



A systemic approach to the prevention of COVID-19 transmission in clinical settings in Nigeria

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Abstract

Coronavirus disease (COVID-19) is a respiratory illness currently ravaging the world in pandemic proportions. Its route of spread and a high degree of infectivity make it easily transmissible within health care settings. Health workers, who are at particular risk of workplace-related infection, should be familiar with and abide by international best practices for infection prevention and control at work to protect themselves and their patients. This is particularly important so that they can continue to provide much-needed care. We present a review of international best practices and guidelines to prevent COVID-19 infection in the clinical space in the Nigerian context. Our focus is on strategies for administrative control, patient management, and environmental cleaning and waste management.

Keywords: COVID-19, SARS-CoV-2, transmission, control

Introduction

Coronavirus disease (COVID-19) infection was first reported in Wuhan, Hubei Province, China in December 2019 after a cluster of atypical pneumonia was observed.¹ The outbreak was declared a Public Health Emergency of International Concern on 30th January 2020 and named COVID-19 by the World Health Organization (WHO) in February 2020.² It has spread to almost all the countries of the world with over three million confirmed cases and over 200,000 deaths by the beginning of May 2020.³ It was declared a pandemic by WHO in March 2020.⁴ The causative organism was initially named the 2019 novel coronavirus (2019 nCoV), but was subsequently renamed Severe Acute Respiratory

Syndrome Coronavirus 2 (SARS-CoV-2).¹ This virus is closely related to the Severe Acute Respiratory Syndrome Coronavirus (SARS-CoV) and the Middle East Respiratory Syndrome Coronavirus (MERS-CoV) but is more infectious.^{1,5} Its basic reproduction number (R_0), a reflection of its transmissibility, is high at about 2-3 and represents the average number of new infections generated by an infectious person in a totally naïve population.⁶ This figure is higher than for SARS-CoV and MERS-CoV.⁵ The virus can be transmitted via respiratory droplets or contact with contaminated surfaces.¹

The infectivity of the virus during the incubation period and asymptomatic phase, and the manifestation of non-classical features are major challenges in the clinical setting.^{7,8} Approximately 80% of infected individuals have a mild or asymptomatic disease; about 14% develop severe disease requiring hospitalisation and oxygen support, and about 5% require admission to an

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intensive care unit.^{1,9-11} Patients in particular risk of severe infection and death are the elderly and people with underlying medical conditions such as diabetes, cancer, chronic respiratory diseases and hypertension.^{1,3,5,6,12} Asymptomatic patients could be purely asymptomatic, pre-symptomatic or post-symptomatic carriers.

Common clinical presentations of symptomatic patients with COVID-19 include fever, dry cough, malaise, sore throat and respiratory distress.¹³ However, these features may also hold for other diseases, thereby confounding diagnosis. In view of these non-specific symptoms, a high index of suspicion and appropriate knowledge of standards of care in clinical settings are crucial to efficiently triage patients, combat fear, reduce morbidity and mortality associated with these and other health conditions, as well as minimise the risk of transmission of the virus in the workplace.

Health Care Workers (HCWs) of all cadres are at the frontline of the pandemic, and thousands have already been infected globally.^{14,15} They are at risk of both becoming infected at their workplaces or communities or transmitting the infection to their families, colleagues or patients.¹⁶ As at the end of April 2020, more than 1000 health workers in 64 countries had already died of the infection.¹⁷ It is therefore critical that infection prevention and control measures are optimised in the clinical space. Various international and national guidelines are in existence on infection prevention and control in hospitals and for health workers such as those by the World Health Organisation, WHO, UNICEF, the European Centre for Disease Prevention and Control (ECDC) and the Nigerian Centre for Disease Control (NCDC). In this paper, we reviewed some international best practices for infection and prevention control in the clinical space in the COVID era with a focus on what is feasible in the Nigerian setting. These measures are discussed under the broad subheadings of administrative control and preparedness, patient management, and environmental cleaning and waste management.

Administrative control measures and general preparedness

Employers and the administrators of health facilities are responsible for ensuring that infection prevention and control strategies are available and

implemented within the health facility.¹⁸⁻²⁰ The strategies employed are known as administrative or work practice control measures. Each health facility should have a designated Institutional Response Team in charge of specific tasks including Infection Prevention and Control (IPC), social mobilisation and risk communication, COVID-19 case management and logistics for release of consumables and equipment. The team is responsible for piloting active preparedness and providing a structure for prevention of COVID-19 infection and safe health care.

There should be stipulated policies or protocols on the nature and extent of services that would be available, patient screening and safety strategies, early detection, laboratory testing and management of suspected and confirmed cases.^{21,22} Prompt communication with relevant authorities is also essential.

Furthermore, there should be appropriate task-specific training and updates for all cadres of HCWs and monitoring to ensure compliance.^{21,22} Arrangements should always also be made to ensure adequate staffing. Increased monitoring of the physical and psychological well-being of HCWs is vital for early detection of COVID-19 symptoms and emotion support where necessary.^{16,18,23} Communication and feedback in a blame-free environment are also necessary to ensure prompt response and reporting of any issues.¹⁸

Patient management

During this pandemic, health facilities are faced with the challenge of balancing the need to provide at least essential services with the possibility or reality of providing care to COVID-19 patients, depending on their expertise and capabilities.

Considering that a significant proportion of COVID-19 patients are either asymptomatic or have only mild, and often, non-specific symptoms, every health facility could potentially encounter them. Hospitals should decide what services they would be able to provide during the pandemic, which should be communicated to their patients. Elective procedures may be temporarily suspended especially for specialities such as ophthalmology, otolaryngology, dentistry and anaesthesia which are at greater risk by virtue of proximity to patients and greater exposure to aerosols in the course of care.²⁴

Access to the health facilities should be limited as much as possible to only emergencies. Alternative means of care for the elderly and vulnerable with chronic diseases such as telemedicine and telephone appointments could be explored.²⁵

Control strategies for managing patients include:

Screening and triage of patients

All patients presenting to entry points of care in the hospital - emergency or outpatient department - should be screened and should undergo risk assessment for possible COVID-19 infection based on the local criteria for case definition.²¹ There are Nigerian case definitions available at https://covid19.ncdc.gov.ng/media/files/Case_Definition.pdf published by Nigeria Centre for Disease Control (NCDC).

The triage area should be well-ventilated, and screening can be carried out using a standard checklist and an infrared thermometer.^{21,26} Patients with respiratory or other symptoms of COVID-19 should be prioritised and isolated for further evaluation and subsequent referral or management.²¹ Social or physical distancing of about two meters is effective in reducing transmission and should be maintained between individuals at all times in waiting areas and consulting rooms.^{24,26} Contact time with patients should be minimised. Observance of standard precautions should be the norm for all patients, while additional precautions should be introduced while caring for suspected or confirmed COVID-19 patients.^{21,24,26,27}

Maintenance of respiratory and hand hygiene

All patients and health workers should wear facemasks within the hospital.^{28,29} In particular, COVID-19 patients and patients with respiratory symptoms should wear medical masks.³⁰ The need to practice appropriate respiratory hygiene which includes coughing into the crook of the elbow or into a tissue (discarded immediately with subsequent handwashing) should be regularly communicated to patients. They should also be encouraged to wash their hands regularly and appropriately. There should be handwashing stations with liquid soap and running water or alcohol-based hand sanitizers at strategic points in the hospital. Veronica buckets

(a bucket with lid and tap) are feasible alternatives in the absence of running water.³¹ Furthermore, HCWs should routinely practice the five moments of hand hygiene as follows: before touching a patient, before performing clean or aseptic procedures, after being exposed to body fluids, after touching a patient and after touching patient surroundings.³² Information, Education and Communication (IEC) materials on hand and respiratory hygiene should be printed and conspicuously displayed for staff, patients and visitors.

Management of confirmed cases

Confirmed cases should be managed in designated isolation wards by dedicated HCWs using disposable medical equipment if possible such as stethoscopes and thermometers.²² Items designated for use in COVID-19 isolation centres should be restricted for use alone at such places and decontaminated adequately before being used elsewhere. Contact and droplet precautions, as well as airborne precautions for aerosol-generating procedures, are recommended at all times.²⁹ HCWs should use full PPEs, especially for aerosol-generating procedures and adhere to safe practices in wearing and discarding them. Infection transmission to HCWs and other non-COVID-19 patients can be reduced by having a designated team of HCWs working in the isolation units and regularly monitoring them for possible signs of infection.

Use of Personal Protective Equipment (PPE)

Personal Protective Equipment (PPEs) are used to protect the wearer from injury or exposure to infection in the workplace.^{27,29,33} They are effective when used in conjunction with other infection prevention and control measures.^{10,29,33,34} Medical masks should be worn by all HCWs in contact with patients while respirators (N95, FFP2) should be reserved for aerosol-generating procedures.^{29,30} HCWs directly caring for COVID-19 patients should wear appropriate medical masks, gowns, gloves and eye protection. Also, cleaners should use heavy-duty gloves and boots or covered work shoes.^{29,30}

Protective body covers could be non-water resistant medical gowns used with aprons, water-resistant

surgical gowns or one-piece hazardous materials suit (HAZMAT suits) which may have an in-built breathing apparatus.³⁵ The preferred material is non-woven polyethylene, polyester or polypropylene fibres because of its hygroscopic property.³⁵ The ideal body cover for SARS-CoV-2 should be of adequate standard and offer a level four barrier protection against fluids and viruses.³³

Shortage of Personal Protective Equipment (PPE) has been a recurring problem across health systems globally and can jeopardise the safety of HCWs.³⁶ In view of this, point of care risk assessment is necessary to ensure that they are judiciously deployed and rationally used based on need. Other measures to circumvent shortages include minimising patient contact (telephone consulting or telemedicine and use of physical barriers), postponing non-urgent procedures, and designating a team of HCWs to run the isolation wards so that PPEs can be used by fewer people and for longer periods.²⁹ Facilities can plan ahead by monitoring usage and conducting regular inventories in order to ensure prompt supply as needed for all health workers.³⁷

Laboratory safety measures

All laboratory specimens should be considered potentially infectious, and laboratory workers should strictly abide by standard precautionary and biosafety measures in collecting, transporting and testing samples.²¹ The microbiology section of laboratories handles respiratory samples. As such, health workers there are at highest risk of coronavirus infection. COVID-19 suspected specimens should be handled with utmost precaution by trained staff and testing should be carried out in certified laboratories.³⁸ Respirators and appropriate PPEs should be used during swab collection and other aerosol-generating procedures. The CDC recommends that routine viral tests be carried out in Bio Safety Lab 2 (BSL2) using standard precautions. In contrast, viral concentrating procedures should be carried out in BSL3 labs using BSL 3 precautions, including the use of certified Class II Bio Safety Cabinets (BSC).³⁹ It also recommends decontamination of equipment and work surfaces, and waste management based on standard protocols for COVID-19 decontamination and biohazardous laboratory waste disposal,

respectively.

Environmental cleaning and waste management

Environmental cleaning and waste management measures are vital to prevent infection from contact with contaminated surfaces and waste. They should be carried out by trained personnel using appropriate PPEs including face mask, face shield, goggles and heavy-duty boots and gloves.^{22,40}

Cleaning and disinfection should be consistently and appropriately carried out according to local regulations. Ideally, all floors and surfaces should be washed with soap or detergent, then disinfected at least once a day.^{40,41} Linen should also be washed with detergent and then disinfected with hypochlorite solution.⁴¹ Frequently touched surfaces like doorknobs, stair railings and furniture should be wiped down and disinfected with hand sprays if possible.⁴¹ The WHO recommended solutions for disinfection are 0.5% sodium hypochlorite and 70% ethyl alcohol for small reusable equipment that may be damaged by hypochlorite.⁴¹

Waste products should be considered as clinical waste category B.⁴² Waste should be disposed of in appropriate equipment such as colour-coded (general, infectious, sharps) and pedal-operated bins.^{10,29,41} Trained staff kitted in proper PPE as defined in the current and relevant guideline should dispose of waste according to local regulations. Waste could be treated and subsequently disposed of off-site. Facilities should anticipate an increase in waste generation because of an increase in PPE use. This may be minimised by using and disinfecting reusable plastic PPEs where possible.⁴¹ They could also consider on-site autoclaving and incineration as alternative waste management strategies.⁴⁰

Conclusion

The SARS-CoV-2 is a highly infectious pathogen which has already infected millions of people and caused hundreds of thousands of deaths. Maintaining safety in the clinical space during this pandemic is a challenging but important and multidisciplinary task. It is necessary to ensure that health care facilities can continue to discharge their duties efficiently without compromising the health and safety of health care workers or patients. It requires active cooperation and participation by all parties to be effective - patients, health

administrators and health care workers. Appropriate training and retraining of staff, communication and adherence to infection prevention and control strategies are key to achieve the health and safety of health care workers.

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