Preparedness and response of a tertiary hospital to the COVID-19 pandemic in Nigeria: challenges, opportunities and lessons

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Africa was the last continent to be affected by the COVID-19 pandemic. Much of the discourse on Africa’s response captured in scientific journals revolves around nations, public health agencies and organizations, but little is documented about how individual healthcare facilities have fared. This article reports the challenges faced in a tertiary hospital in Nigeria, including space constraints, diagnostic challenges, shortages in personal protective equipment and health worker infections. The opportunities and strengths that aided the response are also highlighted. The lessons learned will be useful to similar facilities. More information about health facility response at various levels is needed to comprehensively assess Africa’s response to the pandemic.

Introduction

The coronavirus disease 2019 (COVID-19) pandemic currently ravaging the world was slow to gain ground in Africa. As first responders, public health agencies such as the Africa Centre for Disease Control and Nigeria Centre for Disease Control made concerted and laudable efforts to contain the spread, thus preventing strain on inherently fragile healthcare delivery systems. Currently the pandemic has transitioned into community transmission in most countries, with 100,379 cases detected and 20,321 deaths as of 23 August 2020.1 Besides a vigorous public health response, emergencies of this magnitude also require proactive and functioning healthcare facilities working to maintain services while ensuring patient and health-worker safety.2 The preparedness and response by African nations, public health agencies and organisations are amply captured in scientific publications, but there is a dearth of information concerning how individual hospitals have prepared and fared.

Here we balance the challenges of emergency preparedness and response while facing the evolving COVID-19 pandemic in Nigeria against the opportunities and strengths of the University of Benin Teaching Hospital, a Nigerian tertiary healthcare facility. The aim is to share our experience, particularly with health facilities in other low- and middle-income countries (LMICs), in a bid to build capacity and strengthen resilience.

Setting

The University of Benin Teaching Hospital (UBTH) is located in Benin City, the capital of Edo State, Nigeria. Edo State has a high influx of travellers to and from Lagos, the epicentre of Nigeria’s pandemic; at the time of writing in August 2020, 2,317 of the 44,433 cases in Nigeria had been detected in Edo, making it the state with the fourth highest number of cases.3 The UBTH is an 850-bed tertiary healthcare facility with about 3,870 personnel, including 696 doctors, 750 nurses and 44 pharmacists. It provides referral, emergency and primary care services for Edo and the neighbouring states of Delta, Ondo, Kogi and Anambra. Pre-pandemic, the hospital frequently operated at near-surge capacity, with bed occupancy rates in key service areas such as emergency rooms exceeding 90% at peak times.

Preparedness and response

The UBTH prepared for the pandemic by early communication of the risk to staff, mounting surveillance and triage at entry points, reinforcing infection prevention and control measures, constituting and training a rapid response team for case management and taking inventory of available stockpiles of personal protective equipment (PPE), infrastructure and critical care equipment, followed by short-, medium- and long-term needs assessments. At the announcement of the first confirmed case in Nigeria,
Table 1. Challenges faced in the UBTH COVID-19 response and mitigating strategies

| Challenge               | Context                                                                 | Mitigating strategies                                                                 |
|-------------------------|-------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| Surge in number of cases| ■ All cases irrespective of grade of severity were managed in isolation facilities because it was feared that isolation at home could not be guaranteed, especially in non-motivated patients and those dwelling in overcrowded lodgings<br>■ Prolonged stay and late discharges during the first 2 months of the pandemic based on public health recommendations of two consecutive negative reverse transcription polymerase chain reaction (RT-PCR) results taken 48 h apart. This endpoint proved elusive in a number of patients | ■ Repurposing of a larger building as an isolation ward followed by activation of an annex for mildly symptomatic health workers<br>■ Institution of home-based care for carefully selected COVID-19 patients based on the severity of symptoms, enlightenment, level of motivation and living conditions<br>■ Quick compliance with revised discharge criteria by the Nigeria Centre for Disease Control based on emerging evidence of non-infectiousness of patients after a specified symptom-free period |
| Diagnostic challenges   | ■ Shortages in sampling materials such as viral transport medium<br>■ Delays in receiving RT-PCR test results from the reference laboratory | ■ Substitution with hospital-grade saline<br>■ Expedition of onsite laboratory validation process and commencement of onsite testing 6 weeks into the pandemic |
| PPE shortage            | ■ Surge in PPE use compounded by escalation in prices and scarcity of PPE and other supplies, dwindling internally generated revenue and indebtedness to supply vendors<br>■ Diagnostic delays led to poor flow in holding areas for suspected cases and expenditure of more PPE<br>■ Hoarding of PPE by staff due to heightened risk perception<br>■ Inappropriate use of PPE such as N95 | ■ Indigenous production of launderable coveralls, face masks, face shields and shoe covers by the linen services department<br>■ Cascading of PPE stewardship approaches such as disinfection of used N95 masks and face shields using ultraviolet sterilizing units, coupled and validated by the Engineering and Microbiology Departments, respectively<br>■ Retraining of staff on rational use of PPE such as reserving N95 masks for aerosol-generating procedures<br>■ Contact tracing and risk assessment of contacts<br>■ Psychosocial support for both infected health workers and the worried well<br>■ Low threshold for testing health workers<br>■ Risk communication, including a hospital-wide webinar emphasizing precautionary measures such as the use of face masks both within and outside the workplace |
| Health-worker infection | ■ From a few cases in the early importation phase, this became particularly marked as community transmission became apparent, highlighting health workers’ dual risk from working in a health facility while living in the community. No infections were recorded among isolation ward staff | ■ Contact tracing and risk assessment of contacts<br>■ Psychosocial support for both infected health workers and the worried well<br>■ Low threshold for testing health workers<br>■ Risk communication, including a hospital-wide webinar emphasizing precautionary measures such as the use of face masks both within and outside the workplace |

Challenges

Our response was threatened by major challenges: a lack of capacity to accommodate the surge in cases, a lack of onsite diagnostic capability at the start of the pandemic leading to diagnostic delays and critical shortages in personal protective equipment. Health-worker infections also threatened to diminish the available workforce. Deferment of elective cases and a general decrease in the number of patients seeking care at the facility as a consequence of public fear led to a sharp drop in internally generated revenue. Table 1 puts these challenges in context together with actions taken to mitigate them. Of note, some anticipated challenges did not materialize. For instance, inventory during the preparation phase highlighted deficiencies in the number of ventilators and intensive care unit (ICU) beds. The reports from Asia and Europe showed that ventilators were a priority item, leading to grim forecasts for African countries where there is a gross lack of such critical care equipment. Time, however, proved this a misplaced priority, as it became clear with the progression of the outbreak that we would not require as much ICU support as...
witnessed in Western countries. Efforts were quickly redirected to maximizing oxygen supply. This speaks to the need for context-specific evidence and experiential knowledge to guide the actions of other LMICs.

Opportunities and strengths

Despite the highlighted challenges, some factors may have enhanced our preparedness to respond to COVID-19. Foremost of these was the late start of the pandemic in Africa, allowing a lead time to study the epidemiology of the disease and other countries’ responses through World Health Organization briefings, media sources and published scientific data. For instance, we adapted a risk stratification tool from the Individual Staff Risk Assessment Checklist for COVID-19 published by the National Health Service East and North Essex Foundation Trust Occupational Health and COVID-19 Incident Management Team to conduct risk assessments of the UBTH staff.4

Second, we leveraged on the pool of experts domiciled in our facility, a number of whom are academic staff with research competence, to render consultancy services to the state government at a time when much of the attention of the nation’s presidential COVID-19 taskforce was directed at Lagos, the epicentre of the epidemic in Nigeria. These services included modelling the projected trajectory of the pandemic in Edo, assessing the readiness of private facilities in the state to contribute to active case searches by screening and providingIPC training for health workers in state-owned facilities.5 The initiative resulted in early buy-in into pandemic preparedness plans and ensured cooperation and immense support from the state government. Based on our recommendations, the state government promptly closed schools, prohibited public and social gatherings, including a National sports festival that was slated to kick off in April, and instituted a curfew. These actions contributed to flattening the curve and buying the hospital more time to prepare and plan a response.

Third, in the months preceding the pandemic, an intensive training and retraining of various cadres of staff on IPC coupled with hand hygiene campaign had already been embarked upon as part of a hospital strategic reform plan. Thus all staff had a heightened awareness of IPC which reduced time and resources spent on the training of staff. Our pharmacy department already had the capacity to produce alcohol-based hand sanitizer and this was capitalized upon, increasing the production scale to liberally distribute the product to staff as well as generate income from commercial sales.

Fourth, due to extant collaborative ventures with a university-based World Bank-funded research centre, we were able to obtain a compatible polymerase chain reaction testing machine after signing a memorandum of understanding. This allowed onsite testing that had far-reaching effects on traffic in the emergency rooms and holding areas, prevention of nosocomial transmission and conservation of PPEs.

Finally, we were able to capitalize on a highly motivated workforce to rapidly deploy indigenous production of personal protective coveralls and face shields. This augmented and helped ration our PPE stockpile.

Notwithstanding the aforementioned opportunities and strengths, the greatest aid to our response might have been the less severe tone of the pandemic in Africa. Africa currently accounts for <3% of COVID-19 deaths globally.3 However, there is the need to be cautiously optimistic as the tide may turn: the number of confirmed cases in South Africa, for instance, has now surpassed 500 000. A sustained surge in cases could thwart earlier successes due to shortages of PPEs; infection of healthcare personnel with resultant manpower shortages, burnout and diminishing morale; and insufficient capacity for critical care. Thus the hospital will continue to join forces with state and national public health campaigns aimed at enforcing the use of face masks, physical distancing, hand hygiene and respiratory etiquette for as long as is necessary.

Reflections and lessons learned

COVID-19 has caused us to reflect on institutional strengths and weaknesses, teaching lessons that may increase our facility’s resilience to future infectious disease outbreaks. First, an all-encompassing disaster management and emergency preparedness plan is a sine qua non in all health organizations and we are working towards formulating one. Second, total reliance on disposable PPEs is an unsustainable model, especially for LMICs, and we must continue to devote time, material and human resources to IPC while strengthening on-site production of PPEs and hygiene products like alcohol-based hand sanitizer. Finally, strengthening and updating our laboratory diagnostic capacity is also necessary, especially in the area of molecular diagnosis, and investments must be made in manpower and infrastructure.

To conclude, tertiary healthcare facilities play a significant role in the national and local responses to infectious disease outbreaks. More information about health facility response at various levels is needed to comprehensively assess Africa’s response to the pandemic. Whether in developed or resource-poor settings, this response should be context specific and leadership driven. Emergency preparedness plans, IPC, indigenous manufacturing and laboratory diagnostic capacity should be prioritised, as they undoubtedly improve the quality of response.

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