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Characteristics of Post-ICU and Post-COVID Recovery Clinics in 29 U.S. Health Systems

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OBJECTIVES: The multifaceted long-term impairments resulting from critical illness and COVID-19 require interdisciplinary management approaches in the recovery phase of illness. Operational insights into the structure and process of recovery clinics (RCs) from heterogeneous health systems are needed. This study describes the structure and process characteristics of existing and newly implemented ICU-RCs and COVID-RCs in a subset of large health systems in the United States.

DESIGN: Cross-sectional survey.

SETTING: Thirty-nine RCs, representing a combined 156 hospitals within 29 health systems participated.

PATIENTS: None.

INTERVENTIONS: None.

MEASUREMENT AND MAIN RESULTS: RC demographics, referral criteria, and operating characteristics were collected, including measures used to assess physical, psychologic, and cognitive recoveries. Thirty-nine RC surveys were completed (94% response rate). ICU-RC teams included physicians, pharmacists, social workers, physical therapists, and advanced practice providers. Funding sources for ICU-RCs included clinical billing ($n = 20$, 77%), volunteer staff support ($n = 15$, 58%), institutional staff/space support ($n = 13$, 46%), and grant or foundation funding ($n = 3$, 12%). Forty-six percent of RCs report patient visit durations of 1 hour or longer. ICU-RC teams reported use of validated scales to assess psychologic recovery (93%), physical recovery (89%), and cognitive recovery (86%) more often in standard visits compared with COVID-RC teams (psychologic, 54%; physical, 69%; and cognitive, 46%).

CONCLUSIONS: Operating structures of RCs vary, though almost all describe modest capacity and reliance on volunteerism and discretionary institutional support. ICU- and COVID-RCs in the United States employ varied funding sources and endorse different assessment measures during visits to guide care coordination. Common features include integration of ICU clinicians, interdisciplinary approach, and focus on severe critical illness. The heterogeneity in RC structures and processes contributes to future research on the optimal structure and process to achieve the best postintensive care syndrome and postacute sequelae of COVID outcomes.

KEY WORDS: administration; healthcare delivery; postacute sequelae of COVID-19; postintensive care syndrome; severe acute respiratory syndrome coronavirus-2

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Critical illness and COVID-19 infection are associated with prolonged clusters of cognitive, physical, and psychologic impairments identified as postintensive care syndrome (PICS) and postacute sequelae of severe acute respiratory syndrome coronavirus 2 infection (PASC; i.e., long COVID), respectively. As many as 65% of ICU survivors experience some combination of executive function impairment or memory impairment, depression, and physical disability (1). Similarly, PASC, including cognitive dysfunction (e.g., brain fog), fatigue, and postexertional malaise are experienced by up to 70% of patients hospitalized with COVID-19 (2, 3). There are striking similarities between PICS and PASC.

Long-term impairments following critical illness and/or COVID-19 infection burden public health and society by increasing healthcare utilization, creating new disability, and impacting financial health and return to work, among others (1, 4–6). The multifaceted long-term impairments resulting from critical illness and COVID-19 can be addressed via interdisciplinary management approaches to follow-up assessments. ICU recovery clinics (ICU-RCs) serve to screen, diagnose, refer, and manage critical illness survivors and have been operational in a subset of U.S. health systems with a modest adoption rate prior to the COVID-19 pandemic (7, 8). Amid COVID-19, many ICU-RCs adapted to the care of COVID-19 survivors. Additionally, several COVID-19 recovery clinics (COVID-RCs) were initiated de novo, often built on the framework of interdisciplinary outpatient care that characterizes ICU-RCs.

The Critical and Acute Illness Recovery Organization (CAIRO) Post-ICU Clinic Collaborative, a successor to the Society of Critical Care Medicine Thrive Post ICU Clinic Collaborative, is a global collaborative of interdisciplinary clinicians. CAIRO members collaborate to analyze and address critical and acute illness recovery outcomes, cultivate best practices and exemplars for critical illness survivor recovery care, and disseminate information to inform uptake of post-acute recovery care programs. The work of the collaborative has resulted in descriptions of the structure and process for RC operations and delivery of services (9), which can guide processes for new clinics and inform RC best practices. The purpose of this cross-sectional study is to describe the structure and process characteristics of existing and newly implemented ICU-RCs and COVID-RCs in CAIRO Collaborative sites in the United States.

MATERIALS AND METHODS

We conducted a cross-sectional descriptive study using quantitative survey methods in accordance with Strengthening the Reporting of Observational studies in Epidemiology guidelines (10). Institutional Review Board (IRB) exemption status was obtained from The University of Texas at Austin IRB (2019-05-0132).

Setting and Sample

Participants were recruited from the CAIRO Collaborative (11), which includes global membership from seven countries representing 39 health systems operating an ICU-RC and/or COVID-RC, including 31 health systems in the United States. Only U.S. site results are included. Health systems engaged in CAIRO span every region of the United States, are largely academic, and operate at least one Post-ICU or Post-COVID-RC. Key clinic personnel from each collaborative site were asked to complete one survey for each RC in their institution. Responses from CAIRO Collaborative members within the United States are reported.

Variables and Measures

A 36-item investigator-developed web-based survey was designed to characterize Post-ICU and COVID-RCs. Survey items were developed by CAIRO leaders and RC directors within the collaborative through an iterative process of pilot testing, discussion, deliberation, and consensus with representation spanning critical care medicine, critical care nursing, critical care pharmacy, respiratory care, and health services administration. The survey solicits structure and process measures, including clinic start dates, patient referral sources, patient eligibility criteria, and an assessment of tools and measures used by RC teams to assess functional, psychologic, and cognitive recoveries as well as caregiver and quality-of-life assessments (**Supplemental Table 1**, http://links.lww.com/CCX/A945).

Procedures

The voluntary survey was sent to CAIRO collaborative members in March 2021 via emailed electronic survey link. One reminder e-mail was sent 1 week following initial survey distribution. Study data were collected and managed via the Research Electronic Data Capture tools hosted at Vanderbilt University (12).

Analysis

Responses from health systems and hospitals were analyzed descriptively to summarize RC demographics, operating structures, and clinical practice processes. Frequency distributions were used to summarize nominal and ordinal data. We reported responses to each question as the proportion of total U.S. sites.

Proportions are computed on known values; thus, missing data are removed from denominators. We used the chi-square or Fisher test, where appropriate, for comparing proportions and Wilcoxon rank-sum test to compare distributions. We summarized continuous variables using median values and interquartile range. All tests were two-sided with *p* values of less than 0.05 for significance.

RESULTS

A total of 39 RC surveys were completed by 29 CAIRO Collaborative sites in the United States (94% response rate) representing a combined 156 hospitals within 29 health systems. Characteristics of 26 ICU-RCs and 13 COVID-RCs are presented in **Table 1**. Responses from ICU-RC sites represent 133 hospitals in 26 health

TABLE 1.
Recovery Clinic Characteristics.

Variables	ICU Recovery Clinic, *n* = 26, *n* (%)	COVID Recovery Clinic, *n* = 13, *n* (%)	*p*
Number of hospitals, median (IQR) [range][a]	4 (6) [1–21]	4 (10) [1–26]	0.89
Years of operation, median (IQR) [range][a]	1.7 (2.5) [0.8–9.7]	0.7 (0.8) [0.0–1.0]	0.00
U.S. region[a]			
Northeast	8 (31)	5 (38)	0.68
Midwest	7 (27)	1 (8)	
South	6 (23)	3 (23)	
West	5 (19)	4 (31)	
Referral criteria[b]			
All ICU admissions	7 (27)	5 (38)	0.49
Mechanical ventilation	21 (81)	4 (31)	0.01
No minimum	11 (42)	5 (38)	
24 hr	2 (8)	0 (0)	
48 hr	5 (19)	0 (0)	
> 72 hr	4 (15)	0 (0)	
Sepsis or shock	16 (62)	3 (23)	0.05
Delirium	15 (58)	2 (15)	0.04
Extracorporeal membrane oxygenation	15 (58)	2 (15)	0.02
Trach or percutaneous endoscopic gastrostomy	12 (46)	3 (23)	0.48
Physician referral	17 (65)	3 (23)	0.05
COVID-19 all care levels	4 (15)	10 (77)	0.00
Other referral criteria[c]	4 (15)	2 (15)	1.00
Patient referral sources[b]			
Referral at ICU discharge	17 (65)	6 (46)	0.31
Referral at hospital discharge	19 (73)	5 (38)	0.08
Outpatient referral via primary care	15 (58)	10 (77)	0.30
Outpatient referral via specialist	14 (54)	9 (69)	0.50
Self-referral via social media	3 (12)	3 (23)	0.38
Self-referral general	13 (50)	6 (46)	1.00

IQR = interquartile range.
[a]χ^2 (two-sided).
[c]Other referral criteria: social determinants of health, surgical ICU survivors, respiratory failure requiring high-flow nasal cannula, mechanical ventilation >4 d, and fragility.
[b]Fisher exact test (two-sided).

systems, and responses from COVID-RC sites represent 84 hospitals in 13 health systems.

The operational capacity for participating RCs is presented in **Table 2**. The majority (69%) of RCs are in large metropolitan areas. However, 80% of RCs reported offering telehealth clinic visits, thus extending the geographic reach beyond these large metropolitan hubs. Most RC sites (73%) serve health systems that include both large academic medical centers and smaller community hospitals (range, 2–26 hospitals per health system), suggesting that one clinic serves both urban and rural populations for that health system.

ICU-RC Demographics and Operating Structures

The number of ICU-RCs affiliated with the CAIRO Collaborative has increased steadily since 2016, with the highest number of new center members joining in 2020 (**Figs. 1** and **2**). In 2020, 10 participating ICU-RCs were started in direct response to the COVID-19 pandemic. The most common ICU-RC referral criteria are critical illness requiring an ICU stay and, specifically, target patients who received mechanical ventilation (Table 1). Eighty-five percent of ICU-RCs offer telehealth-enabled access to patients (Table 2). The most common services in the ICU-RC were physical assessment (100%), global needs assessment (85%), behavioral health referral (85%), cognitive assessment (77%), ICU debrief (77%), and communication with primary care (77%).

RC services are detailed in **Table 3**. In addition to physicians, teams included pharmacists (81%), social worker or case manager (58%), physical therapists (54%), and advanced practice providers (46%). Funding sources for ICU-RC operations included clinical billing (n = 20, 77%), volunteer staff support (n = 15, 58%), institutional staff/space support (n = 13, 46%), and grant or foundation funding (n = 3, 12%). One-third of ICU-RC sites report that both staff salaries and physical space allocations are supported by institutional funding. Only three of 26 ICU-RCs reported philanthropic funding and/or research grant funding as contributory to clinic operations. Most ICU-RC clinic visits were 31–120 minutes in duration (n = 19, 73%), with the remainder reporting visits greater than 2 hours (n = 6, 23%).

COVID-RC Demographics and Operating Structures

In COVID-RCs, internal medicine physicians (54%) were prominent members of the clinic team in combination with other disciplines (8–31%) to support a screen-and-refer model. In contrast to services in ICU-RCs, the most common COVID-RC services, after medication reconciliation, were immunization review (54%), care coordination (54%), physical assessment (46%), and sleep/pulmonary referral (46%). As of March 2021, 41% (n = 11) of participating U.S.-based CAIRO member health systems were concurrently supporting both an ICU-RC and COVID-RC. In contrast to ICU-RCs, 92% (n = 12) of COVID-RC operations were funded by clinical billing, with only 38% (n = 5) funded by institutional staff/space support and 31% (n = 4) from volunteer staff support. Clinic appointments were offered an average of 4 days per month with most available for 4–8 hours per clinic day. COVID-RC visits tended to be shorter in duration with the majority being less than or equal to 60 minutes (n = 8, 62%).

Assessments and Measures Used Within Recovery Clinics

ICU-RC teams reported use of validated tools and scales (**Supplemental Table 2**, http://links.lww.com/CCX/A946) to assess psychologic recovery (93%), physical recovery (89%), and cognitive recovery (86%) more often in standard visits compared with COVID-RC teams (psychologic, 54%; physical, 69%; and cognitive, 46%). Tools and scales to assess quality of life and/or care coordination are more prevalent as part of ICU-RC processes compared with those used in COVID-RCs (50% vs 15%).

The Patient Health Questionnaire-9 (PHQ-9) was the most reported psychologic measure in both ICU-RC (57%) and COVID-RC (46%). Assessment and measure of physical recovery included functional exercise capacity (6-min walk test), Activities of Daily Living, and breathlessness (dyspnea scale). The most used cognitive recovery assessment tool was the Montreal Cognitive Assessment (MoCA) or the MoCA-Blind, used by 82% of ICU-RC teams and 38% of COVID-RC teams.

Almost half of participating centers (n = 42%, n = 11) used quality-of-life measures in the context of an ICU-RC, with most sites (42%) using the European Quality of Life Five Dimension. Psychometrically validated measures for caregiver assessment (Zarit burden interview; Hospital Anxiety and Depression Scale [HADS] for caregiver) were not systematically embedded within COVID-RCs but were present in a subset of ICU-RCs (14%).

TABLE 2.
Recovery Clinic Team and Operations

Variables	ICU Recovery Clinic, $n = 26$, n (%)	COVID Recovery Clinic, $n = 13$, n (%)	p
Clinic visit delivery mode[a]			
Telehealth only	4 (15)	2 (15)	1.00
In-person clinic visit only	4 (15)	2 (15)	1.00
In-person clinic visit and/or telehealth	18 (69)	10 (77)	1.00
Number of clinic days per month, median (interquartile range) [range][b]	4 (2) [1–8]	4 (12) [1–20]	0.05
Clinic day operating hours[b]			
<4 hr	5 (19)	3 (23)	0.47
4 hr per day	10 (38)	6 (46)	
5–8 hr per day	10 (38)	3 (23)	
Visit duration per patient[b]			
≤ 30 min	0 (0)	1 (8)	0.09
31–60 min	10 (38)	7 (54)	
1–2 hr	9 (35)	3 (23)	
> 2 hr	6 (23)	0 (0)	
Clinic funding sources[c]			
Clinical billing	20 (77)	12 (92)	
Volunteer staff support	15 (58)	4 (31)	
Institutional staff/space support	13 (46)	5 (38)	
Grant or foundation funding	3 (12)	0 (0)	
Clinic team composition[c]			
Internal medicine	2 (8)	7 (54)	
Critical care/pulmonary	24 (92)	10 (77)	
Physical medicine and rehabilitation	5 (19)	4 (31)	
Advanced practice provider	12 (46)	4 (31)	
Registered nurse	11 (42)	3 (23)	
Pharmacist	21 (81)	4 (31)	
Respiratory therapist	9 (35)	2 (15)	
Physical therapist	14 (54)	4 (31)	
Speech-language pathologist	2 (8)	0 (0)	
Registered dietitian	4 (15)	1 (8)	
Social work or case management	15 (58)	3 (23)	
Psychiatrist	6 (23)	4 (31)	
Psychologist	6 (23)	3 (23)	
Geriatrician	2 (8)	2 (15)	
Palliative care	1 (4)	1 (8)	

[a]Fisher exact test (two-sided).
[b]χ^2 (two-sided).
[c]Multiple responses selected.

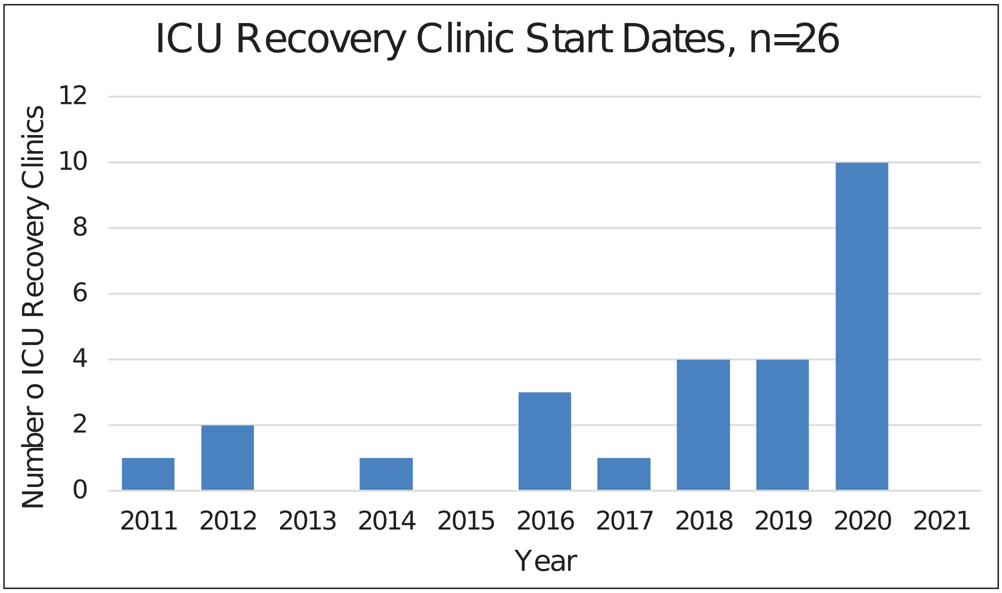

Figure 1. ICU Recovery Clinic start dates. *Blue* refers to ICU Recovery Clinic.

DISCUSSION

New sepsis guidelines (13), international PICS consensus recommendations (14), and rapidly emerging COVID-19 recovery insights (2, 4, 15) contribute to the urgency and scope of demand for evidence-based implementation and operation of RCs. Health systems operating ICU-RCs to assess and treat community-dwelling ICU survivors with clusters of cognitive, physical, and psychologic impairments have largely served as a care delivery model for newly created COVID-RCs in the United States (15). Both ICU-RCs and COVID-RCs are structured with interdisciplinary teams that include ICU clinicians, are generally offered once per week, and have some reliance on volunteer staff and institutional support to operate. However, ICU-RC and COVID-RC respondents report different approaches to team structure and assessments for physical, psychologic, and cognitive recoveries during visits. In partnership with contextual considerations,

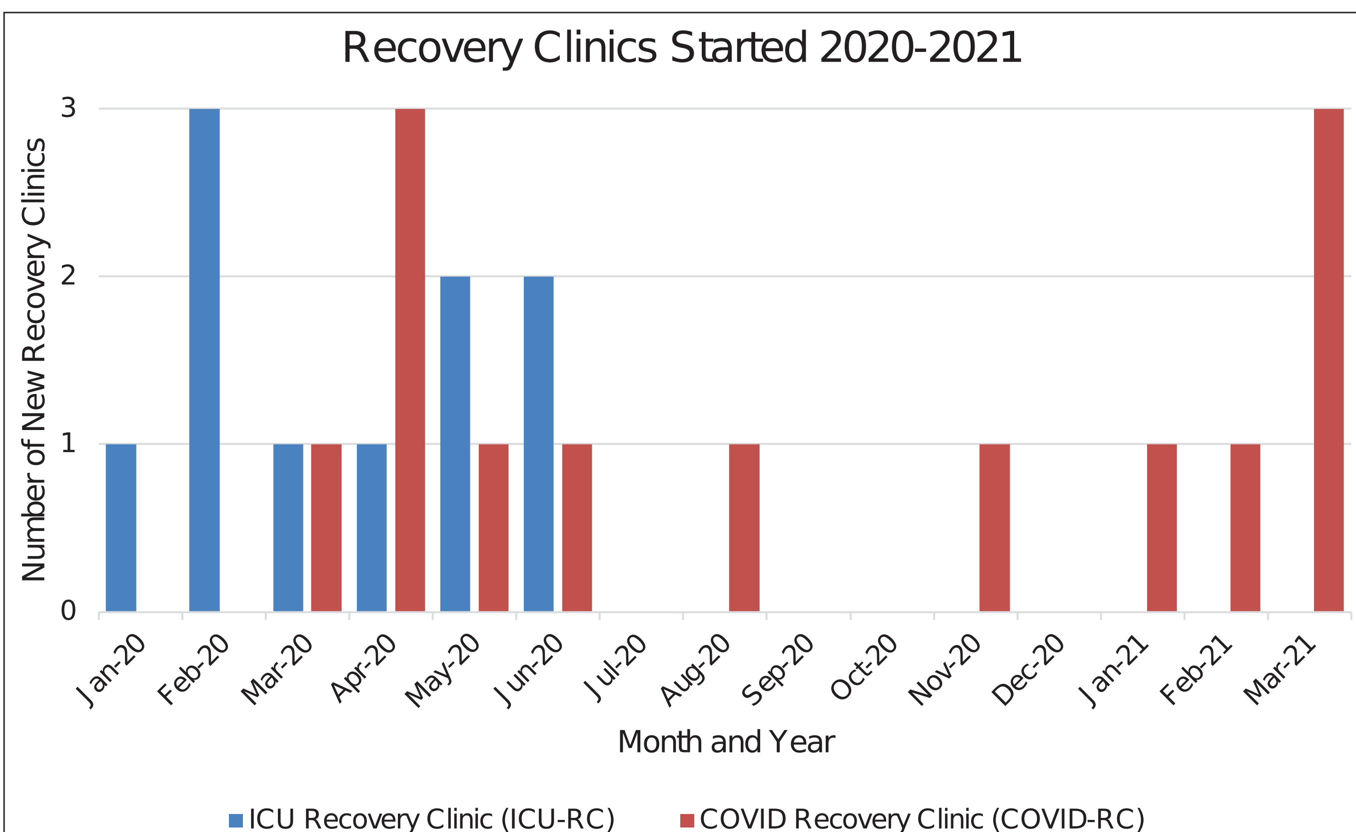

Figure 2. ICU Recovery Clinic (ICU-RC) and COVID Recovery Clinic (COVID-RC) start dates. *Blue* refers to ICU-RC, and *red* indicates COVID-RC.

TABLE 3.
Recovery Clinic Services

Variables	ICU Recovery Clinic, $n = 26$, n (%)	COVID Recovery Clinic, $n = 13$, n (%)
Physical assessment	26 (100)	6 (46)
Global needs assessment	22 (85)	4 (31)
Medication reconciliation	25 (96)	10 (77)
Immunization review	15 (58)	7 (54)
Respiratory function assessment	16 (62)	4 (31)
Sleep/pulmonary referral	19 (73)	6 (46)
Cognitive assessment and/or referral	20 (77)	5 (38)
Care coordination	19 (73)	7 (54)
Case management	9 (35)	2 (15)
Communication with primary care	20 (77)	5 (38)
Occupational function assessment and/or referral	17 (65)	4 (31)
Dysphagia assessment and/or referral	7 (27)	1 (8)
Speech assessment and/or referral	13 (50)	3 (23)
Rehab assessment and/or referral	11 (42)	4 (31)
ENT referral	18 (69)	4 (31)
Urology/sex medicine referral	4 (15)	2 (15)
Behavioral health referral	22 (85)	4 (31)
Caregiver assessment and support	10 (38)	2 (15)
Advanced care planning	6 (23)	1 (8)
Education distribution	17 (65)	3 (23)
Peer support	7 (27)	4 (31)
ICU debrief	20 (77)	3 (23)
ICU visit	7 (27)	2 (15)
ICU diary debriefing	5 (19)	2 (15)

our descriptive survey can contribute to best practice determinations and scaling of critical care resources for RCs (16). For example, there are capacity constraints inherent to clinic models supported with discretionary institutional funding of support services and operating with modest 1 day per week availabilities, compared with self-sustaining models tied to clinical billing enabling teams to operate according to patient volumes.

This sample represents RC leaders linked via a collaborative built for innovation, implementation, and knowledge-sharing specific to RCs for PICS and PASC. In alignment with this intentional diversity, we identified heterogeneity in ICU-RC and COVID-RC operation, team composition, referral criteria, and recovery assessment tools and measures. Clinic differences in structure and operational processes could reflect alignment with individual institutional needs and resource availability, including federal COVID-19 relief funds contributing to resource availability for COVID-RCs (17). The marked heterogeneity in application of recovery assessment tools could be related to our limited understanding and variability of PICS and PASC and an absence of evidence-based diagnostic and treatment guidelines (18, 19). For example, the phenotype of patients best suited to benefit from focused RC care is largely unclear, with varied criteria qualifying patients for referral. Persistent heterogeneity of measures can inhibit comparison and generalizability of results across diverse populations experiencing PICS and PASC (14). For example, depression is measured used four relevant, but different, psychometrically validated scales: HADS, PHQ-9, General Anxiety Disorder-7, and the Becks Depression Inventory. The use of common data elements for critical care research, including ICU-RC and COVID-RC services, could contribute to aggregating insights into postacute sequelae over time, accelerating intervention development, and testing in both populations.

The optimal ICU-RC and COVID-RC structures and processes to achieve best PICS and PASC outcomes are still unknown. Reports have highlighted the role of specific providers (e.g., pharmacist [20]), staffing rationales [21], and services (e.g., medication reconciliation [22]) within ICU-RCs. At present, ICU-RCs and COVID-RCs have been developed iteratively with local clinicians and patients tailoring RC structure and processes to regional context and constraint (23, 24), leading to heterogeneous clinic models and measures (14). Systematic and scoping reviews of the literature affirm diverse structures and interventions in ICU-RCs with mixed efficacy findings (7, 25, 26). At present, the deliverables of RCs in the US are largely undefined. Deliverables, such as the percentage of patients returning to the workforce, are not traditionally defined as metrics of success, nor listed as operational targets. Application of implementation frameworks and use of hybrid effectiveness-implementation trials (27) are needed to drive standardized ICU-RC and COVID-RC development, operation, and outcome measures. For example, pragmatic stepped-wedged cluster trials designed to evaluate long-term outcomes in the context of clinic delivery modes (e.g., telehealth) or clinical team composition could yield insights into intervention effectiveness via routine implementation. Finally, RC development and implementation should consider key factors identified to influence patient access and engagement (e.g., patient rurality and severity of illness) (28, 29) and, thus, clinic sustainability.

Demand for ICU-RC and COVID-RC services surged in 2020 to manage sequelae of both COVID-related and non-COVID-related acute and critical illness (15, 30). Recovery services to address the sequelae of critical illness need to be met with organized, funded care systems. In ICU-RC care, volunteer effort and in-kind institutional support are funding sources in more than 30% of the clinics. As RCs become more necessary for both post-ICU and COVID recovery cares, the prepandemic reliance of ICU-RCs on clinician and staff volunteerism and institutional support will adversely affect sustainability. Additionally, access to COVID-RC care is largely tied to clinical billing (92%, $n = 12$), highlighting access disparities for patients seeking care via self-pay. As the demand for both COVID-19 and non-COVID critical illness (31) recovery services increases, reliance on volunteerism and discretionary institutional support will not be sufficient. This patchwork approach contrasts with other developed healthcare systems, most notably in the United Kingdom, where structured follow-up after critical illness is embedded in national care guidelines (32).

The generalizability of our results is limited by the convenience sampling and selection bias specific to CAIRO Collaborative members in the United States. It is also possible that the information provided by some respondents could contain minor inaccuracies not fully reflective of the evolving structure and process of ICU-RC and COVID-RC. Despite the limitations, survey responses that were contributed are representative of 29 prominent health systems in the United States. Responses were granular and contribute to characterizing the current landscape. Insights into acute and critical care resources (16) are needed for this segment of vulnerable patients and families.

CONCLUSIONS

This description of the attributes of 39 RCs in 29 health systems contributes to characterizing the structure and process of both established and newly implemented RCs supporting post-ICU and post-COVID cares in the United States. Our sample sites employed various referral criteria and endorsed different assessment measures to guide care coordination and subsequent referrals. The operating structures also varied, though almost all describe modest capacity and reliance on volunteerism and discretionary institutional support. These data highlight the evolving postacute recovery care landscape in the COVID-19 era.

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REFERENCES

1. Marra A, Pandharipande PP, Girard TD, et al: Co-occurrence of post-intensive care syndrome problems among 406 survivors of critical illness. *Crit Care Med* 2018; 46:1393–1401
2. Nalbandian A, Sehgal K, Gupta A, et al: Post-acute COVID-19 syndrome. *Nat Med* 2021; 27:601–615
3. Huang C, Huang L, Wang Y, et al: 6-month consequences of COVID-19 in patients discharged from hospital: A cohort study. *Lancet* 2021; 397:220–232
4. McPeake JM, Henderson P, Darroch G, et al: Social and economic problems of ICU survivors identified by a structured social welfare consultation. *Crit Care* 2019; 23:153
5. Hauschildt KE, Seigworth C, Kamphuis LA, et al; National Heart, Lung, and Blood Institute (NHLBI) Prevention and Early Treatment of Acute Lung Injury (PETAL) Network: Financial toxicity after acute respiratory distress syndrome: A National Qualitative Cohort Study. *Crit Care Med* 2020; 48:1103–1110
6. Lone NI, Gillies MA, Haddow C, et al: Five-year mortality and hospital costs associated with surviving intensive care. *Am J Respir Crit Care Med* 2016; 194:198–208
7. Schofield-Robinson OJ, Lewis SR, Smith AF, et al: Follow-up services for improving long-term outcomes in intensive care unit (ICU) survivors. *Cochrane Database Syst Rev* 2018; 11:CD012701
8. Rosa RG, Ferreira GE, Viola TW, et al: Effects of post-ICU follow-up on subject outcomes: A systematic review and meta-analysis. *J Crit Care* 2019; 52:115–125
9. McPeake J, Hirshberg EL, Christie LM, et al: Models of peer support to remediate post-intensive care syndrome: A report developed by the Society of Critical Care Medicine thrive international peer support collaborative. *Crit Care Med* 2019; 47:e21–e27
10. von Elm E, Altman DG, Egger M, et al; STROBE Initiative: The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: Guidelines for reporting observational studies. *Lancet* 2007; 370:1453–1457
11. CAIRO Collaborative: Critical and Acute Illness Recovery Organization Collaborative. 2022. Available at: https://sites.google.com/umich.edu/cairo/home. Accessed January 19, 2022.
12. Harris PA, Taylor R, Thielke R, et al: Research electronic data capture (REDCap)–a metadata-driven methodology and workflow process for providing translational research informatics support. *J Biomed Inform* 2009; 42:377–381
13. Evans L, Rhodes A, Alhazzani W, et al: Executive summary: Surviving sepsis campaign: International guidelines for the management of sepsis and septic shock 2021. *Crit Care Med* 2021; 49:1974–1982
14. Mikkelsen ME, Still M, Anderson BJ, et al: Society of Critical Care Medicine's international consensus conference on prediction and identification of long-term impairments after critical illness. *Crit Care Med* 2020; 48:1670–1679
15. Parker AM, Brigham E, Connolly B, et al: Addressing the post-acute sequelae of SARS-CoV-2 infection: A multidisciplinary model of care. *Lancet Respir Med* 2021; 9:1328–1341
16. Vukoja M, Riviello E, Gavrilovic S, et al; CERTAIN Investigators: A survey on critical care resources and

practices in low- and middle-income countries. *Glob Heart* 2014; 9:337.e1–342.e1
17. Khullar D, Bond AM, Schpero WL: COVID-19 and the financial health of US hospitals. *JAMA* 2020; 323:2127–2128
18. Alwan NA: The road to addressing long covid. *Science* 2021; 373:491–493
19. Crook H, Raza S, Nowell J, et al: Long covid-mechanisms, risk factors, and management. *BMJ* 2021; 374:n1648
20. Stollings JL, Bloom SL, Wang L, et al: Critical care pharmacists and medication management in an ICU recovery center. *Ann Pharmacother* 2018; 52:713–723
21. Sevin CM, Jackson JC: Post-ICU clinics should be staffed by ICU clinicians. *Crit Care Med* 2019; 47:268–272
22. Stollings JL, Bloom SL, Huggins EL, et al: Medication management to ameliorate post-intensive care syndrome. *AACN Adv Crit Care* 2016; 27:133–140
23. Khan BA, Lasiter S, Boustani MA: The critical care recovery center: An innovative collaborative care model for ICU survivors. *Am J Nurs* 2015;115:24–31
24. Huggins EL, Bloom SL, Stollings JL, et al: A clinic model: Post-intensive care syndrome and post-intensive care syndrome-family. *AACN Adv Crit Care* 2016; 27:204–211
25. Williams TA, Leslie GD: Beyond the walls: A review of ICU clinics and their impact on patient outcomes after leaving hospital. *Aust Crit Care* 2008; 21:6–17
26. Lasiter S, Oles SK, Mundell J, et al: Critical care follow-up clinics: A scoping review of interventions and outcomes. *Clin Nurse Spec* 2016; 30:227–237
27. Barr J, Paulson SS, Kamdar B, et al: The coming of age of implementation science and research in critical care medicine. *Crit Care Med* 2021; 49:1254–1275
28. Mayer KP, Boustany H, Cassity EP, et al: ICU recovery clinic attendance, attrition, and patient outcomes: The impact of severity of illness, gender, and rurality. *Crit Care Explor* 2020; 2:e0206
29. Mayer KP, Parry SM, Kalema AG, et al: Safety and feasibility of an interdisciplinary treatment approach to optimize recovery from critical coronavirus disease 2019. *Crit Care Explor* 2021; 3:e0516
30. Santhosh L, Block B, Kim SY, et al: Rapid design and implementation of post-COVID-19 clinics. *Chest* 2021; 160:671–677
31. Kahn JM, Le T, Angus DC, et al; ProVent Study Group Investigators: The epidemiology of chronic critical illness in the United States*. *Crit Care Med* 2015; 43:282–287
32. NICE: Rehabilitation After Critical Illness in *Adults*. London, United Kingdom, National Institute for Health and Care Excellence, 2021