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Interprofessional learning through simulation

Case management of chronic disease: *diabetes in the community*

Health Simulation Centre

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Acknowledgements

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Foreword

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Australia's health workforce is facing unprecedented challenges. Supply won't meet demand, and the safety and quality of care remain key issues. The national health workforce agency, Health Workforce Australia (HWA), an initiative of the Council of Australian Governments (COAG), has been established to address the challenges of providing a workforce that meets the needs of our community – now and in the future.

Accordingly, ECU has set a priority on meeting these challenges, with a focus on the national health workforce reform agenda set out in the 2008 National Partnership Agreement (NPA) on Hospital and Health Workforce Reform.

In June 2010, ECU was awarded $4.6M from the Australian Government through a nationally competitive process under the ICTC Program, an initiative which aims to develop interprofessional learning and practice capabilities in the Australian health workforce.

The IpAC Program aims to complement traditional clinical placement activities with high quality interprofessional learning competency development and assessment, so that at the earliest point students gain exposure to best work practices within multidisciplinary teams that have the patient's individual needs as the focus.

Additionally, the IpAC Program has developed interprofessional learning resources and interprofessional health simulation challenges in collaboration with the ECU Health Simulation Centre. The ECU Health Simulation Centre is recognised internationally as a

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specialist centre in providing human factors based sequential simulation programs using professional actors. Most simulated learning interactions revolve around a single moment, such as a patient's admission to the emergency department. What we provide at the ECU Health Simulation Centre is a sequential simulated learning event that follows the patient and carer's journey through the healthcare system, for example, from the accident site following a motor vehicle accident, to the emergency department, to a hospital ward, to their home and into the community for GP and allied health follow-up.

Human factors in health care are the non-technical factors that impact on patient care, including communication, teamwork and leadership. Awareness of and attention to the negative aspects of clinical human factors improves patient care.

ECU's involvement in national health workforce reform is all about playing a role that enables the health workforce to better respond to the evolving care needs of the Australian community in accordance with the NPA's agenda. The IpAC Program is an example of how we can work across sectors, nationally and internationally, to determine better ways of addressing the pressing issue of how best to prepare students for the workplace and thus assuring that health systems have safe, high quality health services.

Interprofessional Ambulatory Care Program

ECU's IpAC Program was established with support from the Australian Federal Government through funding from the ICTC Program. The IpAC Program aims to deliver a world-class interprofessional learning environment and community clinic that develops collaborative practice among health professionals and optimises chronic disease self-management for clients.

This is achieved through the provision of clinical placements within the multidisciplinary team at the IpAC Unit, a community clinic that develops communication and collaboration among health professionals and optimises chronic disease self-management for clients. Additionally, a range of clinical placements are offered at existing health facilities, where trained IpAC Program clinical supervisors provide clinical support and ensure the integration of interprofessional learning into each clinical placement.

The IpAC Unit, in collaboration with the ECU Health Simulation Centre, has developed a range of interprofessional learning through simulation resources. These learning resources are packages consisting of an audiovisual resource and a facilitator's manual, and aim to facilitate interprofessional learning and to support the participants in the development of interprofessional skills.

The interprofessional learning through simulation resources developed by the IpAC Program aim to provide health students and health professionals with the opportunity to learn with, from and about one another by engaging them in interactive live simulation events. These simulations encourage students and professionals to challenge themselves and each other in a safe learning environment.

ECU Health Simulation Centre

ECU houses the only fully functioning Health Simulation Centre of its kind in Western Australia, specifically designed and equipped to address the interprofessional learning needs of the health workforce and implementation of both state and national safety and quality frameworks.

The ECU Health Simulation Centre offers health workforce training and development specialising in clinical skills, human factors, and patient safety training for multidisciplinary health teams. Using a variety of educational techniques, including a broad range of simulation mannequins, professional actors and task trainers, ECU specialises in immersive simulation and observational learning. Supporting the ECU Health Simulation Centre are nursing, medical, paramedic and psychology academic and technical staff whose aim is to cultivate the development of competent and confident health professionals centred on enhancing patient safety.

Interprofessional learning

Interprofessional education occurs when two or more professions learn with, from and about each other in order to improve collaboration and quality of care (Centre for the Advancement of Interprofessional Education, 2002).

Interprofessional learning is the learning arising from interaction between students or members of two or more professions. This may be a product of interprofessional education or happen spontaneously in the workplace or in education settings (Freeth, Hammick, Reeves, Barr, & Koppel, 2005). It has been found that interprofessional education can improve collaborative practice, enhance delivery of services and have a positive impact on patient care (Canadian Interprofessional Health Collaborative (CIHC), 2008).

The World Health Organization (WHO) has recognised the importance of interprofessional education and collaborative practice in developing a health workforce that is able to meet the complex health challenges facing the world and assist in the achievement of the health-related Millennium Development Goals (World Health Organization, 2010). In developing its framework for action, the WHO have recognised that models of interprofessional collaboration are most effective when they consider the regional issues and priority areas (including areas of unmet need) in the local population (World Health Organization, 2010). In doing so, interprofessional education and collaborative practice can best maximise local health resources, reduce service duplication, advance coordinated and integrated patient care, ensure patient safety and increase health professional's job satisfaction (World Health Organization, 2010).

The end goal of interprofessional education is to create a health workforce with improved levels of teamwork, collaboration, knowledge-sharing and problem-solving, eventually leading to better patient and client outcomes in health settings (Braithwaite et al., 2007).

Interprofessional learning through simulation

Simulation in education refers to the re-creation of an event that is as closely linked to reality as possible. Gaba (2004) defined simulation as a technique, rather than a technology, to replace or amplify real life experiences with guided experiences often immersive in nature to evoke or replicate aspects of the real world, in a fully interactive pattern. Simulation provides a safe learning environment for students to practice, where they are free to make mistakes, correct them and improve the processes of care (Kenaszchuk, MacMillan, van Soeren, & Reeves, 2011). Simulation is the bridge between classroom learning and the real life clinical experience, allowing students to put theory into practice.

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Interprofessional learning through simulation combines the principles of interprofessional learning and the use of simulation as an educational methodology. Interprofessional learning through simulation provides students with the opportunity to practice working with other health professionals and allows participants to explore collaborative ways of improving communication aspects of clinical care (Kenaszchuk, et al., 2011).

Many of the interdisciplinary team core competencies, such as problem solving, respect, communication, shared knowledge and skills, patient-centred practice, and the ability to work collaboratively (Canadian Interprofessional Health Collaborative, 2010) can all be developed by interprofessional learning through simulation.

Teamwork and interprofessional practice and learning are being recognised as central to improving client care and outcomes and enhancing client safety (Sargent, 2008). Promoting patient safety through team efforts is one of the five core competencies identified by the Institute of Medicine (2003).

In today's healthcare setting, no one health professional can meet all of the client's needs and therefore a healthcare team approach is required. Interprofessional learning through simulation provides learning opportunities to prepare future healthcare professionals for the collaborative models of healthcare being developed internationally (Baker et al., 2008).

How to use this resource package

This interprofessional learning through simulation resource package has been designed to support the facilitation of interprofessional learning among students and practitioners with an interest in developing their skills and knowledge of interprofessional practice.

The package consists of two components: an audiovisual resource and a supporting manual. In order to optimise the learning opportunities from this package it is recommended that participants are firstly introduced to the concepts of interprofessional learning and human factors in health care.

The audiovisual resource consists of two scenarios, the first demonstrating sub-optimal performance of the healthcare team, with the second demonstrating more effective performance, improving the patient experience. The package has been created in a format

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to enable flexibility in its application depending of the educational setting. We recommend the following format:

1. Facilitator guided discussion around the concepts of interprofessional learning and human factors in health care
2. View scenario 1 of the audiovisual resource
3. Facilitator guided discussion around the scenario specific learning competency areas (samples given within manual)
4. View scenario 2 of audiovisual resource
5. Facilitator guided discussion, identifying and discussing the changes witnessed and how this resulted in an alternative outcome. In particular discussion relating the causes of these changes to personal (future) practice is essential in improving interprofessional practice.

Opportunities for further reading and exploration of the scenario are provided in the *Further Information* and *References* sections of this resource manual.

Scenario brief

Julie, a newly diagnosed patient with type 2 diabetes, has an appointment with her general practitioner (GP). He prescribes medication to help increase her insulin levels, and recommends that she undertakes some lifestyle changes to address her excess weight. No referrals are provided.

Subsequently Julie visits a dietitian and exercise physiologist to assist with diet choices and weight loss. The dietitian and exercise physiologist do not have any referring information and must rely on Julie to provide details regarding her condition, medications and treatment plan. Julie becomes confused by conflicting messages regarding her treatment. This leads to her having a hypoglycaemic episode and subsequently refusing medication and further care.

List of characters
- Dietitian
- Diabetes Educator
- Exercise Physiologist
- General Practitioner
- Patient

Key learning competencies

The key learning competencies for this scenario are based on the IpAC Program learning objectives as well as the Canadian Interprofessional Health Collaborative (CIHC) Competency Framework (Canadian Interprofessional Health Collaborative, 2010). The specific competency areas for this scenario are:
- Interprofessional and client centred communication
- Role clarification
- Client centred care
- Perceptions and attitudes influencing practice

Interprofessional and client centred communication

The health care team consists of health professionals, the client and the family. The interaction within the health care team demonstrates:
- Communication is authentic, consistent and demonstrates trust.

- Team members demonstrate active listening skills.
- Communication ensures a common understanding of decisions made.
- Trusting relationships with clients /families and other team members.
- Other disciplines' roles are promoted and supported to client/family.

Role clarification

The interaction between the health care team demonstrates:
- Awareness of knowledge and competencies of own role as well as those of other members of the health care team.
- Clear communication of the health professional's role, knowledge, skills, and attitudes.
- Health professionals are respectful of and understand the importance of the roles of others in the health care team.
- Team members identify overlap between disciplines, and value diversity of disciplines.
- Each team member works within scope of practice.
- Each team member demonstrates respect and professional behaviours for different disciplines.
- Questions to clarify roles, responsibilities and skills within the care team are encouraged.

Client centred care

The interaction between team members and the client demonstrates:
- The sharing of information with clients in a respectful manner.
- Communicating with the client in a way that is transparent, understandable, free of jargon, and relates to the client's daily life.
- Listening to the needs of all parties to ensure the most appropriate care is provided.
- The interaction is supportive to the client and his or her needs.
- Facilitation of client decision making.

Perceptions and attitudes influencing practice

Reflective practice is crucial in continuous development and re-assessment of skills when working in health care. A reflective practitioner:
- Reflects on feedback and integrates changes into practice.

- Reflects on how own perceptions, attitudes and beliefs impact on practice.
- Identifies knowledge deficits and seeks clarification.

Key discussion points

Scenario 1

The following discussion points are useful in considering scenario 1 of this resource package.

For each of the characters (Client, General Practitioner, Dietitian, Exercise Physiologist and Diabetes Educator), reflect on these questions:

- What did this character do well?
- Why did this go well? What were the character's skills, knowledge and attitudes for this to go well?
- What did not go well?
- What reasons would this person have for doing things the way he/she did?
- What would this character need to change for a better outcome?
- What would help this character to make these changes?

Additionally, for each of the competency areas a set of facilitation questions have been provided, which can be used by the facilitator to highlight a specific competency.

Interprofessional and client centred communication

How would you describe the quality of communication in this scenario?

A: This scenario shows poor client-centred communication skills, as well as a lack of communication between the health professionals.

Do you think that the client was satisfied with the communication they were receiving from the healthcare team? Why do you think this?

A: Time constraints often affect how health professionals interact with clients. The client is showing respect for the health professionals by not asking questions nor asking for clarification or further referral. This leads to incomplete or for the client conflicting information. Additionally, the Dietitian and Exercise Physiologist do not speak positively about other members of the health care team, thus affecting the trust the client has in health professionals in general.

Whose responsibility is it to provide/ask for information?

A: Client could ask for more information, but health care providers should check knowledge with client, and address any gaps in knowledge.

Which character could have asked for or provided more information?

A: Each character in this scenario has missed out on information sharing opportunities.

How do you think the general communication in this scenario could have been improved?

A: Non-verbal communication skills of each health professional could improve, Health professionals could have checked with the client whether she understood the information, and if necessary provide information in a relevant format for the client.

How could the communication between the health professionals improve?

A: Referrals, and feedback between the health professionals.

Role clarification

What can each health professional offer a diabetes client? Does each of the health professionals know what the other health professionals can offer the client?

A: This is what the role description section of the audiovisual resource has been developed for. Each health professional describes their involvement in diabetes management.

Do the health professionals support each other? What effect has this on the client? How can this be addressed?

A: The health professionals do not speak positively about the other health professionals, which leads the client to lose faith in the people that she expects to look after her. Speaking in solutions, rather than in complaints, would positively affect the client's view of the health professionals.

Does the client know what each health professional does?

A: Not necessarily. She went to see the dietician to lose weight, but a dietician can do much more. She goes to the exercise physiologist for the same reason. This can be a good opportunity for students to clarify the role of their discipline.

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Client centred care

How do you think the client is feeling? Why is this?

Do you believe the health professionals were acting in the best interests of the client? What gave you this impression? Why did the health professionals behave like this? How can negative behaviour be prevented?

Do you think the client is effectively comprehending the information she is being told by the health professionals? What do you think she comprehends and what do you think she is struggling with? How could this be improved?

> **A:** The information provided could be checked with the client more: how would the client make the suggested changes, and why. The dietitian makes an assumption regarding her medication. A referral from the GP would have helped, but she also needs to check this information, before basing care provision on an assumption.

Do you think the client feels part of the care team? Is this good or bad?

> **A:** The client is expecting the health professionals to look after her and make decisions for her. She will however have to be actively involved in the management of this chronic condition, as she will have to manage her diabetes over time.

Do you think the client feels empowered to direct her own diabetes self management? How could this be improved?

> **A:** The client has not been encouraged to reflect on what changes exactly she needs to make to her life, based on the diagnosis and information given.

Perceptions and attitudes influencing practice

What perceptions and attitudes affected how you viewed the characters of this scenario?

> **A:** Some pre-existing assumptions about some of the professions in this scenario are easily confirmed. Make students aware of (own) pre-existing assumptions and beliefs and that this affects collaboration.

What perceptions and attitudes do you think the different health professionals have brought to this scenario? How have these perceptions and attitudes affected their behaviour?

> **A:** For example: the GP may have thought to have to look after the client single-handedly, and because of unawareness of the other discipline's skills in diabetes management may

What attitudes do you think the health professionals have towards each other? How are
these attitudes being influenced by their current interactions?

A: The dietitian may not have much faith in the GP, which is confirmed in her eyes when
there is no referral, no information passed on to her. In return, she does not pass
information back to the GP, which is likely to affect his future choices for referral.

Are the health practitioners aware of gaps in their knowledge? Do they address any gaps in
their knowledge?

A: No. The GP may not have known of the availability of a diabetes educator in
collaboration with the dietitian. The dietitian can inform the GP of this opportunity. She on
her side may assume he is not willing to refer.

A: No. The dietitian assumes the client knows what medication she takes, and that the
information provided will help her self-manage this condition. She does not check
knowledge with the client, and does not explain the different medications to the client.

A: No. The exercise physiologist assumes the client knows what he does and that she
knows how to check her blood glucose levels. More verification of knowledge with the
client and contact with the other health professionals involved would have ensured better
client care and outcomes.

Key discussion points

Scenario 2

- What did you notice had changed from Part 1 of the scenario? How did these
  changes impact on the final outcome?
- How do you think the healthcare team operated in the revised scenario? What were
  some of the specific changes that occurred and how did this affect the dynamics in
  the revised scenario?
- How do you think the client felt in the revised scenario? Why?
- What were some of the specific improvements made in regards to communication –
  with the family, within the team?

Encourage participants to reflect on their own practice:

- How can you ensure the interprofessional learning objectives are addressed in your interprofessional and client-centred practice?

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Literature review

Type 2 diabetes mellitus (also known as non-insulin-dependent diabetes mellitus or adult-onset diabetes) is a metabolic disorder characterised by high blood glucose resulting from a defect in insulin secretion, insulin action, or both (Vermeire et al., 2005). The exact cause of type 2 diabetes is unknown and sufferers may be asymptomatic for a prolonged period of time before a diagnosis is made (Luger & Chabanuk, 2009). Symptoms that may provide cause for testing for type 2 diabetes include increased thirst or urination, numbing of extremities, impotence, blurred vision and fatigue (Vijan, 2010). Diagnosis is made with tests that measure blood glucose levels (Vijan, 2010).

Diabetes is the fastest growing non-infectious disease in the world (Peyrot, Skovlund, & D. I. A. P., 2005). The financial cost of diabetes is immense and continues to increase making it the most costly health condition in Westernised countries (Duke, Colagiuri, & Colagiuri, 2009; Peyrot, et al., 2005). It is estimated that diabetes care costs 5% of total resources and 10% of hospital in-patient resources in the United Kingdom (Kirby, 2004). In the US, spending on diabetes treatment exceeded $130 billion in 2005 (Luger & Chabanuk, 2009). In Australia, rates of diagnosed diabetes have trebled since 1989–1990 and are estimated to account for nearly 6.6% of Australia's total disease burden (Australian Institute of Health and Welfare, 2010).

Therefore, in 2006, the General Assembly of the United Nations agreed to classify diabetes as a global priority and resolved to develop policies for diabetes prevention, treatment and care (Coates et al., 2008). The 192 member states of the United Nations recognised the global threat of diabetes as comparable to the serious infectious epidemics of HIV/AIDS, tuberculosis and severe respiratory syndrome (SARS) (Hirst, 2007).

The incidence of type 2 diabetes is increasing worldwide (Vermeire, et al., 2005). In the early 1990s, the prevalence of type 2 diabetes was about 0.75% of the world's population (Goldie, 2008). The International Diabetes Federation estimated that in 2003, 194 million people suffered from diabetes and that this is predicted to increase to 333 million by 2025 (Duke, et al., 2009). Likewise, the World Health Organization (WHO) predicts a doubling in numbers of diabetes sufferers globally between 2010 and 2030 (Bailey & Kodack, 2011).

Most of the increase in diabetes prevalence is predicted to occur in developing countries where the majority of sufferers aged under 65 will reside by 2025 (Duke, et al., 2009). Social trends analyses suggest that this rise in rates of type 2 diabetes is associated with the adoption of a more Western lifestyle (Pinhas-Hamiel & Zeitler, 2005; Renders et al., 2001).

Over the past decade there has also been an increase in the number of children and adolescents being diagnosed with type 2 diabetes, some as young as 7 years of age (Goldie, 2008; Pinhas-Hamiel & Zeitler, 2005). This rise was initially recognised in the United States in the 1990s but has now been evidenced in many parts of the world, including Asia and Europe (Pinhas-Hamiel & Zeitler, 2005). In the past 15 years, the proportion of children and adolescents diagnosed with type 2 diabetes (as opposed to type 1 diabetes) has risen from less than 3% of all cases to up to 45% of new-onset cases among adolescents (Pinhas-Hamiel & Zeitler, 2005). This appears to be related to increases in diagnosis in the general population, the increasing incidence of obesity in both adults and children and changing ethnic mix (Pinhas-Hamiel & Zeitler, 2005; Vijan, 2010).

Risk Factors

A major risk factor for type 2 diabetes is a family history of the disease. The genetic predictors behind the disease are complex and ill-defined but there appears to be a strong genetic predisposition with people being at increased risk of developing diabetes if they have a first-degree relative who suffers from the disease (ACSM & ADA, 2010; Nield, Summerbell, Hooper, Whittaker, & Moore, 2008).

Ethnicity is another major risk factor for type 2 diabetes and is seen as a major contributor in the health inequalities faced by Indigenous peoples in developed countries (McNamara, Sanson-Fisher, D'Este, & Eades, 2011). In Australia, the prevalence of diabetes is 2–4 times greater among Indigenous people with complications at a rate of 5–30 times that of non-Indigenous people (Harris, 2008). Indigenous Australians also have a 13-year lower life expectancy which can in part be attributed to the high rates of diabetes in this group; as can the 8–9 years lower life expectancy for Maori peoples in New Zealand (McNamara, et al., 2011).

Within North America, it is estimated that of people born on or after the year 2000 the lifetime risk for developing diabetes is one in three (ACSM & ADA, 2010). However, in high-

risk ethnic populations such as African Americans, Latinos, native Americans, Asian Americans, native Hawaiians, and other pacific islanders the risk of developing diabetes may be up to 50% (ACSM & ADA, 2010; Vijan, 2010).

Obesity is another significant risk factor in developing type 2 diabetes (Kyrou & Kumar, 2010). Approximately 80% of people who develop type 2 diabetes are obese (Nield, et al., 2008). Obesity is believed to induce insulin resistance and pancreatic beta-cell dysfunction leading to hyperglycaemia and in the longer term type 2 diabetes (Kyrou & Kumar, 2010). Other risk factors include women who had diabetes when they were pregnant (known as gestational diabetes) and age: the risk of developing diabetes increases substantially in those aged over 40 years (25 years in South Asian and Afro-Caribbean people) (Goldie, 2008; Harris, 2008; Vijan, 2010).

Complications of Diabetes

Type 2 diabetes can have a long asymptomatic phase before a diagnosis is made and during this time up to half of all diabetes sufferers develop early disease complications (Harris, 2008; Vijan, 2010). Newly diagnosed diabetic patients may have been hyperglycaemic for up to 10 years before diagnosis resulting in up to 20% already having some tissue complications by the time they are diagnosed (Nield, et al., 2008). These complications require expensive health care resources and negatively impact on an individual's quality of life (Arevian, 2005). It has also been calculated that one person dies from the complications of diabetes every 10 seconds (Hirst, 2007).

Macro and micro-vascular disease are the most significant diabetes-related causes of morbidity and mortality (Vermeire, et al., 2005). The annual cost of diabetes care is twice as high in people requiring intervention for both micro-vascular and macro-vascular complications compared to people with no complications (Duke, et al., 2009).

Macro-vascular disease

Macro-vascular disease is a disease of the large blood vessels, including the coronary arteries, the aorta, and the sizable arteries in the brain and in the limbs. Individuals with type 2 diabetes have a two- to three-fold increased risk of macro-vascular disease (Renders, et al., 2001). Risk depends on age, sex, family history, and lifestyle choices (Vermeire, et al., 2005). The common complications of macro-vascular diseases found in individuals with type

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2 diabetes are hypertension, coronary heart disease, peripheral arterial disease and stroke (Fowler, 2008). It has been established that macro-vascular complications are nearly twice as common as micro-vascular complications in individuals with type 2 diabetes (National Health & Medical Research Council, 2005).

About 65% of people with diabetes die from cardiovascular disease and their life expectancy can be reduced by up to 15 years (Harris, 2008). Cardiovascular disease is responsible for the greatest proportion of health costs in caring for people with diabetes (Fowler, 2008). Most studies indicate that risk of stroke is increased in type 2 diabetes by between 150-400% (Fowler, 2008; National Health & Medical Research Council, 2005).

Controlling blood pressure and cholesterol are essential to prevent and treat macro-vascular complications of diabetes (Nuzum & Merz, 2009). This is achieved by encouraging lifestyle changes including quitting smoking, undertaking regular physical activity and eating a diet low in saturated fats, trans fats and cholesterol (Nuzum & Merz, 2009). Ultimately, however, the majority of individuals with diabetes will not be able to achieve blood pressure and cholesterol targets without medication (Fowler, 2008; Nuzum & Merz, 2009).

Micro-vascular disease

Micro-vascular disease refers to the damage that occurs to the smallest blood vessels throughout the body. Damage to the very small and delicate branches of the arteries results in blockage which impair blood flow. Of most concern in individuals with diabetes are the small blood vessels in the eye, kidney and the sheaths surrounding the nerves. Micro-vascular complications are a result of hyperglycaemia (high blood glucose levels) and treatments aim to stabilise blood sugar levels (Vermeire, et al., 2005). Micro-vascular disease can lead to a range of complications including retinopathy; nephropathy; neuropathy; and erectile problems.

Retinopathy

Diabetic retinopathy is the most common micro-vascular complication for people with diabetes with approximately 20% of diabetics suffering from this condition (Harris, 2008; Levy, 2001). Retinopathy occurs when the blood vessels in the retina become blocked, leaky or grow irregularly and left untreated it can lead to blindness (Goldie, 2008). As a result regular screening is essential and early laser photocoagulation treatment can prevent further vision loss in 80% of cases (Arevian, 2005; Goldie, 2008).

Nephropathy

Diabetic nephropathy is a disease of the kidneys signified by enduring protein in the urine and is the leading cause of renal failure in the United States (Fowler, 2008). Up to 7% of individuals with type 2 diabetes will have evidence of nephropathy at diagnosis with this increasing to 25% at 10 years post diagnosis (Fowler, 2008). It should be noted that certain ethnic groups are at increased risk of developing end-stage renal disease including Indigenous groups, Hispanics, and African Americans (McNamara, et al., 2011) (Molitch et al., 2003a).

A micro-albuminuria test is used to identify protein (albumin) in the urine (Molitch et al., 2003b). Whilst a positive test result will indicate damage to the kidneys, the damage is not irreversible. Individuals should ensure good glycaemic control, maintain a healthy weight, and engage in regular physical activity (Fowler 2008). Controlling high blood pressure is also essential (Molitch, et al., 2003b). Angiotensin-converting enzyme (ACE) inhibitors and angiotensin receptor blockers (ARBs) are recommended as the standard medications for those without contraindications (Fowler, 2008).

Neuropathy

Neuropathy is the presence of symptoms and/or signs of peripheral nerve dysfunction excluding all other causes (Fowler, 2008). Peripheral neuropathy can affect up to 50% of individuals with diabetes and symptoms may include burning, numbness, knife-like pain, electric sensation, throbbing, and allodynia (Luger & Chabanuk, 2009). Symptoms may be worse at night leading to sleeplessness, fatigue, and depression (Luger & Chabanuk, 2009).

Poor circulation, nerve damage and associated loss of sensation in the extremities places individuals with type 2 diabetes at increased risk of infections, foot ulceration, deformities and amputations (Luger & Chabanuk, 2009; Vijan, 2010). In an Australian study of individuals with type 2 diabetes, it was found that 9% had clinical signs of neuropathy but almost 20% were at risk of a foot ulcer (Harris, 2008). As such it is imperative that regular foot checks are undertaken (Goldie, 2008). Appropriate foot care has been found to reduce amputations by up to 50% (Arevian, 2005).

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There is no specific treatment or drug that is universally accepted for dealing with diabetic neurology, however control and prevention of symptoms is improved with good glycaemic control (Fowler, 2008).

Erectile problems

Erectile dysfunction is the persistent inability to achieve or maintain penile erection for satisfactory sexual intercourse and is a common complication of diabetes (Giugliano et al., 2010). Prevalence varies between 35–90% of men with type 2 diabetes and this tends to increase with age (Giugliano, et al., 2010).

Erectile dysfunction is associated with high glycaemia, hypertension, anxiety, depression and certain medications (Giugliano, et al., 2010; Luger & Chabanuk, 2009). Physical activity has been found to have a protective effect, with one study suggesting men with type 2 diabetes who undertake higher levels of physical activity are 10% less likely to have erectile dysfunction problems (Giugliano, et al., 2010).

Hypoglycaemia

Hypoglycaemia, or a 'hypo' as it is commonly known, occurs when blood glucose levels drop too low. Hypoglycaemia is not common for people with type 2 diabetes who manage their diabetes through diet and physical activity, but it does occur in people who inject insulin or take certain medications (Fisher, 2010). Whilst hypoglycaemia is infrequent in people with type 2 diabetes, it can impact on quality of life (Cradock & Frier, 2010). Some have suggested that the frequency of hypoglycaemia in type 2 diabetics may have been underestimated, partly due to limited symptom recognition in elderly patients (Fisher, 2010). Symptoms of hypoglycaemia vary for each individual but can include sweating, palpitations, shaking, drowsiness, incoordination, speech difficulties, nausea and headache (Fisher, 2010). At its most extreme hypoglycaemia can result in seizures and coma (Fisher, 2010). Hypoglycaemic episodes are usually mild but can happen suddenly so individuals must be educated as to how to treat them effectively to avoid the escalation of symptoms.

Interventions to Avoid Complications

Type 2 diabetes is a chronic health condition. The United Kingdom Prospective Diabetes Study (UKPDS), a 20 year study of diabetes in the United Kingdom that studied over 5,000 patients with type 2 diabetes, concluded that most complications are preventable (Goldie,

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2008). Thus the primary goal in the treatment of individuals with type 2 diabetes is in improving health and preventing or reducing complications (Mulcahy et al., 2003). Treatments focus on lowering high levels of blood glucose and decreasing or delaying the onset of diabetes-related complications (Harris, 2008; Vijan, 2010).

Upon diagnosis of type 2 diabetes, sufferers must face the need for significant lifestyle changes as well as pharmaceuticals to lower glucose levels in the blood, reduce cardiovascular risk and deal with comorbidities (Bailey & Kodack, 2011). Good glycaemic control improves overall health and well-being by reducing the micro- and macro-vascular complications of type 2 diabetes (Levy, 2001; Renders, et al., 2001). For example, good glycaemic control has been found to reduce the risk of developing neuropathy by 60% (Luger & Chabanuk, 2009).

Physical activity

It is believed that at least 80% of people with type 2 diabetes are overweight or obese (Kyrou & Kumar, 2010). Effective weight management is crucial for glycaemic control in overweight and obese individuals with type 2 diabetes (Kyrou & Kumar, 2010). Research has shown that achieving a weight loss of only 5-10% through diet and physical exercise can effectively improve glucose, lipid, and blood pressure control abnormalities in people with type 2 diabetes (ACSM & ADA, 2010; Kyrou & Kumar, 2010).

Physical activity has numerous benefits for people with type 2 diabetes including weight management, reducing stress, improving glycaemic and lipid control, improving blood pressure and preventing cardiovascular disease (Goldie, 2008; Mulcahy, et al., 2003). A meta-analysis of 14 randomised trials found that exercise significantly improved glycaemic control in people with type 2 diabetes irrespective of whether any weight loss occurred (Vijan, 2010). It is also now recognised that lowering blood pressure is as important as reducing blood glucose in diabetic individuals and physical activity plays an important role in achieving this goal (Morrissey & Patel, 2002).

Although it is well established that regular physical activity can prevent or delay the onset of diabetes and its associated complications, the rate of physical exercise for people with type 2 diabetes is significantly below that of the general population (ACSM & ADA, 2010). The optimal goal is for moderate intensity exercise of 20-30 minutes duration, 3-5 times per

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week, encouraging even small improvements in physical activity is considered beneficial in making the first step towards a healthier lifestyle (Mulcahy, et al., 2003).

Efforts to promote physical activity should focus on developing self-efficacy and fostering social support from family, friends, and health care providers (ACSM & ADA, 2010). The availability of inexpensive facilities or pleasant and safe places to walk, is also an important predictor of regular physical activity and should be carefully considered when developing physical activity goals (ACSM & ADA, 2010). Individualised exercise plans should be tailored to meet the person's current level of physical activity, their living situation, and co-morbidities; and those on anti-diabetic medication must be educated on the risks of hypoglycaemia during and after exercise (Vijan, 2010).

Diet and nutrition

As many people with type 2 diabetes are overweight, efforts should focus on assisting them to reduce their weight to within normal limits (Goldie, 2008). Weight loss can help to delay the natural progression of the disease, postponing the need for insulin therapy, but can provide a challenging task (Kyrou & Kumar, 2010).

Individuals with type 2 diabetes generally lose less weight and at a slower rate than the general population due to metabolic dysregulation, potential comorbidities that restrict physical activity and not following recommended nutritional goals (Kyrou & Kumar, 2010). To complicate matters further, many medications used to lower glucose levels and treat common diabetic complications contribute to weight gain (Kyrou & Kumar, 2010). Evidence suggests that expert nutritional advice to assist in diabetes management is effective and it is recommended that consultation with a dietician be provided after initial diagnosis and regularly thereafter (Mulcahy, et al., 2003). The aim of nutritional advice is to assist the diabetic to initiate individualised lifestyle and eating behaviours to improve their metabolic control and reduce the risk of complications leading to overall improved health (Mulcahy, et al., 2003). Dietary changes commonly implemented involve increasing foods that are low in fat and high in unrefined carbohydrate (commonly referred to as low glycaemic index (GI) diets) (Nield, et al., 2008). People with type 2 diabetes also need to be educated in recognising the importance of moderation in their diet; avoiding saturated fats; having a regular meal schedule (especially if taking insulin); and the benefits of frequent, small meals in striving for weight loss and glucose control (Vijan, 2010).

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Smoking cessation

The harmful effects of smoking on health are well known but it is even more harmful for people with diabetes and a serious effort should be made to quit as soon as possible (Goldie, 2008). Smoking further exacerbates cardiovascular disease and neuropathic pain in people with diabetes (Luger & Chabanuk, 2009). By quitting smoking the diabetes sufferer can reduce their risk of vascular disease by up to 50% in one year (Morrissey & Patel, 2002).

Blood Glucose Monitoring and Medications

An ongoing challenge in the care of type 2 diabetes is in reducing fluctuations in blood glucose levels (Mulcahy, et al., 2003). Based on the results of the UKPDS, a haemoglobin A1c level of 7% or less is generally accepted as the ideal although attempts to reach lower levels of haemoglobin A1c do result in fewer micro-vascular complications over 10 years (Vijan, 2010).

Self-monitoring of glucose allows individuals and their health care team to observe glucose levels longitudinally (Vijan, 2010). Self-monitoring of blood glucose by type 2 diabetics is important to ensure minimisation of diabetes-related complications such as diabetic ketoacidosis and severe hypoglycaemia, especially in individuals taking insulin or sulfonylureas (Mulcahy, et al., 2003). Monitoring also allows for individuals to gauge how well their lifestyle changes are working and for dose adjustments to be made in individuals taking anti-diabetic medications or insulin therapy (Vijan, 2010).

Most people with type 2 diabetes will require oral hypoglycaemic agents or insulin therapy to control blood glucose levels (Harris, 2008; Vermeire, et al., 2005). For those people who are unable to achieve adequate glycaemic control with oral anti-diabetic medications, insulin therapy will be required (Vijan, 2010). There are also a number of other indicators for insulin therapy in people with type 2 diabetes, which include: newly diagnosed individuals with severe, symptomatic hyperglycaemia; hospitalisation; pregnancy; and intolerance of oral medications (Vijan, 2010). Research has found that most require insulin therapy within 5-10 years of diagnosis (Morrissey & Patel, 2002).

In addition to glyceamic control, individuals with type 2 diabetes may also be taking a range of other medications to control other diabetes-related complications. Low dose aspirin, ACE inhibitors and statins are indicated for control of diabetic complication and co-morbidities including high blood pressure and cholesterol, and nephropathy (Goldie, 2008; Morrissey &

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Patel, 2002). It is not uncommon for an individual with type 2 diabetes to be taking at least 5 medications on a daily basis (Bailey & Kodack, 2011).

Screening for Diabetes-Related Complications

Much of the expense attributed to diabetes and its care is due to the development of long-term complications, such as retinopathy and neuropathy (Nathan, 2011). Therefore the goals of treatment for people with type 2 diabetes are the avoidance of diabetic complications and normalisation of blood glucose levels and blood pressure (Loveman, Royle, & Waugh, 2003). Early detection and treatment of type 2 diabetes is important to reduce the incidence of complications, mortality and generally improve overall quality of life (Harris, 2008).

Regular review of individuals with type 2 diabetes in a number of areas is crucial for ensuring optimal health and wellbeing (Vijan, 2010). Experts recommend glucose testing every three months but this can be decreased to every six months in individuals who have stable glycaemic control (Luger & Chabanuk, 2009; Vijan, 2010). During these visits cardiovascular complications and blood pressure, as well as diet and exercise compliance should also be discussed and reviewed (Vijan, 2010). Cholesterol screening, retinal examination and foot review should be undertaken by appropriate professionals annually (Goldie, 2008; Luger & Chabanuk, 2009; Morrissey & Patel, 2002). Preventative vaccines such as those for influenza and pneumonia are also recommended (Luger & Chabanuk, 2009).

The use of reminder and recall systems such as scheduled return visits, telephone calls, electronic mail, or mailed forms have been found to be effective in improving attendance rates for follow-up appointments (Von Korff, Gruman, Schaefer, Curry, & Wagner, 1997).

Primary Care and Interprofessional Practice

Ongoing care for people with type 2 diabetes has moved from the hospital context into primary care over the past 30-40 years (Renders, et al., 2001). Within Australia, diabetes accounts for 2.5% of all consultations within general practice (Harris, 2008).

Improving the management of individuals with type 2 diabetes is a priority to address the global costs associated with the disease from increasing morbidity and mortality (Corser & Xu, 2009). Diabetes is a complex condition and the diverse complications associated with

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the disease require intervention and support from a range of health professionals including, but not limited to, dieticians, nurses, podiatrists, diabetes educators, ophthalmologists, psychologists and pharmacists (Loveman, et al., 2003; Peyrot, et al., 2005). Therefore, diabetes care involves an integrated team of health professionals from a range of disciplines with the skills and knowledge to complement one another (Kirby, 2004). Research has shown that decreased demand on acute care services and improved health outcomes including improved metabolic control are associated with interprofessional practice (Harris, 2008; Mills, Harvey, & COAG coordinated care trial, 2003; Zwar et al., 2007).

However, it has been found that referrals to other health professionals may not currently be at levels that best meet the needs of individuals with type 2 diabetes (Zwar, et al., 2007). In addition, almost half of individuals with type 2 diabetes believe that their care providers do not adequately communicate with each other (Arevian, 2005; Peyrot, et al., 2005). It has been suggested that more structured and collaborative management can improve patient care (Mills, et al., 2003). Care plans have been found to provide a tool for comprehensive patient review and prompt referrals to other health professionals (Zwar, et al., 2007). A medical audit examining the care of individuals with type 2 diabetes in Australia found implementation of a care plan increased adherence to diabetes care guidelines and improved metabolic control and cardiovascular risk factors (Zwar, et al., 2007). It was believed this was the result of improved communication and coordination between the interprofessional care team. The global shift from multidisciplinary care to interdisciplinary care requires clear and open communication, shared goals, mutual understanding and respect, and the opportunity to enhance roles to complement each other and maximise health outcomes for the individual with type 2 diabetes (Arevian, 2005; Peyrot, et al., 2005).

Psychosocial Issues

Individuals living with type 2 diabetes are encumbered with psychological, familial, social and financial factors in addition to the physical implications of their medical diagnosis (Jack, 2003). These are important factors that can significantly influence the outcome of diabetes self-management (Jack, 2003). Psychosocial factors can directly impact on an individual's physical health outcomes (Mulcahy, et al., 2003). It has been suggested that the psychological impact of a diagnosis of type 2 diabetes may for some mean that medication or counselling is necessary before lifestyle and behavioural changes can be effectively self-managed (Mulcahy, et al., 2003).

Eighty-five-percent of individuals with type 2 diabetes report high levels of distress at the time of diagnosis, experiencing feelings of shock, guilt, anxiety, depression and helplessness (Peyrot, et al., 2005). Psychological impairments are found to exist in individuals with type 2 diabetes 15 years after diagnosis, including concerns relating to potential complications and their resulting disabilities (Peyrot, et al., 2005).

The international Diabetes Attitudes, Wishes, and Needs (DAWN) program which interviewed health professionals across 11 countries found that 65% of patients with type 2 diabetes experience psychological problems and this contributes to problems in adherence to treatment (Peyrot, et al., 2005). Indeed, depression has been found to significantly impair self-management with a direct association found between level of treatment adherence and the severity of depression (Bailey & Kodack, 2011). Given the significant negative impact that psychological stress can have on effective diabetes self-management, the monitoring of psychological health is an important and necessary component of any treatment plan (Peyrot, et al., 2005).

Social support is also an important factor in supporting diabetes self-management (Bailey & Kodack, 2011). Individuals with type 2 diabetes who live alone are found to have higher blood glucose levels more often than individuals living with a partner or their family (Luger & Chabanuk, 2009). As with many chronic illnesses, individuals with type 2 diabetes and their families are responsible for day-to-day treatment decisions (Von Korff, et al., 1997). Therefore the degree of social support also strongly influences psychological adjustment and resilience to the challenges faced by individuals with type 2 diabetes (Mulcahy, et al., 2003).

Non-compliance

Between medical appointments, treatment requires individuals with type 2 diabetes to undertake complicated diagnostic tests, medication regimens and lifestyle changes on a daily basis (Corser & Xu, 2009; Vermeire, et al., 2005). This requires individuals to effectively assess, evaluate and make subsequent decisions related to their own diabetes-related health care (Corser & Xu, 2009).

Poor treatment compliance is a common and complex problem for people with chronic illnesses (Bailey & Kodack, 2011; Vermeire, et al., 2005). Diabetes has one of the highest

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rates of treatment non-compliance of all chronic conditions (32.5%) (Bailey & Kodack, 2011). Individuals who do not follow treatment regimens are at increased risk of developing micro- and macro-vascular complications (Bailey & Kodack, 2011). Research has also shown that improved adherence results in fewer emergency department and inpatient admissions in individuals with type 2 diabetes (Bailey & Kodack, 2011). Non-compliance with medical treatments generally places a significant financial burden upon health care systems globally, with the cost estimated to be $100 billion annually in the US alone (Vermeire, et al., 2005). There are many potential areas where individuals with type 2 diabetes may fail to effectively follow their treatment regimen, including: non-attendance at appointments; not filling their prescription; not following medication instructions including the correct volume and frequency; or stopping treatment altogether for a period of time or indefinitely (Vermeire, et al., 2005). This is particularly problematic in chronic diseases such as type 2 diabetes where symptoms are not seen to be immediately life threatening, painful or uncomfortable (Bailey & Kodack, 2011). One study suggests less than 20% of individuals with type 2 diabetes follow their recommended treatment regimen for diet, physical activity, administration of medication, glucose testing, and keeping their medical appointments (Peyrot, et al., 2005).

Medication adherence to treat hyperglycaemia is particularly problematic with 1 in 6 individuals with type 2 diabetes believing their treatment is too complicated, and 1 in 3 tired of following their medication regimen (Peyrot, et al., 2005). This is not surprising given that individuals with type 2 diabetes can be prescribed 5 or more medications to be taken daily (Bailey & Kodack, 2011). Medication compliance is often compromised as the number of medications an individual is required to take increases, and the frequency of administration increases (Bailey & Kodack, 2011). Compliance and persistence of the medication treatment regimen is improved by the use of a once-daily oral schedule (Bailey & Kodack, 2011; Vermeire, et al., 2005). Individuals with type 2 diabetes who are confused about their medications, what they are for, why they are necessary, how much to take and how often to take them, are also less likely to comply with their treatment regimen (Bailey & Kodack, 2011).

Race, ethnicity and socioeconomic status have also been found to affect adherence. Race has been found to affect treatment compliance due to language difficulties, cultural differences in relation to food and exercise, and failure to monitor glucose levels (Bailey & Kodack, 2011). Unfamiliarity and an inability to read medical items such as prescription bottle instructions and appointment slips can also contribute to non-compliance to treatment

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(Bailey & Kodack, 2011). A lack of health literacy can impair an individual's ability to understand medical information provided and the ability to give informed consent (Bailey & Kodack, 2011). Given the complexity of diabetes diagnosis and treatment it is imperative that clinicians assess the individual's comprehension of concepts presented as well as individuals with type 2 diabetes being able to provide an adequate description of proposed treatment regimens to ensure it is fully understood (Bailey & Kodack, 2011).

A diagnosis of type 2 diabetes can have a significant impact on an individual's financial status. Individuals with type 2 diabetes have less accumulated wealth at retirement than people without diabetes due to decreased earning potential resulting from health complications and increased health care costs (Schofield et al., 2010).

Vermeire et al. (2005) list a number of strategies which can be effective in assisting an individual with type 2 diabetes to successfully comply with their treatment regimen. These include: using short-term regimens; fewer doses per day; lower medication costs; easy-to-use packaging; reminders; tailoring information for the individual patient; patient education; and patient satisfaction measurement (p. 3). They also suggest the use of recall and review prompts to improve management of health care needs for individuals with type 2 diabetes at the surgery/clinic level (Vermeire, et al., 2005).

Over the past decade a shift has occurred in practice such that treatment regimens are now being developed that are cognisant of the individual's beliefs and circumstances. Creating a 'trusted' relationship with the individual with type 2 diabetes, fostering shared ownership of the individual's condition, setting realistic goals in a constructive manner and creating a continuum of self-management are all accepted features of best practice that are believed to assist adherence (Bailey & Kodack, 2011).

Diabetes Self-Management

Traditionally, the patient was a passive participant in their own health care following the instructions and recommendations set out by the health care professional (Jack, 2003). Very little or no consideration was given to an individual's personal circumstances in regards to treatment and this often led to frustration and non-compliance on the part of the individual with type 2 diabetes (Jack, 2003). Given the high demands placed on the individual with type 2 diabetes in regards to the complexity of the condition and its associated lifestyle changes,

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blood glucose monitoring and medication management, it is now seen as imperative to actively include the patient in developing their own treatment goals (Bailey & Kodack, 2011; Jack, 2003).

It is now recognised that the individual with type 2 diabetes, not the health professional, plays the key role in improving health outcomes (Vermeire, et al., 2005). Empowering the individual with type 2 diabetes to be responsible for and take an active role in their diabetes care generates improvements in communication with health professionals, increased satisfaction as well as improvements in glucose control (Duke, et al., 2009). Patel & Morrissey (2002) reinforce the belief that medical interventions will have limited effectiveness unless the individual with type 2 diabetes is educated, empowered and committed to the self-management of their diabetes.

Education at diagnosis is crucial for individuals with type 2 diabetes but given the complexity of the disease, its control and myriad of potential complications, ongoing education and support is also necessary (Loveman, et al., 2003). Diabetes self-management education teaches individuals how to effectively self-manage their care of diabetes through improving basic knowledge and applied problem solving skills for the monitoring and treatment of their diabetes (Jack, 2003). The monitoring of blood glucose is an important task that requires technical and problem-solving skills for the measurement and interpretation of blood glucose results and implementation of strategies (diet, exercise or medication) to reach target levels (Mulcahy, et al., 2003). This requires an individual to understand what the ideal blood glucose levels are, what the target goal in this instance is and what the appropriate courses of action are given current levels. Mulcahy et al (2003) outline that individuals with type 2 diabetes must be empowered to know what to do (knowledge), how to do it (skills), want to do it (motivation and self-confidence) and be able to do it (problem solving and coping skills).

By actively including the individual with type 2 diabetes in developing a treatment plan, knowledge and motivation regarding the treatments chosen is increased and this has been found to improve compliance, sustain lifestyle behaviour changes and improve health outcomes and well-being in individuals with type 2 diabetes (Mills, et al., 2003). This requires positive communication between the individual with type 2 diabetes and the health professional. Together, they must clearly identify treatment goals, potential problems which may arise in aiming for these goals, and ensure the goals are realistic and achievable (Von Korff, et al., 1997). Health professionals tend to focus on diagnosis, compliance and

minimisation of complications through behaviour change (e.g. smoking cessation), however, individuals with type 2 diabetes are more likely to focus on issues of physical pain and symptoms and impact on daily living, barriers to lifestyle changes, and psychosocial stress and concerns (Von Korff, et al., 1997). It is important that these perspectives synchronise to enable a treatment plan be developed that meets the needs of the individual and for which they are motivated and confident of a positive outcome (Von Korff, et al., 1997).

There are a number of techniques which can be employed to meet this requirement. Von Korff et al. (1997) suggest the following as helpful: goal setting; determining readiness for self-care; isolating tasks into small, manageable steps; obstacle trouble shooting and contingency planning; using personalised feedback; self-monitoring; and enlisting social support. Motivational interviewing techniques have also demonstrated improved success in behaviour change consultations (Peyrot, et al., 2005).

Given the complexity and heterogeneity of the condition, individuals with type 2 diabetes should be provided with a variety of support and services to meet their individual needs (Von Korff, et al., 1997). Approaches can range from intensive case management, group instruction, computer-based education and support programs; to high-quality educational materials with personalised feedback (Von Korff, et al., 1997). Group self-management support programs and specialist diabetes educator support have been found to be particularly effective in influencing positive health outcomes through empowering self-management (Harris, 2008; Renders, et al., 2001).

Conclusion

The impact of diabetes is significant for the individuals diagnosed, their families, the community and health care systems. Effective management of type 2 diabetes requires going beyond treatment of the physical and addressing the psychological, social and behavioural factors that can impede successful self-management (Peyrot, et al., 2005). A team approach, involving a range of appropriate disciplines, as well as effective listening and communication approaches that empower the individual are essential for effective chronic disease self-management (Peyrot, et al., 2005).

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Medical glossary and acronyms

HbA1c

Glycated Haemoglobin Test

A test which should be performed by a GP every 3-6 months. The test shows an average of a person's blood glucose levels, helping those with diabetes to manage their blood glucose levels.

ACE inhibitors

Angiotensin-converting enzyme (ACE) inhibitors

A group of drugs which reduce the activity of the renin-angiotensin-aldosterone system. They are used primarily for the treatment of hypertension (high blood pressure) although they may also be prescribed for congestive heart failure, diabetic nephropathy, renal disease, systemic sclerosis, left ventricular hypertrophy and other disorders.

Anti-diabetic medications

Treat diabetes by lowering glucose levels in the blood. Most are administered orally. The selection of the most appropriate anti-diabetic drug depends on a number of factors including the nature of the diabetes, age and situation of the person. Anti-diabetic medications may also be known as oral hypoglycaemic agents or oral antihyperglycaemic agents.

ARBs

Angiotensin receptor blockers

A group of drugs which modulate the renin-angiotensin-aldosterone system and are primarily used where the use of ACE inhibitor therapy is unsuitable. Their main uses are in the treatment of hypertension (high blood pressure), diabetic nephropathy (kidney damage due to diabetes) and congestive heart failure. ARBs are also commonly known as Angiotensin II receptor antagonists or AT_1-receptor antagonists or sartans.

Cardiovascular disease

A class of diseases that involve the heart or blood vessels (arteries and veins). It is also commonly referred to as heart disease.

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Cholesterol

A fat that is produced in the liver or intestines and is required to build and maintain membranes. Abnormal cholesterol levels (higher concentrations of LDL and lower concentrations of functional HDL) are strongly associated with cardiovascular disease.

Chronic disease

A disease or other human health condition that is persistent or long-lasting in nature (occurring for more than 3 months).

Comorbidity

The effect of all other diseases an individual patient might have other than the primary disease of interest.

Contraindications

A condition or factor that serves as a reason to withhold a certain medical treatment.

Glycaemia

Refers to the presence, or level, of glucose in blood. Hyperglycaemia is an unusually high concentration of sugar in the blood. Hypoglycaemia occurs when your blood glucose level drops too low. It is commonly referred to as a *'hypo'.*

Glycaemic control

Refers to keeping blood glucose levels at recommended target levels for as long as possible.

Insulin

A hormone produced by the pancreas which assists the cells in the body to process glucose. In individuals with type 2 diabetes the pancreas is not able to produce enough insulin.

Interdisciplinary teams

A team that is collaboration-oriented. The team meets regularly to discuss and collaboratively set treatment goals and carry out treatment plans. There is a high level of communication and cooperation among team members (Korner, 2008, p. 2).

Micro-vascular

Relating to the circulatory system made up of finer blood vessels in the body, including the capillary network.

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Macro-vascular	Relating to the large blood vessels in the body, including the coronary arteries, the aorta, and the sizable arteries in the brain and in the limbs.
Multidisciplinary teams	A team that is discipline-oriented. Each professional works in parallel, with clear role definitions, specified asks and hierarchical lines of authority (Korner, 2008, p. 2).
Nephropathy	Refers to damage to or disease of the kidney.
Neuropathy	A disease or abnormality of the nervous system.
Retinopathy	A noninflammatory degenerative disease of the retina. Diabetic retinopathy occurs when the blood vessels in the retina become blocked, leaky or grow irregularly and left untreated it can lead to blindness.
UKPDS	**United Kingdom Prospective Diabetes Study** A 20 year (1977 – 1997) randomised, multicentre trial of glycaemic therapies in 5,102 patients with newly diagnosed type 2 diabetes. It showed conclusively that the complications of type 2 diabetes could be reduced by improving blood glucose and/or blood pressure control.

Further information

International Diabetes Foundation (IDF):   www.idf.org

An umbrella organisation representing over 200 national diabetes organisations across 160 countries aims to influence policy, increase public awareness and encourage health improvement, promote the exchange of high-quality information about diabetes, and provide education for people with diabetes and their healthcare providers. Their web-site includes a range of diabetes-related information including information on diabetes, clinical practice guidelines, fact sheets and current research.

IDF Diabetes Atlas: www.diabetesatlas.org

Provides healthcare professionals, scientists, health economists, policy makers, and governmental agencies with evidence-based information and projections on the current and future magnitude of the diabetes epidemic.

Health*Insite*:   http://www.healthinsite.gov.au
                                             or 1800 022 222

A *healthdirect Australia* health information service providing easy access to quality information about human health.

Diabetes Australia: www.diabetesaustralia.com.au
                                             or 1300 136 588

Diabetes Australia is a national federated body supporting individuals with diabetes and those professional and research bodies particularly concerned with the treatment and prevention of diabetes.

Heart Foundation: www.heartfoundation.org.au
                                             or 1300 362 787

The Heart Foundation is a national body dedicated to reducing the impact of cardiovascular disease in Australia, which includes helping to minimise the number of people living with, or dying from heart, stroke and blood vessel disease. Their web-site includes information on active living, healthy eating, research and information for health professionals.

Quitline: www.quitnow.gov.au
                                             or 13 78 48

An Australian Government Department of Health and Ageing initiative providing comprehensive quality information and support for individuals contemplating or attempting to quit cigarette smoking and health professionals who support them to do so.

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