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**Covid-19 HCW
Surveillance among healthcare workers for SARS-
Coronavirus-2 infection
RIA2020EF-3020**

EDCTP COVID-19 Webinar

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Rationale and objectives

To investigate the epidemiology of SARS-CoV-2 infection among different healthcare workers (HCW) groups that supposedly have different exposure to COVID-19 patients at Chris Hani Baragwanath Academic Hospital.

- To determine the prevalence of symptomatic and asymptomatic PCR-confirmed SARS-CoV-2 infections among HCW using a systematic sampling strategy, coupled with investigation when clinically indicated.
- To define the duration of “shedding” of SARS-CoV-2 in HCW who are identified to be infected with the virus.
- To undertake serial sero-epidemiology surveys on the prevalence of SARS-CoV-2 antibodies among the HCWs.
- To describe the association between PCR-confirmed SARS-CoV-2 infections and SARS-CoV-2-specific antibody levels.
- To analyse humoral and cell mediated immune responses to SARS-CoV-2 infection at 30 and 60 days post initial viral detection.
- To assess differences in underlying risk of infection across HCW.
- To compare the prevalence of PCR-confirmed SARS-CoV-2 infections and SARS-CoV-2 antibodies between HCW and individuals from the Soweto community.

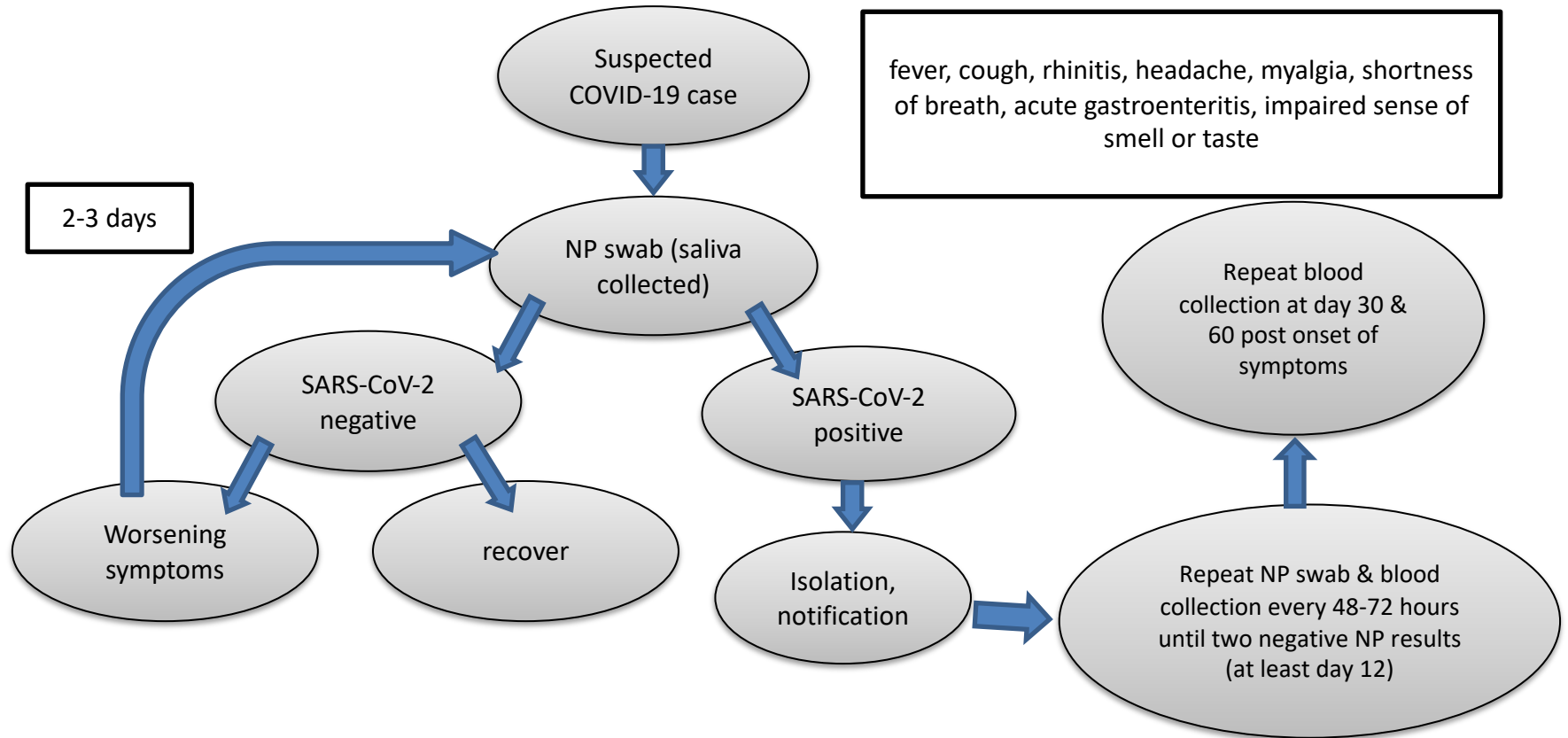
Study design

- HCWs are at the frontline of the COVID-19 response and as such are exposed to threats that put them at risk of infection.
- Surveillance for the full spectrum of disease, including mild or asymptomatic infections.
- Surveillance for SARS-CoV-2 infection among HCW independent of clinical symptoms.
- Sero-epidemiology analyses.
- Describe lymphocyte subsets including central and effector memory and naïve cells.

Procedure	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12	Week 13	Week 14	Week 15	Week 16*	Final visit*
	Month 1				Month 2				Month 3				Month 4*				
Informed consent	X																
Demographic, past medical & surgical history	X																
Blood collection (every 12-16 d)	X		X		X		X		X		X		X		X		X
Nasal swab collection (every 5-10 d)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Questionnaire	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

*Sampling to continue until COVID-19 pandemic is considered under control in South Africa, anticipated to be 3-4 months.

Study design



New emerging questions

- Re-infections.
- Vaccine effectiveness.
- Vaccine immune response in relation to pre-immunity.

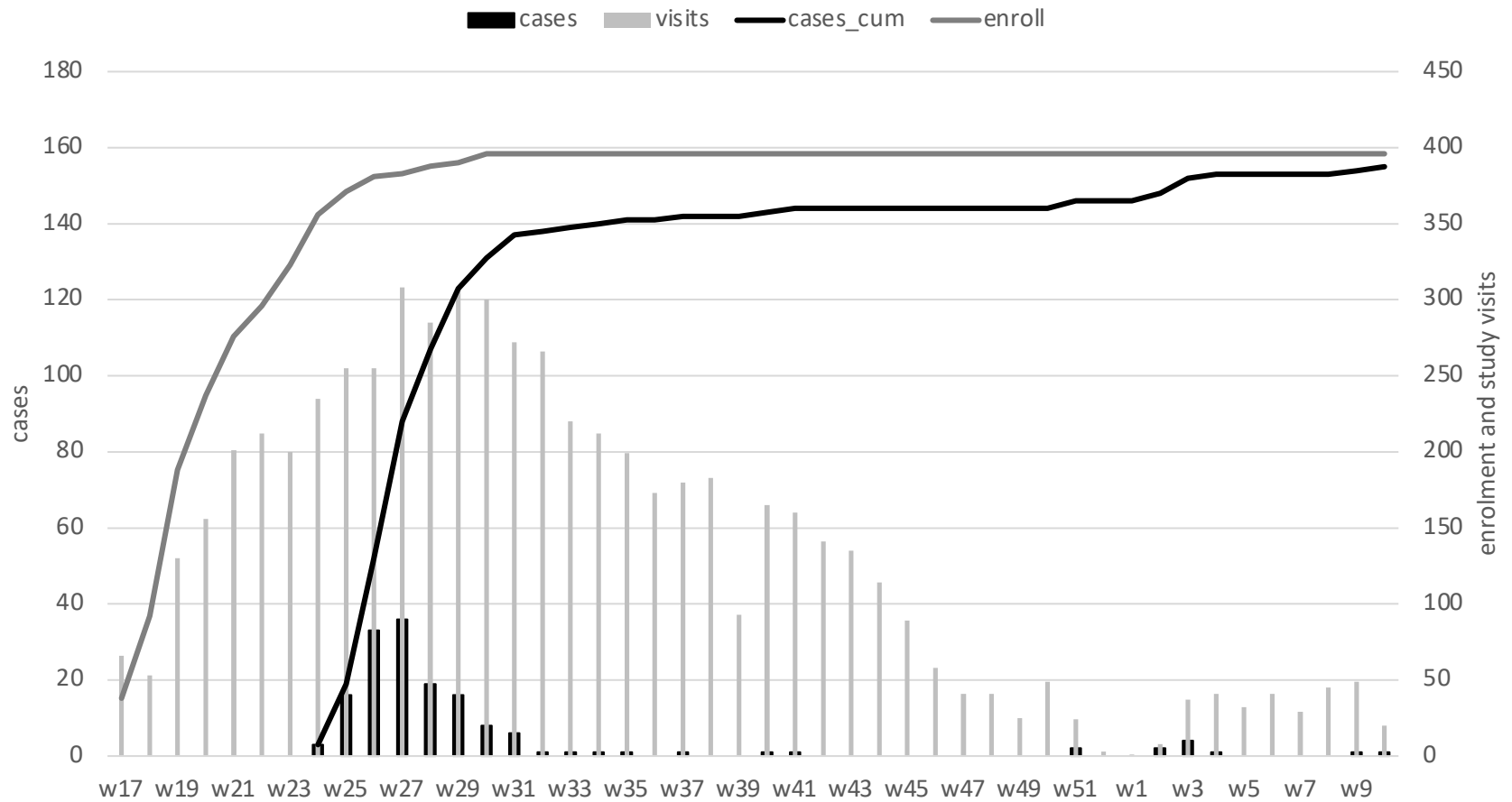
Characteristics of the HCWs enrolled in the study

	Overall N=396
Internal Medicine	167 (42.2)
Pediatrics	93 (23.5)
Intensive care	49 (12.4)
Obstetrics	23 (5.8)
VIDA	64 (16.2)

Characteristics of the HCWs enrolled in the study

	Overall N=396	Internal Medicine N=167	Other departments N=229
Job category			
Nurse	193 (48.7)	128 (76.7)	65 (28.4)
Physician	132 (33.3)	38 (22.8)	94 (41.1)
Para-medical	7 (1.8)	1 (0.6)	6 (2.6)
VIDA Clinical staff	42 (10.6)	N/A	42 (18.3)
VIDA Laboratory staff	22 (5.6)	N/A	22 (9.6)
Race			
Black-African	279 (70.5)	136 (81.4)	143 (62.5)
Asian	57 (14.4)	19 (11.4)	38 (16.6)
White	49 (12.4)	8 (4.8)	41 (17.9)
Other	11 (2.8)	4 (2.4)	7 (3.1)
Female	327 (82.6)	146 (87.4)	181 (79.0)
Mean age in years (SD)	38.0 (9.4)	40.0 (8.7)	36.6 (9.6)
Transport to work			
Private car	250 (63.1)	84 (50.3)	166 (72.5)
Public transport	139 (35.1)	82 (49.1)	57 (24.9)
Other	7 (1.8)	1 (0.6)	6 (2.6)
At least 1 comorbidity	226 (57.2)	110 (65.9)	116 (50.9)
Smoking			
Active smoker	25 (6.3)	8 (4.8)	17 (7.4)
Previous smoker	15 (3.8)	3 (1.8)	12 (5.2)
Received influenza vaccine	204 (51.5)	48 (28.7)	156 (68.1)

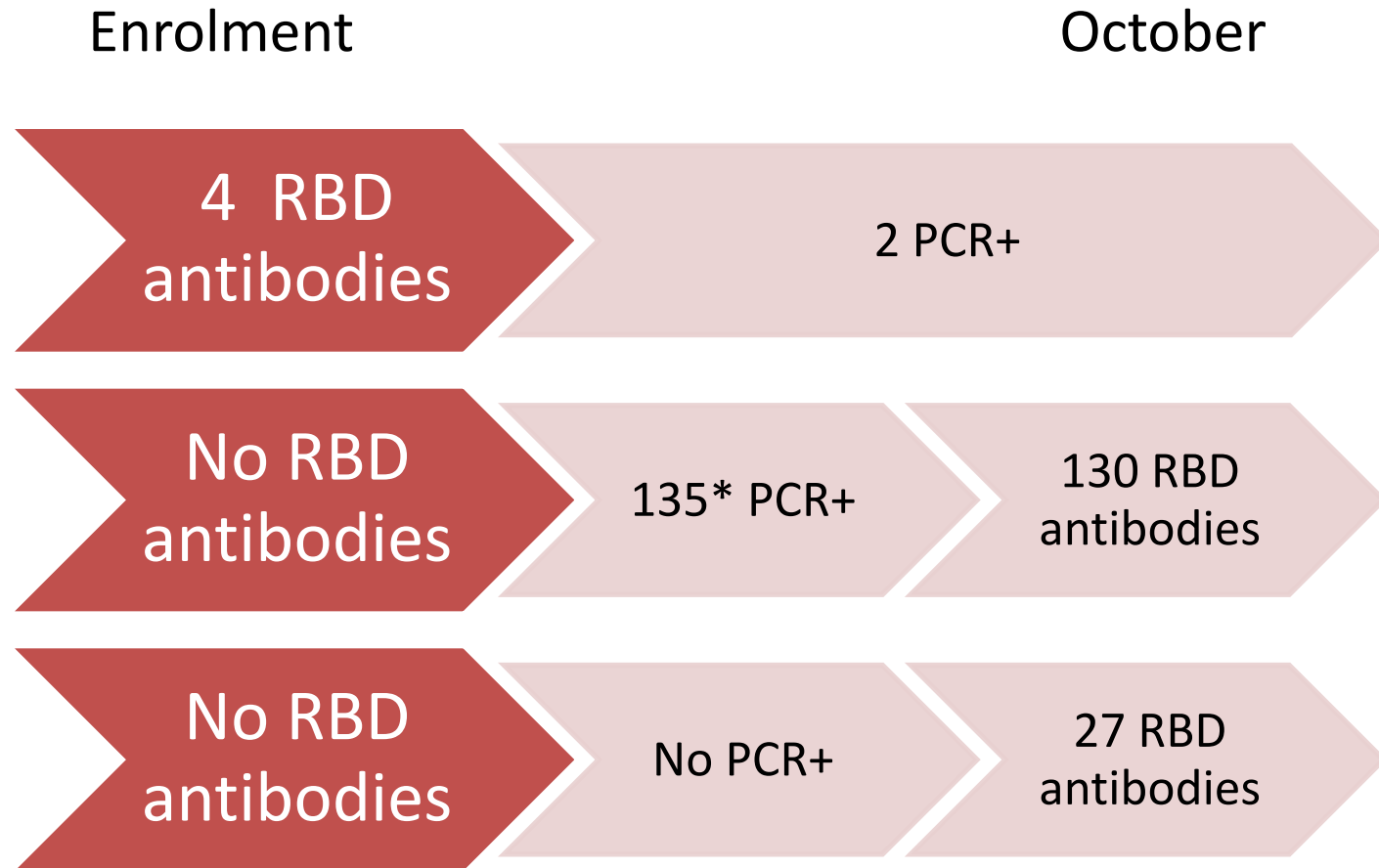
Study enrolments and cases



PCR-confirmed cases by department

Department	Positivity Rate n/N (%)	Incidence per 1000 person- months (95%CI)
Overall	137/396 (34.6)	132.1 (111.8, 156.2)
Internal Medicine	85/167 (50.9)	203.0 (164.1, 251.0)
Other than Internal Medicine	52/229 (22.7)	84.1 (64.1, 110.4)
Pediatrics	25/93 (26.9)	91.3 (61.7, 135.0)
Intensive care	10/49 (20.4)	62.7 (33.7, 116.5)
Obstetrics	2/23 (8.7)	43.8 (11.0, 175.2)
VIDA	15/64 (23.4)	107.0 (65.1, 179.1)

Serology



*2 unavailable sample for serology

Self-reported symptoms at the time SARS-CoV-2 PCR detection or within 10 days of detection

Symptoms	Symptoms at diagnosis N=80 n (%)	Symptoms developed by pre-symptomatic HCWs in the 10 days following diagnosis N=41 n (%)	Symptoms at diagnosis or developed within 10 days of diagnosis N=123 ^a n (%)
Cough	48 (60.0)	28 (68.3)	94 (76.4)
Impaired sense of smell or taste	25 (31.3)	30 (73.2)	90 (73.2)
Sore throat	43 (53.8)	23 (56.1)	83 (67.5)
Myalgia	21 (26.3)	29 (70.7)	81 (65.9)
Rhinitis / runny nose	42 (52.5)	14 (34.1)	69 (56.1)
Acute gastroenteritis/vomiting/nausea	7 (8.8)	20 (48.8)	54 (43.9)
Fever / feeling feverish	28 (35.0)	11 (26.8)	52 (42.3)
Shortness of breath	12 (15.0)	15 (36.6)	50 (40.7)
Headache ^b	48 (60.0)	10 (24.4)	65 (52.8)
Fatigue ^b	35 (43.8)	30 (73.2)	90 (73.2)

SARS-CoV-2 PCR characteristics among symptomatic, asymptomatic or pre-symptomatic cases

	Symptomatic	Asymptomatic	Pre-symptomatic	p-value ^a	p-value ^b	p-value ^c
Mean PCR Ct value at diagnosis, (SD) ^d	24.2 (6.5) [79]	28.9 (7.4) [14]	28.0 (5.5) [41]	0.015	0.002	0.61
Mean lowest PCR Ct value detected, (SD) ^d	22.0 (4.8) [79]	28.8 (7.2) [14]	25.1 (4.9) [41]	<0.001	0.001	0.037
All PCR Ct values ≥30, n (%) ^e	6 (7.6) [79]	6 (42.9) [14]	7 (17.1) [41]	<0.001	0.113	0.050

SD: Standard deviation.

^ap-values comparing symptomatic vs. asymptomatic.

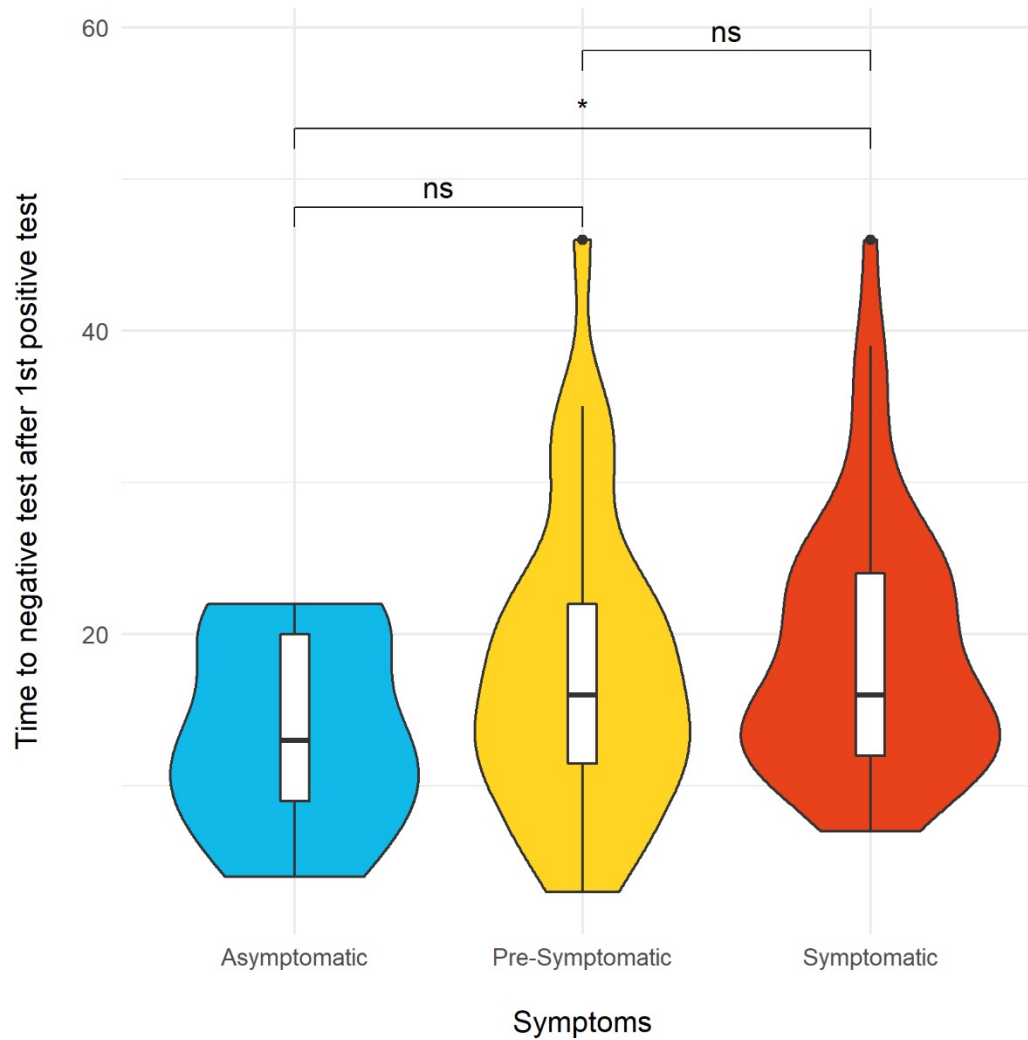
^bp-values comparing symptomatic vs. pre-symptomatic.

^cp-values comparing asymptomatic vs. pre-symptomatic.

^dValues relative to the nucleocapsid-1 target.

^eFor nucleocapsid-1 and -2 targets.

Length of PCR positivity according to symptomatology



Publications and other communications

- Manuscript under review at Clinical Infectious Diseases