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LETTER TO THE EDITOR

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# Factors associated with reattendance to emergency services following COVID-19 hospitalization

To the Editor,

In May 9, 2020, a study published in this journal by Chen et al.[1] described the symptoms and investigations of 11 patients requiring rehospitalization, after an index admission for coronavirus disease-2019 (COVID-19).[1] Since, a limited number of reports have emerged further characterizing patients that reattend hospital services after discharged from an index COVID-19 admission.[2–4] We find contrasting evidence of reattendance rates, time to reattendance, and outcomes of such patients and that, beyond continued COVID-19 pneumonia, other indirect complications may manifest as recurrent hospital reattendances.

We analyzed reattendance data as of July 26, 2020, for a previously described cohort of patients with COVID-19 admitted between March 1 and April 5, 2020, at three large London hospitals.[5,6] In this original cohort, 423/614 (69%) patients were discharged alive from their index COVID-19 hospitalization. As of July 26, we had followed-up these patients for a median of 112 days postdischarge (range, 2–132) and recorded that 97 (23%) reattended emergency services (Table 1). Of these, 63 (65%) required hospitalization.

The median time from index hospitalization discharge to the first reattendance was 27 days (interquartile range [IQR], 20–33; Figure 1A). Across all 97 patients, there were a cumulative 72 presentations to the emergency department and 90 hospital admissions, with 63 (65%) patients having a single reattendance event and 34 (35%) patients reattending on multiple occasions.

The most frequent primary diagnosis at first reattendance was persisting COVID-19 pneumonia (25, 26%), followed by other infectious diseases (15, 16%; including healthcare-associated infections), cardiovascular disorders (9, 9%), and trauma (7, 7%). However, for subsequent reattendances, the most frequent primary diagnosis was other infectious diseases (20, 30%), followed by renal disorders (12, 18%) and cardiovascular disorders (6, 9%), with persisting COVID-19 symptoms in only one case (Supplement). Factors associated with reattendance were increased age ($p = .01$) and a higher burden of comorbidities (median Elixhauser score 5 vs. 0, $p < .01$; Table 1). Specific comorbidities associated with reattendance were chronic kidney disease (odds ratio [OR] 2.96; 95% confidence interval [CI], 1.64–5.35), ischemic heart disease (OR 2.56; 95% CI, 1.33–4.94), congestive heart failure (OR 3.29; 95% CI, 1.38–7.83), and dementia (OR 2.33; 95% CI, 1.16–4.71).

Eight patients (12.7%, 8/63) died during their first readmission to the hospital. These patients were older (median 80, IQR, 69–87) and had a shorter time to first readmission (median 8 days, IQR, 5–10.5), compared with those that survived (Figure 1B). Six (75%) of these deaths were attributed to worsening COVID-19 pneumonia. No patients who attended on multiple occasions died during the follow-up period.

Our findings contrast with those of previous reports. Chen et al.[1] reported that their eleven patients reattended at 16 ± 7.14 days, albeit reattendance rates, how these patients were selected for inclusion, and their second admission outcomes are not discussed. More recently, a study from New York and one from another London hospital reported a median time to reattendance of 4.5 days amongst 103 patients[2] and 10 days amongst 25 patients,[4] respectively. Reattendance rates in these studies were 3.6% and 6.4%, respectively.[2,4] Another recent study from South Korea found that 328/7590 (4.3%) patients were readmitted within 3 days of discharge.[3] Importantly, in the latter study, a large portion of these patients were admitted due to recurrence of severe acute respiratory syndrome coronavirus 2 polymerase chain reaction positivity, regardless of clinical status.[3] Finally, whilst neither of the Asian studies reports reattendance outcomes, the study from New York found a death rate of 3.4% and the one from London of 24% amongst those that required rehospitalization.[2,4]

Early reattendance data may be particularly influenced by local capacity pressures and discharge practices and is not able to capture longer-term complications of COVID-19. By reviewing data over a longer period, we identified a higher proportion of patients reattending emergency services than previous reports and a wide range of secondary clinical complications. While some first reattendances in our cohort were clearly related to COVID-19, most patients presented with possible indirect complications, such as other infections and decompensation of chronic comorbidities. Of note, our cohort had a high representation of older patients with comorbidities, who might be expected to have frequent hospital attendances.

Overall, we find that reattendances following discharge from hospitalization for COVID-19 are common. Amidst the ongoing pandemic, maintaining an adequate clinical suspicion for cardiorespiratory and infectious conditions, among others, that may mimic or coexist with COVID-19 should not be undermined.[8] There is a paucity of data on the delayed complications and outcomes of these patients across different settings. Data from large, multicentre studies are urgently needed to inform a longer-term public health response to the COVID-19 pandemic and to provide an evidence base for the long-term clinical follow-up of these patients.

JOURNAL OF MEDICAL VIROLOGY –WILEY–



**TABLE 1** Factors associated with an increased probability of reattendance

| | All (*n* = 423) | Reattended (*n* = 97) | Not reattended (*n* = 326) | Statistic[a] |
|---|---|---|---|---|
| Male, *n* (%) | 248 (58.63%) | 50 (51.55%) | 198 (60.74%) | 0.69 (0.44–1.08) |
| Median age (IQR) | 63 (27) | 69 (29) | 60 (26) | **2.49 (0.01)** |
| Ethnicity: White | 166 (39.24%) | 45 (46.39%) | 121 (37.12%) | 1.47 (0.93–2.32) |
| Ethnicity: Black | 86 (20.33%) | 20 (20.62%) | 66 (20.25%) | 1.02 (0.59–1.79) |
| Ethnicity: Asian | 61 (14.42%) | 15 (15.46%) | 46 (14.11%) | 1.11 (0.6–2.08) |
| Ethnicity: Other | 14 (3.31%) | 3 (3.09%) | 11 (3.37%) | 0.91 (0.27–3.12) |
| Ethnicity: Missing | 96 (22.70%) | 14 (14.43%) | 82 (25.15%) | 0.5 (0.27–0.93) |
| Median Elixhauser (IQR)[b] | 0 (7) | 5 (11) | 0 (6) | **3.77 (<0.01)** |
| Any comorbidity | 308 (72.81%) | 76 (78.35%) | 232 (71.17%) | 1.47 (0.86–2.5) |
| Diabetes | 130 (30.73%) | 31 (31.96%) | 99 (30.37%) | 1.08 (0.66–1.75) |
| Hypertension | 177 (41.84%) | 41 (42.27%) | 136 (41.72%) | 1.02 (0.65–1.62) |
| Chronic kidney disease | 54 (12.77%) | 23 (23.71%) | 31 (9.51%) | **2.96 (1.64–5.35)** |
| Ischemic heart disease | 42 (9.93%) | 17 (17.53%) | 25 (7.67%) | **2.56 (1.33–4.94)** |
| Congestive heart failure | 21 (4.96%) | 10 (10.31%) | 11 (3.37%) | **3.29 (1.38–7.83)** |
| Stroke | 37 (8.75%) | 9 (9.28%) | 28 (8.59%) | 1.09 (0.5–2.36) |
| Asthma | 45 (10.64%) | 12 (12.37%) | 33 (10.12%) | 1.25 (0.63–2.51) |
| COPD | 21 (4.96%) | 7 (7.22%) | 14 (4.29%) | 1.73 (0.7–4.31) |
| Cancer (solid) | 39 (9.22%) | 11 (11.34%) | 28 (8.59%) | 1.36 (0.66–2.82) |
| Cancer (hematological) | 5 (1.18%) | 0 (0.00%) | 5 (1.53%) | NA |
| HIV | 7 (1.65%) | 2 (2.06%) | 5 (1.53%) | 1.35 (0.3–6.16) |
| Cirrhotic liver disease | 6 (1.42%) | 1 (1.03%) | 5 (1.53%) | 0.67 (0.1–4.39) |
| Non-cirrhotic liver disease | 32 (7.57%) | 13 (13.40%) | 19 (5.83%) | **2.5 (1.2–5.21)** |
| Dementia | 36 (8.51%) | 14 (14.43%) | 22 (6.75%) | **2.33 (1.16–4.71)** |

Abbreviations: COPD, chronic obstructive pulmonary disease; IQR, interquartile range.

[a]Where a range is specified, statistic values correspond to odds ratio (95% confidence interval) and for single numerical values (*p* value), this corresponds to a Student's *t*-test for difference in numerical variables.

[b]The Elixhauser comorbidity score was calculated as per the van Walraven modification.[7]

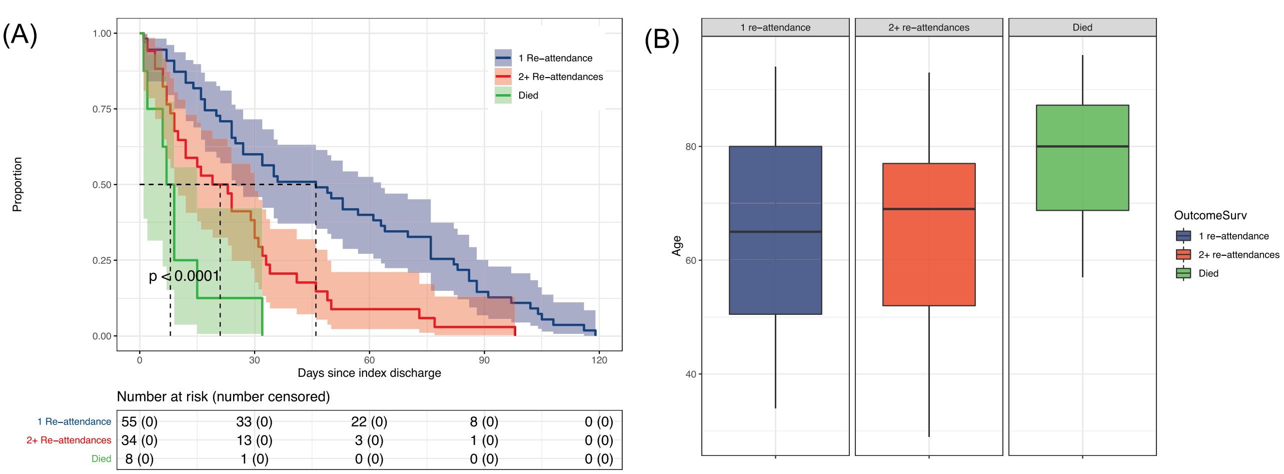


**FIGURE 1** Patient pathways for reattendances. Time to first reattendance (A) and mean age (B) by three different patient pathways: those who died during their first reattendance (green), those who only reattended once and survived (blue) and those who had multiple reattendances (red). Student's *t*-test for mean age difference 2.7 ($p = .03$)

## AUTHOR CONTRIBUTIONS

Anna Daunt, Patrick Mallia, and Shevanthi Nayagam conceived the study. Anna Daunt, John Cafferkey, and Kavina Manalan collected the data. Pablo N. Perez-Guzman analyzed the data. Peter White and Katharina Hauck provided methodological expertise. Graham Cooke, Patrick Mallia, and Shevanthi Nayagam provided clinical expertise. Anna Daunt, Pablo N. Perez-Guzman, John Cafferkey, Kavina Manalan, and Shevanthi Nayagam interpreted the data. Anna Daunt and Pablo N. Perez-Guzman drafted the manuscript. All authors reviewed and edited the manuscript for scientific content.

## CONFLICT OF INTERESTS

All authors declare that there no conflict of interests.

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