Vaccinated or non-vaccinated: patients are not healthcare workers, and the flu is not COVID-19

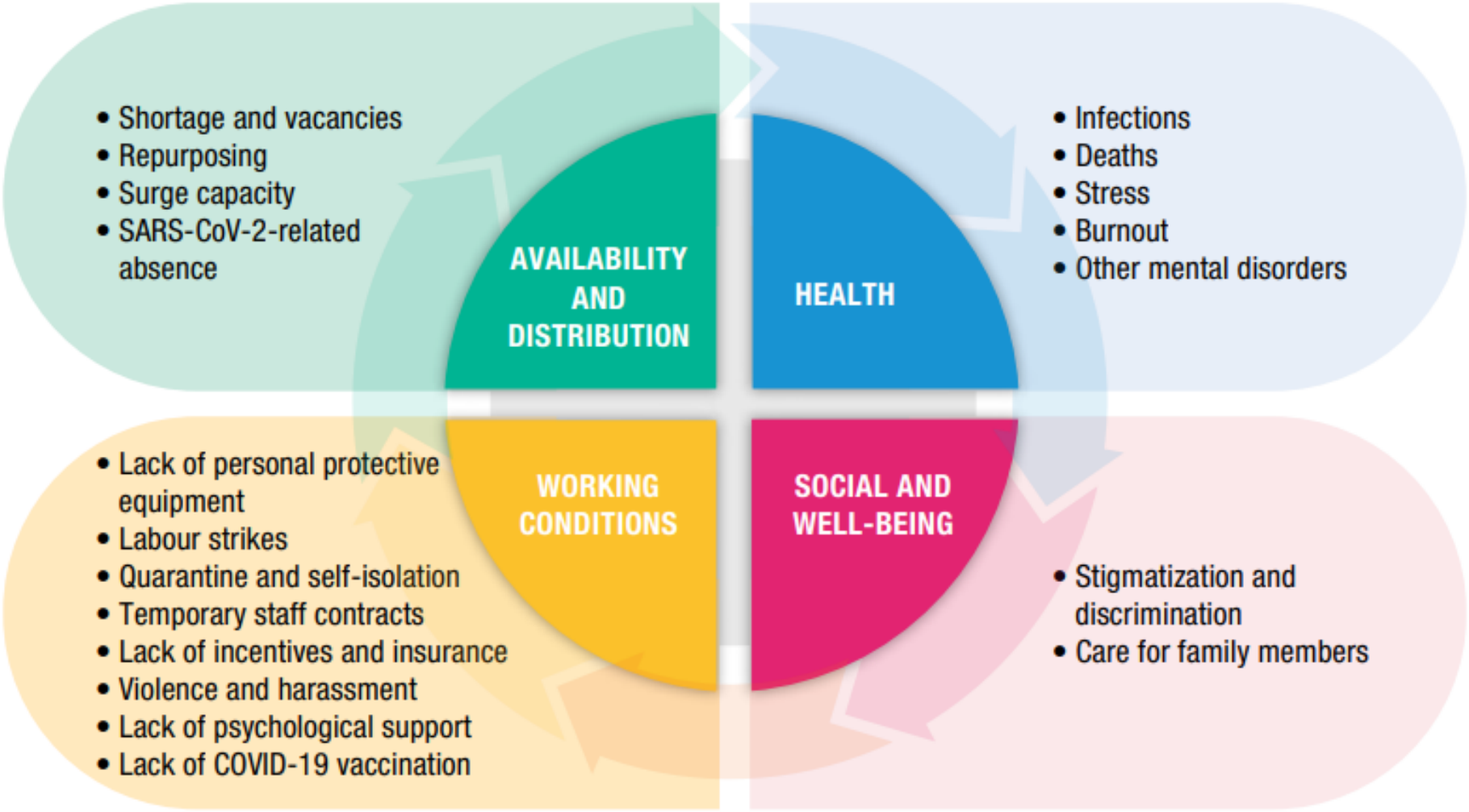
Protecting the immunocompromised healthcare worker

Gabriel Birgand

@gbirgand

ECCMID 2022

Multidimensional factors affecting HCWs



WHO : The impact of COVID-19 on health and care workers: a closer look at deaths

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Influenza among HCWs

CPias Pays de la Loire

Meta-analysis, 97 influenza seasons
58,245 study participants

Incidence rate n/100 population/ season	HCW	Working adults	IRR
All infections			
Unvaccinated	**18.7%**	5.4%	3.4
Vaccinated	6.5%	1.2%	**5.4**
Symptomatic infections (serology)			
Unvaccinated	7.5%	5.1%	1.5
Vaccinated	4.8%	3%	1.6

Kuster, Plos one, 2011

doi:10.1371/journal.pone.0026239

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Kuster, Plos one, 2011
doi:10.1371/journal.pone.0026239

Multicenter prospective cohort 2017
289 HCW from 5 French university hospitals

3 Examinations + serology + PCR

62/278 (22%) HCW positive to influenza

- **46.8% asymptomatic** (Vacc 61% vs 35% others)
- 41.9% paucisymptomatic (Vacc 36% vs 47% others)
- 11.3% symptomatic (Vacc 4% vs 18% others)

Asymptomatic HCW would be able to transmit the virus to both patients and colleagues

Bénet, CID 2021
DOI: 10.1093/cid/ciaa1109

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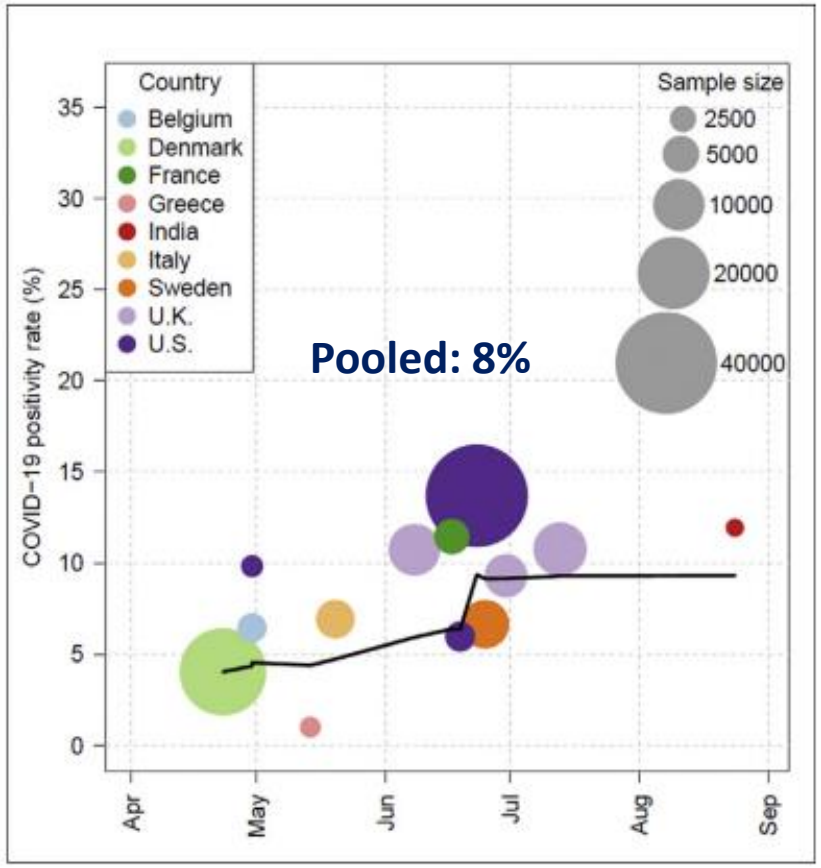
COVID-19 among HCWs

CPias Pays de la Loire

Meta-analysis of 25 prevalence studies (13 high-quality) among HCWs



Kayi I et al, Clin Microb Infect 2021

doi: 10.1016/j.cmi.2021.05.036.

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CPias Pays de la Loire

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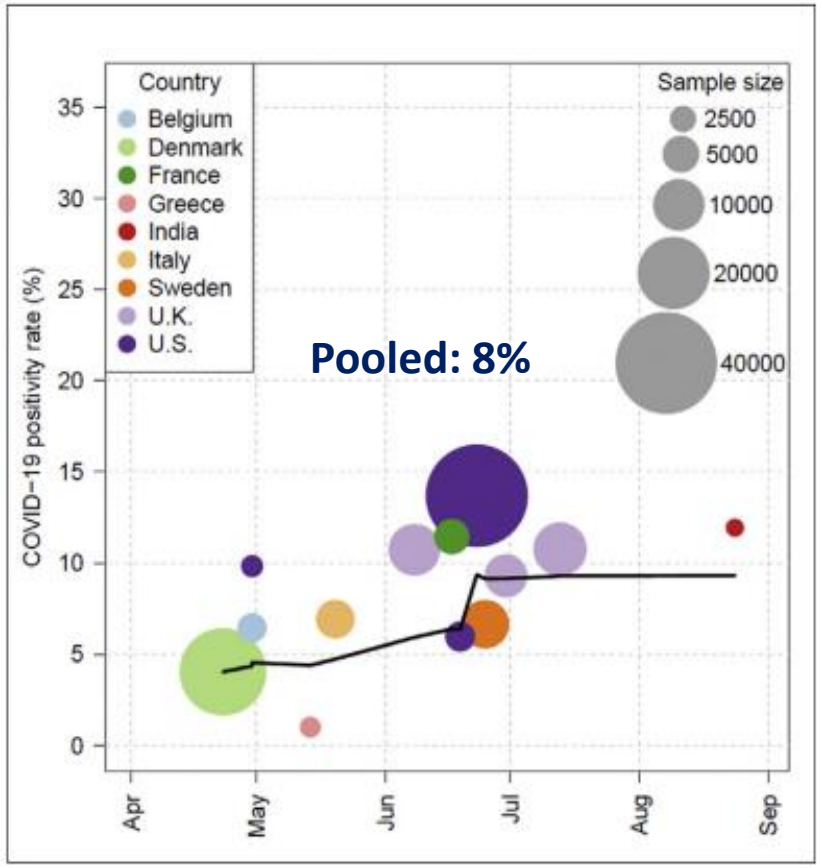


Kayi I et al, Clin Microb Infect 2021

doi: 10.1016/j.cmi.2021.05.036.

Meta-analysis of studies reporting HCW with PCR-proven Covid-19 infection

17 studies

Covid-19 positive HCW: 12.5% (6.2-23.5)

BUT variability according to:

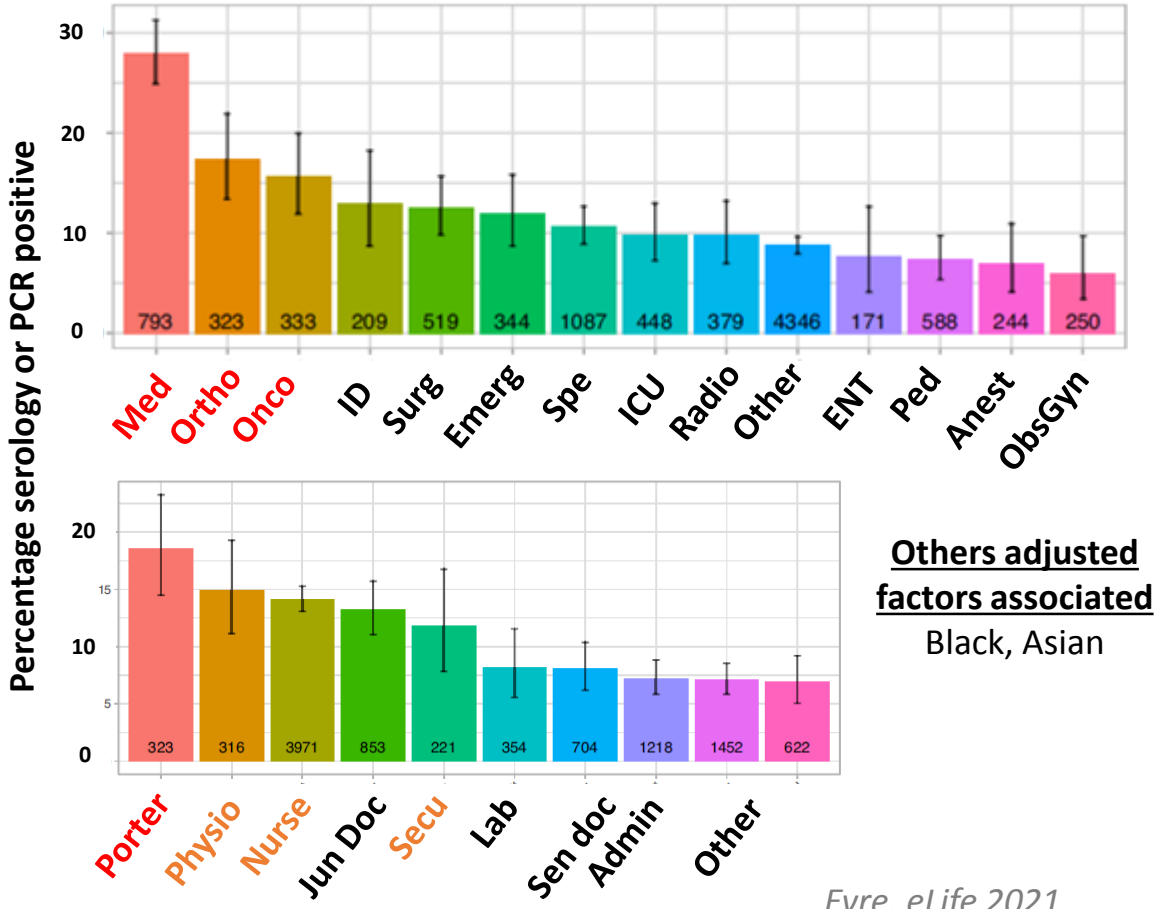
- Individual characteristics (ethnic minor: 9-17%)
- Workplaces setting
- Exposure inside (6-13%), **outside workplaces** (14-32%)
- Testing strategy
- PPE availability/use

Gholami, IJID 2021

https://doi.org/10.1016/j.ijid.2021.01.013

COVID-19 risk factors among HCWs

UK teaching hospital
1128/10,034 (11.2%) staff with Covid-19



Others adjusted factors associated
Black, Asian

Eyre, eLife 2021
DOI: https://doi.org/10.7554/eLife.60675

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COVID-19 risk factors among HCWs

CPias Pays de la Loire

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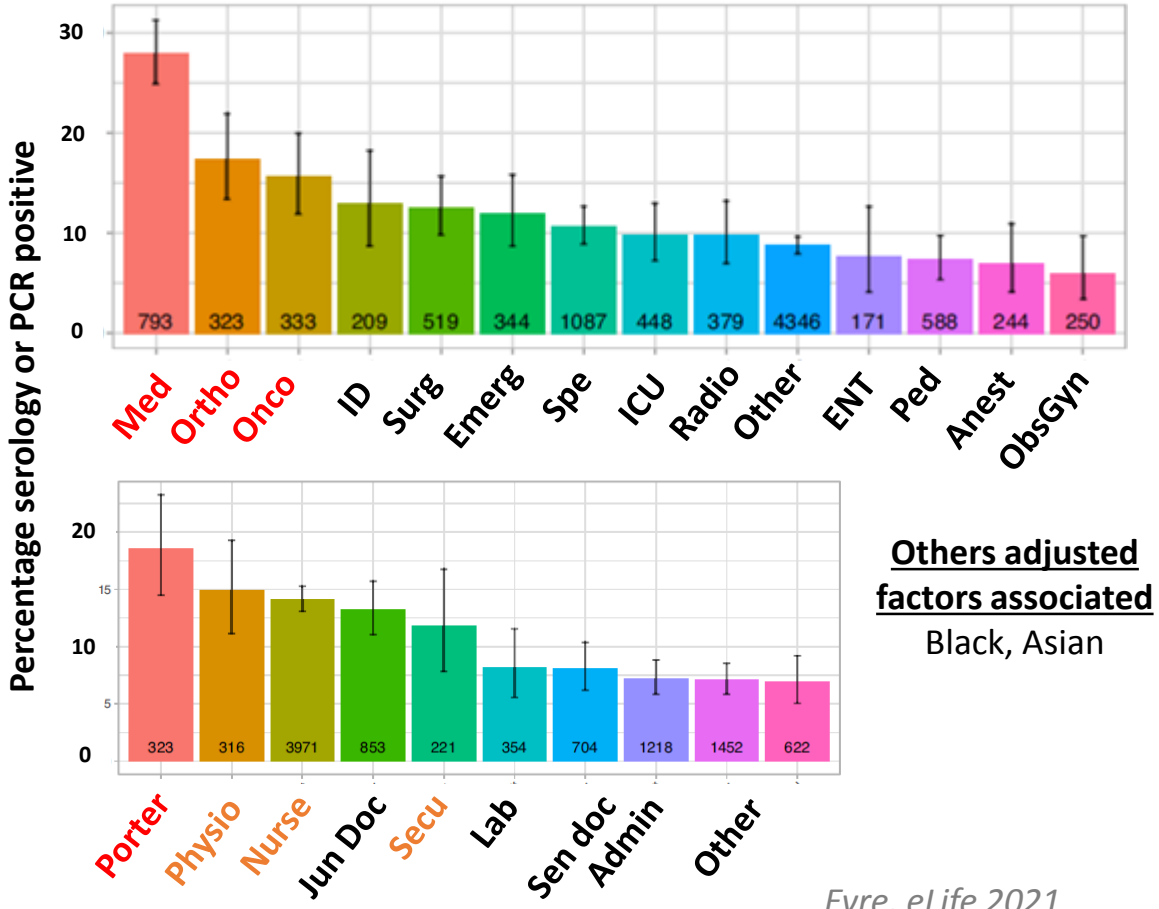
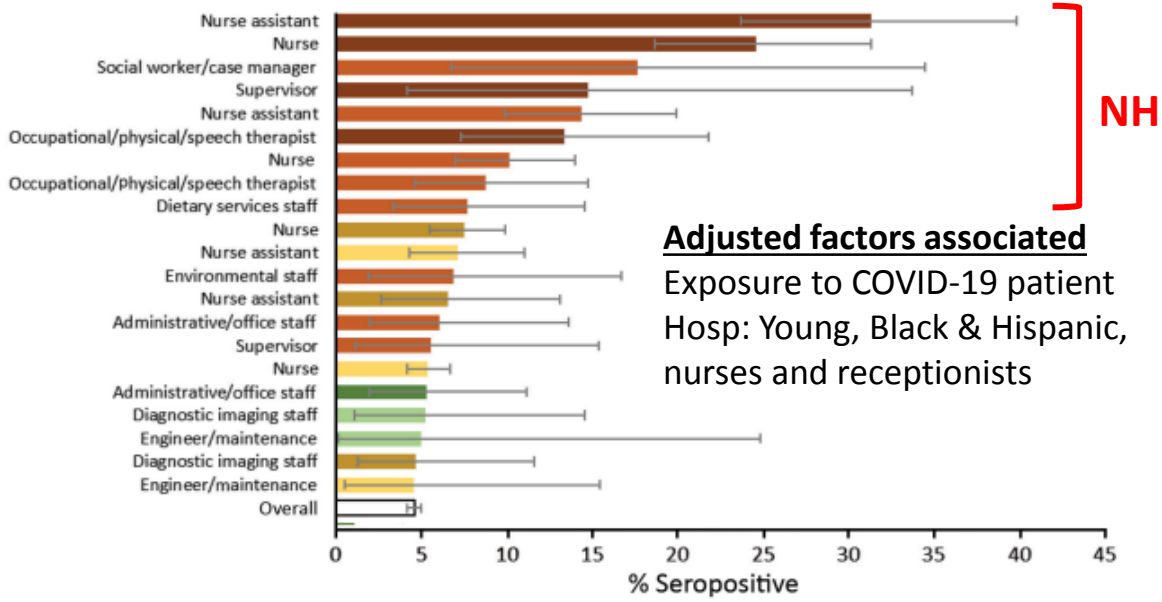


Others adjusted factors associated
Black, Asian

Eyre, eLife 2021
DOI: https://doi.org/10.7554/eLife.60675

Rhode Island US
Serologic survey, July 17–August 28, 2020

N=9,863 HCWs, Overall: **4.6%**
Hospital: **3.1%**
Nursing home: **13.1%**

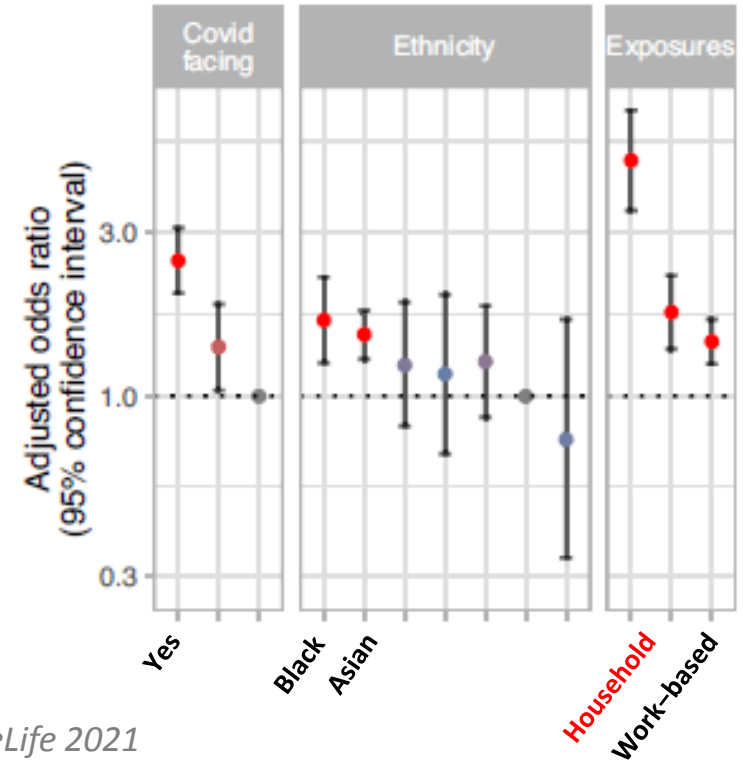


Adjusted factors associated
Exposure to COVID-19 patient
Hosp: Young, Black & Hispanic, nurses and receptionists

Akinbami, Emerg Inf Dis 2021
DOI: https://doi.org/10.3201/eid2703.204508

HCWs exposures to SARS-CoV-2

Role of non-occupational exposure

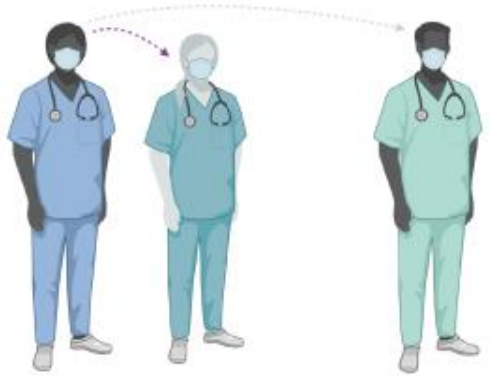


Eyre, eLife 2021

Sources of COVID-19 in US HCWs by NGS

4.2% (4/95)

10.5% (10/95)



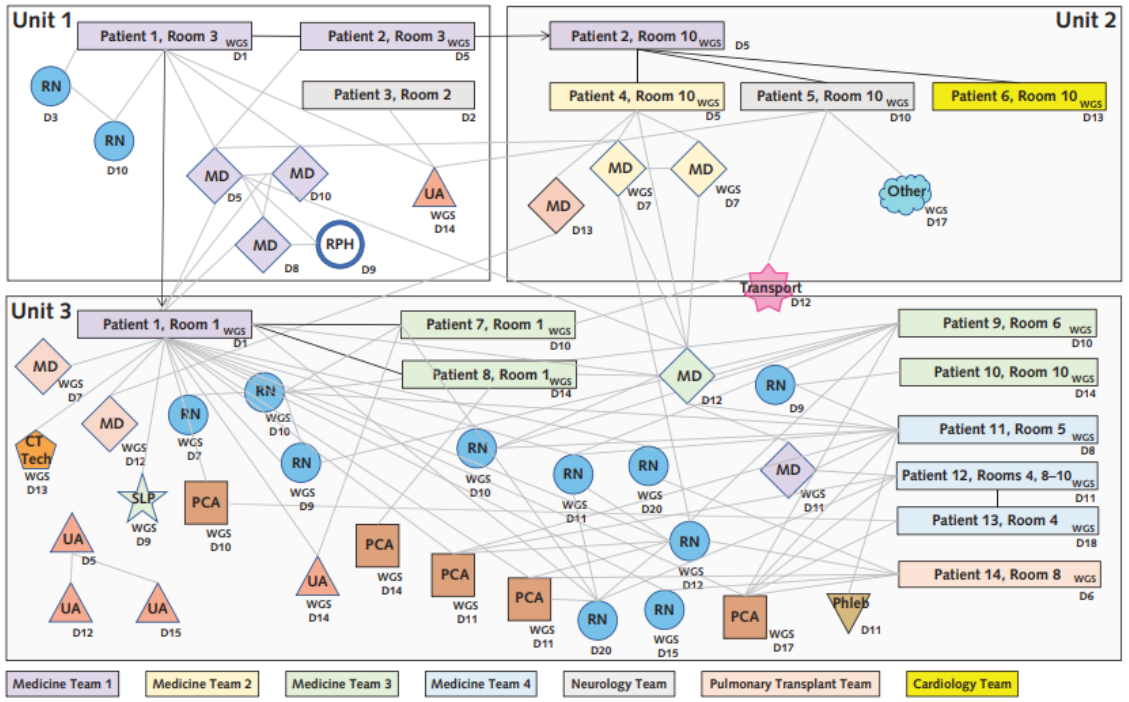
Braun CID 2021

57.9% (55/95) genetically similar to community

The “worst” practices may be outside the healthcare system, in HCWs at higher risk of being contaminated in the community (transport, working during lockdown, socially deprived…)

Risk factors for transmission

- Cluster in 3 units, 14 patients and 38 staff members confirmed by WGS
  - Case–control study : clinical interactions, PPE use, breakroom, workroom practices



Klompas Ann Int Med
doi:10.7326/M20-7567

Variables	Prevalence Ratio
Nebulization	2.5 (1.5–4.4)
Cumulative exposure time > 15 min	2.3 (1.1–4.5)
Pts short of breath	2.1 (1.2–3.7)
Coughing	1.9 (1.2–2.9)
Interactions with SARS-CoV-2– positive staff in clinical areas	1.4 (1.0–1.9)

Situations at risk of aerosol transmission: Patient + Care/task + HCW characteristics + environement

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COVID-19 mortality among HCWs

CPias Pays de la Loire

Region	WHO COVID-19 surveillance data death	Population based estimate	Standardization by sex and age	6.2% of all infections and 0.8% letality	Amnesty International
France	4	6708	2545	2854	63
UK and NI	0	8562	3177	2206	931
Italy	269	3970	1462	2057	407
Germany	0	5809	2112	1778	143
Spain	148	2845	998	1778	92
European	1395	49 374	17 805	26 454	

Lack of transparency in recording and reporting HCW infections and deaths, Need for a better surveillance system

WHO : The impact of COVID-19 on health and care workers: a closer look at deaths

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Immunocompromised HCWs

CPias Pays de la Loire

- Immunosuppressive **medications**
- Hematologic **malignancies**
- CAR-T-cell or hematopoietic stem **cell**
- Advanced or untreated **HIV** infection with CD4 cell count <200 cells/microL
- Moderate/severe primary **immunodeficiency**

Crude number of immunocompromised HCW:

- UK: 35000
- US: 182000

UK, US	Front-line HCW (n=99795)	General community (n=2035395)
Cancer	0.5%	1.3%
Immunosuppressants	2.5%	3.2%
Chemotherapy or immunotherapy	0.1%	0.3%

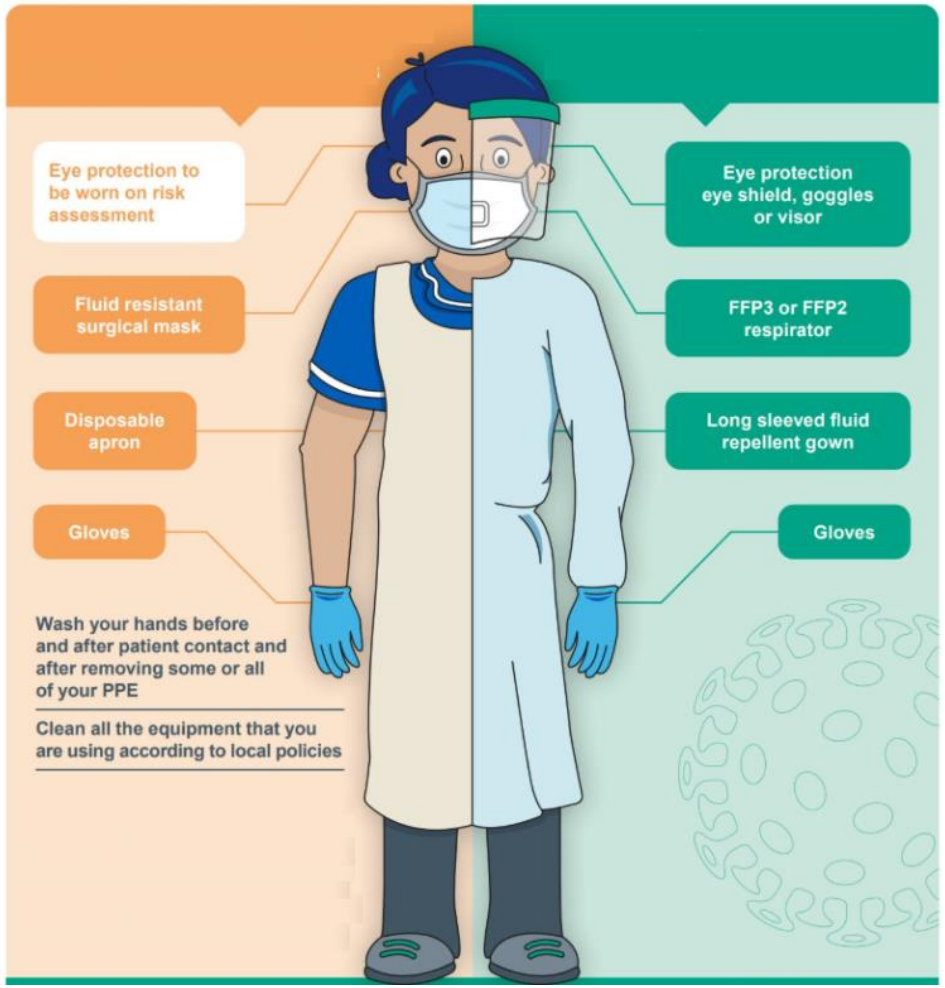
Nguyen, Lancet 2020
https://doi.org/10.1016/S2468-2667(20)30164-X

Hospitalized for COVID-19 US 2020	HCWs (n = 127)	Non-HCWs (n = 1663)
Immunocompromised	16 (12.6)	218 (13.1)

Jeong Yun Yang JAMAopen 2021
doi:10.1001/jamanetworkopen.2020.35699

Measures to protect HCWs

- **Personal Protective Equipment**
  - Mask, either N95 or medical
  - Hand hygiene
  - Gown
  - Face shield
  - Physical distancing without mask
- **Eviction, work restriction**
- ~~Awareness to symptoms, systematic and/or targeted screening~~
- **Source control**: masking infected patients
- ~~Ventilation~~



Royal College of Physicians

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Measures to protect HCWs

Universal masking and Influenza

CPias Pays de la Loire

Only one RCT, 32 HCW wearing vs not wearing surgical mask in Japan 2009

- 2 colds during the study period, NS

Observationnal Studies	Design	Results
Zhang, 2009	Matched case-control	NS
Chokephaibulkit, 2009	Nested case-control	↗ risk if not masked while exposed
Jaeger, 2009	Retrospective cohort	↘ infection if Mask/N95 during exposure

Jacobs, AJIC, 2009

doi:10.1016/j.ajic.2008.11.002

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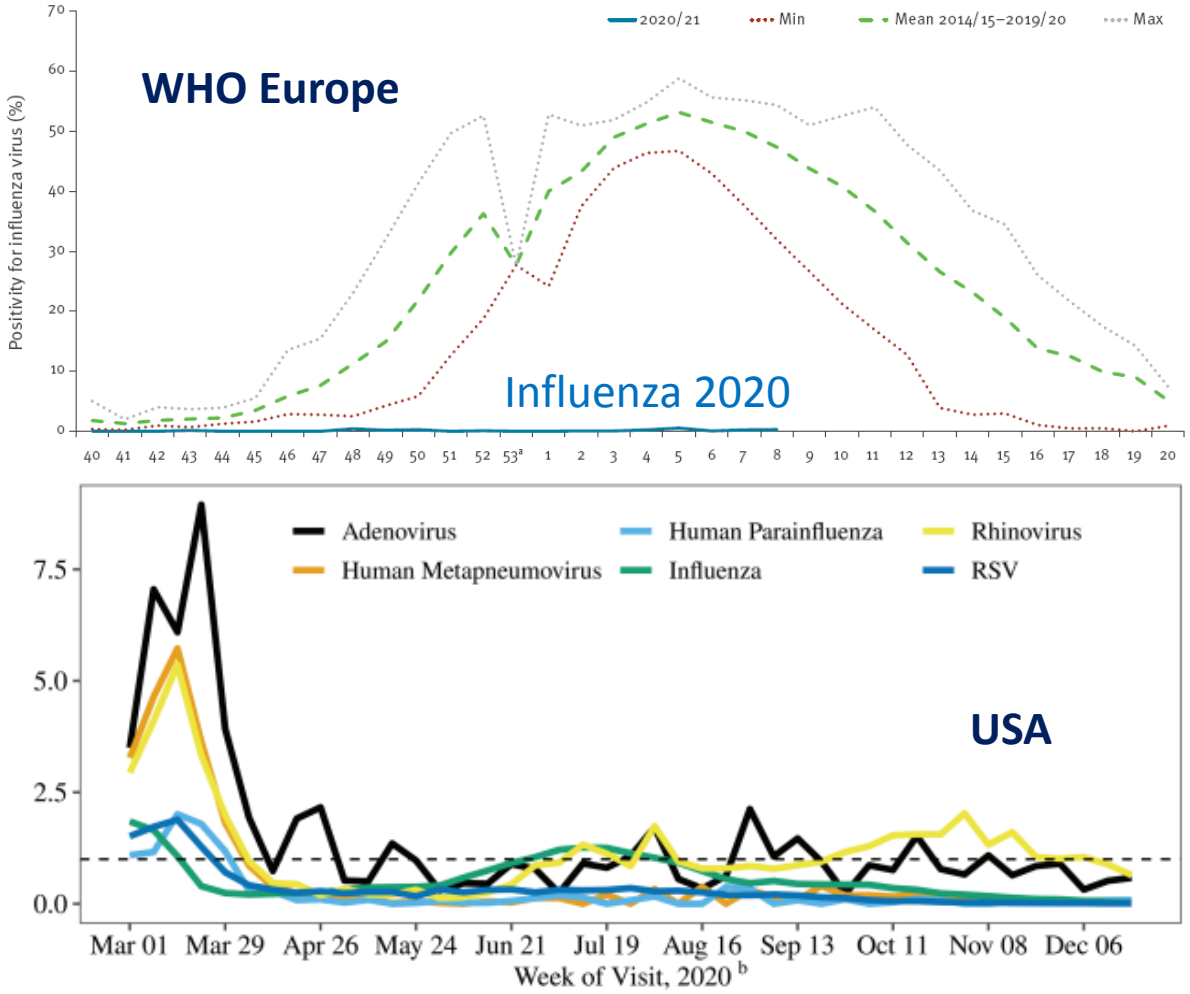


Jacobs, AJIC, 2009
doi:10.1016/j.ajic.2008.11.002

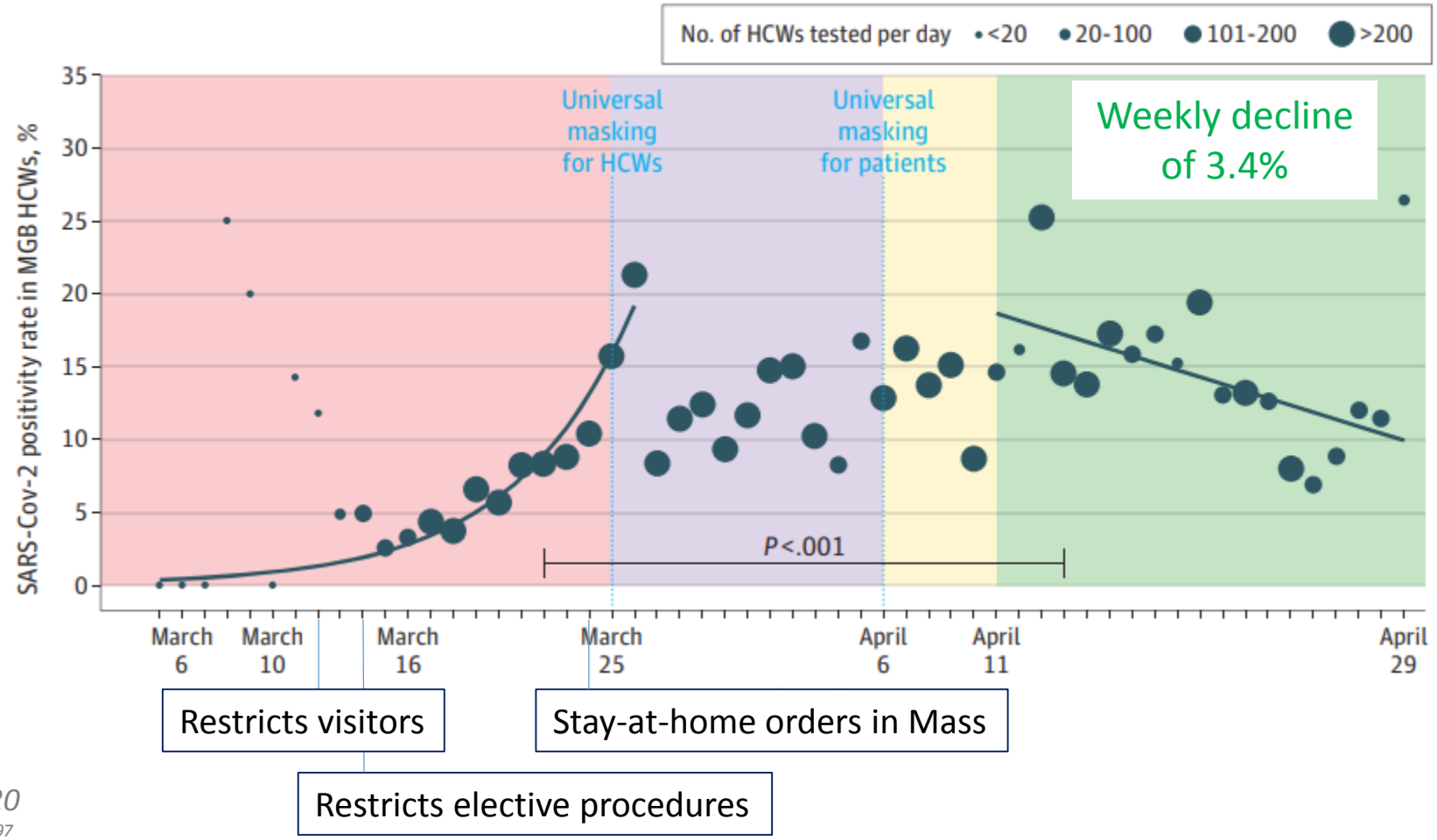
Adlhoch Eurosurv 2021
https://doi.org/10.2807/1560-7917.ES.2021.26.11.2100221

Rodgers CID 2021
DOI: 10.1093/cid/ciab311

Measures to protect HCWs

Universal masking and COVID-19

Mass Gen Brigham, US Massachusetts, 12 hospitals, >75 000 employees



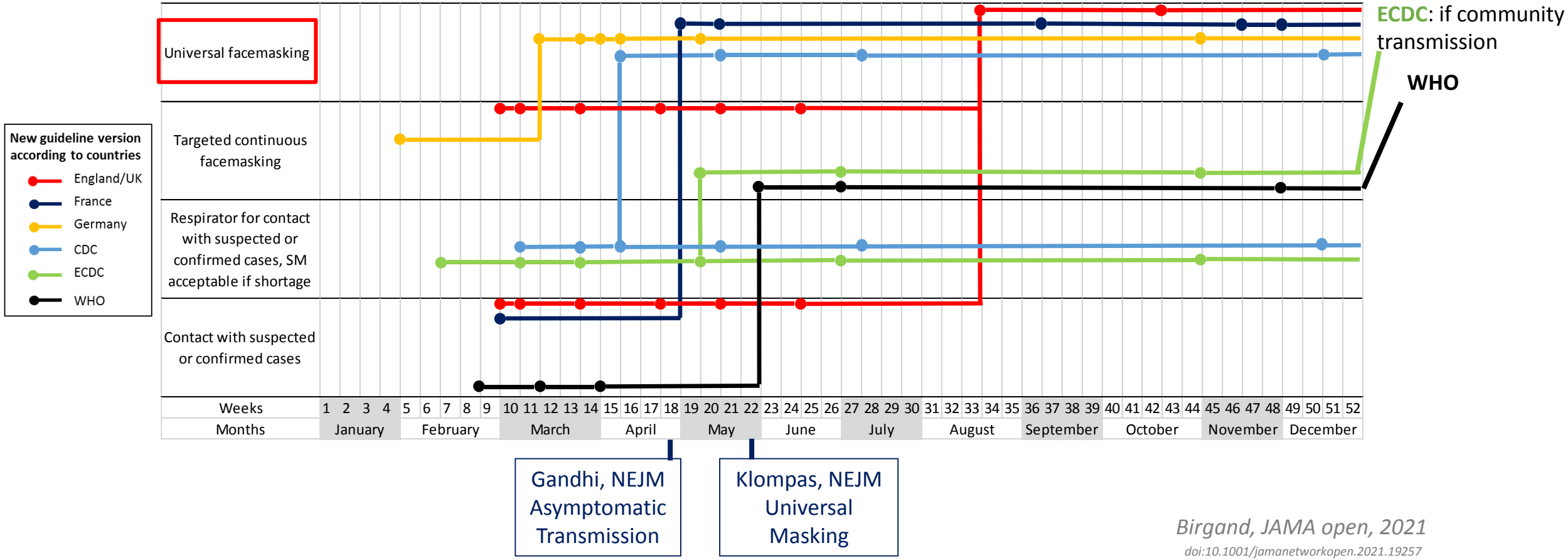
Wang US 2021	↘
Seidelman US 2020	↘
Lan US 2020	↘

Wang, JAMA 2020
doi:10.1001/jama.2020.12897

Measures to protect HCWs

Universal masking and COVID-19

Evolutions of indications for the use of medical facemasks



Birgand, JAMA open, 2021

doi:10.1001/jamanetworkopen.2021.19257

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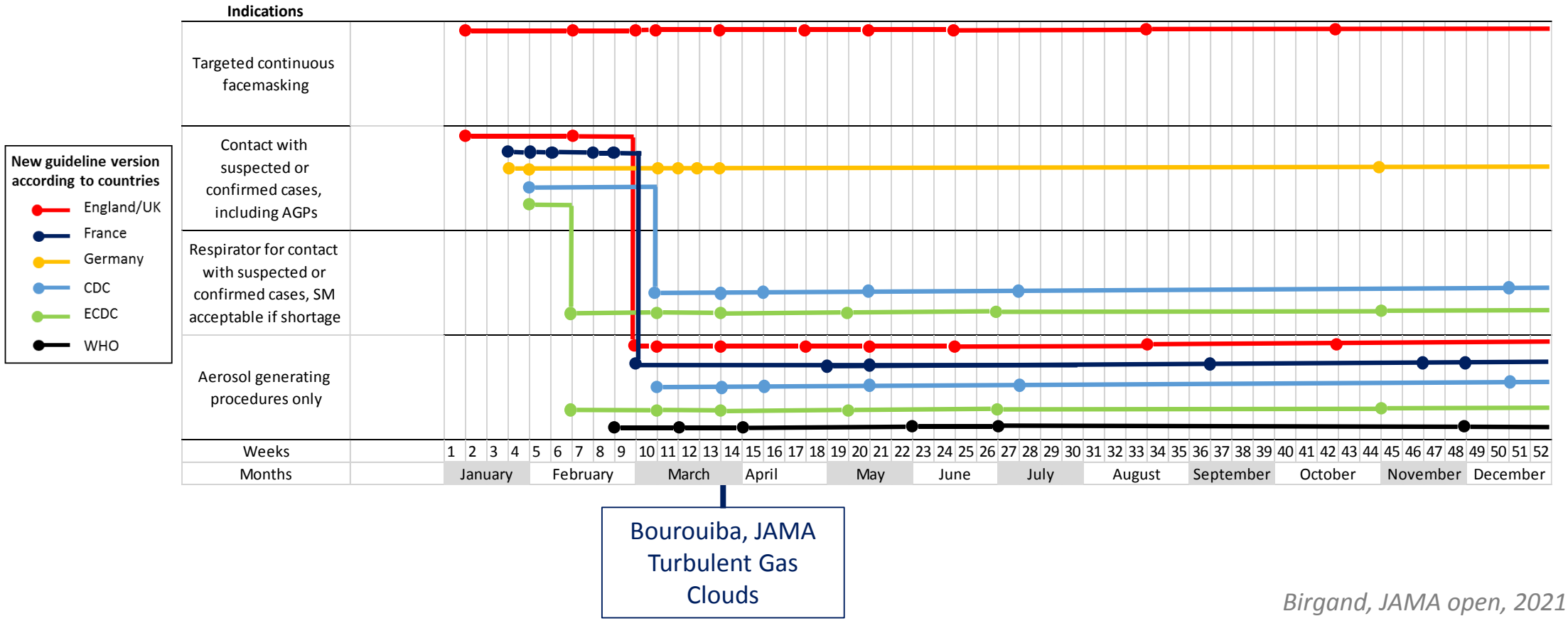
Measures to protect HCWs

Respirators and COVID-19

CPias Pays de la Loire

Evolutions of indications for the use of respirators



Birgand, JAMA open, 2021

doi:10.1001/jamanetworkopen.2021.19257

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Measures to protect HCWs

Respirators

CPias Pays de la Loire

Recommendations

General agreement:

- Intubation
- Non-invasive ventilation
- CPR
- Airway suctioning
- Bronchoscopy
- High-flow oxygen
- High-flow nasal cannula

Frequent agreement:

- Nebulization
- Manual ventilation

Country		England/UK	France	Germany	Germany	USA	Europe	World
Organisation			HCSP	RKI	DGKH	CDC	ECDC	WHO
Date		17/05/2020	20/11/2020	26/01/2020	31/01/2020	05/04/2020	06/10/2020	01/12/2020
N°	Procedures							
1	Intubation							
2	Extubation							
3	Manual ventilation							
4	Suctionning							
5	Tracheotomy/tracheostomy procedures							
6	Bronchoscopy							
7	Dental procedures							
8	NIV							
9	High-Frequency Oscillating Ventilation							
10	HFNO also called High Flow Nasal Cannula							
11	Induction of sputum							
12	Upper ENT airway procedures							
13	Upper gastro-intestinal endoscopy							
14	Surgery/post-mortem procedures							
15	Aerosoltherapy							
16	Naso-pharyngeal sample							
17	Respiratory functional exploration							
18	Mechanical ventilation							
19	Cardiopulmonary resuscitation							

Birgand, JAMA open, 2021

doi:10.1001/jamanetworkopen.2021.19257

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Measures to protect HCWs

Respirators

CPias Pays de la Loire

- Studies identified N95/FFP2 as protective **beyond** AGPs
- Reports of patient-to-HCW transmission despite adequate protection

Study	Description
Klompas CID 2021 *doi: 10.1093/cid/ciab218*	3 transmissions (WGS) despite FM, eye protection
Cheng CID 2021 *https://doi.org/10.1093/cid/ciab313*	9 HCW (WGS), possible airborne transmission, Air grilles
Goldberg OFID 2021 *https://doi.org/10.1093/ofid/ofab036*	3 HCWs surgical masks, no direct contact, any AGPs

- However:
  - Possible biases of reported practices
  - Hand hygiene practices not reported
  - Correlation with other shielding measures, i.e. gown and googles

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CPias Pays de la Loire

Measures to protect HCWs

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- However:
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Even if airborne transmission seems to exist but beyond AGPs, further understanding is required regarding associated factors

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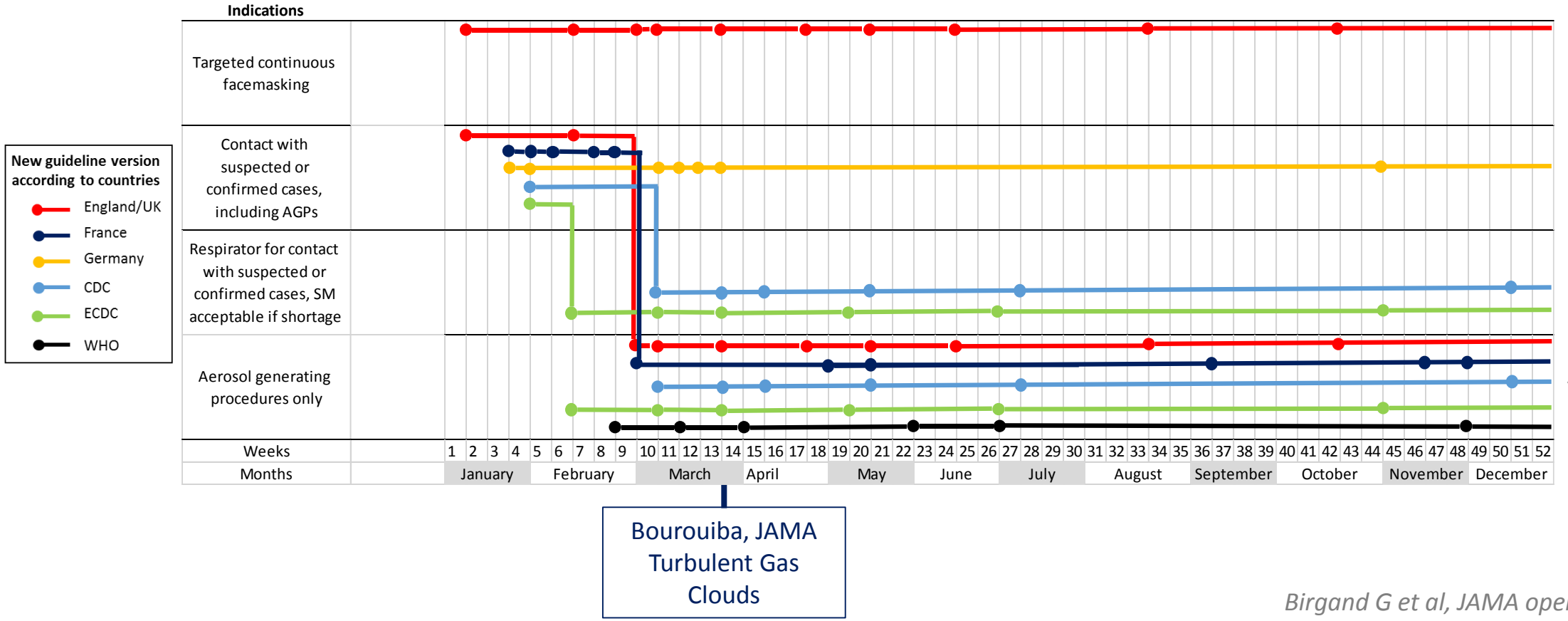
Measures to protect HCWs

Respirators and COVID-19

CPias Pays de la Loire

Evolutions of indications for the use of respirators

2022



UK: Risk assessment

ECDC: Continuous

WHO: Continuous + Risk assessment (AGP)

USA: Risk assessment

France: Vaccination failure, Risk assessment

Birgand G et al, JAMA open, 2021

doi:10.1001/jamanetworkopen.2021.19257

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CPias Pays de la Loire

Measures to protect HCWs

Guidelines on PPE for COVID-19 Pts care

Organisations	Gown	Gloves	Face shield	Apron
	✓	✓	✓	If gown not FR and high volume of fluid
	If contact with body fluids	If contact with body fluids	✓	If gown not FR
	✓	✓	✓	✗

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Measures to protect HCWs

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Organisations	Gown	Gloves	Face shield	Apron
WHO	✓	✓	✓	If gown not FR and high volume of fluid
ecdc	If contact with body fluids	If contact with body fluids	✓	If gown not FR
CDC	✓	✓	✓	✗
Contact precautions	✓	✓	✗	✗
Droplet precautions	✗	✗	✓	✗

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Measures to protect HCWs

Risk factors and protective measures

CPias Pays de la Loire

- Systematic review and meta-analysis to investigate the impact of PPE on HCW infection during viral respiratory pandemics, until **July 6, 2020**
  - 54 comparative studies were included (n = 191,004 HCWs)

	COVID-19		H1N1		SARS		Overall
	N	OR, 95% CI	N	OR, 95% CI	N	OR, 95% CI	OR, 95% CI
Gloves vs no gloves	3	NS	5	NS	8		
Gown vs no gown	2	NS	1	NS	6		
SM vs no SM	1		5	NS	6		
N95 vs no N95	3		3	NS	7		
Face prot. vs no prot.	1	NS	2	NS	6		
HH vs no HH	2	NS	5	NS	6	NS	

"Efficacy of well known measures"

BUT

- Lack of randomized trials
- PPE usually worn in bundles, compliance?
- Heterogeneity of viral pathogens
- Lack of individual patient factors
- HCW-to-HCW transmission?

Tian, ICHE, 2021

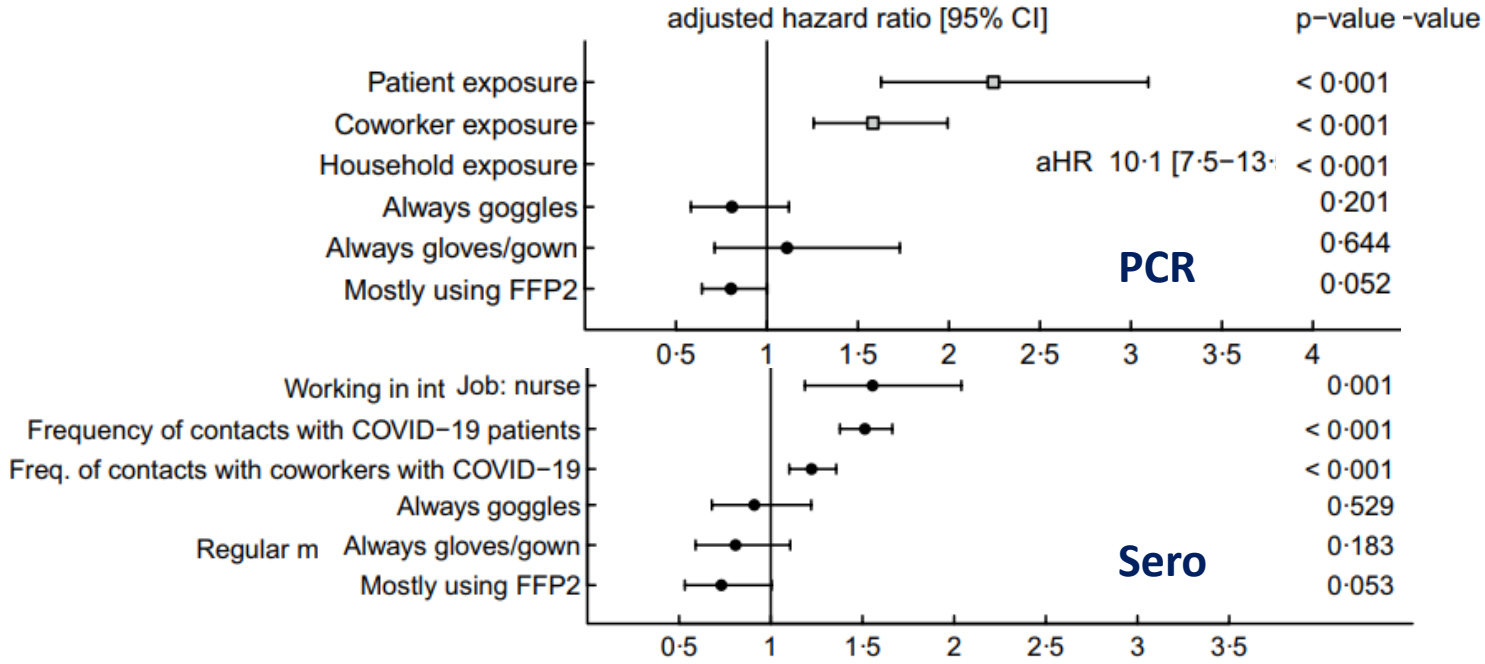
doi:10.1017/ice.2021.18

Measures to prevent HCW COVID-19

Risk factors and protective measures

- Prospective multicentre cohort, **unvaccinated** HCW
  - 3259 participants, 9 Swiss Hospitals, questionnaire on exposure, PPE

	Mostly SM (n=2543)	Mostly FFP2 (n=716)
Always goggles	18%	63%
Always gloves	36%	58%
Always gown	17%	64%
Always FFP2 for AGP	32%	69%



Haller, ARIC, 2022

https://doi.org/10.1186/s13756-022-01070-6

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Measures to prevent HCW COVID-19

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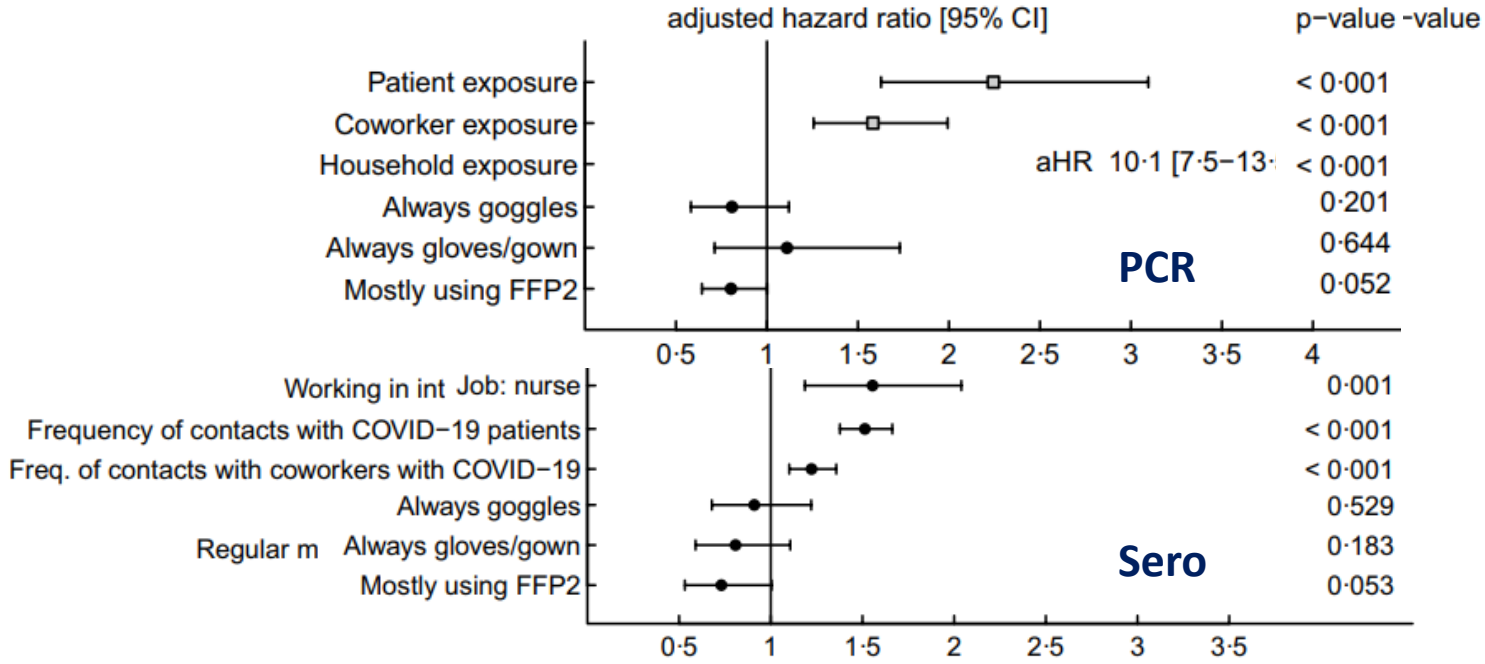

For HCW performing AGP, universal use of FFP2 during AGP (irrespective of the patients COVID-19 status) showed no effect

Haller, ARIC, 2022

https://doi.org/10.1186/s13756-022-01070-6

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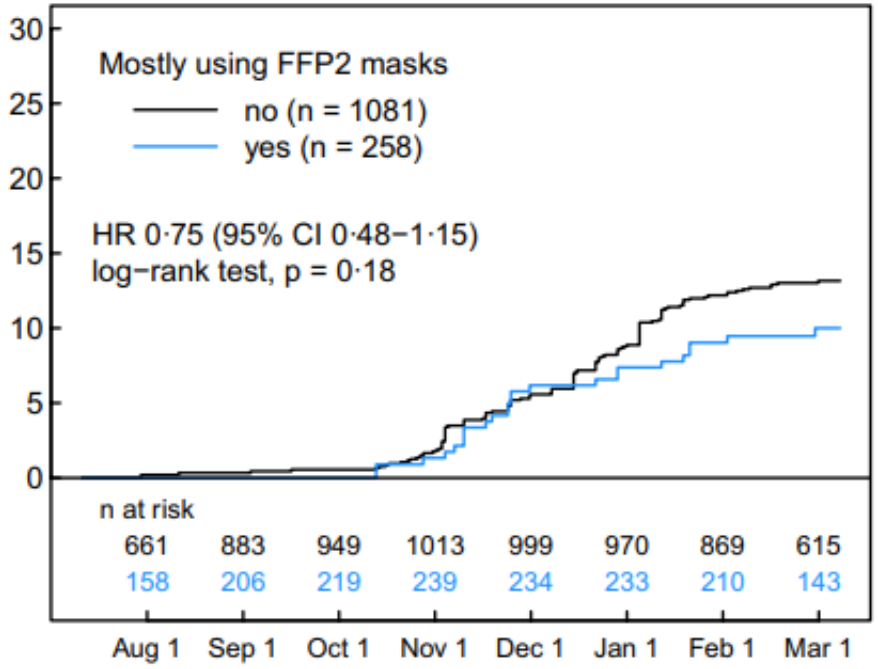
Measures to prevent HCW COVID-19

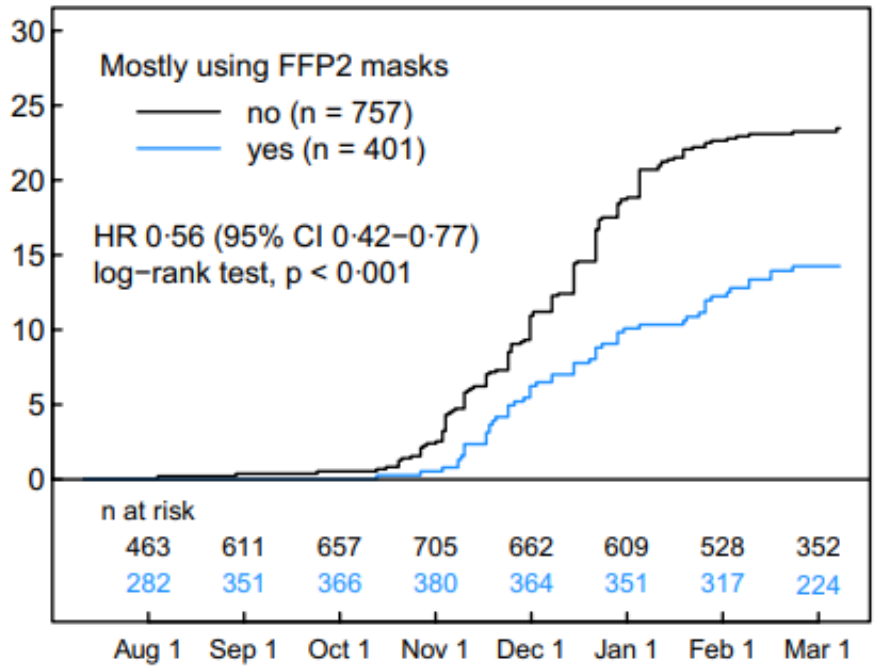
Risk factors and protective measures

CPias Pays de la Loire

1–20 contacts to COVID–19 patients



> 20 contacts to COVID–19 patients



Gain to HCW in wearing FFP2 during work depend on the **exposure inside and outside their activity.**

Haller, ARIC, 2022

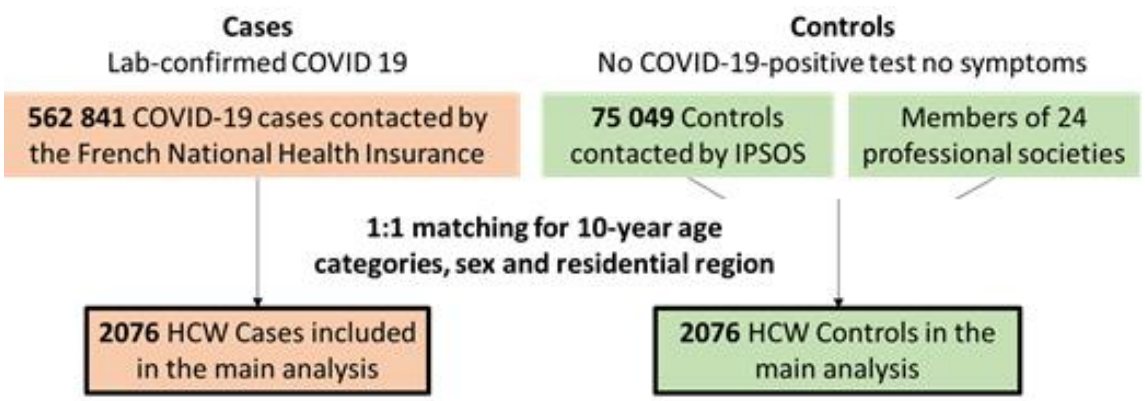
https://doi.org/10.1186/s13756-022-01070-6

Measures to prevent HCW COVID-19

Risk factors and protective measures

- Retrospective matched case-control study, April-July 21, France
  - Hospital : 36%, Nursing home : 16%, Primary care : 48%, Auto-questionnaire

PPE for COVID-19 patient care :



For COVID-19 patients care	aOR (95% CI)
Mask type	
Surgical facemask	—
Cloth mask	1.67 (0.18–15.8)
N95 respirator	0.85 (0.55–1.29)
Gloves	1.44 (0.87–2.39)
Eye protection (goggles or faceshield)	**0.57 (0.37–0.87)**
Gown	0.58 (0.34–0.97)
Apron	**1.47 (1.00–2.18)**

Martin Belan, under review

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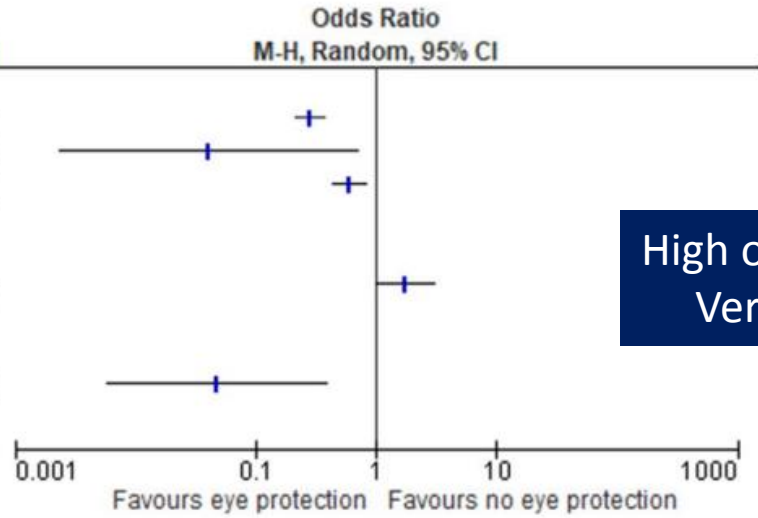
Measures to prevent HCW COVID-19

CPias Pays de la Loire

Face shields

- Systematic review to assess the impact of eye protection on transmission of SARS-CoV-2

Study or Subgroup	Eye protection Events	Total	No eye protection Events	Total	Odds Ratio M-H, Random, 95% CI
1.1.1 Before and after					
Al Mohajer 2021	80	4041	166	2486	0.28 [0.22, 0.37]
Bhaskar 2020	0	50	12	62	0.04 [0.00, 0.69]
Hamilton 2021	98	410	141	410	0.60 [0.44, 0.81]
1.1.2 Case-control					
Rodriguez-Lopez 2021	77	142	33	81	1.72 [0.99, 2.99]
1.1.3 Retrospective cohort					
Shah 2021	1	338	7	120	0.05 [0.01, 0.39]



High overall risk of bias
Very low certainty

Face shields (in addition to masks) should be considered for higher risk situations or when there is substantial Covid spread in the community

Byambasuren ARIC 2021
https://doi.org/10.1186/s13756-021-01025-3

Measures to prevent HCW COVID-19

Face shields

- Electronic survey in a US hospital
- 1,109 responses

Alzunitan, AJIC 2021
https://doi.org/10.1016/j.ajic.2020.09.006

Section	Question	Clinical workers (n = 568)		
		Face mask	Face shield	*P*
Comfort	Comfortable to wear (% agree)	33.3	15.6	<.001
	Easy to breathe (% agree)	24.0	67.0	<.001
	Easy to remove (% agree)	87.2	73.8	<.001
	Easy to see (% agree)	54.2	17.9	<.001
	Feels claustrophobic (% agree)	32.0	32.3	.983
	Feels too warm (% agree)	66.5	52.9	<.001
	Interferes with work (% agree)	31.1	61.1	<.001
	Lightweight (% agree)	93.5	20.9	<.001
	Minimal adjustment after putting it on (% agree)	52.9	34.1	<.001
	Skin irritation or itching (% agree)	56.2	40.2	<.001
Communication	Can hear others (% agree)	58.4	13.3	<.001
	Others can hear me clearly (% agree)	19.9	10.9	<.001
Safety	Feels protective (% agree)	71.5	65.7	.049
	Protects others (% agree)	86.3	74.1	<.001
	Change or disinfect after each use (% yes)	39.1	64.4	<.001
	Touching face in 4-hour period (% more than 5 times)	38.4	28.1	<.001

Need for light face shields models to improve comfort and tolerability

Ability to adjust tension, shifting load bearing from the temples, anti-fogging, ventilation, freedom of movement, and durability

Kurtz, AJIC 2022
https://doi.org/10.1016/j.ajic.2021.10.033

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Measures to prevent HCW COVID-19

Long sleeved gowns

CPias Pays de la Loire

Gown contamination during care of COVID-19 patients

Study	COVID-19 Pts	Results
Ong JAMA 2020 doi:10.1001/jama.2020.3227	3	0/2
Jung ARIC 2021 https://doi.org/10.1186/s13756-021-01017-3	12 severe	3/105 of coveralls
Aumeran JHI 2020 https://doi.org/10.1016/j.jhin.2020.11.004	6 Moderate/severe	2/21 sleeves
Wei ARIC 2020 https://doi.org/10.1186/s13756-020-00839-x	9 > 30 days onset	0/55

Kurtz, AJIC 2022
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Kurtz, AJIC 2022
https://doi.org/10.1016/j.ajic.2021.10.033

Unintended consequences

↗ CLABSI, GNB, ↘ HH, Long-sleeved gowns:

- Reservoir of pathogens?
- Obstacle to hand hygiene (≈ long-sleeved white coat)

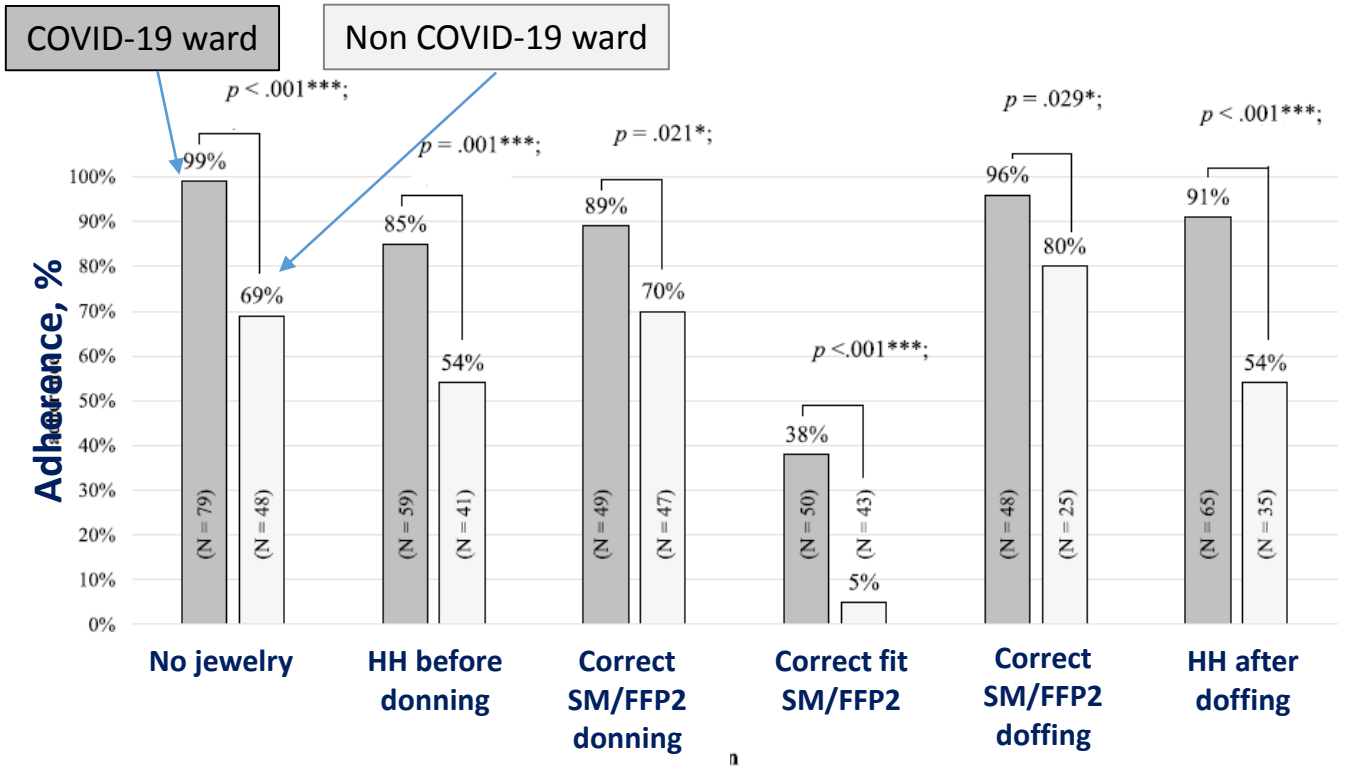
→ Short sleeved gowns + Enhanced environmental cleaning

Meda, JHI 2020
https://doi.org/10.1016/j.jhin.2020.07.036

Measures to prevent HCW COVID-19

Adherence to PPE use

- 127 situations requiring PPE in 8 wards at a university hospital in Cologne



Removal of gowns = Most common errors (65%)

Better adherence in COVID-19 wards

Clear need for training in the correct and indication-appropriate use of PPE in general and outside COVID-19, ID, ICU wards.

Neuwirth ARIC 2020

https://doi.org/10.1186/s13756-020-00864-w

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Measures to prevent HCW COVID-19

Work restrictions for immunocompromised HCWs

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- HCW at higher risk of developing severe COVID-19 illness should not be required to carry out tasks with **medium, high or very high risk levels**
  - Reassign to tasks or roles with lower exposure risk, i.e. telemedicine roles if clinical skills

Lower risk	Medium risk	High risk	Very high risk
Without close contact with public or COVID-19	Close contact with patients, visitors.. but not COVID-19	Close contact with COVID-19 or contact with surfaces contaminated	Exposure to aerosols or COVID-19, indoor, crowded, poor ventilation

- Enable vaccination, screening, early medical evaluation, prophylaxis and therapy
- Consider ethical, legal, privacy/confidentiality
- Understanding of risks, assuming that all patients may be infected

COVID-19: Occupational health and safety for health workers, Interim guidance 2 February 2021
Health workforce policy and management in the context of the COVID-19 pandemic response Interim guidance 3 December 2020

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Protecting immunocompromised HCWs

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What to take away from this talk?

- Infectious risk to immunocompromised HCWs is **unknown**
  - Need for accurate **surveillance system**
  - Setting, exposure inside, **outside workplaces +++**
  - Ease risk assessment (multifactorial factors)
- Case-by-case assessment for additional work restrictions
- Level of evidence regarding impact of PPE remains low to moderate
  - Mostly reported practices by HCWs
  - PPE worn in bundle…
- Unintended consequences of overprotecting HCWs
  - Simple universal measures should be sufficient if strictly observed

Education, training, monitoring of PPE use critical (focus on non specialized HCWs)

Post-acute phase will be tough for IPC teams!!

Poll
Transmission-based precautions for COVID-19

Please select the answers you are agreeing for:

1. **Airborne precautions** should be applied for suspected/confirmed COVID-19
2. **Droplet precautions** should be applied for suspected/confirmed COVID-19
3. **Contact precautions** should be applied for suspected/confirmed COVID-19
4. The type of transmission-based precautions applied should be selected following a **point-of-care risk assessment** taking into account contact proximity, duration and task
5. **A new category of transmission-based precautions** should be established for COVID-19 and other **respiratory viruses** such as influenza

https://online.eccmid.org/vote-183-e3845aa451373bc74fb114288969b055

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RéPias PRIMO Réseau de Prévention des Infections Associées aux Soins

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EUCIC EUROPEAN COMMITTEE ON INFECTION CONTROL

European Society of Clinical Microbiology and Infectious Diseases

Thank you

@EUCIC1

Edit profile

European Committee on Infection Control @ESCMID

@EUCIC1

EUCIC @escmid aims to strengthen infection control and preventive measures in European countries to reduce the burden of healthcare-associated infections

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HCWs exposures to SARS-CoV-2

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Retrospective matched case-control

- 2076 cases: lab confirmed COVID-19
- 2076 controls: no positive test, no symptom
- Matching : age, sex and region, week
- Auto-questionnaire:
  - Personnal/professionnal characteristics
  - Exposures inside/outside work
  - PPE use

CHARACTERISTICS	aOR (95% CI)
Healthcare sector	
Hospital	Ref.
Long-term-care facility	1.11 (0.77–1.61)
Primary care	**1.70 (1.28–2.26)**
HCWs Professional category	
Medical professions	Ref.
Nurses	3.79 (2.50–5.76)
Nurse's assistants	9.08 (5.30–15.5)
Exposures within 10 days preceding inclusion	
Regular COVID-19-Pts-facing activities	**2.37 (1.66–3.40)**
Exposure to infected colleague	**2.26 (1.53–3.33)**
Exposure to infected person outside work	**19.9 (12.4–31.9)**
Professional cluster (patients and/or HCWs)	2.14 (1.50–3.06)

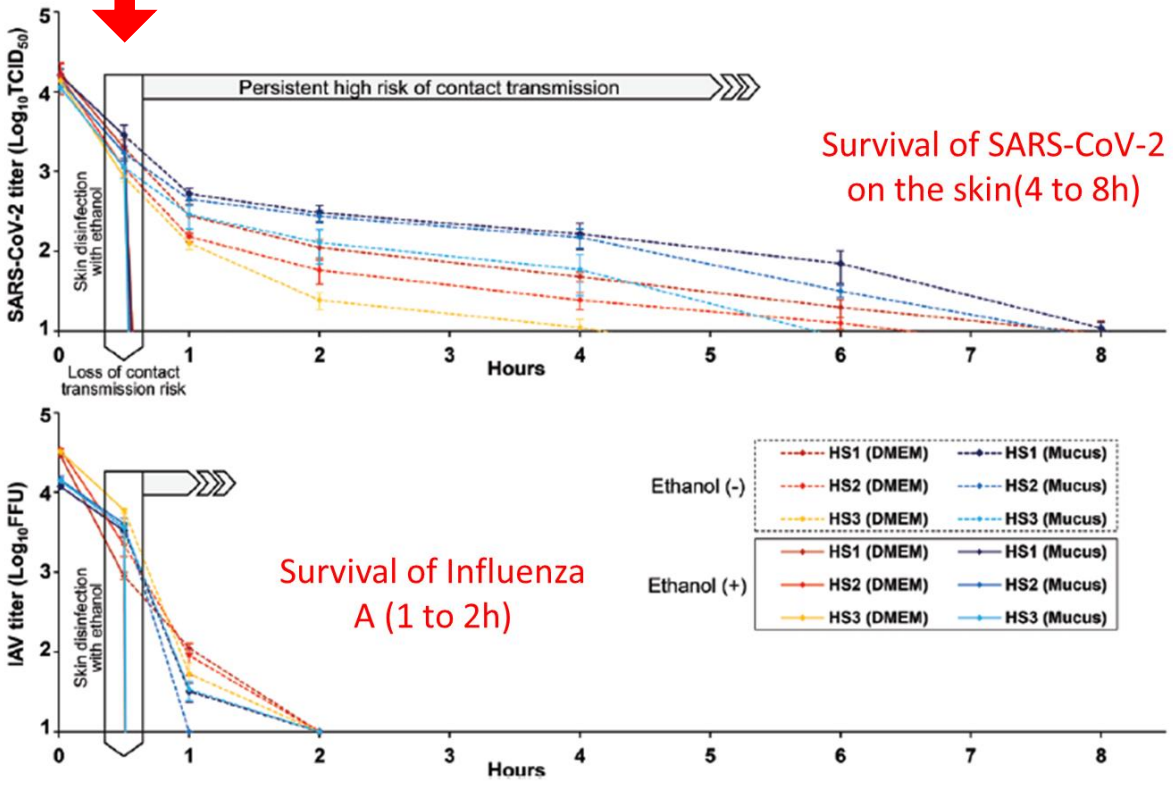
- HCWs at higher risks of getting COVID-19 **outside of work**
- **Non-hospital HCWs** have a higher risk of COVID-19 than hospital HCWs

Belan, under review

Measures to prevent HCW COVID-19

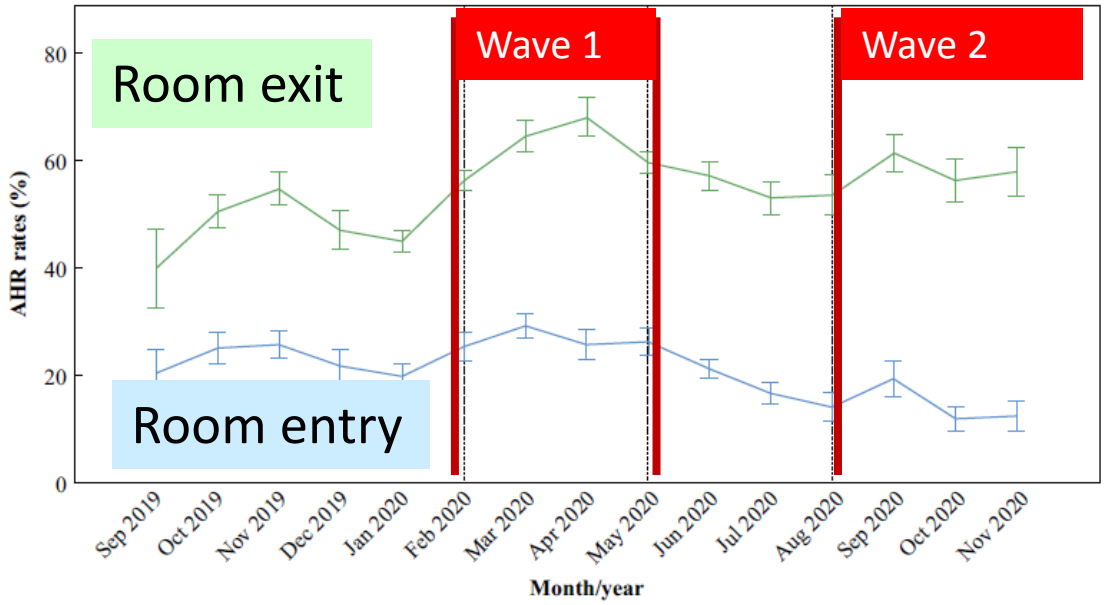
Effectiveness of hand hygiene

Effictveness of ethanol
for 15 seconds



Automatic monitoring system

ID or cohort units, PPE with glove wearing



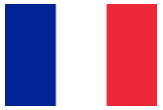
High compliance possible but difficult to sustain
HCW may see hand hygiene more as a means of self-protection than patient protection

Ryohei Hirose Clin Inf Dis 2021, DOI: 10.1093/cid/ciaa1517
Huang JHI 2021, https://doi.org/10.1016/j.jhin.2021.03.004

Measures to prevent HCW COVID-19

Work restrictions for immunocompromised HCWs

- US, CDC guidelines, February 2022
  - Warrant additional work restrictions, require case-by-case assessment by OHS
  - Work in lower-risk areas, minimized exposure to COVID-19 patients and coworkers



- France, High Council for Public Health, Jan 2022
  - FFP2 to HCWs with vaccination failure in charge of COVID-19 patients (OHS advice)
  - Teleworking, adaptation of the workstation, cessation of activity if not possible

- UK Health Security Agency, April 2022
  - Avoid meeting with someone who has tested positive for COVID-19
  - Speak to employer to find arrangements and reduce your risk

- Enable vaccination, screening, early medical evaluation, prophylaxis and therapy
- Consider ethical, legal, personal privacy and medical confidentiality
- Raise understanding of risks, assuming that all patients may be infected

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COVID-19 mortality among HCWs

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- **Objective:** to estimate the global number of deaths in HCWs due to COVID-19 between 1 January 2020 to 16 May 2021
- **Population:** "all staff involved in the provision of care to a COVID-19 patient"

Method 1	Method 2	Method 3
Estimated number of HCWs in each country x Crude COVID-19 mortality rate	Estimated number of HCWs in each country x Crude COVID-19 mortality rate by age and sex	Overall COVID-19 cases x 6.2% attack rate among HCW x 0.8% letality among HCW

Assumption: similar exposure and risk of death to general population

WHO : The impact of COVID-19 on health and care workers: a closer look at deaths

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Risk to immunocompromised HCWs

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- Comcor study, France from Feb 2021 to March 2022
  - Auto-questionnaire (personnal/professionnal characteristics and exposures)

	Lab confirmed COVID-19 N=39 842 HCW	Non-COVID-19 N=5 225 HCW
Immunosupressed	868 (2.3%)	108 (2.1%)
Non-immunosupressed	36331 (97.2%)	5077 (99.7%)

Pearson Chi2, P=0,26

COMCOR

INSTITUT PASTEUR

Immunosuppression does not seem to be associated with an increased risk of COVID-19 among HCWs

Measures to prevent HCW COVID-19

Adherence to PPE use

And we can add…

- Not masking patients in presence of an HCW (source control)
- Reluctance for using face shield (in addition to mask)
- Incorrect or prolonged glove use → missed hand hygiene opportunities
- Incorrect or prolonged gown use
- HCWs interactions without mask:
  - Break rooms and friendly encounters (inside or outside the hospital)
  - Higher risk perception from (symptomatic) patients than from (asymptomatic) colleagues

Theory

Reality

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Measures to protect HCWs

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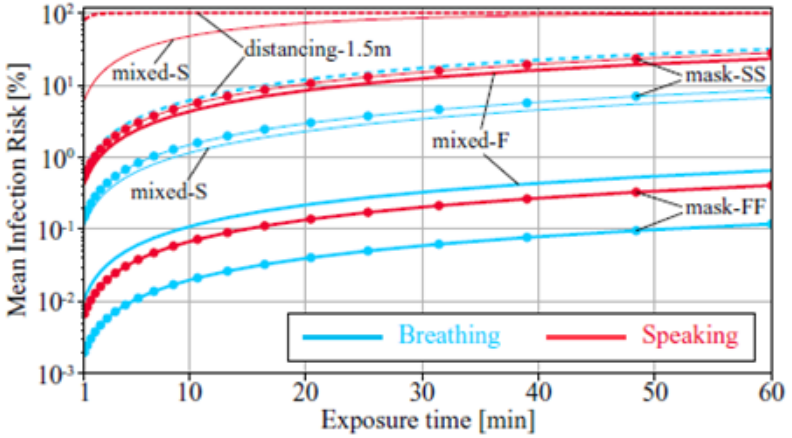
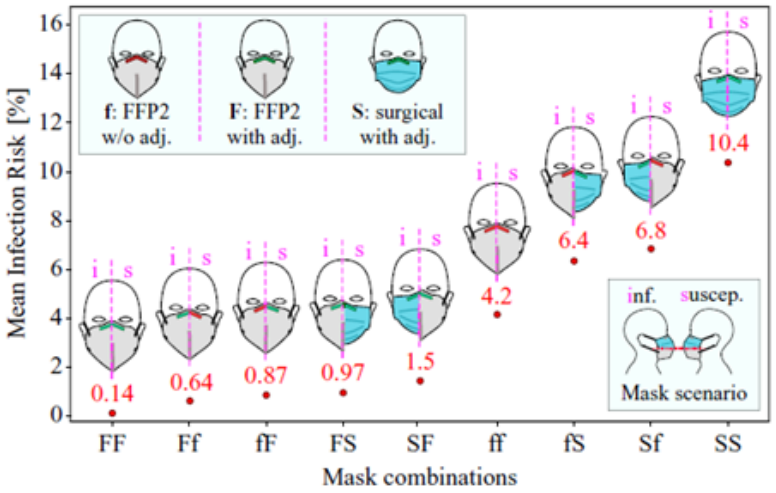
Universal masking and COVID-19

Risk of infection related to exposure duration, masking but poorly distance





- **Without mask,** distancing (3 meters) not reduces risk of infection for speaking infectious
- **Distancing unsafe** after 1.5 min for a speaking infectious,
- **Masking by susceptible and infectious effective** for limiting transmission of SARSCoV-2, even when **face seal leaks** are considered.

Source control by masking infected patients is critical to consider for accurately protect HCWs

Gholamhossein Bagheria PNAS
https://doi.org/10.1073/pnas.2110117118

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Measures to prevent HCW COVID-19

Which strategy to adopt during the post-crisis era?

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IPC precautions before the COVID-19 pandemic

Precautions	Face mask HCW	Face mask Pts	Respirators HCW	Eye protection	Gloves	Gowns	
Standard	When symptoms	-	-	Body fluids	Body fluids	Body fluids	HH+++
Contact	+/-	-	-	-	+/-	When	
Droplet	Close contact, room entry	When out of room	-	+/- Body fluids	-	-	
Airborne	-	When out of room	At room entry	-	-	-	

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Measures to prevent HCW COVID-19

Which strategy to adopt during the post-crisis era?

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What IPC precautions will become ?

Precautions	Face mask HCW	Face mask Pts	Respirators HCW	Eye protection	Gloves	Gowns	Apron	
Standard	Systematic during winter	Systematic during winter	AGPs	AGPs	Body fluids	Large exp to body fluids	Body fluids	HH+++
Contact	+/-	-	-	-	-	When close contact		
Droplet	At room entry	When presence of HCW	Aerosol generating situations	Systematic	-	AGPs	Direct care	
Airborne	-	When presence of HCW	At room entry	+/-	-	+/- AGPs	+/-	

Local risk assessments of ventilation in the area, operational capacity, and prevalence of infection