

The influence of COVID on cognition and behavior in older adults.

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Abstract

The COVID-19 pandemic has raised many questions about the meaning of care for older adults. This study addresses one segment of this population, residents in Assisted Living Facilities (ALFs). We provide a mixed-method study, a combination of quantitative and qualitative methods, in an effort to expose the experience of ALF residents and a case to further elaborate on this. Psychometric data were taken from 147 residents on their cognition, behavior, function, purpose in life, socialization (loneliness), health, anxiety, depression and sleep. This was done during the first stage of the pandemic into the start of the second phase. Results indicated that ALF residents performed well in this context. As a whole, they were not anxious or depressed, had a reasonable purpose in life, were not exceedingly lonely, and demonstrated reasonable levels of behavior and function. The cognition levels varied but 50% were lower. A case was identified from an independent ALF to unearth the phenomenology of these data. This resident had a dementia and reacted well in this context also. We concluded that older adults in ALFs are responding reasonably well in their settings and suggest further study to further validate this.

Keywords: COVID-19, Pandemic, Anxiety, Irritability, Depression, Loneliness.

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Introduction

The current pandemic has had a negative effect on older adults, especially those with neurodegenerative problems. It is now approaching two years since this has been a problem. Older adults in assisted living facilities ALFs and Long Term Care (LTC) facilities have been affected in multiple ways. An analysis of private patient healthcare claims by FAIR Health has determined that hundreds of thousands of Americans of all ages have sought medical treatment for conditions that they did not have pre-COVID-19 [1]. The study, which reviewed records of close to two million people, found that almost 23 percent (one-quarter) of those who have developed COVID-19 suffer from new health problems. Issues are wide-ranging, including but not limited to: nerve and muscle pain, breathing problems, high cholesterol, high blood pressure, malaise and fatigue, anxiety and depression, and intestinal problems. Also, increasing evidence of SARS-CoV-2 impact on the Central Nervous System (CNS) raises key questions on its impact for risk of later life cognitive decline, Alzheimer's Disease (AD), and other dementia.

In this paper we address the problem of COVID-19 in ALFs. We provide an overview of COVID, especially the neurological and neurocognitive symptoms reportedly due to COVID. Also we present data on psychological and social factors related to COVID-19, including COVID anxiety. We speculate on its effects. We present data accrued from over 140 residents in ALFs. Finally, we present a case of a resident in an ALF and argue for the influence on her life over the pandemic period. We especially argue for the unique phenomenology of this pandemic

from the perspective of one with cognitive decline.

Overall background

While the number is changing, it seems likely that by the time the pandemic unfolds one in every 200 persons worldwide will have suffered an infection by the new severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). Furthermore, approximately one out of every 500 people has died from COVID-19 [2]. Up to 11.7% of people who contract COVID-19 experience symptoms beyond 12 weeks, a large survey-based study from the U.K.'s Office for National Statistics found [3].

Most of these individuals will survive the infection, but the public health impact of the pandemic may continue as chronic sequelae of Coronavirus Disease (COVID-19), resulting in disability or diminished quality of life. This has been labeled Post-Acute Sequelae of SARS-CoV-2 infection (PASC), or "long COVID." Persistent symptoms, namely fatigue, have been reported in 10-30% of patients post COVID-19 infection for up to 6 months after the virus. Additional symptoms include disruption in cognition, musculoskeletal pain and mobility issues [4]. Judging by what is known so far, long-term sequelae are not just likely to occur, but also likely to affect certain groups of individuals disproportionately; this only further deepens existing health disparities, adding to rehabilitation needs in these populations.

Given the well-established and projected weight of neuropsychiatric disorders included in the global burden of disability, it seems particularly appropriate to take stock of what

is known about the deleterious, direct effects of SARS-CoV-2 infection and COVID-19 on the Central Nervous System (CNS), and to project how these effects are likely to contribute to the chronic burden of disease globally in coming years. Equally important is the wider societal impact of the pandemic due to its likely wider economic, social, and personal effects in the immediate and longer term.

The β -coronaviruses, including SARS-CoV-2, are postulated to invade the CNS in large part through high affinity binding of the CoV spike glycoprotein to Angiotensin-Converting Enzyme 2 (ACE2) which is expressed largely on the cell membranes, and in both neurons and glia in the brain [5]. Clinical reports of patients infected with SARS-CoV-2 show that several features associated with infection and severity of the disease (i.e., older age, hypertension, diabetes, cardiovascular disease) share a variable degree of ACE2 deficiency [6]. In post mortem brain tissue, ACE2 is notably expressed in the frontal cortex vasculature [7].

Neurological symptoms

Neurotropic respiratory viruses have long been known to result in chronic brain pathology including emerging cognitive decline and dementia, movement disorders, and psychotic illness. Because brain inflammation accompanies the most common neurodegenerative disorders and may contribute to major psychiatric disorders, the neurological and psychiatric sequelae of COVID-19 need to be carefully tracked. First, headache, hypogeusia, and anosmia appear to precede the onset of respiratory symptoms in the majority of affected patients. Ataxia and altered mental status have been documented independent of multi-organ failure [8]. There have also been documented cases of acute encephalopathy and meningoencephalitis associated with detection of SARS-CoV-2 RNA in the Cerebrospinal Fluid (CSF) [9]. Further, pan-encephalitis and diffuse petechial hemorrhage of the entire brain have been reported, particularly perivascular and interstitial encephalitis in the brain stem [10]. This brain stem dysregulation may in part contribute to respiratory problems [11] and some of the gastrointestinal symptoms [12].

Neurological symptoms may occur in their first 1 to 2 days of the clinical symptomatic phase, and cerebrovascular accidents are common within 2 weeks of the onset of the symptomatic phase [13]. Case series of para-infectious or post-infectious acute neuroinflammatory syndromes such as Acute Disseminated Encephalomyelitis (ADEM) are reported in association with SARS-CoV-2 infection [13]. The absence of SARS-CoV-2 viral load in the CSF and the presence of oligo clonal bands in the CSF and serum of some patients suggest immune-mediated response that is not limited to intrathecal production of immunoglobulins [14]. The mechanisms of causation of reported seizures, for example, are probably complex, and may include cortical irritation due to hemorrhages, inflammation, or metabolic changes [15].

Delirium can be the only presenting symptom of SARS-CoV-2 infection even in younger patients [16]. The incidence of delirium in severely ill COVID-19 patients on ICUs is reported to be as high as 84%, of which more than two thirds exhibit hyperactive delirium, despite receiving high sedation and neuroleptics [14].

A substantial proportion of patients with COVID-19 are likely to experience delirium with a currently unknown long-term outcome. In elderly patients with dementia, delirium is a very frequent presenting symptom of SARS-CoV-2 and carries a higher short-term mortality rate [17].

Structural brain Magnetic Resonance Imaging (MRI) has revealed parenchymal brain abnormalities, subcortical micro- and macro-bleeds, cortical-subcortical edema, nonspecific deep white matter changes, and asymmetric olfactory bulbs post mortem, [18] and similar findings during hospital admission [19]. Strikingly, this abnormal imaging has been seen in an individual whose only symptom was anosmia [20]. Systematic reviews [21] and meta-analysis data [22] have firmly established incident and prevalent stroke as independent risk factors of dementia. Furthermore, MRI features of cerebral small vessel disease are additively associated with dementia and cognitive decline [23]. Therefore, it seems likely to expect that COVID-19-related cardiovascular and cerebrovascular disease will also contribute to a higher long-term risk of cognitive decline and dementia in recovered individuals.

Multiple lines of evidence suggest that viral infections of the brain may impact a person's risk for AD or Parkinson's disease. The present pandemic provides a unique—if unwelcome—opportunity to test the role of neurotropic viruses in a prospective fashion in individuals that have recovered from COVID-19. Direct effects of SARS-CoV-2 itself on neuronal function and survival or glial reactivity, exaggerated cytokine responses, or anti-neuronal antibodies are all likely to contribute, as are the sequelae from cerebrovascular accidents. An expectation of increased neuropsychiatric sequelae, including cognitive decline, motor impairment, and affective and psychotic disorders, in addition to demyelinating processes or cerebrovascular disease that occur during the acute viral infection, may follow infection in recovered individuals [24].

COVID-19 results in high levels of pro-inflammatory cytokines, acute respiratory distress, and hypoxia, each of which may contribute to cognitive decline both in healthy and in already predisposed individuals [25]. After the coronavirus pandemics in 2002 and 2012, one in five recovered individuals reported memory impairment, and an early report found that one in three individuals with COVID-19 had dysexecutive syndrome at the time of hospital discharge [26]. Recent data suggest similar findings as well as over two thirds of those with acute COVID-19 infection experiencing delirium and agitation after sedative withdrawal and one fifth with altered consciousness [27]. Impaired cognitive abilities may cause poor occupational and functional outcomes for individuals recovered from COVID-19 that precipitate or exacerbate mental health concerns, while poor mental health may likewise contribute to cognitive dysfunction [28].

The relationship between decline in Instrumental Activities of Daily Living (IADLs), neuropsychological implications and cognition is multidirectional. Functional decline in IADL's, such as shopping, using the telephone, housekeeping etc., relate to an individual's executive control, episodic memory and neuropsychiatric symptoms [29]. In a recent study using a modified Neuropsychiatric Inventory (mNPI) and Geriatric Depression Scales in combination with MMSE to assess

for global cognitive function and interdisciplinary clinical diagnosis of MCI, Ginsberg et al., 2019 showed that a robust relationship between mild IADL impairment and greater apathy ($r=0.497$). They also observed a weaker but statistically significant relationship between IADL with IQ impairment and lower executive control performance ($R=0.271$).

Psychological problems

Psychological distress and acquired cognitive deficits after COVID-19 will likely have complex, bidirectional relationships. Impaired cognitive abilities may cause poor occupational and functional outcomes that precipitate or exacerbate mental health concerns, and poor mental health may likewise contribute to cognitive dysfunction [28]. The SARS-CoV-1 epidemic was associated with psychiatric complications. COVID-19 patients found a high level of post-traumatic stress symptoms and significantly higher level of depressive symptoms. Patients with preexisting psychiatric disorders reported worsening of psychiatric symptoms [30]. After the coronavirus pandemics in 2002 and 2012, one in five recovered individuals reported depressed mood, insomnia, anxiety, irritability, and fatigue. In one study traumatic memories and sleep disorder were frequently reported. The meta-analysis indicated that in the post-illness stage the point prevalence of post-traumatic stress disorder was 32.2%, depression was 14.9%, and anxiety disorders was 14.8% [27].

Psychiatric symptoms have been identified as prodromes or facets of a dementing process. During the SARS-Cov-1 epidemic, individuals with previously established psychiatric diagnoses reported worsening of affective symptoms [30]. Following the 2002 and 2012 pandemics, approximately 20% of individuals recovered from coronavirus reported depressed mood, sleep disturbance, anxiety, irritability, fatigue and traumatic memories [27]. Roughly 20% reported memory impairment and 33% dysexecutive syndrome when discharging from the inpatient setting.

Per a survey following COVID-19 pandemic in UK, those with more increased depression and lower life satisfaction were appreciated to belong to specific demographic groups including, young adults, lower income groups and those with psychiatric diagnoses and their caregivers [31]. Anxiety, depression, fear and stress appeared to increase during the period leading up to the lockdown, while during the actual lockdown period, anxiety appeared to decrease and life satisfaction increase. Some postulate these individuals to have found coping strategies despite the lockdown stress [31]. Younger individuals were found to exhibit higher overall levels of anxiety, depression, and thoughts of death or self-harm and lower life satisfaction compared to older populations over this pandemic period. It would, thus, appear that demographic and socioeconomic backgrounds hold influence on populations' response to the pandemic.

Loneliness and purpose in life

When investigating other adversities and impacts of anxiety and depression during the pandemic, some authors give credence to the influence of loneliness. Hyer L [32] took a look at maximizing cognitive functioning and maintaining independence in older

adults without dementia. In one analysis, the number of participants who reported loneliness before the pandemic (8.5%) more than doubled during the pandemic (18.3%), without much improvement with easing of lockdown regulations. Lack of improvement in anxiety may be in part due to respondents in higher risk groups (elderly and immunocompromised) not readily discontinuing lockdown guidelines. As with previous studies, loneliness was also reported to be worse in young adults, those with lower socioeconomic status, living in isolation or with mental illness [31].

What factors then contribute to successful navigation of these socially isolated times? Hyer L [32] Postulate that those who are reportedly more lonely, are less focused on health preservation and more on connecting with others which goes against many COVID-19 precautions. Further reports hold that individuals with a secure sense of purpose and less loneliness are more likely to exhibit protective measures from COVID-19 [33]. In this regard, worries about potential stressors during the pandemic were appreciated to impact affective symptoms in a similar magnitude to impact from ongoing stressors. Interestingly, those 60 years of age or older reported feeling more in control of factors, such as finances, relationships and the future [34]. It may be that younger individuals (teens to late twenties) are more likely to be at a stage in their life where they are looking to expand their social networks which may explain their increased rates of anxiety during pandemic isolation.

In a recent United Kingdom Coronavirus Outbreak Psychological Experience (COPE) study, a high percentage of individuals reported less structure and uncertainty to their day during COVID-19 times. However, they also reported feeling relieved during the pandemic (79.8%), having a better memory (82.1%) and better concentration and ability to make plans (62.9%). Utilization of coping mechanisms such as religion, spirituality and wellness apps suggested promise [31].

Finally, we note there are problems with sleep. The implication of sleep alterations during the pandemic has been found to be more complex than might be expected. Overall sleep difficulties have been observed to increase (36% to 51%) since the onset of the pandemic. While Robillard et al. [34] appreciated no significant change in Pittsburgh Sleep Quality Index scores, definite changes in sleep patterns were noted and divided into three groups: those exhibiting extended time in bed, those with reduced time in bed (later bedtimes and earlier wake-up times), and those with phase delay (later bedtimes and wake up times) [35]. The groups with reduced time in bed and phase delay exhibited greater increase in stress, anxiety and depressive symptoms.

Methods

Several ALFs in two cities in Georgia were involved. Residents were identified by the staff and presented with the study. They were asked to complete a packet and an online assessment that would take about 20 minute's total. Residents were assessed in the ALF by graduate and medical students. Several tests and scales were applied. The test battery was applied from the evaluation packet given for the [36] grant. This battery consisted of items from standard scales (depression (PHQ-9), worry (GAD-7), sleep (Epworth Sleep Scale) and loneliness/

socialization (UCLA Loneliness Scale) [37]. Scales were shortened to reduce the number of items in the packet. A psychometric measure (alpha) was applied and all four measures have values 7 or greater. Stand-alone scales (Mild Behavior Inventory (MBI) [38], and Purpose in Life [39] were used also. A one item health marker was applied (How would you rate your health?). Finally, a COVID Anxiety Scale [40] was used. Also, self-ratings of health and exercise were provided. The MBI has been developed to assess symptoms such as apathy, mood, anxiety, inhibition/self-regulation, social cognition and psychosis [41]. Finally, the Memtrax was given, a three minute assessment of visuospatial cognition that is given on-line [42]. This measure has been applied to two samples of older adults and shown to be competitive with standard cognitive measures applied in the office settings [43]. All the grant scales had acceptable alphas.

Additional measures were given to the identified patient (Mrs. E, see box below). These included a psychiatric rating of the Clinical Dementia Rating Scale (CDR), a commonly used dementia staging instrument. The CDR offers a global characterization of everyday functions that may be affected by neurodegenerative disease. Also administered were the Geriatric Depression Scale (GDS, 15 items), the Patient Health Questionnaire-9 (PHQ-9), and General Anxiety Disorder-7 (GAD-7). Also two activities of daily living (Checklist of Activities of Daily Living and the Functional Activities Questionnaire (FAQ) were rated by nursing staff.

Results

All scales that were previously given to the ALF cohort in the [36] grant are shown in Table 1. This provides grant data, along with the scores from Mrs. E on these cohort scales. The cohort was 66% female, 63% White, and 83% were 65 or older. They had some college (64%) and rated health as average or above. Most were of course retired (76%). They rated health positive (65%), but all had problems with some health issues (blood pressure was highest). As a whole, the cohorts was lower cognitively, but were average in most qualitative and psychological ways. The Memtrax score then was lower and reflected some cognitive decline. There was variability. The categorization of this score is yet to be determined, MCI

or simple aging decline. The mood, anxiety, socialization, meaning, sleep, function, and COVID anxiety were also lower, again reflecting a more adaptive coping manner. The cohort then had little difficulty with depression, anxiety, loneliness (socialization), sleep, and health. Importantly, the MBI scores were also lower, suggesting few behavioral problems.

Mrs. E’s scores were roughly comparable to the general ALF sample. Her Memtrax was lower, mimicking approximately 20% of the ALF cohort whose average was 74%. She was higher on mood problems and functional difficulties, as well as showed slightly less purpose in life. Her overall functioning was also slightly lower. Her health rating was comparable as was sleep and exercise. Her MBI was in line with the cohort. This was supported by the nurse’s ratings suggesting problems in all IADL areas (FAQ = 26), and further supported by the Checklist of ADLs/IADLs. She was able to do her ADLs. Her individual scales (not given to the ALF residents) for depression were higher - GDS (7) and PHQ-9 (7). Her anxiety score (GAD-7) was lower (2). Her CDR was 2, suggesting mild/moderate dementia.

Brief neuropsychological testing was provided. Patient was briefly seen on three occasions. She had a WRAT-3 Reading score placing her at 10th grade reading level. She did well on picture naming and had a low level of comprehension. She had a SLUMS 13/30 and 15/30, one month apart, suggesting neurodegenerative problems. Additionally, she had a MoCA of 12/30. Her strengths were picture naming, serial 7’s (2/3), clock drawing (2/3), and abstraction (1/2). She also had 7/10 on new learning and did better on the second trial. She was low on visuospatial tasks, attention, language, memory (0/5) with poor recognition (1/5), and orientation (2/6).

Case Report

Mrs. E is an 89 yr female with probable (vascular) dementia, dizziness, palpitations and dry eyes. She resides in an ALF in an upscale area. She was seen as a consult for depressed mood. Her primary provider has prescribed Zoloft, 50 mg, po, Qday. She had been reported by staff to be occasionally “disruptive, refusing to wear mask and pulling other residents’ chairs next to hers.” She requires no assistance for IADL’s and her

Table 1. Descriptive statistics for study scales of patient and study group.

Variables	Patient	Mean	(SD)	Range
MBI (34 items)	7	6.59	(10.25)	0 – 45
Memtrax (% correct)	60	74.11	(15.29)	34 – 100
General Health Rating (1=Poor, 5=Excellent)	3	2.91	(1.02)	1 – 5
Previous Tx for Anxiety/Depression (% yes)	Yes	34%	Yes	-
Mood (6 items)	8	3.77	(3.70)	0 – 18
Function (4 items)	4	0.59	(0.96)	0 – 4
Socialization (5 items)	2	3.99	(1.08)	1 – 5
Safety/SES/Social/Emotional Support (3 items)	3	2.73	(0.55)	0 – 3
Exercise (1=None, 4=30 mins or more daily)	2	2.68	(0.94)	1 – 4
Sleep (3 items)	1	1.22	(0.73)	0 – 3
Meaning: Presence (5 items)	6	5.56	(1.52)	1 – 7
Meaning: Search (5 items)	5	3.79	(2.04)	1 – 7
Worry (7 items)	2	5.02	(4.32)	0 – 21
COVID-19 (5 items)	1	2.97	(3.42)	0 – 20

ns=131-143

medications are managed by nursing staff. She does her ADLs. Mrs. E was born and raised in New England, stating she enjoyed the cold and snow but moved to the south because she used to take trips to her current city of residence with her late husband. She has been in an ALF for over a year. Her four children reside in other states, three of whom call regularly and visit in person occasionally. She has been married four times, all husband's deceased. The most recent one died within the past few years. She herself worked for years before retirement. She is a college graduate and indicated that she has come "from a family of doctors." She relates no milestone disruptions and has described her upbringing as positive.

Current records show that Mrs. E is often feeling "down" over the past 2 months, and more "tired, not interested in usual things" over the past week. She has not been febrile or with other primary medical findings to explain these symptoms. She attributes her low mood to the nursing staff being "mean and bossy." She stated she was not sure why they were enforcing so many limitations on activities in the facility. She noted that the CNA's will discourage her trying to walk down the halls for exercise or visit with other residents in their rooms. She reported they are also not able to eat in the main community dining hall or participate in group exercise classes at this time. She states that, since the groups were broken up, the residents "don't look forward to their time of day anymore." Additionally, she reported the death of a resident she referred to as her boyfriend approximately 2 months ago. Her previously enjoyed hobbies included skiing, time on the beach, walking, hiking and needlework. More recently, she reads or watches television; however her television has been broken in the recent weeks. She denied poor sleep, difficulty focusing, poor appetite, worthlessness or current SI. She also denied generalized worries or concerns, including anxiety regarding the recent COVID pandemic.

Current medications were: Zolof 50 mg po Qday, Aricept 5 mg po QAM, Meclizine 12.5 mg po TID, Metoprolol 25 gm po Qday, Vitamin D 2000 units Qday. Her medical diagnoses included: vertigo, tachycardia, unspecified cognitive impairment. There were no surgeries reported. There was also no other history of psychiatric problems other than recent depression.

Mental status Examination

On exam patient was very pleasant and engaged in conversation with examiner. She had good eye contact but was not oriented to time and situation. She was oriented to person and place. Her thought process was linear and logical, occasionally repeating questions she had forgotten were already asked and answered during the interview. She demonstrated good attention and awareness. She did not express any delusions or response to internal stimuli and denied SI/HI. Her mood was "down", with somewhat congruent, full range of affect. Her responses were largely curt and at times repetitive. She smiled as a reflex response and showed no affect problems. She later showed reasonable insight regarding the recent COVID pandemic, as being the reason for all regulations within the ALF. While sloppy, she was aware of her situation in the ALF and the pandemic. In fact, she seemed to demonstrate good overall judgement.

In sum, Mrs. E has been living in the ALF for over a year. She is experiencing a dementia, moderate level, probable mixed type. She has a college background, had 4 marriages and has enjoyed a higher SES living standard. She is alone but has children in neighboring states who occasionally visit. She had been reasonably active until the pandemic when the ALF asserted strict rules to prevent pandemic problems. She softly resented these rules and found it convenient to complain about staff and to mildly distort staff restrictions and behavior. She was for all intents and purposes confined to her room and floor of a rather nice ALF.

Interestingly, she reflected the phenomenal pattern of 147 residents in the four additional ALFs (subjects in the grant). She felt trapped and made sense of this with resignation and mild distortion. She was not anxious over the pandemic but was critical of it and its restrictions. She was somewhat lonely but made due with TV, a few friends, and hopes for her family. She was not anxious. She was mildly depressed and related less meaning in her life. She of course had most everything done for her, as she was well cared for and protected. She was not angry, not impaired psychologically beyond situational depression (and had been treated for depression in years past). In sum, she reacted as the literature noted above predicted, as one who accommodated to her life, the pandemic and her future. In a sense this may be considered a form of resilience, as one makes more positive responses to a negative situation.

It should be noted that, even though in a dementia, she was well aware of her situation and most elements of her life. The dementia diagnosis did not result in COVID anxiety or excessive confusion beyond her baseline. To the contrary, it seemed to provide a renewed purpose for her life, one where she will battle this episode (and staff) until it breaks. Although she was not part of the formal grant cohort and she was more cognitively impaired than most in the cohort, she echoed the reaction of most residents: They made reluctant peace with this pandemic, were not anxious about COVID-19, and had hopes of change. Even in a dementia, she was able to accommodate to her situation.

Discussion

We presented an overview of COVID-19, especially the neuropsychiatric and neurological problems. Then in the context of COVID-19 we sought to extend a reliance on empirical data alone as these data may be too anemic to inform population health. We presented data on an ALF cohort during the pandemic, suggesting that they too accommodated to this pandemic. Scores on the COVID Anxiety Scale, Purpose in Life, psychological markers of depression and anxiety, as well as sleep and health ratings, were reasonably positive. Mrs. E was low cognitively. After all she has a dementia. Many in the cohort also suffered from a reduced cognitive score. She was lonely but had less meaning in her life. Mrs. E is well protected but very aware of the problems with the pandemic as she has been cloistered for about 18 months. She is vaccinated and sees her life as one of excessive containment. She did not have COVID. She saw herself as a prisoner and has become mildly hypersensitive and negative to the CNAs and staff who care for her. She makes sense of her life by "fooling staff" and

attempting to bend the rules, as she “can outwit the staff.” Her life has become that of a recluse and a survivor. Her family visits were periodic, and her confusion with day-to-day acts has increased as for her life is homogenized.

Perspective on pandemic

The establishment of a neurodegenerative disease is most often a process over time. The effects of viral infections have been exhibited up to years after acute phase infection [31]. With growing hopes of earlier detection and intervention of cognitive decline in older adults, increasing attention has been given to surveillance of co-occurring neuropsychiatric symptoms which often accelerate clinical disease. Most authors along with the Alzheimer’s Foundation of America have argued for an early assessment of cognition. Increasingly, given the neurobiology of depressive, anxious and apathetic symptoms in MCI, it is now known that certain neuropsychiatric and behavioral domains may correlate to poorer prognosis with MCI or early cognitive decline [34]. The MBI markers of apathy, mood, anxiety, inhibition/self-regulation, social cognition and psychosis can be routinely assessed. As the need for a more streamlined and valid screening process for assessing memory function and behavior grows [34], tests such as Memtrax [42] that are brief, on-line, and valid hold promise. It appears that behavioral and psychiatric problems may predict cognitive decline and may be amendable to treatment to obviate further problems [29].

This cohort largely accommodated to the pandemic. To our knowledge none had COVID-19. Both the cohort and Mrs. E were very aware of the pandemic. They were protected and, as a consequence, had to deal with the isolation and protection provided. While there was compromise cognitively (lower Memtrax) for the most part they were aware of their circumstances and adjusted. They were also not anxious over the pandemic. Mrs. E too accommodated to these factors in her protected environment. She, however, was no doubt more cognitively compromised.

In the setting of the recent COVID-19 pandemic, lack of opportunity for behavioral activation and importance of resilience have been ever more vital. As patients in the general community and ALF settings have been increasingly living in isolation with restrictions on social activities, wellness has been negatively impacted. In this study, the screening included individuals’ physical health, affect, sleep exercise, purpose of life, social support and lifestyles, all of which may exert strong influence on cognition and overall functionality. Any of these areas of function may easily be addressed during a patient encounter, taking advantage of the opportunity to educate and intervene. There were few reported or exhibited decline in functioning and behavioral symptoms during the COVID-19 infection. Patients with MCI or dementia no doubt suffered more, but there was less in evidence in this cohort.

A particular problem for COVID-19 is long COVID cases. Estimates have ranged from 10%-30% of cases experience symptoms after six months. The extent to which this applies to older adults can only be inferred but seems likely. Literally hundreds of symptoms have been listed. Since the virus can affect any organ system, its expression can be considerable. Neurological symptoms can be especially debilitating and include

dizziness, anxiety and brain fog. In fact, it is reported that some of the worst cases can appear like dementia [44]. The lingering effects of the virus itself, possible influence of inflammation, interaction with autoimmune system, and combinations of these are probably causative. Cure or rehabilitation is a long process and one that is in its infancy. Older adults no doubt will have special problems. Clearly vaccinations help but even these can result in long haul effects.

Perspective on aging

Compared to younger adults, older adults are more likely to focus on the high points [45]. Furthermore, older adults’ memories of negative events often include a focus on the positive aspects. This tendency for older adults to focus on the positive elements of an otherwise negative event extends to public, high-arousal events, as in the 2013 Boston Marathon bombings: increased age was associated with a greater tendency to reflect on positive details like the city coming together or the heroism displayed by first responders [45]. Overtime, this may allow them to abstract positive life lessons from its occurrence and reframe the event in a less negative light.

The COVID-19 pandemic hit in the spring 2020, it was commonly reported that older age was one of the greatest risk factors for significant complications [46]. There is now considerable disagreement over this. From an aging perspective, Ford JH et al. [43] 2021 studied how adults remember pandemic disruptions. Age was a prominent factor. In two surveys collected during summer 2020 and fall 2020, older age was associated with greater reflections on positive aspects of the initial phase of the pandemic. Evidently the way the pandemic was remembered differed: older age resulted in a greater focus on the positive aspects. In this study participants were asked to rate their overall reflections of the early phase of the pandemic, as well as the extent to which their reflections of that period focused on specific positive (e.g., hope that things would get better) or negative (e.g., fear of contracting the virus) aspects. They were also asked to report memories of their most positive and most challenging events from that period and to rate their phenomenological experience of remembering. Older age was associated with greater positivity. Results showed then that, although the earlier spring phase of the COVID-19 pandemic was associated with abrupt negative changes for most individuals, it is remembered differently depending, in part, on a person’s age. Older adults report reflecting more on the positive aspects of the pandemic than young adults.

Increased age appears associated with both a tendency to experience the current pandemic as more positive and less negative in real time [47] and a tendency to view prior segments of this ongoing event in a more positive way. These patterns provide an important counter to negative stereotypes of aging and suggest the importance of younger adults recognizing the wisdom that older generations can offer during difficult times [48]. A moderate level of knowledge and less anxiety and depression influenced a more upbeat view of the pandemic. By evaluating these behavioral markers, physicians can have a better understanding of the patient’s risk perception and whether they have a rise in their symptoms caused by COVID-19 concerns.

Cognitive aging is a complex process made up of

multidimensional factors involving growth and decline, historical time, and culture, as well as “plastic” factors (new learning and cognitive reserve). There is much individual variation to be understood. In the process of a dementia, the attack of core degenerative biomarkers becomes more salient and often determinative of the decline process. That said, the person is always adapting, satisficing and accommodating to change. Complexity of the potential variables implied is evident and variability is the norm for any person, even/especially in the decline process of a dementia. Factors predictive of cognitive decline in a dementia include education, occupation, social isolation, multiple medical factors (e.g., smoking, nutrition, blood pressure, obesity, diabetes, etc.), as well as genetic components. Clinically, the older adult segues across Subjective Cognitive Impairment (SCI), Mild Cognitive Impairment (MCI), and dementia. Indeed, there are many varieties of these states.

In one area especially, loneliness, COVID-19 has compounded problems in ALFs. The imposition of restrictions on visitors has likely been the cause of many residents who died because of COVID-19 but not from the virus itself. Many facilities have responded by using technologies to connect residents to their families; however, some have been less responsive in addressing the day-to-day connectivity needs of residents for more than ADL tasks. Certified nursing assistants need to be viewed as more than the caregiver for physical needs, but as the first contact for a resident’s social and emotional well-being.

A study reported in February 2020 by the [National Academies of Sciences, Engineering and Medicine](#) noted that one-quarter of Americans over the age of 65 responded that they experienced feelings related to social isolation even if they lived in the community rather than some long term care facility. Researchers concluded that this emotional state had a significant impact on the physical health of individuals, predisposing the person to premature death. Additionally, the study’s authors linked the increased incidence of dementia to social isolation, higher rates of anxiety, depression, and suicide. The study authors suggested that assessments be made to identify at-risk individuals to include social isolation in electronic health records. People are considered isolated if they have fewer than six confidants, no spouse, or no group affiliation. Under these conditions nearly all residents would be defined as being socially isolated. All that said, this cohort reflected less loneliness (socialization) overall.

Deconstruction of Mrs. E

From all indications Mrs. E had a mixed dementia with vascular and Alzheimer components. Although not reported, indications are that her decline process has been over 8 or so years with little aggressive care prior to her entry into an ALF. Her entry into the ALF was during the onset of COVID-19. Her behavior in the ALF was largely consistent, more active and behaviorally appropriate initially and more isolative (forced or otherwise) later. Her deficits were memory (episodic and semantic), executive function (poor IADLs and executive function tests), visuospatial areas, and selected language areas. These can be a function of vascular and Alzheimer types. All indications pointed to a gradual decline with some stability in the last six months.

The milieu of an ALF normally is conducive to structured and caring programs that routinely allow residents access to communal programs often with reinforcement. Special programs for older residents who are experiencing a dementia include orientation, social stimulation, procedural memory challenges and spaced retrieval/errorless learning interventions. Exercise and diet, as well as general health, are monitored. Psychological interventions (e.g., CBT, interpersonal psychotherapy, reminiscence therapy) are also present. And while there are distinct treatments for differing types of dementia (cognitive stimulation, cognitive rehabilitation, and cognitive training), they too were less in evidence during the pandemic. Virtually none of these were in evidence in the ALFs in the cohort residents and none for Mrs. E during COVID-19.

So what was accommodation like in ALFs? One does not have to be a social constructionist in a postmodern world to know that we live through and by our stories. Already noted, Bundy et al, 2021 found that older adults compensated reasonably well. This was especially so for ALF residents as they are already somewhat isolated and often manage the intersection of vulnerabilities (chronic health problems, mobility impairment, restricted activity, less family connection) with a new accommodation that allows for a “new normal.” Studies show that older adults envision and revise their expectations of social connectedness in the face of changing social circumstances [49]. This has been reaffirmed curing COVID-19 [50]. Loneliness seemed to carry a new valence: Loneliness had a new meaning, rendering being lonely necessary and responsible. The extent to which having led a somewhat isolated life prior to entry in the ALF, having reframed loneliness as a precaution and a necessity, relaxing any COVID-19 anxiety, and being the “beneficial victim” of a dementia with poor memory, are all possible and probably influential on Mrs. E’s blithe acceptance of her situation. She was in a dementia but she was a peon who believed in a story, her story.

The qualitative input of Mrs. E helps explain in her own words the data results. Her qualitative interviewing relying heavily on recall, comprehension, and executive function skills reveal how she now understood the situation. She was curt but clear regarding her situation. The pandemic was annoying but tolerable. Her cognitive status supported her simpler view of her life, and she made day-to-day activity in her apartment her new life. Her memory especially was poor, but she knew her situation, the pandemic’s influence, and her degrees of freedom (or lack thereof) in her small setting. She “knew” she would get family visits; she could challenge staff behind the scenes; and she was tolerant of our interviews. In effect, restrictions were recoded and understood for their simple value. How this process takes form is up for interpretation (as we have done here). These are her new essential truths. This process deserves more study.

Finally, in a recent review article, Palmer K, et al. [50] investigated how the COVID-19 pandemic has affected older people, especially those with cognitive impairment, from a range of perspectives to help establish factors associated with poor physical, cognitive, and mental health. Issues related to the psychological effects of COVID-19 in both the acute phase of the disease and post-infection were discussed. The authors

note that neurological manifestations of COVID-19 vary from mild (e.g., loss of taste and smell, dizziness, headache) to severe (e.g., ischemic stroke, encephalitis). Several variables were isolated as candidates for problems. Among these were individuals who perceived COVID-19 as emotionally threatening (older showed the lowest levels of mental distress prior to and during the lockdown), individuals with dementia disorders, MCI, and other conditions, particularly with regard to behavioral and neuropsychiatric symptoms (especially apathy, anxiety, and agitation), healthier older individuals in regards to lifestyle factors, individuals in need of routine clinical activities for non-urgent medical conditions (public health restrictions), and individuals who live alone, among others. Of relevance is that older adults with some cognitive impairment or protection or both seem to weather this event with less impact than expected. Importantly with some largess, older adults in protected environments are affected but seem to accommodate reasonably.

Limitations

This was a mixed methods study. In truth, we attempted to borrow from both qualitative and quantitative procedures as a value-added statement that can serve both methods better. We presented a case to elaborate on the findings of a study performed in ALFs during the pandemic. As such, there were several limits. In the study, no COVID-19 cases were reported. Some of the residents were cognitively compromised based on the Memtrax and may not have accurately reported their status. Importantly, the Memtrax, performed on line, was occasionally confusing and on occasion the test had to be stopped and retaken. This scale is a cognitive method with promise but requires further study. This was a sample of convenience and we had to barter/solicit subjects as the aura of the pandemic was pervasive. The ALFs chosen were selective as they agreed to participate and others did not. We did not know their full history, psychiatrically or medically. Masks were worn by all and on occasion this may have distorted input from residents. Residents received a gift card for participation. On occasion, there was a positive COVID-19 case in the facility and the facility was shut down for a period. The tests were in a packet format and some residents had to have assistance. The MBI especially needed interpretation. In fact, we have now streamlined the assessment packet and improved on the directions of the Memtrax. Mrs. E was not a subject in the study and was from another ALF. She was recommended. She was chosen because she agreed, she had cognitive difficulties, and she was independent of the cohort.

To date, research papers have presented predominantly analyzed data from the first wave of the pandemic in 2020 and the findings must be interpreted in light of this. That said, it is prudent to investigate what effect the pandemic-related changes in health and lifestyle behaviors will have on the future prevalence of older adults with cognitive impairment. Thus, healthcare services need to plan strategies to deal with the emerging needs of older persons, patients with cognitive impairment and dementia, and those with psychological and neuropsychiatric symptoms.

Conclusion

We are now in the second wave of COVID-19 and continue

to react to this pandemic. As this pandemic is not waning, we provided an over view of COVID-19 focusing on neurological and psychological problems. This study is a mixed-method evaluation on the pandemic experience from the perspective of older adults in ALFs. We added a case to further elaborate on this status. It is our belief that older adults are doing (mostly) well psychologically as they adapt with or without cognitive deficits. In fact, their responses indicate that they are well protected and less lonely. Mrs. E was more cognitively compromised than the majority of the cohort sample but appreciated her status as she was more depressed, felt less meaning and functioned less well. She did sense her new current life and had family support. All-in-all she makes sense of her life (cognitive decline, less lonely, less meaning, family support) in her way. Arguably for Mrs. E, cognitive decline seemed to have little influence on adjustment during the pandemic and may be an advantage in her lack of meaning and mild loneliness. This suggests that the phenomenology of her situation is complex, but on balance, reasonably positive. In some ways this lightly suggests the ALFs are doing a reasonable job during this period, a fact strikingly different from early reports of nursing homes. Future study will need to address these issues.

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