

Readmission and inhospital death 1 year after COVID-19 hospitalization in South Africa

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Abstract. Rodseth R, Maslo C, Laubscher A, Friedland R. Readmission and inhospital death 1 year after COVID-19 hospitalization in South Africa. *J Intern Med.* 2023;**294**:370–372.

Background. Acute SARS-COVID-19 infection may increase readmission risk compared to other respiratory infections. We assessed the 1-year readmission and inhospital death rates of hospitalized SARS-COVID-19 patients compared to patients hospitalized with other types of pneumonia.

Methods. We determined the 1-year readmission and inhospital death rate of adult patients initially hospitalized with a positive SARS-COVID-19 result, and subsequently discharged, between

March 2020 and August 2021, at a Netcare private hospital in South Africa, and compared this to all hospitalized adult pneumonia patients in the 3 years prior to the COVID-19 pandemic (2017–2019).

Results. The 1-year readmission rate in COVID-19 patients was 6.6% (328/50,067) versus 8.5% in pneumonia patients (4699/55,439; $p < 0.001$), with an inhospital mortality rate of 7.7% ($n = 251$) and 9.7% ($n = 454$; $p = 0.002$) for COVID-19 and pneumonia patients, respectively.

Keywords: COVID-19, long COVID, mortality, pneumonia, readmission

Background

SARS-CoV-2 is a novel coronavirus that gave rise to the COVID-19 pandemic of respiratory illness. After acute SARS-CoV-2 infection, a percentage of patients may be at higher risk of subsequent readmission compared to other respiratory infections [1]. We assessed the 1-year readmission and inhospital death rates of patients hospitalized with a positive SARS-COVID-19 test across the first three waves, compared to patients hospitalized with other types of pneumonia.

Methods

Netcare is a South African private hospital group consisting of 49 acute care hospitals with more than 10,000 beds. In this analysis, we included all adult patients (≥ 18 years of age) initially hospitalized with a positive SARS-COVID-19 result from 1 March 2020 to 31 August 2021 at a Netcare Hospital, and subsequently discharged. This date range approximates the start of the first wave through

to the end of the third wave in South Africa. Our COVID-19 triage and testing methodology, patient characteristics, and outcomes have previously been described [2].

Using ICD-10 codes, we determined how many patients were readmitted within 1 year of discharge with any one of the following diagnoses: post-COVID condition, stroke, transient ischemic attack, atrial fibrillation, atrial flutter, sinus tachycardia, sinus bradycardia, ventricular arrhythmia, pericarditis, myocarditis, acute coronary artery disease, myocardial infarction, ischemic cardiomyopathy, angina, heart failure, nonischemic cardiomyopathy, pulmonary embolism, deep vein thrombosis (DVT), diabetes type I, diabetes type II, acute renal failure, and chronic renal failure. The comparator was all hospitalized pneumonia patients in 3 years prior to the COVID-19 pandemic (2017–2019) and readmitted within 1 year of discharge with any one of the diagnoses detailed above.

Table 1. Selected primary diagnoses in patients readmitted within 1 year after a COVID-19 admission as compared to those readmitted after a pneumonia admission.

Diagnosis on readmission	No. (%) of patients		<i>p</i> -Value
	COVID-19 cohort (<i>n</i> = 3281)	Pneumonia cohort (<i>n</i> = 4699)	
Renal failure/dysfunction	841 (25.6)	925 (19.7)	<0.001
Heart failure	497 (15.1)	1281 (27.3)	<0.001
Diabetes	487 (14.8)	401 (8.5)	<0.001
Stroke or TIA	457 (13.9)	611 (13.0)	0.23
Pulmonary embolism or DVT	372 (11.3)	436 (9.3)	0.003
Ischemic heart disease	329 (10.0)	482 (10.3)	0.74
Cardiac conduction defects	191 (5.8)	405 (8.6)	<0.001

Abbreviations: DVT, deep vein thrombosis; TIA, transient ischemic attack.

Categorical variables were compared using a χ^2 test, and continuous variables using Mann-Whitney test. A 5% significance level (2-sided) was used. Analysis was performed using R version 4.2.2 for Windows (R Core Team). The study received ethics approval from Pharma-Ethics, South Africa (NETCOVIDMORT202009162). All patients provided written informed consent.

Results

A total of 50,067 COVID-19 patients and 55,439 pneumonia patients were included in this analysis. COVID-19 patients were younger, with a median age of 56 years (interquartile range [IQR], 34–78), than pneumonia patients, with a median age of 58 years (IQR, 38–88; $p < 0.001$). A total of 3281 COVID-19 patients (6.6%) and 4699 pneumonia patients (8.5%; $p < 0.001$) were readmitted to a Netcare Hospital within a year of discharge. COVID-19 readmissions were younger than pneumonia readmissions, with a median age of 60 years (IQR 39–81) versus 63 years (IQR 41–84; $p < 0.001$).

In the COVID-19 readmission cohort, the in-hospital mortality rate was 7.7% ($n = 251$), whereas in the pneumonia readmission cohort, the in-hospital mortality rate was 9.7% ($n = 454$; $p = 0.002$). The incidence of renal failure (25.6% vs. 19.7%; $p < 0.001$), diabetes (14.8% vs. 8.5%; $p < 0.001$), and pulmonary embolism or DVT (11.3% vs. 9.3%; $p < 0.001$) was higher in patients previously admitted with COVID-19 than in patients previously admitted for pneumonia (Table 1).

Discussion

The majority of post-COVID condition symptoms seem to be constitutional in nature and

do not warrant or result in hospital admission [3]. COVID-19's impact on longer term readmission is less clear. A large cohort study with a 300-day follow-up period found COVID-19 patients had the same or lower readmission and death rate as compared to influenza controls after hospital discharge but higher risks of admission or death from lower respiratory tract infections [1].

In our analysis, COVID-19 patients had lower 1-year readmission and in-hospital mortality rate when compared to historical pneumonia patients. This may, in part, be due to the younger age of COVID-19 patients. Consistent with published literature, there were higher incidences of renal failure, diabetes, and pulmonary embolism or DVT in the COVID-19 cohort [4]. However, as this was an observational study, it is possible that COVID-19 patients may have been more aggressively screened for DVTs and that more CT-PA scans were performed in this group, thereby increasing the incidence. From the second wave onward, steroids were almost uniformly used in the treatment of COVID-19 patients, making it likely that most COVID-19 patients received them [5]. This may have contributed to the higher incidences of diabetes in this population. Of note, in the first three waves, vaccinations were not widely available in South Africa.

This analysis is limited in that we were only able to capture readmissions to a Netcare Hospital. In addition, we were not able to match the two patient cohorts, thereby making it possible that differences in outcomes were due to factors other than the cause of the index hospital admission. Due to our use of administrative billing data, we were not

able to differentiate patients admitted primarily for COVID-19-related conditions from asymptomatic patients, with an incidental positive test, admitted for other reasons. Further, due to a lack of specificity in ICD-10 coding, we were unable to determine the ratio of viral to bacterial pneumonia in the non-COVID-19 cohort. Finally, the administrative data used for this analysis have inherent accuracy and sensitivity limitations.

In summary, the 1-year readmission and in-hospital death rates of the 50,067 patients hospitalized with COVID-19 were 7.7% ($n = 251$) compared to 9.7% ($n = 454$; $p = 0.002$) in the 55,439 patients hospitalized with other types of pneumonia. In addition, the incidence of renal failure (25.6% vs. 19.7%; $p < 0.001$), diabetes (14.8% vs. 8.5%; $p < 0.001$), and pulmonary embolism or DVT (11.3% vs. 9.3%; $p < 0.001$) on readmission was higher in the COVID-19 group.

Author contributions

Conceptualization; data curation; formal analysis; methodology; writing—original draft: Reitze Rodseth. *Conceptualization; methodology; project administration; writing—review and editing:* Caroline Maslo. *Conceptualization; project administration; resources; supervision; writing—review and editing:* Anchen Laubscher. *Conceptualiza-*

tion; funding acquisition; resources; supervision; writing—review and editing: Richard Friedland.

Conflict of interest statement

None of the authors note any conflicts of interest.

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