



Estimating the cost of managing COVID-19 patients in Uganda from March to June, 2020

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Summary

Management of COVID-19 patients is resource-intensive, and estimating its costs is complex. In a resource-limited setting such as Uganda, where the gross domestic product per capita (GDP) is \$643, it is important to understand the cost of managing COVID-19 patients to facilitate public resource planning. We estimated these costs early during the pandemic in Uganda.

We reviewed health facility records at Mulago national referral hospital, 13 regional referral hospitals, and 3 district hospitals managing COVID-19 patients in Uganda to obtain direct and indirect costs related to management of COVID-19 patients from March to June, 2020. We used the data to calculate the average cost of managing a COVID-19 patient and identified cost drivers for managing COVID-19 patients.

Of 1,297 patients evaluated, 967 (99%) had mild (asymptomatic/minimally symptomatic) infection; 866 (77%) had no known co-morbidities. The mean time spent in the hospital per patient was 2.5 (range, 1-4) weeks. The total direct cost for the 1,297 patients was estimated at \$2,361,044; indirect costs at \$263,031. The average cost of managing a COVID-19 patient was \$2,023. Healthcare supplies (8.6%), food and drinks for patients/health care workers (18.6%), and healthcare workers' allowances (14.9%) were the main direct cost drivers for managing COVID-19 patients from March to June 2020.

The average cost of managing a COVID-19 patient in Uganda was high compared to the GDP despite nearly all patients having mild disease. More than half of the costs were for healthcare supplies. We recommend the Ministry of Health to do appropriate budgetary allocations to support COVID-19 response in Uganda.

Introduction

On January 30, 2020, WHO declared severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) a Public Health Emergency of International Importance(1). In response, World Health organization (WHO) appealed for US\$675 million to support member states over a 3-month period, as they began implementing priority public health measures (2).



As of August 5, 2020, more than 18 million cases of COVID-19, including more than 600 000 deaths, had been reported globally(3). By the end of July, COVID-19 pandemic had disrupted the global economy and placed an enormous burden on the healthcare system (4, 5). The WHO explicitly expanded the scope of the strategic preparedness and response plan to include a ninth pillar on the maintenance of essential health services in acknowledgment that the pandemic was already straining the health system(6).

The early experience in countries with large-scale community transmission such as China, Iran, Italy, and Spain showed that the management of COVID- 19 Cases required unprecedented mobilization of health care resources (7). Projections in the United States showed that the total cost of the epidemic could reach more than \$650 billion if the majority of the population became infected with COVID-19 (8).

On 21 March, Uganda detected its first case of COVID-19 in a traveler from Dubai at Entebbe International Airport(9). By 29th July, the country had registered a total number of 1,147 of COVID-19 cases. The Ministry of Health (MoH) preparedness and response plan included key pillars, namely: co- ordination, logistics, surveillance and laboratory, case management and Infection prevention and control, risk communication and social mobilization, and mental health and psychosocial support, and management of COVID-19 patients in isolation centers (10). All the public health measures associated with these pillars require substantial financial and human resources to expedite the response.

There was inadequate information about the cost of managing COVID-19 patients in sub-Saharan Africa including Uganda. To better understand the cost implications of managing COVID-19 patients Uganda, we established the cost of managing COVID-19 patients in Uganda using cases admitted in COVID-19 treatments units (CTUs) across the country from March to June, 2020.

Methods Study design

We also reviewed patient files from the national referral hospital, the 13 regional referral hospitals, and the 3 district hospitals that were managing COVID-19 patients from March to June 2020 at the time. We defined a confirmed COVID-19 case as a patient with PCR positive results found in his or her file

Study variables and data collection

We reviewed files of all COVID-19 patients admitted in hospitals with COVID-19 in Uganda with complete information from march, 2020 and discharged by 31th June, 2020. We collected information on socio-demographic and clinical characteristics, length of hospital stay captured in weeks, laboratory tests performed, and the treatment given to patients.



The heads of COVID-19 treatment Units, records officers, accountants and hospital directors provided evidence of health care expenditure.

We collected information on direct and indirect costs (from patient files and health care supplies documents such as stock cards and delivery note books and receipts) incurred in the management of COVID-19 patients using a cost analysis spread sheet. Direct costs were defined as expenditure on

managing a patient from the day of admission up to discharge. Direct medical costs included drugs and medical equipment and direct non-medical costs such as transportation costs and allowances. We collected data on transport costs (fuel, car ser- vice) for health workers travelling from workplace to their respective residents during total lock down, the cost of CTUs trainings and meetings, food and drinks for the hospital task forces during meetings and trainings, the diagnostic tests (laboratory and radiology), risk allowance for the front-line health workers working in CTUs, disinfection cost, food and drinks for both health workers and COVID-19 patients, utility bills (water and electricity) and the cost of medicines and supplies (Face masks, face shields, gum boots, theatre shoes, aprons among others).

The indirect costs were defined as the expenses incurred from the cessation or reduction of work productivity as a result of the morbidity from COVID-19. For indirect costs, we calculated the number of days spent by each patient in the hospital multiplied by the estimated amount of money patient she/he earns a day based on occupation. We excluded the depreciation of the buildings, vehicles or any assets involved in COVID-19 response.

We also identified cost drivers for managing COVID-19 patients and these were defined as those items that consumed most of the resources during the management of COVID-19 patients.

The main outcome of this cost evaluation was to estimate the total cost of managing COVID-19 patients in health care facilities in Uganda from ad- mitted from march to June, 2020.

Data analysis

Using MS Excel 2019, we calculated the total cost of managing COVID-19 patients (direct and indirect costs) in US Dollars. We calculated the direct and indirect costs in order to identify the cost drivers of managing COVID-19 patients in health care facilities in Uganda. We converted the Ugandan shillings to UD dollars at a rate of one US dollar to three thousand seven hundred and eleven Ugandan shillings (3711). Data on socio-demographic characteristics of COVID-19 patients was presented in percentages and table form.



Results

Characteristics of COVID-19 patients in Uganda from march to June, 2020

We reviewed records of 1,297 patients, almost half of patients 734(47.8%) spent 2 weeks in the hospital, majority 768 (67.5%) were asymptomatic at the time of admission, 266 (23.5 %) of patients had comorbidities, and 968 (99.0%) had mild COVID- 19 infection (table 1).

Table 1: Shows the clinical characteristics of COVID-19 patients in Uganda from march to June, 2020

Variable (N=1,297)	Frequency (n)	Percentage (%)
Hospital stay (N=1,297)		
1 Week	102	3.3
2 Weeks	734	47.8
3 Weeks	345	33.7
4 Weeks	116	15.2
Symptoms at admission (N=1138)		
Symptomatic	370	32.5
Asymptomatic	768	67.5
Co-morbidity (N=1,132)		
No	866	76.5
Yes	266	23.5
Severity of COVID-19 (N=977)		
Mild	967	99
Moderate	8	0.8
Severe	2	0.2

The cost of managing a COVID-19 patient in Uganda, March to June, 2020

The estimated the direct cost of managing COVID- 19 patients in Uganda from March to June, 2020 was at two million three hundred sixty-one thousand and forty-four Us Dollars (2,361,044), indirect cost at two hundred sixty-three thousand and thirty- seven US Dollars (263,037). While the total cost of managing COVID-19 patients was



estimated at two million six hundred twenty-four thousand and eighty-one US dollars (2,624,084).

The established average cost of managing a COVID- 19 patient was two thousand and twenty-three US Dollars (2,023).

The cost drivers for managing COVID-19 patients in Uganda from March to June, 2020

Table 3: Total cost drivers for managing COVID -19 patients, March to June, 2020, Uganda

Variable	Cost (\$)	
HW allowances	351,764	14.9
Fuel	137,116	5.8
Food& Drinks	438,885	18.6
Utilities	50,192	2.1
Health supplies	1,383,086	58.6
Total	2,361,044	100

More than half (58.6%) of the money was spent on health care supplies, 18.6% on food and drinks for health workers and patients, 14.9% on health work- er allowances, 5.8% on fuel costs and the least 2.1% on utilities (water and electricity) (Table 2). Discussion

Our cost evaluation was conducted in the first three months of the pandemic in Uganda where almost all COVID-19 patients were a symptomatic. Patients did not require confiscated medical diagnosis and treatment. All patients by the time of data collection were managed in designated hospitals (CTUs).

Our findings established that the average cost of managing a COVID-19 patient in Uganda from march to June, 2020 was \$2,023. The overall cost (direct and indirect) was estimated at \$2,624,081. This cost is likely to be low because, more than half (67.5%) of the COVID-19 patients were asymptomatic and 99.0% had mild COVID-19 infection. The cost is likely to increase due increased community transmission and many patients going into advanced stages of the disease, thus requiring intensive care treatments (11).

Health care supplies (including drugs, diagnostic tests and IPCs) were the main cost drivers accounting for 58.6% followed by food/drinks for both patients and health workers at 18.6% and health workers allowances at 14.9%. This agrees with the study



conducted by Edejer T et al, 2020 in United states where health care supplies accounted for (54%), maintaining essential services at (21%), rapid response and case investigation at (14%), and infection prevention and control at (9%) (11). Due to the dynamic transmission of SARS-CoV-2 through direct, indirect, or close contact with infected people through infected secretions such as saliva and respiratory secretions or their respiratory droplets, which are expelled when an infected person.

coughs, sneezes, talks or sings (2-10), health workers and patients use a lot of IPC measures such as masks, aprons, handwashing sanitizers, biohazard containers among others to protect themselves against the infection. It is necessary that during the subsequent budgetary allocations to management COVID-19 patients, the Ministry of Health should appropriate more funds to procurement of health care supplies

Our findings also established that the overall cost of managing COVID-19 patients was generally high compared to other outbreaks in Uganda, such as Cholera outbreak in Hoima district(12) and measles outbreak in Buvuma district(13) with an overall cost of \$71,769 and \$16,259 respectively. The difference is due to the localized nature of the former outbreaks that were occurring in one district compared to SARS-CoV-2 which spread throughout the country. Our findings further established a high cost of managing a COVID-19 patient compared to other infectious diseases. For instance, a study conducted in West Africa found that the estimated cost of treating an Ebola case was ranging from \$480 to \$912(14). This high cost may be attributed to IPCs implemented in CTUs, such as use of masks by both patients and health workers, face shields and the cost of RT-PCR test for COVID-19 which is relatively high.

Conclusion

The average cost of managing a COVID-19 patient in Uganda was high compared to the GDP despite nearly all patients having mild disease. More than half of the costs were for healthcare supplies.

Study limitation

Due the retrospective nature of this study, most of the data from patient files, health facility records was missing which may have resulted in under estimation of the costs. Most of the patients were asymptomatic, they required only vitamin C and no supportive care. As a result, these should be understood as the cost of mild COVID-19 disease. Regardless, a cost of more than \$2000 USD per patient with almost no clinical illness is relatively high. After easing lock down (August, 2020), we have evidenced increased community transmission with a high proportion of cases in Uganda having moderate to severe disease. The cost of managing such patients is likely to be too much higher because they will require confiscated medical diagnostics and treatment care. Therefore, this may affect generalizability of the findings in other resource limited settings.



Recommendations

We recommend the Ministry of Health to do appropriate budgetary allocations to support COVID-19 response in Uganda. We also recommend another cost evaluation to estimate the cost of managing COVID-19 cases in Uganda including those with severe disease

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