/signupSystem/subscribe.action?pageSequence=1&briefName=diabetespro&campaign=in_brief_signup_link&utm_source=brief
- The Diabetes Times www.diabetestimes.co.uk
- D-NET: The IDF Diabetes Network for Health Professionals https://d-net.idf.org/en/

You can also subscribe to the Table of Contents (TOC) for most journals so they arrive in your inbox every time a new issue is published. A few to consider include:

- Diabetes Care http://care.diabetesjournals.org/
- Diabetologia http://www.diabetologia-journal.org/
- Diabetes http://diabetes.diabetesjournals.org/
- Diabetic Medicine http://onlinelibrary.wiley.com/journal/10.1111/(ISSN)1464-5491
- Journal of Clinical Endocrinology and Metabolism https://academic.oup.com/jcem
- Diabetes Educator http://journals.sagepub.com/home/tde

Of course the other issue is making sense of the papers you read and deciding whether the research presented is relevant. A great resource to use for this is the Critical Appraisal Skills Programme (CASP) checklists, a set of eight critical appraisal tools designed to be used when reading research. CASP checklists cover the main types of research paper you might come across including Systematic Reviews, Randomised Controlled Trials, Cohort Studies, Case Control Studies, Economic Evaluations, Diagnostic Studies, Qualitative studies and Clinical Prediction Rule. Free to download, they can be used for your own self-study or as part of your workplace journal club.

Other strategies include:

- making an appointment with your organisational librarian to learn the skills to conduct a literature search and critique the research.
- contacting your Research Governance Committee to take part in relevant professional development courses.
- linking with Membership Organisations and/or peer support programs.

How do you keep up with the latest research? Please share your tips with fellow readers, so we can all stay on top of what's new and noteworthy.

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Original research

A burning issue:
Exploring incidence and predictors of Burnout in Australian diabetes educators

Nicole Moffatt de Vries, M.App.Sci
Einar B. Thorsteinsson, Associate Professor, PhD

Abstract

__Aims:__ Burnout, a syndrome of emotional exhaustion, depersonalisation and perceived reduced personal accomplishment, is characterised by a lack of enthusiasm and motivation, feelings of ineffectiveness and frustration resulting in reduced workplace efficacy. This pioneer study of Australian Diabetes Educators examined the incidence of burnout and influence of predictors including support, hours worked, age and geographical location.

Methods: Participants were recruited through social media, the ADEA email newsletter, and direct email contact. The final sample consisted of 140 Diabetes Educators (131 females) aged 31-68yrs and working 2-61hrs/week. Participants completed self-report measures of burnout, social support, organisational support and demographic questions.

Results: Results suggest increased burnout is associated with reduced social and organisational support and lower age, but not hours worked. Of the Diabetes Educators in the present sample 27.9% had high levels of emotional exhaustion, 5.0% had high levels of depersonalisation, and 10.0% had low levels of perceived personal accomplishment. Medium burnout levels of emotional exhaustion were experienced by 20.7%, depersonalisation by 10.0%, and perceived personal accomplishment by 16.4% of respondents respectively. There was strong overall prediction of emotional exhaustion with about 24% of the variance explained. The strongest predictors of increased emotional exhaustion were lower age, rural location, smaller support networks and low organisation support. Overall prediction of depersonalisation was 15% of the variance explained, with lower age and lower organisational support contributing strongly to depersonalisation. The overall model for perceived personal accomplishment explained 5% of the variance. Lower perceived personal accomplishment was mainly predicted by lower organisation support, smaller support networks, and lower age. Australian Diabetes Educators sampled experienced lower burnout rates than the average US medical community but similar burnout levels as other Australian healthcare professionals.

Conclusions: Overall, findings suggest that social and organisational support interventions may be useful additions to interventions that target burnout, overall work engagement and psychological health in Australian Diabetes Educators.

Introduction

Burnout is a syndrome of emotional exhaustion, depersonalisation and reduced perceived personal accomplishment that occurs in response to chronic, uncontrollable work stress and inadequate coping and adaptive skills.[1-3] As emotional resources are depleted, workers feel they are no longer able to give of themselves at a psychological level and become emotionally overextended and exhausted by their work.[3] Depersonalisation is an unfeeling and impersonal response towards their clients which can lead workers to view their clients as deserving of their problems.[3] The worker's perceived lack of perceived personal accomplishment in terms of competence impacts on their work with clients.[3] Burnout has been linked to feelings of guilt, absenteeism, job turnover, low productivity, overall ineffectiveness, decreased job satisfaction and reduced commitment to the job,[4] increased levels of depression and reduced levels of social support.[2]

Nurses, including those who specialise as Diabetes Educators (DEs), are exposed to multiple daily stressors including demanding, difficult and aggressive behaviours by distressed, ill, and possibly unmotivated patients, unsupportive work environments and/or work overload. As a result, globally, nursing has among the highest prevalence of burnout of any profession[4] and the rate in Australia is as high as 10.4%.[5] The incidence of burnout has been researched in different nursing specialties, including psychiatry, paediatrics, infectious diseases, emergency, palliative care and aged care but not extensively amongst nurses who are DEs. Burnout may result when DEs work in situations of unmediated stress with no escape, no buffers and/or no support system.[6, 7]

Research into burnout among DEs is limited to one Australian single participant case study which identified the need for DEs to develop self-management skills to reduce the symptoms of burnout but did not identify the incidence of burnout in a larger sample. It also did not compare burnout in DEs, who may come from a nursing or allied health background, to nursing and the medical profession as a whole.[6]

Several factors may affect the stress-burnout relationship including geographic location, number of hours worked, age and social support. A survey of 1,665 social workers found those who worked longer hours showed higher levels of burnout.[8] However, a U S study was unable to determine the long-term impact of reducing work hours.[9] In Australia, burnout has been positively correlated with more hours of work per week with a study of emergency physicians and trainees finding that participants had much better levels of well-being if they worked less than 30 hours per week.[10] The greater the work hours, the higher the emotional exhaustion and depersonalisation aspects of burnout experienced.[10] Nurses and social workers new to the profession, working long hours and with poor levels of support were similarly more likely to experience burnout.[8, 11] Research has found that incidences of burnout were significantly higher for younger employees compared to older employees.[12, 13]

Studies on mental health professionals and substance abuse counsellors found those in rural areas had a higher likelihood of experiencing burnout compared to their urban counterparts.[11, 14] Findings suggest that rural mental health counsellors face more stress and have fewer support resources to assist in coping with their work stress, with professional isolation largely to blame.[14]

The present study examines, for the first time, predictors of burnout and the incidence of burnout in Australian DEs, and compares levels of burnout in Australian DEs with those of other Australian health care professionals and US healthcare professionals.

It was hypothesised that:

a. increased burnout would be predicted by rural geography, low perceived organisational social support levels, younger age and long working hours

b. DEs experience higher rates of burnout compared to
    - the normative data for US physicians and nurses[7]
    - Australian intellectual disability support staff[2]
    - Australian oncology health care workers including physicians and nurses[15] working directly in contact with patients.

Higher rates of burnout are indicated by higher rates of emotional exhaustion and depersonalisation and lower rates of perceived personal accomplishment.

Methods

Participants and recruitment

Members of ADEA who were currently employed as a DE were recruited via social media (Facebook and LinkedIn), the ADEA email newsletters, and direct email (to approximately 1200 CDEs who had contact details listed on the ADEA website). Potential participants were invited to complete an online questionnaire and were eligible to participate if they were 18 years of age or older and currently employed as a DE. The online questionnaire was open for completion for 26 weeks. A response rate could not be estimated as we were unable to measure how many individuals were exposed to the recruitment material. No compensation or inducements were offered to participants.

Out of 159 respondents, data from 140 individuals (9 males and 131 females) was used for analysis (88.1%). Data for 19 individuals (11.9%) was not used as they failed to reconfirm consent at the conclusion of the survey. The 140 participants ranged in age from 31 to 68 years (*M*=50.04, *SD*=8.36) and worked on average 33.39 hours per week ranging from 2 to 61 hours per week (Table 1). Participants were asked to confirm that they were currently working as DEs but were not asked to share their primary discipline.

Table 1: Participant demographics (N =140)

Variable	*n*	%
Sex		
Male	9	6.43
Female	131	93.57
Geographical Location		
Urban	76	54.29
Rural	64	45.71
Inner Regional	45	32.14
Outer Regional	16	11.43
Remote	3	2.14

Note. Geographical location based on Australia Statistical Geography Standard – Remoteness Area (ASGS-RA) geographical classification system.

Rural = Inner regional + outer regional + remote.

Gender split in the study mirrored that of the Australian Diabetes Educators Association (ADEA) Diabetes Educator membership (Oddy K. 2015, personal communication) and was similar to those described in previous research on Australian Diabetes Educators and Australian Registered Nurses.[13, 16]

The online survey was built using Qualtrics[17] and delivered online. SPSS version 21 was used for statistical analyses. Gender differences were not examined due to the low number of male participants. This study was conducted with full human research ethics approval obtained from the University of New England Human Research Ethics Committee (code HE15-033). The word burnout was not included in any of the questionnaires nor in the covering letter. This was to avoid sensitisation to burnout, as instructed by the manual of the MBI.

Measures

Participants completed three self-report measures of burnout and support. Demographic questions regarding sex, age, hours worked and geographic location as specified by the Australian Department of Health[18] were also completed. The Maslach Burnout Inventory (MBI)[3, 7, 19] has 22 items rated on a 7-point Likert type scale from 0 (*Never*) to 6 (*Every day*). The original version of the MBI was employed; sometimes referred to as the MBI Human Services Survey (MBI-HSS). The MBI is commonly employed in research and generally well accepted.[3, 20] The MBI has three subscales:

- Emotional Exhaustion (e.g., 'I feel used up at the end of the workday')
- Depersonalization (e.g., 'I treat some recipients as if they were impersonal objects')
- Perceived Personal Accomplishment (e.g., 'I have accomplished many worthwhile things in my job').

Burnout is indicated by high scores on emotional exhaustion and depersonalisation but with a low score on perceived personal accomplishment. The norms for this scale suggest that a score on any of the subscales can be low (emotional exhaustion≤ 16, depersonalisation ≤ 6, perceived personal accomplishment ≥ 39), medium (emotional exhaustion= 17–26, depersonalisation = 7–12, perceived personal accomplishment = 32–38), or high (emotional exhaustion≥ 27, depersonalisation ≥ 13, perceived personal accomplishment ≤ 31). In the present study, subscale reliabilities were acceptable emotional exhaustion (α=.91), depersonalisation (α=.75), and perceived personal accomplishment (α=.73).

Perceived organisational Support was measured using the Survey of Perceived Organisational Support (POS). The scale contains eight items that have been used as a POS measure in a diverse range of workplaces.[21] The scale asks respondents to judge their organisation's support of staff on 7-point Likert rating scales, from 0 (*strongly disagree*) to 6 (*strongly agree*), with high scores indicating greater support with items such as "the organisation really cares about my wellbeing". Four items were reversed scored. Internal reliability for the present study was excellent (α=.92).

Social support was assessed using the short version of the Social Support Questionnaire Short Form.[22] This version has six questions assessing average satisfaction with social supports and average number of supportive individuals (network) in relation to six questions. Satisfaction was measured on scales ranging from 1 (*very dissatisfied*) to 6 (*very satisfied*). Network size was measured based on the number of supportive individuals on the six questions; participants could list zero to nine individuals per question. Internal reliability for the present study was excellent for network size (α=.90) and support satisfaction (α=.95).

Results

Predictors of burnout

The social support measures correlated moderately with the three different burnout measures (Table 2). Hours worked were not related to burnout and age only seemed to predict depersonalisation. Table 3 shows the regression results for the different predictors of burnout. There was a strong prediction of emotional exhaustion (24%); the strongest

Table 2: Descriptive statistics and correlations for key variables (N=140)

Variable	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
1. Age	-							
2. Hours worked (per week)	.07	-						
3. Emotional Exhaustion (EE)	-.07	.12	-					
4. Depersonalisation (DP)	-.24**	.05	.48**	-				
5. Personal Accomplishment (PA)	.05	.04	-.35**	-.33**	-			
6. Support Number	-.24**	-.15	-.30**	-.02	.23**	-		
7. Support Satisfaction	-.02	-.14	-.38**	-.14	.21*	.49**	-	
8. Perceived Organisational Support	.02	-.13	-.44**	-.30**	.24**	.26**	.33**	-
M	31.00	33.39	19.04	3.05	40.36	3.37	5.23	29.03
SD	8.36	10.69	12.03	4.07	6.26	1.88	1.01	11.75
Actual Range	31-68	2-61	1-45	0-19	14-48	0.17-9	1-6	0-48
Potential Range	≥18	≥1	0-54	0-30	0-48	0-9	1-6	0-48

Note. The higher the EE and DP score the worse the burnout. The lower the PA scores the worse the burnout. *$p \leq .05$. **$p < .01$.

Table 3: Predicting burnout from age, hours worked, location, and social support

		CI$_{95\%}$ for *b*				
Predictor	b	Lower	Upper	β	*r*	*sr*^{2}
Emotional Exhaustion (EE)						
Age	-0.22	-0.44	0.01	-0.15	-.07	.02
Hours worked	0.03	-0.14	0.20	0.03	.12	.00
Location	4.25	0.56	7.95	0.18	.14	.03
Support number	-1.50	-2.62	-0.38	-0.23	-.29	.04
Support satisfaction	-0.81	-2.81	1.19	-0.07	-.24	.00
Organisational support	-0.35	-0.51	-0.19	-0.34	-.43	.10
Depersonalisation (DP)						
Age	-0.12	-0.20	-0.04	-0.25	-.24	.05
Hours worked	0.01	-0.05	0.07	0.03	.05	.00
Location	-0.19	-1.54	1.16	-0.02	-.04	.00
Support number	-0.14	-0.54	0.27	-0.06	-.07	.00
Support satisfaction	0.08	-0.65	0.81	0.02	-.09	.00
Organisational support	-0.10	-0.16	-0.04	-0.29	-.30	.07
Personal Accomplishment (PA)						
Age	0.08	-0.05	0.20	0.10	.05	.01
Support number	0.55	-0.03	1.14	0.17	.16	.02
Organisational support	0.09	0.00	0.18	0.17	.21	.03

Note. The higher the EE and DP score the worse the burnout. The lower the PA scores the worse the burnout. Fit for the EE model $R^2 = .27$, Adjusted $R^2 = .24$, $F(6, 133) = 8.20$, $p < .001$; for the DP model $R^2 = .15$, Adjusted $R^2 = .11$, $F(6, 133) = 3.89$, $p = .001$; and the PA model $R^2 = .08$, Adjusted $R^2 = .05$, $F(4, 135) = 2.97$, $p = .022$. Location coded as 1 = urban and 2 = rural. The squared semi-partial (*sr*^{2}) correlation given is the squared Part correlation from SPSS. The r given is for the zero-order correlation from SPSS.

predictors of increased emotional exhaustion were lower age, rural location, small social support network size, and low organisation support. The overall prediction of depersonalisation was 15% with only lower age and lower organisational support contributing strongly to increased depersonalisation. The model for perceived personal accomplishment explained 5% of the variance. Lower perceived personal accomplishment (worse outcome) was mainly predicted by lower organisation support, smaller support network and lower age. DEs in urban areas had lower emotional exhaustion, higher depersonalisation and lower perceived personal accomplishment than their rural counterparts but these differences were relatively small and not statistically significant.

Burnout: occupational comparisons

Of the DEs in the present sample, 27.9% had high levels of emotional exhaustion, 5.0% had high levels of depersonalisation, and 10.0% had low levels of perceived personal accomplishment. Medium levels of emotional exhaustion were seen in 20.7%, of participants, medium levels of depersonalisation in 10.0%, and medium levels of perceived personal accomplishment in 16.4%.

Table 4: Comparison of means (SD) for burnout in different groups of health care professionals in Australia

MBI scale	Diabetes Educators[a]	Physicians and Nurses[b]	Intellectual disability[c]	Oncology health care[d]
Emotional Exhaustion (EE)	19.04 (12.03)$_{a}$	22.19 (9.53)$_{b}$	17.90 (12.84)$_{a}$	21.3 (19.5)$_{ab}$
Depersonalisation (DP)	3.05 (4.07)$_{a}$	7.12 (5.22)$_{b}$	4.68 (5.39)$_{c}$	4.66 (5.10)$_{c}$
Personal Accomplishment (PA)	40.36 (6.26)$_{a}$	36.53 (7.34)$_{b}$	34.71 (9.17)$_{bc}$	38.5 (6.43)$_{c}$

Note. Parameter estimates in each row that share subscripts do not differ significantly ($p > .05$) based on 95% confidence intervals. MBI = Maslach Burnout Inventory. The higher the EE and DP score the worse the burnout. The lower the PA scores the worse the burnout.

[a] $N = 140$; present study.

[b] MBI norms.

[c] $N = 80$, Australian intellectual disability support staff.[2]

[d] $N = 622$ for EE and DP, $N = 621$ for PA; members of the Clinical Oncological Society of Australia working directly in contact with patients including physicians and nurses.[15]

The results in Table 4 show that the DEs surveyed experienced:

- lower rates of burnout compared to the average US medical community mainly comprising physicians and nurses[7]
- higher emotional exhaustion, lower depersonalisation, and higher perceived personal accomplishment than Australian intellectual disability support staff[2]
- lower depersonalisation and higher perceived personal accomplishment than Australian oncology health care workers, including physicians and nurses, working directly in contact with patients.[15]

Discussion

This study investigated the incidence of burnout in Australian DEs, and examined possible relationships between burnout and geographical location, support, hours worked and age. Surprisingly, hours worked did not contribute strongly to burnout and neither did geographical location. However, social and organisational supports were associated with lower rates of burnout as expected. These findings are consistent with the literature, showing previous findings of greater support being related to lower incidences in burnout.[8, 11, 14, 23-25]

Some demographic characteristics, including age, have been shown to play a role in substance abuse counsellors' and nurses' susceptibility to burnout, with younger counsellors and nurses more susceptible.[13, 26] Results from the present study support previous findings, with age being negatively associated with depersonalisation. It is possible that higher levels of depersonalisation are found in younger DEs because professional education and training cannot always equip new graduates with the skills needed to adequately deal with every possible workplace scenario. Consequently, younger workers may be continually experiencing stress as they struggle to find the necessary resources to deal with new workplace challenges.[13]

DEs experienced significantly lower rates of burnout compared to the average US medical community of physicians and nurses. This result may be due to differences in the culture of the different health care systems. In comparison with the two Australian samples (nurses and intellectual disability workers), the DEs experienced similar levels of burnout overall.

The impact of geographical location and hours worked per week on burnout was also examined. The hypotheses that people working in more isolated areas would experience higher rates of burnout and that increased hours worked per week also increased burnout incidence were not supported. DEs in rural areas showed a trend towards experiencing higher emotional exhaustion and lower perceived personal accomplishment as predicted, however, results were not statistically significant. Rural DEs also experienced lower depersonalisation than their urban counterparts which was opposite to that hypothesised but, again, results were not significant. Overall, results were consistent with the literature in terms of relationship direction between two out of the three facets of burnout and increased isolation[11, 14] but the lack of significance in this study supported other findings of no significance between rural and urban social workers in terms of geographical location.[8]

Hours worked per week was positively correlated with burnout but this relationship was not statistically-significant. Despite this, the direction of the relationship is mostly consistent with the literature, supporting previous findings that those who worked longer hours showed higher levels of exhaustion and depersonalisation.[8,10,11,13]

Clinical implications

Social and organisational support may play a protective role in reducing burnout in Australian DEs. This indicates the potential benefit of targeting support to improve DEs' psychological health and reduce burnout. Further to this, research on burnout has been extended to include both neutral work life (experiencing a neutral stance towards work – experiencing neither joy nor despair[7]) and work engagement which is the positive contrast of burnout. Employees experiencing a neutral work life rarely feel exhausted, distressed, cynical or discouraged. Performance is adequate, health is normal and rewards are sufficient.[7]

Exercise has been found to be an effective intervention for reducing burnout in a sedentary workplace population working a minimum of 20 hours per week.[23] Higher levels of positive well-being and perceived personal accomplishment combined with less psychological distress, perceived stress and emotional exhaustion have been found after four weeks of exercise.[23] Cardiovascular exercise was found to increase well-being and decrease psychological distress, perceived stress, and emotional exhaustion.[23] Resistance training increased well-being and perceived personal accomplishment and reduced perceived stress.[23] Organisations wishing to proactively reduce burnout can do so by encouraging their employees to access regular exercise programs.[23]

Limitations

The modest sample size of this study limits the generalisability of the findings. However, sampling was targeted at ADEA members and represents about 8.4% of the full members. This study may also have been affected by the "healthy worker effect" where the most burned out workers may (a) not even be in a position to take part in the study as they may have been too incapacitated to work, (b) not have had the time or motivation to read the email and complete the survey, or (c) have withdrawn from the survey after finding out the aim of the study due to possible embarrassment or shame. This situation may result in an underestimation of the true incidence of burnout.[13]

The present study's cross-sectional design limits causal conclusions. Furthermore, it does not rule out the influences of other variables such as stress, depression and anxiety which were not assessed. It would have been ideal to run a longitudinal study to examine how different factors (e.g., support, hours worked) may affect burnout over time and to investigate the impact possible interventions such as exercise programs may have on burnout. However, given the limited number of participants willing to take part in a relatively short survey, it is likely that any longitudinal study will need major incentives and the support of health services to enable researchers to recruit a large representative cohort.

Future research

Research has found that some employees, regardless of high job demands and long working hours, do not develop burnout, but seem to thrive in such environments.[27] Engagement is defined as a positive, fulfilling, work related state of mind that is characterised by three dimensions, namely vigour, dedication and absorption. Vigour refers to having high energy levels, resilience regarding work activities, investing effort in one's work and persistence in difficult circumstances. Dedication includes a sense of significance, enthusiasm, inspiration, pride and challenge, while absorption is characterised by full concentration on and engrossment in one's work, and finding it difficult to detach oneself from work.[27] Engagement is theoretically viewed as the opposite end of the continuum from burnout; it cannot be effectively measured by the Maslach Burnout Inventory (MBI), but is measured by its own survey, the Utrecht Work Engagement Scale (UWES).[27]

Future research could incorporate measuring baseline measures of engagement using the Utrecht Work Engagement Scale (UWES).[28] The UWES measures levels of engagement on the three dimensions of vigour (six items: e.g. "I am bursting with energy in my work"), dedication (five items; e.g., "I find my work full of meaning and purpose") and absorption (six items; e.g., "When I am working, I forget everything else around me").[27]

Measures such as stress, depression, anxiety and intention to leave the profession could also be included when measuring burnout, to help in determining the predictors of burnout. Investigating the benefits of interventions such as exercise to combat burnout would also be valuable.

Conclusion

The present study is the first study to examine incidence of burnout in Australian DEs. Social and organisational support is essential to reduce burnout. Australian DEs experience similar levels of emotional exhaustion burnout as their healthcare colleagues in Australia. However, they experience less burnout than their US healthcare colleagues based on measures of emotional exhaustion, depersonalisation, and perceived personal accomplishment. More than a quarter of Australian DEs surveyed experienced high levels of emotional exhaustion suggesting that more interventions and work places changes are needed to reduce burnout.

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Feature article

Footwear and diabetes

David Allen, Ba App. Sci (Pod.), M. Hlth Lead & Mgmt.

Introduction

Foot disease is unfortunately a common and serious complication of diabetes and can lead to ulceration and amputation. The careful individualised prescription and use of high quality and good fitting footwear may help motivated people living with diabetes avoid further foot complications.

Background

Unfortunately, as the rate of diabetes amongst the population increases, so does the rate of associated complications. Foot disease is a serious complication of diabetes characterised by peripheral neuropathy, peripheral vascular disease and sometimes deformity. These adverse changes can contribute to the development of foot ulcers, commonly cited to occur in 15 to 25% of people living with diabetes. However, recent research has shown rates to be as high as 19 to 34%.[1] Foot ulceration is the leading cause of lower limb amputation and is associated with significant increases in morbidity and mortality. People living with diabetes and a foot ulcer have a 2.5-fold higher risk of death at 5 years and a two-fold higher risk at 10 years than a person who has diabetes without a foot ulcer.[1-3] Prevention of foot ulceration reduces risk of amputation and lowers rates of morbidity and mortality, and footwear plays a vital role in the prevention of ulceration and of ulcer recurrence.

Screening and footwear

Screening for foot complications is essential for all people living with diabetes.[2] This screening should involve assessment of their lower limb arterial supply, sensation and foot shape to help identify a high risk foot. The risk of ulceration for an individual with diabetes is increased 32.2% with any two of the following: neuropathy, peripheral arterial disease, a previous amputation or a previous foot ulcer.[2] Assessment of the foot should seek to identify any deformities such as an amputation, a high or low arch, clawed toes and loss of fat padding over the plantar surface (sole) of the feet.[1,2] These deformities may lead to high pressure areas that are prone to ulceration. Image 1 shows the foot of a person living with diabetes who has developed a deformity after having a partial foot amputation. This deformity has led to subsequent ulceration and requires a careful selection of footwear (although in the long term this person may benefit from foot surgery to help correct some of the foot deformity).

Image 1: A person with diabetes has developed a foot deformity after a partial foot amputation which has ultimately resulted in a new foot ulcer.

Once an individual's risk status for foot ulceration has been established, appropriate footwear can be prescribed and should be selected based upon its appropriateness for the individual's unique needs. For example, a person living with diabetes and peripheral arterial disease, peripheral neuropathy and clawed toes, will need a shoe that has a deep toe box, allowing sufficient space so that their clawed toes do not have any pressure over them.[3] The shoe upper should be soft and flexible, without exposed seams, yet the shoe should be secure (with laces, ideally) and also be able to accommodate an insole.

Table 1 shows some risk categories that can be used to help prescribe appropriate footwear based on screening. Schaper et al, recommend people fitting into category '0' can be prescribed good fitting off-the-shelf footwear, however they advise extra care for the prescription of footwear for patients fitting category '1' and higher.[3] Bergin et al advise all people living with diabetes to have their shoes professionally fitted and that those at higher risk, or category '2' and '3', have specialised footwear assessment and advice.[4]

Table 1: Risk categorisation and associated podiatry/foot clinic follow-up and footwear recommendations

Category	Characteristics	Frequency	Footwear
0	No peripheral neuropathy	Once per year	Fitted off-the-shelf footwear
1	Peripheral neuropathy	Once every 6 months	Carefully prescribed and fitted off-the-shelf footwear/ possibly specialised advice if foot deformity present
2	Peripheral neuropathy with peripheral arterial disease and/or a foot deformity	Once every 3-6 months	Specialised footwear assessment and prescription
3	Peripheral neuropathy and a history of foot ulcer or lower- extremity amputation	Once every 1-3 months	Specialised footwear assessment and prescription

Adapted from Schaper et al (2016), The International Working Group on the Diabetic Foot (IWGDF) risk classification system 2015 and preventative screening frequency.

Education and footwear

Peripheral neuropathy, affecting some 30-50% of all people living with diabetes, is one of the main causes of diabetes related foot problems and is responsible for between 45 and 60% of ulcers.[5,6] It also appears responsible for more hospital admissions than the combined total of all other diabetes complications.[6] Foot care education should be tailored specifically to suit people living with diabetes who have sensation loss and those who have had a previous foot ulcer. A more intensive education process may be needed for individuals with less understanding of the disease process.[1,7,8] This education should have a major focus on footwear. Unfortunately, there is currently a lack of evidence to support the effectiveness of education to prevent a recurrence of foot ulcer, however there is little to be lost by providing such education and much to be potentially gained.[9] It appears that strategies to encourage people living with diabetes and a prior foot ulcer to obtain custom-made footwear could be improved. Study findings show that custom made footwear is not worn as much as it should be by this group of individuals, increasing their risk of re-ulceration.[10]

People living with diabetes should be taught to monitor their feet at home for any signs of bruising, callus, infections or wounds and they should be encouraged to check their feet daily for redness or swelling in their feet, especially if they have peripheral neuropathy. Of course, should they notice any abnormalities with their feet, they should seek further assessment and advice from a health professional. Since people with peripheral neuropathy are not receiving the normal sensory feedback that would be associated with a foot pathology, they may be less aware of harmful, ill-fitting footwear.

Footwear prescription

Foot ulcers in persons with diabetes may be prevented by the use of high quality and good fitting footwear and insoles, especially when they have been shown to have a pressure relieving effect.[5,7,9] It should be noted, however, that there is little evidence to support these devices for the prevention of a first ulcer, and further research is needed.[9,11] A generic shoe design (using optimisation of a rocker sole) may effectively lower plantar foot pressure in a similar manner to a custom made shoe and provide a footwear choice for a person living with diabetes to reduce their chance of developing a first ulcer.[12] This could influence footwear prescription in the future, although once again, more research and industry development is needed.

Prescribed footwear and insoles should be worn at all times during the day, both in and outside the house and worn in gradually with regular foot checks for any signs of rubbing or trauma.[3,9,10] Due to the association with higher and altered foot loads in people living with both diabetes and peripheral neuropathy, ulceration can occur with inappropriate footwear selection.[1,13]

Footwear should be selected to meet the following criteria for people living with diabetes:[3,4,7]

- Protect against high and low temperatures
- Be resilient/high quality
- Reduce plantar (sole) pressure
- Provide stability
- Not have hard, rough or unprotected seams that rub the foot
- Have good fit and width, without applying compression on the foot (generally around 1-2cm longer than the toes) and be fitted professionally. The feet should not cause the shoe sides to bulge over the shoe sole when they are worn.
- Fit securely, with easy adjustment-lace up or Velcro straps being preferable
- Be reasonably light weight
- Have a removable insole with enough depth to fit an orthotic with padding around the forefoot (ideally an orthotic would be fitted at the same time, or prior to the footwear fitting)
- Offer impact absorption
- Bend at the 'ball of the foot' (metatarso-phalangeal joint area), but be stiff at the centre of the shoe when the shoe is wrung out (like washing) or folded
- Have an enclosed, firm, but padded heel counter that does not slip or rub
- When the person walks in the shoe, it should move with their foot as one unit, rather than work against their foot.

Footwear should be fitted in the afternoon to account for dependent oedema

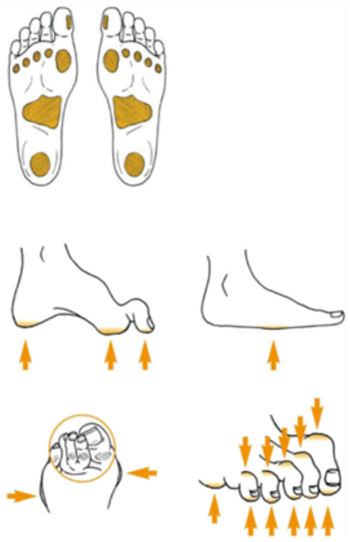
Footwear and wounds

When a wound is present, a complete pressure off-loading device (for example a knee walker), a total contact cast or an irremovable fixed ankle walking boot is best to support healing.[5,11,14] The choice of device will depend upon the individual and is best selected by an experienced clinician. Unfortunately, foot ulcers can commonly return, with around 40% recurring after 1 year of healing, 60% within 3 years and 65% within 5 years, leading some researchers to suggest that people with a 'healed' wound are in ulcer remission rather than 'healed'.[1] Footwear is therefore also extremely important for people who have previously had a foot ulcer, and simple additions (such as a padded insole) can be made to decrease high pressure regions over a vulnerable foot.[13] Custom made total contact insoles or foot orthotics have been shown to be effective to help reduce the risk of re-ulceration when they are worn regularly and these should be encouraged, especially for those individuals with a history of a previous foot ulcer.[1,5,14]

Figure 1

Shoe width. Image taken from Schaper et al (2016).

Figure 2



Common sites at risk of ulceration that may be influenced with footwear selection. Image taken from Schaper et al (2016).

Footwear access

Footwear can sometimes be quite costly, especially so if the footwear is custom made and with custom foot orthoses. States and territories around Australia offer government schemes that offer financial support for eligible individuals. These schemes often require qualified practitioners to conduct a footwear assessment and complete an application together with the person living with diabetes. Many public hospitals and community health services that provide foot care for people living with diabetes will know of, or be able to access these schemes.

Summary

There are several features that need to be considered when prescribing appropriate footwear for people with diabetes and they should be based upon an individual's needs. At this stage there is a lack of evidence to support the best type of footwear for prevention of a first ulcer, with most of the available evidence based around ulcer recurrence. However, it could be assumed that similar strategies could be successfully used for prevention of a first ulcer. By providing advice about suitable footwear to people living with diabetes and with complex foot problems, experienced clinicians can help these individuals to obtain the best outcomes.

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NDSS Updates

ndss
national diabetes services scheme

NDSS Helpline

The NDSS Helpline is available for people living with diabetes to obtain information and support, sign up for events or support programs, or speak to a health professional.

Diabetes educators can contact the Helpline for more information on the NDSS and the services available, as well as to request copies of a range of NDSS resources. Diabetes educators can also contact their relevant state or territory NDSS Agent for information about upcoming local events. Contact the NDSS Helpline on 1300 136 588.

For further information visit ndss.com.au

Continuous Glucose Monitoring through the NDSS

For the first time, thousands of Australian families have free access to continuous glucose monitoring (CGM) through the National Diabetes Services Scheme (NDSS), and more children and young people are accessing CGM through the NDSS every day.

Credentialled Diabetes Educators (CDEs) play a key role in supporting people with diabetes who are using CGM. Some of the responsibilities of the CDE, working in collaboration with the multidisciplinary diabetes team, and guided by the CDE's individual scope of practice, may include:

- Certify CGM Eligibility Assessment Form
- Provide CGM training and support, including setting personalised low/high alerts, for people with diabetes starting on new devices
- Ensure that the device is configured correctly, including date and time, and operates according to manufacturer's requirements
- Work collaboratively with the treating endocrinologist and user to determine initial settings and help with necessary adjustments to insulin therapy (MDI or CSII) based on CGM data
- Work with the wearer to support their lifestyle goals and choices
- Emphasise the importance of device calibration
- Regularly assess the suitability of the CGM device and the clinical benefit of use for the individual
- Complete an CGM Update and Termination form if a change of device or termination of access through the NDSS is required (a person with diabetes or their carer can also elect to end their access to CGM by completing the CGM Update or Termination form)

You can find copies of the forms relevant to the Government-funded CGM Initiative on the NDSS website at ndss.com.au/cgm

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