



RESEARCH ARTICLE

Infection prevention and control during the COVID-19 pandemic: challenges and opportunities for Kenyan public hospitals [version 1; peer review: 2 approved]

Michuki Maina ^{1,2}, Olga Tosas-Auguet³, Mike English ^{1,3}, Constance Schultsz^{2,4}, Jacob McKnight³

¹Health Services Research Group, KEMRI Wellcome Trust Research Programme, Nairobi, Kenya

²Department of Global Health, Amsterdam UMC, University of Amsterdam, Amsterdam, The Netherlands

³Nuffield Department of Medicine, University of Oxford, Oxford, UK

⁴Amsterdam Institute for Global Health and Development, University of Amsterdam, Amsterdam, The Netherlands

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Abstract

Background: Infection prevention and control, and water sanitation and hygiene have an essential role in ensuring the quality of care and patient outcomes in hospitals. Using a modification of the World Health Organization's water sanitation and hygiene facility improvement tool, we undertook assessments in 14 public hospitals in Kenya in 2018. The hospitals received written feedback on areas where they could make improvements. Following the first confirmed cases of COVID-19 in Kenya, we were drawn to ask whether the results of our pre-pandemic survey had led to action, and whether or not the threat of COVID-19 had focused more attention on infection prevention and control and water sanitation and hygiene.

Methods: Using a semi-structured interview guide, we carried out phone interviews with key hospital leaders in 11 of the 14 hospitals. The data were transcribed and coded into thematic areas. We draw on these interviews to describe the status and awareness of infection prevention and control.

Results: The infection prevention and control committee members are training health workers on infection prevention and control procedures and proper use of personal protective equipment and in addition, providing technical support to hospital managers. While some hospitals have also accessed additional funds to improve infection prevention and control, they tended to be small amounts of money. Long-standing challenges with supplies of infection prevention and control materials and low staff morale persist. Crucially, the reduced supply of personal protective equipment has led to fear and anxiety among health care personnel.

Conclusions: As funds are mobilised to support care for COVID-19, we ask that funds prioritise infection prevention and control measures.

Open Peer Review

Reviewer Status

	Invited Reviewers	
	1	2
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10 Sep 2020	report	report

1. **Angela Dramowski** , Stellenbosch University, Cape Town, South Africa

2. **Lydia Okutoyi**, Kenyatta National Hospital, Nairobi, Kenya

Any reports and responses or comments on the article can be found at the end of the article.

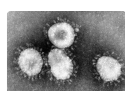
This would have a profoundly positive effect on within hospital virus transmission, patient and staff safety but also lasting benefits beyond the COVID-19 pandemic.

Keywords

Water Sanitation and Hygiene, Infection Prevention and Control, COVID- 19



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Corresponding author: Michuki Maina (mmaina@kemri-wellcome.org)

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Introduction

Improving water sanitation and hygiene (WASH) and infection prevention and control (IPC) in medical facilities is crucial to the fight against COVID-19 in all countries, but particularly so in those countries with long-standing problems in maintaining effective infection control¹. Hospitals are now thought to have been significant sites for COVID-19 infection spread in some of the countries worst affected by the pandemic². Ensuring effective infection control in hospitals protects patients and health workers, improving worker confidence and morale. Maintaining a healthy workforce is essential to the COVID-19 response and the provision of all other health interventions³.

We conducted a WASH survey of 14 Kenyan hospitals in 2018. We adapted the World Health Organisation's WASH facility improvement tool to explore performance differences between hospitals and between wards in individual hospitals⁴. We found a wide degree of performance variation and particular problems in hand hygiene and waste management infrastructure. We also proposed accountability structures to facilitate improvements in WASH^{5,6}. All the 14 original hospitals had an IPC focal person who was trained to conduct WASH-FAST surveys and had surveyed at least four hospitals, including their own; each hospital received detailed site-specific feedback on their results. We hoped that this feedback and the training given to local focal points might prompt local post-survey WASH and IPC improvement efforts.

The first confirmed case of COVID-19 in Kenya was announced on 12th March 2020. This was accompanied by extensive media coverage and citizen education on COVID-19, including the importance of social distancing and proper hand hygiene. At this point, the main policy measures implemented by the government included quarantine of travellers returning to Kenya, the suspension of public gatherings and the setting up of a national COVID-19 isolation unit in Nairobi⁷. No restriction of movement or curfews were executed at this point. Following the first confirmed cases, we were drawn to ask what actions had occurred, and whether or not the threat of COVID-19 was focusing more attention on IPC and WASH. On 2nd April 2020, we contacted the hospital staff who previously led the WASH surveys. By this date, there were 110 confirmed cases around the country, and the main government interventions included restriction of movement and a nationwide dusk to dawn curfew. The government, through the regional governments, had embarked on setting up COVID-19 isolation units in multiple county hospitals⁸. As April proceeded, Kenya requested World Bank funding for these isolation units, for training and for the purchase of ventilators to improve intensive care capacity⁹.

Methods

Interview data collection

We conducted semi-structured phone interviews in April and May 2020. Each interview lasted approximately 20–30

minutes, with the consent of 11 representatives of the original 14 hospitals, (the semi-structured interview template can be found in the online data repository). The respondents were medical officers, dentists, pharmacists, non-physician clinicians, nurses, and public health officers. Of these, one was a hospital director, and another was in charge of hospitals across the administrative region (sub-county). The interviewees comprised a balanced mix of gender, age and experience. The semi-structured interview instrument used was informed by data collected from the previous surveys. The interview guide was prepared by all the authors, who consisted of a mix of clinicians, epidemiologists, health system experts and medical anthropologists. The authors are also very familiar with the Kenyan health system and IPC context and were all actively involved in the previous IPC/WASH surveys in 2018^{5,6}. The first author conducted the phone interviews. The first author, who is a Kenya doctor, also led the original surveys and is familiar with the health system context. . Field notes were not taken. Background information concerning the study and interview was available to these interviewees before consenting. As interviews were conducted over telephone, all respondents gave verbal informed consent for the interviews.

Analysis of data obtained from interviews

We sought to understand if any changes or improvements had occurred within the hospital for each area we had previously analysed^{5,6}. We then asked how the present COVID-19 pandemic was affecting efforts to improve the WASH infrastructure and IPC, how the facility was preparing for COVID-19 patients and how the pandemic had affected hospital and health worker activities. The audio files of each interview were transcribed and uploaded into NVivo 12 and kept on an encrypted laptop. The first author coded the transcripts independently before discussing the codes and agreeing on combined axial codes and thematic areas with the last author. The findings from these themes illustrated using quotes. No repeat interviews were conducted. A Consolidated criteria for Reporting Qualitative research (COREQ) checklist was completed and is included in the data repository¹⁰. Summary data are available, see *Underlying data*¹⁰.

Ethical approval

This study received approval from the Oxford Tropical research ethics committee (OXTREC) from the University of Oxford (Ref: 525–17) and the Kenyan Medical Research Institute (Ref: KEMRI/SERU/CGMR-C//086/3450).

Results

Infection control status and awareness improved

Our original survey had noted the low performance of WASH and infection control. Previously, staff responsible for hygiene issues contrasted infection control committees with those of more prestigious domains, such as the medicines committee, and complained that members did not attend meetings. Since the emergence of COVID-19, this has changed and the roles played by the IPC committees have gained more focus and importance.

“Actually, right now people are more responsive, previously you call people on things to do with IPC and all that people used to take it for public health workers and all that. But now we are even having the consultants attending.” IPC Committee Member.

IPC committees are also now being asked to offer technical advice to managers.

“But now we also do have supervision. The committee does the supervision within the hospital, and then reports whatever we have agreed and seen to the CEO.” Hospital IPC coordinator.

Hence, infection control has become an urgent priority, and the interviews revealed hospital staff at all levels are now concerned about IPC best practice. This may be due to the fear of contracting COVID-19 at work, and it was clear that these concerns are leading to a great deal of anxiety:

“There is a lot of fear initially the time we were starting out. And after the once who have gone through things change for example initially, they could say they can’t see patients without an N95 mask, but after the training on which masks to be worn where people become more confident. The element of fear and anxiety is still there, but the ones who attend the training it becomes less.” IPC Leader.

Positive changes

The interest in preparing for COVID-19 has resulted in positive actions in several areas: In some of the facilities, this has offered an opportunity to increase the IPC supplies and infrastructure including hand hygiene facilities in the hospital, albeit some of these are temporary.

“I believe that after this we will go far, we never had sanitisers before, these days we have sanitiser.” Hospital IPC leader.

Where previously budgets for IPC activities were non-existent, in some hospitals some funds are now available specifically for IPC activities.

“I don’t know where the med sup [Medical Director] got some little money. Almost USD 1500, he was telling us to come up with a budget. We sat last week. And we have given the proposal to him.” IPC Committee Leader.

Some of the facilities reported an improvement in the cleanliness standards. This was mainly through reallocation of cleaning staff and increased supervision in critical areas of the hospitals to ensure these were regularly cleaned, and waste management was improved.

“And then the cleanliness, we improved on the supervision. Yeah, we got another public health officer. And we got at least two supervisors for the cleaning company. And then

with the supervision, there is some, there is an improvement.” IPC Lead.

Some of the facilities reported significant improvement in WASH infrastructure including fixing of hand hygiene stations;

“The sinks even if they are not fully functional, maybe we are over 90% there. Because at least you can repair one and it gets spoilt. But I’m telling you we are very far. That one we have done it.” IPC Lead.

Ongoing IPC challenges

While the respondents noted areas of improvement, the overall assessment of our respondents suggested that long-standing issues had not been adequately resolved. These include challenges with waste management, infrastructure and funding. Some of the areas where challenges persisted included in infrastructure where, for example, poor quality fixtures of hand hygiene (taps and pipes) led to frequent breakages and leaks. Other areas with long-standing challenges were waste management and funding for IPC activities. All these play a critical role in service delivery and staff morale.

“The other challenge is that currently, our incinerator is down. So, we are not able to offer incineration services. Both in house and even anyone from outside. So, what we are doing right now we are disposing our waste off sight.” IPC Committee Leader.

“But of course, here, staff morale has gone down because of the issue of salaries – it’s so delayed. Like now, we have not even got our salaries you can imagine.” Hospital Manager.

Newer challenges have also emerged. Though some of the IPC supplies are present, in some facilities, the supply diminishes rapidly due to theft and misuse.

“Even the soap, you put it outside there, and the following day even the container is not there. Yes, sometimes we put the soap there and the relatives of the patients when they come in, they think that maybe that is the soap they should be using for washing clothes. They drain it all out in the basins when they come across it. They are taking it away.” IPC lead.

Health worker safety

In addition to these long-standing issues, a host of new issues related to the pandemic response have been raised, and most prominent among these are concerns about the safety of health workers. These include challenges in the acquisition of personal protective equipment (PPE) for both clinical and support staff.

“Right now, it’s not adequate because we are yet to get the gowns, the masks and the gloves we have. But the gowns which I think we really need we don’t have. But at the designated areas they have some.” IPC Leader.

The lack of PPE is strongly related to levels of anxiety and concerns about the ability of the workforce to do its job:

"Yes, we are very, very anxious. We are so worried about ourselves, our safety before even the patients because we have families definitely. So, there is this sort of some attitude." Doctor.

"Everybody is worried. Everybody, but if they provide people with enough PPE'S, nobody is there to worry. People are ready to work." IPC Leader.

Health seeking behaviour in the COVID-19 pandemic

In terms of patients seeking care for other ailments, we noted the numbers have significantly reduced in the facilities. However, the hospitals that serve large populations still have to contend with crowding. This is a challenge in reducing hospital-acquired infections.

"The management had decided to halt outpatient clinics; unfortunately, we still have a problem with that. like today is our Gynaecology Outpatient Clinic, so we expected we wouldn't have any patients, but apparently, we were so disappointed when we found like about thirty patients and you know they are all crammed together, there is no even social distancing or anything" Medical Doctor

We contrast this to other facilities where numbers are worryingly low. The concern is some of these patients will lack much-needed care. This may, in the long run, affect the gains made in reducing the infant and maternal mortalities in the region.

Key insights

Huge opportunity for improvements due to status change and interest.

The considerable importance of WASH and IPC in addressing COVID-19 provides a real opportunity for improvement of IPC in health facilities. The existing structure of IPC committees and coordinators, and public health officers, could offer a real opportunity for highly efficient use of COVID-19 funds. A bottom-up approach would ensure funds are allocated where they are needed. Some hospitals have embraced this and are making positive changes, even with limited resources.

"...I was given the responsibility of like a coordinator; I usually go around on a daily basis. You decide today to go to the medical department, maybe the following day you can go to maternity, you can go to paediatrics. You look at the way they are segregating you find that they are not doing it properly you just correct them." IPC Lead.

Structural weaknesses, long-standing issues need to be prioritised and dealt with urgently.

The issues of lack of crucial infrastructure still exist. These include poor waste disposal, plumbing to guarantee water supply in the wards and proper ventilation. Improving plumbing and access to appropriate sinks are some of the interventions that can be effected quickly. Others may include long term investments

like improving ventilation within the hospitals by the installation of exhaust fans. Other long-term investments would consist of setting up/building fully-fledged isolation units.

However, these investments need to be prioritised in budget allocations as they are essential for the appropriate management of COVID-19 and other infectious conditions which are prevalent in our region. Investing in IPC and WASH would greatly complement the efforts being put to improve the availability of oxygen and critical care support in some of the hospitals in our survey and across the country.

Health systems challenges

The greatest risk COVID-19 poses in our context is a health system collapse. In most facilities, though the patient load has significantly reduced, there is still a need to ensure the health system does not get overwhelmed by COVID-19. Health system collapse and closure of services such as maternal and child health would result in tragic increases in maternal and child mortality¹¹.

There have been numerous reports of frontline health workers globally contracting COVID-19 in the line of duty and some due to lack of proper PPE^{12,13}. If health workers do not feel safe while offering services, some may choose to stay away or take industrial action, including strikes. Strikes have been frequent in Kenya and the region with devastating effects, and there are ongoing negotiations to avert a looming health worker strike in the country^{14,15}. Motivating staff and ensuring safe working conditions, including PPE, training and treatment if they fall ill needs to be a priority at this time. With already low staff numbers, staff staying off work due to illness or fear of COVID-19 as a result of weak IPC structures would easily overwhelm service delivery within hospitals.

We can seize this moment to make things better not only during this pandemic but for years to come.

"but again, COVID- 19 is a blessing in disguise it's not the right phrase to use but I think this COVID coming, it's a wakeup call to all these people who were like taking things for granted. Our health system is in trouble; it has been in trouble all through, now at least they are seeing." Medical Doctor.

Conclusion

Effective treatment of COVID-19 relies on effective IPC and WASH and funds must be immediately directed towards this in low- and middle-income countries such as Kenya where performance is often poor. These gains could have long-lasting positive effects for other huge issues facing hospitals such as antimicrobial resistance and hospital-acquired infections. We believe that investing in IPC should be prioritised in advance of setting up critical care units as part of the COVID-19 response⁹. If we wish to mitigate the effects of COVID-19 on health systems and avert the collapse of an already stretched health system, IPC and WASH should be recognised as a major policy priority. Staff safety should be prioritised by

availing proper PPE for health workers in their line of duty and during procedures that are aerosol-generating to ensure they remain disease-free.

Data availability

Underlying data

Harvard Dataverse: Replication Data for: Water Sanitation and Hygiene in Kenyan Hospitals. <https://doi.org/10.7910/DVN/IJU-WWR>¹⁰.

This project contains the following underlying data:

- WASHKenya.tab. (Summary data for this study.)
- codebook_Michuki_WASH.pdf. (Codebook for the above data file.)

Access to the transcripts is restricted since they contain identifying information about participants. Applications for access of the study transcripts can be made through the Data Governance Committee (dgc@kemri-wellcome.org). Further details are available at <https://kemri-wellcome.org/about-us/>. This contains [guidelines for how to apply for access](#) and an [application form](#).

Extended data

Harvard Dataverse: Replication Data for: Water Sanitation and Hygiene in Kenyan Hospitals. <https://doi.org/10.7910/DVN/IJU-WWR>¹⁰.

File 'MainaetalPC_supplement.docx' contains the questions asked to each participant.

Reporting guidelines

Harvard Dataverse: COREQ checklist for 'Infection prevention and control during the COVID-19 pandemic: challenges and opportunities for Kenyan public hospitals'. <https://doi.org/10.7910/DVN/IJUWWR>¹⁰.

Data are available under the terms of the [Creative Commons Attribution 4.0 International license](#) (CC-BY 4.0).

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Open Peer Review

Current Peer Review Status:  

Version 1

Reviewer Report 05 November 2020

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Lydia Okutoyi

Department of Quality and Patient Safety, Kenyatta National Hospital, Nairobi, Kenya

1. General comments: The study conducted among health facilities that had previously been part of a WASH assessment by the first author. This gave a basis for having a prior assessment of the WASH related structures and processes before the pandemic. Given the current situation phone interviews were an easier option and safer option too. I would have liked to know whether the same staff were interviewed, 2 years is a long time. Among the staff who participated in the previous WASH study, getting a realist assessment of what changes happened after the WASH, and which changes are attributable to COVID 19 response. I would be interested to know the match between the WASH tool used for assessment and the guiding questions for this study. Qualitative methods enabled better understanding of the various experiences with regards to staff safety, leadership and un-intended effects of having scarce recourses available in the facilities. The coding for themes was well done.
2. Provide answers to our mandatory reviewer questions: The work is accurate as provided and cites existing literature. The findings are generally replicable in Kenyan public sector. Having lead the IPC efforts in KNH I concur with the findings. They are generally replicable as much as qualitative survey may depict peculiar experiences. The documented experiences have been reported in media and some at a public hospital I work at.. The study design is appropriate in the COVID Era.
3. Generally Approved. Consider the comments in the text above.

Is the work clearly and accurately presented and does it cite the current literature?

Yes

Is the study design appropriate and is the work technically sound?

Yes

Are sufficient details of methods and analysis provided to allow replication by others?

Partly

If applicable, is the statistical analysis and its interpretation appropriate?

Yes

Are all the source data underlying the results available to ensure full reproducibility?

Yes

Are the conclusions drawn adequately supported by the results?

Yes

Competing Interests: No competing interests were disclosed.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Reviewer Report 22 September 2020

<https://doi.org/10.21956/wellcomeopenres.17815.r40415>

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Angela Dramowski 

Department of Paediatrics and Child Health, Faculty of Medicine and Health Sciences, Tygerberg Hospital, Stellenbosch University, Cape Town, South Africa

This timely study uses telephonic, semi-structured interviews with hospital representatives to document changes in IPC and WASH programme implementation and performance at 11 Kenyan hospitals. The findings of the survey are contrasted with data reported from a 2018 survey of 14 Kenyan hospitals, which documented widespread shortcomings in WASH and IPC infrastructure and organisation. Using thematic analysis, the authors describe improvements in IPC awareness and programme status, increased provision for hand hygiene and increased facility cleanliness following the emergence of COVID-19 in Kenya. Despite small increases in budgetary allocation to IPC activities, many challenges remained or emerged including waste incineration, theft/removal of IPC consumables and shortages of PPE required for COVID-19. Participants raised concerns regarding health care worker safety during the pandemic and the likelihood of service disruption owing to staff absences (illness and absenteeism due to fear) or even strike action. The authors accurately convey the ongoing challenges to IPC in African healthcare facilities and describe how these have been further amplified by COVID-19. The authors advocate for prioritisation of funds to strengthen IPC and WASH programmes, so that some of the IPC "gains" during the COVID-19 pandemic may have a lasting impact on healthcare quality, patient and staff safety. This is an important manuscript that warrants indexing with no substantive changes required.

Is the work clearly and accurately presented and does it cite the current literature?

Yes

Is the study design appropriate and is the work technically sound?

Yes

Are sufficient details of methods and analysis provided to allow replication by others?

Yes

If applicable, is the statistical analysis and its interpretation appropriate?

Not applicable

Are all the source data underlying the results available to ensure full reproducibility?

Yes

Are the conclusions drawn adequately supported by the results?

Yes

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Infection Prevention and Control.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.
