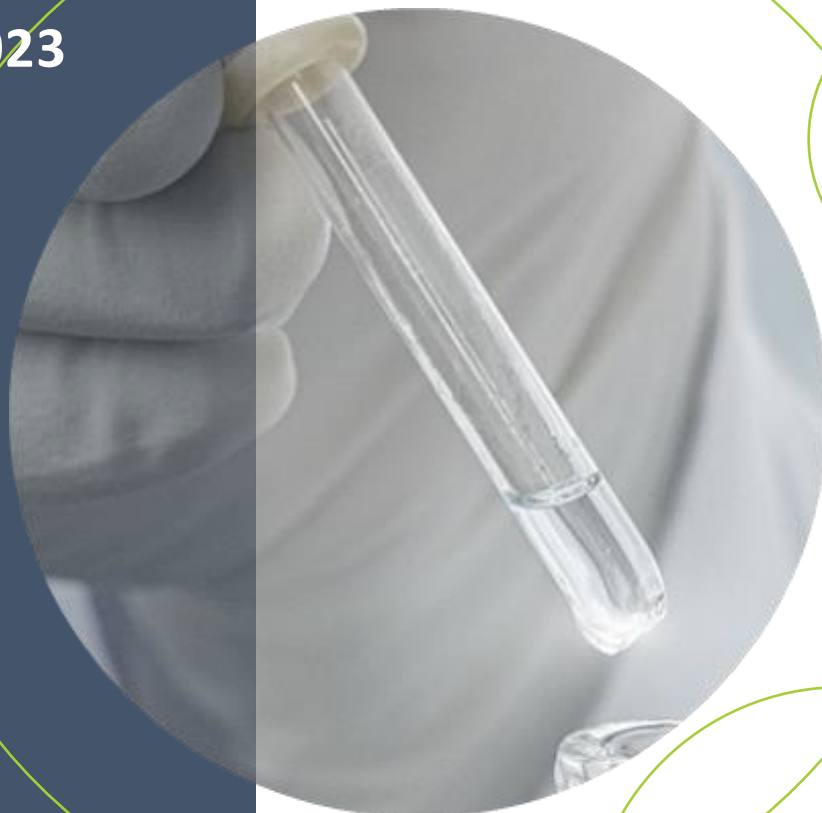


DISCIPLINE OF VIROLOGY

QUARTERLY NEWSLETTER Q2 OF 2023



IN THIS ISSUE

PG. 2

Message from our HOD

PG. 4

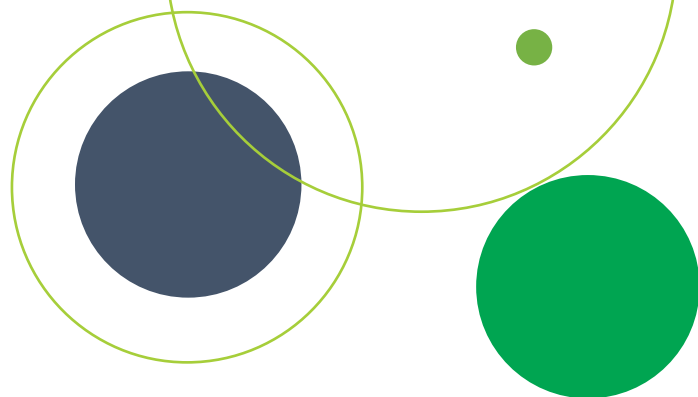
Focus on Respiratory viruses

PG. 7

News

PG. 9

Research





NEWSLETTER

This issue of the newsletter was edited by Dr Kerusha Govender. Please email questions or comments to: govenderk7@ukzn.ac.za

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MESSAGE FROM OUR HOD

On 05 May 2023, the World Health Organization (WHO) declared that COVID-19 is no longer a “global health emergency” while emphasizing that it remains a global health threat (1). This marks just over 3 years since it was declared a public health emergency of international concern on 30 January 2022 (2). At the time of closure of the Johns Hopkins Coronavirus Resource Centre in March 2023, the death toll was estimated at just under 7 million worldwide. (<https://coronavirus.jhu.edu/map.html>). While taking important lessons from the COVID-19 pandemic, we join the global community in the development of long-term programmes to manage the virus on an ongoing basis and drafting strategic preparedness and response plans for the next “pathogen X” of pandemic potential.

Closer to home, our National Institute for Communicable Diseases (NICD) published its last COVID-19 weekly epidemiological brief on 25 March 2023, however SARS-CoV2 data continues to be published in the weekly respiratory pathogens surveillance report accessible at:

<https://www.nicd.ac.za/diseases-a-z-index/disease-index-covid-19/surveillance-reports/weekly-respiratory-pathogens-surveillance-report-week>

The Network for Genomics Surveillance in South Africa (NGS-SA), continues to monitor the evolution of SARS-CoV-2 and genomic surveillance reports are published fortnightly at:

MESSAGE FROM OUR HOD

Continued

<https://www.nicd.ac.za/diseases-a-z-index/disease-index-covid-19/sars-cov-2-genomic-surveillance-update/>.

As we enter the South African winter season which has been traditionally associated with an uptick in respiratory viral infections, our focus in this newsletter will be on respiratory viruses in the province of KZN. In SA, the 2023 influenza season officially started on week 17 of 2023 and this was characterized by an increase in the influenza detection rate above the seasonal threshold. The influenza season was preceded by the Respiratory Syncytial Virus (RSV) season which started in week 6 of 2023 among children aged <5 years with pneumonia. RSV positivity rates among children aged < 5 years in pneumonia surveillance reached a high level of activity around week 13 and has plateaued at low levels in week 20 (May 2023). Strong surveillance systems, both passive and active; remain the cornerstone in identifying infectious diseases with epidemic potential and serve as early warning indicators to curb the spread of these diseases.

We conducted a snap-shot trend analysis of respiratory viral infections in a 12-month period between June 2022 and May 2023 from the IALCH diagnostic virology laboratory servicing the KZN public health sector across all health districts (pages 4 to 6). We hope this demonstrates the seasonality in the pattern of viral respiratory infections in the post COVID-19 era.

The annual influenza vaccine is available; it is not too late to take the vaccine, even though the flu season has started. The WHO recommended vaccine composition for the 2023 Southern Hemisphere influenza season has the following strains:

- A/Sydney/5/2021 (H1N1) pdm09 - like strain
- A/Darwin/9/2021 (H3N2) - like strain
- B/Austria/1359417/2021 - like strain (B/Victoria lineage)
- B/Phuket/3073/2013-like strain (B/Yamagata lineage) virus (Quadrivalent vaccine only)

The freshest lesson from the COVID-19 epidemic was how a combination of pharmaceutical and non-pharmaceutical prevention strategies helped curb the transmission and ameliorated disease severity respectively. May this knowledge of health affirming behaviours carry us going forward. Practicing frequent hand washing, wearing a mask, especially when having symptomatic respiratory infections, congregating in well ventilated rooms and using available vaccines against respiratory pathogens will keep illness at bay.

Until next time.

Dr Khanyi Msomi

Key references

1. WHO. [www.who.int/news/item/05-05-2023-statement-on-the-fifteenth-meeting-of-the-international-health-regulations-\(2005\)-emergency-committee-regarding-the-coronavirus-disease-\(covid-19\)-pandemic](http://www.who.int/news/item/05-05-2023-statement-on-the-fifteenth-meeting-of-the-international-health-regulations-(2005)-emergency-committee-regarding-the-coronavirus-disease-(covid-19)-pandemic)
2. Mahase E. China coronavirus: WHO declares international emergency as death toll exceeds 200. *BMJ*2020;368:m408. doi:10.1136/bmj.m408 pmid:32005727

FOCUS ON RESPIRATORY VIRUSES

This section is a retrospective analysis of KZN laboratory data from June 2022 to May 2023. Dr Lilishia Gounder assisted with data collection; Dr Kerusha Govender did the write-up.

The nearly global public health responses to the COVID-19 pandemic resulted in dramatic shifts in the circulation of other respiratory viruses such as influenza and respiratory syncytial virus (RSV)(1). Subsequent lifting of strict protective measures resulted in a resurgence of these viruses (1).

Ongoing variable usage of non-pharmaceutical protective measures such as social distancing and mask use, and variable vaccine coverage rates will continue to influence the circulation of respiratory viruses. The global circulation of influenza resurged after measures were lifted, with patterns that did not fit with the pre-COVID-19 period. The Southern hemisphere specifically reported inter-seasonal or pre-seasonal influenza epidemics. Similarly, countries in the Southern hemisphere experienced RSV peaks that were in atypical seasons (1). Changes in hospitalization rates and duration of hospitalization were also reported.

Even prior to the emergence of SARS-CoV-2, influenza-like illness and severe respiratory illness represented a substantial burden of disease in South Africa, with influenza and RSV specifically linked with severe respiratory illness at the extremes of age (2). With the emergence of SARS-CoV-2, the circulation of RSV initially declined with the implementation of respiratory precautions, and subsequently resurged upon relaxation of those precautions, in South Africa (3) and globally (4).

RESPIRATORY VIRUSES

Continued

The virology laboratory at Inkosi Albert Luthuli Central Hospital recently received calls and emails from clinicians enquiring on the circulation of respiratory viruses in the province. We retrospectively analyzed the department of Virology respiratory virus diagnostic results from KwaZulu-Natal over the past year (June 2022 to May 2023), and presented the information graphically below.

Results

A total of 2 831 Respiratory Multiplex PCR results were analyzed for the June 2022 to May 2023 period.

As shown in Figure 1, a lower proportion (18%) of the specimens for the year were collected during the summer season. Interestingly, the percentage positivity for respiratory viruses was also lower in that season. This may be attributed to a lower clinical index of suspicion for viral causes of respiratory illnesses during summer, and suggests that this is an appropriate clinical approach. Correspondingly the highest numbers of specimens were collected during the autumn season, and this season also had the highest percentage positivity. This, reassuringly, suggests that KZN clinicians are using the Respiratory Multiplex PCR assay prudently.

Fig. 1: Specimens tested and percentage of Respiratory Virus positivity by season, June 2022 to May 2023

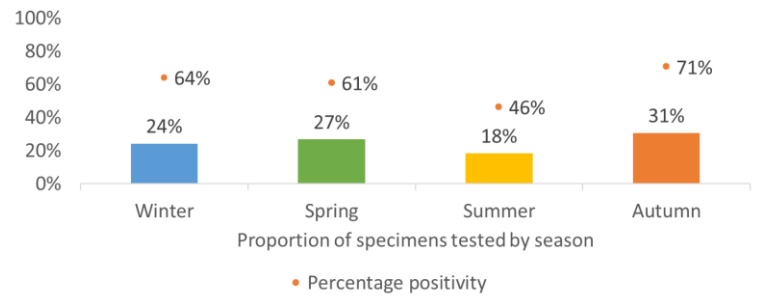


Fig. 2: Proportion of positive specimens with viral coinfections, per season

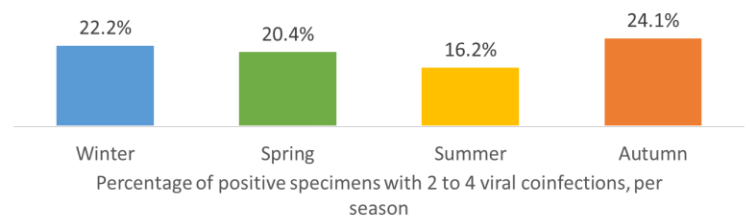


Fig. 3: Respiratory viruses in specimens from Paediatric ICU and Hi-care

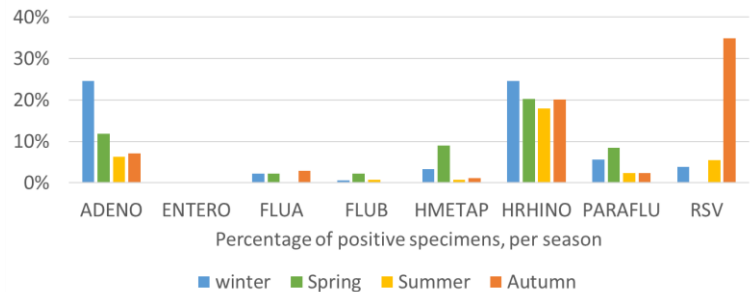
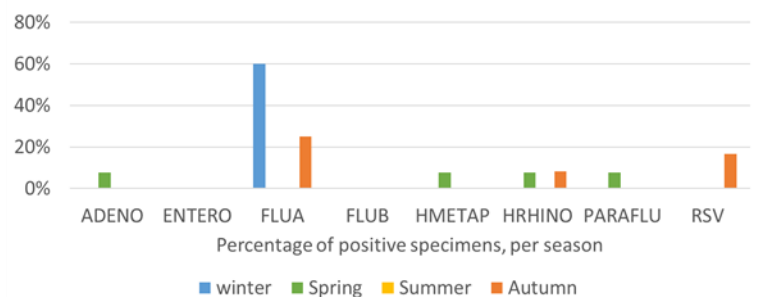


Fig. 4: Respiratory viruses in specimens from Adult ICU and Hi-care



Key: ADENO: adenovirus; ENTERO: enterovirus; FLUA: influenza A virus; FLUB: influenza B virus; HMETAP: human metapneumovirus; PARAFLU: parainfluenza virus; RSV: respiratory syncytial virus

RESPIRATORY VIRUSES

Continued

Figure 2 shows, as expected, that the lower burden of respiratory viruses in the summertime translates to a lower rate of coinfections.

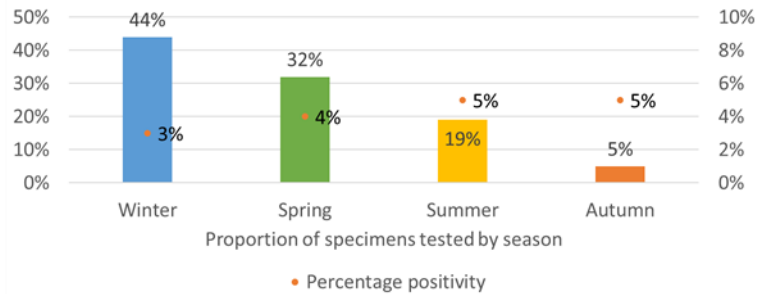
An analysis of 654 paediatric results from ICU and High Care settings (Figure 3) closely mirrored the seasonal predominant circulating viruses (not shown here). Adenoviruses had year-round circulation, with increased circulation in winter months.

There was a near-absence of influenza positivity in the summer months. There was a slight increase in Human metapneumovirus detection in spring months. Human rhinovirus had year-round circulation, with fewer positive results in summer than in winter. Respiratory syncytial virus had a distinct rise in the autumn season this year.

In contrast, only 42 results from adult ICU and High Care settings were analyzed (Figure 4). As expected, influenza was a dominant player in adult ICU and High Care specimens. All other respiratory viruses had sporadic positivity, with one or two cases represented in the small dataset of specimens from adult patients.

An analysis of SARS-CoV-2 PCR results for the same time period yielded very different insights.

Fig. 5: Specimens tested and percentage of SARS-CoV-2 positivity by season, June 2022 to May 2023



A database of 151 004 results with positive or negative results, and demographic data were analyzed. There was a steady decline, from 65 993 specimens in winter 2022 to just 7 924 specimens in autumn 2023 (Figure 5). The positivity rate did not change substantially in that time, which suggests that the clinical utility of the assay has reduced in the past year. This may be due to a combination of the increasing use of rapid antigen tests, and the reduction in preventive public health measures, such as isolation and social distancing, over the past year. Analysis of paediatric and adult ICU or High Care specimens showed a positivity rate of 1.9% and 3.5% respectively. No obvious seasonal trend could be ascertained due to a small sample size.

Conclusion

The seasonal trend of respiratory viruses seems to have returned to pre-pandemic patterns, and there is a substantial reduction in the referral of specimens for SARS-CoV-2 testing in the past year.

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1. Chow EJ, Uyeki TM, Chu HY. The effects of the COVID-19 pandemic on community respiratory virus activity. *Nat Rev Microbiol.* 2023;21(3):195-210.
2. Eden JS, Sikazwe C, Xie R, Deng YM, Sullivan SG, Michie A, et al. Off-season RSV epidemics in Australia after easing of COVID-19 restrictions. *Nat Commun.* 2022;13(1):2884.
3. Tempia S, Walaza S, Bhiman JN, McMorrough ML, Moyes J, Mkhencele T, et al. Decline of influenza and respiratory syncytial virus detection in facility-based surveillance during the COVID-19 pandemic, South Africa, January to October 2020. *Euro Surveill.* 2021;26(29).
4. Stein RT, Zar HJ. RSV through the COVID-19 pandemic: Burden, shifting epidemiology, and implications for the future. *Pediatr Pulmonol.* 2023;58(6):1631-9.

NEWS

Training

Mr Melen Pillay made good progress at Prof Jon Li's Harvard University/Brigham Virology Specialty Laboratory this quarter. Mr Pillay enhanced his sequencing skills, learned the Illumina and PacBio platforms and gene linkage analysis as part of his PhD laboratory work. He is now busy with data analysis and write up of his thesis.

Graduations

We are proud to announce that Dr Neli Ngcaba has graduated with FCPATH (Viro) (CMSA); she is the latest clinical virologist to graduate in our department.

Hearty congrats to Lulama Mthethwa, who graduated with her MMedSci, entitled "MicroRNA Profiling in Patients co-infected with Chronic Hepatitis B Virus (CHBV) and Human Immunodeficiency Virus (HIV) in a High Prevalence Setting."

Conference presentations

We had two presentations at the 41st Annual Meeting of the European Society for Paediatric Infectious Diseases (ESPID), which was held in Lisbon, Portugal from 8 to 12 May 2023. Mr Sontaga Manyana presented a poster entitled "Innovative and Affordable HIV-1 Drug Resistance Testing for Resource Limited Settings" and Ms Lulama Mthethwa presented on "MicroRNA Profiling in Patients co-infected with Chronic Hepatitis B Virus (CHBV) and Human Immunodeficiency Virus (HIV) in a High Prevalence Setting." They also presented at the UKZN School of Laboratory Medicine and Medical Sciences Research Symposium 2023. They are both pictured here, delivering their presentations.



NEWS

continued

Teaching

Over 100 3rd year UKZN BSc students of the Molecular Virology module did a laboratory tour with our registrars and pathologists, and a pipetting practical with our scientists (the students are pictured here, on arrival at the hospital, during the tour, and busy with their practical).

New laboratory developments

We are excited about the imminent placement of an Ion GeneStudio™ S5 System. This system is capable of Ion Torrent™ Next-Generation Sequencing, and can greatly enhance our virus sequencing and HIV drug resistance testing capacity. It is expected that once numbers of specimens increase, the cost per specimen will improve substantially, and out-compete the older Sanger technology which is currently widely used. The system is also broadly capable in research applications, with a complete solution available for targeted NGS of the SARS-CoV-2 genome and other respiratory viruses.

The revival of our cell culture laboratory is steadily progressing. Mr Lunga Xaba is currently being hosted and trained at Prof Alex Sigal's laboratory at Africa Health Research Institute, where he is learning cell culture and immunology techniques that he will apply at our laboratory. This was the first laboratory to isolate the live beta variant, which was made available for research worldwide.

Grants

We are pleased to report that Dr Kerri-Lee Francois was successful in her application to the Poliomyelitis Research Foundation for her planned research on HIV diversity and drug resistance patterns in KZN female sex workers. She has also received partial funding to attend a Genomics and Clinical Virology Course at the Wellcome Sanger Institute in Cambridge, UK.



RECENT PUBLICATIONS

1. Identification of HIV-1 subtype CRF18_cpx in a patient with multidrug resistance in KwaZulu-Natal, South Africa: An epidemiological worry? Aabida Khan, Melendhran Pillay, Benjamin Chimukangara, Lilishia Gounder, Sontaga Manyana, Kerri-Lee Francois, Knowledge Chipango; *Journal of Clinical Virology Plus* 3(2023): 100143.

<https://doi.org/10.1016/j.jcvp.2023.100143>

2. Affordable drug resistance genotyping of HIV-1 reverse transcriptase, protease and integrase genes, for resource limited settings. Manyana, S., Pillay, M., Gounder, L. et al. *AIDS Res Ther* 20, 9 (2023).

<https://doi.org/10.1186/s12981-023-00505-3>

3. Heterogeneity in COVID-19 infection among older persons in South Africa: Evidence from national surveillance data, Nada Abdelatif, Inbarani Naidoo, Shanaaz Dunn, Mikateko Mazinu, Zaynab Essack, Candice Groenewald, Pranitha Maharaj, Nokukhanya Msomi, Tarylee Reddy, Benjamin Roberts and Khangelani Zuma; *Front. Public Health* 11:1009309 (2023).

DOI 10.3389/fpubh.2023.1009309

4. Seroprevalence of SARS-CoV-2 IgG in HIV-positive and HIV-negative individuals in KwaZulu-Natal province, South Africa. Kerri-Lee Francois, Nokukhanya Msomi, Kerusha Govender, Lilishia Gounder, Pravi Moodley, Raveen Parboosing, Indrani Chetty, Lunga Xaba, Aabida Khan

African Journal of Laboratory Medicine (accepted for publication)

5. Breaking the unbreakable: A paediatric case of dolutegravir resistance from KwaZulu-Natal. Malinga, S., Khan, A., & Archary, M. (2023). *Southern African journal of HIV medicine*, 24(1), 1458.

<https://doi.org/10.4102/sajhivmed.v24i1.1458>