# Hospitalized Healthcare workers and adverse outcomes from Covid-19

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# Game plan

- Review an article on healthcare workers and their risk of adverse outcomes during hospitalization for Covid-19, from a large population-based study in Spain

# Objectives

- Be able to recite key findings from this study

- Recognize that both survey analytic methods and cohort study analytic methods were both used in this study, and the main design considerations in so doing

- Suggest studies that should be done moving forward to better understand factors associated with poor outcomes among HCW with Covid-19

# Take home messages

- Hospitalized HCW had less severe courses of infection/disease than non HCW in Spain

- Occurrence of sepsis was lower in hospitalized HCW compared to non HCW patients

- Mortality in hospital was lower in HCW vs. non HCW (0.7% vs 4.8%)

- For all patients combined:  non HCW status, advanced age, male sex, and higher number of co-morbidities were associated  with higher mortality in hospital

- 30-day survival (unadjusted) was higher among HCW than non HCW (97% vs 85%)

# Introduction

- A single case reported from China in February sparked interest in this question: how much more likely are healthcare workers hospitalized with Covid-19, to experience adverse outcomes from infection/disease?

- Risk of death from Covid-19 reported to be high among HCW in Mexico, but low in Germany and Malaysia

- The high proportion of HCW in New York, Sweden, and other locations (compared to community members) with antibodies to SARS-CoV-2, makes this topic one of clear concern

- Few comprehensive, population-based approaches to address the question of adverse outcomes among HCW have been published

# Healthcare workers study, Diez-Manglano et al, Methods

- Nationwide observational cohort, all patients hospitalized in Spain from Jan to end of May (10,600 cases)

- Electronic chart review (300 variables collected)

- Foci: socio-demographics, lab, clinical, treatment

- Included patients aged 20-65 years, all with RT-PCR testing +

- Logistic regression used to identify key factors associated with in-hospital mortality and other secondary outcomes (different models were considered)

- Survival analysis to examine differences in 30-day survival post diagnosis

# Healthcare workers study, results

▶ 4393 total hospitalized Covid-19 patients were included in the analysis (a large proportion were very old and thus excluded)

▶ 419 (9.5%) were HCW

▶ Median age 52 years, 62% female

▶ 1/3 physicians, ¼ nurses, ¼ nurses aides, rest were 'other'

| | Total | NHCW | HCW | p |
|---|---|---|---|---|
| **Complications** | | | | |
| Bacterial pneumonia (n=4356) | 330 (7.6) | 305 (7.7) | 25 (6.0) | 0.209 |
| ARDS (n=4355) | 1001 (23.0) | 919 (23.3) | 82 (19.8) | 0.101 |
| Acute kidney failure (n=4353) | 243 (5.6) | 228 (5.8) | 15 (3.6) | 0.068 |
| Sepsis (n=4351) | 160 (3.7) | 153 (3.9) | 7 (1.7) | 0.024 |
| Shock (n=4349) | 132 (3.0) | 125 (3.2) | 7 (1.7) | 0.094 |
| Thromboembolic disease (n=4350) | 71 (1.6) | 64 (1.6) | 7 (1.7) | 0.921 |
| **Respiratory support** | | | | |
| High flow nasal cannula (n=4334) | 327 (7.5) | 293 (7.5) | 34 (8.2) | 0.578 |
| Noninvasive mechanical ventilation (n=4357) | 174 (4.0) | 156 (4.0) | 18 (4.3) | 0.707 |
| Invasive mechanical ventilation (n=4357) | 314 (7.2) | 291 (7.4) | 23 (5.5) | 0.168 |
| **Intensive care unit (ICU)** | | | | |
| Admission to ICU (n=4385) | 415 (9.5) | 371 (9.4) | 44 (10.5) | 0.435 |
| Days in the ICU | 11 (10) | 11 (11) | 8.5 (10) | 0.099 |
| **Death and readmission** | | | | |
| Hospital length-of-stay, days (n=4392) | 8 (7) | 8 (8) | 7 (7) | 0.067 |
| In-hospital death (n=4393 | 194 (4.4) | 191 (4.8) | 3 (0.7) | <0.001 |
| Readmission (n=4194) | 121 (2.9) | 112 (2.9) | 9 (2.3) | 0.449 |

ARDS: acute respiratory distress syndrome; ICU: intensive care unit
Data are expressed as n (%) and median [interquartile range]

- The next slide shows univariate and multivariate associations of a variety of risk factors, with in-hospital mortality as the outcome.

| Model 2 | | | | |
|---|---|---|---|---|
| Age | 1.073 (1.053-1.095) | <0.001 | 1.055 (1.031-1.081) | <0.001 |
| Male sex | 1.884 (1.366-2.599) | <0.001 | 1.712 (1.159-2.530) | 0.007 |
| BAME | 0.743 (0.505-1.094) | 0.132 | | |
| HCW | 0.143 (0.045-0.449) | 0.001 | 0.285 (0.089-0.908) | 0.034 |
| Alcohol | 2.642 (1.604-4.351) | <0.001 | 1.266 (0.674-2.379) | 0.463 |
| Smoking | 2.491 (1.625-3.820) | <0.001 | 2.436 (1.473-4.030) | 0.001 |
| Hypertension | 2.362 (1.762-3.166) | <0.001 | 1.360 (0.923-2.004) | 0.120 |
| Dyslipidemia | 1.886 (1.393-2.552) | <0.001 | 0.819 (0.543-1.236) | 0.342 |
| Obesity | 2.029 (1.471-2.798) | <0.001 | 1.679 (1.136-2.481) | 0.009 |
| Diabetes | 2.870 (2.030-4.059) | <0.001 | 1.464 (0.926-2.316) | 0.103 |
| Acute myocardial infarction | 2.609 /1.236-5.508) | 0.012 | 1.278 (0.518-3.156) | 0.595 |
| Heart failure | 3.660 (1.782-7.519) | <0.001 | 1.158 (0.426-3.147) | 0.773 |
| Atrial fibrillation | 2.279 (1.085-4.788) | 0.03 | 0.939 (0.376-2.344) | 0.893 |
| Stroke/TIA | 3.913 (2.178-7.033) | <0.001 | 0.952 (0.417-2.171) | 0.907 |
| Dementia | 8.773 (4.551-16.910) | <0.001 | 8.884 (3.800-20.772) | <0.001 |
| COPD | 6.017 (3.600-10.057) | <0.001 | 2.330 (1.233-4.403) | 0.009 |
| OSAHS | 3.165 (2.058-4.867) | <0.001 | 1.659 (0.955-2.884) | 0.072 |
| Moderate-severe CKD | 5.351 (3.138-9.126) | <0.001 | 3.649 (1.889-7.051) | <0.001 |
| Moderate-severe CLD | 5.375 (2.324-12.429) | <0.001 | 1.845 (0.657-5.180) | 0.245 |
| Malignancy | 3.710 (2.490-5.527) | <0.001 | 3.058 (1.891-4.943) | <0.001 |

BAME: black, Asian and minority ethnic; CCI: Charlson Comorbidity Index score; CI: confidence interval; CKD: chronic kidney disease; CLD; chronic liver disease; COPD: chronic obstructive pulmonary disease; HCW: healthcare workers; OR: odds ratio; OSAHS: obstructive sleep apnoea/hypopnoea syndrome; TIA: transient ischemic attack

# Strengths and weaknesses of this study

▶ Large and complete series of eligible cases/patients; all RT-PCR positive, population-based

▶ Over 300 variables include in data collection

▶ Efficient use of electronic records

▶ Use of different regression models to evaluate strength of associations with multiple outcomes

▶ Appropriate use of survival analysis but multiple co-factors were NOT considered

▶ Concern re: healthy worker effect (what is that?)

▶ No QC on hospital admission criteria….up to each admitting dr….perhaps HCW were admitted quickly and received different care

# Strengths and weaknesses, cntd

- ▶ Reasonable request to see the authors report on cumulative incidence and cumulative incidence ratios, as a measure of relative risk (in addition to survival curves)

- ▶ To calculate cumulative incidence, we need a closed cohort and complete follow-up to specific endpoints (like death) with a definite endpoint in time (like a month)

- ▶ Numerator is number of Covid admissions that died, divided by all admitted and followed forward to the endpoint in time.

- ▶ We can compare cumulative incidence of death among HCW to that of non HCW, and do so within strata

- ▶ We rarely have this type of information

# CI/CIR example (made up)

- 100 HCW admitted with Covid-19 and followed til one month post admission.

- 10 of them die within that one month period, or 10/100 HCW=10% or .10

- 100 non HCW admitted and followed for same time period

- 20 of them die within that same period, or 20/100 non-HCW =20% or .20

- Cumulative incidence ratio: .10/.20, or .5   The risk of death from Covid-19 during one month post admission was .5 for HCW compared to non-HCW.  (The term does not have units, but the time period of follow-up needs to be stated).

# Take home test

- List three factors associated with in- hospital mortality from Covid-19 in the Spanish study

- How might this study be expanded or improved upon?

- What is healthy worker effect and how could this factor influence study results?

- Is it reasonable to generalize findings from Spanish clinicians and providers to our own situation in Indian country with those providers?

# References

► **doi:** https://doi.org/10.1101/2020.11.23.20236810  Diez-Manglano et al, Healthcare workers hospitalized due to Covid-19, MedRxiv 2020

► Thanks to Grazia Ori