

# Covid-19 presentation among symptomatic healthcare workers in Ireland

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<b>Background</b>	It is recognized that healthcare workers (HCWs) are at high risk of contracting Covid-19. It is incumbent on occupational health staff to recognize potential symptoms of Covid-19 among HCWs.
<b>Aims</b>	The aims of the study were to describe the presenting symptoms of HCWs who developed Covid-19 in Ireland, and to estimate the odds of specific symptoms being associated with a positive Covid-19 polymerase chain reaction (PCR) result.
<b>Methods</b>	A retrospective chart review of all symptomatic HCWs who self-presented for Covid-19 testing in Cork from March to May 2020 was conducted. A sex-matched case-control study was carried out to compare presenting features among those who tested positive compared to those who tested negative. Univariate and multivariable-adjusted conditional logistic regression models were run using Stata 15.0 to identify the symptoms associated with positive Covid-19 swab results.
<b>Results</b>	Three hundred and six HCWs were included in the study; 102 cases and 204 controls. Common presenting features among cases were fever/chills (55%), cough (44%) and headache (35%). The symptoms which were significantly associated with a positive Covid-19 swab result were loss of taste/smell (adjusted odds ratio [aOR] 12.15, 95% confidence interval [CI] 1.36–108.79), myalgia (aOR 2.36, 95% 1.27–4.38), fatigue (aOR 2.31, 95% CI 1.12–4.74), headache (aOR 2.11, 95% CI 1.19–3.74) and fever/chills (aOR 1.88, 95% CI 1.12–3.15).
<b>Conclusions</b>	Fever, fatigue, myalgia, loss of taste/smell and headache were associated with increased odds of a Covid-19 diagnosis among symptomatic self-referred HCWs compared with those had negative swab results. Testing criteria for HCWs should reflect the broad range of possible symptoms of Covid-19.
<b>Key words</b>	Covid-19; healthcare worker; occupational health; SARS-CoV-2; symptoms.

## Introduction

Cardinal symptoms of Covid-19 are fever, new cough and dyspnoea [1]. As the pandemic has evolved, the literature has highlighted a myriad of other presenting symptoms, including anosmia, hypogeusia, headache and diarrhoea [2–5]. The wide spectrum of presenting symptoms makes it difficult to discern which suspect cases are more likely to test positive for SARS-CoV-2 infection.

In Ireland, one-third of all confirmed cases of Covid-19 were among healthcare workers (HCWs) in the 'first wave' of the pandemic up to mid-July 2020 [6]. Early identification of infected HCWs is vital to minimize the risk of SARS-CoV-2 transmission to patients, other HCWs and the public. This is also necessary for maintaining workplace health and safety, and sustaining adequate levels of staffing. In this paper we present the descriptive

epidemiology of symptomatic HCWs who self-presented for Covid-19 testing, during the first 12 weeks of the pandemic. We undertook a case-control study to estimate the odds of a positive Covid-19 swab result during this time, based on HCWs' presenting symptoms.

## Methods

The Occupational Health Department (OHD) in Cork University Hospital (CUH), Ireland, had a dedicated testing centre for nasopharyngeal polymerase chain reaction (PCR) swab referrals. Any new or unexplained medical symptoms were considered an indication for testing, this did not have to be a 'typical' symptom of Covid-19. Symptomatic HCWs self-presented by contacting the OHD directly; testing was arranged within 24 h. The OHD provides support to HCWs who are employed in

## Key learning points

### What is already known about this subject:

- There is limited evidence on the presenting symptoms of Covid-19 among healthcare workers.
- One-third of all SARS-CoV-2 infections were in healthcare workers in Ireland in the first wave of the pandemic. It is not known if symptoms in healthcare workers differ from the general public.
- Recognition of symptoms of Covid-19 in healthcare workers is vital to reduce the risk of transmission to patients, other healthcare workers and the wider public.

### What this study adds:

- This case-control study examined features of symptomatic healthcare workers during the first wave of the pandemic in Ireland.
- Symptoms in healthcare workers with positive polymerase chain reaction swabs were compared to symptoms in healthcare workers with negative polymerase chain reaction swabs.
- Fever, fatigue, myalgia, headache and anosmia/hypogeusia were all associated with increased odds of Covid-19 diagnosis in symptomatic healthcare workers.

### What impact this may have on practice or policy:

- Covid-19 can present with a broad constellation of symptoms. Fever, fatigue, myalgia, anosmia/hypogeusia and headache help to discriminate positive cases of Covid-19 among symptomatic healthcare workers.
- Inclusion of these symptoms in Covid-19 testing criteria may help to identify cases, thereby reducing the risk of further transmission.

public healthcare facilities in Cork. Thus, HCWs who were employed in private facilities, or self-employed, were not included in the study.

Cases of SARS-CoV-2 infection were defined as symptomatic HCWs who had a positive Covid-19 swab result. Controls were defined as symptomatic HCWs whose swab did not detect Covid-19. Cases and controls were selected from the same study period; 9th of March to 31st of May 2020. Asymptomatic HCWs were excluded. We included two sex-matched controls for each case to reduce the possibility of confounding by sex, or by unmeasured sex-specific factors, and to enhance statistical power.

HCW role was categorized as medical, nursing, allied health professional (physiotherapy or pharmacy) or support staff (including healthcare assistants, multi-task attendants, cleaning, security, clerical and catering). The location of work was divided into three categories; Community hospitals (residential long-stay facilities), Model 2 hospitals (local/district hospitals which admit low acuity medical patients) and Model 4 hospital (large tertiary hospital) [7].

We collected information from paper records held in the OHD on the HCWs' presenting symptoms. The HCW was not examined by a doctor prior to testing. Data were recorded in Microsoft Excel in an irrevocably anonymized form. The data were transferred to Stata 15.0 and random matching by sex was undertaken.

We used multivariable-adjusted conditional logistic regression with backward selection to identify the demographic factors or presenting symptoms most strongly

associated with positive Covid-19 swab results. We did not include work location in the adjusted models since some community hospitals experienced large outbreaks of Covid-19 during the study period; this may have disproportionately impacted on the likelihood of HCWs testing positive.

Ethical approval for the study was granted by the Clinical Research Ethics Committee of the Cork University Teaching Hospitals.

## Results

There were 102 positive cases and 204 sex-matched controls. There was no significant difference in mean age at presentation between cases and controls. The majority of HCWs were either nurses 47% ( $n = 143$ ) or support staff 35% ( $n = 108$ ) (Table 1).

The most common presenting symptoms among cases were fever/chills (55%), cough (44%), headache (35%), sore throat (31%) and myalgia (29%). Controls were most likely to present with cough (52%), sore throat (38%) or fever/chills (37%).

As shown in Table 2, no significant differences by age or work role were observed.

The symptoms which were significantly associated with a positive Covid-19 swab result were anosmia/hypogeusia (adjusted odds ratio [aOR] 12.15, 95% confidence interval [CI] 1.36–108.79), myalgia (aOR 2.36, 95% 1.27–4.38), fatigue (aOR 2.31, 95% CI 1.12–4.74), headache (aOR 2.11, 95% CI 1.19–3.74) and fever/chills (aOR 1.88, 95% CI 1.12–3.15). Other symptoms did not help to discriminate cases versus controls.

**Table 1.** Characteristics of HCWs who presented for Covid-19 testing in Cork, and their symptoms at presentation, March–May 2020

	Cases, <i>n</i> (%)	Controls, <i>n</i> (%)	$\chi^2$ : <i>P</i>
Gender			
Female	79 (77)	158 (77)	
Male	23 (23)	46 (23)	
Age			
Mean (SD)	44.1 ± 11.2	41.9 ± 11.1	0.10
20–39	35 (34)	78 (38)	0.76
40–49	36 (35)	75 (37)	
50–59	24 (24)	38 (19)	
60+	7 (7)	13 (6)	
Role			
Doctor	10 (10)	21 (10)	0.68
Nurse	52 (51)	91 (45)	
Allied health professional*	6 (6)	18 (9)	
Support staff**	34 (33)	74 (36)	
Location			
Community hospital	36 (35)	32 (16)	<0.001
Model 2 hospital	37 (36)	63 (31)	
Model 4 hospital	29 (28)	109 (53)	
Symptoms			
Pyrexia/chills	56 (55)	76 (37)	<0.01
Cough	45 (44)	55 (27)	0.23
Dyspnoea	9 (9)	27 (13)	0.26
Chest tightness	14 (14)	17 (8)	0.14
Fatigue	23 (23)	17 (8)	<0.01
Myalgia	30 (29)	27 (13)	<0.01
Headache	36 (35)	40 (20)	<0.01
Sore throat	32 (31)	79 (38)	0.21
Rhinitis	11 (11)	24 (12)	0.80
Nasal congestion	9 (9)	11 (5)	0.25
Anosmia	4 (4)	1 (1)	0.04
Hypogeusia	4 (4)	0 (0)	0.01
Diarrhoea	1 (1)	2 (1)	1.00

## Discussion

The study outlines the frequency of specific symptoms among Covid-19 positive HCWs and it helps to highlight the wide spectrum of relevant symptoms which may warrant inclusion in Covid-19 testing criteria.

Five specific symptoms helped to discriminate Covid-19 positive HCWs from negative controls: fever, fatigue, myalgia, anosmia/hypogeusia and headache. Although onset of new cough is a cardinal feature of Covid-19 infection, it was a common symptom among HCWs who self-presented for testing in our study, including among those in whom Covid-19 was not detected. A small minority of HCWs in our study reported anosmia/hypogeusia. Nonetheless, these symptoms were strongly associated with a positive Covid-19 swab result and this is consistent with previous research [5]. Fever, myalgia and fatigue also helped to discriminate positive cases from controls. These symptoms are common presentations of influenza [8]. This demonstrates the difficulty in

differentiating Covid-19 infection from influenza based on self-reported symptoms. This highlights the increased need for widespread influenza vaccination of HCWs during the Covid-19 pandemic [8].

Our study is largely representative of HCWs in public hospitals in Ireland in terms of gender, age and role [9].

Selection bias is a potential limitation since HCWs self-presented for testing. Negative controls may have had a higher representation of the ‘worried well’, and presenting symptoms were not objectively measured. A negative or ‘not detected’ swab result only reflects a single point in time and we cannot exclude the possibility of false negatives among our controls. Given that knowledge of Covid-19 symptoms evolved during the study period, we cannot exclude the possibility that the date of testing may have led to some unmeasured information bias.

Another limitation to consider is the reliability of the nasopharyngeal PCR test. Studies have shown it to have a false-negative rate between 2 and 29% [10].

**Table 2.** Multivariable-adjusted logistic regression for positive Covid-19 PCR swab result among HCWs by characteristics and presenting symptoms

	Unadjusted		Adjusted		P
	OR	95% CI	aOR	95% CI	
Age					
20–39	Ref.	Ref.			
40–49	1.07	0.61–1.88			
50–59	1.41	0.74–2.69			
60+	1.20	0.44–3.27			
Role					
Nurse	Ref.	Ref.			
Doctor	0.83	0.33–1.90			
Allied health professional <sup>a</sup>	0.58	0.22–1.56			
Support staff <sup>b</sup>	0.80	0.47–1.37			
Symptoms					
Fever/chills	2.05	1.27–3.32	1.88	1.12–3.15	0.016
Cough	0.74	0.46–1.20			
Dyspnoea	0.63	0.29–1.40			
Chest pain/tightness	1.75	0.83–3.71			
Fatigue	3.20	1.62–6.32	2.31	1.12–4.74	0.023
Myalgia	2.73	1.52–4.92	2.36	1.27–4.38	0.007
Headache	2.24	1.31–3.81	2.11	1.19–3.74	0.01
Postnasal symptoms	0.87	0.54–1.40			
Loss of taste/smell	10.46	1.21–90.79	12.15	1.36–108.79	0.026

<sup>a</sup>Physiotherapists and pharmacists.

<sup>b</sup>Healthcare assistants, multi-task attendants, cleaning, security, clerical and catering staff.

In conclusion, fever, fatigue, myalgia, anosmia/hypogeusia and headache were associated with Covid-19 diagnosis among self-presenting HCWs in Ireland. This supports the need for these symptoms to be included in testing criteria for Covid-19.

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## Competing interests

None declared.

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