

Leveraging independence and mental fitness – keys to reducing in-hospital mortality among geriatric COVID-19 patients in the intensive care unit: A cross-sectional study in Poland

Anna Woźniak^{1,A,C,F}, Weronika Misiąg^{2,B,D,F}, Patrycja Leśnik^{3,C,E}, Jarosław Janc^{4,C,E}, Mariusz Chabowski^{5,6,A,C,E}

¹ Division of Internal Medicine Nursing, Department of Nursing and Obstetrics, Faculty of Health Sciences, Wrocław Medical University, Poland

² Student research group No. K180, Faculty of Medicine, Wrocław Medical University, Poland

³ Department of Microbiology, Faculty of Medicine, Wrocław Medical University, Poland

⁴ Department of Anesthesiology and Intensive Therapy, Hospital of the Ministry of the Interior and Administration, Wrocław, Poland

⁵ Department of Surgery, 4th Military Teaching Hospital, Wrocław, Poland

⁶ Department of Surgical Clinical Sciences, Faculty of Medicine, Wrocław University of Science and Technology, Poland

A – research concept and design; B – collection and/or assembly of data; C – data analysis and interpretation;

D – writing the article; E – critical revision of the article; F – final approval of the article

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Address for correspondence

Mariusz Chabowski

E-mail: mariusz.chabowski@gmail.com

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Abstract

Background. Coronavirus disease 2019 (COVID-19) quickly reached the pandemic status, with 765.22 million confirmed cases of COVID-19 and 6.92 million COVID-19 deaths reported worldwide by May 2023. Due to its sudden and global nature, the COVID-19 pandemic has had a significant impact on the emotional and mental health of many people. A group of COVID-19 patients who frequently require intensive care are geriatric patients. The cognitive performance of these patients and their independence in instrumental activities of daily living (IADL) may be crucial to their prognosis and risk of in-hospital death.

Objectives. The present study aimed to assess the level of independence in activities of daily living (ADL), mental fitness, the level of fear of COVID-19, and cognitive functions to determine their impact on in-hospital mortality in geriatric COVID-19 patients.

Material and methods. A total of 300 intensive care unit (ICU) patients with COVID-19 were included in the cross-sectional study, using the following questionnaires: the Lawton IADL scale, the Katz ADL index of independence, the fear of COVID-19 scale (FCV-19S), the abbreviated mental test score (AMTS), and the 15-item geriatric depression scale (GDS15).

Results. Patients aged 64 or below reported significantly greater independence on the IADL scale and the basic ADL scale, and showed a significantly higher level of mental fitness (Mann–Whitney *U* test; $p = 0.001$). Patient survival and in-hospital mortality were influenced by independence in basic and complex ADL.

Conclusions. The level of independence is an important prognostic indicator for in-hospital mortality in geriatric COVID-19 patients. The higher the level of mental fitness, the higher the level of independence in basic and instrumental activities of daily living. Patients aged ≥ 65 years are less independent in basic and instrumental activities of daily living. Moreover, they show a significantly lower level of cognitive functions.

Keywords: quality of life, depression, COVID-19, intensive care unit

Introduction

The novel coronavirus disease 2019 (COVID-19) quickly reached the pandemic status, and as of May 3, 2023, 765.22 million confirmed COVID-19 cases and 6.92 million COVID-19 deaths had been reported worldwide.¹

Due to its sudden and global nature, the COVID-19 pandemic has had a significant impact on the emotional and mental health of many people.² Its influence on healthcare professionals and patients requiring long-term hospital treatment, including intensive care, has been particularly profound.

According to the Centers for Disease Control and Prevention (CDC) report, 41% of respondents in the surveys conducted across the United States reported at least one adverse mental health condition directly attributable to the pandemic.³ Over 50% of the respondents reported the symptoms of an anxiety disorder or a depressive disorder, or the symptoms of a trauma- and stressor-related disorder with regard to the pandemic, and as many as 11% reported having seriously considered suicide as a result of the pandemic.³

During the COVID-19 pandemic, the number of patients requiring intensive care increased significantly. COVID-19 patients hospitalized in intensive care units (ICUs) are under extreme psychological strain and they exhibit high levels of stress, as they are aware of how deadly the disease can be. In addition, an ICU stay is itself a risk factor for psychological difficulties.⁴ Another factor that has an impact on the severity of anxiety and depression symptoms and confusion in COVID-19 patients under intensive care are ICU visitor restrictions, which make conscious patients feel they do not receive sufficient psychological support.⁵ Isolation and the lack of contact due to COVID-19 negatively affect the mental health of patients. Research shows that isolation has a significant influence on the incidence of anxiety and depression, making patients more likely to show anger, feel lonely or be dissatisfied with the healthcare in the ward.^{5,6} In addition, staff in overburdened wards are not always able to ensure that patients are provided with appropriate psychological care, which increases patients' stress and fear.⁷ The literature notes that women are more likely to show a fear of the disease.^{8,9} Studies also suggest that women's greater sensitivity and emotionality, which are dependent on the level of sex hormones, may be an influencing factor.^{8,9} On the other hand, men find it more challenging to express fear. Therefore, women might be more vulnerable to the fear of COVID-19.^{8,9}

COVID-19 patients requiring intensive care are often those who have developed acute respiratory distress syndrome (ARDS) and require prolonged mechanical ventilation (PMV). Prolonged mechanical ventilation is associated with an extended stay in ICU. It contributes to emotional stress and the deterioration of patients' well-being, as well as enhances the possibility of developing

depression or even post-traumatic stress disorder (PTSD). The severity of the disease and the prolonged hospital stay negatively affect the mental well-being of patients.^{10–13} The apparatus used makes it difficult for these patients to communicate with others. Moreover, they suffer from dyspnea, chest pain and chest tightness, which increases their anxiety about their health and long-term prognosis.^{14–16} All these factors can lead to anxiety and depressive disorders, reducing patients' quality of life.

A common group of COVID-19 patients requiring intensive care are geriatric patients. Since geriatric patients, in addition to the underlying disease, often suffer from other comorbidities, and are more likely to have their daily independence deteriorated or their cognitive functions impaired, or to feel loneliness, there is a risk that their hospitalization and further prognosis may differ as compared to patients below 65 years of age. Studies show that in-hospital mortality in geriatric patients in ICUs, apart from somatic disorders, is associated with the impairment of their independence (in terms of activities of daily living (ADL) and instrumental activities of daily living (IADL)), and the loss or deterioration of cognitive functions.¹⁷ The presence of cognitive dysfunction worsens the prognosis of patients, independently of other medical comorbidities.^{18,19} The cognitive performance of patients aged 65 and above and their independence in IADL may be crucial to their prognosis and risk of in-hospital death.

Since the above factors may influence the occurrence of either depression or in-hospital mortality, the authors decided to use multiple scales. It was crucial to assess independence in basic and complex activities of daily living (the IADL and ADL scales), as well as the mental state, and this was done using the 15-item geriatric depression scale (GDS15). In the study, we used scales for evaluating the fear of COVID-19 (FCV-19S) and the abbreviated mental test score (AMTS), which assesses the cognitive functions of patients. Based on the existing research, our study hypothesizes that the loss of independence and the deterioration of cognitive functions worsen the prognosis of geriatric patients and increase the risk of in-hospital mortality.

The present study aimed to assess the level of independence in activities of daily living, mental fitness, the level of fear of COVID-19, and cognitive functions to determine their impact on in-hospital mortality in geriatric COVID-19 patients in comparison with patients aged ≤64 years.

Material and methods

This cross-sectional study was conducted among 300 ICU patients with COVID-19 from 2 hospitals in Wrocław, Poland: the 4th Military Teaching Hospital; and the Independent Public Healthcare Center of the Ministry of the Interior and Administration. Among the patients examined, 234 were from the former hospital, and 66 from the latter one. The group was a convenient sample.

The data was collected from November 2020 to March 2022. The inclusion criteria were as follows: adult patients (aged more than 18 years); admission to ICU; a diagnosis of COVID-19; and informed consent. The exclusion criteria were: age under 18; admission to ICU without being diagnosed with COVID-19; being unable to complete the questionnaire; and the lack of consent to participate in the study. The following questionnaires were used: the Lawton IADL scale; the Katz ADL index of independence; FCV-19S; AMTS; and GDS15. Each of the questionnaires was administered to each patient only once. The patients were informed about the purpose of the study, and were made aware that they could withdraw from it at any time. Patient confidentiality was maintained by interviewing the patients in individual rooms. The questionnaires were not signed with the patient's first and last name; only gender and age were indicated in the questionnaire. The conversation with the patient was always conducted individually, devoting a lot of attention to each patient and an individually selected amount of time. The interviewer was the lead author – a qualified nurse with 25 years of experience with older people and considerable knowledge of the scales used in the study. The interviewer read the questions to each patient. When a given question was incomprehensible, the interviewer explained it thoroughly. At the end of the survey, the patient personally confirmed with their signature that all the data was correct, and signed informed consent to participate in the study.

If a given questionnaire was incomplete, and it was possible to talk to a particular patient, the conversation was repeated and the missing data was completed. If this was not possible, an incomplete questionnaire was excluded from the study. There were 15 incomplete questionnaires. For the 300 patients presented in the study, all data was completed in full. The study was approved by the relevant bioethics committee (Military Medical Chamber, Warsaw, Poland; approval No. KB-191/22).

The Lawton IADL scale is used to assess the patient's ability to carry out instrumental activities of daily living. There are 8 questions about the ability to use the telephone, do the shopping, prepare food, do housekeeping, do the laundry, travel independently, take medications, and handle finances. In each question, the patient may score from 1 point to 3 points, where 3 points refers to full independence in a given activity, 2 points means that the patient needs help with an activity, and 1 point that the patient is almost completely dependent on another person's help. The scale has a score range of 8–24. The higher the score, the higher the level of IADL independence. A minimum score of 8 points indicates full dependence, a score of 9–23 points means that the patient is moderately dependent, and a maximum score of 24 points stands for full independence.^{20,21} The validity of the IADL scale was assessed using the Guttman and Rasch scoring system. The validity coefficients were consistent across the scoring methods.²²

The Katz ADL index of independence is used to assess performance in basic activities of daily living. The scale consists of 6 questions (activities) measuring the ability to bathe, dress/undress, eat, and use the toilet independently, basic mobility, and the ability to control urination and defecation. The patient answers positively (1 point) or negatively (0 points) to each question. The total score on the scale (0–6 points) is the number of activities the patient can carry out independently. A score of 2 and less means that patient is significantly disabled.²³ The reliability of the Katz ADL index of independence was assessed with Cronbach's alpha of 0.87. Validity was assessed as a coefficient of scalability of 0.6 and a correlation with the activity index of 0.95.²⁴

The FCV-19S is used to assess the fear of COVID-19. It has a score range of 7–35. The higher the score, the higher the level of fear. There are no standards as to what score on the scale indicates a high level of fear and what score denotes a low level of fear. However, the average number of points per question can be calculated and interpreted using the scoring scale for a single question, where 1 denotes a definite lack of fear, 2 denotes the lack of fear, 3 denotes a neutral response, 4 denotes the presence of fear, and 5 denotes the presence of a significant fear.²⁵ The interpretation of the results was adopted from the existing literature in Polish: 27–35 points stands for a high level of COVID-19 anxiety; 20–26 points indicates that anxiety is at a moderate level; 9–19 points means low anxiety; and <9 points indicates no COVID-19 fear.^{26–28} In European publications, the cut-off point is a score of 16.5 or higher.²⁹ It is recommended not to use that cut-off point as a diagnostic value, but only as a value for screening for a group of patients with an increased risk of COVID-19 fear.^{27–29} The FCV-19S was validated in Poland by testing 708 people.²⁶ The results showed high internal consistency of the scale (Cronbach's alpha of 0.89), and that the criteria of scale invariance and correlation with other variables were met.²⁶

The AMTS is used to assess cognitive functions. It comprises 10 questions. The total score on AMTS is the number of correct answers to those questions. When answering, the patient has to supply information about their age, year of birth, address, the current time, the current year, the date of the First World War, and the name and surname of the current president. The patient is asked to repeat and remember an address given by the doctor, and count backward from 20 to 1. A score of 0–3 suggests a severe impairment of cognitive functions, a score of 4–6 suggests a moderate impairment, a score of 7–8 indicates a mild impairment, and a score of 9–10 indicates normal cognitive function.³⁰ The AMTS was validated by comparison to 7 AMTS versions and the mini-mental state examination (MMSE). Based on the linear regression and C statistics, AMTS showed a significant correlation and no significant differences from the C statistic (0.87), which proves the usefulness of this tool for assessing cognitive impairment.³¹

The GDS15 is used to assess the severity of depressive symptoms in the elderly. The scale consists of 15 questions that are answered affirmatively or negatively. The questions focus on evaluating satisfaction with life, being happy, feeling bored or inferior to others, feeling helpless or anxious, having memory problems, and not wanting to leave the house. The scale has a score range of 0–15, where the higher the score, the higher the severity of depressive symptoms. A score of 0–5 indicates the absence of depressive symptoms, a score of 6–10 indicates a moderate severity of depressive symptoms and a score of 11–15 indicates severe depression.³² The validity of GDS15 was assessed by meta-analysis of the 69 studies identified.³³

The following hypothesis was tested: the IADL, ADL, FCV-19S, AMTS, and GDS15 scores depend on age (24–64 years vs. 65–97 years) and gender (female vs. male). Other hypotheses were: the IADL and ADL scores correlate with the AMTS scores; the AMTS scores correlate with the FCV-19S results; the IADL and ADL scores correlate with the FCV-19S results; the FCV-19S scores correlate with survival; the GDS15 scores correlate with survival; the IADL and ADL scores correlate with survival; and the FCV-19S results correlate with the length of the hospital stay.

All the scales used in the study had been proved to be valid and reliable in the population corresponding to the study group of patients.^{22,24,26,31,33,34}

Statistical analysis

For the assessment of the sample size, we used convenience sampling. The study was conducted within a specific timeframe from November 2020 to March 2022 in the 4th Military Teaching Hospital and the Independent Public Healthcare Center of the Ministry of the Interior and Administration, Wrocław, Poland. We included all patients available at that time and place who met the study inclusion criteria; therefore, our sample was the largest possible. The analysis of quantitative variables was carried out by calculating means and standard deviations ($M \pm SD$), and medians and interquartile ranges (Me (IQR)). Qualitative variables were analyzed by calculating frequencies and percentages (n (%)). The values of quantitative variables were compared between the 2 groups (patients aged 24–64 years vs. 65–97 years) using the Mann–Whitney U test. Correlations between quantitative variables were analyzed using Spearman's correlation coefficient (r). A univariate analysis of the impact of a number of variables on a dichotomous variable was carried out using logistic regression. The results are reported as odds ratio (OR) values with a 95% confidence interval (CI). Statistical significance was set at 0.05. Thus, all p -values of less than 0.05 were interpreted as indicating significant relationships.

The comparison of the values of quantitative variables in the 2 groups was made using the Mann–Whitney U test, since the data being analyzed did not have a normal distribution (as checked with the Shapiro–Wilk test). Correlations between quantitative variables were analyzed using Spearman's correlation coefficient, since the data did not have a normal distribution (as checked with the Shapiro–Wilk test). A univariate analysis of the influence of many variables on a binary variable was performed using the logistic regression method. The results are presented as OR parameter values with a 95% CI , as the modelled variable was a two-state one.

The analysis was carried out using the R software, v. 4.1.3 (<https://www.r-project.org>). Logistic regression was performed by entering the appropriate command (glm) in the R program, which then performed calculations according to the formulas.³⁵

Results

Of the 300 patients included in the study, 161 were female and 139 were male. The mean age of the patients was 70.41 years. Eighty-one patients were aged 64 or below, and 219 patients were aged 65 or above. Of the 300 patients examined, 34 died during hospitalization (the mortality rate was 11.33%). Among the variables examined, there were dependent variables, including death, and independent variables – the IADL, ADL, FCV-19S, AMTS, and GDS15 scores, which were treated as continuous variables, so in the analysis of their impact on mortality they were not divided into categories. Hence, there is no calculation of the number of deaths in each category.

The Lawton IADL results showed that of the 300 patients included in the study, 153 (51.00%) were partially independent, 145 (48.33%) were fully independent, and 2 (0.67%) were fully dependent in IADL. The Katz ADL results showed that of the 300 patients studied, 288 (96.00%) were fully functional, 6 (2.00%) had a significant degree of ADL disability, and 6 (2.00%) showed a moderate degree of ADL disability. The characteristics of the study group, including the results of the IADL and ADL independence assessment, are presented in Table 1.

The mean score of the patients on FCV-19S was 18.93 ± 5.61 , i.e., 2.7 points per question (rounded to 3). The minimum score was 7, while the maximum score was 35 points. The mean score of 18.93 is interpreted in the Polish adaptation of the scale as indicating a low level of fear,^{27,28} while in the European adaptation, the score is above the cut-off point; therefore, these patients should be evaluated further to assess their mental well-being.²⁹

The AMTS results showed that of the 300 patients included in the study, 196 (65.33%) had normal cognitive function, 62 (20.67%) had mild cognitive impairment,

Table 1. Characteristics of the study group

Scale	N	Data gaps	M ±SD	Me (IQR)	min	max	Score	Interpretation	n (%)
Lawton IADL scale	300	0	21.01 ±4.32	23 (20–24)	8	25	8	fully dependent	2 (0.67)
							9–23	partially dependent	153 (51.00)
							24	fully independent	145 (48.33)
Katz ADL index of independence	300	0	5.80 ±0.87	6 (6–6)	0	6	0–2	significant degree of disability	6 (2.00)
							3–4	moderate degree of disability	6 (2.00)
							5–6	fully functional	288 (96.00)
AMTS	300	0	8.37 ±2.13	9 (8–10)	0	10	0–3	severe cognitive impairment	17 (5.67)
							4–6	moderate cognitive impairment	25 (8.33)
							7–8	mild cognitive impairment	62 (20.67)
							9–10	normal cognitive function	196 (65.33)
GDS15	219	0	4.07 ±3.09	4 (2–6)	0	14	0–5	absence of depressive symptoms	156 (71.23)
							6–10	moderate severity of depressive symptoms	56 (25.57)
							11–15	severe depression	7 (3.20)

M – mean; SD – standard deviation. Me – median; IQR – interquartile range; min – minimum; max – maximum; IADL – instrumental activities of daily living; ADL – activities of daily living; AMTS – abbreviated mental test score; GDS15 – 15-item geriatric depression scale.

25 (8.33%) had moderate cognitive impairment, and 17 (5.67%) had severe cognitive impairment (Table 1). The analysis showed that the level of cognitive functions in geriatric patients differed from that in younger patients. Mental performance was significantly higher in the under-65 age group ($p < 0.001$) (Table 2).

Using GDS15, the authors assessed only the group of geriatric patients (≥ 65 years old) without making a comparison to the younger group, and this was due to the reliability of this scale only in a geriatric group of patients. The GDS15 results showed that of the 219 patients studied, 156 (71.23%) had no depressive symptoms, 56 (25.57%) displayed a moderate severity of depressive symptoms, and 7 (3.20%) had severe depression (Table 1).

Our analysis showed certain statistically significant correlations ($p < 0.05$). Based on the results, we may notice that age is an important factor affecting the level of independence among patients. Patients aged 64 or below reported significantly greater independence on the IADL scale and the basic ADL scale, and showed a significantly higher level of mental fitness. The correlations between age and independence in IADL, independence in basic ADL and mental fitness are collected and presented in Table 2. Our analysis using the Mann–Whitney U test showed that gender was a factor influencing the level of fear of COVID-19 ($p = 0.001$). Female patients reported

a significantly higher fear of COVID-19 as compared to male patients. The mean score on FCV-19S in the female group ($N = 161$) was 19.84 ± 5.60 , while in the male group ($N = 139$) it was 17.88 ± 5.45 .

The analysis showed statistically significant relationships ($p < 0.05$), indicating that the higher the level of mental fitness, the higher the level of IADL and ADL independence. The correlation between the AMTS and Lawton IADL scale scores was $r = 0.438$, whereas between the AMTS and Katz ADL scale scores it was $r = 0.270$.

Our study presents a novel, previously unpublished result regarding the impact of IADL and ADL independence on in-hospital mortality. It shows that patient survival and

Table 2. Statistically significant relationships between age and independence in instrumental activities of daily living (IADL) and basic activities of daily living (ADL) and mental fitness

Variable	Age [years]	M ±SD	Me (IQR)	p-value
Lawton IADL scale score	≤ 64 ($N = 81$)	23.25 ± 2.28	24 (24–24)	$< 0.001^*$
	≥ 65 ($N = 219$)	20.18 ± 4.60	22 (17–24)	
Katz ADL scale score	≤ 64 ($N = 81$)	5.99 ± 0.11	6 (6–6)	0.007*
	≥ 65 ($N = 219$)	5.73 ± 1.00	6 (6–6)	
AMTS score	≤ 64 ($N = 81$)	9.33 ± 1.13	10 (9–10)	$< 0.001^*$
	≥ 65 ($N = 219$)	8.01 ± 2.29	9 (7–10)	

* statistically significant (Mann–Whitney U test).

in-hospital mortality are influenced by independence in basic and complex activities of daily living. The dichotomous variable was the variable determining whether the patient died or not. The FCV-19S and GDS15 scores did not affect the dichotomous outcome, each point on the Lawton IADL scale reduced the chance of death by 11.1%, and each point on the Katz ADL scale reduced the chance of death by 31% ($p < 0.05$). Table 3 demonstrates the correlations between the IADL and ADL scores and the likelihood of death. Therefore, the higher the IADL and ADL scores, the higher chance of patient survival.

No statistically significant relationships ($p > 0.05$) were found between age and the level of fear of COVID-19, between gender and the level of IADL and ADL independence, between gender and the level of mental fitness, between gender and the severity of depressive symptoms, between mental fitness and the level of fear of COVID-19, between the level of fear COVID-19 as well as the severity of depressive symptoms and survival, and between the level of fear of COVID-19 and the length of the hospital stay. In conclusion, gender had an impact on the level of fear of COVID-19, but it had no significance on the level of independence and mental fitness, and the severity of depression. There was no significant correlation between age and the level of fear of COVID-19. The intensity of fear of COVID-19 did not significantly affect the level of cognitive functions, the level of independence (IADL, ADL), survivability, and the length of the hospital stay. The age of the patients showed a significant correlation with the level of independence and the level of cognitive functions. However, age did not determine the level of fear of the disease. The statistically significant and non-significant relationships and correlations are presented in Tables 4 and 5.

Table 3. Correlations between the independence in instrumental activities of daily living (IADL) and basic activities of daily living (ADL) scores and the likelihood of death

Variable	OR	95% CI	p-value
Lawton IADL scale score	0.889	0.829–0.953	0.001*
Katz ADL scale score	0.690	0.522–0.914	0.010*

OR – odds ratio; CI – confidence interval; * statistically significant (univariate logistic regression).

Table 4. Comparison of scores on various scales with regard to age and gender (statistically significant and non-significant relationships)

Variable	Lawton IADL scale score	Katz ADL scale score	AMTS score	FCV-19S score	GDS15 score
Age [years]	≤64 (N = 81)	23.25 ± 2.28	5.99 ± 0.11	9.33 ± 1.13	18.48 ± 4.60
	≥65 (N = 219)	20.18 ± 4.60	5.73 ± 1.00	8.01 ± 2.29	19.10 ± 5.94
p-value	<0.001*	0.007*	<0.001*	0.675	–
Gender	F (N = 161)	20.96 ± 4.09	5.75 ± 0.95	8.17 ± 2.30	19.84 ± 5.60
	M (N = 139)	21.07 ± 4.58	5.86 ± 0.76	8.60 ± 1.89	17.88 ± 5.45
p-value	0.167	0.060	0.112	0.001*	0.583

Data presented as $M \pm SD$.

FCV-19S – fear of COVID-19 scale; F – female; M – male; * statistically significant (Mann–Whitney U test).

Table 5. Statistically non-significant correlations with regard to the fear of COVID-19

Correlation	r	p-value
IADL vs. FCV-19S	–0.043	0.460
ADL vs. FCV-19S	–0.045	0.436
AMTS vs. FCV-19S	0.014	0.807
FCV-19S vs. the length of hospitalization	0.051	0.379

r – Spearman's correlation coefficient.

Discussion

Illnesses requiring hospital admission, and in particular those requiring intensive care management, have a negative impact on the well-being of patients.³⁶ According to the available literature, up to 67% of hospitalized patients suffer from symptoms of anxiety and depression, and 45% are diagnosed with PTSD,^{37–48} which has a negative impact on their health-related quality of life (HRQoL).^{40,44,45,47}

COVID-19 patients hospitalized in ICUs suffer from stress and anxiety. A study by Kupeli et al. found that 37.1% of the COVID-19 patients studied showed symptoms of anxiety and 43.6% showed symptoms of depression in the first 24 h of admission to ICU.⁴⁹ Such a response to a stressor is considered acute stress disorder (ASD). This disorder is associated with feelings of great uncertainty, vulnerability and even fear resulting from exposure to a potentially fatal event.⁵⁰ COVID-19 patients hospitalized in ICUs need to be kept isolated from other patients, which may increase their feelings of uncertainty and vulnerability. They do not know what is going to happen to them next. Moreover, the personal protective equipment (PPE) that must be worn by health workers while treating patients with COVID-19 can evoke negative connotations, making patients aware of the seriousness of their situation.

Studies have shown that certain demographic features and factors relating to the hospital stay itself can have a negative impact on the mental well-being of patients. These include a low level of education, being unemployed, female gender, the duration of the stay in ICU, and disease severity.^{41,51–53}

In their study, Daltaban and Aytekin showed that there is a strong association between female gender and an increased level of fear during the pandemic.⁵⁴ Similarly, the present study found a correlation between female gender and a greater fear of COVID-19. Women are more likely to respond more emotionally to such difficulties. Moreover, given the different life roles of men and women, the fear of infection experienced by women may be due to their concerns that no one would replace them in taking care of their children, grandchildren or living partners, or in carrying out their duties if they became ill. Studies suggest that women's greater sensitivity and emotionality, which are dependent on the level of sex hormones, may be an influencing factor. However, we cannot name the exact causes of women's higher levels of fear. Therefore, the suggested factors are the subject of research; we propose to consider them a hypothesis.^{8,9,55–57}

In our study, we found no relationship between age and the level of fear of COVID-19. Kaya and Bayındır observed a higher level of fear during the COVID-19 pandemic among geriatric patients, and suggested that healthcare professionals should help patients normalize the level of fear with physical activity and social support.⁵⁸ In a study by Nino et al., the researchers noticed that the level of anxiety increased with age, which might be related to more frequent comorbidities in older people.⁵⁹ However, these results have not been confirmed in every ethnic group studied. In a study by Lin et al.²⁵ and also one by Łazarz-Półkoszek et al.⁶⁰, children and older people showed a lower level of anxiety than young or middle-aged adults, which was attributed to their different perceptions of the disease and its impact on health and social functioning, including financial functioning.

In addition, the mental fitness of patients and their level of IADL independence prior to hospitalization have an impact on their perception of the disease and their awareness of the risk it poses. The present study showed that patients aged over 64 exhibited a lower level of cognitive function and were less independent in activities of daily living as compared to younger patients. Moreover, the study found that the level of mental fitness and the level of independence in daily life influence each another, and that there is a statistically significant correlation between them. This also has implications for the patient's hospital stay, and especially their prognosis. In the present study, a higher level of independence was found to be associated with a lower likelihood of death. Bruno et al. concluded in their study that the Katz ADL index of independence provides additional information that can help assess the risk of in-hospital death in COVID-19 patients.⁶¹ Patients with low Katz ADL scores, i.e., those with limitations in ADL, were found to be at a particularly high risk of death.⁶¹ Similarly, Ting-Jie et al.⁶² and Ocagli et al.⁶³ noted in their studies that the Barthel index could be used as a prognostic indicator for mortality. A study by Bo et al. confirms the assumed hypothesis

regarding the impact of independence and the quality of cognitive function on the prognosis of geriatric patients hospitalized in ICUs; the lower the level of self-reliance and high or moderate cognitive impairment, the higher the in-hospital mortality.¹⁷

With age, the loss of interneuronal networks and brain atrophy can be observed. It is often associated with a cognitive decline. However, cognitive impairment may also be associated with dementia, due to damage to the vessels, brain tumors, post-stroke changes, or the impairment of the dopaminergic system, or with potentially reversible causes, such as depression, endocrine causes, such as hypothyroidism, or vitamin B12 deficiency.^{64–67} Older age also affects the level of independence, but it is not the only important factor. Depression, a low level of social support, not living and participating in social relationships, as well as the impairment of cognitive functions, also reduce independence. There is an age–cognition–independence connection, where all factors influence each other.^{68,69}

In addition to a low level of independence, other risk factors for in-hospital death reported in the available literature include dementia, cognitive impairment and older age (>85 years).⁷⁰ It has been observed that older age is not a sufficient indicator of the risk of death. The independence of the patient and their functioning in everyday life are more important indicators. Some geriatric patients live alone, some rely on support from their families or professionals, and some live in care homes. However, this does not mean that the impairment of functioning is the main cause of death. Independence is also influenced by factors such as comorbidities and the severity of their symptoms, as well as cognitive impairment.⁷¹ It is these factors that are crucial in determining risk factors for mortality in older COVID-19 patients.⁷² Elderly COVID-19 patients under intensive care, especially those with impaired physical or mental function, require special care and support.^{53,62}

The mental state of patients, and their levels of independence and cognitive function have a significant impact on the course of hospitalization and treatment. Clinicians should pay attention to the presence of risk factors for increased mortality in these patients and provide them with appropriate care. Based on our research and the literature cited, we can conclude that acute physiological impairment is not the most important prognostic factor. Despite treating the patient according to the established guidelines, the effect on each patient may vary. We hope that clinicians, especially in ICUs, will pay attention to the factors mentioned in the present article.

Determining these factors on admission to hospital is of great prognostic importance and should lead to modifications in patient care so that the therapeutic effect is as good as possible. Our work proposes future research directions in searching for factors that would improve patients' cognitive function and level of independence. We recommend focusing on the role of social and family

relationships and psychological care during the ICU stay, as well as on minimizing the state of isolation to improve patients' mental well-being. Our research suggests a wider use of scales (the Lawton IADL scale, the Katz ADL scale and AMTS) to assess the levels of independence and cognitive function on hospital admission. Whilst assessing cognitive function, we recommend keeping in mind the potentially reversible causes of dementia.

It is essential to approach patients holistically so that, in addition to the therapeutic effect, patients' subsequent quality of life would be as good as possible. It is worth considering what appropriate measures could be taken to improve the condition of patients at an early stage. The mental state, the level of cognitive function and the level of independence of patients seem difficult to modify. However, an attempt to improve them or to implement appropriate treatment would contribute to a better functioning of patients, their better survival, and from a far perspective, a better functioning of the wards.

Limitations

The results of the study were based on observations. A potential limitation to this work is a small cohort group and a smaller group of patients under 65 years. Due to the low expected values resulting from the insufficient number of patients, the conclusions presented in this study should be treated cautiously. Another potential limitation is not including dependent variables, such as comorbidities, disease severity, race or ethnicity, the socioeconomic status, medications, and the length of the hospital stay, in the assessment. Based on the current literature, the influence of the level of education, unemployment and disease severity on the well-being of patients has been noted. Our study primarily addressed factors such as independence, the level of fear of COVID-19 and the level of cognitive function. A limitation to our work is not mentioning other possible factors that may affect the well-being of patients. However, as we could not obtain such data from all respondents, it was impossible to analyze those factors with due reliability. We suggest that future research on this topic should investigate the factors mentioned above. We recommend conducting a larger and more age-differentiated population study over a longer period of time.

Conclusions

The level of independence in basic and instrumental activities of daily living is associated with in-hospital mortality in geriatric COVID-19 patients, which is a novel conclusion, not published in the previous literature.

A higher level of cognitive function is positively correlated with higher levels of independence in basic and instrumental activities of daily living.

Patients aged 65 and older are more likely to be less independent in basic and instrumental activities of daily living as compared to younger patients. Moreover, this cohort group exhibits a statistically significantly lower level of cognitive function.

These findings highlight the importance of considering both cognitive function and independence in daily living activities when planning care and treatment strategies for geriatric COVID-19 patients.

Ethics approval and consent to participate

The study was approved by the relevant bioethics committee (Military Medical Chamber, Warsaw, Poland; approval No. KB-191/22). All patients provided written informed consent to participate in the study.

Data availability

The datasets supporting the findings of the current study are available from the corresponding author on reasonable request.

Consent for publication

Not applicable.

ORCID iDs

Anna Woźniak  <https://orcid.org/0000-0003-4805-6487>
 Weronika Misiąg  <https://orcid.org/0000-0001-8638-2350>
 Patrycja Leśnik  <https://orcid.org/0000-0002-1457-9899>
 Jarosław Janc  <https://orcid.org/0000-0003-2164-8079>
 Mariusz Chabowski  <https://orcid.org/0000-0002-9232-4525>

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