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Dementia Research: A Comprehensive Overview

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Abstract: Dementia is a general term describing irreversible diseases that affect people's memory and capabilities. In recent years, its global prevalence has been rising gradually. Several studies have focused on different areas of dementia. This article reviews current knowledge of dementia from ten aspects, including types, etiology, symptoms, diagnosis, treatment, prognosis, ethical policies, and the latest news on dementia. Most studies agree that the most common type of dementia is Alzheimer's disease, which accounts for 60% to 80% of cases; the average life expectancy after diagnosis is 5 to 10 years. Recent National Health Service (NHS) policy and the General Medical Council (GMC) have listed caregiving suggestions for doctors and carers of dementia patients. The NHS explained the reasons it denied drugs intended to treat dementia. Our review summarises basic information about dementia, analyses the policies and treatment resources that need to be addressed or improved, and indicates the next steps to control this global problem.

Keywords: Dementia, Alzheimer's disease, Treatment and care policy

1. Introduction

In 2021, there were 57 million dementia patients around the world, and 10 million cases were diagnosed each year [1]. Dementia is one of the major causes of death or disability among older people, costing 1.3 trillion dollars in both formal and informal care [1]. Long-term caregiving is a huge burden on families and the healthcare system; therefore, more research is focusing on dementia, aiming to reduce the stress of the disease. However, most papers focus on a particular dimension; lack of summarised, up-to-date information may delay improvements in related policies and treatments, leading to reduced diagnostic accuracy and less effective clinical investment in dementia.

In recent years, dementia-management guidelines have been updated by many hospitals and organisations, including national department [2]. Some medications for dementia have become widely available across the world [3]. Hence, decisions regarding new policies for dementia-related medications play a crucial role in both the healthcare system and the population with dementia. It is important for doctors and patients to understand news and updates in order to maximise treatment effects and reduce unexpected expenses.

In summary, this article presents a comprehensive overview of dementia, summarises clinical facts proven by several studies, provides updates on new treatment methods and policies, and discusses common ethical and caregiving challenges.

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2. What is dementia

Dementia includes several diseases that affect memory, thinking, and the ability to carry out basic daily activities. It is irreversible, chronic, and progressive [1].

3. Types of dementia

The main types of dementia are Alzheimer's, Lewy body, vascular, and frontotemporal [4].

Alzheimer's is the most common type of dementia, accounting for 60 % to 80 % of cases [5]. It is mainly caused by abnormal deposits of the proteins Aβ and Tau. α-Synuclein protein affects the brain's chemical messengers, which causes Lewy body dementia. Vascular dementia, as stated in the name, is caused by conditions in blood vessels, for example, blood clots and disrupted blood flow. Frontotemporal dementia occurs when abnormal amounts of Tau and TDP-43 proteins accumulate inside neurons in the frontal and temporal lobes [6]. There are also other, less common types of dementia, such as Parkinson's disease, Huntington's disease, and mixed dementia [7]. They all have different pathology and sometimes different symptoms.

4. Etiology

There are both immutable and mutable factors. Immutable factors include age [1]. The typical age of diagnosis depends on the type of dementia, but the majority of cases occur in people over 45 years old [6]. Mutable factors include hearing loss, hypertension, smoking, obesity, physical inactivity, diabetes, excessive alcohol consumption, traumatic brain injury, air pollution, and social isolation [8]. A study shows that psychiatric diseases including depression, anxiety, PTSD, autism and personality disorders can lead to a higher risk of dementia (relative risk: 1.19–4.40) [9].

5. Symptoms

Symptoms of dementia can vary across the early, intermediate, and late stages [4] [10].

In the early stage, recent memory can be impaired, and learning and personality are gradually affected; this may include some functional disabilities, forgetting learned skills, language, and identification of objects. In the intermediate stage, memory of remote events is reduced but not totally lost. More behavioural disorders may develop, including uncooperativeness and aggression. Patients do not have a sense of time and place; sleep patterns can be disrupted. In the Late stage, patients are unable to complete basic activities and depend completely on others for care.

6. Diagnosis

According to current diagnostic guidelines, the diagnostic process can be summarised in four main steps: [11]]

1. Take the patient's family and symptom history to create risk profiles.
2. Evaluate the ability to perform tests of thinking abilities, functional status, and behavioural syndromes. Use scales such as the MOCA and MMSE [12].
3. Use MRI or CT and other lab tests (CSF Aβ42, p-Tau) to identify any conditions contributing to cognitive impairment.
4. Identify any likely brain diseases that cause these symptoms.

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7. Treatment

Several medications have been approved as useful for altering disease progression (Donanemab), cognitive symptoms (Benzgalantamine), and non-cognitive symptoms (Brexpiprazole) [13]. Other than medications, psychological treatments, for example Cognitive Behavioural Therapy (CBT), are main methods used for mental and mood symptoms such as anxiety [14].

In recent news, two studies agreed that weight-loss injections, GLP-1 agonists, are significantly associated with a decreased risk of dementia. This is good news for dementia prevention and treatment. However, these drugs do have side effects, and the studies had short follow-up times and were reviews but not cohort studies, so they are not guaranteed to prevent dementia, especially for those who do not have diabetes. Further investigations are needed; hopefully, this drug will become an option for dementia [15].

8. Prognosis

The average life expectancy varies from 5 to 10 years, depending on the type of dementia. People diagnosed earlier tend to have a longer life expectancy. The main causes of death are increased risk of falls, difficulties swallowing and eating, and incontinence [16]. It is important for patients to have the Advance Care Planning (ACP) and decide when to intervene with palliative care.

9. Ethical issues

Unfortunately, dementia patients do not always keep their basic rights to decide things for themselves. Consideration is required to balance patients' rights in decision-making, safety issues, and the pressure on carers [1].

According to the GMC, doctors should always ask patients' opinions about their treatment [17]. They keep their rights to decision-making when they have the ability to make rational decisions. Even if they lose part of their thinking ability, doctors still need to respect patients' choices when communicating with their families.

Therefore, doctors cannot assume that patients do not have the right to decide their lives in hospital and ignore their opinions. However, if patients are likely to harm themselves or others, doctors have the right to break the rules and require them to stay in hospital after clear communication [18].

Additionally, safety in driving, financial management, and the risk of accidental injuries should be considered. If patients are diagnosed with severe dementia, doctors should ask patients to inform, or allow doctors to inform, their families so that family members can consider helping them keep their important items and money, to prevent them from being forgotten or misused. When patients are in hospital, doctors should provide reasonable care and help in any way, including reminding them to eat meals, moving tables or chairs when needed, and sometimes accompanying them when they are walking to prevent falls.

Regarding pressure on carers, it is important for them to get necessary rest and free time, and to communicate with doctors if they find their job too stressful or are unsure how to care for the patients. Doctors have a responsibility to provide help when carers are in trouble or need professional guidance [19].

10. Nursing and caring NHS guidelines

Ways of caring for dementia patients are extremely important [19].

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When assessing and making care plans for patients, doctors should use the bio-psycho-social-physical-spiritual model and take care of patients' feelings and health. Patients should be frequently examined so doctors can collect the newest data and renew care plans to manage disease progression and meet patients' needs. Doctors need to evaluate patients' decision-making ability and start advance care planning once their capacity is impaired.

When communicating with patients, doctors should notice patients' moods and what they care about at present. Use life stories, pictures, or objects as references to explain treatments or diseases. Doctors should also care about patients' personal preferences and respect their personal space, telling them what is going to happen next to reduce their anxiety. Doctors should also try to catch any clues patients give about end-of-life issues, and try to understand patients' attitudes towards the end in order to help them decide what to do if anything unexpected happens.

Avoid using medications as much as possible; try CBT, structured activities, and physical activities first. If medications are necessary, always analyse the situation and simplify medications at each ward visit. In late-stage dementia, gradually stop using any non-comfort-related drugs. If patients refuse medication and lack capacity to understand the situation, crushing and tube feeding (PEG) can be considered after an MDT review, but capacity needs regular review. When patients are unable to swallow, avoid rushing to give PEG; instead, try hand-feeding or strong flavours first.

If patients have persistent immobility, inability to swallow, and reduced consciousness, this indicates that the patient has entered the terminal stage, and palliative pathways are needed. Doctors should consider patients' comfort, nutrition, pain, and spiritual needs. Provide a supportive plan, stop any invasive testing and treatment, start end-of-life pathways, and inform families.

Doctors should also assess caregiver burden and give carers mental and physical support. It is important to establish a caring profile, and everyone should follow the care plan. Both families and doctors have the right to rest.

11. Current news: NHS denied first drugs that treat alzheimer's disease

The NHS refused to approve the first two drugs that treat Alzheimer's disease because clinical batches are already limited and cannot justify their costs [20] [21]. This decision is a setback for people with Alzheimer's disease; families have to pay £60,000 per year for injections. Many charities criticise the NHS, arguing that it should reform its drug-value assessment framework and improve the health-care system to increase the efficiency of drug delivery and keep pace with medical development.

However, the NHS is under pressure from several practical limitations.

The phase III clinical trial shows that lecanemab and donanemab only delay cognitive decline by 4-6 months [20]; long-term injections and regular PET-CT, MRI are required [22]. It is a long-term investment for the NHS, and these medications are not cheap; the benefit gained may be less than money invested.

As mentioned in this article, approving the medications cannot solve the problem because the system is not ready to deliver them immediately [21]. There are over 70,000 Alzheimer's patients in the UK; regular PET-CT and MRI scans would be needed for all of them if they started to use these drugs. However, the average waiting time for CT and MRI scans is more than a month [23]. It is a huge task to arrange 70,000 more patients in the schedule without delaying other appointments.

Another concern is drug safety. Studies show that 21.3 % of patients in the medication group had signs of cerebral oedema or cerebral haemorrhage, compared to 9.3 % in the placebo group [24]. Both conditions are serious and life-threatening; the drug safety is doubtful, and patients need to be monitored closely if they use these drugs.

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Overall, the decision of the NHS can be considered as reasonable, although this is truly sad news for Alzheimer's patients. If the prices fall, risks are reduced, and the UK health-care system has enough resources to provide support, then it will be a better time for the NHS to approve these medications.

12. Conclusion

In general, it is widely agreed that dementia is age-dependent, irreversible, and common worldwide. There are four main types, with Alzheimer's taking the majority of cases. Patients can live for 5-10 years after diagnosis. There are also new discoveries regarding medications and more reasonable caregiving guidelines according to GMC rules. These developments indicate rising awareness of dementia within the healthcare system. However, many debatable areas still need to be fully researched. The effectiveness of GLP-1 agonists has yet to be confirmed. Further clinical trails are needed to examine the side effects of lecanemab and donanemab, and the NHS may need to negotiate on the price of these drugs in order to approve them and benefit patients. More supporting resources and caregiving suggestions for families and doctors mean that older people with dementia will have a better quality of life in the final stage.

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