Setting up a service for people with diabetes and dementia: Experiences from the DIADEM project

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As the average life expectancy in the UK increases and the prevalence of diabetes continues to rise, there is an increased need to understand the management of older adults with diabetes. As the number of people with cognitive impairment and dementia also grows, it is inevitable that healthcare professionals working in the field of diabetes will encounter patients with both conditions. There is increasing evidence of the link between the two conditions; however, real-world examples concerning the practicalities of management are limited. This article aims to support readers in managing people with diabetes and dementia in a secondary care setting, and provides practical suggestions on how to design a service and manage such patients, drawing on the author's experiences from creating the DIADEM project.

People with diabetes are at an increased risk of developing cognitive impairment, with observational studies showing up to a twofold increased risk in this population (Cukierman et al, 2005; Cheng et al, 2012). People with cognitive impairment and diabetes who are on treatment with blood glucose-lowering agents are at an increased risk of hypoglycaemia, and this risk increases with deterioration in cognition (Bruce et al, 2009).

Patients with cognitive impairment are important to consider as they are a particularly vulnerable population given their changes in cognition over time and the functional decline and dependency they may experience (Wilkins et al, 2014). However, it must be noted that the spectrum of cognitive impairment varies and, in the initial stages, patients may only have mild memory lapses and may still be able to contribute to their diabetes care and management.

This article will guide the reader through the considerations and practicalities of managing this population, with specific focus on the secondary care environment, drawing on experiences of the author when setting up a similar service.

Initial considerations

When determining how best to manage patients with diabetes and cognitive impairment, one should consider the best setting to address this population. Whilst primary care would be an obvious location, given the benefits of up-to-date records and awareness of normal behaviours in the patient's usual environment, there may be some limitations. Patients with cognitive impairment may not always have had up-to-date HbA_{1c} checks or blood glucose monitoring. Additionally, depending on cognitive impairment, they may not be amenable to obtaining blood tests or other readings such as blood pressure or blood glucose. However, patients admitted to secondary care services inevitably have blood tests, to which an HbA_{1c} check can be added. Additionally, although the setting is not the individual's usual environment, the ability to regularly monitor oral intake, hydration and fluid output can aid management planning.

Article points

1. People with comorbid diabetes and dementia are at increased risk of hypoglycaemia and may benefit from medication de-intensification and less strict glycaemic targets.

2. The DIADEM project reviews all people with the two conditions who are admitted to hospital and uses a specially developed assessment tool to aid clinical decision-making.

3. Preliminary analysis of outcomes has revealed improved patient safety (via reducing hypoglycaemia risk), reduction in polypharmacy and financial savings.

Key words

- Comorbidities
- Dementia
- DIADEM
- Frailty

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Page points

1. People with diabetes and dementia are at increased risk of hypoglycaemia and may benefit from less strict glycaemic control.

2. The updated Quality and Outcomes Framework now allows for an HbA$_{1c}$ up to 75 mmol/mol (9.0%) in people with moderate to severe frailty, a category which many people with dementia would fall under.

3. The DIADEM project reviews all people with diabetes and dementia who are admitted to hospital, with a specific focus on medication review, treatment de-intensification or simplification, and provision of an individualised care plan.

One must also consider the aims of intervention, whether it is medication review, including de-intensification and reduction of hypoglycaemia; optimisation of medication; or a more comprehensive review of the patient's diabetes. A quality-improvement approach, using the Plan, Do, Study, Act (PDSA) cycle and process mapping, may be useful in planning such a project (NHS Improvement, 2018).

Targets to consider

It should be noted that HbA$_{1c}$ may not always be the most accurate or ideal method of assessing glycaemic control in the older adult, as it can mask wide glycaemic variation (Munshi et al, 2015). Sometimes capillary blood glucose readings may be best for planning management targets.

Various targets have been suggested for patients with diabetes and cognitive impairment, with most organisations, including the International Diabetes Federation (IDF, 2012), American Diabetes Association (ADA, 2018) and a UK expert working group (Sinclair et al, 2014), suggesting a focus on lax regimens to avoid hypoglycaemia and an HbA$_{1c}$ target of 53–64 mmol/mol (7.0–8.0%). The ADA allows for an HbA$_{1c}$ up to 70 mmol/mol (8.5%), and specifically suggests capillary blood glucose targets to aim for. Recently, in the UK, the Quality and Outcomes Framework was updated and now allows for an HbA$_{1c}$ up to 75 mmol/mol (9.0%) in those with moderate to severe frailty, a category which many people with dementia would fall under (NHS England, 2019).

This means that many patients will not need stringent control and can have lax glycaemic targets. Additionally, focus must be made on reducing hypoglycaemia risk, and this includes stopping unnecessary medication and simplifying regimens.

The DIADEM approach

The DIADEM project was devised to address the gap in knowledge about managing patients with diabetes and dementia. The aim was to assess all patients with the two conditions who were admitted to secondary care, providing a focused review with specific consideration towards medication review and treatment de-intensification or simplification, and an individualised care plan.

This project was a unique initiative specifically

Table 1. The DIADEM assessment tool.	
D	Determine degree of cognitive impairment and self-management
I	Involve patient/carers/family
A	Assess and set goals
D	Determine hypoglycaemia risk
E	Evaluate complication risk
M	Monitor for changes

targeting this group of patients. Though awareness of the older adult with diabetes is not new, there are very few initiatives focusing on this patient group, let alone the particularly vulnerable subgroup of those with cognitive impairment. To our knowledge, there was no other project in the UK, or even the world, with a focus on this specific area or group.

All patients admitted with diabetes and dementia, regardless of reason for admission, were assessed by the team to provide a focused management plan and an up-to-date assessment of their diabetes. The DIADEM team were members of the diabetes team and comprised the lead clinician, a senior house officer and a diabetes specialist nurse team to case-find and link to the lead clinician.

The key to the project was the use of the DIADEM assessment tool to aid management; this tool is summarised in *Table 1* and outlined below.

D – Determine degree of cognitive impairment and self-management

Depending on the degree of cognitive impairment, the person with dementia may or may not be able to look after their diabetes. Those on oral medication may be able to continue to take it either unprompted or with support or pill boxes; however, as cognition deteriorates, the ability to respond to prompts or to take medication may change. Additionally, in severe cognitive impairment, coordination of swallowing may be hampered, making oral medication a trickier choice. For people on insulin therapy, self-administration of insulin may not be possible, due to lack of either coordination or awareness of dose, timing of injections or method. In those

reliant on others for administration, considerations must be taken with insulin regimens to ensure this is possible and fits with the availability of someone who is able to administer the injection.

A potential aid to assessing patients with cognitive impairment is a frailty assessment tool. These are useful in aiding decisions on treatment targets and what might be expected of the patient. There are a variety of scales that can be used; however, a simple tool such as the Rockwood Clinical Frailty Scale (Rockwood et al, 2005) can be a quick method of assessing those with cognitive impairment. It has three dementia classifications: mild, moderate and severe, as defined in *Table 2*.

I – Involve patient/carers/family

As mentioned above, as cognition declines, the burden of administration of medication may pass on from the patient to their carers. This may be family members but could also be carers at set times in the day or, if in a nursing home, 24-hour care. Additionally, in some cases, district nurses may be required, making administration of medications (especially insulin) at appropriate times and complex mealtime-based administration difficult. Involvement of carers allows for joint agreement of the regimen that is most appropriate and also makes the carers aware of any changes to the regimen.

A – Assess and set goals

Determining the target HbA_{1c} and glycaemic range depends on various factors. Food intake, functionality and life expectancy, as well as current comorbidities, all contribute to the target decided upon. There are many guidelines to consider, including those by the IDF (2012) and ADA (2018), but generally targets tend to be between 53 and 64 mmol/mol, with recommendations up to 70 mmol/mol in people with increasing frailty or advanced cognitive impairment.

Regardless of what the targets are, it is important that they be communicated to the carers and/or family so that they are aware of the reasons behind this and agree. Highlighting the targets to primary care teams would also aid clarity, and can be done either via the discharge document or via a separate letter.

Table 2. Dementia classifications in the Rockwood Clinical Frailty Scale.

Classification	Common symptoms
Mild dementia	• Forgetting details of a recent event, though still remembering the event itself • Repeating the same question/story • Social withdrawal
Moderate dementia	• Recent memory very impaired, but seemingly can remember past life events well • Can do personal care with prompting
Severe dementia	• Cannot perform personal care without help

D – Determine hypoglycaemia risk

Hypoglycaemia risk assessment is particularly important in this population, given the potential for serious complications combined with the difficulty in recognition and/or communication. Regularity of meals can vary, and the amount of food consumed can deteriorate over time or even from day to day. Comorbidities such as renal or hepatic impairment will have an impact on the dose of insulin and other medications with higher hypoglycaemia risk, such as sulfonylureas. Variable food intake risks mismatch between meals and insulin dose, flexibility in regimens and even the timing of bolus dosing.

E – Evaluate risk of complications

Depending on the degree of cognition and the frequency of review by healthcare professionals, patients with cognitive impairment may not have had a comprehensive vascular or foot risk assessment. Including a risk assessment for these complications identifies those with active risks and those with low risk, thereby reinforcing targets and medication choice.

M – Monitor for changes

As cognitive function varies, functionality deteriorates or comorbidities increase, targets and management plans will need to be modified. Reviewing recent trends in glycaemia and hospital admissions will provide further information to utilise when creating management plans and determining the optimal intensity of control and medication.

"Patients with diabetes and dementia need focused and early assessment, with a detailed management plan to prevent avoidable hypoglycaemia and hyperglycaemia."

Stakeholder involvement

The key to implementing a service is ensuring that (in addition to it being agreed by the diabetes department) it is highlighted across the Trust and that the teams involved are aware of and support the project. With this particular population, apart from the diabetes teams, it would be essential to involve the elderly care teams to aid case finding. "Dementia nurses" would be the most ideal members, as they will be involved in coordinating care for those admitted to hospitals with cognitive impairment. Some hospitals may have a frailty team, and even acute medicine departments may aid earlier referrals. If there is an online referral system then a discussion with IT services may allow for specific referral boxes to be created and even email alerts to the relevant team member.

Data review and continual review of processes

Once the service is ongoing, it is important to create a database of patients to review and aid quality control. Additionally, this helps for future audit and improvement of the processes. This is dependent on the team members being actively involved in the collection of data. It also will highlight areas to develop and whether the current design needs reviewing. Continued awareness and highlighting of the project also will aid continuing involvement by other teams.

The DIADEM project: Outcomes so far

Preliminary data collected between March and September 2017 reveal that, of 66 patients with diabetes and dementia admitted to hospital and seen by the DIADEM team, two thirds had some form of intervention, most commonly de-intensification of medication (Moorey et al, 2018). The proportion of patients on insulin was reduced from 38.5% to 26.9% following review by the team, and the proportion of those on any hypoglycaemic medication was reduced from 43.1% to 30.8%. Polypharmacy was reduced and 91% of patients had a foot assessment. All readmissions to hospital in the following 4 months were for non-diabetes-related conditions.

Conclusion

Patients with diabetes and dementia need focused and early assessment, with a detailed management plan to prevent avoidable hypoglycaemia and hyperglycaemia. Targeting this group can result in optimisation of medication, appropriate target-setting and the potential to reduce health and economic burden. Designing a pathway requires a structured review of the processes involved and a clear method of implementation. DIADEM is one of the first projects to address the combined comorbidity of diabetes and dementia, and data are currently being collected on outcomes following its implementation, with preliminary data already available. ■

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