

Medical internship training during the COVID-19 pandemic – a case of ‘sacrificial pawns’ or not?

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Abstract

Background Newly qualified medical practitioners (interns) in South Africa (SA) are part of the frontline healthcare workers who face Africa's most severe COVID-19 pandemic within an environment already burdened with tuberculosis, HIV and trauma epidemics. The experiences of interns during the pandemic reflect SA's preparedness to respond in a crisis and inform strategies that could be adopted to balance training and service in resource-challenged contexts. This study explored the strengths, weaknesses, opportunities and threats posed by the COVID-19 pandemic as reflected on by interns within clinical training platforms in SA.

Methods An online survey tool consisting of ten open-ended questions based on the SWOT framework related to personal and professional perspectives to clinical training during the COVID-19 pandemic was developed using SurveyMonkey. Due to lockdown restrictions, all data were collected remotely with the survey instrument being distributed via the social media platform WhatsApp. Three coders thematically analysed data until consensus was reached.

Results Forty-six first- and second-year interns reflected on personal and systemic challenges as the major threats and weaknesses in intern training during the COVID-19 pandemic. Extrapolating on strengths and opportunities, there were three overarching learnings interns reflected on. These related to being a medical professional, being in a learning environment, and specific learnings realised. Existing challenges in the environment exacerbated the threats posed by COVID-19 and innovative strategies related to improving support, feedback and broadening the intern curriculum were identified. In addition, the use of online training around holistic care and intern evaluation was mooted as an innovation to develop out of this pandemic.

Conclusion Although the clinical environment where interns learn and work is often stressful and overpowered by high service burdens, there are unique opportunities to enhance self-directed learning and graduate competencies, even in the midst of the COVID-19 pandemic.

Background

COVID-19 has substantially disrupted conventional medical practice and training, as this sector became the focal point of heightened engagement due to their crucial role in managing this evolving pandemic. Within this context, a focus on medical interns as part of the frontline workers was needed in order to understand and put in place strategies to support them as emerging medical practitioners. Hence the central question that guided this paper was, "What learning opportunities were possible for medical interns within the context of the COVID-19 pandemic in South Africa?"

Medical interns are at a formative stage of their careers and require a focus on both service delivery and training. For this next generation of healthcare workers who will lead the response to forthcoming pandemics, it is vital to ensure training is optimally managed and that interns learn about "leadership, teamwork, and crisis management".¹ Further, it is at these times of crisis that physician educators are

known to model professionalism to their trainees.² The COVID-19 pandemic created new expectations for both senior and emerging medical practitioners to ensure all staff are well informed and prepared to remain on the frontlines whilst education continues.² This expectation includes that senior staff stand “shoulder to shoulder” with emerging staff to deliver care collaboratively.²

South Africa (SA), a resource-constrained setting, is the African country most severely affected by COVID-19.³ The country’s public health system, already burdened with multiple epidemics of HIV, tuberculosis and trauma, has had to prepare its healthcare workers for the COVID-19 pandemic.^{3,4} This threat, also faced by overburdened public health systems across Africa, was recognised early, and calls were made for a comprehensive strategy to prepare and respond with capacity building amongst healthcare workers.⁵ Despite such efforts, the effects of the COVID-19 pandemic have been stark, with significant numbers of frontline healthcare workers being infected or demising.⁶ The group of frontline healthcare workers in SA includes medical interns. In 2020, 2369 interns were appointed in the largest deployment in South African history.⁷ SA interns work long hours in resource-challenged hospitals where supervision is not uniformly optimal.⁸⁻¹⁰ High levels of stress, anxiety and burnout have been documented in interns in SA prior to the COVID-19 pandemic.¹¹

In this study, we aim to explore the strengths, weaknesses, opportunities and threats (SWOT) of medical internship clinical training within the context of the COVID-19 pandemic. After performing this SWOT analysis we argue that, although interns learning and working are often stressed or overwhelmed by high service burdens, especially in resource-challenged settings, there are unique opportunities to enhance self-directed learning and graduate competencies that are enhanced by communities of practice at worksites.¹²

Methods

Study design

This study adopted a SWOT analysis framework to collect data. A SWOT analysis is a management tool used as an effective situation analysis technique that entails identifying the strengths, weaknesses, threats and opportunities that one encounters in a system.¹³ It is also used for both determining the resource capabilities of a system and as a results-orientated strategic planning tool.¹⁴

Setting

Medical internship in SA incorporates a 24-month salaried training period that certifies medical practitioners for independent practice in the country. Interns rotate through the major disciplines of internal medicine, general surgery, obstetrics and gynaecology, paediatrics and family medicine, with shorter rotations through anaesthesia, orthopaedics and psychiatry. Interns work in the frontlines of specialised referral (regional) hospitals for all the disciplines except for family medicine, where they rotate within non-specialised (district) hospitals.¹⁴ These hospitals are governed by the Department of

Health in each province under the umbrella of the National Department of Health (NDOH).¹⁵ The internship programme is managed by the NDOH through a professional accrediting body, the Health Professions Council of South Africa (HPCSA) Internship Subcommittee.¹⁵ Higher education bodies do not directly oversee internship, although many of the intern supervisors are affiliated to various medical schools.¹⁵

Study methodology

This qualitative study was conducted using an online survey tool developed using SurveyMonkey (SurveyMonkey Inc., San Mateo, California, USA, www.surveymonkey.com). The research instrument consisted of ten open-ended sections related to personal and professional strengths, weaknesses, opportunities and threats to clinical training during COVID-19. Due to the restrictions on social distancing during the national lockdown in SA, all data were collected remotely, with the survey instrument being distributed via the social media platform WhatsApp.

Sample

Medical interns were invited by the investigators using snowball sampling. This is a convenient sampling method when it is challenging to access subjects with the target characteristics.¹⁶ Existing intern subjects recruited future subjects among their acquaintances. Sampling continued until data saturation was reached.¹⁷ All 46 participants provided consent to participate in the study.

Data analysis

The responses to the open-ended questions were framed overall by the participants' understanding of their personal and professional strengths, weaknesses, opportunities and threats related to clinical training during the pandemic. The primary analytical method used was thematic content analysis.¹⁸ Thematic analysis involves looking across the data set to identify common issues that recur and identifying the main themes that summarise all the views collected.¹⁷ Authors individually interpreted and immersed themselves in the data by reading and rereading it several times to identify codes and categories.¹⁹ To enhance the trustworthiness of the authors' interpretations, a research assistant was employed to codify and categorise the data. Themes and subthemes were identified, compared and discussed until consensus was reached. A summary of the themes, with supporting quotes, is given in the next section. To keep their identities anonymous, participants (P) are represented by numbers, which are included with the quotes for purposes of trustworthiness and confirmability.

Results

Of the sampled group of forty-six interns, 42% were in the first year of their two-year internship period, 56% in the second year and 2% unknown. The majority of the interns were female (56%) and single (66%), and most did not have children (91%). Of the total number of 226 responses to open-ended items, 40% related to strengths, highlighting positive aspects, while 46% highlighted the negative aspects related to weaknesses (20%) and threats (26%). Fifteen percent described opportunities that arose as a result of the COVID-19 pandemic. The major themes and subthemes are illustrated in Table 1.

Table 1
Major themes and subthemes

Challenges	
<p>Personal challenges</p> <ul style="list-style-type: none"> • Limited knowledge and experience • Constrained support structures • Safety issues 	<p>Systemic challenges</p> <ul style="list-style-type: none"> • Poor supervision • Unprofessional behaviours • Lack of adequate staffing • Lack of adequate personal protective equipment • Hierarchy in clinical medicine • Compromised learning • Burnout symptoms
Opportunities	
<ul style="list-style-type: none"> • Reflective practice • Support structures to facilitate learning • Enhanced clinical and non-clinical competencies 	

Personal challenges

Interns, having recently graduated from medical school, were thrust into the frontlines during the COVID-19 pandemic. Three themes that illustrated their feelings of personal limitations, vulnerability and neglect were identified.

Limited knowledge and experience

The subtheme of inexperience was unsurprisingly reported by the interns. This often came in the form of phrases that reflected a lack of knowledge or insufficient knowledge.

Limited knowledge to function independently (P11)

I still require experience in the rotations. (P24)

Constrained support structures

The lockdown restrictions and poor access to support structures contributed to or exacerbated stress and anxiety.

Stress caused by lack of access to support structures (family and friends) and lack of stress release – socialising, being outdoors, going on trips (P36)

Safety issues

A major subtheme identified from the data and viewed as a threat was the safety concerns many interns expressed about being infected by COVID-19. These concerns extended to their significant others such as family, partners and older relatives with whom they reside.

Our health is at risk on a new level that hasn't been explored yet. (P25)

How are we supposed to get all the training we need when we are continuously praying we don't die or go home and spread the disease? (P27)

We silently wait to see if we die or not versus how best I can become a doctor. We took an oath to protect. Not to give our life away. (P23)

Living with elderly family members and the need to not want to place them at risk, i.e., move out of the house during COVID time (P1)

Systemic challenges

Systemic challenges related to existing fault lines within the public health system, safety issues specific to COVID-19, compromised learning and the exacerbation of burnout symptoms amongst already anxious and overburdened interns.

Poor supervision

Subthemes around supervision tended to reflect negatively on supervisors. Interns reported weaknesses in their positions due to what they felt was attributed to their status as interns. They felt that supervisors neglected interacting with them regularly on important issues such as feedback and debriefings.

Meetings and feedback don't happen anymore. (P21)

High-stress environment, mental health 'testing', limited time and space for debriefing, lack of directed information (P18)

Unprofessional behaviours

Interns observed unprofessional behaviours in their supervisors and senior medical staff, which also hindered their learning and increased their fears.

Senior medical staff have terrible bedside manner, which is now exaggerated with the pandemic. (P10)

The ever-present threat of being dismissed if one refused to go to the COVID unit to be abused hinders one's willingness to learn quite substantially. (P27)

Lack of adequate staffing

The lack of adequate staffing was seen to be exacerbated by redeployment to new COVID-19 related services areas, new scheduling, staff being quarantined and absenteeism.

Staff shortages means more calls. (P10)

Other doctors not showing up for work because they are scared to get infected, leaving the rest of us understaffed and work overloaded. (P26)

Lack of adequate personal protective equipment

Many interns expressed views related to poor access to the most optimal types of personal protective equipment (PPE) required as well as concerns with the provision of adequate quantity and quality of PPE. Interns therefore had to make do with what was at their disposal, even if it means renegeing on their own personal safety precautions. The clinical setting in which the interns work then comes to be experienced as a setting of compromise, which is often accompanied by feelings of fear.

Lack of PPE that is being rationed and not easily available (P1)

Lack of N95 masks (P1)

Unavailability of proper PPE – lately our antiseptic hand rub is of poor quality (P13)

Lack of PPE or having to provide your own if you feel you want to be fully protected (P17)

Not enough PPEs and often had to re-use masks from the previous day or worse (P31)

Hierarchy in clinical medicine

A major subtheme to emerge from the data related to what interns viewed as exacerbated negative hierarchical relationships already present in clinical medicine. The interns had very strong words for the hierarchical structure of power in the medical settings in which they worked.

[We are] used as sacrificial pawns ... 100% clear that our lives mean less. (P27)

Interns are most likely to be sent to the frontline and not more senior clinicians. (P4)

The entire profession is built upon a hierarchical structure wherein the most senior members of the team do nothing, the MOs [middle-grade staff] do a minimal amount, and the most inexperienced members do everything. (P18)

Dissatisfaction with a system which abuses the lowest rank, using us as cannon fodder instead of sending senior clinicians first (P45)

Compromised learning

Interns expressed concern over the decreased exposure to adequate patient numbers, pathology and training, as many patients defaulted on scheduled hospital visits. In addition, time away from work due to quarantine or infection and decreased direct patient physical contact compromised learning.

Less patients, less procedures, no training programmes, no academic classes (P7)

Tutorials have largely been cancelled ... meetings and feedback don't happen anymore. (P21)

We are seeing less patients during this time, which means less opportunities to learn. (P41)

Burnout symptoms

Interns indicated that fear, anxiety, stress and being overwhelmed were emotional responses they were noting within themselves as a result of the COVID-19 pandemic. These emotions were seen to aggravate an existing stressful internship known to have high levels of burnout.

It's overwhelming and scary, almost every patient is now becoming a PUI and we don't know if we are adequately protected. (P19)

Internship is already so terrifying and emotionally abusive ... interns are depressed and emotionally affected, but because we are just 'interns', we are gleefully seen by higher-ranking members of the health system as 'they are fine' and 'it makes us stronger'. (P27)

Opportunities

Three major opportunities were identified by the interns. The first related to reflective practice and the second to support structures that facilitated learning. The third related to the development and enhancement of clinical and non-clinical competencies.

Reflective practice

Interns gained insights of self and practice as they reflected on their strengths as resources to leverage in order to sustain clinical work and training as they experienced the pandemic. Being able to work under pressure and manage change were identified as key skills to cope amidst the changes experienced. These included the innate capacity of the interns' resilience-building skills, professional behaviours, positive attitudes and coping skills.

Resilience-building skills:

self-motivated (P15); adaptability (P30); flexibility (P33); optimism (P40)

Professional behaviours:

independent (P12); being responsible (P16); persistence (P29); discipline (P40)

Positive attitudes:

I'm just an all-around badass taking it all in my stride. (P6)

Fast worker, can work with high turnover of patients (P24)

I am always around looking for ways to get involved. (P29)

Development of ability to work in many different work environments (P30)

Coping skills:

Keeping up to date with the latest guidelines (P17)

Level-headedness with regard to having a logical rather than emotional response to persistent changes (P30)

Crisis management, organisation, taking leadership roles, compassion within team settings and being a team player (P33)

Support structures to facilitate learning

Interns identified their colleagues, friends and family as positive support systems during the COVID-19 pandemic. In a few instances, they described their superiors as sources of access to support. Often, interns collaborated with each other and worked in teams in order to provide understanding to each other, learn together and teach each other. Online Zoom calls were a popular source of support in terms of bridging the knowledge gaps that interns felt they possessed regarding COVID-19.

Fellow intern support ... can teach each other and have support (P17)

Coping by chatting to friends (P19)

Working in a team, having superiors available to consult whenever necessary, training via online Zoom calls (P24)

Enhanced clinical and non-clinical competencies

New learning opportunities in clinical skills specific to the COVID-19 pandemic and the management of patients in high-care situations were highlighted by the interns. They also described the development of core competencies of a physician. Collaboration, leadership and advocacy were specifically identified.

Many interns valued the knowledge and training of infection prevention and control (IPC) practices as strengths in being ready to deal with the pandemic as frontline workers.

Knowing the value of IPC, pandemic preparedness and a first-person perspective of a disaster (P12)

There is a clear and followed protocol when a member is infected ... this supports the well-being of healthcare workers. (P20)

We have learnt to practice strict sanitising methods. In other words, how to continue working in a hospital despite a pandemic. (P25)

Pandemic-related clinical skills:

Best management strategies of patients with COVID (P24)

How to treat hypoxic pneumonias (P14)

Emphasis on improving intubation skills (P36)

Interns often reported using whatever was at their disposal and developing on-the-go knowledge in order to deal with what confronted them in their daily routines of clinical care. It is encouraging to note the collaborative and leadership development of the interns as they indicated their acceptance of learning with their seniors as opposed to the usual expectation of learning from their seniors.

We are learning with our seniors about this virus as we go along every day in the hospital. (P29)

Even though the interns described themselves as relatively structurally powerless, it was interesting to see some reports of health advocacy having emerged out of this situation. Health advocacy often took the form of spreading the correct knowledge about COVID-19 to colleagues and friends, and discarding propaganda. It also developed in cases where interns took active steps to implement protocols despite resource constraints in their departments.

Health advocacy and education in terms of social media ... and propaganda (P5)

Development of health advocates in each department (P12)

Discussion

The discussion unfolds within three key areas and is guided by the contents of Table 2.

Table 2
 Medical interns' learnings during the COVID-19 pandemic

	Being a medical professional	Being in a learning environment	Learnings realised
Strengths	Personal attributes of being a medical doctor, which include a sense of intrigue, efficiency, working in a high-demand environment, an attitude of getting involved, working across different disciplines and developing coping skills	Collaborative learning; learning with peers; integration of online sources of learning; digital platforms enabling collaborative learning within supportive structures	Soft skills: protocol methodologies; sustained working in a highly compromising environment; developing logical rather than emotional responses to patients and colleagues; assuming leadership roles in a crisis situation Hard skills: <i>knowing the value of IPC; pandemic preparedness; a first-person perspective of a disaster (P12)</i>
Weaknesses	Existing hierarchical-based relationships within medical training	<i>Meetings and feedback don't happen anymore (P21); limited time and space for debriefing (P18)</i> exacerbating existent sub-optimal intern supervision	Limited knowledge and experience, as interns at the start of their careers provided a springboard to learning
Opportunities		<i>Compassion within team settings and being a team player (P37);</i> learning about collaboration and advocacy	Soft skills: <i>development of health advocates (P12)</i> Hard skills: <i>best management strategies of patients with COVID (P24); how to treat hypoxic pneumonias (P14); emphasis on improving intubation skills (P36)</i>

	Being a medical professional	Being in a learning environment	Learnings realised
Threats	<i>To be abused hinders one's willingness to learn quite substantially (P27); lack of stress release – socialising (P36); being dismissed if one refused to go to the COVID unit (P27); unavailability of proper PPE (P13); themselves and their significant others being infected by COVID-19; developing burnout within resource-constrained, disease-burdened contexts</i>	<i>Staff shortages means more calls (P10); other doctors not showing up for work because they are scared to get infected, leaving the rest of us understaffed and work overloaded (P26); lack of support structures due to new social distancing norms</i>	Compromised learning opportunities stimulated innovations in learning strategies
Contradictions	<i>We took an oath to protect. Not to give our life away. (P23); How are we supposed to get all the training we need when we are continuously praying we don't die or go home and spread the disease? (P27)</i>		<i>Our health is at risk on a new level that hasn't been explored yet. (P25); less patients, less procedures, no training programmes (P7); We are seeing less patients during this time, which means less opportunities to learn. (P41)</i>

On becoming a medical doctor during a global medical crisis

In the time of a disease crisis, the professional identity construction seems to receive some attention. Professional identity has been conceptualised as the adoption and development of identifiable characteristics specific to that profession.²⁰ The subjects in this study alluded to this professional identity construction. They indicated that they began to develop a sense of intrigue about the disease, worked more efficiently in a high-demand environment, and developed an attitude of getting involved and working across different disciplines. All of this relates to the attitudinal and soft skills that are value-based, and core to being a professional. There are, however, some threats to this professional identity construction. These include the comments *[being] abused hinders one's willingness to learn quite substantially (P27); lack of stress release – socialising, being outdoors, going on trips (P36); and being dismissed if one refused to go to the COVID unit (P27)*. Under appropriate management, these threats can be addressed and curbed to a point where they do not have a major influence on the professional identity construction process.

From hierarchical learning to collaborative learning processes

The data suggest that hierarchical learning from experts to interns is replaced with collaborative learning processes with the emphasis on learning rather than teaching in times of unprecedented crisis conditions. Wenger's conception of communities of practice brings together a significant number of individuals, which amongst others include differing expertise, experience, knowledge and positionality, within a learning space where the focus is on learning.²¹ Each individual within this community of practice shares in the learning process, drawing from individual strengths and supporting others in their learning endeavours. In the context of the pandemic, communities of practice formed the basis of the teaching and learning community wherein supervisors, interns and others could engage meaningfully to respond medically to the COVID-19 pandemic, being the centre of engagement. This community of practice mode of learning is not immune to weaknesses and threats. The most common weaknesses, as expressed by the subjects, include a reduction in feedback and debriefing sessions on intended learning. In this instance, the planned learning is replaced by on-the-job learning and, as such, what was planned for learning during a normal internship period is marginalised by the prevailing medical emergency. Hence, emergency learning takes centre stage.

Learnings realised during internship within the context of a global medical pandemic

Aoki writes about the planned and experienced curriculum.²² The HPCSA highly regulates the internship of medical doctors and, as such, a planned curriculum leading to certification has been set, approved and monitored. During the COVID-19 pandemic, the interns' planned learning curriculum was disrupted and replaced by on-the-job learning, a learning informed by the immediate needs of the current medical pandemic situation.

The interns reported learning both soft and hard skills of the medical profession. Soft skills include protocol methodologies, sustained working in a highly compromising environment, developing logical rather than emotional responses to patients and colleagues, and assuming leadership roles in a crisis situation. Hard skills include *knowing the value of IPC, pandemic preparedness and a first-person perspective of a disaster (P12)*. More elaboration on soft skills and hard skills is presented below.

Develop interns' resilience-building skills

Some interns identified deficiencies in managing safety issues, difficult staff, death and dying, whilst others identified clear strategies for coping. In addition, many interns reported emotions of fear, anxiety and being overwhelmed, and they could be self-identifying as cases of burnout. South African doctors, including interns, have documented high background rates of burnout.⁹ Urgent strategies are imperative to mitigate these concerns. The development of resilience has been seen as a means to assist healthcare workers in similar contexts.²³ Modifiable factors such as workload, social support, leisure-time activities, access to good mentorship, occupational health and counselling have been shown to influence resilience in clinical areas.^{11,24}

Consolidate IPC training and practices

The study found that the interns appreciated and valued IPC protocols put in place as a consequence of COVID-19, such as the *donning and doffing of personal protective equipment (P5)*. This process has been documented as an important factor in pandemic preparedness.²⁵ In addition, the vulnerability felt by the interns in this study about being infected with COVID-19 and being the last ones to have access to PPE can be allayed with IPC protocols being taught, reviewed and practised regularly as part of standard practice.²⁵

Enhanced core skills training for interns

Interns identified various opportunities for learning as a result of the COVID-19 pandemic. In addition to clinical skills related to high care, intubation and managing hypoxic respiratory distress, interns also have had the opportunity to enhance other core competencies while working collaboratively within teams, for example *organisation, taking leadership roles, compassion within team settings and being a team player (P37)*. This marks a welcome shift that sees clinicians valuing the view of developing holistic graduate competencies that are important for safe patient management. Whilst undergraduate and postgraduate curricula across SA have used multiple graduate competencies to create frameworks for training and evaluation, the internship programme has not formally embraced this.^{26,27} The COVID-19 pandemic provides a possible and necessary catalyst for an overhaul of assessment and evaluation within internship.

Recommendations

Feasible strategies for present and future pandemics are identified and recommended from the information provided by the interns in this study. These are done specifically to address needs within resource-challenged and disease-burdened contexts. There is a critical need to formally harness existing institutional support systems, including intern curators, occupational health, employment assistance programmes and supervisor–mentors, into developing intern skills training programmes on resilience building. This should include sources of support available and how to avoid negative and enhance positive coping strategies.

The COVID-19 pandemic opportunity must be utilised to formalise curriculum renewal for South African internship in order to ensure that holistic skills are valued and evaluated as part of the internship. The impact of the COVID-19 pandemic on a refocusing on skills outside of specific clinical procedural paradigms has been highlighted by this and other studies. This focus includes improving communication skills, especially related to *breaking bad news* and “death and dying”.²⁸ A strategy to harness with regard to interns’ self-identified limited knowledge and experience is to leverage their willingness to learn and adjust by creating processes that will facilitate rapid access to information and knowledge. The forced usage of burgeoning online training platforms during the COVID-19 pandemic can serve as a model according to which future intern training can be done, and this has special relevance in resource-constrained contexts. The use of online platforms has the potential to standardise intern training and evaluation across South African hospitals, especially as discrepancies in both have been documented for

many years.^{8,29} The compromised learning environment that was created by the need to direct the majority of services to COVID-19 specific care was highlighted as a threat to intern training during the pandemic. Strategies to make up for the decreased scope of learning can thus imbibe online learning opportunities to ensure that clinical learning time is more flexible in the internship and includes effective feedback. Interns identified weaknesses with feedback during the COVID-19 pandemic. This may reflect the general culture in public-sector hospitals; however, for interns, the need for mentoring and support is especially crucial, and the lack of adequate feedback has negative outcomes.³⁰ The creation of formalised feedback systems for interns is overdue, and this needs evaluation once implemented.³¹

Conclusions

In resource-constrained settings, the COVID-19 pandemic exacerbated existing fault lines within the learning environment of medical interns. Despite these challenges, unique opportunities that can be leveraged to enhance training were identified by interns themselves. These strategies have the potential to enhance the development of a professional identity amongst emerging medical practitioners in their future roles.

Limitations

This explorative study is based on the perceptions of the participants. Future observational studies might clarify issues further. This SWOT analysis was conducted only with interns. The analysis should be extended to supervisors, seniors and other hospital staff involved in intern training to get different stakeholder perspectives on the issues found in this study.

List Of Abbreviations

HPCSA: Health Professions Council of South Africa

IPC: Infection prevention and control

NDOH: National Department of Health

PPE: Personal protective equipment

SA: South Africa

SWOT: Strengths, weaknesses, opportunities and threats

Declarations

Ethics approval and consent to participate

This study received approval from the University of KwaZulu-Natal ethics committee (HSSREC/00001306/2020). All participants provided informed consent. All methods were carried out in accordance with relevant guidelines and regulations.

Disclaimer

The views expressed in the submitted article are the authors' own and not an official position of the institution.

Prior and duplicate publication

This manuscript has not been previously published and is not under consideration in the same or substantially similar form in any other journal.

Previous presentations

None

Availability of data and materials

The data sets used and analysed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

Conflict of interest

To the authors' knowledge, no conflict of interest, financial or other, exists.

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Contributions of the authors

VSS contributed to the study conception and design, the development of the survey instrument and the drafting of the first version of the manuscript. KN edited the survey, and revised and contributed to all aspects of the manuscript. VSS and KN collected and analysed the data and approved the final version of the manuscript. LR reviewed and analysed the data, contributed to the manuscript and approved the final version.

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