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REVIEW ARTICLE

Strategic implementation of dental infection control in resource-poor jurisdictions during COVID-19 pandemic: a perspective from South Africa

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ABSTRACT

Background: The coronavirus disease-19 (COVID-19) pandemic caused by the severe acute respiratory syndrome Coronavirus −2 is unceasing, and the consensus is that the dental profession has to co-exist with this vicious foe for the foreseeable future. Dental professionals in resource poor countries, as opposed to those in developed countries, face additional challenges due to the lack of personal protective equipment, and chronic infrastructural impediments extant in such jurisdictions, such as regular and chronic interruptions to electricity and water supplies.

Objectives: To address this new 'normal' which dictates that dentistry has to 'adapt and adopt' in order to deliver care to the needy, particularly in resource poor nations, whilst care deliverers take appropriate precautionary measures to obviate cross infection.

Methods: A review was preformed of the challenges to delivery of infection control measures in dentistry in resource meagre settings, and practical interventional measures proposed to mitigate these challenges, taking South Africa as a case study.

Results: In reality, optimal infection control measures cannot be implemented in delivering dental care in resource poor settings, a challenge that has been ill addressed by the relevant authoritative bodies. A re-adaptation of infection control guidelines that could be simply implemented in such settings has been formulated.

Conclusion: We present practical infection control guidelines to lessen the burden of dental professionals in resource poor countries who dispense treatment under trying circumstance. The strategic infection control measures, including engineering and administrative controls outlined could be applicable in jurisdictions with a diminished capacity to respond to local, regional or national infection control guide-lines, due to financial, regulatory, or other infrastructural resource deficiencies.

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Introduction

The coronavirus disease −19 (COVID-19) pandemic, due to the severe acute respiratory syndrome coronavirus −2 (SARS-CoV-2), is unceasing, relentless and has spared no country. At the time of this writing, in mid-July 2020, more than 14,600,000 million cases of COVID-19 have been reported globally. In South Africa there are currently more than 360,000 cases of COVID-19 and the country occupies the unenviable fifth position amongst the 215 countries where the disease is prevalent [1]. The COVID-19 numbers double in every 2–3 weeks in South Africa, and there are no signs of waning of infections despite the fact that the country has been placed under various levels of lockdown for over 3 months [2].

Dental care delivery during the pandemic has been an unprecedented challenge for the profession. Although up to now there has been no reported nosocomial transmission of SARS-CoV-2 in dental settings, dentists are considered to be the group of healthcare workers at highest risk for contracting COVID-19 according to an analysis by the O*Net Bureau of Labour Statistics of the USA [3]. This is likely to be due to the nature of their work associated with aerosol generating procedures (AGP) and working in very close proximity to their patients during dental treatment [4,5].

To mitigate infection transmission in dentistry, various infection control measures have been promulgated by several regulatory bodies and these remain as the most trusted and pivotal ally in the battle against SARS-CoV-2 [6]. Yet, adherence to these guidelines and regulations is dictated not only by the availability of the various personal protective equipment (PPE) but their affordability and availability, especially in developing countries, such as South Africa [7]. Moreover the situation is further complicated by the fact that dental care is not well regulated in the country and not even considered as one of the essential components of the primary health care system. Similar to many other jurisdictions, South Africa has major gaps in response capacity to the pandemic, especially in the provision of personal protective equipment (PPE) [8]. We examine below some of these challenges and propose practical interventional measures to protect dental healthcare workers (DHCWs) as well as the patients both in South Africa and other resource meagre

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settings. The strategic measures we have outlined could be applicable in any jurisdiction with a diminished capacity to respond to local, regional or national infection control guidelines, due to financial, regulatory, or infrastructural resource deficiencies.

The extant challenges

The challenges faced by the dental community in the provision of dental care to the needy must be considered in the context of the overall societal structure and the norms of a country. South Africa, like many resource-poor countries, have existing unresolved infrastructure challenges such as intermittent lack of electricity and running water [9–11] that hamper implementation of infection control measures.

The situation is further complicated by the widespread human immunodeficiency virus (HIV) and tuberculosis (TB) infections [12] in Sub-Saharan regions, with many untested and untreated individuals circulating in the community. The COVID-19 pandemic has led to major interruptions to the treatment programmes for HIV, TB and other chronic conditions [13]. Hence, as was the case with the Ebola crisis in West Africa, the focus on the pandemic has become all-consuming with many other diseases pushed to the background [14].

The accompanying societal problems are also virtually overwhelming. Families are larger, housing is poor, with loss of income consequential to virus-related unemployment, lack of sanitation and dependency on overcrowded public transport, all of which contribute to an increased risk for COVID-19 spread [10,15,16]. These vulnerable members are also those who are dependent on government dental services. Their demand for urgent dental treatment for pain and sepsis, (as the only dental treatment they ever seek), continues, independent of the pandemic or lockdown restrictions [11].

Additionally, as a result of the severe downturn in the economy and loss of employment [17], patients who previously would have sought treatment from private health care facilities are likely to report to the government clinics, requesting routine treatment which would require aerosol generating procedures.

Implementation of infection control in resource poor countries

As mentioned, dental practice and aerosol generation are inextricably linked due to interventional procedures that generate copious volumes of droplets, splatter and aerosol [4,5]. The regulatory measures for dental professionals advocated by many organisations, can be relatively easily implemented in resource-rich, first-world nations where personal protective equipment (PPE) is available and clinic decontamination and other instructions could be readily realised [18–22]. On perusal of the literature we were unable to locate any publications on strategic and coordinated response to dental services in resource-constrained, developing countries during the current pandemic, apart from a single, short opinion piece from Pakistan [23].

In South Africa, the official numbers of dental professionals who have contracted COVID-19 since the start of the pandemic is unclear. Additionally, it is known that dental professionals, particularly in developing nations such as India are experiencing high levels of anxiety and fear on returning to service [7,24]. We believe this is to be true for South Africa as well, although no surveys have been undertaken thus far. Most mitigating measures against virus spread suggested for high-income countries, such as telephone-triage to screen patients and limiting the numbers of patients who report to clinics are, for various reasons, not a viable option for low-income countries [19,25]. Temperature scans or the most meticulously performed triage to determine a possible underlying SARS-CoV-2 virus infection cannot guarantee that a patient is not infected. This is further complicated by asymptomatic carriers who may turn up for treatment [21]. Limiting dental care to a few selected centres is also not feasible due to long distances that patients have to travel to reach the clinics, and not having the means to cover their transportation costs [26].

Strategic infection control initiatives to mitigate viral spread

On the face of these colossal challenges, and particularly due to the lack of critical PPE necessary to render safe care, what action should be taken by the dental care professionals in resource poor countries? We believe that the strategic action plan for infection control procedures outlined below, though not an exhaustive list, will go some way in redressing the situation and provide the DHCWs some measure of comfort rendering all essential acute clinical services. These measures could be broadly classified as administrative controls and engineering controls [27].

Administrative controls

- Simple, cheap, reliable, no-touch, electronic thermometers (at least two) should be available to check the temperature of all patients, accompanying persons (if any), and all clinic staff and administrative staff *at the entrance* to the clinic. A dedicated dental assistant should perform this task.
- If the patient is ambulant, he/she should be given a card with an appointment time and be requested to wait outside the clinic until called to enter the clinic; an accompanying person should not enter the clinic unless absolutely necessary.
- Dearth of respiratory protective equipment, in particular face masks and face shields are a universal challenge for HCWs. This could be alleviated by the local production of (optimally, three layered) cloth masks that could be washed, sterilised and reused, according to standard guidelines. A face shield, fabricated from a rectangular transparent plastic, and attached to a plastic frame, should be worn over the mask. The major advantages of face shields are that they are inexpensive, easily

fabricated, reusable after disinfection, while protecting the conjunctiva as well as the facial skin from contaminated splashes.
- If disposable plastic gowns are not available, these could be fabricated using large, white, thin, plastic bags by cutting holes at the top, for the head, and laterally, for the arms; this is however an extreme measure to protect the clothing from spatter and splashes. Such materials should be aseptically disposed of after each session.
- The critical importance of the face mask and shield should be communicated and the staff encouraged to fabricate their own face masks and shields, if these are in short supply.
- Continue with universal precautions with heightened vigilance and dedicated procedures in relation to hand sanitisation and surface disinfection.
- If a water supply is intermittently interrupted a water reservoir should be installed either within or outside the clinic premises with a provision for dispensing the water (such as a tap at the bottom of the supply) to obviate the contamination of the main reservoir, the water in the reservoir should not be allowed to stagnate for a prolonged period.
- Replace aerosol generating procedures (AGP) as far as possible with hand instrumentation as per the standard guidelines of local/regional dental advisory bodies.

Engineering controls

- If feasible, a supply of surgical face masks should be kept in the clinic for those who enter the clinic without a mask.
- Hand sanitiser dispensing bottle/equipment must be provided at the entrance to the clinic.
- Ensure that existing saliva evacuation/suction units are functional and thoroughly disinfected after each treatment session.
- The furniture and the interior of the dental clinic should be assessed, and if necessary, rearranged to allow for maintaining safe social distancing; all unnecessary material such as book racks, magazines and newspapers, that may act as vectors of infection transmission (fomites) should be removed from the clinic and the reception areas.
- The routeing within the dental clinic should be arranged in such a way that both DHCWs and patients are able to maintain distance from each other when DHCWs are not wearing PPE. Social distancing between DHCWs should also be maintained when not caring for a patient.
- As virus infested aerosols can lurk in the air for hours in unventilated rooms, good ventilation of both the clinic and reception areas are critical for mitigating disease spread. Hence, care should be taken to ensure that the air conditioning systems in clinic/reception areas are effective and efficient.
- Open all the windows as much as possible in the clinics and reception areas, in rural, small clinics where air conditioning may not be available. This action should be followed whenever there is an interruption to the electricity supply, as frequently happens in the developing world economies.
- If possible, space out-patient treatment once every 30 min, to make room for adequate surface disinfection and ventilation, although this may not be feasible in busy clinics.
- Infographics on hand washing and mask donning and doffing procedures, and those related to COVID-19 spread etc., should be prominently displayed in the local language in the reception areas.
- After each clinical session removal/doffing of PPEs should be performed in a designated area of the clinic, prior to their disposal or disinfection, as required.

Behavioural issues

Apart from the above, as behavioural changes are an essential prerequisite for proper implementation of infection control measures extra attention must be paid to create a sense of such awareness amongst the dental team members [4]. Continuous professional development courses such as webinars on infection control and virtual teaching tools, freely available in the worldwide web, must be provided to the whole dental team to meet the dynamic, and changing educational demands related to the pandemic [28].

Sensational reporting on COVID-19 contracted by HCWs due to lack of PPE, has regrettably created fear and stigmatisation of dental care workers as well [8]. Having to work under conditions of inadequate PPE, adds to this fear and anxiety, eventually resulting in mental health issues such as depression among members of the dental team [8]. Employers are therefore urged to communicate regularly and clearly and maintain transparency on such issues to alleviate stress. If trust is to be maintained among employers and employees it is important that employees are regularly informed of all attempts made and existing impediments to obtaining the necessary PPE [29].

Last but not least, an authoritative voice in the country should advocate equal recognition of dental professionals as frontline providers of urgent and emergency health care and need to give them the recognition and wherewithal they truly deserve [8]. In terms of infection control in locales where basic infrastructure facilities are wanting, it is critical that the local and regional health authorities promulgate practical and utilitarian modified infection control guidelines along the lines we have outlined above.

Conclusions

The COVID-19 pandemic is evolutionary, dynamic and unceasing. The consensus is that we have to co-exist with SARS-CoV-2 for the foreseeable future. This new 'normal' dictates that dentistry has to 'adapt and adopt' in order to deliver care to the needy whilst we ourselves, as care deliverers take appropriate precautionary measures to obviate cross infection. Dental professionals in resource poor countries, as

opposed to those in developed countries, face additional challenges due to the lack of PPEs and chronic infrastructural impediments such as regular interruptions to electricity and water supplies. We have outlined above some of these issues and guidelines that may ameliorate the infectious challenges faced by dental professionals in such jurisdictions, using South Africa as an example. Calls have been made for the equitable allocation of health care resources between the first- and third-world countries and the dental profession in Africa would most certainly welcome such a move, should it materialise.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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