non–COVID-19 ARDS (11). Half of our cohort complained of shoulder pain. This warrants further investigation, given that 60% of our cohort underwent prone positioning during their hospital admission.

In summary, we report a high prevalence of lung function and functional impairment as well as substantial symptom burden in survivors of severe COVID-19 requiring mechanical ventilation. Detailed longitudinal studies are required to document the recovery trajectory of this group of individuals.

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### Table 1. Cutoff values for the measured parameters and codes of alarm used in the telemonitoring activity

| Measurement          | Cutoff Value Set off conditions                                                                 | Safety Cutoff Value Action                                                                 |
|----------------------|-------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|
| SpO₂                 | <95% or 3% drop as compared with patient baseline                                              | <90%                                                                                       |
| Heart rate, bpm      | ≤55 and ≥50 or ≥120 and <140                                                                  | <50 or ≥140                                                                              |
| Body temperature, °C | >38 and <39                                                                                   | ≥39                                                                                       |
| Respiratory rate     | ≥25 and <30                                                                                    | ≥30                                                                                       |
| Red                  | Two cutoff values met or one safety cutoff value met                                            | Telephone message to study physician for an immediate telephone check with the patient   |
| Yellow               |                                                                                                 | Check by physician (daily)                                                               |
| Gray                 | One cutoff value met                                                                            | Check by help desk for technical assistance                                              |
|                      |                                                                                                 |                                                                                           |

**Definition of abbreviations:** bpm = beats per minute; SpO₂ = oxygen peripheral arterial saturation.

### Table 2. Characteristics of the study population and study groups during hospitalization

| Age, mean (SD), yr | Study population (n = 87) | Observations (n) | Short Persistence Group (n = 36) | Long Persistence Group (n = 38) |
|--------------------|---------------------------|------------------|----------------------------------|-------------------------------|
| Sex, n (%)         | 69 (78.6)                 | 74               | 60.6 (13.5)                      | 58.9 (12.9)                   |
| Male               | 62 (71.3)                 | 74               | 25 (69.4)                        | 30 (78.9)                     |
| Female             | 25 (28.7)                 | 74               | 11 (30.6)                        | 8 (21.1)                      |
| Smoking history, n (%) | 31 (57.4)               | 47               | 9 (52.9)                         | 17 (56.7)                     |
| Never-smoker       | 21 (38.9)                 | 73               | 8 (47.1)                         | 11 (36.7)                     |
| Former smoker      | 2 (3.7)                   | 73               | 0 (0)                            | 2 (6.7)                       |
| Comorbidities, n (%) |                           |                  |                                  |                               |
| Cardiopathy        | 10 (11.9)                 | 73               | 3 (8.3)                          | 5 (13.5)                      |
| Pneumopathy        | 9 (10.8)                  | 72               | 5 (14.3)                         | 4 (10.8)                      |
| Arterial hypertension | 30 (35.7)            | 73               | 12 (33.3)                        | 14 (37.8)                     |
| Diabetes           | 5 (6)                     | 73               | 2 (5.6)                          | 3 (8.1)                       |
| Cancer             | 8 (9.5)                   | 73               | 3 (8.3)                          | 2 (5.4)                       |
| Chronic kidney failure | 3 (3.5)               | 74               | 1 (2.8)                          | 1 (2.6)                       |
| Symptoms at onset, n (%) |                       |                  |                                  |                               |
| Fever              | 66 (78.6)                 | 74               | 24 (66.7)                        | 32 (84.2)                     |
| Cough              | 17 (20.2)                 | 74               | 7 (19.4)                         | 8 (21.1)                      |
| Dyspnea            | 11 (13.1)                 | 74               | 4 (11.1)                         | 6 (15.8)                      |
| Anosmia            | 6 (7.1)                   | 74               | 4 (11.1)                         | 2 (5.3)                       |
| Ageusia            | 11 (13.1)                 | 74               | 6 (16.7)                         | 5 (13.2)                      |
| Vomiting           | 5 (6)                     | 74               | 1 (2.8)                          | 3 (7.9)                       |
| Diarrhea           | 6 (7.1)                   | 74               | 1 (2.8)                          | 4 (10.5)                      |
| CRP, mean (SD), mg/L | 88.7 (117.8)              | 71               | 80.4 (68.9)                      | 101.5 (156.9)                 |
| Oxygen treatment   | 55 (64.7)                 | 74               | 24 (66.7)                        | 25 (65.8)                     |
| HFNC               | 11 (12.9)                 | 74               | 1 (2.8)                          | 9 (23.7)                      |
| Noninvasive ventilation | 14 (12.9)            | 74               | 3 (8.3)                          | 7 (18.4)                      |
| ICU, n (%)         | 14 (16.5)                 | 74               | 4 (11.1)                         | 9 (23.7)                      |
| Admission to ICU   | 5 (5.9)                   | 74               | 1 (2.8)                          | 4 (10.5)                      |
| Endotracheal intubation |                |                  |                                  |                               |
| Pharmacological treatment, n (%) |           |                  |                                  |                               |
| Hydroxychloroquine | 76 (89.4)                 | 74               | 33 (91.7)                        | 33 (86.8)                     |
| Steroids           | 3 (3.5)                   | 74               | 2 (5.6)                          | 1 (2.6)                       |
| Anti-IL-6          | 21 (25)                   | 74               | 10 (27.8)                        | 10 (26.3)                     |
| Anticoagulants     | 56 (69.1)                 | 70               | 23 (69.7)                        | 28 (75.7)                     |

**Definition of abbreviations:** CRP = C-reactive protein; HFNC = high-flow nasal cannula; ICU = intensive care unit; IL-6 = interleukin-6; SD = standard deviation.
The time of viral persistence, defined as the time from the onset of symptoms to a double-negative real-time RT-PCR nasopharyngeal swab test, was available for 74 patients (85% of the study population). The mean time to a negative test was 41.2 days (SD, 13.1 d). The study population was divided in two groups using the median of viral clearance as the cutoff (39 d) to explore those factors among the baseline characteristics (Table 2) that could influence the time of viral persistence. Treatment with high-flow oxygen during hospital admission was more frequent in the “long persistence” than in the “short persistence” group (nine and one patients, respectively; \( P = 0.014 \)), possibly suggesting that more severe patients may present a slower virus clearance.

High patient adherence to the telemonitoring protocol supports the feasibility of a telemonitoring system in patients recovering from COVID-19 undergoing isolation in a dedicated facility. On the other hand, the high rates of missing measurements, and “false” alerts, deployed by either erroneous measurements by the tool or incorrect patient entries, highlight the importance of continuous medical and technical assistance to discriminate true emergencies and solve technical issues. Our model included 24/7 support provided by both technical staff and a clinical team consisting of three nurses and three medical doctors. These resources can be considered sensibly inferior to those required by a prolonged hospital stay for isolation purposes. Given the shortage of healthcare staff and bed availability in the context of the SARS-CoV-2 pandemic, the use of dedicated isolation facilities integrated with telemedicine systems can...
facilitate the hospital turnover of infected patients, protect patients’ family members, and reduce the risk of infection of healthcare professionals. On the other hand, no adverse events requiring medical intervention emerged during the telemonitoring period, suggesting that the occurrence of clinical deterioration in SARS-CoV-2–positive, clinically stable patients is uncommon. As such, further research in larger cohorts is warranted to validate our findings and determine the real cost-effectiveness of this approach.

In conclusion, we show that a hotel-based, telemedicine-enabled management represents a feasible and safe approach for patients with COVID-19 requiring long-term isolation. The widespread adoption of telemonitoring tools as alternatives to unnecessary or prolonged hospitalization gets particular relevance in the context of the ongoing second or third wave of COVID-19 in many countries.

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**Characteristics of Children with Bronchopulmonary Dysplasia with Prolonged and/or Later-Onset Pulmonary Hypertension**

To the Editor:

A common sequela of prematurity is bronchopulmonary dysplasia (BPD), characterized by impaired alveolar growth, airway inflammation, and airflow obstruction (1), which may affect up to 50,000 U.S. infants annually (2, 3). Pulmonary hypertension (PH) is an increasingly recognized comorbidity of BPD. Cohort studies estimate that 14–43% of infants with BPD will develop PH, which is associated with increased mortality (14–38%) (4). Few studies describe the natural history of PH in infants with BPD after neonatal intensive care unit (NICU) discharge. Two retrospective studies found that 24–34% of survivors still had PH at ~3 years of age (5, 6), but it has not been observed in school-age children with BPD (7, 8). Given these studies, our first objective was to characterize preterm infants at risk for prolonged resolution of PH after 1 year of age.

Published guidelines recommend screening echocardiograms at 36 weeks postmenstrual age (PMA) for infants with moderate or severe BPD (9). One subsequent study did not identify any cases of PH after 40 weeks PMA (10), but another study found that 48% of PH cases were diagnosed after NICU discharge (6). Our second objective was to identify infants with negative screening echocardiograms who were subsequently diagnosed with PH.

**Methods**

Charts for 758 subjects enrolled in an outpatient BPD clinical registry between 2008 and 2018 were retrospectively reviewed. Inclusion criteria included birth at <32 weeks gestation and a diagnosis of BPD (all severities) (2, 11). Caregivers were consented per the Johns Hopkins University Institutional Review Board. Echocardiogram findings were abstracted from the medical record. Subjects were classified as having PH if PH was present on any clinically obtained echocardiogram in the screening period (34–38 wk PMA) and/or follow-up period (>38 wk PMA). The diagnosis of PH was based on elevated right ventricular pressures defined by tricuspid regurgitation jet, patent ductus arteriosus (PDA) gradient, or systolic interventricular septal position. Of the 758 subjects, 57 subjects had echocardiograms only in the screening period, 197 only had them in the follow-up period, and 168 had them in both periods. For this study, we arbitrarily examined children who had PH resolve after 1 year of chronological age versus before 1 year of chronological age. Late-onset PH was defined as PH found in the follow-up period that was not observed during the screening period; infants were only included in this analysis if they had echocardiograms during both the...