Why we’re failing to tackle the twin challenges of diabetes and dementia

Diabetes and dementia are both commonplace. Diabetes UK estimates that 4.5 million people in the UK live with diabetes. The Alzheimer’s Society suggests that 850,000 people in the UK have dementia. So some people will be unfortunate enough to coincidentally develop both conditions. Emerging evidence, however, also links diabetes and dementia on a fundamental biological level.

Yet, as Mark Greener here reports, diabetes management in people with dementia and other complex needs is often suboptimal.

Addressing complex needs

Up to 27% of nursing home residents have diabetes and many of these are frail, cognitively impaired or have other comorbidities. Moreover, between 13% and 20% of people with dementia also have diabetes. Nevertheless, according to a recent survey, only 53% of care homes in England assessed residents’ knowledge of hypoglycaemia using a standard protocol. Furthermore, 34% did not assess whether residents knew the signs and symptoms of hypoglycaemia, 37% did not have a written policy for hypoglycaemia management and 65% did not have a policy on diabetes screening.

‘Care homes can manage basic health care, but the teams know very little about more complex cases, such as dementia and concurrent diabetes, or where to access support,’ remarks Charles Fox, Consultant Diabetologist, Northampton General Hospital NHS Trust.

An intimate link

A web of mutually reinforcing strands links diabetes and dementia. Cognitive impairment, for instance, can undermine patients’ ability to monitor blood glucose and adhere to treatment, as well as impairing hypoglycaemia awareness. Care is often suboptimal across the social and health care sectors – and increasing evidence links diabetes and dementia pathophysiologically.

‘There is evidence that diabetes and dementia are linked,’ says Ahmed Abdelhafiz, Consultant Geriatrician at Rotherham General Hospital, South Yorkshire, and chairperson of the Diabetes Interest Group of the British Geriatrics Society. ‘Diabetes increases the risk of dementia through various mechanisms including hyperglycaemia, hypoglycaemia and the associated vascular and metabolic complications.’

Indeed, higher levels of glycosylated haemoglobin (HbA1c) predict lower cognitive function across multiple tests. In one study, for example, people with diabetes showed greater declines in speed of information processing and word recall during a 12-year follow up versus controls without diabetes. Epidemiological studies suggest that the relative risk of dementia among people with type 2 diabetes (T2D) ranges from 1.2 to 2.8 compared to controls without diabetes, although the difference was not significant in some of the studies.

Numerous other studies support a direct link between diabetes and dementia. For example, retinal vessels show structures and physiological properties similar to those of cerebral arterioles. As a result, damage to the retinal vasculature seems to offer a marker of cerebral microvascular disease. Patients with diabetic retinopathy tend to perform ‘poorly’ on cognitive function tests, show a faster cognitive decline, and seem to be especially prone to develop dementia.

Neurological assessments and molecular biological studies also support a close pathophysiological relationship. Magnetic resonance imaging, for example, reveals that chronic hyperglycaemia seems to promote dysfunction of the hippocampus, a part of the brain that is central to memory. Meanwhile, molecular biologists identified changes in the brains of people with diabetes that resemble the early events which precede symptomatic Alzheimer’s disease (AD).

The intracellular protein tau, for example, is essential for the normal stability and functioning of neurons. Tau forms abnormal aggregations in AD called neurofibrillary tangles. The body adds phosphate groups to regulate numerous enzymes and other proteins. But tau in the neurofibrillary tangles contains excessive amounts of phosphate – in other words, the tau is ‘hyperphosphorylated’. Insulin resistance seems to trigger a chain of events that enhances activation of glycogen synthase kinase 3 beta (GSK3 beta), one of the enzymes that phosphorylate tau. The increased activation hyperphosphorylates tau and contributes to the formation of neurofibrillary tangles.

The brains of people with AD also show plaques made from a protein called amyloid-beta. Insulin-degrading enzyme (IDE) breaks down amyloid-beta as well as insulin. But hyperinsulinaemia means that IDE degrades insulin rather than amyloid-beta. This seems to enhance amyloid-beta accumulation. Brains affected by AD also show increased oxidative stress and inflammation – as do the brains of people with diabetes. Biologists have identified several other molecular links between the two conditions.

AD is the most notorious cause of dementia. However, a meta-analysis found a stronger association between T2D and vascular dementia (relative risk [RR] 2.48) than with AD (RR 1.46). The association between T2D and vascular dementia seemed to be relatively consistent across studies. In contrast, the association between T2D and AD varied considerably. Most dementia cases, however, probably arise from a mix of AD and vascular pathologies.

A difficult conversation

Dementia rarely emerges rapidly. Usually, cognitive function declines insidiously over many years (which complicates the analysis of studies assessing epidemiological links between diabetes and dementia).
Gradually, however, patients become less able to cope with the activities of daily living. ‘I’ve watched patients with excellent control deteriorate until they were unable to manage their diabetes as their cognitive function declined,’ says Anne Kilvert, Consultant Diabetologist, Northampton General Hospital NHS Trust. ‘It’s very sad to see people who have taken pride in managing their diabetes lose their ability to self-manage and become dependent on people who have less understanding of how to manage the condition.’

Understandably, patients often resent the loss of control over their diabetes. ‘It’s a bit like when a person with dementia is told they can’t drive anymore,’ Dr Kilvert says. ‘They resent the loss of independence and control. But there will come a point when self-care becomes unsafe. Health care professionals need to help people acknowledge that they need to make that transition.’ But – as Frances Bunn, Reader in Evidence Based Health Care at the Centre for Research in Primary and Community Care at the University of Hertfordshire notes – ‘this can be a very difficult conversation’.

Unfortunately, even the most willing spouse and other family members are rarely able to take up the slack. After all, people with diabetes – especially type 1 – learnt to manage the subtleties of their diabetes over many years. ‘Unless the carer is very knowledgeable and informed, replicating the patient’s control is almost impossible,’ Dr Kilvert remarks.

Dementia’s impact on self-care can undermine glycaemic control in other ways. ‘The erratic eating patterns associated with dementia mean that older people with diabetes are also at risk of malnutrition, dehydration and worsening diabetes control,’ Dr Abdelhafiz adds. ‘The combination of diabetes and dementia is likely to be associated with an increased incidence of treatment adverse events, such as severe hypoglycaemia.’ In addition, people with cognitive impairment may simply forget to take their treatments or they may take medication more than once. ‘Simplifying hypoglycaemic medications, especially the insulin regimen, is vital to optimise compliance,’ Dr Abdelhafiz says.

**Patchy care**

Despite compelling evidence of a link between the conditions and a clear clinical burden, current services often do not meet the needs of people with diabetes and dementia (PWDD). ‘Caring for PWDD often poses a considerable challenge for the NHS and carers, but there usually isn’t the support or resources needed to address the problems,’ says Dr Fox.

‘Care should be individualised with reasonable goal setting, a focus on quality of life and the development of shared-care protocols including the indications for hospital referral to reduce unnecessary admissions,’ Dr Abdelhafiz adds. ‘However, the current care for PWDD is largely patchy with no structural national system for regular screening and early diagnosis of both conditions, especially in care homes. The integration between primary and secondary care, particularly involving geriatricians in community care, is also less than optimal. In addition, educational programmes for PWDD, which are suitable for their cognitive function, and their carers are not always available.’

Some guidelines have been developed, such as those covering diabetes care in care homes. But the variability and unpredictability of diabetes and dementia individually – let alone as comorbidities – hinder attempts to develop guidelines and care pathways. ‘Care of anyone with diabetes needs to be individualised. That’s especially important if the person also has dementia,’ Dr Kilvert says. ‘So guidelines are not very helpful. Managing people with dementia and diabetes is more about clinical experience and professional judgement than following guidelines.’

‘Developing guidelines is a real problem,’ Dr Bunn agrees. ‘Diabetes care is very dependent on self-management. The current NICE guidelines do not really focus on complex needs in detail and mention dementia only in passing. But the lack of guidelines and care pathways isn’t a problem that is confined to dementia. There is a need to address similar issues in people with diabetes and other complex needs, such frailty or COPD.’

**Accepting looser control**

Managing PWDD might mean that patients, carers and health care professionals need to accept looser glycaemic control than that recommended in the guidelines. PWDD should have their medication reviewed regularly as their cognitive state deteriorates. ‘Dementia is progressive and patients tend to lose weight. Therefore, regular review of polypharmacy and de-intensification or even complete withdrawal of medications is needed in PWDD who are frail, have lost significant weight or are at high risk of recurrent hypoglycaemia,’ Dr Abdelhafiz says. ‘Focusing on improvements in function and quality of life may be of greater clinical relevance in PWDD than metabolic targets alone.’

‘In particular, health care professionals should consider whether sulphonylureas, with their associated risk of hypoglycaemia, are appropriate,’ Dr Fox says. ‘So the clinician and the patient may need to accept less than perfect glycaemic control. Safety needs to come first.’

Dr Kilvert suggests reviewing the regimen when a person experiences a hypoglycaemic episode. ‘Clinicians in the specialist teams and in the community need to ask proactively about hypoglycaemia even if it just a “funny turn”,’ she says. ‘This may suggest, for example, that the dose of sulphonylureas needs to be reduced or stopped completely.’

Dr Kilvert adds that cognitive impairment might undermine the person’s ability to monitor blood glucose levels and dementia might hinder the person’s ability to detect hypoglycaemia. ‘Severe hypoglycaemic episodes – those that require hospital treatment for example – produce a repeated insult to the brain. This can exacerbate the cognitive decline and reduce hypoglycaemia awareness,’ she says. ‘On the other hand, being aware of hypoglycaemia depends on a certain degree of intact mental function. Dementia undermines cognition. So, not surprisingly, PWDD tend to have impaired hypoglycaemia awareness.’
‘Tight glycaemic control is not usually suitable for PWDD or those who are frail and at a high risk of side effects due to polypharmacy,’ says Dr Abdelhafiz. ‘We need a new approach to defining glycaemic targets based on the level of function. Tight glycaemic control is reasonable in fit older people, but a relaxed approach is more appropriate in PWDD.’

**To screen or not to screen**

Patients with impaired cognition might not recognise a decline in their mental abilities, self-care and diabetes control. Dr Kilvert comments that sometimes the spouse or another family member notices the subtle cognitive changes that can herald dementia. ‘In other cases, health care professionals notice the difference,’ she says. ‘Early detection of dementia and other problems is one of the advantages of continuity of care.’

Nevertheless, many places lack continuity of care and the symptoms of dementia emerge insidiously. So, should the NHS screen patients for diabetes and dementia? ‘We need to make sure that screening isn’t a tick-box exercise as it can be with depression in diabetes. But I think that people in care homes should be screened for cognitive function and diabetes once a year,’ Dr Kilvert suggests. ‘Both diseases show a high incidence in this population, so this seems reasonable. I think community-dwelling people should be screened if there are any concerns or suspicions – such as if glycaemic control declines.’

Dr Abdelhafiz suggests using the Mini-Cog test (mini-cog.com) as a screening tool for dementia. ‘The Mini-Cog test has a sensitivity of 86.4%, a specificity of 91.1% and takes only 3 minutes to perform,’ he says.

**Is greater integration the key?**

Against this background, Dr Bunn and colleagues are working on a ‘realist synthesis of the evidence’ to improve the care of PWDD for the National Institute for Health Research (NIHR). Dr Bunn and colleagues aim to develop a theoretical framework that explains which interventions work, for which patients, in what context and why. The study also aims to identify ‘barriers and facilitators to effective management’ of PWDD.¹ Dr Bunn argues that explaining how interventions work and the mechanisms that achieve change, will help tailor interventions to the setting and patient group.¹ Dr Bunn hopes that the NIHR will publish the report within the next year.

The review will also inform the design of much-needed intervention studies.¹ PWDD are often excluded from clinical trials,’ notes Dr Abdelhafiz. ‘There is a need for clinical trials specifically designed for older people with diabetes to explore the real benefits of glycaemic control in this diverse group. There remains a lack of intervention studies that reduce disability and improve quality of life in PWDD.’

Studies also need to examine issues facing carers of PWDD. Carers often feel undervalued or excluded from decision-making about people with dementia.³ Carers of PWDD face extraordinary challenges to care for both conditions especially in people who develop behaviour changes,’ Dr Abdelhafiz says. ‘Their needs should be identified early to allow for greater support from the health care system.’

Dr Bunn agrees: ‘We still don’t know what support carers need or what interventions will help them. There are going to be a lot more people with diabetes and dementia or other complex needs in the future,’ she concludes. ‘We know what many of the issues are. We know many of the problems people face. What we don’t know is the best way forward.’

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**References**