



“Lessons from COVID-19 & infectious diseases: Potential of Personalized Medicine

EU-Africa PerMed Stakeholder Workshop – 10 February 2022

Salim S. Abdool Karim, FRS

Director: CAPRISA

CAPRISA Professor of Global Health, Columbia University

Adjunct Professor in Immunology and Infectious Diseases, Harvard University

Adjunct Professor of Medicine: Cornell University

Pro Vice-Chancellor (Research): University of KwaZulu-Natal

Director: DSI-NRF Centre of Excellence in HIV Prevention

Member: African Task Force for Coronavirus



CAPRISA hosts a
DST-NRF Centre of Excellence
in HIV Prevention

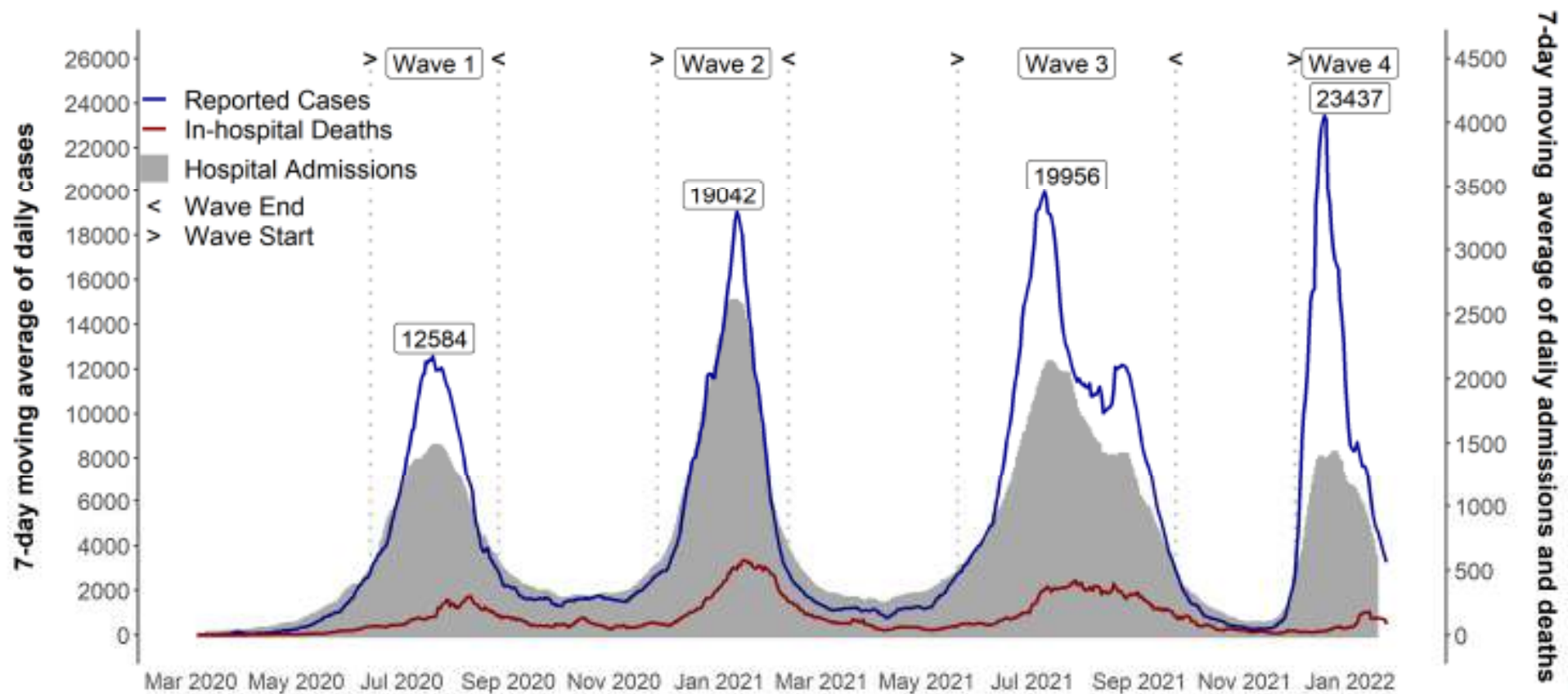


CAPRISA hosts a MRC HIV-
TB Pathogenesis and
Treatment Research Unit



An evolving Covid-19 epidemic & response in SA

7-day moving average of new cases, hospital admissions and in-hospital Covid-19 deaths up to - 2022-01-22



Precision public health approach: “Know your epidemic – Refine your response”



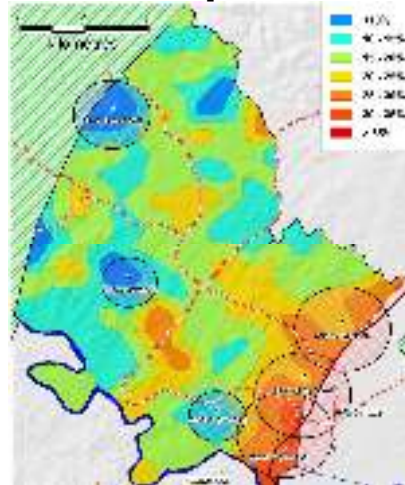
Data-driven plan for the response

UNAIDS
DATA
2020

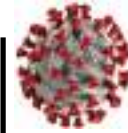
Report



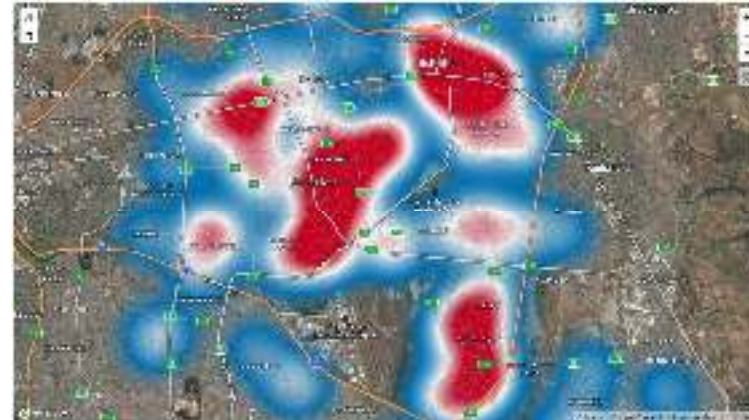
HIV hotspots



Hlabisa district,
KwaZulu
-Natal
Tanser
et al
IJE; 2009



South Africa: SARS-CoV-2 Hotspot
identification and mitigation



Khayelitsha
Township
in Cape Town,
Cloete et al,
2020

Guidelines for second
generation HIV surveillance: an
update: Know your epidemic



The NEW ENGLAND
JOURNAL of MEDICINE

The South African Response to the Pandemic

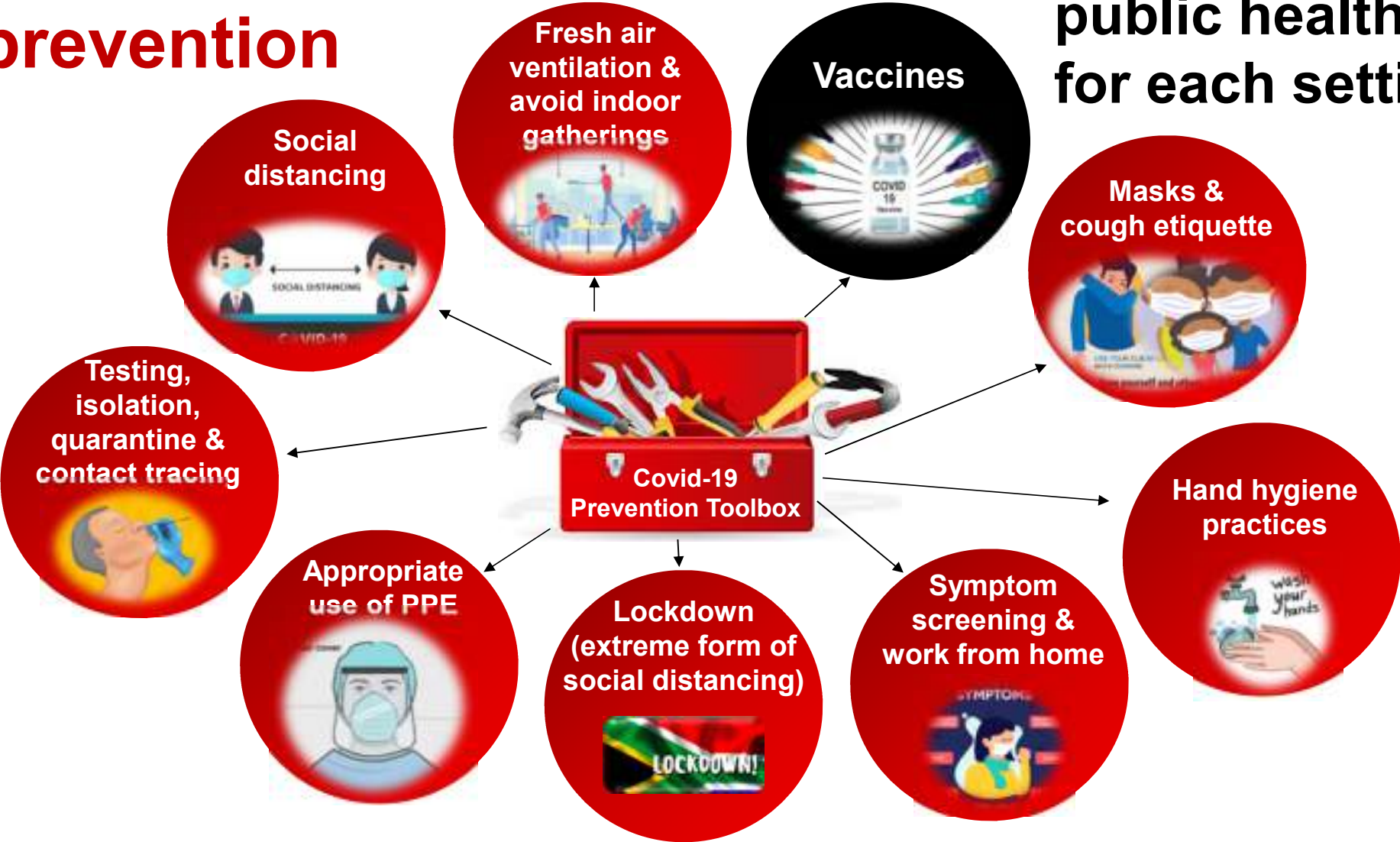
Salim S. Abdool Karim, M.B., Ch.B., Ph.D.

The first person with confirmed Covid-19 in South Africa was a traveler who had returned from Italy. During Stage 4, which was initiated on day 33, the government has deployed more than 28,000



Combination prevention

Toolbox with precise public health tools for each setting...

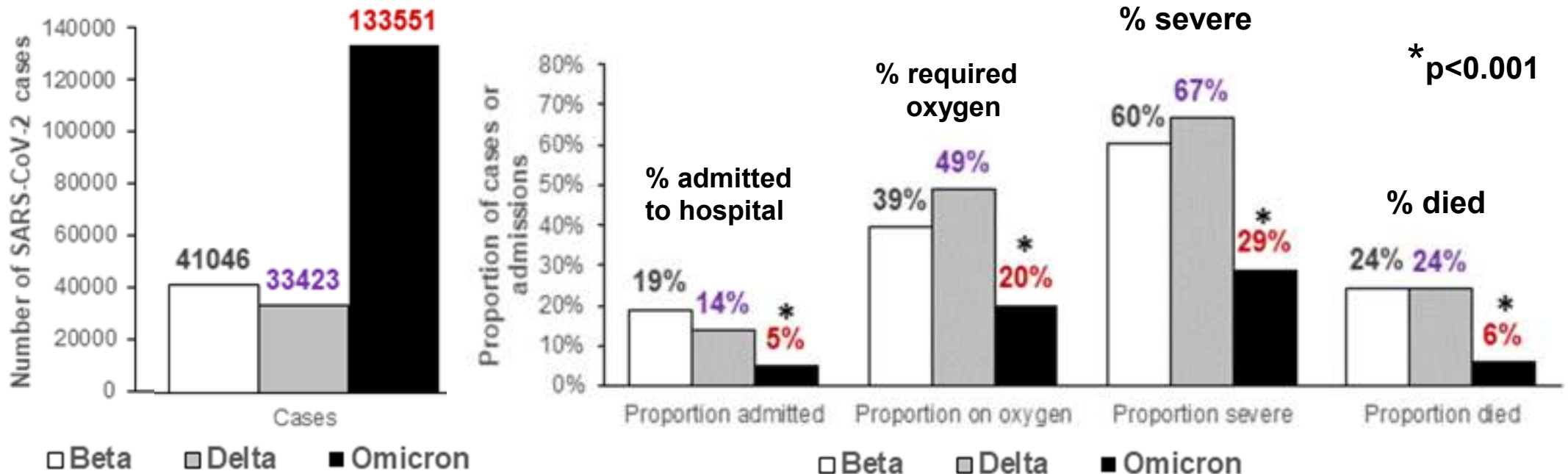


Omicron is less severe: but who's high risk of dying?



Clinical severity of Covid-19 patients admitted to hospitals in Gauteng, South Africa during the Omicron-dominant fourth wave

Waasila Jassat¹, Salim S Abdool Karim^{2,3}, Caroline Mudara¹, Richard Welch¹, Lovelyn Ozougwu¹, Michelle J. Groome^{1,4}, Nevashan Govender¹, Anne von Gottberg^{1,4}, Nicole Wolter^{1,4}, DATCOV author group, Lucille Blumberg^{1*}, Cheryl Cohen^{1,5*}



"Severe" defined as respiratory distress, oxygen, mechanical ventilation, high care / ICU care or death

Note: Gauteng data from the first 4 weeks of each wave – later data may change this picture

CDC report: Vaccines & boosters impact individual risk on risk of death

Weekly average deaths per 100,000

From Oct. to Nov. 2021



Unravelling individual genetic risk of severe disease

Genomewide Association Study of Severe Covid-19 with Respiratory Failure

The Severe Covid-19 GWAS Group*



THE NEW ENGLAND
JOURNAL of MEDICINE

The major genetic risk factor for severe COVID-19 is inherited from Neanderthals

Hugo Zeberg^{1,2,3} & Svante Pääbo^{1,3,4}

nature

APOE e4 Genotype Predicts Severe COVID-19 in the UK Biobank Community Cohort

Chia-Ling Kuo, PhD,^{1,2} Luke C. Pilling, PhD,^{2,3} Janice L. Atkins, PhD,³ Jane A. H. Masoli, MRChB,^{3,4} João Delgado, PhD,³ George A. Kuchel, MD,² and David Melzer, MRChB



THE GERONTOLOGICAL
SOCIETY OF AMERICA

also as: J Genet

Urgent: Need to individualise care for immunocompromised individuals to reduce risk of variants



Persistent SARS-CoV-2 infection and intra-host evolution in association with advanced HIV infection

Karim F, PhD1,2, Moosa MYS, MD, PhD3, Gosnell BI, MD, PhD3, Cele S, MSc1,2, Giandhari J, PhD4, Pillay S, MSc4, Tegally H, MSc4, Wilkinson E, PhD4, San JE, MSc4,

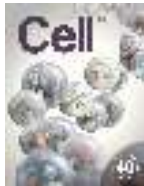
- Uncontrolled HIV, CD4 = 6, HIV VL: 34,151
- 11 new mutations / deletions in spike protein
- Patient recreated the 3 key RBD mutations of Beta variant (501Y.V2)



SARS-CoV-2 evolution during treatment of chronic infection

Steven A. Kemp, Dami A. Collier, Rawlings P. Datir, et al

- Patient with B cell lymphoma on chemo and anti-CD20 B cell depletion with rituximab
- SARS-CoV-2 convalescent plasma
- Virus evolved with ↓ sensitivity to neut Abs



Case Study: Prolonged Infectious SARS-CoV-2 Shedding from an Asymptomatic Immunocompromised Individual with Cancer

Victoria A. Awanzato,^{1,2*} M. Jeremiah Matzon,^{1,2*} Stephanie N. Seibert,^{1,2} Hlys Price,² Ursula N. Williamson,¹ Scott L. Arnold,⁴ Kari Erdem,¹ Paul D. Johnson,⁵ Elizabeth P. Sedorff,⁶ Peter M. Taylor,⁴ Thomas A. Brown,³

- Immunocompromised individual with chronic lymphocytic leukemia
- Continuous turnover of viral variants



Persistence and Evolution of SARS-CoV-2 in an immunocompromised Host

Choi B, Choudhary MC, Regan J, et al

- Multiple viral mutations in patient with antiphospholipid syndrome



Collaboration – brought us 1st vaccine in 9 months

Need stronger EU-Africa precision medicine collaborations to help slow the Covid-19 deaths

