HEALTH RESEARCH NEWSLETTER

'DOING RESEARCH IN THE TIME OF COVID-19'

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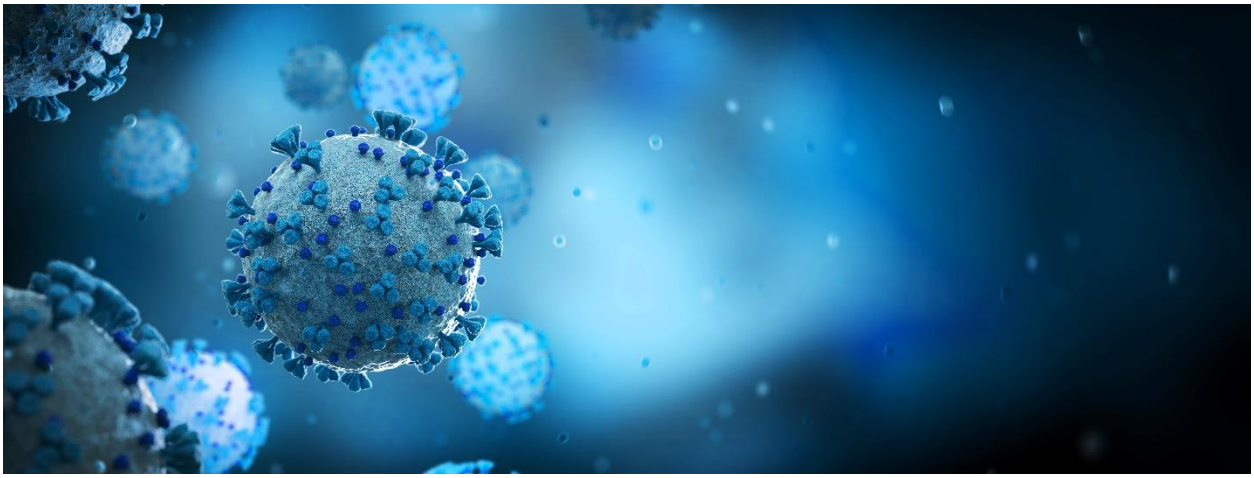
Contents



Editorial

The editorial is based on the opening address by Prof Nico Gey van Pittius (Chairperson, WC: Provincial Health Research Committee) at the Provincial Health Research Day in November 2021.

The Covid-19 pandemic wreaked havoc on lives and livelihoods across the globe and led to a shakeup on how academic and social gatherings are hosted. In 2021, the traditional platform of in-person events was not an option, yet the desire and interest in information sharing and knowledge exchange remained.

In his opening address, Prof Gey van Pittius welcomed all participants to the first virtual online Western Cape Provincial Health Research Day and thanked the speakers. Over 300 persons registered – researchers, managers and front-line health workers – from urban and distant rural settings. This increased attendance that surpassed previous face-to-face events.

Prof Nico remarked that although the pandemic had been with us for 18 months (2020-2021), with adaptations made to mitigate its impacts, it was a life situation unlike anyone had experienced before. Waves of the pandemic, followed by several months of lockdowns, forced staff and students in higher education institutions and health services to change. All had to factor in social distancing restrictions, limit to numbers attending indoor gatherings, which included distance learning and virtual meetings.

The pandemic not only affected service delivery, but also research, teaching and learning; and required adaption to achieve a sense of normality over the disruption. It also affected health research in the Western Cape. While many studies were closed or put on hold, increased capacity was required for laboratory research for diagnostic testing, infectious diseases epidemiology, mathematical and economic modelling. These were central to national policymaking and gave input into public and social media communication. Timeous clinical research improved Covid-19 management. Investigating the evidence base for a range of therapies was also important, with many found to be lacking.

Despite this, our global future relied on the development of an effective vaccine against SARS-CoV-2. The huge power of science, research and health sciences witnessed over 2020-

21 was staggering. Multiple vaccines, therapeutic monoclonal antibodies and effective antivirals were developed and implemented within a year. This was possible as biomedical and health research capacity had been built over years. This underlines the importance of ongoing, broad health research in a variety of disciplines to benefit society.

The pandemic led to an explosion in funding opportunities for Covid-19 related research. Funders shifted the focus of grants towards the immediate problem, and consequently there was less funding for other important research projects. Many researchers pivoted their research towards this new source of global funding. Others struggled to survive due to limitations set on non-Covid-19 related research, with many reporting difficulties in recruiting study participants and others facing closure of clinical trials for other interventions.

These developments undermined researchers' academic freedom and threatened important ongoing and new research. They also had a devastating impact on other health issues such as the fight against HIV and TB, which jeopardized years of hard-fought gains in these fields.

Universities and clinical training sites throughout the province contended with pressures to provide a high quality and safe education experience for students. Challenges included campus safety as well as safety on the clinical platform; university admission processes; blocks faced by international students due to expiring study visas and a consequent inability to be placed on the platform; managing electives; and online learning arrangements.

Encouragingly, these developments generated important and useful discussions amongst academics, health non-government organizations, private and public health service providers regarding issues such as mandatory vaccinations; the ethics of doing research while the health system was under severe pressure; management of staff health and wellness and, importantly, mental health as well as health innovations.

The pandemic has and will have future complex, unexpected long-term implications for medical and health research, including its social effects. Many were addressed in the research day and feature as articles in this Research Newsletter.

Western Cape Department of Health (WCG:H) response to contain the impact of Covid-19

This article is based on the introductory talk by Dr Keith Cloete (Head, WCGH: W) at the Western Cape Provincial Health Research Day in November 2021.

Covid-19 has tested the resilience and responses of health systems around the world and challenged the functioning of many country systems in high, middle and low-income countries such as South Africa. The Head of the Western Cape's Health Department, Dr Keith Cloete's introductory talk at the 2021 Western Cape Provincial Health Research Day shared with the audience the department's response to the pandemic.

He focused and reflected on three broad areas that comprised the provincial response to the Covid-19 pandemic – surveillance; the health platform; and thirdly, what was learned in a rapidly changing situation over months – from 2020 to 2021.

Surveillance

The Covid surveillance response to the pandemic has taught the WCG:H important approaches and technical lessons. These include to become evidence informed, agile and to be data-led. The Provincial Health Data Centre (PHDC), which was created prior to Covid-19, placed the department in a strong position to be data-led and enabled the department to track indices like infections and death rates on a weekly and daily basis over the 15 months since the pandemic began. This informed the department about what was happening with cases, oxygen use in hospitals, hospitalization, and the testing positivity rate across the province in real time.

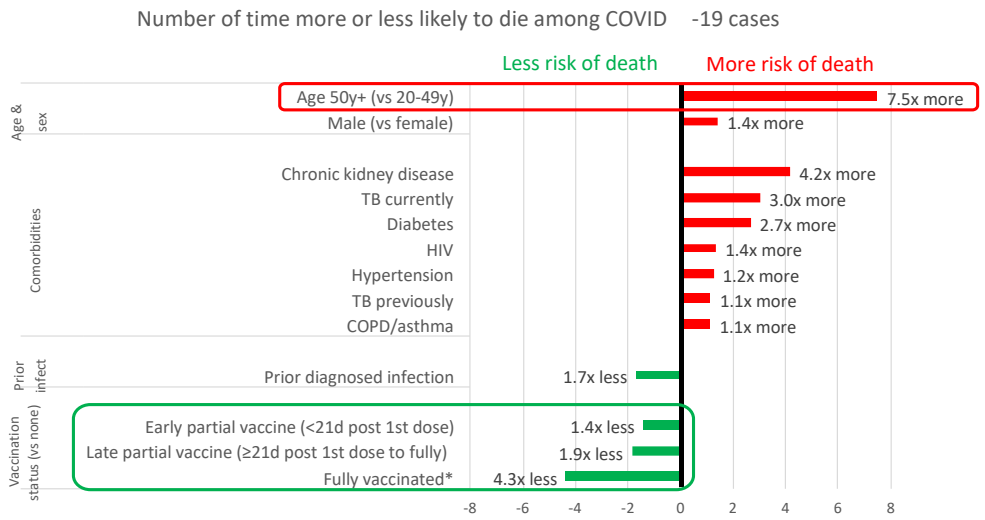
One of the big successes was the development of the provincial Covid-19 public dashboard. This changed the way the real-time data was shared and updated. It kept the public informed and prepared. By November 2021, over three million people had viewed the site. The department also sourced and utilized data from external sources. For example, the South African Medical Research Council (SAMRC) weekly excess death report allowed the PHDC to externally validate, update and refine its daily reporting system. This allowed the department's death reporting system to be closely aligned with the SAMRC's publicized Excess Death Reporting System, which was

not achieved in other provinces. It also allowed the province to showcase its innovations.

Additionally, the SAMRC together with the City of Cape Town (CoCT) setup a system to sample SARS-Cov-2 in the wastewater which promises to be an early warning system. Together systems have been put in place to timeously access and learn about this early warning system, which will be triangulated with provincial case experiences. The department's staff also worked closely with the National Health Laboratories Services (NHLS). The NHLS fed case data into the PHDC allowing for the calculation of case positivity rates, and estimation of seroprevalence. The department carried out a seroprevalence study using patients specimens left over from HIV viral loads and HbA1C blood samples taken from diabetic patients and could estimate the size of the epidemic in the rural districts and Metro sub-structures. Through an anti-body test, the proportion with anti-bodies for the population tested (diabetics or HIV-infected patients) could be calculated. These tests could be repeated after the Third Wave, and it can be seen what proportion of people in each district were affected. This allowed the department to see the significant difference between Khayelitsha and other areas with lower seroprevalence. Khayelitsha suffered a huge first wave but was less affected in waves 2 and 3 than, for example, Klipfontein-Michells Plain sub-structure.

The department's capacity in infectious disease epidemiology was demonstrated and enhanced during 2020 and 2021. These skill sets allowed the department to combine, analyse and interpret data sources to generate information that was used to drive the provincial vaccination initiative. For example, an analysis of who was severely affected in the Third Wave was undertaken to generate information about the degree of protection from severe disease conferred by vaccination. In this case, the proportion of the 58 010 public sector cases diagnosed before the 23rd August who died from Covid-19, by vaccination status, were compared. From **Figure 1,** by age group, it can be seen that unvaccinated infected people were more likely to die compared to vaccinated people.

These levels of expertise and the data quality drove what the province did. This work enabled the province to prepare for the Second and Third Waves, and subsequent Covid -19 variants.



Age 50y+ (vs younger) is the single biggest risk factor for COVID -19 death.
Even in those with breakthrough infections, vaccination is strongly protective against death.
*Fully vaccinated: ≥14d post 2nd Pfizer or ≥28d post J&J

Figure 1: Risk factors for death in adult Covid-19 cases in wave 3
(limited to public sector cases diagnosed before 23 August 2021; n = 58,010)

Health platform response

The health platform response was learning how to be agile, to network, to be 'tech savvy', and person centred. The province was deliberate in how it scaled-up or scaled-down health system capacity, and how to implement this response. Following the experiences of Waves 1 and 2, the province formulated threshold indicators that when breached, triggered pre-identified action. This included: when to bring on capacity, how soon to bring it on, and also reverting to re-introduce other services. Scaling up Covid-19 capacity and de-escalation of non-Covid services, has resulted in challenges. For example, huge backlogs have been created in other disease services. By the end of 2021, the province faced the effects of three Covid-19 waves and the need for recovery in a range of services – preventive, curative and rehabilitative across the health system.

Despite this, so much has been learned about operationalizing many initiatives. These range and include creating additional bed capacity, such as the Cape Town International Convention Centre (CTICC) Hospital of Hope and the Sonstraal field hospital in the rural areas during the first wave. These presented coordination challenges, such as moving patients from emergency centres (ECS) to acute hospitals; the critically ill, to field hospitals; and

streamlining discharges to prevent bottlenecks. Transportation was enabled by the critical role that provincial Emergency Medical Services (EMS) and its partners played with the department of public works, through the red dot taxi service. Red dot taxis also transported staff to work. Additional people management strategies included flexibility in staff deployment, particularly for staff with conditions placing them at increased risk of severe Covid-19. Staff wellness was also a focus and there were learning collaboratives focused on this as well as occupational health that focused on procurement of personal protective equipment (PPE).

What has been learned

The Health Department has learned a great deal. Learning areas include both service implementation and the impact of societal intervention on health. For example, the importance of oxygen (O_2) was critical for a respiratory virus. This required O_2 stock availability through monitoring and operation. There are now skilled personnel in the clinical services who are able to assist with assuring a daily uninterrupted oxygen supply. We have learnt how to manage bed capacity, as was shown in the Third Wave.

Significantly, the department has seen the impact of alcohol restrictions during the lockdowns which decreased the demand on Emergency Centres, and created space for critically ill Covid-19 patients. Lifting the restrictions resulted in increased alcohol related trauma seen in emergency centres.

2021 saw the health services initiating and scaling up vaccination against Covid-19, first for staff, and later for the public by age group. The data was analysed to see how it was protective in our context and against our variants, and vaccination proved to be an effective intervention. During the Third Wave, the majority of hospital admissions were among unvaccinated cases. By November 2021 over 3 million vaccine doses had been administered, and this was maintained at an average of 200 000 per week.

Conclusion

The Western Cape Health Department learnt to become evidence informed and data-led in its management of the Covid-19 epidemic. This is due to guidance by world class epidemiologists and health scientists. The province is fortunate to have this rich expertise in the scientific and research field. This has enabled the department to develop and refine a targeted health and societal response to the Covid-19 epidemic.

The Sisonke Covid-19 Trial

This article is based on the first keynote address by Prof Linda-Gail Bekker (UCT) at the Western Cape Provincial Health Research Day in November 2021.

Prof Bekker outlined the development of the Covid-19 pandemic in South Africa, and efforts to contain its spread. By November 2021, there had been three Covid-19 waves, and official numbers of deaths were underestimated. Nationally, there were over 265, 000 from natural causes which suggests that reported Covid-19 deaths were underestimated, some also occurring among young people. The Western Cape probably had the most accurate official data, but the country as a whole experienced the devastation of Covid-19. By November 2021, South Africa experienced the slowest vaccination programme compared with other regions in the world. It was on this backdrop of vaccine inequity and inadequate global supply that the Sisonke team rolled out vaccines to South African healthcare workers ahead of the national rollout in the first quarter of 2021.

The Ad26COV.2S vaccine, made by Jansen (Johnson and Johnson), and known as the J&J vaccine was developed as a single dose vaccine, meaning that as a once off administration people could be protected more quickly.

The Ensemble study

The Ensemble study, the single dose J&J vaccine trial started in August 2020, and South Africans (SA) took part in that process. The vaccine trial was rolled out in the well-established and internationally recognised HIV clinical research sites in SA. These are a network of busy clinical research sites conducting HIV prevention and treatment trials. These include the HIV prevention trials network, the HIV vaccine trials network, and the AIDS Clinical Trials Group (ACTG). There are many dotted around the Western Cape, linked to communities, and have well established Community Advisory Boards (CABS). They are also well known to the regulator (SAPHRA) and ethics committees that review their research protocols.

In May 2020, many of these HIV and TB research sites recognized that they would need to pivot very quickly to include Covid-19 related clinical research. In the context of South Africa's severe lockdown which limited people's mobility and work, HIV researchers needed to ensure that HIV and TB related research would continue, and that they would need to contribute to the Covid-19

efforts. Ensemble One, the phase three trial of the single dose J&J Covid-19 vaccine, began in three countries (USA, South America and South Africa) at the end of the First Wave in October 2020 as the country moved into the Second Wave due to the Beta variant. The Ensemble trial was conducted in 31 sites in South Africa and enrolled just over 7000 participants. Participants were enrolled over two months during lockdown at a time when no one knew about variants.

By November 2021, there had been four main variants of concern, including the Beta in our Second Wave and Delta in our third. A variant of concern is one that results in a change in epidemiology of SARS-Cov-2, such as the transmissibility or severity of disease. **Figure 1** shows how these may have an impact on vaccine efficacy.

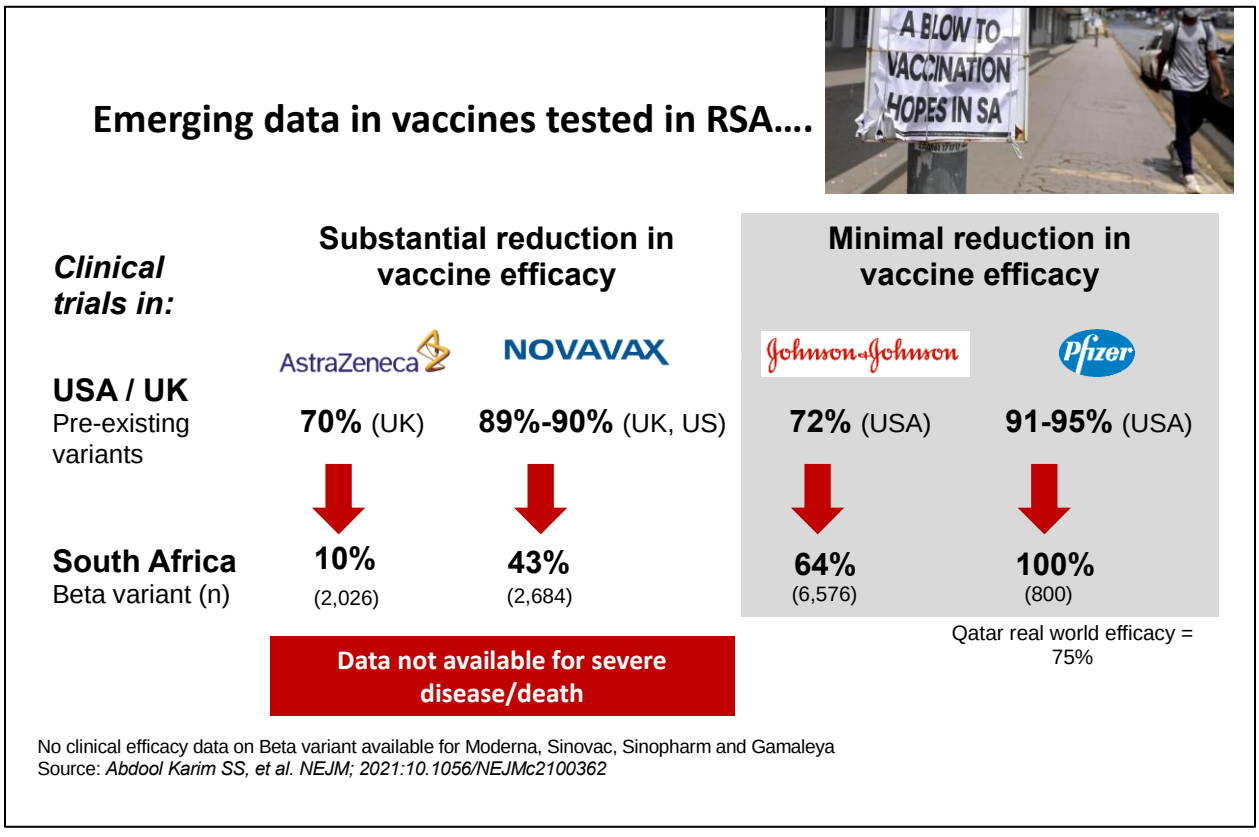
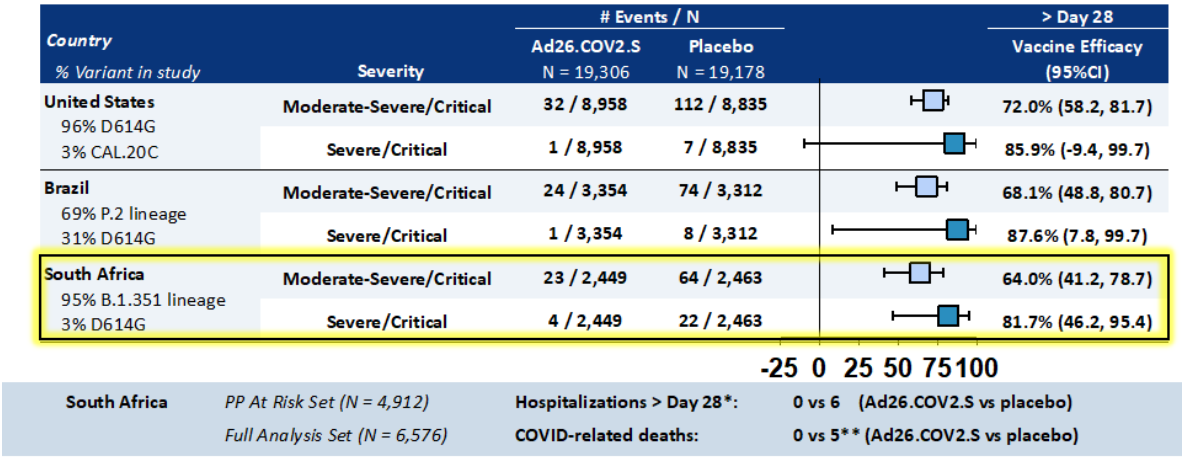


Figure 1: Vaccine efficacy against symptomatic Covid-19 caused by the beta variant

The Ensemble team became conscious of the impact of the virulent Beta variant, and there were indications that variants of concern can have an impact on vaccine efficacy. **Figure 2** demonstrates that this Ensemble trial, conducted in the three countries simultaneously (USA, Brazil, and South Africa) found varying vaccine efficacy to Covid-19 infection due to the differing circulating variants in each country. Vaccine efficacy in South Africa was 64% compared with vaccine efficacy in USA which was 72%.



COV3001; non-confirmed: all COVID-19 cases with a positive PCR from any source, regardless of central confirmation
*Sources: MRU (Medical Resource Utilization), SAE, and MA-COV (medical attendance-COV); **6th case excluded due to PCR+ test at baseline

Figure 2: Vaccine efficacy against severe/critical Covid-19 consistently high across key countries > 28 day

Importantly, the trial demonstrated that vaccine efficacy against Covid-19 related severe disease (>80%) and death (100%) was maintained globally despite different variants. Over the same period two other trials were underway in South Africa. One involved the Chimpanzee Adeno vaccine from Astra Zeneca, the other, a protein subunit vaccine from Novavax. These studies had enrolled small numbers (approximately 2000 individuals) and were conducted by Prof Shabir Madhi and colleagues. Both studies showed decreased efficacy against Covid-19 infection due to the Beta variant. However, severe disease (hospitalization and death) data was not available for either of those trials because of the small numbers of people enrolled in both. It was important at the time that South Africa did have trial evidence that J&J was effective against severe disease and death and had relatively good protection against infection even in the face of the Beta variant.

Sisonke – addressing vaccine concerns

By this time, South Africa's health care workforce had weathered two waves of SARS-Cov2 and with the delay in the National Vaccine Roll out, an urgent plan had to be made to secure vaccines ahead of a potential Third Wave. An alternative plan was set in motion for healthcare workers to be offered the J&J vaccine. The J&J vaccine was safe, efficacious based on the Ensemble's data and was easy to rollout. It had already been approved by USA regulator(s) under an Emergency Use Authorization (EUA) but was not yet approved by the South Africa Health Products Regulation Authority (SAHPRA) and therefore not available yet for general roll out. As an emergency, 500 000 donated research doses were secured from Jansen and it was decided that the Health Care Workers (HCWs) could be vaccinated by offering this to them as part of a clinical pragmatic real world study. The phase 3b study known as Sisonke (together) trial commenced before the national rollout on the 16th February in 122 sites. The effectiveness of the vaccine was assessed on safety and disease severity, hospitalizations and deaths.

Safety measures

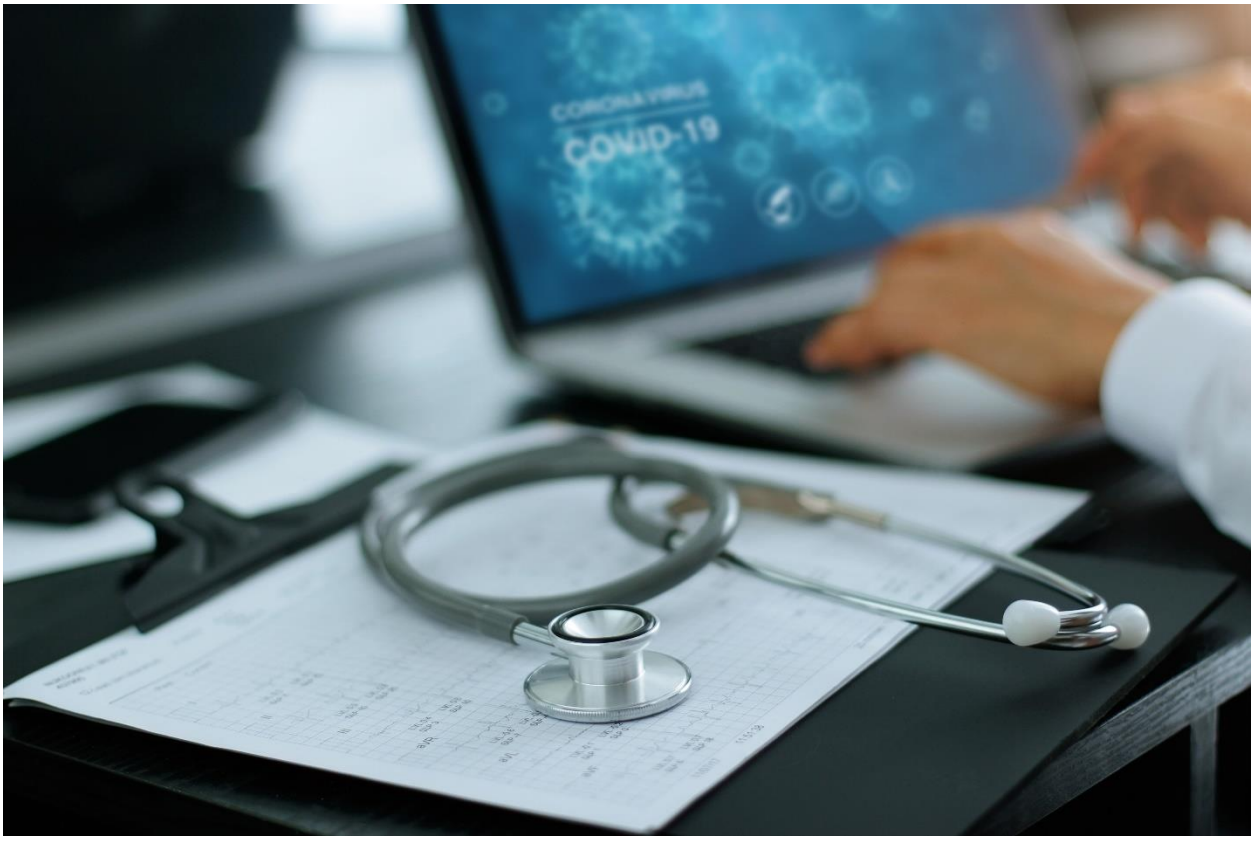
Safety mechanisms through both passive and active surveillance, were implemented. Data submitted was reviewed and the vital register monitored. SMSs were sent to participants advising them to report any side effects or health concerns to a helpdesk. The Western Cape province had a high proportion of health workers participating in Sisonke with 93, 000 vaccinated, predominantly female in the age group of 30-55 years. Adverse events reported were mainly vaccine reactogenicity which settled within a few days. Minimal adverse events were observed and the incidence of these conditions were less than would be expected to occur in a comparable unvaccinated population. The condition known as Thrombocytopenic Thrombosis Syndrome was described in association with Covid-19 vaccination and led to a 2 week safety pause in the study in April. Two cases were reported in South Africa during Sisonke and were expertly managed and they recovered fully.

In conclusion, Sisonke 1 was able to immunize half a million health care workers using the networks and field expertise by seasoned South African HIV vaccine researchers in partnership with the South African national vaccine program. It had robust surveillance and safety mechanisms in place, and the single dose J&J vaccine was found to be safe and efficacious.

Postscript

The findings of the Sisonke trials have been published in peer reviewed journals. The effectiveness article was published in the Lancet (March 2022) - https://www.sciencedirect.com/science/article/pii/S0140673622000071. A pre-print of the safety data article is found in medRxiv https://www.medrxiv.org/content/10.1101/2021.12.20.21267967v1.

Lessons learnt for scale up of vaccine trials is found in the South African Medical Journal at http://www.samj.org.za/index.php/samj/article/view/13486.



Adapting and pivoting research during Covid

This article is based on the second keynote address by Dr Edward Nicol (SAMRC) at the Western Cape Provincial Health Research Day in November 2021.

Conducting non-Covid-19 related research under strict Covid-19 restrictions was a big challenge and risked non-delivery and completion of projects which would result in financial and evidence-based information loss. Dr Nicol shared with the audience how researchers managed these issues through presenting a case study funded by the Centre for Disease Control and Prevention (CDC).

The research objectives were to monitor the HIV testing treatment services in PEPFAR supported districts in KwaZulu-Natal (KZN). The study intended to generate knowledge that could be used to strengthen the HIV services, by increasing linkages to care, and retention in HIV care among adolescent girls and young women (AGYW) age 15-24 years and adolescent boys and young men (ABYM) aged 15-35 years. The study also sought to identify feasible pre-exposure prophylaxis (PrEP) models of care which could improve PrEP uptake and continuation among AGYW and ABYM. His presentation focused on three components – study overview and design; how this was impacted by Covid-19; and finally, adaptations made to move forward with the project.

Study overview and design

The study sites were HIV testing and treatment service delivery points (SDPs) located in seven sub-districts in uMgungundlovu district in KZN. They included health facilities, schools (High schools and TVET colleges) and community-based centres (Youth zones). Fieldwork included approaching participants when they came to test for HIV at all 22 SDPs. After meeting inclusion criteria, prospective participants were invited to participate in the study. They then completed a baseline questionnaire before HIV testing. Researchers reviewed results, and those testing positive were assigned to the *linkage arm*[1] of the study as seen in **Figure 1**. Those with a HIV-negative outcome were placed in the *PrEP arm*[2]. Participants who tested HIV-positive were followed up at one and six months after enrolment using quantitative and qualitative data collection methods. Data on the HIV testing experience of AGYW and ABYM were collected cross-sectionally, whereas the proportion of young people that linked to care were monitored prospectively over

one month. A further follow up using routine data ascertained how many were retained in care at six months. The study also involved interviews with healthcare providers to determine their perceptions on the implementation of the universal test and treat (UTT) policy; and with facility managers to find out the readiness of the health facilities to offer HIV prevention and treatment services.

[1] Nicol E, Basera W, Lombard C, Jonas K, Ramraj T, et al Strengthening Health System's Capacity for Linkage to HIV care for adolescent girls and young women and adolescent boys and young men in South Africa (SHeS'Cap – Linkage): Protocol for a mixed methods study in KwaZulu-Natal, South Africa.
DOI: 10.1101/2022.07.12.22277541

[2] Nicol E, Ramraj T, Hlongwa M, Basera W, Jama NA, Lombard C, et al. Strengthening health system's capacity for pre-exposure prophylaxis for adolescent girls and young women and adolescent boys and young men in South Africa (SHeS'Cap–PrEP): Protocol for a mixed methods study in KwaZulu-Natal, South Africa. *PLoS ONE* 2022;17(3): e0264808. https://doi.org/10.1371/journal.pone.0264808

SHeS'Cap STRENGTHENING HEALTH SYSTEMS' CAPACITY FOR PrEP AND LINKAGE TO CARE

Objectives

PrEP		Linkage to care
To conduct a scoping review of the literature to identify evidence-based PrEP service delivery models for AGYW and men in sub-Saharan Africa.	One	To systematically compile and review existing evidence on the effects of different HIV treatment service delivery models on linkage to, and retention in HIV treatment and care for AGYW and adolescent boys and young men (ABYM).
To assess the characteristics of AGYW and ABYM in the uMgungundlovu district who initiate PrEP compared to those who do not initiate PrEP.	Two	To describe the socio-demographic characteristics of AGYW and ABYM newly diagnosed with HIV who access HIV testing services in the uMgungundlovu district of Kwa-Zulu Natal, and to compare service delivery models.
To determine the rates of uptake of (initiation on) PrEP among AGYW and ABYM in the uMgungundlovu district and continuation on PrEP at 1 (t1), 4 (t3) and 7 (t6) months.	Three	To describe the HIV testing experiences of AGYW and ABYM newly diagnosed with HIV in the uMgungundlovu district, comparing experiences across service delivery models.
To compare the rates of PrEP uptake and continuation of various existing PrEP-based HIV prevention service-delivery models in the uMgungundlovu district. The service delivery models include facility-only, school-based only models, community-only and hybrid school-facility and community-facility models.	Four	Among HIV positive AGYW and ABYM, to quantify linkage to and retention in HIV care across different service delivery models, and to describe the factors associated with linkage to and retention in HIV care and health impacts thereof, in the uMgungundlovu district.
To investigate the social, economic, health system, and behavioural factors that facilitate or impede PrEP cascade outcomes among AGYW and ABYM in the uMgungundlovu district, including factors relating to the various models of PrEP service delivery and their acceptability.	Five	To identify the mechanisms (reasoning and decision-making) and context (individual, structural social and health systems factors) that influence AGYW's and ABYM's uptake of HIV treatment and care services to describe the relative success of different HIV treatment service delivery models.

Figure 1: PrEP and Linkage to Care

Impact of Covid on the study

2020 was the planned year for project implementation after the study was commissioned in September 2019. The lockdown imposed in response to the Covid-19 pandemic profoundly affected the commencement of the project. Negative impacts were in two areas – fieldwork and deliverables.

Impact on Fieldwork

Due to Covid-19 lockdowns, the fieldwork including training, and participant recruitment could not take place as planned, with risk to losing part of the funding. These delays necessitated re-negotiation with the funders to re-schedule the project activities.

The initial lockdowns extended over months and resulted in the research team not being able to visit the study sites due to travel restrictions. The delays extended until lockdown Level One, when the research team was able to travel. However, plans to access schools were thwarted as school priorities were on writing examinations and later, school holidays, which meant learners could not be accessed.

Training of the field team was also affected by the non-availability of venues that could accommodate both research staff and fieldworkers. These needed to comply with social distancing measures. The research team was faced with procurement problems of training and fieldwork equipment such as car hire as well as organizational support. The finance and human resource (HR) departments of the SAMRC were depleted by Covid-19 deaths, isolation, and quarantining of staff.

Impact on deliverables

Over half of the fieldworkers became infected by the Covid-19 virus, resulting in further delays in the fieldwork, data gathering, analysis and reporting. The project was largely facility - and school-based and relied on potential participants attendance. However, schools were focused on completing their curriculum and clinic attendance for HIV testing was low as people were fearful of being infected with the SARS-CoV-2 in facilities. This resulted in low recruitment, and at times fieldworkers waited in the SPDs for days to recruit participants. This meant that HIV-infected individuals could not be identified. Facility staff who agreed to assist with HIV testing were also overwhelmed with other work priorities. By November 2021 only 21 out of the anticipated 1080 HIV-positive participants for the *linkage arm* were identified. The team also had challenges recruiting

the 600 participants for the *PrEP arm,* and US$230, 000 of the funds budgeted for fieldwork was unspent by the end of the financial year.

Addressing the problems

The study team decided to conduct virtual interviews as in-person interviews could not be done. However, this did not work well, and the team were forced to review sample sizes, add more study sites, and train more fieldworkers. The sites increased from 12 to 22 and included clinics that diagnosed many HIV infected people.

There were negotiations with funders for budget adjustments, and the study entered into a tender to outsource the management of staff salaries in order not to forfeit funds allocated to salaries in the financial year. There were unbudgeted and unexpected expenses, including the procurement of personal protection equipment (PPE) such as sanitizers, and face masks, as well as the hiring of additional cars to ensure that staff were not crowded in vehicles and adhered to social distancing measures. New collaborations with HIV and TB organizations were formed to conduct the HIV testing as the field workers could not do testing, and facility staff were overstretched to assist in this activity.

Conclusion

Project implementation under Covid-19 conditions was an enormous challenge. Study timelines, funding terms and conditions could not be met as agreed, necessitating unplanned meetings for the renegotiation and re-adjustments of plans and activities. Without the highlighted adjustments in the study and support from colleagues, Dr Nicol thanked his colleagues, and believed that without them the project would not have been implemented or possible.

Staff health and occupational health interventions in workplace settings over Covid

This article is based on the first roundtable presentation by Prof Steve Reid, and Dr Zahida Sonday, both from the University of Cape Town, at the Provincial Health Research Day in November 2021.

The SARS-CoV-2 virus caused immense suffering the world over and forced many a country and health systems to respond in unprecedent ways. Reid and Sonday presented work undertaken to address the impact of the first Covid-19 wave on both health staff and patients in Cape Town. Reid's presentation highlighted the work at a temporary hospital – the Hospital of Hope – constructed at the Cape Town International Convention Centre (CTICC). Sonday then discussed the initiatives to safeguard staff health over Covid19 at a tertiary hospital in Cape Town.

The CTICC Hospital of Hope

Reid and his research team undertook research to explore staff experiences, views and responses at the Hospital of Hope over its three months of life during the first wave – June to August 2020. The hospital at the CTICC was planned and quickly erected by the Western Cape Department of Health (WCG:H) to respond to and ease pressure experienced at public hospitals, due to the influx of sick Covid-19 patients. The conditions experienced at the hospital differed and contradicted what was being reported in news broadcasts – the dire hospital conditions internationally, such as the United States. Working at the hospital was a positive experience. The research team wanted to understand why it was such a positive experience, when there were contrary reports, and importantly, what were the implications for routine health services outside of a pandemic? The study team, consisting of CTICC staff, reviewed hospital Covid-19 infection rates, conducted an exit survey of staff, and interviewed many people to understand this phenomenon.

A positive experience

The staff exit survey found staff, all of whom volunteered to work at CTICC, had a positive experience, with the majority reporting a sense of meaning and worth. They experienced work in a coherent team, reported relatively low levels of stress, high levels of professional growth and 92% reported that they enjoyed going to work. The level of support, including emotional support, facilitated through debriefing sessions made them feel valued. Initiatives such as problem-

solving were valued, and as was the attention given to safety at work.

The CTICC had very low nosocomial infections rates (2.4%) compared to 8.1% found in a similar sized hospital in Cape Town with equivalent numbers of staff over the same period. Only 16 nosocomial Covid-19 infections were recorded between 8th of June and 14th of August (see **Figure 1**). Although the CTICC admitted only Covid patients, the comparator hospital managed sicker cases which could account for these differences.

However, the CTICC was carefully planned, and implemented a personal protective equipment (PPE) system which prevented infections. The interviews found that staff experienced excellent leadership, and CTICC managers had autonomy to design systems as they saw fit and were given the resources for implementation. Decisions were made rapidly despite the uncertainty, as nobody knew what the future would bring.

	CTICC HOH	COMPARABLE HOSPITAL
Total staff at 31 July		
Total staff COVID +ve between 8 June and 14 u ust 202	16	64
Health Professionals	16	41
Non-professionals		23
Total positivity rate	2.4%	8.1%

Figure1: Staff infection with Covid-19

Nevertheless, there was extraordinary unity of purpose, hope and positive teamwork. At the same time, responsiveness and flexibility was experienced all around. This resulted in high levels of job satisfaction, a sense of professional development and conduct, which resulted in the low infection rates. The sense of meaning and hope resonated well with the name of the hospital – Hospital of Hope. This designation was vindicated by the feedback from staff, patients and their families, despite the dire situation faced by all.

These findings have implications for routine health services. It is crucial to view all working in the health system as working together in an integrated way rather than as a multiple professions within a faceless system, operating in silos. The Cape Town Hospital of Hope was a beacon of promise holding lessons

of the value of committed staff, working with agency, to implement systems that work.

Occupational health and safety at a tertiary hospital

Sonday's presentation detailed the activities that a tertiary hospital in Cape Town's occupational health team implemented over the pandemic. She reviewed three sets of activities undertaken to address Covid-19 safety. These were, firstly the development of staff readiness and planning protocols, as well as risk assessment focusing on the workplace and individual staff for case and contact management; secondly, occupationally acquired Covid-19, and surveillance for long Covid, and finally, employee wellbeing.

Staff readiness and planning

Provincial Covid-19 preparedness teleconferences were held or informally arranged by the hospital quality and infection prevention and control (IPC) colleagues, which facilitated up to date information on Covid-19 being relayed to the Occupational Health and Safety (OHS) team, as depicted in the organogram (**Figure 2**). The hospital employed around 3 500 staff. Following the assessment of the impact of the impending pandemic, the team successfully motivated for an additional occupational medical practitioner and also enlisted the support of weekend volunteer teams consisting of OHS staff, hospital management and other volunteer health workers. In addition, early in the pandemic, the team developed an operational plan for the protection and management of staff infections. This included workplace health risk assessments, which were in line with the Department of Labour guidelines. They also included work accommodation in the case of staff vulnerable to severe Covid-19 disease; screening for Covid-19; case management for Covid-19 as well as contact management; return to work; and management of compensation for occupational injuries and diseases.

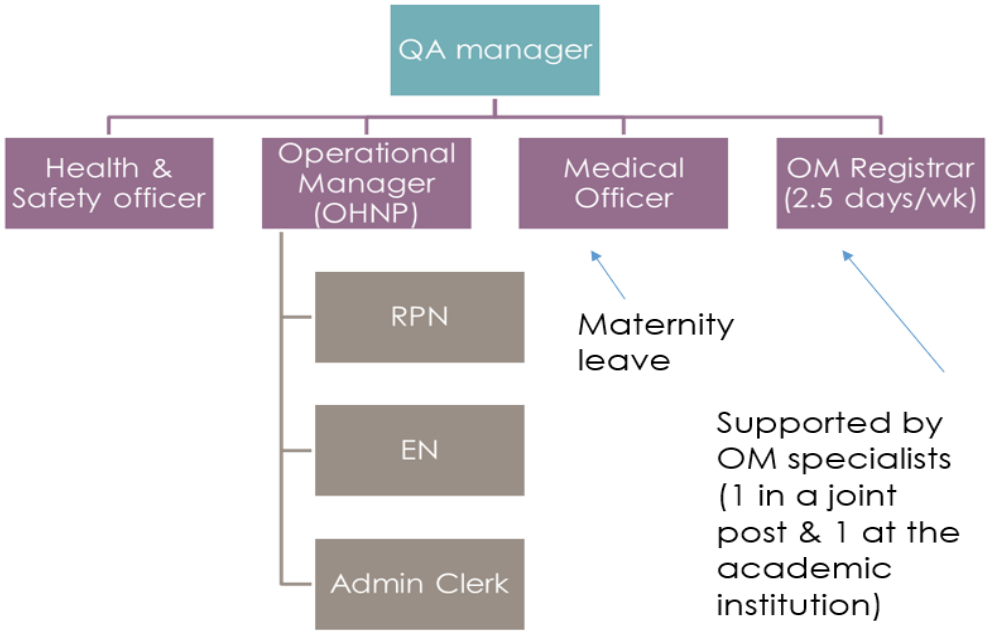


Figure 2: Occupational Health and Safety Organogram at the tertiary hospital

Workplace and personal risk assessment

Personnel Protection Equipment (PPE) guidelines were simplified by focusing on what was relevant for clinical and non-clinical health workers. They developed easy reference algorithms and pamphlets for managing cases and context. Special travel arrangements for staff using public transport were made, and fabric face masks for all staff were provided.

Through workplace risk assessments, high-risk Covid areas were identified. In accordance with the Hazardous Biological Agents regulations of the Occupational Health and Safety Act, this involved evaluating the severity of the hazard (SARS-Cov-2) and exposure. Following the assessment, control measures for infection control and risk mitigation were put in place. All measures had to be updated regularly as new information on Covid-19 emerged. Later, a checklist (**Figure 3**) was developed and was used by operational managers. It covered all working areas of the hospital, and assessed control measures to identify gaps, and so ensured statutory compliance. A multi-disciplinary incapacity management committee was involved in conducting individual vulnerability assessments of staff who applied for accommodation. The committee was comprised of OHS, people management, occupational therapy, and wellness personnel. The committee developed criteria for accommodation and met regularly to review requests for accommodation.

COVID-19 Walk-through risk assessment			
Site:	Date:		
Department:	Risk Assessor:	Name & Surname	Signature
Work Area/s:	Area Supervisor:	Name & Surname	Signature
Occupations in Area:	Health & Safety Representative:	Name & Surname	Signature

No	Requirement	Status			Comments
		Yes	No	NA	
1.	**Basic education & awareness campaigns**				
1.1	**GSH staff** COVID-19 education/communication programme				
1.2	**Contractor staff** COVID-19 education/communication programme				
1.3	PPE donning and doffing training programme				
1.4	Health status monitoring/questionnaire and reporting for employees				
	Hygiene / cleaning measures				
2.1	Work surfaces are decontaminated with appropriate disinfectants at appropriate intervals				
2.2	Equipment are decontaminated before and after use				
2.3	Specimens are placed in leak proof containers during handling, processing, storage and transport				
2.4	Hand washing basin/s is/are present in all clinical areas				
2.5	Soap and paper towel /hand dryer available at handwashing basin				
2.6	Sufficient surface disinfectants and hand sanitizers are available in all areas				
2.7	The area is cleaned according to Covid-19 cleaning and decontamination (terminal cleaning) protocols				
2.8	Additional sanitation facilities (e.g. hand sanitizers, etc.) at door entrances				
3.	**Reduce physical contact (social distancing)**				
3.1	Facility access and visitation is limited or restricted				

Figure 3: A snapshot of the checklist used for managers' risk assessments

Occupational Covid, long Covid and Employee wellbeing

Team members saw anyone presenting with symptoms, facilitated their testing and if positive, instituted isolation, putting them off for 10 to 14 days from work, per protocol. Claims to the Department of Labour were submitted for presumed occupational Covid-19 as appropriate, but the decision for compensation resides with the Compensation Commission. As most staff had persistent symptoms, the team did not want to close the cases prematurely.

Surveillance for long Covid was put in place, using an international validated tool. This used a graded score to assess functional impairment or limitations. The team focused on Grades Two, Three and Four impairment which were equivalent to slight, moderate, and severe functional limitations. The case history and physical examination focused on specific symptoms. If the staff required additional follow up and investigations based on findings, an action plan was instituted which included employee wellbeing. Later in the epidemic, supportive assistance from a volunteer hospital-based team, and Metropolitan Health services were offered.

Covid-19 brought uncertainty and an ever-changing context. It was an opportunity to develop strong teams and implement useful tools. Moreover, the team brought 'caring-for-the-carer' to life through continuing to provide high quality services despite the challenges brought by Covid-19.

Partnerships and health system innovations during Covid

This article is based on the roundtable presentation by Prof Mary Ann Davies (UCT) at the Provincial Health Research Day in November 2021.

Innovations are vital levers that can ensure comprehensive, creative and scientific interventions to respond decisively against livelihood and life-threatening pandemics such as Covid-19.

Prof Davies outlined various innovative activities that provincial teams and collaborators embarked upon to understand and address the pandemic. It was important to partner with the private sector as sizeable proportions of people tested in that sector, and this partnership has been important throughout with many fruitful projects.

The critical role of information systems

Much innovation relied on the Provincial Health Data Centre (PHDC), which linked various data sources such as laboratory data, hospital information systems and primary care systems for individual patients, including patient demographic and health data. The PHDC and Epidemiology team refined this Single Patient Viewer (SPV) system to produce reports on Covid-19. Early in the pandemic, PHDC data enabled automated updates of the numbers of new and ongoing infections, by patient addresses and hotspot mapping; and formed the basis of case management and contact tracing. The SPV system was able to generate management reports, rapid epidemiological analysis and tracked the pandemic. Health outcomes for the province were followed and by November 2021 over 20 000 deaths associated with the disease had been reported. Importantly, the system allowed the analysis of clinical outcomes of Covid-19 cases, determining what the main drivers of mortality associated with Covid-19 in the province were.

One of the key innovative outputs was the creation of the Department's Covid-19 data dashboard. This allowed the portrayal of the pandemic over the Second and Third Waves and was viewed by the public across the world. The dashboard graphs and tables visualized the trajectory of the pandemic and was used as an early warning indicator of what was emerging (see **Figure 1**). The use and success of the dashboard prompted discussion and further dashboards were planned. Tuberculosis (TB) and Trauma dashboards were later launched which would be updated regularly.

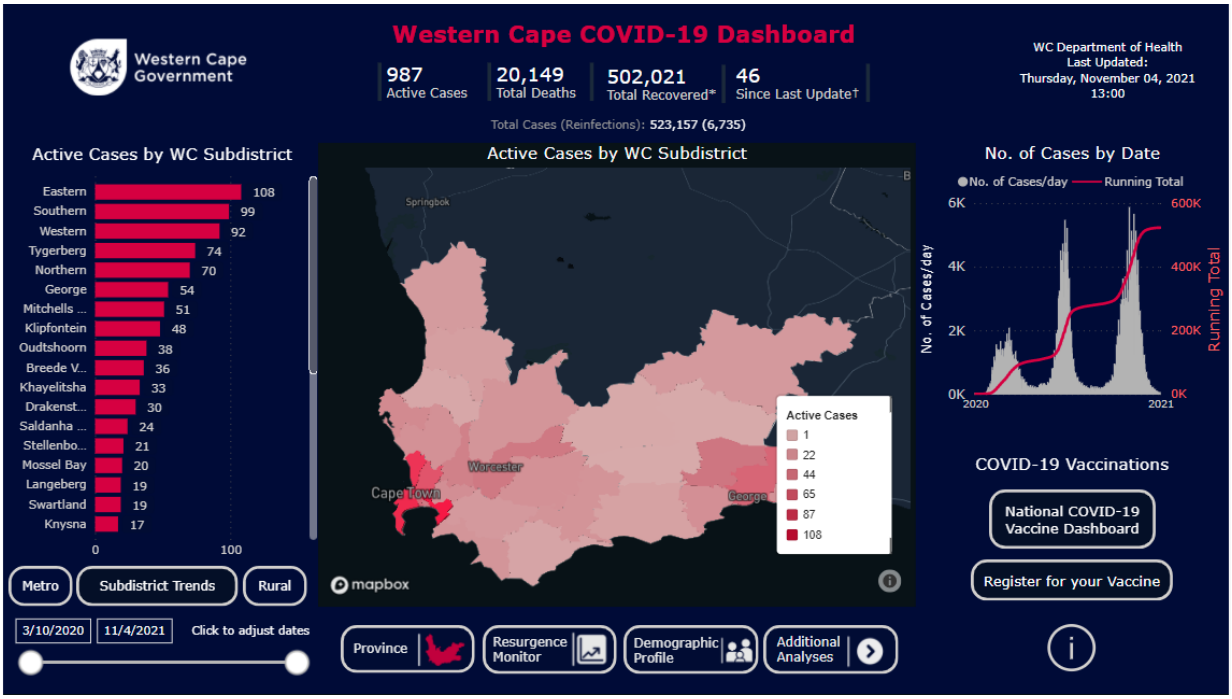


Figure 1: Thew Western Cape public-facing Covid-19 dashboard available at: https://coronavirus.westerncape.gov.za/covid-19-dashboard

Genomic surveillance

The team also learned about the importance of genomic surveillance. Initially, virologists had detected the wild type virus (see Figure 2), followed by the Beta variant in September/October 2020 and the Delta variant emerged in 2021. Identifying these variants was through sequencing of the virus over time – genomic surveillance. Relationships between the epidemiology and genomics teams enabled the determination that the upsurge in cases in Wave 2 and disease severity seen first in the Eastern Cape and then in Garden Route district was the result of a new variant, later called Beta. Beta travelled to the Garden Route and onward through the Western Cape province between October and December 2020, possibly due to farm and other workers travelling between the two provinces.

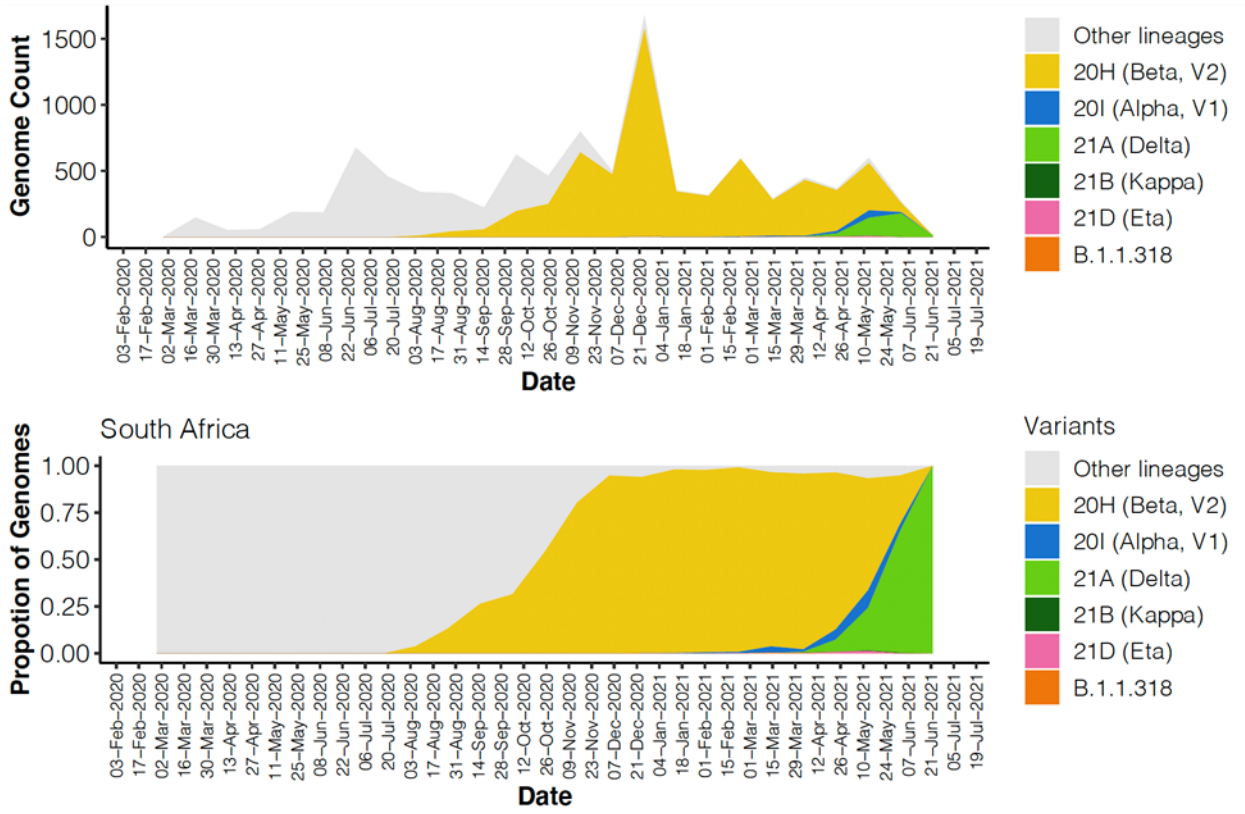


Figure 2: **SARS-CoV-2 genomic sequence results from February 2020 to July 2021 showing the emergence of the Beta and Delta SARS-CoV-2 variants**

Soon a further surge in cases was detected – Wave 3. Although present in other provinces, it was in specimens analysed in the private sector that the Delta variant was first identified in the Western Cape.

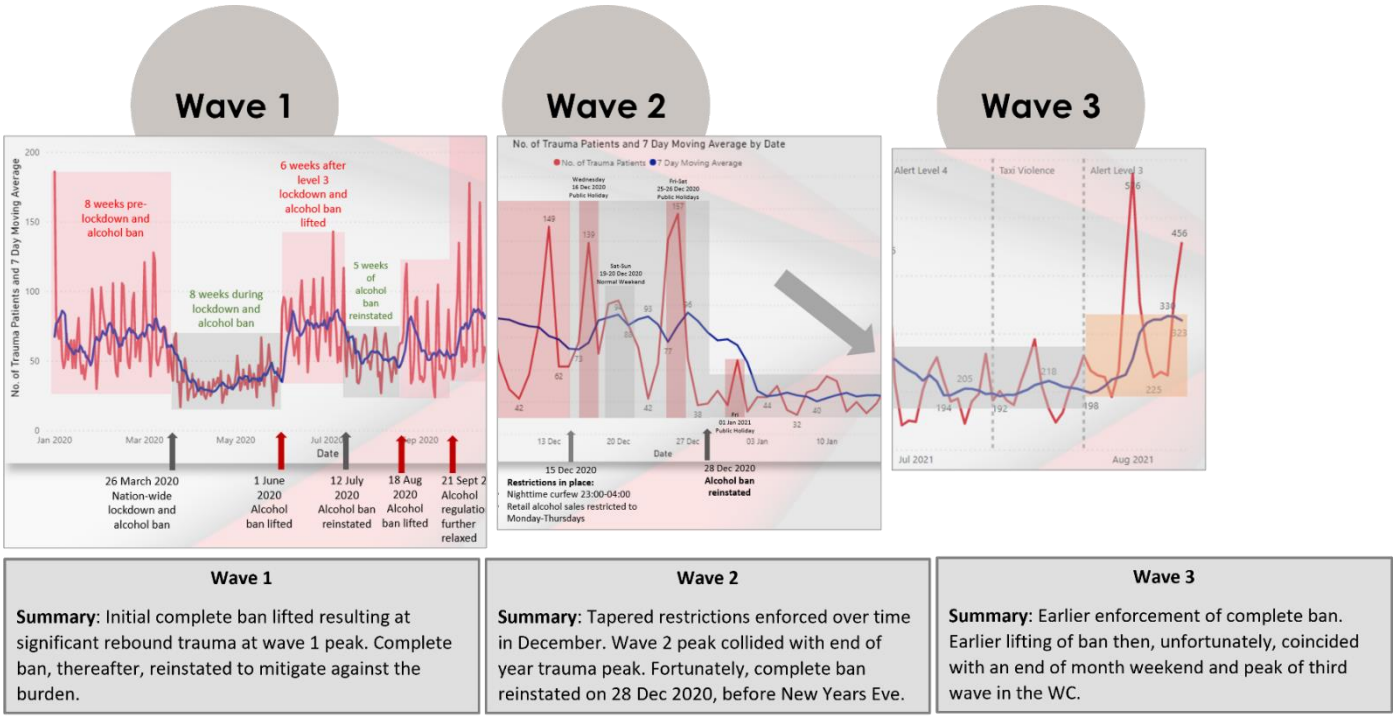
Engaging with districts

Prof Davies pointed out that information and intelligence was not only from data, but also what staff in districts gleaned from frontline health workers and communities. Consequently, during the second wave, regular 'surveillance huddles' were set up where staff from all districts and substructures reviewed case numbers and trends. For example, high numbers of cases in schools were reported, which highlighted the importance of inter-sectoral and cross-disciplinary collaboration. Bringing together sources of intelligence from different sectors helped the epidemiology team to better understand the epidemic.

A further innovation was the collaboration with municipalities to monitor the levels of the SARS-CoV-2 in wastewater. We saw that in Waves 2 and 3, as wastewater levels of the virus rose, so did the laboratory confirmed cases (see **Figure 3**).

Analysing data

Seroprevalence studies – calculating the proportions of people with anti-bodies against SARS-CoV-2 were conducted using residual blood samples of patients visiting health services for other health reasons. These results enabled the province to estimate the proportion of people who had already been infected in different areas. The provincial data systems also enabled the analysis and graphical demonstration of the effect of alcohol bans on Emergency Centre visits, as is seen in **Figure 3**. The alcohol ban freed hospital beds usually filled by trauma patients, creating space for the care of Covid-19 cases.



Wave 1	Wave 2	Wave 3
Summary: Initial complete ban lifted resulting at significant rebound trauma at wave 1 peak. Complete ban, thereafter, reinstated to mitigate against the burden.	**Summary**: Tapered restrictions enforced over time in December. Wave 2 peak collided with end of year trauma peak. Fortunately, complete ban reinstated on 28 Dec 2020, before New Years Eve.	**Summary**: Earlier enforcement of complete ban. Earlier lifting of ban then, unfortunately, coincided with an end of month weekend and peak of third wave in the WC.

Figure 3: Emergency Centre visits for trauma during the first 3 Covid-19 waves demonstrating the impacts of the alcohol sales bans on trauma burden

Once vaccinations had become available, the province successfully requested vaccination data from the national department of health. This enabled research that assessed the effect of vaccination on infection and hospitalization, as well as assessments of how protective vaccines were against infection and severe disease.

Conclusion

These innovations enabled the epidemic puzzle to be put together which in turn informed the provincial management response. Despite this, these efforts were insufficient to

track and contain the spread of the virus and its variants. Adding in non-pharmaceutical interventions (NPIs), while perhaps delaying viral transmission, did not contain the spread, which is largely due to social determinants of disease.

However, scientific innovations, such as improved data systems, diagnostics and therapeutics, should enable us globally to better manage, contain and eradicate known and unknown disease conditions that threaten humanity. This is demonstrated by the dedicated teams who collaborated and responded to the Covid-19 pandemic in the Western Cape. Lessons can be learnt and built on to address other local and international health challenges.

Reflections on Covid-19, the health system and public health

This article is based on the closing remarks made by Dr Vera Scott (City of Cape Town - Health).

Closing an insightful, interactive, and informative research day, Dr Scott, a City of Cape Town manager, thanked the Western Cape Department of Health for the invitation to close the day. She remarked that she had previously participated in the research day as a researcher.

Closing the day was an opportunity to reflect on the value of research from an operational perspective. The first Covid-19 wave's impact on the health system was a time of chaos, yet health service providers were guided and knew where they were going. A major facilitator for this was the research capacity that exists within the province. Researchers' work enabled discernment about what was known about the local epidemic, what providers knew, what could be done as well as the ability to identify what was not known about Covid-19. This allowed the department to shape questions that needed to be answered in order to act against the virus.

Dr Scott highlighted that the Covid-19 epidemic was the first public health problem to have affected the entire population. Since South Africa's democracy, the HIV epidemic had emerged, which required an intense anti-retroviral (ARV) programme rollout. However, this largely affected the public health sector, and did not affect the entire population – young and old; urban and rural across all South Africa's people. The Covid-19 epidemic required a public, private and National Department of Health response. All stepped into the stewardship role and have been responsible for the rollout of vaccinations and other public health interventions across the entire health system platform. This has raised some important questions about changes going forward. For example, how have relationships changed? What are the implications for the province within the health system? How should the provincial health department be positioned in relation to other sectors?

She reflected that public health reconnected to its roots with the focus on infectious diseases. Public Health's origins were in the control of infectious diseases and the development of systems to control them. With time, to address the full burden of disease, public health later addressed chronic diseases and non-communicable diseases, and recognized the importance of continuity of care.

Despite this progress, public health again is faced with the possibility of recurring acute infectious diseases pandemics. Dr Scott wondered how will this shape the health service? How will resilient health systems be built? And, what is the nature and scope of the health system? She believed the pandemic highlighted the value of the working with communities, and the trust built over years, as well as the importance of maintaining those trust relationships. These relationships were tested through the social mobilization – spreading messages about Covid-19, engaging with communities for case management and contact tracing, working with community leaders. Moving forward, how should the department build on that trust? What are the key elements that would ensure trust and how are they embedded into a system? And, how does this work across sectors?

Dr Scott remarked on how health service providers worked together at various levels, within the health system, and how they leveraged relationships with other sectors in society. For example, the provincial health platform shared resources across the provincial government platform. Similarly, City Health within the local government sphere was able to leverage resources and relationships across local government departments. This taught everyone about how each person is positioned to collaborate across sectors, for health, across various levels of the health system. One example was how she, as a clinician in primary care and later as a researcher, through working in City Health, learnt about the role of environmental health and experienced it first-hand through the Covid-19 response.

Covid-19 has taught health care workers and managers many things – the value of partnerships within and outside the health system and the value of building and maintaining the health system, a system that reflects, learns and trusts.

Conferences and Announcements

Conferences

1. Cochrane South Africa Virtual Symposium, Theme: Research evidence in a post-truth world – 22-23 November 2022. For more information contact: cochranesa@mrc.ac.za

2. Global Health Network Conference, Theme: Enabling health research in every healthcare setting – 24 – 25 November 2022, University of Cape Town. For more information see: httpts://uctcmc.eventsair.com/the-global-health-networkconference-2022/

3. The Global Evidence Summit schedule for the 9 – 13 September 2024. For more information contact: contact@globalevidencesummit.org

Announcements

1. Dr Krish Vallabhjee, Chief Director Strategy and Health Support is to retire end of September 2022 after serving for over 20 years in the Western Cape Department of Health, and Ms Nonhlanhla Anda Nkosi has been appointed as the new chief director from the beginning of October 2022.

2. Dr L.C Phillips, ex-Director of Cape Winelands rural district has been appointed Chief Director of the rural health districts in the Western Cape Department of Health.

3. Prof Nico Gey van Pittius appointed for the third term as the chairperson of the Provincial Health Research Committee (PHRC) – a statutory body in charge of research oversight in the Western Cape province.

4. Prof Charles Wiysonge appointed Senior Unit director HIDRU and Cochrane SA. He will lead, manage and expand the research portfolio of HIDRU as well as Cochrane SA.

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