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Morning Brief : Scientific Review

14 April 2020

The purpose of the Morning Brief is to **summarise** and present key information, research articles and other relevant publications pertaining to critical care and COVID-19. We aim to prioritise information, articles and publications released in the preceding 24-48 hours.

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Content

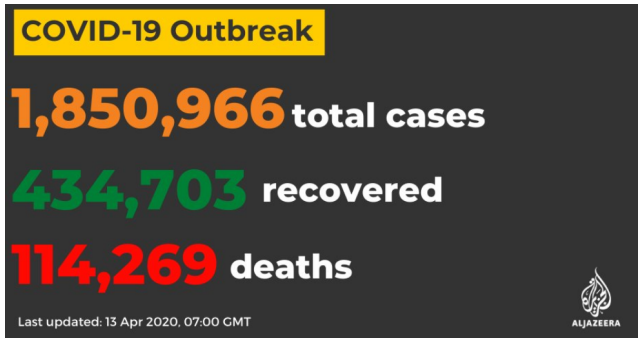
- World update
- South African update
- Topics discussed:
- Risk of transmission in healthcare workers
- Infection prevention control recommendations for HCWs
- Immunity after SARS-CoV-2 infection

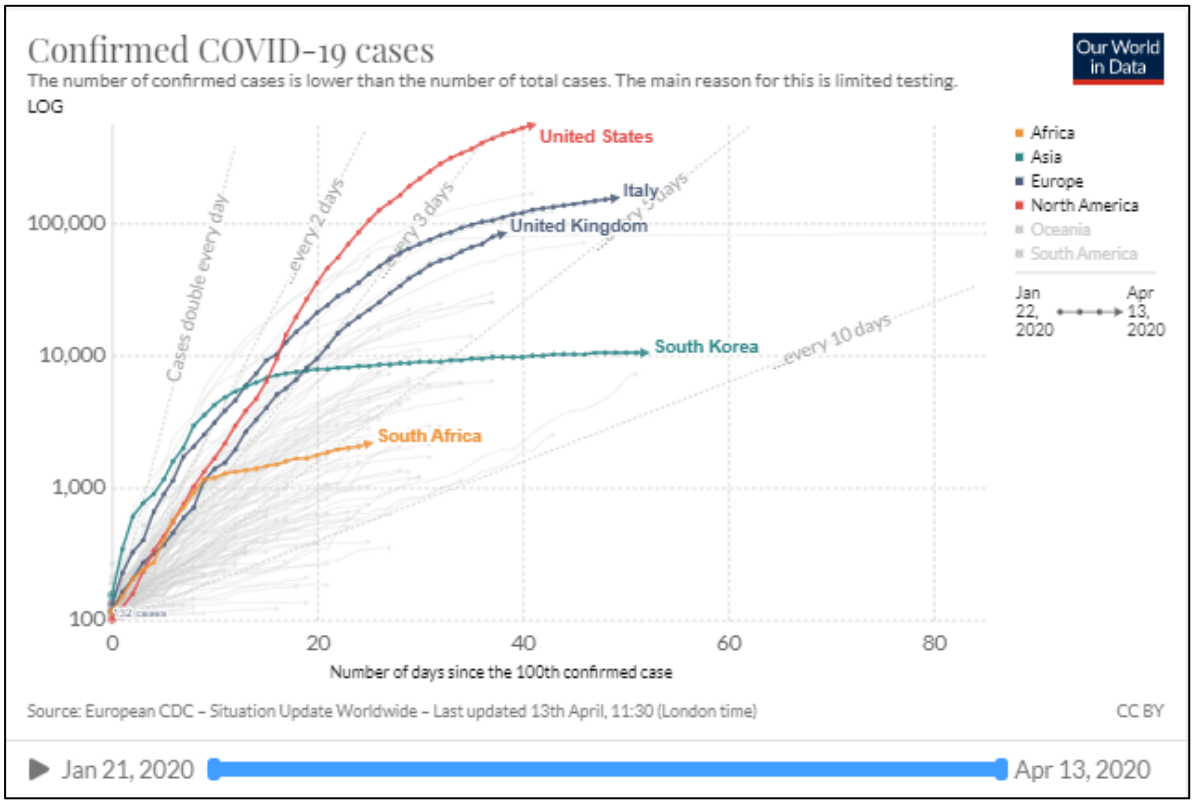
Global data

>1.8 million confirmed cases worldwide
>400 000 have recovered
>110 000 fatalities

>550 000 cases in USA

Italy reports lowest daily death toll since March





Max Roser, Hannah Ritchie and Esteban Ortiz-Ospina (2020) - "Coronavirus Disease (COVID-19) – Statistics and Research". Published online at OurWorldInData.org. https://ourworldindata.org/coronavirus [Online Resource] Accessed 13 April 17h00

Western Cape data

628 confirmed cases in the province
29 Hospitalised
15 in ICU

LET'S STOP THE SPREAD

Municipality	Cases
City of Cape Town	512
Cape Winelands District Municipality	29
Central Karoo District Municipality	0
Garden Route District Municipality	56
Overberg District Municipality	10
West Coast District Municipality	5

Media briefing by Premier Alan Winde https://www.westerncape.gov.za/department-of-health/news/update-coronavirus-premier-alan-winde-13-april Accessed 13 April 17h30

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Rapid Review Covid-19: Risk of transmission and IPC recommendations for HCWs

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Introduction
Risk of transmission in HCWs

- Transmission risk to HCWs is multi-factorial
- IPC approaches are similar to those used in SARS
- IPC interventions need to be dynamic, taking into consideration the changing epidemic, the setting and resources at hand
- Current Guidance
  - Western Cape Government Department of Health: *Guidelines for PPE use during the coronavirus disease 2019* (25 March 2020)
  - WHO: *Rational use of PPE for corona virus disease 2019 (Covid-19)*, (27 February 2020)

Methods

- Literature review performed using
  - PubMed and Google Scholar databases
  - MeSH terms included transmission/infection, risk, healthcare/health care worker, COVID*
  - Articles from 2019 to present, including pre-publication proofs
  - English language restrictions
  - Search expanded using a snowballing method applied to the references of retrieved papers
  - Discrepancies and doubts were resolved through consensus of the authors

Who gets infected?

- Routes of transmission in individuals
  - Symptomatic (first three days)
  - Pre-symptomatic (incubation period)
  - Asymptomatic (test positive, never have symptoms, as yet not documented but cannot be ruled out)
- Most at risk
  - HCWs working crowded emergency rooms, outpatient departments and general wards where patients may be unidentified, undiagnosed or concealed transmitters (Adams & Walls, 2020)

- Critical care staff and anaesthetists performing aerosol generating/operative procedures (Wax & Christian, 2020)

- Transmission from family members may contribute

ADAMS, J. G. & WALLS, R. M. 2020. Supporting the Health Care Workforce During the COVID-19 Global Epidemic. *JAMA*

Transmission: Risk factors & reasons

Contact transmission

- Contamination of the HCW's hands is one of the main transmission routes
  - Suboptimal hand hygiene before and after touching a patient or fomites
  - Unqualified handwashing practices

(Ran et al., 2020)

Environmental transmission

- Immediate environment of infected patient
- Extensive surface contamination of patient's room including outlet fans, toilet bowl, sink, door handles etc
- Poor bed spacing, no negative air pressure nor frequent air changes

(World Health Organisation 2020c)

WORLD HEALTH ORGANIZATION 2020c. Water, sanitation, hygiene, and waste management for the COVID-19 virus: Interim guidance, 19 March 2020. Geneva

Transmission: Risk factors & reasons

Suboptimal PPE practice

- Lack of preparation and poor awareness of transmission route
- Inadequate training
- Incorrect use of PPE
- Short supply of PPE
- CHW fatigue

Not recognizing the infected patient

- Atypical presentation
- Asymptomatic patients
- Patients who conceal their diagnosis

(Ran et al., 2020 , Zhou et al., 2020)

RAN, L., CHEN, X., WANG, Y., WU, W., ZHANG, L. & TAN, X. 2020. Risk Factors of Healthcare Workers with Corona Virus Disease 2019: A Retrospective Cohort Study in a Designated Hospital of Wuhan in China. *Clin Infect Dis*.

What about bodily fluid?

- Specimens from patients in China show COVID-19 %positivity rates by number of samples:

Bronchoalveolar lavage fluid	93%
Sputum	72%
Nasal swabs	63%
Fibrobronchoscope brush biopsy	46%
Pharyngeal swabs	32%
Faeces	29%
Blood	1%
Urine	0%

- ICP guidelines should reflect protective measures that are based on procedure risk which correspond to the above positivity rates in specimens. (Wang et al.,2020)

WANG, D., HU, B., HU, C., ZHU, F., LIU, X., ZHANG, J., WANG, B., XIANG, H., CHENG, Z., XIONG, Y., ZHAO, Y., LI, Y., WANG, X. & PENG, Z. 2020. Clinical Characteristics of 138 Hospitalized Patients With 2019 Novel Coronavirus-Infected Pneumonia in Wuhan, China. *JAMA*

IPC recommendations in HCWs

Firstly,

- Training, training, training
- Triage patients appropriately
- Good supply of appropriate PPE
- Regular environmental decontamination

IPC recommendations in HCWs

Protect the high risk/low risk interface

- Think of risk in terms of procedure and location (zone)
  - Traffic Control Bundling (green, orange, red): low risk zone, high risk zone with transition zone in between. Strict hand hygiene, donning and doffing occur according to zone. (Schwartx et al., 2020)

New IPC interventions

- Real-time infection control
  - CCTV cameras in isolation rooms
  - An observer overseeing staff at work in the office on a screen
  - Looks for IPC breeches, advises and supports staff over radio/intercom
  - Low cost solution: “IPC police” observe staff don and doff and at work where feasible (Chen et al., 2020)

SCHWARTZ, J., KING, C. C. & YEN, M. Y. 2020. Protecting Health Care Workers during the COVID-19 Coronavirus Outbreak -Lessons from Taiwan's SARS response. *Clin Infect Dis*.

Important points from our HCW IPC training

Donning and doffing

- Always don and doff with an observer who checks for potential breaches in PPE
- Ensure the correct glove removal technique when doffing

Appropriate use of PPE

- Be sure to know when to add an apron to the gown

Use hypochloride

- To clean surfaces
- On apron between patients in same room, discard apron when finished in the room

Most importantly: HAND HYGIENE

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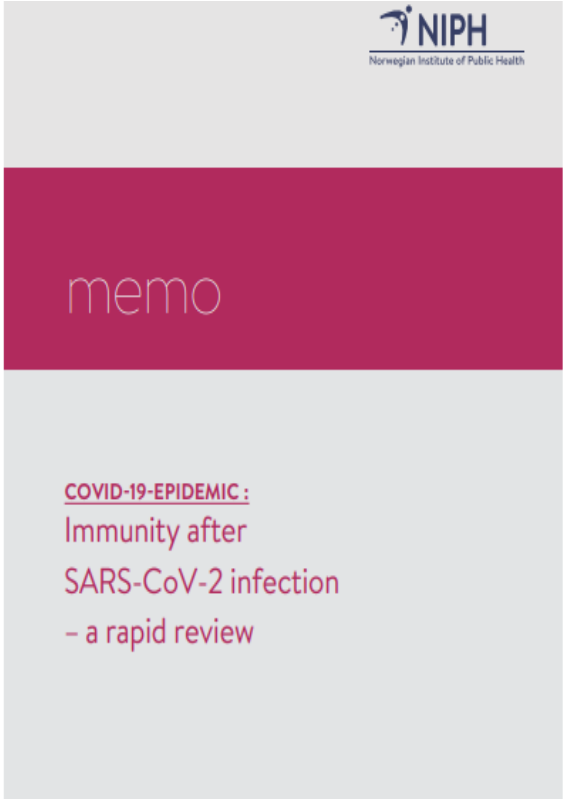
Immunity after SARS-CoV 2 infection: rapid review

Nonto Mponda

Flodgren GM, Immunity after SARS-CoV-2 infection. Rapid review 2020. Oslo: Norwegian Institute of Public Health, 2020

Questions Addressed:

1. Does primary infection with SARS CoV-2 result in immunity, and if so, how long does the immunity last?
2. How quickly does one develop SARS-CoV-2 specific antibodies, and what is the proportion of patients presenting seroconversion?
3. Does the rate of seroconversion and/or the timing depend on the severity of SARS-CoV-2 infection?



Method

Rapid searches in PubMed, EMBASE and two pre-print databases. Manual search of reference lists to find relevant papers. Only one researcher did the search and summary of findings. Found 439 records and used 16 original papers.

Flodgren GM, Immunity after SARS-CoV-2 infection. Rapid review 2020. Oslo: Norwegian Institute of Public Health, 2020

Results

Does primary infection with SARS CoV-2 result in immunity, and if so, how long does the immunity last?

Authors did not identify any human studies that could help with answering whether people who have been infected with SARS-CoV-2 gain immunity.

They found a rhesus macaque study with SARS-CoV 2 and human studies on SARS-CoV infection which followed up antibodies of participants 3 years after infection.

Bao et al. study on 4 macaques suggests a protective effect of primary infection against reinfection with SARS-CoV-2 when re-challenged immediately after recovery.

A study on healthcare workers previously infected with SARS-CoV by Guo et al. showed sustained IgG levels one year after infection which lasted up to 13 years whereas another study suggested that IgG antibodies were maintained for up to two years after infection.

Conclusion: Not enough evidence on SARS-CoV -2 immunity in humans.

Results

How quickly does one develop SARS-CoV-2 specific antibodies, and what is the proportion of patients presenting seroconversion?

9 studies, sample sizes 22 to 173, 4 had no disease severity information, no studies included asymptomatic people.

The type of serological tests used varied greatly.

Measurement of seroconversion rate varied across studies. Less than 60% seroconversion within 7 days of symptom onset for IgM and IgG. More than 75% seroconversion beyond 14 days of symptom onset for IgM and IgG.

Two studies reported median seroconversion time 10 to 12 days

for IgM and 12 to 14 days for IgG.

Conclusion: Seroconversion rate and timing varied across studies and between IgM and IgG antibodies most likely due to different test sensitivities and small sample population used.

Results

Does the rate of seroconversion and/or the timing depend on the severity of SARS-CoV-2 infection?

One study reported evidence for a faster peak in antibody response in people with COVID 19 disease who later died, than in those who recovered.

One study reported no relationship between IgM or IgG antibodies and severity of disease.

Conclusion: Seroconversion timing for IgM and IgG varied across studies and antibody class. The relationship between rate and timing of seroconversion and severity of disease needs further investigation.

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