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Original Article

Challenges of contact tracing during COVID-19 pandemic response in a tertiary hospital in Northwestern Nigeria

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Abstract

Background: Contact tracing is a traditional pillar of infectious disease control, especially for illnesses involving direct transmission from person to person, such as COVID-19. Several challenges have arisen from COVID-19 contact tracing activities, particularly in low-resource settings. These include refusal of positive clients to disclose their close contacts, difficulties in conducting risk assessment for contacts traced, among others. **Objectives:** To explore the activities and identify challenges of contact tracing during COVID -19 pandemic response in a tertiary hospital in Northwestern Nigeria from May, 2020 to March, 2021. **Methodology:** A mixed method approach was done with quantitative secondary data analysis of COVID-19 contacts traced, and qualitative assessment through Key Informant Interviews (KII) of Ahmadu Bello University Teaching Hospital staff involved in COVID-19 outbreak response during the period. **Results:** A total of 2,249 clients were tested for COVID-19, of which 925 (41.1%) were healthcare workers. The identified challenges included problems with contact identification, delay in notification of results, refusal to disclose contacts by cases, contacts refusing to allow risk assessment, and health workers being overwhelmed by the task of contact tracing. **Conclusion:** Challenges identified include refusal of cases to disclose their contacts, overwhelming number of contacts, and delay in notification of results. There is need to institute contact tracing protocols to mandate cases to disclose their contacts, train more manpower to reduce the burden of contact tracing, and improve the notification of results.

Keywords: challenges, contact tracing, covid-19, emergency response team.

Introduction

Pneumonia caused by Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2) infection emerged in Wuhan City, Hubei Province, China in December 2019. By Feb. 11, 2020, the World Health Organization (WHO) officially named the disease resulting from infection with SARS-CoV-2 as Coronavirus Disease 2019 (COVID-19).[1] Globally, as of 5:52pm CEST, 27 May 2022, there have been 525,467,084 confirmed cases of COVID-19, including 6,285,171 deaths, reported to WHO.[2] As at 29th of May 2022, 256,028 cases of COVID-19 have been confirmed in Nigeria, while 250,036 cases have been discharged and 3,143 deaths have been recorded in 36 states and the Federal Capital Territory.[3] Contact tracing is a traditional pillar of infectious disease control, especially for illnesses involving direct transmission from person to person, such as COVID-19. At the onset of the pandemic, the

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early deployment of local, human-to-human contact tracers (face-to-face and telephone calls) in African countries was crucial to control chains of transmission.[4] Non-pharmaceutical interventions are crucial to mitigate the COVID-19 pandemic and contain re-emergence phenomena. Targeted measures such as case isolation and contact tracing can alleviate the societal cost of lock-downs by containing the spread where and when it occurs.[5]

Contact tracing systems for SARS-CoV-2 aim to interrupt transmission chains by investigating people who had contact with a probable or confirmed case, and quarantining or isolating exposed or infected individuals in a timely manner, thereby reducing the occurrence of future transmission events. While identifying and notifying contacts is a core part of contact tracing, other closely related activities like case investigation, testing of contacts, and case isolation and quarantining of contacts, are commonly understood to be part of contact tracing.[6] The World Health Organization (WHO) currently recommends contact tracing for persons with exposure to a probable or confirmed case during the infectious period; defined as face to face contact within one meter for 15 minutes or more, or direct physical contact regardless of duration. The infectious period is defined as two days before until ten days after symptom onset for symptomatic cases, and two days before until ten days after a positive test for asymptomatic cases.[7] The purpose of contact tracing is to identify and classify contacts as early as possible for preventing spread of further transmission. The decision to test some of the contacts and to quarantine others is based on risk assessment process considering factors like –proximity, duration, nature of exposure as well as other factors.[8] Contact tracing is a tool used in surveillance of diseases, especially infectious diseases. The aim is to identify and report exposure to disease, connect to testing and care, and prevent further disease transmission. The key steps for contact tracing are contact identification, contact listing, and contact follow-up.[19] Contact identification locates all persons who have had contact with a confirmed case, as defined by the case definition. Contact listing informs people of their contact with an infectious person(s) and makes recommendations based on the type and extent of the interaction. Lastly, contact follow-up monitors all contacts for the duration of the disease incubation period. Contact tracing has been instrumental in controlling disease during outbreaks such as Ebola,[20] Middle East Respiratory Syndrome[21] and Tuberculosis,[22] but they were not without challenges. One study suggests that earlier and increased efforts in contact tracing during an epidemic could greatly reduce the spread of disease, thus emphasizing the importance of this surveillance tool.[20] Contact tracing requires substantial public health investment including trained personnel; coordination between surveillance, laboratory, and clinical teams; and critical community buy-in.[23]

For COVID-19, contact tracing operates on the principle that identification and subsequent quarantine of contacts will reduce the spread of disease. Modeling studies suggest the effectiveness of contact tracing depends on the R0 of the pathogen and the amount of transmission possible before the onset of symptoms.[24] The R0 for COVID-19 is estimated to be around 2-3.[25] This infectivity rate emphasizes the importance of performing contact tracing to reduce community spread of the virus. WHO general contact tracing guidance for COVID-19 was not published until May 2020.[26] Contact tracing procedures and implementation varied widely at local, national and regional levels. These were not devoid of challenges. The purpose of this study is to examine and document the contact tracing activities carried out by the Epidemic Response Team of Ahmadu Bello University Teaching Hospital as well as identify gaps and challenges they met while performing these activities.

Materials and method

Study area:

The study was conducted from May, 2020 to March, 2021 at Ahmadu Bello University Teaching Hospital in Shika, Zaria. It is a tertiary health centre in the North-Western part of Nigeria which offers services to the people of Zaria, Kaduna State and environs. It serves as a referral center for persons from all over the federation to its various specialty clinics. It has a staff-strength of more than 3000, a bed capacity of 500 and a total patient admission turnover of more than 10,000 annually. The hospital has 18 clinical and 8 non-clinical departments.[9] The Epidemic Response Team (ERT) was reactivated to ensure cohesive and effective coordination of the response

to COVID-19 within and around the health facility. The ERT coordinates the ABUTH COVID-19 Isolation and Treatment Centre which is located in the peripheral area of the hospital as a stand-alone structure which has a separate area for testing suspected COVID-19 clients. Prior to the onset of the pandemic, the ERT was already addressing the outbreak of Lassa fever, and in April 2020 the centre was adapted to meet the peculiar needs of the COVID-19 pandemic with several pillars and additional volunteers from various relevant departments joining the team.

The ERT had the following response pillars; Case management, Surveillance, Risk Communication and Infection Prevention & Control. The surveillance pillar of the ABUTH ERT worked in collaboration with the Disease Surveillance and Notification Officers (DSNOs) and Lab Scientists of Sabon Gari, Zaria, and Giwa Local Government Areas (LGAs) to coordinate surveillance activities for COVID-19 within and outside the immediate surroundings of the facility that constitute its catchment area. They adopted the strategy of active surveillance via contact tracing and passive surveillance via self-reporting. All clients/patients who were tested by the Surveillance arm of the ERT were asked to identify their contacts. A contact list was then prepared and these contacts were then followed up, with each contact subsequently assessed for risk of COVID-19. Some of these contacts were then tested depending on the outcome of the risk assessment (Figure 2).

The ERT of ABUTH is part of the Emergency Operations Committee (EOC) of Kaduna State. The EOC which is chaired by the Kaduna State Commissioner of Health was convened to provide technical support in response to the COVID-19 pandemic. It is a multi-sectoral body consisting of experts and public health practitioners from various Ministries, Departments, and Agencies (MDAs) of Kaduna, including officials of the Nigeria Centre for Disease Control (NCDC), World Health Organisation (WHO), and the United Nations Children`s Fund (UNICEF) in the state. It also has members from the Kaduna State Primary Healthcare Development Agency (KDSPHA), local governments, universities and research institutions, and traditional and religious leaders, among others.[27]The index case in Kaduna State was recorded on 28th March, 2020. Following the first report of a confirmed case in ABUTH, the ERT started to implement COVID-19 contact tracing measures. As the pandemic evolved, community transmission continued to rapidly spread, which led to the overwhelming load of contact tracing and case detection workload for the healthcare workers in the ERT. These issues, coupled with stigma, misinformation, mistrust of political entities, limited testing capacity as well as poor adherence to quarantine and isolation all contributed to challenge the continued feasibility and cost-effectiveness of contact tracing measures by the team in ABUTH. A best practice was the use of multiple communication platforms to engage, inform, and educate communities. Mainstream and social media platforms were leveraged upon to share with information for different populations, including locations of testing and isolation centers, and other messaging to counter myths and misinformation.

Study design and period:
A mixed method approach was employed with quantitative secondary data analysis of COVID-19 contacts traced between 1st May, 2020 and 31st March, 2021, and qualitative assessment through Key Informant Interview (KII) of Ahmadu Bello University Teaching Hospital staff involved in COVID-19 outbreak response during the period.

Study population:
The study population for the quantitative component comprised of contacts of confirmed cases of COVID-19 who fulfilled testing criteria following risk assessment. For the qualitative aspect, the study population was made up of thirteen key informants who were health workers and management staff actively involved in the pandemic response in ABUTH.

Data collection tools and procedure:
Quantitative Data: A proforma was developed and used to extract data from ABUTH COVID-19 tests and results register. Variables of interest included age, sex, test result and test category.

Qualitative Data: A Key Informant Interview (KII) guide was used to conduct the KII sessions. The guide contained questions regarding challenges faced during the surveillance activities which included delay in notification of results, refusal to disclose contacts by cases, refusal for risk

assessment by contacts and whether ERT members were overwhelmed at any time of contact tracing. Qualitative data was collected over a two-week period by trained research assistants who were resident doctors. Interviews lasted about 60 minutes and were audio-recorded, with handwritten notes as back-up.

Data analysis:
Quantitative data was coded using Microsoft Excel® 2013 and analysed with IBM SPSS® version 23. Findings were presented using frequencies and percentages for categorical variables, and the results were presented using tables and charts created with Microsoft Excel® 2013.

Key informant interviews were digitally recorded and transcribed, and findings were analyzed using thematic content analysis.

Ethical approval:
Ethical approval for the study was obtained from the Health Research Ethics Committee (HREC) of Ahmadu Bello University Teaching Hospital (ABUTHZ/HREC/W35/2021). Informed consent was obtained from each respondent before interview. Data collected was stored in a secure database accessible only to the researchers.

Results
Quantitative results:
A total of 2,249 clients were tested for COVID-19, of which 925 (41.1%) were healthcare workers (Figure 1). Just under half of the healthcare workers tested were doctors (47.8%), followed by nurses (29.2%), with the least tested cadre being medical records staff (0.3%). About a fifth of the healthcare workers (20.1%) tested for COVID-19 were positive, with doctors having the highest number of positive test results (10.5%) (Table 1).

Qualitative results:
Six main themes emerged regarding challenges of contact tracing during COVID-19 response from analysis of the data collected during the interviews. The themes identified included refusal of cases to disclose their contacts, problems with contact identification, overwhelming number of contacts, contacts refusing to allow risk assessment, issues with sample collection, and delay in notification of results.

Refusal to disclose contacts by cases:
Many respondents agreed that there was refusal to disclose contacts by cases with many of them expressing their denial in the existence of the disease. Some cases claimed that they did not believe they had the disease while others insisted that they had forgotten their contacts.

"Yes, some people do not believe COVID-19 exists." Interviewee 6

"This happened a couple of times. Some cases refused to mention contacts while some forgot." Interviewee 8

Majority of the respondents agreed that there were instances of refusal by healthcare workers to disclose their contacts while others claimed there were no issues at all. This problem was addressed by assuring the healthcare workers of confidentiality, or in difficult cases, involving hospital authorities like the Chairman of the Medical Advisory Committee (CMAC).

"Some clients said they had no contact. We addressed this by assuring of confidentiality and link up if contact is in another town."- Interviewee 2
"Yes, surprisingly from senior doctors. We addressed this by engaging their friends or involving the CMAC" – Interviewee 7

Contact identification:
Majority of the respondents observed difficulty in identifying contacts of cases in the hospital wards, especially when the cases became so many. Another respondent added that some contacts in communities outside the hospital could not be traced due to their overwhelming number.

"To some extent it was a big deal tracking contacts of positive patients in the ward." Interviewee 8
"Yes, especially for contacts outside the hospital. We missed such contacts. But for contacts within the hospital, the management calls them to present themselves." Interviewee 7

Overwhelmed at any time of contact tracing:
Majority of respondents mentioned being overwhelmed by the task of contact tracing at various times during the COVID-19 pandemic response, with some expressing the major reason as

mass exposure of people in the hospital wards including doctors, nurses, attendants, as well as patients on admission.

"We had an instance where about two-thirds of patients were positive in the ward with doctors, nurses and attendants all infected." Interviewee 7 A few of the respondents mentioned the challenge of shortage of staff for contact tracing after an outbreak of COVID-19 in some departments of the hospital, including the ERT. This made contact tracing so difficult that some sections of the hospital had to be closed down.

"We had paucity of personnel for surveillance and case management. We had so many contacts that the theatre and emergency units had to be closed." Interviewee 6

Refusal for risk assessment by contacts:
Majority of the respondents reported experiencing occasions when contacts refused to allow for risk assessment. Some of these contacts were said to reject phone calls from ERT members while others refused to disclose their location.

"There were times when we had to call contacts severally and they still refused to give their whereabouts." Interviewee 2

Regarding healthcare workers and their contacts, majority of the respondents agreed that there were instances of their refusal to come for risk assessment. Some respondents recalled times when healthcare workers still came to work despite being told to remain at home while awaiting the outcome of their COVID-19 test result. This problem was addressed by engaging the hospital management; thereby forcing contacts that were hospital staff to present themselves at the isolation centre for risk assessment.

"Contacts were not turning up (for risk assessment) and some contacts still came to work…" interviewee 6

"Like our last positive case, we had to go through the friend who helped us to bring the client's wife and children." – Interviewee 1

Sample collection and transportation:
There were challenges of irregular availability of Viral Transport Media (VTM) and other packaging materials, delay in transporting collected samples and inconsistency of transport means.

"Sometimes there were issues especially when you have a lot of samples, the kits provided, sometimes the VTM (Viral Transport Media) are not enough, so you have to make a separate arrangement or you have to improvise… once you do that, it really affects the time the sample may stay without getting spoilt." Interviewee 7

"Sometimes our triple packaging was really not available and our samples were not triple packaged, so issues of safety or issues of contamination arose" Interviewee 2

"There was an instance when our samples where I think, of about 9 or 11 patients, it was over the weekend and they were not taken to the laboratory and of course we never got the results." Interviewee 2

"There were so many instances where the staff had to use their own vehicle to transport samples which is not ideal and sometimes even after transporting the sample to the laboratory, you have to wait for so long, sometimes even under the sun, for the sample to be collected in the lab." Interviewee 7

Delay in notification of result:
Delay in result notification is one of the challenges encountered during the period of response to the pandemic. Many respondents noticed that samples collected could be sent for testing with some results missing and some delayed for a long time.

"For the missing result, there are cases whereby we could not get the result of some samples we sent. It would delay for quite a long time, some after the delay the result will be released but other times the result will not be seen." Interviewee 7

"There are times you will send a batch of samples to be tested. Maybe about 10% or 20% might not comeback…I remembered a particular colleague, a healthcare worker, we had to follow up for like two to three weeks. We never got those results so it usually occurs once in a while." Interviewee 1

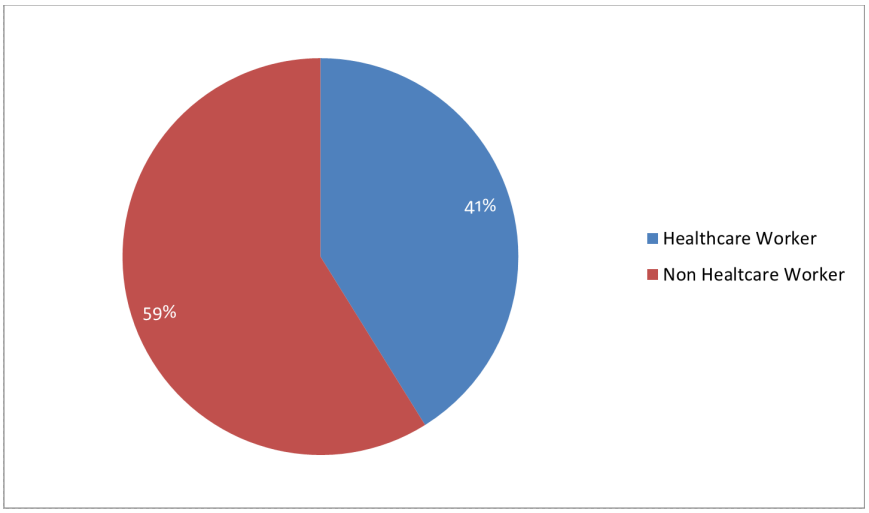

Fig 1: Occupation of clients tested for COVID-19 by ABUTH Epidemic Response Team (ERT) from May, 2020 to March, 2021. (n = 2,249)

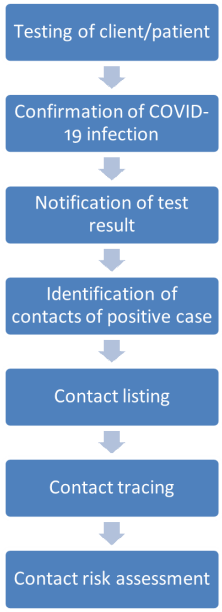

Fig 2: Flow pathway of case notification and contact tracing for COVID-19 by ABUTH Epidemic Response Team

Table 1: Cadre and test results of health workers tested at ABUTH Shika-Zaria between May, 2020 to March, 2021

Cadre	Test Result			Total (%)
	Negative (%)	*Positive (%)*	*Pending (%)*	
Doctors	316 (34.2)	97 (10.5)	29 (3.1)	442 (47.8)
Nurses	202 (21.8)	52 (5.6)	17 (1.8)	271 (29.2)
Pharmacists	24 (2.6)	7 (0.8)	8 (0.9)	39 (4.3)
Laboratory Technicians	21 (2.3)	1 (0.1)	1 (0.1)	23 (2.5)
Administrative Staff	24 (2.6)	10 (1.1)	3 (0.3)	37 (4.0)
Medical Records	3 (0.3)	0 (0.0)	0 (0.0)	3(0.3)
Clinical Support	53 (5.7)	10 (1.1)	7 (0.8)	70 (7.6)
Community Health Worker	5 (0.5)	0 (0.0)	0 (0.0)	5 (0.5)
Non-Clinical Support	3 (0.3)	4 (0.4)	1 (0.1)	8 (0.8)
Optometrist/Optician	9 (1.0)	4 (0.4)	0 (0.0)	13 (1.4)
Physiotherapist	5 (0.5)	1 (0.1)	0 (0.0)	6 (0.6)
Dental Professional	7 (0.8)	0 (0.0)	1 (0.1)	8 (0.9)
Total	**672 (72.7)**	**186 (20.1)**	**67 (7.2)**	**925 (100.0)**

Discussion

Contact tracing is an integral component of surveillance activities in the control of infectious diseases such as COVID-19. Healthcare workers and high-risk contacts were among the clients tested by the ERT in ABUTH. The highest proportion of healthcare worker infections occurred among nurses and doctors; this is troubling considering that they usually have the first contact with patients. In another similar study,[10] healthcare workers who represented the majority of positive cases reportedly contracted COVID-19 from patients with subclinical infections who presented in hospitals with other conditions while hiding vital information from them. A similar result was also observed in a study in FCT, Nigeria where 23.5% of healthcare workers tested positive for COVID-19.[11]

Majority of respondents mentioned refusal to disclose contacts as a form of challenge experienced during contact tracing. This could be as a result of COVID-19 associated perceived stigma as reported in similar studies from some African countries.[12,13]

Majority of respondents revealed there was difficulty in identification of contacts especially for those outside the hospital. This was because of inadequate number of contact tracers and dedicated means of transportation for contact tracing. This is different from what was observed in a study in Turkey, where contact tracing teams were successful in locating cases quickly, enabling them to isolate patients, follow-up of contacts and thus reduce the spread of infection.[14]

Majority of the respondents mentioned the challenge of being overwhelmed at some time of the response and this is similar to the finding reported in a study done in Nigeria, where it was reported that increased burden of cases overwhelmed the traditional labor-intensive contact tracing strategies.[4] In another similar study done in USA, the high volume of work affected staff members' ability to trace contacts.[15] However, a study in South Africa and Rwanda showed as part of their best practices, that they implemented digital contact tracing with the use of a mobile application and cell phone tower data respectively, hence reducing the required workforce.[16]

Refusal for risk assessment by contacts was reported by majority of the respondents and many factors could influence participation in contact tracing. These include reluctance to share information about people they have been in contact with, reluctance to divulge information on places they have recently visited, and fear of possible quarantine measures. This is in contrast to a study by the Pew Research Centre which showed that about half of the adults would participate in all aspects of risk assessment for contacts of COVID-19 cases.[17]

Our study shows that there was shortage of testing and transport materials and this is similar to the findings in another study from USA.[18]The COVID-19 pandemic has resulted in an unprecedented worldwide demand for laboratory testing, thus leading to increased pressure on the laboratory supply chain. This has caused shortages of key supplies including flocked nylon swabs for collecting samples and Viral Transport Media (VTM) used for preserving and transporting samples.[18]

Delay in notification of result is one of the challenges identified in this study. Some of the reasons included the large number of samples that had to be processed by few laboratories, delay in transporting these samples to the laboratories, inadequate staff in the laboratories, and prolonged process of communication of results to the ERT. This is similar to the finding in the FCT, Nigeria study where some of the challenges reported included delays in receiving results from laboratories.[11]

Conclusion

There were many challenges faced by the ERT during COVID-19 contact tracing activities in ABUTH. These include refusal of cases to disclose their contacts, overwhelming number of contacts, and delay in notification of results. There is need to institute contact tracing protocols to mandate cases to disclose their contacts, train more manpower to reduce the burden of contact tracing, and improve the notification of results.

Conflict of interest: The authors have no conflict of interest to declare.

Authors' contributions:
Study design: A.A.U, K.L.H, Z.S.B, S.U, S.S.
Data acquisition: M.A.D, F.I, J.M.B, S.O.A, S.L.O, S.U, S.S.
Data analysis: A.A.U, K.L.H, M.A.D, F.I, J.M.B, S.O.A, S.U, S.S.
Manuscript writing: M.A.D, F.I.
Critical review and major scientific input: All authors.

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