OBSERVATIONAL STUDY

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Post-Intensive Care COVID Survivorship Clinic: A Single-Center Experience

Michael Gilmartin, MD[1]

Jack Collins, MD[1]

Sabina Mason, BSc (Hons), LLB[1]

Anna Horgan, MD[1]

Elena Cuadrado, MD[2]

Melanie Ryberg, DPsychSc[3]

Garret McDermott, DClinPsych[3]

Maria Baily-Scanlan, MSc(Physiotherapy)[4]

David Hevey, BA(Hons), MA(Appl Psych), PhD[5]

Maria Donnelly, MD[1]

Veronica O'Doherty, BA(Hons), MPhil, MSc, PhD[3]

Yvelynne P. Kelly, MD, PhD[1]

OBJECTIVES: Patients discharged from the ICU post-COVID-19 pneumonitis may experience long-term morbidity related to their critical illness, the treatment for this and the ICU environment. The aim of this study was to characterize the cognitive, psychologic, and physical consequences of COVID-19 in patients admitted to the ICU and discharged alive.

DESIGN: Prospective cohort study.

SETTING: Post-intensive care syndrome (PICS) follow-up clinic at Tallaght University Hospital, a tertiary referral center with a 16-bed mixed medical-surgical ICU, including critical care physicians, a psychologist, a physiotherapist, and a research nurse.

PATIENTS: Patients who had been admitted to the ICU in our tertiary referral center with COVID-19 pneumonitis 6 months earlier.

INTERVENTIONS: None.

MEASUREMENTS AND MAIN RESULTS: A total of 22 patients attended the 6-month PICS follow-up clinic following admission to ICU with COVID-19 pneumonitis. Mean grip strength was low at the 6-month follow-up at 24.1 pounds (SD 9.8) with a minimally active median metabolic equivalent (MET) of 970 METs/wk (interquartile range, 0–7,794 METs/wk). Only 59% of patients were independent with regard to their activities of daily living. Eight of 14 patients (57%) had returned to work by 6 months post-ICU discharge. Their mean Intensive Care Psychological Assessment Tool (IPAT) score was 6.6 (SD 4.6) with a Post-Traumatic Stress Disorder Checklist for Diagnostic and Statistical Manual of Mental Disorders-5th Edition (PCL-5) score of 21.1 (SD 17.5) and a mean Montreal Cognitive Assessment (MoCA) score of 24 (SD 8.4); suggestive of mild cognitive impairment. In a multivariable regression model, only Acute Physiology and Chronic Health Evaluation II score was significantly independently associated with MoCA score as a cognitive PICS outcome (beta-coefficient, −1.6; SE, 0.6; $p = 0.04$). None of the predictor variables were significantly independently associated with IPAT and PCL-5 as psychologic outcomes, nor with International Physical Activity Questionnaire-Short Form as a physical PICS outcome.

CONCLUSIONS: In this single-center prospective cohort study, we found that patients have a high burden of physical and psychologic impairment at 6 months following ICU discharge post-COVID-19 pneumonitis; in many cases requiring specialist referrals for long-term input. We advocate for increased resources for this much needed follow-up multidisciplinary intervention for an ever-growing population of patients.

KEY WORDS: cognition; COVID-19; intensive care unit survivorship; physical activity; post-intensive care syndrome; post-traumatic stress disorder

Patients who survive a prolonged stay in the ICU may experience long-term morbidity related to their critical illness, the treatment for this and the ICU environment. The post-intensive care syndrome (PICS) is defined by new or worsening physical, mental, and neurocognitive disorders that negatively affect daily functioning and quality of life in survivors of critical

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illness (1). An expanded definition also includes factors such as osteopenia, metabolic and endocrine dysfunction, vulnerability, sleep disorders, chronic pain, and fatigue (2). There is also a higher risk of death for ICU survivors in the years following discharge, as well as reduced quality of life compared with matched controls (3). PICS multidisciplinary follow-up clinics for ICU survivors are becoming increasingly available and have been shown to have promising results on mental outcomes (4), although published data in this field are still limited with two randomized controlled trials showing no improvement in patient outcomes with PICS follow-up interventions (5, 6). Inconsistency and heterogeneity between different PICS clinic processes, therefore, lead to difficulty in assessing the subsequent impact/outcomes and effectiveness of these processes.

COVID-19 is an acute viral infection that causes severe respiratory failure and which the World Health Organization has declared as a global pandemic since March 2020. More than 230 million infected cases globally have been confirmed to date (7). In patients affected by COVID-19, symptoms may persist over prolonged periods, with symptoms for more than 12 weeks defined as "post-COVID-19 syndrome" or "long COVID." Patients discharged from the ICU have been found to have a high prevalence of chronic lung changes, anxiety, depression, post-traumatic stress disorder (PTSD), ICU-related neuromyopathy, and other physical and cognitive impairments associated with a prolonged critical care stay (8–10). This has therefore led to increased interest in and increased need for a PICS follow-up system to help patients to move back into the community and to understand the long-term course of PICS after COVID-19 infection.

Our aim was therefore to establish a PICS follow-up clinic for patients who had been admitted to the ICU in our institution with COVID-19 pneumonitis.

METHODS

PICS Follow-Up Clinic—Study Design, Population, and Setting

We performed a prospective cohort study through establishing a PICS follow-up clinic at Tallaght University Hospital in October 2020 for patients who had been admitted to the ICU in our institution with COVID-19 pneumonitis at the start of the pandemic 6 months earlier. Ethical approval was achieved in advance of study commencement from the St. James' Hospital/Tallaght University Hospital Joint Research Ethics Committee (JREC Reference Number: 2020-06 Chairman Action [07]) and all study subjects signed written informed consent prior to inclusion in the study. Our clinic was staffed by consultant and trainee critical care physicians, a psychologist, a physiotherapist, and a critical care research nurse. Our aim in following up this cohort of patients was to characterize the cognitive, psychologic, and physical consequences of COVID-19 in patients admitted to the ICU and discharged alive. We wished to identify contributing factors to abnormalities identified in cognitive, psychologic, and physical functioning. Where such abnormalities were found, referrals to specialist medical services as well as community psychology and rehabilitation services were made.

Study Outcomes

Using the ICU electronic patient record (IntelliSpace Critical Care & Anesthesia Information System), we prospectively recorded the demographic features, premorbid state, and comorbidities of patients admitted to the ICU with COVID-19 pneumonitis. We also recorded the patients' ICU course, including use of mechanical ventilation, proning, and continuous renal replacement therapy (CRRT). Patients were treated with prone ventilation for 16 hours per day (16.00–10.00), after which they were returned to supine position for 8 hours by the proning team and then reproned again the following day if persistent hypoxemic respiratory failure present with a Pao_2/Fio_2 (P/F) ratio less than 150, an Fio_2 greater than 0.6, and a positive end-expiratory pressure greater than 14 cm H_2O. In addition, we recorded the ICU pharmacological therapies used for each patient, including sedatives, neuromuscular blockers, vasopressors, anti-microbial agents, and corticosteroids. ICU admission laboratories were recorded, including inflammatory markers such as C-reactive protein (CRP), procalcitonin, interleukin-6 (IL-6), ferritin, troponin, and D-dimer. In the PICS clinic, follow-up laboratories were recorded, and measures of cognitive function, self-report measures of psychologic functioning, and tests of physical functioning at 6 months post-ICU discharge were administered. The Montreal Cognitive Assessment (MoCA) was used to provide a global measure of

cognitive function. The Intensive Care Psychological Assessment Tool (IPAT) was used to screen for psychologic distress. The Post-Traumatic Stress Disorder Checklist for Diagnostic and Statistical Manual of Mental Disorders, 5th Edition (DSM-5) (PCL-5) was used to screen for the presence and severity of PTSD symptoms. The Patient Health Questionnaire-9 (PHQ-9) was used to screen for the severity of depression symptoms and the General Anxiety Disorder-7 (GAD-7) was used to screen for signs of general anxiety. The Fatigue Severity Scale (FSS) was used to measure patient fatigue. Physical functioning was measured using the ICU Mobility Scale, the International Physical Activity Questionnaire-Short Form (IPAQ-SF), grip strength, and the 6-minute walk test.

Statistical Analysis

Demographic and clinical characteristics are reported as counts and percentages or means and SDs. Medians and interquartile ranges (IQRs) were utilized for nonparametric data. We used chi-square tests to assess for significant differences between patients who had and had not returned to work by 6 months post-ICU discharge with regard to categorical variables (sex, ethnicity, social support, and occupation pre-ICU). The Mann-Whitney *U* test was used to assess for significant differences between proned and unproned patients with regard to nonparametric continuous variables. Our primary outcome were linear multivariable regression models that assessed the impact of clinical and demographic factors on PICS symptomatology; with MoCA score as a cognitive PICS outcome, IPAT and PCL-5 as psychologic PICS outcomes and IPAQ-SF (metabolic equivalents [METs]/wk) as a physical PICS outcome, respectively. All analyses were performed using IBM SPSS Statistics, Version 26.

RESULTS

Baseline Demographics

Approximately 60% of our ICU beds were occupied by COVID-19 positive patients during the first wave of the COVID-19 pandemic. Thirty-two patients were admitted to our ICU with COVID-19 pneumonitis during the study period. Of these patients, 25 were discharged home alive. Two patients subsequently passed away posthospital discharge and one patient was lost to follow-up as they were of no fixed abode and could not be contacted to return to the clinic. A total of 22 patients attended the 6-month PICS follow-up clinic following admission to ICU in Tallaght University Hospital with COVID-19 pneumonitis from March 2020 to April 2020 (**Table 1**). Our rate of follow-up was therefore 96% (22/23 available patients who were alive posthospital discharge following COVID-19 pneumonitis) for this study. The majority of these patients were male and obese. The most common comorbidities were hypertension, diabetes mellitus, and ischemic heart disease.

ICU Admission Course

The median ICU and hospital length of stay was 21 days (IQR, 2–75 d; **Supplemental Table S1**, http://links.lww.com/CCX/A991) and 37 days (IQR, 8–130 d), respectively. Ninety-one percent patients underwent invasive mechanical ventilation during their ICU admission and 55% were proned. The median duration of proning was two sessions (IQR, 0–17). Almost a quarter of the overall COVID-19 pneumonitis cohort required CRRT during the ICU admission and 14% had a pulmonary embolism.

TABLE 1.

Baseline Demographics	Result
Mean age (SD), yr	52.4 (15)
Male (%)	15/22 (68)
Mean height (SD), cm	172.5 (11.3)
Mean body mass index (SD), kg/m^2	31.4 (7.6)
Mean weight (SD), kg	92.6 (20.2)
Ethnicity, *n*/*n* available for analysis (%)	
Irish	16/22 (73)
Eastern European	1/22 (5)
Asian	5/22 (23)
Comorbidities, *n*/*n* available for analysis (%)	
Diabetes	5/22 (23)
Obesity	12/22 (55)
Hypertension	11/22 (50)
Smoking	3/22 (14)
Chronic obstructive pulmonary disease	0/22 (0)
Asthma	3/22 (14)
Ischemic heart disease	3/22 (16)
Congestive heart failure	0/22 (0)
Alcohol excess	1/22 (5)
Mean frailty score (SD)	2.6 (0.6)

Median cumulative daily doses of propofol, fentanyl, midazolam, dexmedetomidine, and morphine were high by comparison with previous reports for ventilated ICU patients. More than half of the patients required muscle paralysis for a median of 3 days (IQR, 0–25 d). Fifty-five percent of the patients experienced proning complications. The most common complications were ulcers, neuropathic pain, paresthesia, and foot drop.

PICS Follow-Up Clinic

Laboratory Data. There was no significant difference in patient hemoglobin and serum creatinine between ICU admission and the PICS follow-up clinic 6 months later (**Table 2**). Inflammatory markers including CRP, procalcitonin, IL-6, ferritin, lactate dehydrogenase, D-dimer, and fibrinogen were all significantly lower at the PICS follow-up clinic compared with their values at ICU admission ($p < 0.05$). Mean low-density lipoprotein had significantly increased from 1.4 to 2.8 mmol/L between ICU admission and the PICS follow-up clinic ($p < 0.05$).

Physical Measures. Eighty-six percent of patients at the PICS clinic ($n = 19$) had returned to their baseline level of mobility, while 14% ($n = 3$) were relying on a new mobility aid since their discharge from hospital (**Table 3**). Ninety-six percent of the cohort ($n = 21$) had been independently mobile prior to ICU admission with COVID-19 pneumonitis. Patients walked an average of 359 meters during the 6-minute walk test (compared with a healthy population average of 571 meters [11]) with an average highest Borg Rating of Perceived Exertion score of 2 indicating a "slight" amount of breathlessness on exertion (12). Eighty-six percent ($n = 19$) had no oxygen desaturation during the 6-minute walk test. Nine percent of patients ($n = 2$) were using ambulatory oxygen that required an increase in support to maintain oxygen saturations and one patient declined oxygen therapy.

Mean grip strength was relatively low at 24.1 pounds (SD 9.8 pounds) (13) with a low median MET of 970 METs/wk (IQR, 0–7,794 METs/wk) based on the IPAQ-SF (14). Three patients (14%) reported health-enhancing physical activity active physical activity levels greater than 3,000 METs/wk. Nine patients (41%) reported minimally active physical activity levels greater than 600 METs/wk. Ten patients (46%) had physical activity levels per week defined as inactive by the IPAQ-SF.

Eleven patients (50%) were referred to a community-based pulmonary rehabilitation program due to low levels of exercise tolerance. Three patients (14%) were referred to the ambulatory oxygen clinic due to ongoing oxygen desaturation on exertion. Six patients (27%) were referred for outpatient musculoskeletal physiotherapy review given shoulder dysfunction from proning ($n = 3$), foot weakness ($n = 2$), and back/hip pain ($n = 1$) following discharge from the ICU. Two patients (9%) required ongoing physiotherapy including neuro, aquatic, and musculoskeletal rehabilitation.

TABLE 2.
Laboratory Data

Laboratory Parameter, mean (SD)	At Admission to ICU	At 6-mo Post-Intensive Care Syndrome Follow-Up Clinic	*p*
Hemoglobin, g/dL	12.8 (2.1)	13.5 (2.1)	> 0.05
Creatinine, mmol/L	84 (72)	81 (31.5)	> 0.05
C-reactive protein, mg/L	147.9 (94.3)	3.8 (2.2)	< 0.05
Procalcitonin, ng/mL	2.6 (7.4)	< 0.01 (0)	< 0.05
Interleukin-6, pg/mL	282.9 (77)	4.6 (2)	< 0.05
Ferritin, µg/L	1,699 (1,491)	85 (82.9)	< 0.05
Lactate dehydrogenase, U/L	530.7 (314.3)	197.1 (45.1)	< 0.05
Troponin, ng/L	49.2 (51.5)	40.4 (57.5)	> 0.05
D-dimer, µg/mL	2.3 (1.5)	0.4 (0.2)	< 0.05
Low-density lipoprotein, mmol/L	1.4 (0.8)	2.7 (1.2)	< 0.05
High-density lipoprotein, mmol/L	0.8 (0.3)	1.4 (0.4)	< 0.05
Fibrinogen, g/L	6.1 (1.1)	3.7 (0.8)	< 0.05

TABLE 3.

Physical measure	Result
Mean ICU Mobility Scale score, SD	9.8 (0.4)
Mean grip strength (SD), kg	24.1 (9.8)
Mobility type, *n*/*n* available for analysis (%)	
Independent	18/22 (82)
Crutches	1/22 (5)
Rollator	1/22 (5)
Walking frame	2/22 (9)
Mean 6-min walk test (SD), meters	359.4 (122.1)
Mean lowest Borg Scale reading (SD)	0.48 (0.9)
Mean highest Borg Scale reading (SD)	2 (1.8)
Median highest Sao_2[a] (IQR), %	97.8 (96–100)
Median lowest Sao_2[a] (IQR), %	93.4 (96–100)
Median metabolic equivalents per week (IQR)	970 (0–7,794)
Physical activity type, *n*/*n* available for analysis (%)	
High	4/22 (18)
Moderate	8/22 (36)
Low	10/22 (16)

Borg = Borg Rating of Perceived Exertion, IQR = interquartile range, Sao_2 = arterial oxygen saturation.
[a]Oxygen saturations reported include both those measured on room air and on supplemental oxygen therapy for patients who were dependent on this ($n = 2$).

Psychosocial Assessment. Only 59% of patients were independent with regard to their activities of daily living (**Table 4**). Eight of 14 patients (57%) had returned to work by 6 months post-ICU discharge. Neither sex ($\chi^2 = 0.16$; $p = 0.69$), ethnicity ($\chi^2 = 1.11$; $p = 0.29$), social support ($\chi^2 = 2.68$; $p = 0.26$), nor occupation pre-ICU ($\chi^2 = 1.90$; $p = 0.39$) was significantly associated with return to work post-ICU discharge. The mean MoCA score for patients attending the 6 months PICS follow-up clinic was 24 (SD 8.4), which is suggestive of mild cognitive impairment (15). They had a mean FSS score of 36.1 (SD 16.4) (16). Participants had a mean PHQ-9 score of 7.8 (SD 7.4), that is, indicative of a mild level of depression (17). The mean score on GAD-7 was 5.8 (SD 6.1) indicating mild anxiety (18). Their mean IPAT score was 6.6 (SD 4.6); scores of above 7 on this tool are considered to be "at risk" (19). Mean PCL-5 score of 21.1 (SD 17.5) was below the cutoff score of 33 suggesting subthreshold PTSD signs on aggregate (20). There was no significant correlation between the change in inflammatory markers from ICU admission to clinic assessment and any of the physical or psychologic measurements taken during the clinic assessment (**Supplemental Table S2**, http://links.lww.com/CCX/A991).

Multivariable Regression Model for PICS Outcomes

In a multivariable model including age, sex, body mass index (BMI), ethnicity, diabetes, hypertension, smoking, frailty score, ICU length of stay, Acute Physiology and Chronic Health Evaluation (APACHE) II score, admission Sequential Organ Failure Assessment (SOFA) score, admission P/F ratio, and the total number of proning sessions, only APACHE II score was significantly independently associated with MoCA score as a cognitive PICS outcome (beta-coefficient, –1.6; SE, 0.6; $p = 0.04$). None of the predictor variables were significantly independently associated with IPAT and PCL-5 as psychologic outcomes, nor with IPAQ-SF as a physical PICS outcome (**Table 5**).

Given our relatively small sample size, we ran an additional multivariable regression analysis with a smaller number of predictor variables, including risk factors of key interest such as ICU length of stay and proning, as a sensitivity analysis to assess the effect of this smaller model on the PICS outcomes in question. In a multivariable model including age, sex, BMI, ethnicity, ICU length of stay, APACHE II score, admission SOFA score, and the total number of proning sessions, only APACHE II score was significantly independently associated with MoCA score as a cognitive PICS outcome (beta-coefficient, –1.1; SE, 0.5; $p = 0.04$). None of the predictor variables were significantly independently associated with IPAT and PCL-5 as psychologic outcomes, nor with IPAQ-SF as a physical PICS outcome (**Supplemental Table S3**, http://links.lww.com/CCX/A991).

DISCUSSION

In this single-center prospective cohort study, we established a PICS follow-up clinic at 6 months post-ICU for patients who survived COVID-19 pneumonitis. The majorities of patients in our cohort were male, obese, and had medical comorbidities including hypertension, diabetes mellitus, and ischemic heart disease. The majority of patients underwent invasive mechanical ventilation during their admission and 59% were proned. Only APACHE II score was a significant predictor variable for risk of a lower MoCA score as a PICS cognitive

TABLE 4.
Psychologic, Social, and Cognitive Assessment

Psychosocial assessment	Result
Social	
Type of support for activities of daily living, *n*/*n* with data available (%)	
Independent	13/22 (59)
Assistance	7/22 (32)
Dependent	2/22 (9)
Type of occupation, *n*/*n* with data available (%)	
Full-time employment	14/22 (74)
Retired	6/22 (27)
Student	2/22 (11)
Number who have returned to work postdischarge	8/14 (57)
Cognitive	
Mean Montreal Cognitive Assessment score (SD) (range)	24 (8.4) (0–29)
Psychologic	
Mean Fatigue Severity Scale score (SD) (range)	36.1 (16.4) (0–36.1)
Mean Patient Health Questionnaire-9 score (SD) (range)	7.8 (7.4) (0–25)
Mean Generalized Anxiety Disorder Assessment-7 score (SD) (range)	5.8 (6.1) (0–21)
Mean Intensive Care Psychological Assessment Tool score (SD) (range)	6.6 (4.6) (0–19)
Mean Post-Traumatic Stress Disorder Checklist for DSM-5 score (SD) (range)	21.1 (17.5) (4–71)

DSM-5 = Diagnostic and Statistical Manual of Mental Disorders, 5th Edition.

outcome at the 6-month PICS clinic follow-up; in keeping with other large prospective observational cohort studies showing that higher illness severity scores such as APACHE II were associated with worse long-term cognitive outcomes for patients postcritical illness (21, 22). Our 6-month follow-up PICS clinic data showed that patients have a high burden of physical and psychologic impairment following ICU discharge post-COVID-19 pneumonitis; in many cases requiring specialist medical, psychologic, and rehabilitation referrals for long-term input.

Our results reflect a growing body of evidence showing that survivors of ICU admission for COVID-19 pneumonitis have significant physical, psychologic, and cognitive impairments requiring medium- to long-term specialist follow-up in up to 48% of cases (23). Despite this, prior to the COVID-19 pandemic, only 30% of ICUs in the United Kingdom and no ICUs in Ireland provided outpatient follow-up (24). Although randomized controlled trial data in this field have been limited with no strong evidence for benefit from PICS clinics, observational data suggests a clear benefit; with multidisciplinary teams associated with longitudinal improvements in patient outcomes at 2.5-month intervals (25). A recent meta-analysis showed that post-ICU follow-up models focusing on physical therapy were associated with fewer depression symptoms and better mental health-related quality of life scores, while post-ICU follow-up models that focused on psychologic or medical management interventions were associated with fewer PTSD symptoms in the medium term (4). No clear guidelines currently exist to guide how PICS clinics should be structured in terms of professionals, patient eligibility, timing, and duration of follow-up and criteria for specialist referral (2). There is also a potential important role for the PICS clinic in improving the transition from in-hospital care to community management, particularly with regard to interoperability of information sharing (26). We had the opportunity to address this through early written communication with patient primary care physicians directly following the PICS clinic, often supplemented with verbal communication as needed. Another potential benefit to PICS clinics is to facilitate patient return to work following recovery from COVID-19 infection, given that joblessness is common post-ICU admission (27). Follow-up of ICU survivors decreased the annual health

TABLE 5.
Multivariable Regression Models for Effect of Clinical and Demographic Variables on Post-Intensive Care Syndrome Outcomes

Post-Intensive Care Syndrome Outcome	Montreal Cognitive Assessment Score		Intensive Care Psychological Assessment Tool Score		Post-Traumatic Stress Disorder Checklist for DSM-5 Score		International Physical Activity Questionnaire-Short Form Score	
Predictor	**β (SE)**	***p***	**β (SE)**	***p***	**β (SE)**	***p***	**β (SE)**	***p***
Age	0.36 (0.18)	0.1	−0.03 (0.15)	0.87	−0.5 (0.5)	0.37	39.7 (67.8)	0.58
Sex	9.25 (7.7)	0.28	−3.9 (6.5)	0.57	22.6 (23.9)	0.38	−2,941 (2,882)	0.34
Body mass index	−0.09 (0.5)	0.86	0.01 (0.37)	0.98	−1.8 (1.3)	0.21	96.8 (163.2)	0.57
Ethnicity	−7.32 (4.7)	0.18	2.5 (3.3)	0.47	−1.1 (13.1)	0.94	−1,045 (1,460)	0.5
Diabetes	6.7 (10.7)	0.56	−4.6 (8)	0.58	10.8 (27.1)	0.7	−1,875 (3,540)	0.5
Hypertension	1.1 (5.9)	0.86	−2.1 (4.7)	0.67	−15.9 (15.6)	0.35	3,496 (2,076)	0.14
Smoking	3.9 (7.2)	0.61	4.4 (6)	0.49	−12.8 (20.3)	0.55	1,998 (2,672)	0.48
Frailty score	−0.87 (6.5)	0.9	−0.66 (5.8)	0.91	8.5 (19.5)	0.68	−2,943 (2,586)	0.29
ICU length of stay	0.18 (0.25)	0.5	−0.09 (0.2)	0.91	0.06 (0.76)	0.94	−43 (98)	0.68
Acute Physiology and Chronic Health Evaluation II score	−1.6 (0.6)	0.04	−0.32 (0.5)	0.56	−0.6 (4.1)	0.23	−51.6 (228)	0.83
Admission Sequential Organ Failure Assessment score	0.32 (1.5)	0.84	−0.7 (1.2)	0.57	−5.4 (4.1)	0.23	1.3 (525)	1.00
Admission Pao_2/Fio_2 ratio	−0.5 (0.29)	0.14	0.35 (0.25)	0.2	0.5 (2.8)	0.87	−69.9 (110)	0.55
Total proning sessions	0.18 (0.98)	0.87	0.01 (0.84)	0.99	0.5 (2.8)	0.87	−42.6 (373.8)	0.91

DSM-5 = Diagnostic and Statistical Manual of Mental Disorders, 5th Edition.

cost by 60–65% in a single center due to decreased cost of care per patient if they required readmission in the year post-ICU stay (28).

The strength of our study is to prospectively describe the burden of physical, psychologic, and cognitive need of a group of ICU survivors at 6 months postadmission for COVID-19 pneumonitis from the first wave of the global pandemic. We have described the demographic, clinical, biochemical, and rehabilitation status of a growing group of patients with clear medium- and long-term needs in the wake of an ongoing pandemic and a disease whose long-term effects are still being fully elucidated at present. We provided multidisciplinary team outpatient follow-up for ICU survivors for the first time in our academic tertiary referral center and plan to follow-up this group again in 6 months' time for ongoing input. We provided timely referrals for these patients to specialist and community teams as a result of these 6-month clinic assessments as well as early written communications for patient primary care physicians.

Limitations to our study include patient loss to follow-up in some cases despite best efforts to maintain communication by the clinic research nurse coordinator and medical team. Our sample size was relatively small, and we did not have baseline cognitive, psychologic, and physical measurements for these patients to compare with the results of our first PICS follow-up clinic. However, we have used epidemiological data where appropriate to guide patient progress in this regard. We also recognize that patients treated very early during the COVID-19 pandemic likely received significantly different care to the current standard of care for ICU management of COVID-19 pneumonitis and that this may have affected the PICS outcomes observed. At present, we are only resourced to provide PICS follow-up for COVID-19 survivors every 6 months due to availability of all members of the multidisciplinary team. We are not yet able to extend the PICS clinic to non-COVID ICU survivors but aim to do so if our ongoing results from further follow-up clinics at 6

months intervals continue to show benefit in terms of patient outcomes and health system utilization.

CONCLUSIONS

In this single-center prospective cohort study, we established a PICS follow-up clinic at 6 months post-ICU for patients who survived COVID-19 pneumonitis. Our 6-month follow-up PICS clinic data showed that patients have a high burden of physical and psychologic impairment following ICU discharge post-COVID-19 pneumonitis; in many cases requiring specialist medical, psychologic, and rehabilitation referrals for long-term input. We eagerly await the results of our 12-month PICS follow-up clinic and advocate for increased resources for this much needed follow-up multidisciplinary intervention for an ever-growing population of patients.

1 *Department of Critical Care, Tallaght University Hospital, Dublin, Ireland.*

2 *Department of Nephrology, Hospital Clinic de Barcelona, Barcelona, Spain.*

3 *Department of Psychology, Tallaght University Hospital, Dublin, Ireland.*

4 *Department of Physiotherapy, Tallaght University Hospital, Dublin, Ireland.*

5 *School of Psychology at Trinity College Dublin, Dublin, Ireland.*

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For information regarding this article, E-mail: yvkelly@tcd.ie

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