Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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Burnout amongst emergency healthcare workers during the COVID-19 pandemic: A multi-center study

Burnout is a major healthcare issue [1] which has intensified with additional stressors arising from the ongoing 2019 Novel Coronavirus (COVID-19) pandemic [2,3]. Emergency Department (ED) healthcare workers (HCWs) have had one of the highest incidences of burnout [4-6] even prior to the pandemic. Being at the frontline in direct contact with patients suspected or confirmed to have a COVID-19 infection exacerbates this [7].

To evaluate the prevalence of burnout in this population and the preferred methods of coping with the COVID-19 situation, we conducted a cross-sectional study amongst doctors and nurses in our regional health cluster's Emergency Departments (EDs) and Urgent Care Center (UCC). This was performed in end-May, three months into an escalation of hospital workflows in response to the pandemic, at which time Singapore had seen more than 30,000 cases of COVID-19 infections [8]. Approval from the relevant institutional review board was obtained for waiver of consent. Anonymized data was collected via an online questionnaire which covered sociodemographic data, COVID-19 related anxiety and stress as well as coping strategies. These questions were developed based on previous studies and expert opinions on mental health and coping in infectious disease outbreaks [9-11]. We evaluated for burnout using the Copenhagen Burnout Inventory (CBI) [12].

The primary outcome was the proportion of moderate-to-severe burnout amongst the HCWs, defined by a score of 50 or higher in the personal domain of the CBI. Secondary outcomes assessed included factors associated with moderate-to-severe burnout and preferred methods of coping with the COVID-19 situation.

A total of 337 HCWs (210 nurses and 127 doctors) participated in the survey. The overall response rate was 60.2% (69.4% for doctors and 55.7% for nurses). The most common age range was between 21 and 30 years old (46.4%). Majority of respondents were female (67.7%). Most respondents (84.6%) had already been working in the ED or UCC prior to the COVID-19 pandemic while the rest were deployed to augment departmental manpower.

Using the CBI, the mean score of personal burnout was 49.2 (SD 18.6). A significant proportion of respondents reported moderate-to-severe personal burnout (49.3%). Nurses had significantly higher CBI scores than doctors, with the mean personal burnout scores for nurses and doctors at 51.3 (SD 19.6) and 45.7 (SD 16.2) respectively ($p = 0.005$). Staff who were originally working in the ED or UCC before the COVID-19 pandemic also had a higher rate of moderate-to-severe personal burnout as compared to those deployed from other departments (90.4% versus 9.6%, $p = 0.004$).

In terms of preferred methods of coping with the COVID-19 situation (Table 1), most respondents chose technological media such as watching television or internet videos (84.9%), followed by spending time with family and friends (83.1%) and receiving acts of gratitude (e.g. thank you cards, gifts) from their department and/or from their peers (65.0%).

The presence of burnout affecting almost 50% of ED HCWs is of concern. Of note, a larger proportion of nurses (53.3%) were found to be experiencing burnout as compared to physicians (42.5%). These findings are consistent with a similar study of hospital employees in a regional hospital in Taiwan [13]. Possible contributory factors include higher active job strain amongst nurses and poorer social support. [13,14]. These are compounded by the COVID-19 pandemic with social isolation and increased physical discomfort from prolonged use of personal protective equipment. [15].

Staff originally based in the ED or UCC were also more likely to have moderate-to-severe burnout compared to deployed staff members. This may be related to pre-existing high levels of stress that ED HCWs experience [5,14], as well as the uneven allocation of critical duties to more experienced ED or UCC personnel. We anticipate that burnout will worsen amongst the original staff members after deployed personnel eventually return to their original roles and departments as strict infection control measures and vigilance will need to be maintained.

Besides the use of technological media, spending time with family and friends and acts of gratitude from the department and peers were preferred methods for coping with the pandemic. Similar findings were seen during previous infectious disease outbreaks [16]. While spending time with family and friends can be challenging when social distancing is recommended, staff should be encouraged to maintain social connections through other digital means [16] such as video-calls and social media. These methods are also in line with the World Health Organisation's recommendations on mental health and psychosocial considerations amongst HCWs during the COVID-19 outbreak [17].

Our findings highlight that frontline HCWs, especially nurses, have a relatively high prevalence of burnout during the COVID-19 pandemic. While we have identified preferred methods of coping, specific interventions along these lines need to be implemented to improve well-being and reduce burnout. We recommend that a regular assessment

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Table 1
Preferences for various methods to cope with the COVID-19 situation.

Methods to cope with the COVID-19 situation	n (%) Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Ranking of preference based on combined 'Strongly Agree' and 'Agree' (%)
Use of technological media such as watching television/videos on the Internet	53 (15.7)	233 (69.1)	31 (9.2)	14 (4.2)	6 (1.8)	84.9
Spending time with friends/family	111 (32.9)	169 (50.2)	34 (10.1)	14 (4.2)	9 (2.7)	83.1
Acts of gratitude (e.g. thank you cards, gifts) from the Emergency Department/Urgent Care Centre and/or from peers.	38 (11.3)	181 (53.7)	77 (22.9)	31 (9.2)	10 (3.0)	65.0
Use of print media such as reading books/magazines.	18 (5.3)	183 (54.3)	97 (28.8)	27 (8.0)	12 (3.6)	59.6
Participation in sporting activities	41 (12.2)	157 (46.6)	90 (26.7)	34 (10.1)	15 (4.5)	58.8
Acts of gratitude (e.g. thank you cards, gifts) from the hospital/cluster	32 (9.5)	159 (47.2)	92 (27.3)	39 (11.6)	15 (4.5)	56.7
Religious beliefs	69 (20.5)	119 (35.3)	111 (32.9)	22 (6.5)	16 (4.8)	55.8
Acts of gratitude (e.g. thank you cards, gifts) from the public	34 (10.1)	164 (43.5)	93 (27.6)	31 (9.2)	15 (4.5)	53.6
Prior training in skills such as communication or teamwork	15 (4.5)	160 (47.5)	118 (35.0)	34 (10.1)	10 (3.0)	51.9
Participation in relaxation techniques such as meditation/yoga	22 (6.5)	94 (27.9)	145 (43.0)	59 (17.5)	17 (5.0)	34.4
Hospital COVID-19 hotline for seeking psychological help	5 (1.5)	79 (23.4)	173 (51.3)	58 (17.2)	22 (6.5)	24.9
Use of alcohol or smoking.	4 (1.2)	43 (12.8)	42 (12.5)	95 (28.2)	153 (45.4)	14.0
Use of medication.	2 (0.6)	16 (4.8)	54 (16.0)	106 (31.5)	159 (47.2)	5.3

of burnout and coping amongst frontline HCWs be performed and interventions tailored, especially as the pandemic continues to evolve.

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Declaration of Competing Interest

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