The challenges of managing type 1 diabetes in older people

Rachel Yates, Jane Menon

This article discusses the challenges of managing the growing population of older people people with type 1 diabetes. A case report is included, which illustrates the difficulty of managing such people, both in acute care and in the community. Factors that are particularly prevalent in this group include loss of the ability to self-manage, irregular nutritional intake, cognitive impairment and communication difficulties. These barriers to achieving stable glycaemic control are discussed, along with options for management. National guidelines are explained, including certain limitations to the advice, and we emphasise the importance of individualised care planning, taking into account physical and cognitive abilities. The dangers of hypoglycaemia, including falls, fractures and, in some cases, death, are highlighted; individuals who are particularly at risk are those with hypoglycaemia unawareness. The risk of developing diabetic ketoacidosis is discussed, along with measures to prevent hospital admissions and improve post-discharge care.

Citation: Yates R, Menon J (2015) The challenges of managing type 1 diabetes in older people. *Journal of Diabetes Nursing* **19**: 143–7

Article points

1. Older people with type 1 diabetes face a number of barriers to achieving good glycaemic control, including cognitive decline, reduced ability to self-manage and unpredictable nutritional intake.
2. In the outpatient setting, a twice-daily insulin regimen, with the principal aim of avoiding hypoglycaemia rather than achieving tight glycaemic control, may be easier to follow.
3. Care of older people in their own home can be difficult and requires detailed written care plans, individualised treatment protocols, and education and involvement of family members.
4. Carers in nursing homes need to be competent in recognising the signs of dangerous complications such as hypoglycaemia and diabetic ketoacidosis.

Key words

- Older people
- Type 1 diabetes

Authors

Rachel Yates is Lead Diabetes Specialist Nurse, Western Sussex Hospitals Foundation Trust. Jane Menon is Diabetes Specialist Nurse, Western Sussex Hospitals Foundation Trust

There is a growing challenge in managing older people with type 1 diabetes, who often contend with a multitude of comorbidities. Due to advances in therapies, many people outlive conditions that previously would have resulted in death and, instead, it is old age itself that is influencing management and survival. Sharing experience through case studies is a way of strengthening knowledge in this area.

Worldwide, both the incidence and the survival rates of type 1 diabetes are increasing (Schütt et al, 2012). Diabetes UK now issues medals for surviving 50, 60 and 70 years of type 1 diabetes. Approximately £2 billion per year is spent on diabetes inpatient care in the NHS (Wallymahmed, 2014). This cost can account for 11% of NHS inpatient expenditure (Kerr, 2011). The 2012 National Inpatient Audit showed that, on average, one in six NHS hospital beds are occupied by people with diabetes (Health and Social Care Information Centre, 2012). These individuals were generally found to be older, with more serious illness. The Joint British Diabetes Societies for Inpatient Care (JBDS–IP, 2013a; 2013b) have published guidance on staffing levels of diabetes inpatient specialists and on avoiding admissions in people with diabetes.

The diabetes multidisciplinary team (MDT) at Western Sussex Hospitals Foundation Trust provides care to people for whom the complexity of diabetes management has delayed discharge and resulted in readmission. The following article discusses issues of management, such as poor glycaemic control, cognitive decline, malnutrition and compliance, in such individuals.

Case study

Mr P is a 76-year-old gentleman with type 1 diabetes diagnosed before the age of 10 years. He also has coeliac disease. His name has been omitted

Page points

1. The case of a 76-year-old man with type 1 diabetes since the age of 10 years, as well as coeliac disease, is discussed. At age 65, he was able to self-manage his condition, although his glycaemic control was poor.
2. At age 70, he was living alone and had problems with hypoglycaemia, purposely maintaining high blood glucose levels to prevent this. He began forgetting to take his insulin and eventually started to refuse support from community nurses.
3. At age 75, he had two episodes of diabetic ketoacidosis (DKA) in quick succession, and a trialled community care plan failed to maintain good health.
4. He is now settled in a nursing home, where the staff have received education on his complex diabetes care plan and ketone monitoring. While he still often has high blood glucose levels, he has had no DKA episodes or hospital admissions for hypoglycaemia.

to protect confidentiality. At age 65 years, he was managing his diabetes independently, although his glycaemic control was poor, with an average HbA_{1c} level of 86 mmol/mol (10.0%). He was on a twice-daily, pre-mixed human insulin regimen.

At age 70, he was admitted unconscious with severe hypoglycaemia and a loss of hypoglycaemia awareness was highlighted. He lived alone and would allow his blood glucose levels to run high, fearful of recurrent, unpredictable hypoglycaemia. He refused to increase his insulin dose as advised. His endocrinologist arranged tests that confirmed delayed gastric emptying and a diagnosis of gastroparesis. He was commenced on pro-peristaltic agents that helped to reduce hypoglycaemia by enhancing gastrointestinal contractility, which leads to more predictable nutrient digestion and absorption (Abell et al, 2006).

At age 72, district nurses were visiting Mr P twice daily to supervise treatment administration, as he was often forgetting to take his insulin. He was still able to inject appropriately with prompting, although his eyesight was deteriorating. He tested his blood glucose levels but would fail to act on the results and he was not timing his insulin correctly in relation to meals. He continued like this for years with community support.

At age 75, Mr P was admitted for diabetic ketoacidosis (DKA) with no apparent triggering illness, but he had been refusing visits from the district nurses. He admitted to having memory problems and sometimes forgetting his insulin. In hospital, he was often seen snacking on high-carbohydrate and sugary foods. The MDT discussed dietary issues and the management of both coeliac disease and diabetes with him. He remained in hospital for 2 weeks and his blood glucose levels were often erratic, making insulin adjustment challenging. His endocrinologist advised daily basal analogue insulin, along with short-acting human insulin every 4–6 hours if his blood glucose level rose to 12 mmol/L or above; however, his eating habits and blood glucose levels remained unpredictable. On discharge, he agreed to allow the district nurses to visit. Carers helped with the preparation of gluten-free meals, but he continued to eat sugary snacks. Referrals to community services were made and he was given a ketone meter and a detailed care plan. This included management of hypoglycaemia and hyperglycaemia, ketone monitoring, the management of rising ketone levels and sick day rules. Helpline contacts for advice were available for the district nurses.

Mr P was readmitted 2 weeks later with DKA. His insulin regimen was changed back to twice-daily, pre-mixed human insulin. A care plan was formulated and trialled, in which regular insulin doses were varied depending on blood glucose levels to manage his unpredictable and erratic glycaemia patterns. This maintained safe levels of glycaemic control in the run-up to discharge. He was discharged 2 weeks later but was readmitted in less than a week, after being found unwell by his carers. Capillary ketone levels were 5.1 mmol/L, but he was not in an acidotic state and so did not have DKA. In hospital, a consultant discussed future care options with him and arrangements were made for him to go to a nursing home as he felt safer there. The nursing home staff were educated on his complex diabetes care plan and ketone monitoring, and they were given a community DSN contact number.

Now aged 76 years, Mr P has settled well into his new environment and has gained approximately 3 stone (19 kg) in weight, with a BMI of 20 kg/m^2, in a year. He recently sustained a fall, not associated with hypoglycaemia, and so spent some time in hospital, resulting in temporary disruption of his glycaemic control. He has since returned to the nursing home and regularly attends the endocrinology clinic. His last HbA_{1c} level was 80 mmol/mol (9.5%), a small improvement. The nursing home staff have become skilled in the management of his diabetes using the detailed care plan, and hypoglycaemia is rare as he has regular eating habits and a sensible diet. He still shows frequent high blood glucose readings but has had no further admissions to hospital with DKA or hypoglycaemia. The nursing home has contacted the DSN helpline for advice on a few occasions, which has worked successfully to avoid hospital admission.

This case report highlights how the gradual cognitive decline of Mr P may have led to difficulties in managing his diabetes independently. Many other factors associated with long-standing diabetes, such as gastroparesis, deteriorating eyesight and hypoglycaemia, may also have contributed.

Coeliac disease, unpredictable eating habits and non-compliance with dietary advice are other relevant issues. Optimising safety and maintaining patient independence requires significant education and resources, and this case illustrates the difficulty in managing such patients in the community.

Barriers to achieving good glycaemic control

Cognitive decline and dementia impact on many aspects of diabetes management, such as communication, coping with hypoglycaemia, eating habits and the ability to self-manage. Malnutrition is highly prevalent in older inpatients with diabetes, making them vulnerable to other problems such as pressure injuries and slow healing (Vischer et al, 2010). The majority lose independence and become reliant on others to administer their insulin. Testing blood glucose levels is complicated by declining dexterity.

Gastroparesis influences control in older people with type 1 diabetes, and gastric emptying is frequently abnormal, attributable to the presence of autonomic neuropathy (Ma et al, 2009). For people with decreased appetite, anorexia and unpredictable food intake, insulin doses may be recommended after meals once carbohydrate intake has been calculated. Sometimes complex insulin plans are prescribed, dependent on food intake and blood glucose levels, but these can prove impractical for busy nursing staff or carers in the community setting. Pragmatically, a simple insulin regimen will reduce confusion and errors, but may not achieve the most stable diabetes control.

Management

Basal–bolus insulin regimens give 24-hour insulin coverage and achieve the best results in managing erratic glycaemic control by covering postprandial and unpredictable glucose elevations; however, following discharge from hospital, such regimens require frequent blood glucose monitoring and an ability to titrate doses according to carbohydrate intake and blood glucose levels. People with memory loss or dementia may not remember to inject four times a day and their carers may be uncertain regarding safe insulin doses if meals are skipped. It is usual to switch to a twice-daily insulin regimen before discharge to comply with community resources. Sometimes a regimen with varying doses of mixed insulin is suggested for safety and is usually established while the person is in hospital.

The International Diabetes Federation (IDF, 2013) has designed a global guideline for managing older people with diabetes. It advises to take into account physical and cognitive abilities, and promotes a holistic and individualised care plan, focusing on safety, avoiding hospital admissions and maintaining independence where possible. Although it is a guideline for type 2 diabetes, the IDF suggest that many principles of care can also be applied to older people with type 1 diabetes, as both groups share many similar issues.

NICE (2004) guidance for type 1 diabetes recommends an HbA_{1c} target of 48–58 mmol/mol (6.5–7.5%) for the prevention of microvascular disease. The Quality and Outcomes Framework, determined by NICE, financially rewards general practices for achieving certain HbA_{1c} targets. Da Costa (2014) suggests that, while remuneration may help to reduce HbA_{1c} levels, it may also compromise patient safety, as intensive blood glucose control has been linked to an increased risk of hypoglycaemia and mortality (Anekwe, 2010).

For older people with poor health status, frailty, cognitive impairment and risk of falls, treatment needs to focus on minimising hypoglycaemia and serious hyperglycaemia. This should address physical, emotional and social challenges to enhance safety and quality of life (QoL) and avoid focusing on HbA_{1c} targets (IDF, 2013; Dhaliwal and Weinstock, 2014). Individuals and close family members can find it difficult if they have established lifetime habits of trying to control blood glucose levels very tightly, so changing this at this stage in life can be daunting and may lead to confusion and anxiety.

Hypoglycaemia

Dhaliwal and Weinstock (2014) highlight that hypoglycaemia is common in older people with type 1 diabetes regardless of HbA_{1c} level and with a long duration of diabetes there is also an increased risk of severe hypoglycaemia, even within the hospital environment (Leslie et al, 2012). Polypharmacy and reductions in cognitive function, renal function and appetite can increase

Page points

1. Barriers to achieving good glycaemic control in older people include cognitive decline, malnutrition and inability to test and treat blood glucose levels independently.
2. A simple twice-daily insulin regimen, although less likely to achieve tight glycaemic control, may be easier for both patients and busy care staff to administer.
3. An individualised care plan that takes into accout an individual's physical and cognitive abilities, maintaining independence where possible, should be drawn up. For elderly and frail people, the plan should, above all, focus on minimising the risk of hypoglycaemia and severe hyperglycaemia.

Page points

1. Hypoglycaemia in older people can lead to falls, serious injury and even death, as well as increased cardiovascular risk.
2. Older people are particularly vulnerable to hypoglycaemia as they can struggle to communicate their symptoms, may have irregular eating patterns and may have different hypoglycaemia symptoms, such as confusion, dizziness and delirium, leading to misdiagnosis.
3. Diabetic ketoacidosis is also common in this population, and the care plan should incorporate regular blood ketone testing. Carers also need to be well educated in spotting such complications.

this risk. Recurrent hypoglycaemia can lead to hypoglycaemia unawareness as a result of reduced autonomic warning systems and impairment of the counter-regulatory system (Shafiee et al, 2012).

Hypoglycaemia in older people affects QoL and leads to falls and fractures, serious injuries and even death (Williams and Raj, 2013). Studies have indicated that hypoglycaemia can contribute to cardiovascular risk by causing abnormal repolarisation, leading to arrhythmias, and by increasing thrombotic tendency and events such as stroke, angina and myocardial infarction (Hanefeld et al, 2013; Larsen et al, 2013).

Older people with cognitive impairment are particularly vulnerable to hypoglycaemia, as they struggle to communicate their symptoms. Eating habits are more likely to be erratic with cognitive impairment, leading to poor appetite, missed meals and lack of recognition of hunger and thirst (Williams and Raj, 2013). Hypoglycaemia may present quite differently in older people, with confusion, dizziness and delirium, rather than sweating, tremors and palpitations, and so it may be misdiagnosed (Sinclair, 2006). Elliot and Rankin (2014) describe relatives having to go through harrowing and traumatic events, such as finding a loved one collapsed or unconscious.

Insulin regimens and blood glucose and HbA_{1c} targets should be tailored specifically to the individual, taking into account factors such as eating habits and alcohol intake to maintain optimal safety and avoid hypoglycaemia at all costs. Relevant education on the recognition and management of hypoglycaemia should be given.

DKA

Older people with type 1 diabetes are at high risk of DKA, and capillary blood ketone testing could be a necessity in discharge planning. Some individuals are afraid of hypoglycaemia and prefer to run higher blood glucose levels, thus increasing the risk of developing DKA. Nursing homes are not often familiar with capillary ketone testing, and in our Trust we teach staff members how to test and interpret results, how to treat the condition and when to admit to hospital. GPs need to supply ketone strips on repeat prescription despite the extra cost.

Although the mortality rate from DKA has fallen significantly in the last 20 years, older people with DKA still have a high risk of death (IDF, 2013). They are likely to have comorbidities such as renal and cardiac disease, so fluid replacement can be challenging, with the risk of complications such as pulmonary oedema (JBDS–IP, 2013a). Recovery is likely to take more time and arranging a safe discharge, particularly with a package of social care, can lengthen hospital stay, which impacts on the individual's QoL, hospital bed occupancy and cost to the NHS.

Visible signs and symptoms of DKA include nausea, weakness, weight loss, acetone breath, Kussmaul breathing, polydipsia, polyuria, weakness, confusion, stomach pain and loss of consciousness (Wilson, 2012).

It is also important for nurses and carers to acknowledge that infection is the most common precipitating factor for DKA (Kitabchi et al, 2009). With infection, insulin requirements can increase owing to counter-regulatory factors, which induce insulin resistance and stress hyperglycaemia (Bogun and Inzucchi, 2013).

When older individuals lose ability to manage their own care needs, they become reliant on the knowledge, assessment skills and prompt action of their carers. In accepting a person with type 1 diabetes into a care home, nurses should be competent in recognising the signs of dangerous complications such as hypoglycaemia and DKA. Discharge coordinators at our Trust recently had a patient declined by a matron shortly before his discharge to her nursing home, as she had recognised that her staff could have been working outside their scope of practice by accepting this person.

Discharge planning

Discharge planning for complex older patients can be challenging, requiring treatment options that are appropriate for a community setting. Normally, district nurses can visit twice daily, so treatment is chosen to fit with available resources. The tendency for erratic control in older people with type 1 diabetes in our Trust has led to concerns regarding the consequences upon discharge. Detailed written care plans with individualised treatment protocols are often required. This puts pressure on district nurses, community DSNs, GPs, nursing homes and family members. Referrals to community

DSNs are made at discharge, but it may take some time before the person is reviewed and initial contact is made through telephone calls. When an individual returns home, glycaemic control can alter significantly owing to many factors, particularly dietary changes; therefore, ideally, an early review post-discharge should take place to prevent complications.

Involvement of any family members is a crucial aspect of MDT meetings and discharge planning. Ascertaining whether a person's home conditions provide a safe environment can prove challenging and often involves work from discharge co-ordinators. As an example, one individual in our Trust had family abroad who wanted their mother to remain at home and independent but, because of a series of readmissions, we had to recommend 24-hour nursing care. Eventually, by communicating well with the family, transfer to a nursing home was achieved with their approval. In contrast to this solution, another person and her family refused nursing home care. This resulted in frequent hospital admissions with DKA, as she was purposely running high blood glucose levels to avoid hypoglycaemia. In such cases, we explain the dangers of poorly controlled diabetes and will refer to community DSNs, district nurses, GPs and the Rapid Access Intervention Team. We also follow up with regular discharge phone calls, supply a care plan and include the diabetes helpline phone numbers.

Conclusion

Older people with type 1 diabetes can be particularly challenging to manage for many reasons, including variable nutritional intake, cognitive impairment and difficulty with communication, and associated conditions such as gastroparesis and coeliac disease may complicate matters further. We look forward to future developments, such as technological advances and newer insulin preparations, that can facilitate the management of this growing vulnerable population.

Patient safety and promoting optimal QoL is paramount for this vulnerable group of people, and many extra hours of care and MDT involvement are often required. There is a need for healthcare professionals to develop skills and knowledge through education and training to improve the care delivered to these individuals. As a team, we would welcome seeing more published material from other teams to share experiences of this complex patient group. ■

Abell TL, Bernstein RK, Cutts T et al (2006) Treatment of gastroparesis: a multidisciplinary clinical review. *Neurogastroenterol Motil* **18**: 263–83

Anekwe L (2010) *NICE committee raises QOF HbA_{1c} target*. Pulse, London. Available at: http://bit.ly/1vjVT4u (accessed 19.02.15)

Bogun M, Inzucchi SE (2013) Inpatient management of diabetes and hyperglycemia. *Clin Ther* **35**: 724–33

Da Costa S (2014) Care of the older person with diabetes: when the target misses the person. *Journal of Diabetes Nursing* **18**: 144.

Dhaliwal R, Weinstock RS (2014) Management of type 1 diabetes in older adults. *Diabetes Spectrum* **27**: 9–20

Elliot J, Rankin D (2014) Hypoglycaemia unawareness: a call not to forget the needs of family members. *Diabetes & Primary Care* **16**: 9

Hanefeld M, Duetting E, Bramlage P (2013) Cardiac implications of hypoglycaemia in patients with diabetes – a systematic review. *Cardiovasc Diabetol* **12**: 135

Health and Social Care Information Centre (2012) *National Diabetes Inpatient Audit 2012*. HSCIC, London. Available at: http://bit.ly/1lyO03h (accessed 19.02.15)

International Diabetes Foundation (2013) *Managing Older People with Type 2 Diabetes: Global Guideline*. IDF, Brussels, Belgium. Available at: http://bit.ly/1udzRMA (accessed 19.02.15)

Joint British Diabetes Societies for Inpatient Care (2013a) *The Management of Diabetic Ketoacidosis in Adults*. JBDS–IP, London. Available at: http://bit.ly/1hdKw3c (accessed 19.02.15)

Joint British Diabetes Societies for Inpatient Care (2013b) *Admissions Avoidance and Diabetes: Guidance for Clinical Commissioning Groups and Clinical Teams*. JBDS–IP, London. Available at: http://bit.ly/1mn68zD (accessed 19.02.15)

Kerr M (2011) *Inpatient Care for People with Diabetes: The Economic Case for Change*. Diabetes UK, London. Available at: http://bit.ly/1kTlNX9 (accessed 19.02.15)

Kitabchi AE, Umpierrez GE, Miles JM, Fisher JN (2009) Hyperglycemic crises in adult patients with diabetes. *Diabetes Care* **32**: 1335–43

Larsen A, Højlund K, Poulsen MK et al (2013) Hypoglycemia-associated electroencephalogram and electrocardiogram changes appear simultaneously. *J Diabetes Sci Technol* **7**: 93–9

Leslie D, Lansang C, Coppack S, Kennedy L (2012) *Diabetes Clinician's Desk Reference*. Manson Publishing, London: 170

Ma J, Rayner CK, Jones KL, Horowitz M (2009) Diabetic gastroparesis: diagnosis and management. *Drugs* **69**: 971–86

NICE (2004) *Type 1 Diabetes: Diagnosis and Management of Type 1 Diabetes in Children, Young People and Adults*. NICE, London. Available at: www.nice.org.uk/guidance/cg15 (accessed 19.02.15)

Schütt M, Fach EM, Seufert J et al (2012) Multiple complications and frequent severe hypoglycaemia in "elderly" and "old" patients with type 1 diabetes. *Diabet Med* **29**: e176–9

Shafiee G, Mohajeri-Tehrani M, Pajouhi M, Larijani B (2012) The importance of hypoglycemia in diabetic patients. *J Diabetes Metab Disord* **11**: 17

Sinclair AJ (2006) Special considerations in older adults with diabetes: meeting the challenge. *Diabetes Spectrum* **19**: 229–33

Vischer UM, Perrenoud L, Genet C et al (2010) The high prevalence of malnutrition in elderly diabetic patients: implications for anti-diabetic drug treatments. *Diabet Med* **27**: 918–24

Wallymahmed M (2014) Reducing hospital admissions for people with diabetes: what can be done? *Journal of Diabetes Nursing* **18**: 290

Williams J, Raj S (2013) *Reducing Risks of Hypoglycaemia in Acute Admissions in the Department of Medicine for the Elderly*. The Health Foundation, London. Available at: http://bit.ly/1BqB21A (accessed 19.02.15)

Wilson V (2012) Diagnosis and treatment of diabetic ketoacidosis. *Emerg Nurse* **20**: 14–8

"Patient safety and promoting optimal quality of life is paramount for this vulnerable group of people, and many extra hours of care and multidisciplinary team involvement are often required."