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BACKGROUND AND OBJECTIVES

- The first wave of COVID-19 infections in South Africa began in March 2020, peaked in July of 2020 and ran until approximately the end of October 2020.
- Gauteng, South Africa’s most populated province, had the highest incidence risk of 218.8 cases per 100 000 during the first wave and reported the largest number of COVID-19 admissions and deaths within this period.
- Estimates of the cost of COVID-19 care during this period, which was characterized by increasing cases and hospital admissions, are critical for building responsive and resilient health-systems
- There is however a dearth of cost estimates for pandemic related hospitalisation in the South African public sector, which bore a significant proportion of the COVID-19 healthcare burden.

This study aims to understand the cost per patient day (PPD) and associated outcomes for COVID-19 related hospitalization during the first wave in South Africa at two academic hospitals in Gauteng

RESEARCH SNAPSHOT

Figure 1: COVID-19 hospitalisation: Cost per patient day (2020 US dollars) by highest-level of care reached
Wave 1: March 2020 - October 2020, South Africa-Gauteng province, N=573 (Cost estimates in 2020 USD)

Wave1-Phase1(W ₁ P ₁)	Wave1-Phase2(W ₁ P ₂)	Wave1-Phase3(W ₁ P ₃)
n/N (%): 6/573 (1)	n/N (%): 505/573 (88)	n/N (%): 62/573 (11)
LOS (days), median (IQR): 20 (30.5-3.5)	LOS (days), median (IQR): 9(14.5-5)	LOS (days), median (IQR): 9(13-6)
Age, median (IQR): 55.5 (64-50)	Age, median (IQR): 58 (68-45)	Age, median (IQR): 54 (64-47)
Cost PPD, median (IQR): \$379.24(399.03-348.90)	Cost PPD, median (IQR): \$380.32 (415.58-365.32)	Cost PPD, median (IQR): \$362.63(378.79-348.62)

Cost per patient day(USD)

Admission Month

Highest level of care reached
• Emergency department (only) • General ward • High-care/MACU • ICU

METHODOLOGY

Study population

Patients with laboratory confirmed COVID-19 infection aged ≥18 years hospitalised during the first wave (March 2020 – October 2020) at two tertiary-hospitals in South Africa’s Gauteng province.

Sampling strategy

- Random and purposive sampling used.
- Purposive sampling targeting all patients requiring oxygen support or ICU based care
- Only patients with a known outcome (died or discharged alive) were included in the study, with admission data further restricted to the first COVID-19 related hospitalization.

Data collection

- Retrospective medical record review

Data analysis

- Bottom-up costing from the provider perspective was based on patient-level resource usage.
- Cost estimates are reported in 2020 United States Dollar (USD)

RESULTS

Sample size

573

Female: 52%

Median age: 57 years

Mortality: 31%

ICU utilisation: 12%

Invasive mechanical ventilation(IMV): 2%

Median cost PPD: \$1185.43

≥1 chronic conditions: 84%

Median cost PPD: \$381.17

Median (IQR) length of stay(LOS)

Sample: 9 days (14.5-5)
Outcome death: 5.5 days (12-3)
Outcome discharged alive : 9.5 days (14.5-6)

Median (IQR) cost PPD

Sample: \$378.62 (407.54-363.91)
Outcome death: \$399.03 (456.13-373.88)
Outcome discharged alive: \$373.33 (391.24-360.08)

Table 1: Ward based statistics and costs (2020 USD) per patient day (PPD)

	General Ward	High-care	ICU
Admissions, n/N (%)	499/573 (87)	121/573 (21)	71/573 (12)
LOS(days), median (IQR)	7 (12-4)	2 (5-1)	7 (13-3)
Ward based oxygen support , n/N (%)	367/499 (74)	63/121 (52)	52/71 (73)
Ward based laboratory tests , n/N (%)	390/499 (78)	93/121 (77)	55/71 (77)
Oxygen support , Median cost PPD (IQR) [for the subset of patients receiving ward based O2]	\$8.19 (\$14.90-\$3.74)	\$12.29 (\$30.73-\$6.15)	\$35.00 (\$57.87-\$7.50)
Laboratory, Median cost PPD (IQR) [for the subset of patients receiving ward based labs]	\$10.64 (\$17.68-\$6.07)	\$24.87 (\$65.96-\$13.05)	\$26.96 (\$41.25-\$11.71)
Staff, mean cost PPD (SD)	\$308.49 (0)	\$368.57 (0)	\$1330.68 (0)
In-hospital drugs, median cost PPD (IQR)	\$3.7 (\$6.95-\$2.59)	\$6.12 (\$12.15-\$3.07)	\$5.26 (\$9.07-\$3.11)
Diagnostics and Hemodialysis, median cost PPD (IQR)	\$1.93 (\$3.37-\$1.10)	\$1.93 (\$4.59-\$0.94)	\$1.49 (\$2.62-\$0.85)
IPC , mean cost PPD (SD)	\$36.12 (0)	\$53.70 (0)	\$71.29 (0)
Overheads, median cost PPD (IQR)	\$10.22 (\$22.19-\$3.10)	\$3.10 (\$10.22-\$2.91)	\$10.22 (\$13.85-\$2.91)
Total cost PPD, median(IQR)	\$382.99 (\$395.32-\$371.62)	\$472.21 (\$526.39-\$448.44)	\$1466.36 (\$1520.79-\$1421.70)

Ward statistics

Ward costs (PPD)

- The median cost PPD for 573 admissions was \$378.62 and median length of stay (LOS) was 9 days with in hospital mortality of 31% (175/573).
- Median cost PPD was higher for non-survivors, \$399.03 with median LOS 6-days in comparison to \$373.33 and LOS of 10-days if discharged alive.
- The median cost PPD was \$381.17 (IQR:\$417.42-\$365.13) in patients with ≥1 comorbidities and \$368.03 (IQR:\$383.00-\$351.40) in patients without comorbidities.
- Patients requiring IMV in ICU had the highest median-cost PPD of \$1185.43 (IQR: \$1345.74-\$915.14).
- Staff costs were the largest driver of cost PPD, followed by infection-prevention and control (IPC) costs.

DISCUSSION AND CONCLUSIONS

- This study is the first to estimate the resources necessary for COVID-19 inpatient care based on real world data.
- It has shown that human resource costs were the largest cost driver with costs varying by level of care required and presence of comorbidities.
- Understanding the hospital costs of COVID-19 patients and related sub-groups is essential to evaluating the economic impact of the pandemic on healthcare costs.
- These cost estimates may help in planning for future catastrophic health events.

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