Risk factors for SARS-CoV-2 infection in Healthcare Workers following an identified nosocomial COVID-19 exposure during Waves 1-3 of the pandemic in Ireland.

J. McGrath, C.G. McAloon, S.J. More, S. Garrett, C. Reidy, U. Geary, N. Noonan, C. Bergin

Introduction

Healthcare workers (HCW) have increased exposure and subsequent risk of infection with SARS-CoV-2. The HERD Study investigated contemporaneous work-related risks associated with confirmed SARS-CoV-2 infection amongst HCWs following in-work exposure to a confirmed case during Waves 1-3 of the pandemic.

Methods

Study Design

This is a retrospective case-control study of HCWs following in-work exposure to a confirmed COVID-19 case. Digital contact tracing and occupational health data were used to identify factors associated with the exposure that resulted in SARS-CoV-2 infection or non-infection.

Participant Enrolment and Data Collection

All contact tracing records within the hospital site from March 2020 to June 2021, corresponding to Waves 1-3 of the COVID-19 pandemic in Ireland, were screened for eligibility for inclusion in the study. Data relating to age, sex, nationality, co-morbidities (hypertension, asthma, diabetes mellitus), vaccination status, job role, location of contact, contact type, PPE use and dates of contact/PCR testing were derived from a combination of contact tracing and Occupational Health databases. Nosocomial exposures alone were studied, with community-related interactions excluded.

Statistical Analysis

Percentages and IQR were calculated where appropriate for demographic and work-related factors. Univariate and multivariable logistic regression was used to determine adjusted odds ratios (aOR) for risk factors associated with SARS-CoV-2 infection following in-work exposure to an index COVID-19 case.

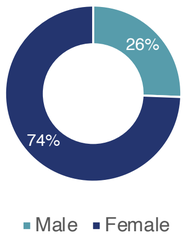
Results

285 Cases **1,537 Controls**

Following 1,822 in-work exposures with 755 COVID-19 index cases between March 2020 and April 2021

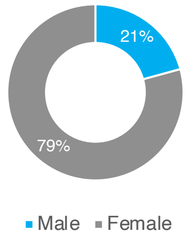
- Each index case was linked to a mean of 2.6 HCW exposure events (range 1-42, median 2, IQR 1-3).

Cases



Median age 37 years
Range 20-65 years

Controls



Median age 36 years
Range 20-67 years

- Irish (Cases 55.4%, Controls 61.2%) was the most common HCW nationality followed by Indian (Cases 12.6%, Controls 13.5%).
- Nursing (Cases 56.5%, Controls 51.7%) was the most common job role, followed by HCA (Cases 15.8%, Controls 12.5%).
- Medical wards (Cases 34%, Controls 39.1%) were the most common exposure location followed by COVID-19 wards (Cases 19.7%, Controls 9.5%).
- Index cases were patients (Cases 42%, Controls 42%) and other staff members (Cases 44.9%, Controls 46.7%) with PPE being worn in 20.7% of patient interactions for Cases and 26.9% of Controls patient exposures.

Key factors associated with SARS-CoV-2 positivity following in-hospital exposure to a known COVID-19 index case.

	n (%)	Crude OR (95%CI)	Adjusted OR (95%CI)	p-value
Gender				
Male	392 (21.5)	1.31(0.98,1.76)	1.42(1.03,1.95)	0.031
Nationality				
Eastern Europe	43 (2.4)	2.58 (1.32,5.05)	3.35 (1.61,6.97)	0.001
Exposure Location				
ICU	82 (4.5)	0.58 (0.26,1.29)	0.35 (0.15,0.79)	0.012
COVID-19 Ward	202 (11.1)	2.38 (1.64,3.46)	2.06 (1.38,3.06)	< 0.001
Contact Type				
Patient – Staff wearing PPE	472 (25.9)	0.55 (0.37,0.81)	0.58 (0.38,0.88)	0.01
Vaccine Status				
At least one dose received	177 (9.7)	0.37 (0.2,0.67)	0.4 (0.22,0.75)	0.004
Timepoint of exposure in Pandemic				
Wave 2	316 (17.3)	0.21 (0.13,0.34)	0.18 (0.11,0.3)	< 0.001
Wave 3	575 (31.6)	0.24 (0.17,0.34)	0.21 (0.14,0.31)	< 0.001

Discussion / Conclusion

- Continuing emphasis on PPE use is necessary and demonstrates persisting benefit in the era of COVID-19 vaccinations.
- Non-work-related factors may influence infection risk seen in certain ethnic groups as no difference in outcomes between HCW nationalities was demonstrated.
- Previously identified high risk HCW roles (e.g. nursing) may be the result of repeated exposures rather than risks inherent to a single prolonged event.

- We recommend that future studies combine epidemiological and WGS data to provide a complete assessment of interaction outcomes that aid in exclusion of confounding undocumented exposures.