Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Coronavirus Disease-2019 in Older People with Cognitive Impairment

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KEYWORDS

• COVID-19 • Dementia • Behavior disturbances • Nursing home • Ethics

KEY POINTS

- Patients suffering from dementia are at higher risk of COVID-19 infection and higher risk of severe forms and hospitalisation. There should be considered as a health priority in vaccination campaigns.Pandemia and its stay-at-home associated measures has result in higher rate behavior disturbances in demented patient that has increased burden for caregiver.
- This nursing home population accounted for about 30% of all COVID-19 related deaths in all industrialized countries and mainly among demented resident.
- Care in nursing home should be redefined according to this new situation.

Dementia affects approximately 50 million people worldwide, and this number is predicted to triple by 2050. Dementia is a disease with significant and prolonged repercussions on the patient and their family, and a huge cost for the community.[1] The combined impact of dementia and the coronavirus disease 2019 (COVID-19) pandemic have raised serious concerns about people living with dementia. Faced with the COVID-19 pandemic, the population of patients suffering from dementia has been shown to be particularly vulnerable to infection and to the severity of the disease. The application of health measures has proved particularly difficult to apply in the community as in hospital units or in nursing homes. Caregivers were challenged to ensure quality of care in difficult conditions, combining the application of

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appropriate health measures for the safety of all and individual respect for human dignity and ethical rules of care.

This narrative review aims to report current data on the pandemic in the population affected by dementia. After having summarized the epidemiologic data on the increased risk of infection and death in this population, this review successively discusses (i) the behavioral consequences of the social isolation and distancing measures (lockdown) such as anxiety, delirium, and depression, as well as the challenges of dealing with -wandering and pacing behaviors, (ii) current strategies, including vaccination, to face the epidemy in the dementia population, (iii) COVID-19 as a risk factor for cognitive decline and dementia, (iv) the burden of dementia for caregivers and social support during the pandemic, (v) the ethical issues, including advance directives and decision-making for hospitalization or resuscitation of dementia patient with COVID, (vi) palliative care and the critical need for advance care planning and finally (vii) care for patients with dementia living in nursing homes.

EPIDEMIOLOGY OF CORONAVIRUS DISEASE-2019 IN PATIENTS WITH DEMENTIA

From the first wave of COVID-19, the dangerousness of the COVID-19 pandemic to patients with dementia worried the medical community.[2,3] Epidemiologic data quickly highlighted the increased risk in patients suffering from dementia, not only of infection, but also of severe forms, with a frequent need for hospitalization and a high risk of death,[3–6] as well as specific complications related to their behavior disturbances.

The most recent meta-analysis on the risks associated with COVID-19 infection[3] and grouping together nearly 46,391 patients with dementia suggests that suffering from dementia increases by 2 to 3 the risk of contracting COVID-19 compared with patients of comparable age (relative risk [RR], 2.7; 95% confidence interval [CI], 1.4–5.3). Some researchers even report in studies carried out at the start of the epidemic, a significantly higher increase in risk among patients with dementia (RR, 8.5; 95% CI, 5.0–14.5).[7] This increased risk of infection can be explained by the difficulty in implementing protective measures and in particular in wearing the mask while living in an environment where many health care professionals circulate, as well as other potentially sick patients who do not observe the protective measures.[5]

A meta-analysis was published in May 2021[6] to evaluate factors associated with mortality in older adults with COVID-19. After adjustment, dementia was an independent risk factor for death (RR, 3.6; 95% CI, 2.4–5.5) that was significantly higher than other classically recognized pathologies as a risk factor for death (diabetes RR, 1.9 [95% CI, 1.5–2.3], hypertension RR, 1.3 [95% CI, 1.2–1.5], chronic obstructive pulmonary disease RR, 2.1; 95% CI, 1.5–3.1). This excess mortality of patients with dementia has been observed in particular in patients living in nursing homes.[5] Another meta-analysis published in 2021,[3] grouping 24 studies, also confirms that dementia is a risk factor for severe COVID-19 (RR, 2.6; 95% CI, 1.4–4.9), and excess mortality by COVID-19 infection (RR, 2.6; 95% CI, 2.04–3.36). In the UK, data from a large community cohort show that the risk of hospitalization for COVID-19 is approximately 3 times greater in patients with dementia than in patients without dementia.[7]

There are many reasons for the severity of the disease in patients with dementia.[8] Patients with dementia are often very old, multimorbid, and their functional reserves are low, which means that their frailty often limits their ability to cope with a potentially serious infection.[9] However, even after adjusting for these confounding factors, dementia remains a risk factor for severe COVID-19. The atypical clinical expression of patients infected with COVID-19, such as confusion, can also lead to diagnostic

and therapeutic delay.[10,11] Bianchetti and colleagues[12] reported in a cohort of patients with dementia infected with COVID-19 that delirium was the most frequent presenting symptom on arrival at the hospital. Delirium is an independent, well-known risk factor for mortality and adverse outcomes in older adults. Various authors have reported that dementia was associated with more nonspecific symptoms and less clinically detected dyspnea.[12,13]

More specifically linked to Alzheimer's-type disease, carrying the ApoE4 genotype, a genetic factor associated with an increased risk of the disease, has been reported as a risk factor for more severe COVID-19 infection.[14] The modulatory function of ApoE4 on the cells of the inflammatory response, especially in the lungs, could be the explanation.[15] ApoE4 contributes to the production of proinflammatory cytokines by macrophage and may potentiate the cytokine storm seen in severe forms of COVID-19.[16]

Finally, during the pandemic, the health of patients with dementia depended more than ever on caregivers who were sometimes left out of care to limit the spread of the virus or affected by COVID-19 themselves. The impact of the reorganization of patient support as well as social isolation measures (lockdown) that are often difficult for patients to understand has potentially affected their health status[17] and help to decompensate pre-existing chronic diseases in patients with dementia more than in other populations.[18] The negative effects of the measures taken around the world to control the spread of the virus have certainly been more detrimental in patients with dementia.[9] Various studies point out that people with dementia have increased their psychiatric symptoms and behavioral manifestations caused by social isolation.[19] Loneliness at home or in nursing homes has facilitated the onset of confusion and may have resulted in agitation. Many health care providers intervene with patients with dementia living at home. The pandemic has often constrained or decreased the fragile balance of the organization of essential human care for maintaining patients at home.[17–20]

NEUROPSYCHIATRIC SYMPTOMS OF PATIENTS WITH DEMENTIA DURING THE OUTBREAK

Since the beginning of 2020, social isolation and distancing measures have been imposed on several occasions. These periods of confinement have led to a significant increase in psychological distress, such as anxiety or depression, in the general elderly population.[19] In nursing homes, residents had a higher risk of infection by COVID-19 than the population living at home and were also confronted with the absence of their relatives and limitations on activities and social interaction.[19]

Recent literature undeniably shows that the outbreak has increased neuropsychiatric symptoms in people with and without major neurocognitive impairments.[8] This increase would be more important in patients with dementia.[19] Moreover, outbreak measures have been responsible for an increase in neuropsychiatric symptoms in more than one-quarter of patients with dementia and a worsening of symptoms in more than one-half of them.[21] Whiting and colleagues[22] highlighted that the severity of neuropsychiatric symptoms measured by the Neuro-Psychiatric Inventory increased significantly since the beginning of the outbreak and especially during periods of lockdown. In patients with major neurocognitive impairment, apathy seems to be the most frequently found neuropsychiatric symptoms. Anxiety and agitation are the second most frequent neuropsychiatric symptoms.[23] In contrast, irritability, apathy, agitation, and anxiety are the most frequently worsened neuropsychiatric symptoms in this population.[21] Finally, anxiety and sleep disturbances were reported to be higher in subjects with dementia living alone at home.[24] In several studies, agitation and aggression were more severe than other neuropsychiatric symptoms, with a

high impact on professional and family caregivers.[8,19,21] An Argentinean study suggests that neuropsychiatric symptoms—namely, anxiety, depression, and sleep disorders—occur more frequently in person living in the community with mild Alzheimer's disease compared with more advanced stages of the disease.[25] An Italian study focused on persons with vascular dementia living at home. It would seem that these patients have more severe neuropsychiatric symptoms overall and that the most frequently found neuropsychiatric symptoms were anxiety, delusions, hallucinations, and apathy.[26] Patients with Lewy body disease seemed to have a predilection for anxiety, sleep disorders, and, to a slightly lesser extent, hallucinations.[21] In frontotemporal lobar dementia, the most frequently increased neuropsychiatric symptoms are wandering and eating disorders.[21] In nursing homes, eating disorders have also been more frequent during the outbreak and notably during periods of lockdown.[23]

In contrast, the increase in mood disorders was found inconsistently, mainly in association with social isolation and the loss of family contacts at home or in the long-term care facilities.[27,28] Finally, psychotic disorders seemed to be the least impacted by the outbreak.[12,19,21]

The main hypotheses to explain the increase and worsening of neuropsychiatric symptoms are the social isolation and distancing measures resulting from successive lockdowns,[23] the abrupt absence of professional interventions and the outpatient care (respite day care, rehabilitation services), and, to a lesser extent, COVID-19 infection itself.[19,25,26] A small number of studies seem to suggest that delusions are the neuropsychiatric symptoms most frequently found in hospitalized patients with dementia who are infected with COVID-19.[12,19] In the long-term care facilities, social isolation, limitations of activities, in particular the sharing of meal times, and the absence of family members, explains to a large degree the increase in neuropsychiatric symptoms.[23]

Longer periods of lockdown seem to be the major cause of more severe neuropsychiatric symptoms, particularly in the apathy of individuals with Alzheimer's disease living at home.[27] Some experts have suggested that neuropsychiatric symptoms secondary to periods of lockdown may become chronic.[19]

In contrast, during these same lockdown periods, family caregivers of patients with major neurocognitive impairments also presented more neuropsychiatric symptoms, such as anxiety, mood or sleep disorders, and eating disorders.[29] One study suggests that some neuropsychiatric symptoms such as depression in informal caregivers may cause neuropsychiatric symptoms to emerge in subjects with dementia, and symptoms such as anxiety and depression in informal caregivers may exacerbate pre-existing neuropsychiatric symptoms.[30]

Finally, several studies have highlighted that the most common response to increased neuropsychiatric symptoms during lockdown and outbreak periods has been increased prescribing of psychotropic medications.[21,25–27]

IMPACT OF CORONAVIRUS DISEASE-2019 ON COGNITIVE DECLINE IN PATIENTS WITH DEMENTIA

Patients with dementia, particularly the elderly, are among the most vulnerable populations facing COVID-19 infection. This population often suffers from sensorial deficits and perception troubles, including visual and hearing difficulties, and an inability to recognize or understand their environment and thus, to adapt to changes. This factor is even more important with the mask-wearing measures. In addition, COVID-19 social isolation measures led both to a greater psychological distress and, at the same time, to a minor cognitive and functional stimulation in the patients with dementia. As a consequence, cognitive decline has been shown to be exacerbated by the

pandemic.[31–33] More specifically, memory, orientation, motor abilities, and language skills seem to be the most affected cognitive domains in these patients.[34]

In contrast, it is known that COVID-19 infection may have an impact on neurological functioning, resulting in worsening cognitive decline, even in patients without dementia, and certainly in patients with dementia. The potential mechanisms underlying these symptoms are not understood fully, but are probably multifactorial, involving indirect proinflammatory general state and direct neurotrophic effect of severe acute respiratory disease coronavirus 2.[35] Neurotropism is associated with various mechanisms, including retrograde neuronal transmission via olfactory pathway, a general hematogenous spread, and the virus using immune cells as vectors.[35]

Lessons learned from this pandemic show that further crisis and emergency phases should not neglect the multiple needs of patients with neurocognitive disorders and that a special support system will be urgently necessary to be addressed to these patients to avoid a decline in cognitive functioning, a hallmark symptom of Alzheimer's disease and related disorders.

VACCINATION OF PATIENTS WITH DEMENTIA

People with dementia suffering from COVID-19 infection are a higher risk of severe forms, longer hospitalizations, and high mortality rates.[36] In contrast, social isolation and distancing, face mask, proper hand washing, and other anti–COVID-19 measures often become extremely difficult to be respected owing to patients' cognitive and behavioral disturbances.

Therefore, given these negative health outcomes and difficulties, these patients should greatly benefit from the COVID-19 vaccine, and they should be considered as a health priority in vaccination campaigns in both living settings, namely, those in the community and those in nursing homes. However, they might need the encouragement of health professionals and families to become vaccinated. Proxy and professionals' preferences regarding vaccination for this group are, therefore, extremely important to increase the use of this preventive measure.[37]

Nevertheless, concerns still arise from safety of these news vaccines in this population with neurocognitive disorders.[38]

IMPACT OF "STAY-AT-HOME MEASURES" ON PATIENTS WITH DEMENTIA

Stay-at-home measures, mainly lockdown periods and social isolation during the COVID-19 crisis, have had an important negative impact on patients with dementia. In fact, functional, cognitive, and behavioral outcomes, as well as quality of life, have worsened significantly in this vulnerable population throughout this pandemic.[8] The main reason is that patients with dementia have suffered all the collateral sides effects of COVID-19 measures; first, by canceling many ambulatory and outpatient activities and/or planned hospitalizations, these patients lacked their regular disease follow-up and care from the family doctor or at the memory specialist. In addition, decompensation of other chronic conditions or emerging acute diseases were not be able to be managed appropriately.[39] Second, all care activities provided to patients with dementia, such as daily home care, respite day care, home professionals like physiotherapist, therapist, or mobiles teams, diminished their interventions or event were disrupted because of COVID-19 measures. As consequence, patients' diseases have worsened in terms of cognitive and physical decline, as well as in behavioral and psychological disturbances. This negative impact has been also observed in caregivers, who were facing the disease alone.

However, the challenges posed by COVID-19 have led to development and innovation in terms of providing care, whether that be via telemedicine, the development of new online tools, or receiving treatment within one's home.[40] In fact, the COVID-19 pandemic has been an accelerator for the implementation of new technologies applied to the care and management of patients with dementia and their caregivers. Indeed, the implementation of teleconsultation has been a tremendous advance.[41] Patients and caregivers were extremely grateful and relieved that health professionals were still there. Although there are several limitations to teleconsultation, patients and caregivers have accepted this new way of interaction and follow-up. Currently, health professionals, mainly physicians, still use this method of care in conjunction with traditional follow-up consultations, especially in cases such as severe dementia and behavioral disorders.

For the future, this experience has opened many doors and provides new possibilities to enhance follow-up based on telehealth in conjunction with the traditional in-person consultations for patients with dementia. For example, monitoring alerts first signs of cognitive decline, or risk for falls, or risk for behavioral disturbances is an important challenge for future telemonitoring tools; the development of novel interventions or monitoring system for pharmacologic treatment can be applied to issues of tolerance and efficacy. Concerning caregivers, in the same manner, new tools addressed to them could be used to enhance their training or support. Indeed, monitoring alerts the first signs of high burden, depression, or health problems could allow preventive interventions for caregivers.

Finally, COVID-19 and these new technologies have allowed novel ways of providing care much closer to patients and caregivers, toward a home care–centered model for dementia and away from a hospital-centered model.

BURDEN OF DEMENTIA DURING CORONAVIRUS DISEASE-2019

Major neurocognitive disorders,[42] led by Alzheimer's disease,[43] are the cause, according to their definition, of a loss of independence in instrumental and fundamental activities[42] of daily living. These disorders can also be associated with behavioral disorders[44,45] as discussed elsewhere in this article. Thus, these symptoms can cause a burden on caregivers. This burden causes psychological[46–48] and physical[47] stress for caregivers, which can lead to institutionalization for patients.[49]

The COVID-19 pandemic has caused many disturbances. First, owing to the high mortality rate of COVID-19, especially in the elderly,[50] and the lack of an effective specific molecule or vaccine, most countries implemented social distancing and home confinement measures to avoid gatherings and, thus, the spread of the virus.[51] Second, the health situation has impacted indirectly formal and informal caregivers and the health system they rely on. Indeed, care procedures considered nonurgent were suspended temporarily,[52] centers were closed,[53–55] and health professionals were sick or had to modify their schedules to cope with their own difficulties; therefore, telemedicine was promoted.[40,56]

In the general population, these measures contributed to mental health problems,[57] a decrease in physical activity, and thus an increase in sedentary behavior.[58] For people with major neurocognitive disorders, it may have been difficult to understand the health situation and, more specifically, to implement social distancing measures,[59] which may have led to an increase in behavioral problems and a loss of functional independence in the activities of daily living.[33,60] The caregivers, sometimes still working, have had to adapt their workstation, for example, by teleworking. Most of the time, they have had to cope with increased financial stress while continuing to manage their

family and their sick loved one. Indeed, several studies show that the health situation related to COVID-19 caused an increase in caregiver burden and a decrease in their well-being,[33] an increase in caregiver exhaustion,[32] an increase in stress levels[61,62] with an increase in anxiety,[63] particularly about transmitting the infection to their relative,[53] and finally an increase in depressive symptoms.[64] In addition, older caregivers seem to have been the most vulnerable to this increase in stress.[53] Finally, the burden was greater the more advanced the stage of neurocognitive impairment was.[65]

To decrease the burden on the caregiver, several researchers have worked on proposing concrete solutions. For example, the work of Ercoli's team has put forward 3 approaches to limit the stress and burden related to COVID-19: first, education about COVID-19. The second approach is stress prevention by maintaining daily routines, especially sleep, daily physical activity, and communication with the ill family member, as also shown by the Goodman–Casanova team. Finally, the last axis is based on the self-care of caregivers, notably through monitoring their mental health, participation in discussion groups, and mindfulness meditation.[24,66]

Other studies emphasize the use of telemedicine for patients and their caregivers. Indeed, studies have shown the effect of teleconsultation on the well-being of patients suffering from dementia and their caregivers.[56]

ETHICAL ISSUES IN PATIENTS WITH COGNITIVE IMPAIRMENT

The COVID-19 pandemic, both through health and psychological effects, and through the impact of control measures, raises many ethical questions in the care of patients with cognitive impairment. Some bibliographic sources have been interested in ethical questions and their main pillars: beneficence, nonmaleficence, justice, autonomy, and dignity.[67]

Impact on the Care of Elderly Patients with Cognitive Disorders

Cognitive impairment represents a risk factor for a serious form of infection with severe acute respiratory syndrome coronavirus 2[68] for many reasons: associated comorbidities, drug-related causes, delayed or sometimes inappropriate treatments, and behavioral disorders that make care complex. However, some less obvious factors may be involved as well, including socioeconomic conditions and increasing disparities.[69]

In this sense, the ethical discussion concerning sometimes high-acuity care (high-flow oxygen therapy, transfer to hospital or intensive care unit) must consider the presence of cognitive impairment, and sometimes associated neuropsychiatric symptoms. It is the patient's prognosis, and not their age alone, that must be taken into account in these discussions.[70] The difficulties in obtaining the consent of persons with cognitive impairment, in the discussion concerning the continuation of high-acuity care, highlights the importance of seeking upstream the designation of a medical power of attorney and the discussion and creation of advance directives.[71] Some recommendations have been made to facilitate the management of patients with cognitive impairment in the context of the COVID-19 pandemic,[72] particularly for palliative support, stressing the need for collegiality and interdisciplinary collaboration.

Psychological Impact of the Pandemic and Health Measures

Social isolation and a reduction in outside healthcare and support workers available for people living at home may have contributed to greater psychological weakness, more frequent mood disorders, or even to the increase in certain neuropsychiatric

symptoms linked to neurological disease.[23] Likewise, social distancing measures, starting with wearing a mask, can make it difficult to communicate with people with cognitive impairment. Nonverbal communication and the use of appropriate face masks can be of great help in promoting understanding despite cognitive disorders.[5]

In long-term care units, residents regularly experience periods of isolation and fewer outside interventions or activities. Caregivers in these facilities observed changes in the mental health of residents with cognitive impairment. The health measures in these care settings, in particular the isolation of residents who sometimes cannot give informed consent to these measures, require them to be adapted to the well-being and safety of the patients.[73] Reflection on the appropriate isolation measures for the epidemic situation, as well as the adaptation of existing legislative texts, remains necessary in this context.[74]

Development of Alternatives and New Care Methods

With the pandemic and the health containment measures, we have seen the development of new activities and the acceleration of other measures previously less developed. This is particularly the case with telemedicine, which has made it possible to continue medical support for isolated people or with cognitive disorders, living at home or in institutions.[71,75,76]

We have also seen, for elderly people with COVID-19 requiring complex medical care (oxygen therapy) who were not hospitalized, the development of hospital levels of care at home significantly increased during this period.

PALLIATIVE CARE IN PATIENTS WITH COGNITIVE IMPAIRMENT

Patients with dementia have an increased risk of developing COVID-19 infection. Moreover, all-cause dementia is considered a comorbidity associated with an increased risk of mortality.[77,78] In this context, there has been a significant use of palliative care in the management of patients with dementia with COVID-19.

Palliative care is a comprehensive and individualized care that should begin early in the course of any life-limiting disease.[79] During the pandemic, there was a lack of hospital beds, and palliative care had to be implemented in long-term care units.[80] This situation led to ethical discussions in the institutions and caused distress among the staff and relatives.[72] Care choices, if they were not anticipated, had to be made in a less than ideal context. Overload caregivers working during this period, the shortage of health care professionals, the absence of families and their doctor (prohibited from entering the nursing homes), and the low availability of beds at the hospital and of hospital professionals forced health care professionals in nursing homes to endorse complicated ethical choices, for which they were sometimes not prepared. This situation has revealed the importance of palliative care networks and the need for nursing homes to work on advanced directives and procedures regarding end-of-life and palliative care management.

The therapeutic means used in the management of respiratory symptoms are preferably opioids and oxygen therapy in case of hypoxemia. For behavioral disorders such as agitation and anxiety, the recommended treatment is benzodiazepines.[81] These behavioral disorders can be increased by isolation or restrictions on visits.[82] This also required care and support for the families, especially because isolation measures had to be respected.[83]

This management of the COVID-19 pandemic highlighted a lack of early discussion about the life plans of nursing homes patients. Kaasalainen and colleagues[83] established recommendations for end-of-life and palliative care management for patients

with dementia during the COVID-19 crisis and beyond. In this article, the Alzheimer Society of Canada proposes a coordinated multistep approach to improve palliative and end-of-life care for people with dementia in nursing homes during the COVID-19 pandemic.

CARE FOR THE PATIENT WITH DEMENTIA IN A NURSING HOME DURING THE PANDEMIC

COVID-19 infection is a disease mainly affecting elderly people and, among them, the most vulnerable living in nursing homes. Some data demonstrate the severity of the epidemic in nursing homes: Across the United States, approximately 1.4 million people live in nursing homes, or approximately 0.4% of the 330 million Americans. This nursing home population accounted for more than 180,000 COVID-19 deaths, or about 30% of all COVID-19–related deaths in the United States. In France, approximately 1% of the general population live in nursing homes. This small group has also accumulated, as in other European and industrialized countries, approximately 30% of all COVID-19 deaths.[84,85] The drama experienced by the nursing homes can be explained by the physical regrouping of people; their very old age, their great vulnerability owing to their immunosuppression, their multimorbidity, and, in particular, a prevalence in nursing homes of more than 50% of residents with dementia. Dementia has been repeatedly reported as an important risk factor for deaths related to COVID-19. This factor has led to the completion of numerous studies on the COVID-19 epidemic in nursing homes.[86–88]

The scientific literature quickly highlighted the challenge of providing care for residents with dementia, both to limit the risk of the virus spreading in the nursing homes and also to ensure quality care for this population.[89] Various authors highlight the difficulty of taking care of residents treated with psychotropic drugs during the epidemic,[72] as well as those with cognitive impairment.[67] The increased risk of COVID-19 in patients with dementia living in nursing homes and their roommate or environment, who are often also affected by dementia, is explained in particular by their great difficulty in applying barrier measures. All the unfavorable components of a severe and difficult to control epidemic are present in patients with dementia living in nursing homes.[90,91]

The use of masks, room isolation, and decreased mobility in the nursing homes quickly proved to be complicated to understand by the residents and unrealistic to apply by the nursing homes staff among the most impaired residents, especially those exhibiting wandering behavior.[92,93] Distancing (quarantine, isolation, cohorting) are effective strategies for fighting against pandemics,[94] but it has been difficult to implement effectively in nursing homes, especially for residents with dementia.[73] Moreover, the side effects of recommendations against the spread of COVID-19 in nursing homes were particularly significant among residents with dementia. Indeed, recommendations based on barrier measures (social distancing, limiting visits, especially from families) decreased the possibilities for social interactions, physical activity, and other nonpharmacological measures for decreasing psychobehavioral disorders. These measures were associated with an increase in anxiety, loneliness, and depressive symptoms in residents with cognitive impairment, for whom the explanations given were not understood.[39,93] Likewise, the strict application of social isolation and distancing measures have sometimes increased the use of physical restraints or the use of psychotropic drugs.[39,73,93]

For the family, restricting visits has generated concern about the consequences of loneliness on their loved ones.[95] The involvement of families in providing palliative care support to their loved ones suffering from dementia during the epidemic has been

hampered owing to the constraints of nursing homes visits.[96] Articles on this subject highlight the difficulties encountered by nursing home staff in discussing advance directives for hospitalization or resuscitation with patients with dementia who do not understand the situation and with referring families who were prohibited from visiting their loved ones because of the pandemic.[72] Despite these constraints, the pandemic period seems to have encouraged team discussions and discussions with residents' representatives on advance directives in nursing homes.[97] Despite the frequency of this situation, a recent review of the literature shows that work on the specific challenges of supporting the end of life of residents with dementia duly infected with COVID-19 is lacking. The ethical dimensions, and the cultural and spiritual aspects of the accompaniment of residents, their relatives, and their care teams have so far been little studied.[72] Recommendations for nursing staff on providing palliative care for people with dementia in long-term care facilities have been proposed.[72]

SUMMARY

The epidemic was indicative of the limits of organizations caring for the elderly with dementia, but also of the capacity for innovation and resilience of caregivers and families.

The design of nursing homes, often accommodating large number of residents at a single site, most of them with dementia and unable to understand and apply social isolation and distancing measures, has contributed to the problem of COVID-19 infection. The difficulties caused by double occupancy rooms of large and sometime poorly ventilated institutions should lead to a reexamination of the nursing homes of tomorrow.[98] Cohorting has often been difficult to organize in nursing homes clusters owing to architectural constraints. Research should question the applicability of barrier measures, particularly in specialized Alzheimer's units and in the particular situation of wandering patients.[99,100] The challenge is considerable; all the previous data argue for an increase in social interactions in nursing homes.[101]

A major problem in the community and in nursing homes has been the isolation of patients with dementia and their disconnection from their families and other loved ones. The multiple innovations initiated by caregivers or families must be sustained, improved, and evaluated in future research.[102] The epidemic will have had the outcome of showing everyone the benefits of telemedicine, so far in its infancy in many health care structures, in the prevention of avoidable hospitalizations, and in the improvement of care.[103] Once the epidemic has passed, it will be up to us to perpetuate these practices for the good of patients with dementia.

Data from the literature show that the consequences of the pandemic in patients with dementia go far beyond the risks of COVID-19 pneumonia. It seems that the quality of care given to nursing homes residents has been particularly complex to maintain.[67,91]

The long-term consequences of the decline in physical activity in patients with dementia, most often at high risk of motor functional decline and falls, will be assessed in future work. Current data are already showing the impact on the well-being, cognitive decline, and loss of functional abilities of the most fragile patients.[104] The experience acquired on the evaluation of the benefit–risk balance of barrier measures and their ethical dimensions will be taken into consideration for future years and in the event of a new epidemic. Longitudinal studies will also be needed to assess the neurocognitive consequences associated with COVID-19 in the long term.[105]

Although no study has looked specifically at the efficacy of vaccination in patients with dementia, or in the most fragile patients,[106,107] observational data, particularly

in nursing homes, have confirmed the benefits of vaccination in this population without a greater number of adverse effects than in the rest of the population. This finding is reassuring, but testifies to our difficulty in carrying out research and providing solid scientific data on the patients most affected by the epidemic.

Health care teams, such as in Singapore (no doubt more accustomed to using new technologies), report innovative initiatives[108] for patients with dementia, such as physical exercise programs, as well as dementia patient care programs offered by the ADA such as "Stay Home Fun," which contains fun activities such as karaoke, bingo, cooking, and singing.[109] These initiatives should be made known to everyone.

In conclusion, we cannot ignore the impact of the COVID-19 pandemic on the progress of therapeutic clinical research on Alzheimer's disease, which has most often been stopped for safety reasons during the pandemic. The delay and loss of opportunity for innovative drugs for participants and future patients as well as the loss of research money for the disease is also a tragedy. This situation should inspire us to have a procedure allowing the pursuit of remote research in such a situation. In this field of research, this epidemic should lead us to be innovative by using new methods and virtual remote evaluation devices that are efficient and validated.[39]

CLINICS CARE POINTS

- Significant attention must be paid to demented patients (application of health recommendations, vaccination) to limit their risk of COVID-19 infection.
- A regular exhaustion assessment of caregivers must be carried out in order to provide the appropriate aids.
- The training of nursing home care teams in epidemic situations must be reinforced in the training programs.
- The pandemic has underlined the importance of initiating ethical reflections in retirement homes.
- Given the consequences of containment measures on the behavior of demented patients, the assessment of the risk/benefit balance must be carried out regularly.

CONFLICTS OF INTEREST

The authors have nothing to disclose.

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