Age-related cognitive decline: prevention and future planning

Declining cognitive function can be a difficult topic to raise with patients and their families. It is important to reassure older patients that some degree of cognitive change is a natural consequence of ageing, and minor memory problems do not necessarily indicate that they have, or will develop, dementia. Maintaining good cardiovascular health and remaining physically and mentally active, especially during midlife, can delay the onset of significant cognitive decline. Planning for future needs can reduce the stress that older people and their families/whanāu may experience in a person's advancing years.

This article focuses on the proactive management of issues relating to cognitive impairment that may arise with normal ageing. It is the first article in a series on cognitive impairment and dementia in older people. Future articles will cover the diagnosis and management of mild cognitive impairment and dementia, treatments for the behavioural and psychological symptoms of dementia, and the role of primary care in providing support for patients with advanced dementia.

KEY PRACTICE POINTS:

- Normal ageing eventually results in neurological changes that may impair cognitive function; this does not necessarily indicate that a person is developing dementia, which is a separate pathological process
- Consider opportunities to enquire about and assess cognitive function in an older person, e.g. during a cardiovascular risk assessment, following a significant medical event, at times of transition (e.g. retirement, bereavement)
- Strategies to maintain brain health, thereby preventing or slowing cognitive decline, focus on maintaining cardiovascular health, being physically, mentally, socially and culturally active, and the optimal management of co-morbidities. Although these interventions are more effective when introduced during midlife, they are still likely to be beneficial to patients at any age.
- Encourage older patients to proactively plan for their future, including discussing an advance care plan and identifying a person who may be appointed as an enduring power of attorney

The effect of ageing on cognition

As we age, the volume of the brain shrinks, neuronal networks operate less efficiently, neurons and synapses are lost, changes in cerebral vasculature and metabolism occur and inflammation levels in the brain increase.[1, 2] The way we live also changes as we age; physical activity often decreases, social networks may become smaller and many people are less cognitively active once they retire. These physiological and social changes begin in our 20s and 30s, collectively resulting in noticeable alterations in cognitive function in the decades that follow.[3]

The terms crystallised and fluid are used to describe the cognitive abilities that are affected by normal ageing and those that are not.[1] Crystallised refers to the cumulative skills and memories acquired over a lifetime, e.g. reading comprehension, historical knowledge and vocabulary.[1] Studies have demonstrated that crystallised cognitive abilities generally improve until approximately age 60 years and then plateau until around age 80 years*.[1] Fluid cognitive abilities require assimilation, manipulation and transformation of information to solve problems, e.g. read a map, make decisions, e.g. plan a holiday, and learn new concepts, e.g. master a new electronic device.[1, 4] Studies have shown there is a steady but slow decline in fluid cognitive abilities from age 20 to 80 years as cognitive processing speed decreases.[1, 4]

Set shifting, i.e. our ability to transfer focus between tasks, is a mental skill closely related to fluid cognitive abilities that also declines with advancing age.[5] In older age a person's relative ability to "multi-task" is decreased and they become more susceptible to distracting interference during cognitive tasks.[4]

* There is insufficient data beyond this age, but the available data suggest a slowly declining trend

Memory and normal ageing

Different components of memory are affected by ageing in different ways (see: "The different types of memory"). Working memory declines with normal ageing, making it more difficult to form long-term memories.[1, 2] People also more frequently forget to perform planned tasks as they age, due to declining prospective memory.[1] Episodic memory remains relatively stable in older age, although the accuracy of the memory and the level of detail may decline; memories formed earlier in life are usually more persistent.[1] Semantic and procedural memories are largely preserved in people experiencing normal ageing, but may decline late in life.[1, 6] In general, age-related memory changes mean that older people may find it more difficult to learn new information and will more frequently misplace objects, need to search for a word or a person's name or forget to perform a task.[1] For some people, these cognitive

The different types of memory

Working memory refers to the short-term storage and processing of information over second or minutes, before it is dismissed or transferred to long-term memory.[7] It may be phonological, e.g. a person's name or a phone number, or spatial, e.g. directions to a location. A deterioration in working memory often becomes apparent beyond age 60 years.[2]

Prospective memory refers to remembering to perform an action in the future, e.g. adhering to a daily medicine regimen or buying a required item at the supermarket.[1] This form of memory declines with age.[1]

Episodic memory refers to a person's ability to remember past events and the context in which they occurred. These memories may be stored for minutes or years, e.g. what was eaten for lunch that day to who attended a wedding several years ago.[7] The ability to learn new information and recall recently learned material declines with age.[4]

Semantic memory refers to knowledge, ideas and concepts that have been accumulated over a lifetime. The volume of this memory gradually increases until approximately age 60 years.[1, 6]

Procedural memory refers to learned skills required to perform tasks that cannot usually be explained verbally.[8] These skills can be explicit (purposeful and conscious), e.g. when learning to ride a bike, or implicit (automatic and unconscious), e.g. knowing the sequence of keys when typing.[8] Procedural memories are generally retained in old age.[1]

changes seem magnified as they pay closer attention to them later in life, whereas they would have been unconcerned by the occasional memory lapse as a younger adult.

Dementia is not an inevitable consequence of ageing

Dementia is a syndrome with a variety of pathological causes, in contrast to the normal process of cognitive ageing. Clinically, dementia involves a decline in mental function that is not a part of, and is beyond what might be expected in normal ageing.[9]

Distinguishing early stage dementia from normal cognitive ageing can, however, be difficult as the precise changes underlying the two conditions are not completely understood and the two processes may occur concurrently. Furthermore, a substantial number of older people who have died without dementia have similar neuropathology on autopsy to those who have died with dementia.[2]

An important difference between normal cognitive ageing and dementia is that people with dementia have an acquired functional impairment that restricts their daily activities or ability to live independently, and it is progressive.[1]

Age is the strongest risk factor for dementia and the prevalence in New Zealand increases markedly after the age of 60 years.[9, 10] The prevalence of dementia is estimated to be 9% in people aged 65 years and over and 30% in those aged 85 years and over.[11] Dementia is not, however, an inevitable consequence of ageing. For example, one study found that over one-third of 207 centenarians who were interviewed and examined had no signs of dementia.[12]

Further information on dementia will be available in a future article: "Recognising and managing early dementia"

Having a conversation about brain health

Cognitive ageing can be a difficult issue to raise with patients; younger people are frequently disinterested in talking about it and older people often avoid the subject. Common concerns about cognitive decline, include:[13]

- Embarrassment or shame
- Fear about developing dementia
- A need to continue to contribute to families/whanāu and communities
- A desire to live independently for as long as possible
- Wanting to maintain dignity and mana

Framing the issue positively in terms of maintaining and improving brain health may help to overcome any reluctance to discuss this topic.

Specific occasions where conversations about improving brain health can be initiated include:

- When a patient asks for health advice
- Cardiovascular risk assessments, as part of a broader conversation about the benefits of good cardiovascular health
- During the management of long-term conditions, e.g. depression or diabetes
- Transition phases, e.g. retirement, moving homes or bereavement
- Following a significant medical event, e.g. discharge from hospital, a fall
- Initiating or renewing a long-term medicine, especially any with the potential to adversely affect cognition
- During a medical certification consultation, e.g. providing a driving certificate (See: "Assessing driving safety")
- If a patient appears to be having cognitive difficulties or another practice staff member notices there may be an issue, e.g. at reception
- The patient, partner or a family member raises concerns about memory lapses or safety issues due to incidents in the home, e.g. unattended cooking, flooded bathroom

Decide if a formal cognitive assessment is needed

The patient's history (of perceived cognitive impairments) is the initial focus when deciding if they are likely to have age-related cognitive decline or a more serious impairment warranting a formal cognitive assessment and further investigation. Wherever possible, this should include the observations of a family/whanāu member who knows the person well, as cognitive impairment may diminish the patient's ability to recognise and report their own symptoms. Conversation with the patient may also provide clues as to whether cognitive testing is warranted, e.g. are they able to answer questions succinctly or did they hesitate to find words or recall the sequence of events?

Reassurance can be provided to patients with normal cognitive ageing that some level of decline is a natural part of ageing and dementia is not an inevitable consequence. Furthermore, lifestyle changes can be made to improve brain health and reduce the risk of cognitive decline (see below).
If there are concerns about dementia or its symptoms, these should be investigated the first time they are noted.[11] This should include considering potentially reversible causes of declining cognitive function, e.g. adverse effects of medicines, depression, delirium, alcohol or drug misuse and metabolic causes such as vitamin B12 deficiency or hypothyroidism.[14]

Cognitive assessment tools

If a cognitive assessment is considered appropriate, the 6-item cognitive impairment test (6CIT) or the general practitioner assessment of cognition (GPCOG) may be used initially, with

a more comprehensive tool utilised if the results suggest the patient may be clinically impaired, e.g. Mini-Addenbrooke's Cognitive Examination (Mini-ACE or M-ACE). If cognitive testing shows that a significant cognitive impairment is unlikely, this result may relieve anxiety for the patient and provide a baseline against which any future concerns can be assessed.

The Cognitive Impairment Assessment Review (CIAR) Working Group have prepared a report on the preferred test for assessing cognitive decline in New Zealand. The Mini-ACE is now recommended as the preferred screening tool. Online training will be available from 1 August, 2020 at **www.nzdementia.org/mini-ace** and from 1 September, 2020, Mini-ACE will be incorporated into the cognitive impairment pathway on HealthPathways. From 1 September, 2019, it has been mandatory to have completed a training and certification programme from the MoCA institute and after 1 September, 2020, access to the test will be restricted to officially certified users.

Arrange a follow-up consultation

Offer the patient a follow-up consultation for reassessment, e.g. in six months. The benefits of this strategy are that it provides reassurance to the patient that their situation is being monitored and it facilitates an early diagnosis if subsequently they develop significant cognitive impairment.

Further information on investigating dementia and other causes of cognitive impairment will be available in a future article: "Recognising and managing early dementia"

"What's good for your heart, is good for your head" – strategies to prevent cognitive decline

Improving brain health is a key strategy for potentially slowing age-related cognitive decline. This focuses on maintaining a healthy lifestyle, remaining socially and mentally active, and optimal management of co-morbidities.[10] Modifiable risk factors that can improve brain health and cognitive function may also reduce the risk of dementia onset in some people.[10] Many of these risk factors are linked and the benefit of multiple interventions is likely to be synergistic.

Early interventions have the greatest evidence of benefit

Following a healthy lifestyle and optimising the management of cardiovascular risk factors may slow the progression of existing cognitive impairments, but the strongest evidence of benefit is when these interventions are introduced early in life, e.g. when a person is in their 40s and 50s, before the symptoms of cognitive ageing have become noticeable.[10, 15] There are also numerous other benefits to improving lifestyle, e.g. better cardiovascular health, improved quality of life and longer life expectancy.

Perform physical exercise at least two to three times per week

People who are physically active are more likely to have good brain health.[10] The benefits of physical activity appear to increase as the degree of exercise increases, with no apparent upper limit;[10] more is better, as long as it is physically safe.

At least 2.5 hours of moderate activity is recommended each week, e.g. brisk walking, swimming, aqua jogging, playing social games/sports, gardening, vacuuming, mowing the lawn.[16] This can be reduced by half if it is vigorous activity, e.g. running, hill walking, aerobic dancing, digging.[16] Encourage interventions that promote physical activity and social interaction, e.g. dancing or dog ownership. Activities that involve others tend to be associated with increased adherence and are more likely to persist as a healthy behaviour later in life when the assistance of a support person may be required.

Eat a healthy, balanced diet

A healthy diet helps to prevent conditions that are known risk factors for cognitive decline, e.g. cardiovascular disease and diabetes.[10] The Mediterranean diet is the most extensively studied dietary pattern in relation to improving brain health and systematic reviews have reported that strict adherence to this diet is associated with a decreased risk of Alzheimer's disease.[10] The dietary approach to stop hypertension (DASH) regimen has also been associated with improved cognitive function in older people.[10] In general, a diet rich in fresh fruit and vegetables, fish, nuts, olive oil can be recommended to improve brain health and reduce the risk of dementia.[10] Consumption of caffeinated beverages such as coffee or tea in moderation may have a mild protective effect against cognitive decline later in life, e.g. two to three cups of coffee per day.[18]

Supplementation to prevent cognitive decline is not recommended

There is no evidence of benefit of dietary supplementation with multi-vitamins, B vitamins or polyunsaturated fatty acids, e.g. omega-3, to prevent cognitive decline in healthy people and these products should not be recommended for this purpose, although they are unlikely to cause harm.[10] There is a limited amount of evidence that supplementation in people with dietary deficiencies, who are unable to meet requirements through diet alone, may be associated with modest improvements in cognitive ability.[19]

The prevention of Alzheimer's disease by vitamin E and selenium (PREADViSE) trial found no evidence that the antioxidants vitamin E and selenium, either alone or in

combination, were protective against dementia in over 7,500 asymptomatic older men, over a period up to 11 years.[20] The Ginkgo Evaluation of Memory (GEM) trial found that *Ginkgo biloba* was not protective against dementia in over 3,000 asymptomatic older people, over a period up to seven years.[21]

There is good evidence that routine hormone replacement, i.e. with oestrogen or testosterone, is not protective against cognitive decline in older females and there is no evidence that it is protective in males.[22]

Further information on healthy dietary options is available from: "Weight loss the options and the evidence" **www.bpac.org.nz/2019/weight-loss.aspx**

Minimise alcohol intake

In people who may be drinking hazardously, interventions to reduce alcohol intake to improve brain health (among other benefits) are recommended.[10] This guidance is based on multiple studies showing that excessive use of alcohol is an established risk factor for cognitive decline and dementia.[10]

Further information on managing alcohol misuse is available from: "Assessment and management of alcohol misuse by primary care", **www.bpac.org.nz/2018/alcohol.aspx#3**

"Use it or lose it": keep mentally active

Mentally stimulating activities may reduce the risk of cognitive decline and a diverse range of activities is recommended to maintain brain health.[10] A prospective study of more than 1,900 cognitively normal people aged over 70 years found that mentally stimulating activities, e.g. reading books, crafts, computer use and social activities such as going out to movies or the theatre, significantly reduced the risk of a person developing cognitive impairment after four years of follow-up.[23] The greater the frequency of mentally stimulating activities, the greater the benefit; a systematic review found that solving crosswords several times a week reduced the risk of cognitive decline more than doing them once a week.[15] The benefit is unlikely to persist, however, once the person ceases performing the activity. Computer programmes and smartphone apps specifically designed to improve cognitive function are available, however, a recent systematic review was unable to identify any evidence of benefit.[24]

Staying socially connected is associated with general well-being

Social engagement and support provided by family, friends, Age Concern or other community groups is associated with good health and wellbeing at any age and is likely to be beneficial.[10] It also improves adherence to other "brain health" activities, e.g. exercise classes, games and craft groups. There is insufficient and inconclusive evidence, however, to recommend social engagement as a strategy solely to prevent cognitive decline or dementia.[10]

A person's cultural background and beliefs will influence how they view the importance of connections with family, friends and the environment. For example, many kaumātua (Māori elders) believe mate wareware* can negatively affect their te oranga wairua (spiritual wellbeing).[25] Cultural activities and regular participation in Māori community groups such as waiata (song), kapa haka (song and dance) or whaikorero (formal speaking on the marae) and maintaining their roles within whanāu and on the marae may counterbalance this.[25]

* Mate wareware, meaning becoming forgetful and unwell (pronounced "*ma-te* wah-reewah-ree"), was identified as a preferred Te Reo Māori term for dementia in interviews of 223 kaumātua from across Aotearoa New Zealand.[25]

A list of local Age Concern offices is available from: **https://www.ageconcern.org.nz**

Smoking cessation may reduce the risk of cognitive decline

Smoking tobacco is associated with cognitive decline and dementia, as well as a range of other adverse effects. There is strong epidemiological and observational evidence that smoking tobacco is likely to be a causal factor for cognitive decline and dementia later in life.[10] Improving brain health is one of many reasons to recommend smoking cessation.

Long-term marijuana use has a negative effect on cognitive ability during midlife.[26] It is unknown whether this leads to accelerated cognitive decline later in life, as the appropriate studies have not been conducted. The Dunedin longitudinal study of 1,037 individuals found that persistent marijuana use over 20 years was associated with neuropsychological decline that was most significant in those that had persistently used marijuana for the longest periods.[27] The effect was detectable across five neuropsychological domains, i.e. executive function, memory, processing speed, perceptual reasoning and verbal comprehension, and was greatest among users who started using marijuana during adolescence.[27]

Optimise the management of co-morbidities

There is some evidence, often epidemiological and observational, that improved management of certain co-morbidities early in life may improve brain health, including:[10]

- Reducing obesity
- Managing dyslipidaemia
- Reducing blood pressure
- Optimising diabetes management

Optimal management of these co-morbidities is also highly likely to provide non-cognitive health benefits, e.g. reduced cardiovascular risk and improved quality of life.

Consider if a hearing aid would improve quality of life

Hearing loss is associated with cognitive decline, increased social isolation and reduced mobility.[10] Hearing aids need to be introduced before any cognitive decline reaches the point where learning to use a device may be problematic. The patient's hearing can quickly be checked by asking them to repeat a few softly whispered words, or if they can hear some strands of hair being rubbed behind their ear.

Hearing aids can improve quality of life and may provide transitory improvements in cognitive function that return to baseline within one year.[10] There is insufficient evidence, however, supporting their use solely to reduce the risk of cognitive impairment or dementia.[10]

Helping ageing patients plan for their future

Once the symptoms of age-related cognitive decline become apparent, people are more likely to have increasing needs. Proactively identifying and planning for these issues may reduce the stress the patient and their family/whanāu experiences in the future.

One approach is to make a checklist of topics to be discussed as opportunities arise and to note in the patient's file when a topic is addressed. A focused session with a practice nurse provides patients with more time to talk about these issues. The specific topics will vary, but might include:

- Potential issues in the home, e.g. stairs, other fall hazards, home maintenance, heating and cleaning, managing the section
- Driving confidence and safety
- Considering who could provide assistance or care in their home and when residential care might be considered
- Considering who would make any decisions for them if they were not mentally competent, i.e. enduring power of attorney (EPOA – see below)

Older people may be eligible for support services. Contact details for DHB Needs Assessment Services are available from: **www.nznasca.co.nz/regions/**

Appointing an enduring power of attorney

The benefit of an EPOA is that a person can be reassured that they have a supporter who can help them to remain involved in their decisions and make decisions for them that are aligned with their values and beliefs if they eventually are unable to do so themselves. In the absence of an EPOA, decisions about the person's healthcare will be made by a clinician based on what is clinically best for the patient or by a court-appointed welfare guardian.[28]

There are two types of EPOA:[28]

1. Personal care and welfare, e.g. agreement to undergo medical treatments or admission into residential care – only one person may be appointed
2. Property, e.g. money and assets – more than one person may be appointed or a suitable organisation such as the Public Trust

A medical certificate stating that the patient is mentally incapable is required to activate the EPOA before the designated person can act on matters that are likely to have a significant effect on the health, wellbeing or enjoyment of life of the patient.[28]

Encourage older patients to consider advance care planning

Advance care planning (ACP) is the process of discussion and shared planning for future healthcare with the patient, their partner and family/whānau and a health professional.[28] ACP should be considered by patients while they are cognitively intact; it cannot be undertaken once a patient becomes mentally incompetent.[29] The key triggers for initiating conversations about ACP are a deterioration in the patient's health or their admission to residential care.[29] Initiating these conversations can be difficult; a possible approach is:[28]

> *"You're currently in good health and taking care of yourself. Now is a good time to think about healthcare planning; we call this advance care planning. Is that something you've ever thought about?"*

A conversation about ACP should include:[28]

- The patient's understanding of their current state of health
- The patient's values and beliefs about quality of life and what makes life worth living
- Input from the patient's partner and family, if possible
- Identification of a person for EPOA
- The patient's views on life support and resuscitation if they were in an intensive care unit

Conversations about ACP may occur in a dedicated consultation or over multiple visits. There is no requirement to cover all the issues in one sitting. It is crucial, however, that the conversation is well documented and that any decisions that the patient makes are communicated with relevant family/whānau and health professionals.[28]

Training material and an ACP manual for health professionals are available from: **www.hqsc.govt.nz/our-programmes/advance-care-planning/projects/staff-information/**

"Kia korero | Let's talk advance care planning" is a campaign encouraging people to plan for their future healthcare. Resources for patients, including a guide for creating an advanced care plan, are available from: **www.hqsc.govt.nz/our-programmes/advance-care-planning/kia-korero-lets-talk-advance-care-planning/**

Assessing driving safety

People aged 75 years or over require a medical certificate when they renew their car driver licence (Class 1).[30] This certificate can now be supplied by a general practitioner, nurse practitioner or registered nurse.*

* Since November, 2018, registered nurses and nurse practitioners, working within their scope of practice, have been able to issue medical and eyesight certificates for driver licensing.[30]

Health professionals have two primary legal obligations when performing medical assessments for fitness to drive:[31]

1. To advise the Transport Agency, via the Chief Medical Adviser, if a person is a danger to public safety by continuing to drive after having been advised not to
2. To consider "Medical aspects of fitness to drive" when a conducting the assessment

Health professionals also need to be mindful that their role in assessing driving fitness is not to be an advocate for the patient.

Relinquishing a driver licence is a sensitive issue which health professionals in primary care often find difficult to manage.[32] A patient with worsening cognitive impairment can be gradually prepared for this (unless they are already clearly unsafe), by suggesting that they might require periodic driving assessments or need to restrict their driving to familiar short routes and avoid driving at night. People with moderate or more severe dementia should be told that they must stop driving.[33]

The Transport Agency has a medical certificate for driver licence (DL9) available from: **www.clinicalresources.org.nz/forms/medical_certificates/drivers_license_medical_certificate.pdf**

A New Zealand clinical guideline for assessing driving safety in people with dementia is available from: **www.alzheimers.org.nz/getmedia/7c988632-6e93-43d7-b0de-871df0bd2663/Dementia_and_Driving.pdf.aspx**

The Goodfellow Unit has produced a case study for assessing driving safety in a patient with recently diagnosed dementia, available from: **www.goodfellowunit.org/medcases/driving-assessment-patients-dementia-how-guide**

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