

COVID-19 and Post Intensive Care Syndrome

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ABSTRACT

COVID-19 has led to a significant number of neuropsychological deficits. Post-Intensive Care Syndrome or PICS awakes a worsened state of cognitive, emotional, mental, and physical impairments to a patient post any critical illness in the Intensive Care Unit (ICU). The COVID-19 Pandemic may result in a larger number of survivors post the virus to be associated with PICS. Previous healthcare crisis much like this one has resulted in the prevalence of Post-Traumatic Stress Disorder (PTSD) among survivors, and PICS awakes a new set of vulnerability. To allocate the different sequelae of the virus, symptoms of post COVID-19 PICS to increase recognition of it amongst ICU survivors- especially older adults, this paper integrates the research across related areas and its new challenges for post COVID-19 survivors and their family.

Keywords: COVID-19, Post Intensive Care Syndrome, Delirium, Older Adults, Quality of Life.

The Coronavirus outbreak (SARS-CoV-2) triggered a wave of psychological disorders like PTSD (post-traumatic stress disorder), depression, and anxiety among individuals exposed to the virus (Panariello et al., 2021). A disease caused by the SARS-COV-2, the coronavirus, awakened in December 2019 which caused severe rapid infections and deaths around the globe.

The long-term effects of the virus have become a vital and growing area of research amongst clinicians and researchers, and in alignment with the growing number of reports and cases of the virus, there may have been a lack of knowledge among health care professionals regarding Post-Intensive Care Syndrome (PICS) pertaining to COVID-19, and vitality to increase the recognition of it amongst ICU survivors. Post-Intensive Care Syndrome (PICS) comprises of symptoms that are of physical strength deficit, decline in cognition, and even mental health disturbances, and goes on to persists even after a patient leaves the ICU (Intensive Care Unit). ICU survivors of COVID seem to be directly discharged home from the hospital (Ellen et al., 2020). A survivor of any kind of medical illness in the ICU is susceptible to developing it. PICS does not limit itself to a patient post admission, but can reach out to loved ones and family that provide support and care. The onset and prevalence of PICS post COVID-19 had varied with 28-87 percent of cases relating with physical

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Received: December 21, 2021; Revision Received: March 18, 2022; Accepted: March 24, 2022

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impairments, 20-57 percent that pertain to cognitive impairments, and about 6-60 percent pertaining to mental health problems after about six months post discharge.

Previous to the COVID-19 pandemic's ascent, about 19 million individuals every year developed a life-threatening acute organ dysfunction which required admission to the intensive care unit (ICU); among the 19 million individuals, about 14 million survive and half of them recover. However, one third of the survivors had died during the following year post ICU discharge, and one sixth experience a permanent functional disability. (Hallie et al., 2018; Santos et al., 2016)

With people needing mechanical ventilation to recover critical illnesses every year, the coronavirus pandemic only increases the number of mechanical ventilations needed every day, and approximately 20% of COVID-19 patients have been reported to require care in the critical care units of hospitals. (Rodriguez-Morales et al., 2020) and about 50% of all COVID-19 patients that require it go on to develop PICS (Hopkins et al., 2004). With the constraints on mechanical ventilation, and exposure to a higher amount of sedatives, there lies an increased risk of PICS amongst COVID-19 ICU survivors. There consists an earlier evidence of COVID-19 case studies which suggests that the virus survivors may have a variety of neurocognitive deficits that rise from serious neurological conditions which relate to the treatment of the illness or the illness itself such as acute disseminated encephalomyelitis, hypoxic brain injury, or large vessel stroke (Ashrafi et al., 2020; Paterson et al., 2020; Fan et al., 2020). As psychologists and neuropsychologists evaluate the sequelae of the virus, a crisis falls in after crisis. There is also a lack of research towards PICS post the COVID-19 virus for older survivors. Research suggests that older patients that recover from severe respiratory illnesses present an ongoing secondary disability from the intensive treatments which include long-term cognitive impairment, and poor mental health outcomes (Davidson et al., 2016; Brown et al., 2019). As clinicians and researchers continue to understand the long-term effects of the corona virus, hospitals and health care workers may need to implement stronger strategies to prevent PICS for patients with acute respiratory syndrome.

This paper looks into topics like family burden, quality of life, and how delirium and impairment from COVID-19 and PICS can affect an individual and their family/care giver, especially an older adult. Research for older adults and PICS have not been explored much in the last two years with the onset of the coronavirus pandemic and needs to be looked into because of the age group being most vulnerable to health problems. Of the many papers reviewed for this paper, these were some of the common aspects, and this paper attempts at compiling them for further knowledge and research in these areas.

Risk Factors

The implication of cognitive impairment for ICU survivors as mentioned before, varies in duration and severity in each individual. The most severe risk factor in long-term cognitive impairment is delirium. (Pandharipande et al., 2013) Earlier research also suggest that other possible risk factors could include hyperglycemia, sedation, hypotension, and hypoxemia. (Desai et al., 2011) A meta-analysis study found that the major risk factors that were associated with PICS were the female sex, mental health problems, delirium, older age, and a higher rate of severity of disease or illness (Lee et al., 2020)

METHODOLOGY

Various areas of literature were reviewed for this paper to understand the neurological, physical, and psychological outcomes of the coronavirus and the Post-Intensive Care Syndrome for COVID-19 ICU survivors. The current paper is a review of the existing literature between the years 2004 and 2021. The research papers were both empirical and literature review papers which was undertaken by using terms such as COVID-19, delirium, Post Intensive care syndrome, quality of life, and PICS in older adults. For the current article, various articles were reviewed and cited from journals such as JSTOR, Sage Journals, American Journal of Respiratory and critical care medicine, Springer, Journal of Clinical Medicine, The Lancet, and websites such as Google Scholar, and NCBI.

RESULTS

Impairment and Quality of Life

PICS brings forth a worsened state of impairment even in the physical domain post a critical illness in the intensive care unit, and go beyond- to last about 5 to 15 years. (Desai et al., 2011). Physical impairment that happens due to PICS can include fatigue, muscular dysfunction, sexual dysfunction and even dyspnea (shortness of breath). This could also actively reduce quality of life. Although there have been technological advancements and the number of survivors post critical care increases, the long-term outcomes are usually not positive. Anxiety, depression and PTSD are the most common PICS symptoms which may also affect caregivers, and studies have found a higher onset of younger, female patients who generally have poorer recall of their stay in the ICU. (Biehl et al., 2020)

Although anxiety, PTSD, and muscular dysfunction persists- memory loss, comprehensibility and difficulty in concentration have known to be present in 30-80% of patients (Colbenson et al., 2019), this has been reflected in a study which looked into over 800 patients who had respiratory failure and shock after being admitted in the ICU (Pandharipande et al., 2013). These impairments may last over a year and affect the quality of life of the individual and their family. The needs especially during a global pandemic like COVID-19 when hospitals and health centers have an increase in burden, insufficient hospital beds and health-care workers, leaves the vulnerable population with critical illnesses at an increased risk of overwhelming healthcare costs, and hospitalization. Research suggests that during the first month post ICU discharge the most common physical manifestation of PICS is the neurological impairment. After 3 months, osteoarticular impairment was frequent, especially in the shoulder region. (Daste et al., 2021). More than 20% of patients indicated having delirium and experienced a cognitive disorder like memory loss after a month post ICU discharge, and at 3 months memory, attention, and speed of processing had remained altered and most patients had not fully recovered in those areas. (Daste et al., 2021).

As mentioned before, health concerns of patients can decrease quality of living of the family and the survivor. Since patients with acute respiratory distress syndrome (ARDS) tend to have worsened outcomes, they require treatment in the ICU. Patients that do survive often develop poor health quality of life with several mental, cognitive, and physical symptoms post ICU discharge (Taboada et al., 2020). There has not been a lot of research or investigation around the quality of life after a critical illness and being admitted in the ICU. The social burden that follows this is also one of the major concerns. A study done in 2021 evaluates the length of COVID-19 symptoms, its neurocognitive impairments and function with the quality of life in mild to severe COVID-19 survivors that required to be hospitalized post the acute phase. A cross sectional analysis on a study of hospitalized

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COVID-19 survivors was followed up after about 2 months post discharge. The tools for the study were administered via telephone, and 179 final patients were included in the study. Through this study about 58.7% of survivors had showed signs of moderate neurocognitive decline, 39.1% with psychiatric morbidity and about 40% presented low quality of life. The study also showed delirium during hospitalization. With the limited amount of ongoing data around COVID-19 and neurocognitive functioning, quality of life is one of the prime dimensions of research that require investigation in terms with PICS. The findings of the study mentioned above show that survivors presented poorer mental and physical quality of life. (Mendez et al., 2021). The tools were administered by telephone which may not have provided the most precise information that an in-person approach might bring forth. The study also mentioned a 21.8% dropout rate before taking the final 179 participants from the initial sample of patients. This may have brought forth a bias in the final results. Early detection of the virus, prevention, treatment for psychiatric and cognitive symptoms may lead to improvement in daily functioning and quality of life.

Delirium

Delirium is a shifting disturbance in cognition and consciousness and is one of the potential manifestations of acute brain dysfunction in patients that are critically ill; frequently occurring in older patients leads to high mortality rates and morbidity. It is the onset of a state of confusion and cognitive ability decline. Delirium is known to be as one of the most recognized complications in respiratory illnesses, especially in older adults. Studies earlier have indicated that 20-30% of all individuals that suffered the SARS-COV-2 virus had developed delirium in the course of being hospitalized with 60-70% in severe cases at all ages. (Grasseli et al., 2020; Helms., et al 2020). Isolation, precautions, limited visitation and staff are some of the management techniques hospitals have undertaken for COVID-19, and underlying all this is delirium for patients with admission in the ICU. Using personal protective equipment by staff in hospitals often can be frightening and depersonalizing to older patients who might be having cognitive impairment or dementia. Social Isolation increases both chemical and physical restraints on such patients in order to manage agitation, and wandering which may increasingly develop the risk for delirium, and prolong the duration of it, internally leading to accelerated mortality (O'Hanlon et al., 2020). This state of confusion has been known to be reported in about 30-80% of patients post-ICU and varies in severity and duration depending on any pre-existing cognitive deficits and age group (Harvey et al., 2016)

Patients with COVID-19 are usually at a higher risk of delirium because of the neurovirulent properties of the SARS-COV-2 virus to invade and inflame the central nervous system. For older patients that are mechanically ventilated, earlier studies suggest that delirium may occur in 80% of the ICU patient population (Ely et al., 2004) The duration of Delirium, over 40 days has also been associated with a higher risk in Post-Traumatic Stress Syndrome (Basher et al., 2018). Delirium is a vital problem that requires assessment and management especially in older adults with cognitive impairment during the COVID-19 pandemic.

Family Burden

COVID-19 brings home burden not just for the discharged patient, but also caregiver and family. The virus and the pandemic have created a shift in the landscape for healthcare, especially for older adults. The unrecognition of the needs of the patients that have just recovered from a critical illness leads to a more vulnerable population and increased risk of hospitalization. Post discharge, primary care providers must be aware of the symptoms of PICS, even reference to an ICU recovery clinic should be ideal for all physical and

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neuropsychiatric needs. PICS-F (Post Intensive Care syndrome- Family) is the response to a critical illness by the family/families, and together describes the onset of post-traumatic stress, depression, anxiety, and grief to include a few. The symptoms usually occur after the patient is discharged and even during the stay, or even following the patient's death.

Family members are screened for distress during follow-up visits for the patients at ICU recovery centers. The uncertainty of the virus and the feeling of not being able to meet their loved one that are admitted because of visitor restrictions also brings in increased levels of stress, and only a limited number of studies have reported on the experiences of family members of those admitted and their needs of support. In a study by Chen, Wittenberg et al., in 2021, a study was done using a sample of 10 family members of adult COVID-19 patients who were admitted in the ICU. The study sought to investigate the experiences and needs of family members of COVID-19 patients that were ventilated in the Intensive care unit. There were several people who mentioned that the healthcare system was perceived and responsible for the delay in treatment and diagnoses. They experienced severe levels of stress and anxiety when they learn of the patient's diagnosis, and immediately start reflecting on how they must have contracted the virus. The study brings forth these experiences during the first wave of the COVID-19 pandemic and made an analysis through which several themes emerged. 1) The reactions to the diagnosis of covid-19; 2) The effect of COVID-19 on the outcomes of bereavement' 3) desperately seeking information; 4) having conflicting feelings about video calls; 5) needs of family members; and 6) The appreciation of care. (Chen et al., 2021). Another study done by Greenberg & Basapur in 2021 supports the investigation done by Chen and his colleagues in which family satisfaction was by being emotionally supported, receiving regular updates, and the ability of video calls. (Greenberg et al., 2021). Although, patients post discharge who are still ill with symptoms of PICS in a care unit, can increase distress and anxiety on family members as to why they might have not been cured yet. Depending on the severity of the illness, relatives and family members also have considerable strain about their weakened family member contracting COVID-19, and relatives of the deceased or surviving patient might experience a higher level of grief and separation distress (Barnes et al., 2017). With such symptoms, and the progress of the pandemic there would be an increase in workload for healthcare professionals and focus on patient care, which may directly lead to family members of the patient to feel neglected or not involved in the life until the final stage of the patient's ICU life, (Jeitziner et al., 2021) hence remains necessary to meet the importance of the individual needs of family members and relatives of the patient.

Older Adults

Research suggests that older adults with a critical illness significantly have an increased rate of mortality in the 1-year period that follows discharge from an ICU in comparison to other patients who are hospitalized, with the difference being greater when compared to a general population (Huggins et al., 2016). There is not a lot of research or studies done on PICS and its implications on older adults, being the age group more vulnerable to critical illnesses, and most studies which exist differentiate between the characteristics of older and younger patients, and the young-old with the old-old (Liu et al., 2020; Guo et al., 2020). The impact of the SARS-CoV-2 virus increases with age, and besides the mortality rate, some patients may experience disability which could be related to major complications which require admission in the ICU and can be linked with physical impairments. Muscle weakness is the most frequent problem in the ICU and usually generated due to critical conditions that have high risk factors. (Udina et al., 2021). There is an increased number of older adults that suffer from psychological, long-term cognitive, and physical impairments because of critical

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illnesses. These long-term impairments collectively make PICS more likely to affect older adults for several reasons. A study done in 2018 mentions that patients that are 65 years and older have accounted for 50% of ICU admissions, whereas patients 85 years and above makes the largest age group of admissions in Intensive Care Units (Kheir et al., 2018).

Since COVID-19 is a respiratory illness, symptoms are more pronounced when it comes to older adults even if its presymptomatic or asymptomatic, and are more likely to develop ARDS (acute respiratory distress syndrome) in comparison to patients that may be lesser than 60-years old (Mills et al., 2020). The pandemic raised these challenges and mortality rates for this age group severely. Conditions like hypertension, and diabetes can put them at a higher risk of developing organ failures like cardiac injury or liver dysfunction. Treatments for PICS in older adults with serious respiratory syndromes need to be a priority when it comes to COVID-19 because of the limited amount of research done around it, and need for better post ICU treatment strategies.

CONCLUSION

Recent studies indicate that there are about 23 ICU recovery clinics spread over 3 continents (Haines et al., 2019). Patients who are critically ill in the ICU and have COVID-19 usually have a post-ICU follow up in a recovery clinic after discharge (Biehl et al., 2020), but this would depend from country to country. Developing countries might not have the facilities for an ICU recovery center and patients are just sent back home to deal with what comes after a critical illness. The virus is an uncertain threat to everyone, keeping the older patients in a higher risk of impairment, and almost life-threatening cerebral or respiratory complications. The main aim of this paper was to highlight the need of post ICU care for not just adults, but older adults especially with the limited amount of research around it. The paper tries to highlight the complications, risk factors and duration of symptoms like delirium in patients with COVID-19.

As new variants of COVID-19 come into the front, prevention strategies have to be taken and the strong evidence that exists of cognitive, physical, and psychological sequelae of the virus can affect quality of life, and induce PICS even in family and not just the patient.

Even with the deficits, the experience of impairment can be hard and distressing not just to the patient and their families, but also healthcare givers. Psychological trauma can carry itself onto healthcare workers especially amidst the COVID-19 global pandemic and may experience symptoms of post-traumatic stress. There is a need for future research to look into the treatments, and PICS in older adults and their caregivers. There is also a need to prioritize preparedness for pandemics in healthcare facilities, nursing homes, especially for older adults to ensure the risk of infection and post ICU syndrome is mitigated during uncertainty.

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Acknowledgement

The author appreciates all those who participated in the study and helped to facilitate the research process.

Conflict of Interest

The author(s) declared no conflict of interest.

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How to cite this article: Wilson A. M. & Pereira N. G. (2022). COVID-19 and Post Intensive Care Syndrome. *International Journal of Indian Psychology*, 10(1), 1079-1087. DIP:18.01.108.20221001, DOI:10.25215/1001.108