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Perspective of emergency medical services (EMS) professionals on changes in resources, cardiac arrest care and burnout in Texas during the COVID-19 pandemic

Beyond traditional obstacles associated with providing care in the prehospital setting, EMS clinicians now face a novel series of challenges resulting from the SARS-CoV-2 (COVID-19) pandemic [1,2]. Resource constraints and concern regarding risks associated with aerosolizing procedures resulted in rapidly changing protocols [3-5]. Out-of-hospital cardiac arrest (OHCA) activations increased substantially and survival outcomes worsened [3,6-11]. Collectively, these new strains on EMS clinicians have led to increased burnout and potential for attrition [12-16]. Understanding how prehospital care practices and EMS professional well-being have been affected by the COVID-19 pandemic is important to mitigate negative patient outcomes and improve workforce well-being and stability. The objective of this study was to assess how the COVID-19 pandemic affected EMS clinicians in the state of Texas through structural factors (resource availability, operational protocols), process measures (clinical care, prehospital time intervals) and wellness (burnout).

In this cross-sectional study we surveyed all licensed EMS providers in Texas who provided patient care during the beginning of the COVID-19 pandemic (April 2020–June 2020). We excluded those who did not provide care during this timeframe and those younger than 18 years. The authors developed survey items designed to assess EMS clinicians’ perceptions of resource availability and the influence on patient care, changes in prehospital time intervals, process measures (clinical care, prehospital time intervals) and wellness (burnout).

There were 72,567 licensed EMS professionals on the list provided by Texas Department of State Health Services. Of these, 11,488 were excluded because of incomplete or invalid email addresses. Responses were collected from February 15 to March 10, 2022. Out of the 61,079 invited EMS clinicians, completed surveys were received from 1924 (3%) clinicians. We excluded 245 participants who did not provide care during the initial pandemic, for an analysis sample of 1675 EMS providers (Fig. 1). Half of participants were between the ages of 30–49 years of age and 70% were male. Most (79%) identified as white and 80% identified as non-Hispanic. Survey respondents reported a median 13 years (IQR 6–22 years) of EMS experience and 62% were paramedics (Table 1).

With regards to PPE, during the beginning of the pandemic (April – June 2020), 50% of respondents reported that shortages of N95 masks affected their ability to provide patient care. Nearly three-fourths (71%) of EMS professionals reused N95 masks during the initial period of the pandemic, followed by 45% who reused surgical masks. Within the three months preceding the survey (December 2021 – February 2022), approximately one-third of providers were still reusing N95 masks (39%) or surgical masks (31%). More than 60% of respondents reported that a lack of ambulance availability influenced patient care (Table 2). Most respondents reported an increase in wall times (68%) and return to service time (74%) in addition to increased call volume (63%) (Table 3).

With regards to practice changes during the pandemic, most EMS clinicians (78%) reported their employer either provided modified protocols or specific training for care of patients with COVID-19. For OHCA care, compared to before the pandemic, 11% of respondents reported decreased likelihood of continuing a resuscitation during the pandemic. Over 20% reported an increased likelihood of terminating resuscitation in the field during COVID-19. Only 17% reported being less likely to perform intubation in the field during the pandemic (Table 4). As for workforce well-being, most participants reported feeling burdened by the pandemic-related shortage of work colleagues...
### Table 1
Provider characteristics.

| Age (Years), n (%) | N = 1675 |
|--------------------|----------|
| 18–29              | 315 (18.8%) |
| 30–39              | 441 (26.3%) |
| 40–49              | 392 (23.4%) |
| 50–59              | 256 (15.3%) |
| 60+                | 84 (5.0%) |
| Missing            | 187 (11.2%) |

| Gender, n (%)     | N = 1675 |
|-------------------|----------|
| Male              | 1178 (70.3%) |
| Female            | 301 (18.0%) |
| Other             | 5 (0.3%) |
| Missing           | 191 (11.4%) |

| Race, n (%)       | N = 1675 |
|-------------------|----------|
| White             | 1322 (78.9%) |
| Black             | 16 (1.0%) |
| American Indian / Alaskan Native | 25 (1.5%) |
| Asian / Pacific Islander | 85 (5.1%) |
| Multi-racial / Other | 204 (12.2%) |
| Missing           | 215 (12.8%) |

| Ethnicity, n (%)  | N = 1418; Missing = 257 |
|-------------------|--------------------------|
| Non-Hispanic      | 1189 (80.0%) |
| Hispanic          | 271 (16.2%) |
| Missing           | 215 (12.8%) |

| Median Years of EMS Experience, IQR | 13 (6–22) |

| Highest Level of EMS Training, n (%) | N = 1675 |
|-------------------------------------|----------|
| Paramedic                           | 1039 (62.1%) |
| Advanced EMT                        | 83 (5.0%) |
| EMT-Basic                           | 338 (20.2%) |
| Emergency Care Attendant (ECA)      | 18 (1.1%) |
| Other                               | 8 (0.5%) |
| Missing                             | 189 (11.3%) |

| Highest Level of Education, n (%)   | N = 1675 |
|-------------------------------------|----------|
| High School / GED                   | 85 (5.1%) |
| Some College                        | 587 (35.0%) |
| College Graduate                    | 689 (41.1%) |
| Master’s Degree or Higher           | 124 (7.4%) |
| Missing                             | 190 (11.3%) |

|EMS Agency Location Type, n (%)      | N = 1675 |
|-------------------------------------|----------|
| Rural Area                          | 291 (17.4%) |
| Small city or town                  | 309 (18.5%) |
| Suburb near a large city            | 400 (23.9%) |
| Large City                          | 485 (29.0%) |
| Missing                             | 190 (11.3%) |

### Table 2
Provider Resources.

| At the beginning of the COVID-19 pandemic (April–June 2020), changes in availability of the following resources affected my ability to provide the same level of patient care as before the pandemic, n (%) | N = 1675 |
|-------------------------------------------------------------------------------------------------|----------|
| N95 Masks                                                                                       | 843 (50.3%) |
| Surgical Masks                                                                                  | 452 (27.0%) |
| Gowns                                                                                           | 409 (29.8%) |
| Gloves                                                                                          | 375 (22.4%) |
| Cleaning Products                                                                               | 611 (36.5%) |
| None                                                                                           | 531 (31.7%) |

| At the beginning of the COVID-19 pandemic (April–June 2020), please indicate whether you reused each of the following items, n (%) | N = 1675 |
|-----------------------------------------------------------------------------------------------------------------|----------|
| N95 Masks                                                                                                      | 1196 (71.4%) |
| Surgical Masks                                                                                                 | 756 (45.1%) |
| Gowns                                                                                                          | 214 (12.8%) |
| Gloves                                                                                                         | 59 (3.5%) |
| None                                                                                                           | 252 (15.0%) |

| Within the last three months, please indicate whether you reused each of the following items, n (%) | N = 1675 |
|-------------------------------------------------------------------------------------------------|----------|
| N95 Masks                                                                                       | 658 (39.3%) |
| Surgical Masks                                                                                  | 513 (30.6%) |
| Gowns                                                                                           | 51 (3.0%) |
| Gloves                                                                                          | 33 (2.0%) |
| None                                                                                             | 666 (39.8%) |

(continued on next page)
During the first three months of the COVID-19 pandemic (April – June 2020), how often did shortage of the following resources affect your ability to provide patient care?, n (%)  

| Resource                          | Always / Almost Always | Often | Sometimes | Never / Almost Never |
|-----------------------------------|------------------------|-------|-----------|---------------------|
| Oxygen (Missing = 225; 13.4%)     | 38 (2.3%)              | 97 (5.8%) | 220 (13.1%) | 1095 (65.4%)        |
| Airway Equipment (Missing = 222; 13.3%) | 40 (2.4%)              | 124 (7.4%) | 285 (17.0%) | 1004 (59.9%)        |
| EMS Units (Missing = 208; 12.4%)  | 230 (13.7%)            | 359 (21.4%) | 428 (25.6%) | 450 (26.9%)         |

Table 4  
Provider Practice Variation.  
During the beginning of the pandemic (April – June 2020), on average, how did the following change in your system?, n (%)  

| Change                                    | Increased | No Change | Decreased |
|-------------------------------------------|-----------|-----------|-----------|
| My employer provided specific training or modified protocols for care of COVID-19 patients during the first three months of the COVID-19 pandemic (April – June 2020) | Yes | 1305 (77.9%) | No | 169 (10.1%) | Missing | 201 (12.0%) |
| Compared to before the pandemic to now, my likelihood of continuing a “code” or cardiac arrest case has increased | 126 (7.5%) | No change | 1172 (70.0%) | Decreased | 184 (11.0%) | Missing | 193 (11.6%) |
| Compared to before the pandemic, how much more likely are you to terminate resuscitations in the field? Much more likely or somewhat more likely | 354 (21.3%) | Neither more likely nor less likely | 1085 (64.8%) | Somewhat less likely or much less likely | 38 (12.3%) | Missing | 198 (11.8%) |
| Compared to before the pandemic, how much more likely are you to intubate in the field? Much more likely or somewhat more likely | 225 (15.3%) | Neither more likely nor less likely | 961 (57.4%) | Somewhat less likely or much less likely | 283 (16.9%) | Missing | 206 (12.3%) |

Table 5  
Provider Burnout.  
I am burdened by the pandemic-related shortage of colleagues/staff at work, n (%)  

| Disagree or Strongly Disagree | 355 (21.2%) |
| Agree or Strongly Agree       | 1114 (66.5%) |
| Missing                       | 206 (12.3%) |

On a scale of 1 to 10, with 1 being the best and 10 being the worst, rate your level of burnout, median (IQR)  

| Disagree or Strongly Disagree | 251 (14.0%) |
| Agree or Strongly Agree       | 1223 (73%)  |
| Missing                       | 201 (12.0%) |

(67%) and increased workload (73%) (Table 5). Over half of respondents had the highest levels of self-reported burnout (7–10: 53%), followed by 27% of providers endorsing moderate (4–6) levels of burnout (Fig. 2). In this statewide survey of the effects of COVID-19 in EMS, we identified important changes in prehospital practice, resource shortages that influenced patient care, and a high rate of occupational burnout. The
influence of changes in prehospital care delivery on patient outcomes warrant further exploration, while the potential for burnout among EMS clinicians to lead to additional workforce shortages is concerning. While some pandemic-related effects were reported more frequently during the initial phase of the pandemic, others, including shortages of key PPE items continue for a substantial proportion of EMS clinicians. Collectively, the findings of this study may serve to inform initiatives to improve the safety and well-being of patients and EMS clinicians.

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Summer Chavez: Writing – review & editing. Writing – original draft, Formal analysis, Data curation, Conceptualization. Remle Crowe: Writing – review & editing. Writing – original draft, Formal analysis, Data curation, Conceptualization. Ryan Huebinger: Writing – review & editing, Writing – original draft. Normandy Villa: Writing – review & editing, Writing – original draft, Data curation. Micah Panczyk: Writing – review & editing, Writing – original draft. Jeff Jarvis: Writing – review & editing, Writing – original draft, Data curation. Bentley Bobrow: Writing – review & editing, Writing – original draft, Conceptualization.

Declaration of Competing Interest
None.

Appendix A. Supplementary data
Supplementary data to this article can be found online at http://doi.org/10.1016/j.ajem.2022.08.028.

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