

## OBSERVATIONS: BRIEF RESEARCH REPORTS

## Sixty-Day Outcomes Among Patients Hospitalized With COVID-19

**Background:** Although characteristics and in-hospital outcomes for persons with coronavirus disease 2019 (COVID-19) have been well described, less is known about the longer-term outcomes of hospitalized patients.

**Objective:** To describe 60-day postdischarge clinical, financial, and mental health outcomes of patients with COVID-19.

**Methods:** This observational cohort study looked at patients hospitalized with COVID-19 (discharged between 16 March and 1 July 2020) at 38 hospitals participating in the MI-COVID19 initiative. The aim of MI-COVID19, a Michigan state-wide collaboration sponsored by Blue Cross Blue Shield of Michigan (BCBSM) and Blue Care Network, is to improve care for patients hospitalized with COVID-19. Trained quality abstractors (often registered nurses) collect data from patient

medical records using structured templates. For hospitals unable to abstract all COVID-19 hospitalizations, a sample is selected for inclusion by using a pseudo-randomization procedure (minute of hospital discharge).

At 60 days after discharge, abstractors review the medical record to collect data on clinical events, including readmission (to the index hospital or any hospital viewable in the medical record) and postdischarge death. In addition, for all patients alive and not residing in a health care or correctional facility, abstractors contact patients by telephone to complete a survey about primary care follow-up, ongoing cardiopulmonary symptoms, return to normal activity, financial impact, and emotional and mental health outcomes. At least 3 attempts are made to contact patients. The study was deemed “not regulated” by the University of Michigan institutional review board (HUM 00179611).

**Findings:** Of 1648 patients with COVID-19 admitted to 38 hospitals, 398 (24.2%) died during hospitalization and 1250 (75.8%) survived. Of 1250 patients discharged alive, 975 (78.0%) went home whereas 158 (12.6%) were discharged to a

**Table 1.** Demographic and Clinical Characteristics of 1250 Survivors of COVID-19 Hospitalization

| Characteristics                              | Value*      |
|--|-------------|
| <b>Patient characteristics</b>               |             |
| Median age (IQR), y                          | 62 (50–72)  |
| Male   | 648 (51.8)  |
| Race   |             |
| Black  | 645 (51.6)  |
| White  | 466 (37.3)  |
| Other/unknown                                | 139 (11.1)  |
| Ethnicity                                    |             |
| Hispanic                                     | 55 (4.4)    |
| Non-Hispanic                                 | 1079 (86.7) |
| Unknown                                      | 116 (9.3)   |
| Residence before hospitalization             |             |
| Home   | 1034 (82.8) |
| Congregated living facility†                 | 190 (15.2)  |
| Subacute rehabilitation facility             | 8 (0.6)     |
| Other/unknown                                | 18 (0.4)    |
| Chronic conditions                           |             |
| Hypertension                                 | 800 (64.0)  |
| Diabetes                                     | 436 (34.9)  |
| Cardiovascular disease                       | 301 (24.1)  |
| Moderate/severe kidney disease               | 287 (23.0)  |
| Asthma                                       | 168 (13.4)  |
| Congestive heart failure/cardiomyopathy      | 145 (11.6)  |
| Chronic obstructive pulmonary disease        | 130 (10.4)  |
| Cerebrovascular disease/paraplegia           | 130 (10.4)  |
| Dementia                                     | 96 (7.7)    |
| Cancer‡                                      | 89 (7.1)    |
| No chronic conditions                        | 179 (14.3)  |
| <b>Hospitalization characteristics</b>       |             |
| Treated in an ICU                            | 165 (13.2)  |
| Treated with invasive mechanical ventilation | 75 (5.9)    |
| Treated with supplemental oxygen             | 865 (69.2)  |
| Median length of hospitalization (IQR), d    | 5 (3–8)     |
| Discharged to a health care facility         | 158 (12.6)  |

COVID-19 = coronavirus disease 2019; ICU = intensive care unit; IQR = interquartile range.

\* Values are numbers (percentages) of patients unless otherwise indicated.

† Includes assisted living, group home, and skilled nursing facilities; homeless shelters; correctional facilities; community living facilities; and inpatient psychiatric facilities.

‡ Includes leukemia, lymphoma, hematologic cancer, and any cancer.

**Table 2.** 60-Day Outcomes Among 1250 Survivors of COVID-19 Hospitalization, 488 of Whom Completed the Telephone Survey

| Outcome  | Value*     |
|--|------------|
| <b>Mortality and rehospitalization</b>                                 |            |
| Died in the 60 d after discharge, <i>n</i> (% of hospital survivors)   | 84 (6.7)   |
| Rehospitalized, <i>n</i> (% of hospital survivors)                     | 189 (15.1) |
| <b>Primary care follow-up</b>  |            |
| Any follow-up primary care visit in the 60 d after discharge           | 382        |
| Established PCP  | 352        |
| New PCP  | 30         |
| Visit type   |            |
| Clinic   | 77         |
| Telephone  | 143        |
| Videoconference  | 161        |
| Days from discharge to visit   |            |
| <15  | 265        |
| 15-30  | 74         |
| >30  | 37         |
| Home health services   | 98         |
| <b>New/worsened symptoms</b>   |            |
| Persistent symptoms related to illness†                                | 159        |
| New or worsening symptoms related to illness                           | 92         |
| Continued loss of taste and/or smell                                   | 64         |
| Cough  | 75         |
| Shortness of breath/chest tightness/wheezing                           | 81         |
| Difficulty ambulating due to chest problems                            | 44         |
| Breathlessness walking up stairs                                       | 112        |
| Oxygen use   | 32         |
| New use of CPAP or other breathing machine when asleep                 | 34         |
| <b>Return to normal activity</b>                                       |            |
| Unable to return to normal activity                                    | 188        |
| New or worsening difficulty completing activities of daily living‡     | 58         |
| <b>Return to employment</b>  |            |
| Employed full- or part-time before COVID-19 hospitalization            | 195        |
| Able to return to work by 60 d after discharge                         | 117        |
| Median days from discharge to work return (IQR)                        | 27 (13-42) |
| Reduced hours and/or modified duties upon return to work due to health | 30         |
| Unable to return to work   | 78         |
| Because of health  | 45         |
| Because of job loss  | 21         |
| <b>Emotional impact</b>  |            |
| Emotionally affected at least mildly by health conditions              | 238        |
| Emotionally affected at least moderately by health conditions          | 124        |
| Health care use related to mental health                               | 28         |
| <b>Financial loss/impact</b>   |            |
| Financially affected at least mildly by health conditions              | 179        |
| Financially affected at least moderately by health conditions          | 124        |
| Specific financial effects   |            |
| Used up all or most of savings   | 47         |
| Unable to pay for necessities, such as food, heat, and housing         | 29         |
| Contacted by a collection agency                                       | 17         |
| Skipped or delayed getting medical care because of cost                | 16         |
| Took less medication than was prescribed because of cost               | 11         |

COVID-19 = coronavirus disease 2019; CPAP = continuous positive airway pressure; IQR = interquartile range; PCP = primary care physician.

\* Values are numbers of patients unless otherwise indicated.

† Include cough, shortness of breath, chest tightness, wheezing, difficulty getting around the house due to chest trouble, breathlessness walking up stairs, oxygen use, and CPAP or other breathing machine use when asleep.

‡ Include dressing, eating, bathing, toileting, transferring in/out of bed, and walking across a room.

skilled nursing or rehabilitation facility (Table 1). By 60 days after discharge, an additional 84 patients (6.7% of hospital survivors and 10.4% of intensive care unit [ICU]-treated hospital survivors) had died, bringing the overall mortality rate for the cohort to 29.2%, and 63.5% for the 405 patients who received

treatment in an ICU. Within 60 days of discharge, 189 patients (15.1% of hospital survivors) were rehospitalized.

Of patients alive 60 days after discharge, 488 (41.8%) were successfully contacted and completed the 60-day postdischarge telephone survey. Of these, 265 reported seeing a primary care

physician within 2 weeks (Table 2). Most follow-up visits (304 of 382) occurred virtually by videoconference (161 of 382) or telephone (143 of 382), whereas 77 occurred in person and 1 was of unknown format.

Cardiopulmonary symptoms (such as cough and dyspnea) were reported by 159 patients, including 92 with new or worsening symptoms and 65 with persistent loss of taste or smell. Fifty-eight patients reported new or worsening difficulty completing activities of daily living. Among 195 patients who were employed before hospitalization, 117 had returned to work whereas 78 could not because of ongoing health issues or job loss. Of the 117 patients who returned to work, 30 reported reduced hours or modified duties due to health reasons.

Nearly half of all patients (238 of 488) reported being emotionally affected by their health, and 28 sought care for mental health after discharge. Moreover, 179 patients reported at least a mild financial impact from their hospitalization, with 47 reporting use of most or all of their savings and 35 rationing food, heat, housing, or medications due to cost.

**Discussion:** In this multihospital cohort of patients hospitalized with COVID-19 in Michigan, nearly 1 in 3 patients died during hospitalization or within 60 days of discharge. For most patients who survived, ongoing morbidity, including the inability to return to normal activities, physical and emotional symptoms, and financial loss, was common (1). These data confirm that the toll of COVID-19 extends well beyond hospitalization, a finding consistent with long-term sequelae from sepsis (2) and other severe respiratory viral illnesses (3). Although most patients saw a primary care provider after discharge, 1 in 5 had no primary care follow-up visit within 60 days of discharge. Collectively, these findings suggest that better models to support COVID-19 survivors are necessary (4).

Our study has limitations. Although postdischarge chart review was completed for all patients, telephone contact occurred in fewer than half. Loss to follow-up may be nonrandom; thus, the proportion of patients who had adverse outcomes may be biased. We therefore report numbers of events, which should be interpreted as the minimum known number of patients with a given outcome. Despite these limitations, our study conveys that adverse events after COVID-19 hospitalization

are common. Policies and clinical and research programs targeting these aspects are needed.

**Acknowledgment:** The authors thank all the BCBSM Collaborative Quality Initiatives that partnered together on data collection and all the hospitals that volunteered to be part of MI-COVID19.

**Financial Support:** From BCBSM and Blue Care Network as part of the BCBSM Value Partnerships program.

**Disclosures:** Disclosures can be viewed at [www.acponline.org/authors/icmje/ConflictOfInterestForms.do?msNum=M20-5661](http://www.acponline.org/authors/icmje/ConflictOfInterestForms.do?msNum=M20-5661).

**Reproducible Research Statement:** *Study protocol:* Information available at <https://mi-hms.org/quality-initiatives/mi-covid19-initiative>. *Statistical code:* Available on request from Dr. O'Malley (e-mail, [meganom@med.umich.edu](mailto:meganom@med.umich.edu)). *Data set:* Not available.

**Corresponding Author:** Vineet Chopra, MD, MSc, 2800 Plymouth Road, Building 16, #432 W, Ann Arbor, MI 48109; e-mail, [vineetc@umich.edu](mailto:vineetc@umich.edu).

doi:10.1152/ajpcell.00576.2019\_RET

#### References

1. Carfi A, Bernabei R, Landi F; Gemelli Against COVID-19 Post-Acute Care Study Group. Persistent symptoms in patients after acute COVID-19. *JAMA*. 2020;324:603-5. [PMID: 32644129] doi:10.1001/jama.2020.12603
2. Prescott HC, Angus DC. Enhancing recovery from sepsis: a review. *JAMA*. 2018;319:62-75. [PMID: 29297082] doi:10.1001/jama.2017.17687
3. Ahmed H, Patel K, Greenwood DC, et al. Long-term clinical outcomes in survivors of severe acute respiratory syndrome and Middle East respiratory syndrome coronavirus outbreaks after hospitalisation or ICU admission: a systematic review and meta-analysis. *J Rehabil Med*. 2020;52:jrm00063. [PMID: 32449782] doi:10.2340/16501977-2694
4. Prescott HC, Girard TD. Recovery from severe COVID-19: leveraging the lessons of survival from sepsis. *JAMA*. 2020;324:739-40. [PMID: 32777028] doi:10.1001/jama.2020.14103