Original Article

‘Code-95’ rapid response calls for patients under airborne precautions in the COVID-19-era: a cross-sectional survey of healthcare worker perceptions

Ashwin Subramaniam 1,2,3,4, Alexandr Zuberav 1, Robert Wengritzky 5, Christopher Bowden 5, Ravindranath Tiruvoipati 2,6, Wei Chun Wang 4,7 and Vikas Wadhwa 1

1Department of Intensive Care, Frankston Hospital, 2Department of Intensive Care, The Bays Hospital, and 3Peninsula Clinical School, Monash University, Frankston, 4Peninsula Health, Monash University, 5Department of Anaesthesia, Peninsula Health, and 7Department of Biostatistics, Cabrini Health, Melbourne, and 6Department of Intensive Care, Peninsula Private Hospital, Langwarrin, Victoria, Australia

Key words
Code-95 call, rapid response system, medical emergency team, healthcare worker, personal protective equipment, COVID-19.

Correspondence
Ashwin Subramaniam, Department of Intensive Care, Frankston Hospital, 2 Hastings Road, Frankston, Vic. 3199, Australia.
Email: ashwin.subramaniam@monash.edu

Received 25 November 2020; accepted 2 December 2020.

Abstract

Background: To allow better allocation of staff and resources, rapid response teams attending to acutely deteriorating or aggressive patients with suspected or confirmed COVID-19 infection were pre-warned with the announcement of ‘Code-95’ with calls.

Aim: To assess healthcare worker (HCW) perspectives on pre-warning rapid response calls (RRC) with ‘Code-95’ in announcements when attending to deteriorating or aggressive patients with suspected/confirmed COVID-19 infection.

Methods: Design: prospective cross-sectional single-centre survey of HCW over a 3-week period. Setting: tertiary public hospital. Participants: HCW caring for deteriorating or aggressive patients. Main outcome measures: the primary outcome was to assess HCW perspectives in attending Code-95 calls. Secondary outcomes were to identify any differences related to craft group, age, experience or presence of comorbidities.

Results: A total of 297 responses was analysed; 86.7% of HCW (n = 257) attending Code-95 calls reported anxiety. Medical staff reported greater anxiety in comparison to nursing staff (93.8% vs 78.5%; P = 0.002). Efferent team reported higher anxiety in contrast to afferent team (92.6% vs 58.8%; P = 0.021). There was no significant difference in perceived anxiety based on age (≤40 vs >40 years of age), years of experience (≤5 vs >5 years), comorbidities or mental illness; 54% reported concerns about adequacy of infection-control policies and personal protective equipment; 45% were worried about inadequate training for responding to Code-95 calls.

Conclusions: Most surveyed HCW supported Code-95 announcements pre-warning them of potential COVID-19 exposure when attending a RRC. However, the majority of HCW reported anxiety when attending these calls. Medical and efferent team HCW perceived greater anxiety compared to nursing and afferent team HCW. The Code-95 system to pre-warn rapid response teams may be a useful addition to protecting HCW from infectious diseases, although broader implementation will require greater resourcing, training and support.

Introduction

Rapid response systems (RRS) have become standard of care in most healthcare organisations. These systems are designed to identify deteriorating patients and enable appropriate and timely care. Such systems involve recognition and timely activation of rapid response calls (RRC) by the home team (defined as the ‘afferent team’) and appropriate response by adequately trained and equipped medical emergency team (MET, defined as the ‘efferent team’).1 There is variance in rapid response team (RRT) nomenclature2 and composition3 across the world; however, a ‘Code Blue’ response is generally reserved for patients in life-threatening situations who require immediate resuscitation. Many countries including Australia have

Funding: None.
Conflict of interest: None.
mature RRS, which allow for early detection of clinical deterioration. In addition, many healthcare facilities have aggression management team (AMT) systems to respond to actual or perceived threat to safety of healthcare workers (HCW), patients or visitors.

The ongoing COVID-19 global pandemic and most recently, the second-wave outbreak in Victoria, has rapidly and significantly altered many aspects of clinical practice. The RRT and AMT members responding to clinically deteriorating patients with suspected or confirmed COVID-19 infection may be at greater risk for contracting severe COVID-19 infection due to their own comorbidities or age. Based on the International Society of Rapid Response Systems recommendations, our hospital, developed and implemented a ‘Code-95’-labelled announcement system to alert HCW responding to deteriorating or aggressive patients with suspected or confirmed COVID-19 infection. The purpose of the Code-95 system was to allow for timely and optimal patient management when attending calls, in particular the ready access to trolleys with dedicated personal protective equipment (PPE; including N95 masks) and staff support on wards.

There is sparse scientific evidence to demonstrate the feasibility and functionality of such a system. Using a cross-sectional anonymous survey study design, we aimed to investigate local experience with regards to organisational and clinical issues and study any personal implications as a result of Code-95 calls.

Methods

Study design and setting

A prospective cross-sectional single-centre survey of all clinical staff that were involved in the care of deteriorating or aggressive patients who required the services of RRT or AMT respectively. The study hospital is a tertiary public hospital with 454 bed spaces and 15 intensive care unit (ICU) beds.

RRS in the pre-COVID-19 era

The MET in this hospital includes a critical care liaison nurse or ICU nurse, an ICU registrar and a medical registrar. An additional ICU nurse and coronary-care trained nurse attend for Code Blue. An anaesthetist is available if required for airway management. The patient services manager also attends MET or Code Blue calls.

RRS during the COVID-19 pandemic

Although the same members attend, there are clear policies on the reduced number of people inside the patient cubicle (refer to Supporting Information Fig. S1 for COVID-19 MET and Code Blue team roles).

AMT composition

Four patient service assistants (PSA), two security personnel, ward nurse-in-charge and psychiatry liaison nurse.

Ethical approval

This study was approved by local hospital research ethics committee (HREC Reference number: 66401).

Survey development and distribution

A provisional questionnaire was prepared after review of the literature. This questionnaire was then revised following input by clinical experts. A pilot study helped further refine the questions. Finally, a web-based anonymous survey was developed using the SurveyMonkey™ platform and published online (Appendix S1). This survey targeted staff who were involved in both the afferent and efferent teams of the RRS implemented in the study hospital. The survey weblink was distributed in the hospital e-Bulletin for 3 weeks between 17 August 2020 and 6 September 2020, initially once a week and then daily in the last week to improve the response rate. An intranet hyperlinked desktop banner was created for all hospital computers in the last week prompting staff to complete the survey. Participation was voluntary and anonymous, with no reimbursement offered to participants.

Data collection

The 48-question survey collected basic information including age group, gender, type of employee, work experience, comorbidities and mental illness.

Study outcomes

The primary outcome of the study included identification of potential organisational, clinical and personal implications of HCW attending Code-95 calls for patients with suspected or confirmed COVID-19. Secondary outcomes included HCW perceptions with comparisons between different groups based on the reported anxiety level and reasons to be more anxious: (i) clinical experience (≤5 years vs >5 years); (ii) age (≤40 vs >40 years); (iii) presence of chronic conditions; (iv) history of mental illness; (v) afferent vs efferent teams; and (vi) medical vs nursing staff. The perceived anxiety was presented as proportion of responses ‘feeling anxious sometimes’ and ‘feeling significantly anxious’.
Data analysis

Survey responses were exported from the online survey platform, converted to Microsoft Excel format and analysed using SPSS Statistics Version 26 (IBM Corp., Armonk, N.Y., USA). The data analysis was primarily descriptive and reported as percentages of valid responses. The responses were compared using Chi-squared and Fisher’s exact tests with a two-tailed alpha-level of 5% considered significant ($P < 0.05$). As 50.4% of HCW had not attended a Code-95 MET call, we analysed for any differences in perceptions between those who attended such calls to those who did not.

Results

Of 334 responses, 297 were included in the final analysis (Fig. 1). Approximately 40% of the overall efferent team (excluding PSA) responded, compared to 15% in the afferent team (Fig. 1). More than 50% of staff were over 40 years of age; 65% of respondents were female and 59% ($n = 174$) belonged to the afferent team; 57% of respondents had >5 years’ experience in their current clinical role. Only 16% of respondents reported medical comorbidities with most (41 out of 47) having one chronic condition. Approximately 5% of clinical staff were current smokers. Approximately 10% of the respondents reported some form of mental illness. Half of all respondents had not attended a Code-95 MET call, most of whom were over 40 years of age and senior clinicians. The demographic characteristics of respondents are summarised in Table 1.

Primary outcome

Organisational issues of Code-95 calls for patients under COVID-19 precautions

A total of 82% believed that Code-95-labelled announcements should be used for all patients in
isolation for respiratory infectious illness requiring airborne/droplet precautions in the future. Nine percent were unaware of the meaning of the Code 95 announcement by the time of the survey; 54% of respondents were concerned that hospital policies were inadequate and there was insufficient PPE; 64% of the respondents believed that existing COVID-19 training programmes were adequate; however, some aspects could be improved; 71% of them believed there were adequate signage and instructions for COVID-19 precautions. A ‘buddy’ supervising PPE donning/doffing processes was usually/always present 25% of the time. Most (77%) believed that communication methods (e.g. wall-phone, walkie talkie) between teams inside and outside negative pressure room during such calls was more difficult than usual and 25% reported there were no communication devices present in negative pressure rooms. Moreover, approximately half of the respondents expressed concerns about interdisciplinary communication. The findings are summarised in Table 2.

### Clinical issues during MET/Code Blue calls for patients under COVID-19 precautions

A total of 69% of respondents believed that there were no differences in escalating to MET or Code Grey/Black calls in patients in COVID-19 precautions when compared to non-COVID-19 patients. Most respondents (89%) believed that respiratory precautions often delayed treatment to patients during Code-95 RRC and 39% felt that these patients were less likely to be reviewed by the MET team leader when compared to non-COVID-19 patients. Eighty percent of respondents were satisfied with outcomes at the conclusion of Code-95 calls. Only 17% of respondents reported that patients post Code-95 calls were likely to be transferred to ICU. Almost all (95%) consultants believed that complex clinical decisions (e.g. instituting new or modifying existing goals of care) were possible during Code-95 calls. Fifty-eight percent of the AMT members believed that patients under COVID-19 precautions were more confused and aggressive than non-COVID-19 patients and 78% believed that managing such patients was more complex.

### Table 1 Demographics of the survey respondents

| Questions                                                                 | n (%) |
|---------------------------------------------------------------------------|-------|
| **Clinical role: efferent team**                                          |       |
| ICU junior medical staff                                                  | 14 (4.2) |
| Critical care liaison nurses                                             | 6 (1.8) |
| ICU nurses                                                                | 39 (11.7) |
| ICU consultants                                                           | 6 (1.8) |
| Coronary care                                                             | 6 (1.8) |
| Medical registrars                                                        | 15 (4.5) |
| Anaesthetic consultants                                                   | 18 (5.4) |
| Patient service assistants                                                | 18 (5.4) |
| Hospital coordinators/PSM                                                 | 1 (0.3) |
| **Clinical role: afferent team**                                         |       |
| Ward nurses, ward ANUM                                                    | 81 (25.5) |
| Other registrars                                                          | 24 (7.2) |
| Medical/surgical RMO                                                      | 34 (10.2) |
| CLIPS clinicians                                                          | 2 (0.6) |
| Other consultants                                                         | 28 (8.4) |
| Others†                                                                  | 37 (11.4) |
| **Experience in current clinical role (years)**                          |       |
| <1                                                                       | 28 (9.5) |
| 1–5                                                                     | 98 (33.2) |
| 5–10                                                                    | 49 (16.6) |
| >10                                                                     | 120 (40.7) |
| **Age category (years)**                                                  |       |
| <30                                                                      | 69 (23.6) |
| 30–40                                                                   | 73 (24.9) |
| 41–50                                                                   | 69 (23.6) |
| 51–60                                                                   | 66 (22.5) |
| >61                                                                     | 16 (5.5) |
| **Female gender**                                                        | 189 (64.7) |
| **Chronic health conditions for staff**                                  |       |
| No chronic conditions                                                     | 245 (83.9) |
| 1 chronic condition                                                      | 41 (14) |
| 2 or more chronic conditions                                              | 6 (2.1) |
| Severe and/or multiple chronic conditions                                 | 0 |
| Staff with some form of mental illness                                    | 27 (9.5) |
| **Current smoker**                                                       | 15 (5.1) |
| **Number of MET calls attended by staff with sCOVID-19/COVID-19 with airborne precautions** |       |
| No experience                                                            | 144 (51.3) |
| 1–10                                                                    | 112 (39.9) |
| 11–50                                                                   | 23 (8.2) |
| >50                                                                     | 2 (0.7) |
| **Number of Code Blue calls attended by staff with sCOVID-19/COVID-19 with airborne precautions** |       |
| No experience                                                            | 220 (77.4) |
| 1–5                                                                     | 59 (20.9) |
| 6–10                                                                    | 2 (0.7) |
| >10                                                                     | 2 (0.7) |
| **Number of Code Grey/Code Black calls attended by staff with sCOVID-19/COVID-19 with airborne precautions** |       |
| <5                                                                      | 27 (65.9) |

*Allied health (6), pharmacists (3), Finance (2), sonographers (2), clinical coordinator, psychologist, social worker, medical administration, ward clerk (1 each), not specified (10), preferred not to answer (n = 9). ANUM, associate nurse unit manager; CLIPS, consultation liaison inpatient psychiatry service; COVID-19, coronavirus disease 2019; ICU, intensive care unit; MET, medical emergency team; PSM, patient services manager; RMO, resident medical officer; sCOVID-19, suspected patient with COVID-19.
### Table 2  Organisational and clinical impact of Code-95 calls for patients under COVID-19 precautions

| Question                                                                                                                                                                                                 | %    |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| **Organisational**                                                                                                                                                                                      |      |
| Do you usually observe adequate signage/instructions for COVID-19 precautions when you arrive at a MET/Code?                                                                                               |      |
| Never observe                                                                                                                               | 4.9  |
| Usually not                                                                                                                                | 8.3  |
| Sometimes observe                                                                                                                          | 15.9 |
| Usually observe                                                                                                                            | 30.6 |
| Always observe                                                                                                                             | 40.3 |
| Essential PPE always present when you arrive at Code-95 calls for COVID-19/sCOVID-19?                                                                                                                 |      |
| Important parts of PPE usually missing                                                                                                      | 6    |
| Some parts of PPE occasionally missing                                                                                                      | 50   |
| All necessary parts of PPE usually present                                                                                                  | 44   |
| Donning/doffing process is usually well organised during Code-95 calls for sCOVID-19/COVID-19 patients                                                                                                    |      |
| Usually poorly organised                                                                                                                    | 19.4 |
| Sometimes poorly organised                                                                                                                  | 32.8 |
| Usually well organised, but can be improved                                                                                                  | 39.6 |
| Always well organised                                                                                                                      | 8.2  |
| Presence of a well trained person (‘buddy’) supervising the donning/doffing process                                                                                                                      |      |
| Never present                                                                                                                              | 17.8 |
| Sometimes present                                                                                                                          | 58   |
| Usually present                                                                                                                            | 17.2 |
| Always present                                                                                                                             | 7    |
| Staff awareness of any existing local COVID-19 policies for MET/‘Code’ calls?                                                                                                                         |      |
| Not aware                                                                                                                                   | 16.8 |
| Aware but not very familiar                                                                                                                 | 28.4 |
| Aware and somewhat familiar                                                                                                                 | 33.7 |
| Aware and very familiar                                                                                                                    | 21.1 |
| Staff awareness of any existing training programmes specific to COVID-19 infection prevention (i.e. required PPE, donning/doffing, transporting patients) |      |
| Unaware of any specific training programmes                                                                                                  | 6.9  |
| Aware of but not participated in any training programmes                                                                                      | 8.3  |
| Existing training programmes are inadequate/poorly designed/do not cover significant aspects                                                                                                           | 19.9 |
| The existing training programmes are adequate; however, some aspects can be improved                                                                                                                  | 44.4 |
| The existing training programmes are appropriate and well designed                                                                          | 19.9 |
| The existing training programmes are excessive to the extent of the problem in our hospital                                                                                                           | 0.5  |
| Communication between staff members during the MET/Code-95 calls for COVID-19/sCOVID-19 patients compared to non-COVID-19 patients                                                                        |      |
| Communication is better during MET/’Code’ calls                                                                                               | 7.3  |
| No significant difference in communication issues during MET/Code Blue calls                                                                                                                             | 15.9 |
| Communication between staff members is somewhat more difficult                                                                             | 59.4 |
| Significant issues with communication between staff members                                                                              | 17.4 |
| Communication system (e.g. wall-phone, walkie talkie) between teams inside and outside negative pressure room during a Code-95 calls                                                             |      |
| Communication device always present inside the negative pressure room                                                                       | 38.2 |
| Communication device sometimes presents inside the negative pressure room                                                                     | 37.3 |
| Communication device usually not present inside the negative pressure room                                                                   | 24.5 |
| Do you think we should use the ‘Code-95’ calls for all patients in isolation for respiratory infectious illness airborne/droplet precautions in the future? |      |
| Disagree                                                                                                                                   | 4.6  |
| Neither agree nor disagree                                                                                                                 | 13.6 |
| Agree                                                                                                                                     | 81.8 |
| For the MET team members: are you usually aware that the MET/Code Blue call you are going to attend is for a patient with suspected/confirmed COVID-19 beforehand? |      |
| Usually unaware and do not know much about Code-95 calls                                                                                     | 0    |
| Sometimes aware and do not know much about Code-95 calls                                                                                     | 8.8  |
| Usually aware since introduction of the Code-95 calls                                                                                         | 91.2 |
| If you hear Code-95 call, how likely is that you are going to ask your colleagues to attend it instead of you?                                                                                           |      |
| Likely. Due to higher risk of infection                                                                                                      | 9.5  |
| Neutral. Not more likely than with other calls                                                                                               | 39.2 |
| Unlikely. Prefer to attend protected calls myself                                                                                             | 13.5 |
| Question                                                                 | %  |
|-------------------------------------------------------------------------|----|
| Usually this is not an option                                           | 37.8 |
| Clinical impact                                                         |    |
| MET/Code Blue calls                                                     |    |
| Do you think that patients under COVID-19 precautions are less likely to be reviewed by the MET team leader during MET/Code Blue call? |    |
| Disagree                                                                | 20 |
| Neither agree, nor disagree                                             | 43.3 |
| Agree                                                                   | 36.7 |
| Do you believe that the treatment of the patients with sCOVID-19/COVID-19 is often delayed during MET/Code Blue calls due to infectious precautions? |    |
| Disagree                                                                | 11.3 |
| Neither agree, nor disagree                                             | 0  |
| Agree                                                                   | 88.7 |
| Do you think that patients with suspected/confirmed COVID-19 often receive inadequate treatment due to infectious precautions comparing to non-COVID-19 patients? |    |
| Disagree                                                                | 21 |
| Neither agree, nor disagree                                             | 40.3 |
| Agree                                                                   | 38.7 |
| Do you think that patients under COVID-19 precautions are more likely to be transferred to ICU after MET/Code Blue calls comparing to non-COVID-19 patients? |    |
| Disagree                                                                | 21.9 |
| Neither agree, nor disagree                                             | 61.3 |
| Agree                                                                   | 16.8 |
| Do you think that patients under COVID-19 precautions are more likely to trigger MET Calls/Code calls for similar problems comparing to non-COVID-19 patients? |    |
| Disagree                                                                | 10.6 |
| Neither agree, nor disagree                                             | 68.4 |
| Agree                                                                   | 21.0 |
| Staff satisfaction with the outcomes of MET/Code calls for patients under COVID-19 precautions comparing to non-COVID-19 patients |    |
| Significantly less likely to be solved during Code-95 calls             | 0  |
| Somewhat less likely to be solved during Code-95 calls                  | 20 |
| Same rate of satisfaction regardless of COVID-19 precautions           | 65.7 |
| More likely to resolve the issue                                      | 8.6 |
| Significantly more likely to resolve the issue                         | 5.7 |
| Code Grey and Black calls                                               |    |
| Do you think that patients under COVID-19 precautions are more often become confused and aggressive comparing to non-COVID-19 patients? |    |
| Strongly disagree                                                      | 0  |
| Disagree                                                                | 0  |
| Neither agree nor disagree                                              | 41.9 |
| Agree                                                                   | 32.6 |
| Strongly agree                                                         | 25.5 |
| Do you think that response to Code Grey/Black for patients under COVID-19 precautions is usually delayed comparing to non-COVID-19 patients? |    |
| Disagree                                                                | 13.9 |
| Neither agree nor disagree                                              | 44.2 |
| Agree                                                                   | 41.9 |
| Do you think that management of an aggressive patient on airborne precautions in the COVID-19 era is more complicated comparing to non-COVID-19 patients? |    |
| Strongly disagree                                                      | 4.7 |
| Disagree                                                                | 2.3 |
| Neither agree nor disagree                                              | 4.7 |
| Agree                                                                   | 30.2 |
| Strongly agree                                                         | 58.1 |
| Senior clinicians and hospital administrators (PSM)                    |    |
| Do you think that you are more likely to be involved in a MET call if it is for a patient on airborne precautions comparing to non-COVID-19 patients? |    |
| Agree                                                                   | 18.2 |
| Neither agree, nor disagree                                             | 51.5 |
| Disagree                                                                | 30.3 |
Personal implications due to Code-95 calls

A total of 86.7% of HCW ($n = 257$) attending Code-95 calls reported anxiety (Fig. 2). More than half of all respondents expressed concerns related to PPE, such as discomfort and potential heat stress. Although the majority was not concerned about their health issues increasing risks for COVID-19, 76% were concerned about spreading the virus to either family members, colleagues or other patients. Overall, most respondents were not concerned about making difficult decisions, such as changing patients’ goals of care and redirection of care.

Secondary outcomes

Staff perception of anxiety based on subgroups is summarised in Table 3. Medical staff were more anxious when compared to nursing staff (93.8% vs 78.5%; $P = 0.002$) when Code-95 calls were activated. Similarly, efferent team members reported being more anxious when compared with afferent team members (92.6% vs 58.8%; $P = 0.021$), with 41% of afferent team members not feeling anxious at all. About 38% of all respondents felt they had no choice in attending Code-95 calls. There was no difference in staff perception of anxiety based on their years of experience, age, comorbidities or mental illness.

HCW with ≤ 5 years’ experience (56.9% vs 37%; $P = 0.003$) and those ≤ 40 years of age (60% vs 32.6%; $P < 0.001$) believed they were more likely to be exposed to COVID-19 when compared to respective more experienced or older counterparts. Younger HCW (≤ 40 years) also believed there were inadequate infection control policies and/or lack of appropriate PPE, compared to older counterparts (64.8% vs 44%; $P = 0.006$). A higher proportion of HCW with one or more comorbidities expressed concerns that their health placed them at higher risk of contracting COVID-19 when compared to HCW without comorbidities (48.6% vs 8.8%; $P = 0.0001$). Similarly, HCW with mental illness had reservations about attending Code-95 calls in comparison to those without mental illness (31.6% vs 16.8%; $P = 0.047$). Furthermore, approximately 10% of efferent team members with chronic disease or mental illness said they would likely ask their colleagues to attend Code-95 calls due to concerns about their health. A higher proportion of efferent team members believed there were deficiencies in infection-control policies and PPE when compared to the afferent team (57.4% vs 29.4%; $P = 0.017$). Significantly more nursing HCW expressed concerns about their health issues increasing risks for contracting COVID-19 (23.9% vs 12.5%; $P = 0.02$). A higher proportion of medical staff believed they lacked essential elements of PPE (70.1% vs 37.3%; $P = 0.001$) and PPE was poorly organised (61.5% vs 48.2%; $P = 0.04$) when compared to nursing counterparts. Although more nurses experienced discomfort and potential heat stress due to donning PPE for a long duration than medical staff, it was not statistically significant (57.3% vs 42.7%; $P = 0.15$).

Post-hoc analysis comparing HCW with and without Code-95 MET experience

A total of 137 HCW reported having attended Code-95 MET calls. They were more likely to be ≤ 40 years of age (60.6% vs 36.7%; $P < 0.001$), with ≤ 5 years’ experience (54% vs 33.1%; $P = 0.002$) and report anxiety (77.4% vs 50.4%; $P < 0.001$) (Table 4).
believed that infection precautions compromised timely care delivery.

HCW caring for COVID-19 patients experience significant psychological stress. A survey, early in the pandemic showed 71% of HCW were anxious of becoming exposed to the SARS-CoV-2 virus. COVID-19 has been reported to be associated with psychological stress amongst HCW and burnout. Our survey found that
more than 85% HCW attending Code-95 calls reported anxiety, with medical staff reporting higher levels of stress compared to other HCW. Rapidly evolving and unfamiliar practice environments with high workload, ethical dilemmas, uncertainty, and stigmatisation are likely to contribute to psychological stress.10,11 Anxiety surrounding attending Code-95 calls was more pronounced in HCW who had medical comorbidities or mental illness. We also observed positive correlations between respondents’ comorbidities and reported anxiety when attending Code-95 calls. This is not surprising as older age and comorbidities are risk factors for more severe clinical course of COVID-19.12

Respondents’ reported fear of contracting COVID-19 infection during work and spreading to family members was no different to previously published data.13,14 HCW concerns are justified as more than 70% of the total COVID-19 cases in HCW (3408) in Victoria were acquired in a healthcare setting.15 It is however difficult to differentiate reported anxiety related to the pre-warning Code-95 calls or to attending patients in the current COVID-19 climate.

Our survey was related to all Code-95 calls. We have used MET calls as an example. For instance, it is possible that anaesthetists may have participated in Code Blue Code-95 calls; and PSA, and floor nurses in AMT Code-95 calls. Our survey found that HCW who attended MET Code-95 calls were more likely to report being anxious. A possible explanation for this could be that this is related to recollection of their previous Code-95 RRC experience.

Efferent team members who attended deteriorating patients more frequently reported anxiety. Beside afferent team members less frequently reported anxiety when escalating Code-95 calls. This is probably because the afferent teams have habituated to a patient over time,16 whereas the efferent teams are likely to be encountering the patient for the first time at the call.2 There were notable differences in perceived adequacy of infection control policies and procedures between efferent and afferent teams. Although afferent teams believed that infection-control policies and procedures were adequate, efferent teams reported gaps that needed to be addressed. This may be related to afferent teams working in known and familiar environments when compared to the efferent teams.

In keeping with published literature,11,17 our survey demonstrated that a high proportion of nurses who spend long hours donned in full PPE reported experiencing physical and psychological distress. The potential for impaired cognitive and executive functioning by members of the RRT and/or AMT while undertaking critical care procedures in full PPE, while feeling highly anxious about cross-infection risk cannot be ignored.18
Our survey identified concerns related to gaps in processes, training, education and infection-control policies \(^{17,19}\) with Code-95 calls. It will be important to develop quality metrics to assess whether addressing these results in reduced HCW anxiety and infections.

There were several limitations that need to be acknowledged. First, the online survey was conducted over a short timeframe and longitudinal alterations in perception are unknown. \(^{20}\) Second, the survey was conducted at a single institution without a clearly defined probabilistic population sample along with a low response rate may limit

| Table 4 Post-hoc analysis comparing HCW with and without Code-95 MET experience |
|---------------------------------|---------------------------------|---------------------------------|-------------------|
|                                 | HCW with no RRC experience, n (%) | HCW with RRC experience, n (%) | P-value           |
| Experience in current role (years) |                                 |                                 |                   |
| <1                              | 13 (9.4)                         | 15 (10.9)                       | 0.002             |
| 1–5                             | 33 (23.7)                        | 59 (43.1)                       |                   |
| 5–10                            | 23 (16.5)                        | 22 (16.1)                       |                   |
| >10                             | 70 (50.4)                        | 41 (29.9)                       |                   |
| Age group (years)               |                                 |                                 |                   |
| <30                             | 28 (20.1)                        | 39 (28.5)                       | <0.001†          |
| 31–40                           | 23 (16.6)                        | 44 (32.1)                       |                   |
| 41–50                           | 46 (33.1)                        | 20 (14.6)                       |                   |
| 51–60                           | 32 (23.0)                        | 26 (18.9)                       |                   |
| >60                             | 7 (5.0)                          | 8 (5.8)                         |                   |
| Preferred not to answer         | 3 (2.2)                          | 0 (0)                           |                   |
| Gender                          |                                 |                                 |                   |
| Female                          | 93 (66.9)                        | 83 (60.6)                       | 0.48†             |
| No. comorbidities               |                                 |                                 |                   |
| 0                               | 114 (82.0)                       | 114 (83.2)                      | >0.99†            |
| 1                               | 20 (14.4)                        | 19 (13.9)                       |                   |
| ≥2                              | 3 (2.2)                          | 3 (2.2)                         |                   |
| Preferred not to answer         | 2 (1.4)                          | 1 (0.7)                         |                   |
| Mental illness                  |                                 |                                 |                   |
| No                              | 121 (87.0)                       | 119 (86.9)                      | 0.96†             |
| Yes                             | 13 (9.4)                         | 14 (10.2)                       |                   |
| Preferred not to answer         | 5 (3.6)                          | 4 (2.9)                         |                   |
| Current smoker                  |                                 |                                 |                   |
| No                              | 131 (94.3)                       | 130 (94.9)                      | 0.83†             |
| Yes                             | 7 (5.0)                          | 5 (3.7)                         |                   |
| Preferred not to answer         | 1 (0.7)                          | 2 (1.4)                         |                   |
| What statement best describes your feeling when you realise that you need to attend MET/Code call for patients under COVID-19 precautions? | | |                   |
| Not at all                      | 9 (6.5)                          | 25 (18.2)                       | <0.001†          |
| Anxious sometimes               | 45 (32.8)                        | 83 (60.6)                       |                   |
| Significantly anxious           | 30 (21.6)                        | 23 (16.8)                       |                   |
| Preferred not to answer         | 18 (12.9)                        | 6 (4.4)                         |                   |
| Not applicable                  | 37 (26.6)                        | 0 (0)                           |                   |
| HCW reasons for being anxious, median Likert score (IQR) | | |                   |
| About inadequate infection control, lack of PPE, inadequate policies | 4 (2)                           | 4 (1)                           | 0.85              |
| About inadequate training       | 3 (2)                            | 3 (2)                           | 0.92              |
| About personal poor health condition increasing risk of severe COVID-19 infection | 1.5 (2)                          | 1 (2)                           | 0.35              |
| About spreading infection to family, colleagues, other patients | 4 (1)                            | 4 (1)                           | 0.10              |
| About inability to provide adequate care to patients due to COVID-19 precautions | 3 (1)                            | 4 (1)                           | 0.52              |
| About making difficult patient decisions | 3 (2)                            | 3 (2)                           | 0.83              |
| About interdisciplinary communication issues | 3 (2)                            | 4 (4)                           | 0.22              |
| About discomfort and potential heat stress caused by wearing PPE for a long time | 4 (2)                            | 3 (3)                           | 0.22              |

†Fisher's test. COVID-19, coronavirus disease 2019; HCW, healthcare worker; PPE, personal protective equipment; RRC, rapid response calls.
generalisability of our results. However, psychosocial stress contributing to staff absenteeism\(^3\) and hospital outbreak associated furlough of over 700 HCW may have underestimated the respective response rates of 40% (efferent) and 15% (afferent). Third and inherent to any survey, there may be selection bias in respondent sampling. Perceived negativity over the outbreak management could have potentially influenced the responses and reactive comments. Cognitive biases such as overconfidence in the older and more experienced group of clinicians also cannot be excluded. The timing of the survey coincided with a major SARS-CoV-2 virus outbreak in the hospital that resulted in many HCW being infected or furloughed\(^22\)\(^,\)\(^23\) and this could have influenced responses. Finally, the survey was not balanced between different subgroups as half of all respondents reported never attending a Code-95 RRC and three-quarters had not attended Code Blue calls for patients on airborne precautions.

**Conclusions**

Most surveyed HCW supported Code-95-labelled announcements pre-warming them of required airborne precautions when attending a RRC. Such calls may be an additional useful safety function for organisations to pre-warn HCW attending to patients that pose high infectious risk. However, the majority of HCW reported anxiety when attending these calls. Medical and efferent team HCW perceived greater anxiety compared to nursing and afferent team HCW. Results of this survey should be of interest to hospital administrators and policymakers to help refine existing RRC practices. We believe Code-95 calls should be considered for utilisation by healthcare organisations to support and protect HCW responding to deteriorating patients with COVID-19 and other respiratory infections who are under airborne precautions.

**References**

1. Devita MA, Bellomo R, Hillman K, Kellum J, Rotondi A, Teres D et al. Findings of the first consensus conference on medical emergency teams. *Crit Care Med* 2006; 34: 2463–78.
2. Subramaniam A, Botha J, Turvoiopoiti R. The limitations in implementing and operating a rapid response system. *Intern Med J* 2016; 46: 1139–45.
3. A-CMdJ, Jones D, Drennan K, Hart GK, Bellomo R, Web SA. Rapid response team composition, resourcing and calling criteria in Australia. *Resuscitation* 2012; 83: 563–7.
4. Joint College of Intensive Care Medicine and Australian and New Zealand Intensive Care Society Special Interest Group on Rapid Response Systems; ANZICS Centre for Outcome and Resource Evaluation. Resource use, governance and case load of rapid response teams in Australia and New Zealand in 2014. *Crit Care Resusc* 2016; 18: 275–82.
5. Statement from the Premier. 2020 [cited 2020 Sep 16]. Available from URL: https://www.dhhs.vic.gov.au/updates/coronavirus-covid-19/statement-premier
6. Recommendations for Rapid Response Teams (RRTs) and Critical Care Outreach (CCO) services in the context of the COVID-19 pandemic. 2020 [cited 2020 Sep 16]. Available from URL: http://rapidresponsesystems.org/wp-content/uploads/2020/03/RRT_and_CCO_COVID-19_Version_1.pdf
7. IBM Corp. IBM SPSS Statistics for Windows. Version 26.0. Armonk, NY: IBM Corp.; 2019.
8. Lai J, Ma S, Wang Y, Cai Z, Hu J, Wei N et al. Factors associated with mental health outcomes among health care workers exposed to coronavirus disease 2019. *JAMA Netw Open* 2020; 3: e203976.
9. Matsuo T, Kobayashi D, Taki F, Sakamoto F, Uehara Y, Mori N et al. Prevalence of health care worker burnout during the coronavirus disease 2019 (COVID-19) pandemic in Japan. *JAMA Netw Open* 2020; 3: e2017271.
10. Shanaileft T, Ripp J, Trockel M. Understanding and addressing sources of anxiety among health care professionals during the COVID-19 pandemic. *JAMA* 2020; 323: 2133–4.
11. Shaukat N, Ali DM, Razzak J. Physical and mental health impacts of COVID-19 on healthcare workers: a scoping review. *Int J Emerg Med* 2020; 13: 40.
12. Yang X, Yu Y, Xu J, Shu H, Xia J, Liu H et al. Clinical course and outcomes of critically ill patients with SARS-CoV-2 pneumonia in Wuhan, China: a single-centered, retrospective, observational study. *Lancet Respir Med* 2020; 8: 473–81.
13. Khasnet RWDB, Mahajan HC, Kuikarni AP. Burnout among healthcare workers during COVID-19 pandemic in India: results of a questionnaire-based survey. *Indian J Crit Care Med* 2020; 24: 664–71.
14. Society of Critical Care Medicine COVID-19 Rapid Cycle Survey Work Group. SCCM COVID-19 rapid-cycle survey 2 report. *Soc Crit Care Med* 2020; 1–8. https://sccm.org/getattachment/ Blog/May-2020/SCCM-COVID-19-Rapid-Cycle-Survey-2-Report/COVID19-Clinicians-Are-Stressed-Rapid-Assessment.pdf?lang=en-US.
15. Victoria State Government, Health and Human Services. Victorian healthcare worker coronavirus (COVID-19) data. DHHS, 2020 [cited 2020 Sep 19]. Available from URL: https://www.dhhs.vic.gov.au/victorian-healthcare-worker-covid-19-data
16. Chalwin R, Giles L, Salter A, Kapitola K, Karnon J. Re-designing a rapid response system: effect on staff experiences and perceptions of rapid response team calls. *BMC Health Serv Res* 2020; 20: 480.
17. Liu Q, Luo D, Haase JE, Guo Q, Wang XQ, Liu S et al. The experiences of health-care providers during the COVID-19 crisis in China: a qualitative study. *Lancet Glob Health* 2020; 8: e790–e798.
18. Walton M, Murray E, Christian MD. Mental health care for medical staff and affiliated healthcare workers during the COVID-19 pandemic. *Eur Heart J Acute Cardiovasc Care* 2020; 9: 241–7.
19. Speroni KG, Selbert DJ, Nurses MRK. Perceptions on Ebola care in the United States, part 2: A qualitative analysis. *J Nurs Adm* 2015; 45: 544–50.
Supporting Information

Additional supporting information may be found in the online version of this article at the publisher’s web-site:

Appendix S1. The survey.
Figure S1 COVID-19 MET and Code Blue team roles.