



Populational Perceptions Regarding Decision to Visit the Emergency Room with Chest Pain During COVID-19

Jason J. Han · William L. Patrick · Akhil Rao · Benjamin Smood · Mark Helmers · Amit Iyengar · John J. Kelly · Saiesh Kalva · Pavan Atluri · Nimesh Desai · Marisa Cevasco

Received: December 7, 2021 / Accepted: March 1, 2022 / Published online: March 22, 2022
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ABSTRACT

Introduction: A significant decrease in emergency presentations of acute cardiac conditions has been observed during the COVID-19 pandemic. We aimed to understand perceptions that influence people's decisions whether to present to the emergency department (ED) with symptoms related to acute cardiovascular events to inform necessary medical communication.

Jason J. Han and William L. Patrick are co-first authors.

Supplementary Information The online version contains supplementary material available at <https://doi.org/10.1007/s40119-022-00259-5>.

J. J. Han · W. L. Patrick · A. Rao · B. Smood · M. Helmers · A. Iyengar · J. J. Kelly · S. Kalva · P. Atluri · N. Desai · M. Cevasco
Division of Cardiovascular Surgery, Department of Surgery, Perelman School of Medicine, University of Pennsylvania, Philadelphia, PA, USA

W. L. Patrick · N. Desai
Leonard Davis Institute, University of Pennsylvania, Philadelphia, PA, USA

W. L. Patrick · N. Desai
Penn Cardiovascular Outcomes, Quality, and Evaluative Research Center, Philadelphia, PA, USA

M. Cevasco (✉)
Division of Cardiovascular Surgery, Hospital of the University of Pennsylvania, 3400 Spruce St, 6 Silverstein Pavilion, Philadelphia, PA, USA
e-mail: Marisa.Cevasco@uphs.upenn.edu

Methods: We recruited users of Amazon Mechanical Turk (Seattle, WA) to participate in a survey to elucidate perceptions of COVID-19 risk associated with a visit to the ED. A conjoint analysis was designed based on commonly reported factors associated with people's decisions to present to the ED during the pandemic to calculate preference utilities.

Results: After exclusions, 1003 participants completed the survey between 12/5/2020 and 12/6/2020. Participants ranked the perceived risk of contracting COVID-19 at the ED as one of the highest, only second to that at bars and restaurants. Only 68% (685/1003) were willing to present to the ED immediately with severe chest pain. Fear of further transmitting the virus to loved ones was the most frequently cited reason for not presenting. Conjoint analysis demonstrated severe chest pain to be the dominant factor in the decision to present to the ED. **Conclusions:** The risk of contracting COVID-19 while presenting to the ED for a life-threatening cardiovascular symptom is overestimated and is strongly affected by social factors.

Keywords: COVID-19; Risk aversion; Cardiovascular emergency; Chest pain; Communication

Key Summary Points

There has been a significant decrease in emergency presentations of acute cardiac conditions.

This study aimed to understand perceptions that influence people's decision to present to the emergency department (ED) with symptoms related to acute cardiovascular events.

The study recruited users of Amazon Mechanical Turk to participate in a survey.

Risk of contracting COVID-19 while presenting to the ED for a life-threatening cardiovascular symptom is overestimated.

INTRODUCTION

The world is witnessing a tremendous surge in the number of hospitalizations and deaths related to the coronavirus (COVID-19) pandemic. While promising treatment modalities and vaccines are underway, significant mortality and morbidity are still expected to be observed for the foreseeable future. In addition to its direct pathologic effects, the COVID-19 pandemic has led to many downstream ramifications regarding people's other physical, psychological and economic well-being, which is a phenomenon that has been observed in prior crises of similar scale [1]. According to the US Department of Health and Human Services, emergency department (ED) visits in the United States decreased significantly during the pandemic [2, 3]. Notably, in New York, the volume of ED visits underwent a greater than 60% decline during the height of the early surge in the spring of 2020. The reasons behind this observation are presumed to be multifactorial and are incompletely understood, but it is likely in part due to perceived risk of contracting COVID-19 from visiting the ED and potentially

becoming hospitalized. Within the cardiovascular domain, this has correlated with a notable decline in patient presentations for acute conditions such as ST-segment elevation myocardial infarction (38%) and type A aortic dissections (77%) [4–6]. This is concerning because timely revascularization and surgical repair are the standard of care for these respective disease processes, and sequelae of delay in recognition and treatment can be fatal. Early signs of potentially harmful effects of COVID-19-related interruption of longitudinal care have also been noted in heart failure populations [7, 8].

Understanding the interplay between perceived risk of COVID-19 and decision to present to the ED with symptoms associated with serious cardiovascular conditions may help inform public health officials and healthcare providers about the types of fears and concerns that need to be addressed with patients to minimize collateral morbidity from COVID-19. This survey aimed to understand the salient factors which comprise this decision within a large, nationally representative sample, utilizing Likert scale-based questions and choice-based conjoint analysis.

METHODS

Survey Design

A 24-question survey was created using an electronic survey platform (Qualtrics, Raleigh, NC) (Supplementary Material). The survey was prefaced with a description of the study purpose and orienting facts regarding the decrease in emergency room visits associated with COVID-19. A screening question was used to determine whether participants understood the study scenario. Participants who answered incorrectly were excluded. Demographic information including age, ethnicity, income, and education was obtained. Perception of baseline tendency to present to the ED for possible medical emergencies in the absence of COVID-19 was assessed using a five-point Likert scale. Perception of COVID-19 transmission risk associated with different environments, including medical

environments such as the intensive care unit and ED, was assessed. Participants were asked to consider several symptoms commonly associated with cardiovascular emergencies (e.g., chest pain, abdominal pain, back pain, and shortness of breath) and whether concerns regarding COVID-19 would delay their presentation to the ED given each. Using a five-point Likert scale, participants were then asked to assess the degree to which different fears associated with COVID-19 would delay their presentation to the ED (e.g., “I fear being close to people in the emergency room who have COVID-19” or “I fear I will become severely ill with COVID-19”).

Participants were then directed to participate in a discrete choice experiment in order to facilitate a conjoint analysis. This methodology

is optimal for understanding how individuals choose between scenarios when multiple features of each scenario simultaneously vary across two or more levels. In this study, participants were asked to evaluate six hypothetical scenarios. The scenarios were described by four features which could take two levels each (Table 1). The attribute “how bad is my chest pain” was selected because chest pain is a symptom common to many cardiovascular emergencies. The remaining attributes were selected because they represent common concerns expressed by the authors’ patients. The levels of each attribute were selected based on medical severity or plausible risk based on emerging literature.

Scenarios were presented two at a time and participants asked to choose the scenario in which they were most likely to present to the ED (Supplementary Material). Any level of one feature could be shown with any level of another feature—there were no exclusion parameters. This was repeated two more times with different pairs of scenarios using a fractional factorial design. This was done so that individual participants were not tasked with evaluating every possible combination of level across the four attributes, leading to cognitive fatigue. This is achieved in aggregate by the fractional factorial design. In doing so, Qualtrics uses a randomized balanced design such that each level is chosen randomly and presented an approximately equal number of times. The Qualtrics algorithm ensures that an adequate number of responses are recorded for each unique comparison so long as the total number of participants is adequately large to power this design.

Table 1 Features and levels of conjoint analysis

Feature	Level 1	Level 2
How bad is my chest pain?	Moderate (painful but not crushing)	Severe (crushing)
What is the COVID-19 census in the emergency room?	One in ten patients (10%) is COVID-19-positive	One in four patients (25%) is COVID-positive
Your risk of becoming severely ill or dying from COVID-19?	Low (1%)	High (> 10%)
You live with people who are elderly or who have medical condition that place them at high risk of becoming severely ill or dying from COVID-19	Yes	No

Enrollment

Participants were recruited through Amazon Mechanical Turk (MTurk)—a well-established crowdsourcing platform that has been utilized across many different patient populations in the past with varying degrees of generalizability [9, 10]. Members of this community were offered \$0.30 in return for completion of the survey. Explicit consent was given by each. The

minimum number of participants required to draw conclusions from a conjoint analysis of four attributes with a maximum of two levels each using a multiplier of 1000 is 250 [11]. Enrollment was constrained to 1200 individuals for budgetary considerations. Enrollment opened at 12:00 PM on 12/5/2020 and closed at 12:00 PM on 12/6/2020. IRB approval was obtained after initial release of the survey. Because the study entailed voluntary enrollment of anonymous subjects regarding hypothetical scenarios, the proposal was considered under the “exempt” category. Written consent was obtained in the form of participants “agreeing to proceed” after being provided the terms of participation in the survey.

Statistical Analysis

All baseline characteristics were summarized with descriptive statistics. Categorical characteristics were reported as a number and percentage. Continuous characteristics were reported as mean \pm standard deviation if normally distributed or median with interquartile range if not normally distributed. In order to determine demographic characteristics associated with willingness to present to the emergency room, a multivariable logistic regression was created in which the outcome variable was willingness to present to the emergency room “right away” upon experiencing severe chest pain. Variables were chosen from all baseline characteristics using stepwise Akaike information criterion selection (“blorr” package). Residual assessment was performed using normalized residual to confirm absence of outliers, defined as greater than three standard deviations from the mean (“pscl package”) (Supplementary Fig. 1). A goodness of fit test was performed using a Chi-square test. Regression analysis was performed using R version 4.0.3.

Preferences were analyzed using the proprietary conjoint analysis service of Qualtrics. This service utilizes a Bayesian hierarchical multinomial logistic regression model to calculate individual preference utilities. This is performed using STAN statistical software [12]. The output of this model is a partworth utility score ranging

from -5 to $+5$ for each participant for each level of an attribute. This score can be used to calculate a variety of metrics. Feature importance is a metric that describes the amount of influence a feature has in the decision to select one scenario over another. Qualtrics calculates feature importance by determining the distance between the worst and best levels of each feature. In this case there are only two levels for each feature. The further apart these levels are, the more polar the feature is in driving choice of scenario. Average utility score is the average partworth score of each attribute level across the entire population. Because the partworth scores are ordinal, an average utility score denotes relative preference for a feature level compared to other feature levels as well as the directionality of preference.

RESULTS

During the enrollment period, 1111 participants completed the survey. After eliminating those who did not meet the test criteria for comprehension, 1003 (90.3%) were included in the analysis. Of the whole, 29.5% ($n = 296$) were between 18 and 29 years of age, 47.2% ($n = 473$) were between 30 and 49, and 23.3% ($n = 234$) were older than 50. The sample was 68.2% ($n = 684$) White, 14.6% ($n = 146$) Asian or Pacific Islander, 6.6% ($n = 66$) Black, and 6.5% ($n = 65$) Hispanic. The cohort was highly educated, with 47.1% ($n = 472$) having a bachelor’s degree and 18.9% ($n = 190$) having a master’s or more advanced degree. Many were employed for wages (62.0%, $n = 622$), while 9.4% ($n = 94$) were not, with 76.3% ($n = 765$) of participants having an average annual income below \$100,000. Of the total, 21.9% ($n = 220$) stated their occupation as within healthcare. Many reported having been admitted to the hospital in the last 5 years for any reason (41.8%, $n = 419$), or having condition(s) that predispose to higher risk of dying from COVID-19 (31.4%, $n = 315$). Many had a friend or a family member admitted to the hospital (43.0%, $n = 431$) or who died from COVID-19 (27.8%, $n = 279$) (Table 2).

Table 2 Baseline characteristics of participants

Variable	Overall	> 50 years old
Number, <i>n</i> (%)	1003	251
Age (30–49)	473 (47.16)	251 (25.03)
White, <i>n</i> (%)	684 (68.20)	222 (88.45)
African American or Black, <i>n</i> (%)	66 (6.58)	7 (2.79)
Asian or Pacific Islander, <i>n</i> (%)	146 (14.56)	9 (3.59)
Education, (%)		
No schooling completed	2 (0.20)	1 (0.40)
Some high school, no diploma	11 (1.10)	1 (0.40)
High school graduate or GED	94 (9.37)	27 (10.8)
Some college credit, no degree	138 (13.76)	32 (12.75)
Trade/technical/vocational training	27 (2.69)	8 (3.19)
Associate degree	69 (6.88)	26 (10.36)
Bachelor's degree	472 (47.06)	103 (41.04)
Master's degree	190 (18.94)	53 (21.12)
Employment, <i>n</i> (%)		
Self-employed	182 (18.15)	37 (14.74)
Employed for wages	622 (62.01)	135 (53.79)
Out of work and looking for work	58 (5.78)	7 (2.79)
Out of work but not currently looking for work	23 (2.29)	5 (1.99)
Homemaker	51 (5.08)	7 (2.79)
Military	2 (0.20)	1 (0.40)
Retired	52 (5.18)	55 (21.91)
Unable to work	13 (1.30)	4 (1.59)

Table 2 continued

Variable	Overall	> 50 years old
Income, <i>n</i> (%)		
Under \$40,000	308 (30.71)	77 (30.68)
\$40,000–99,000	457 (45.56)	107 (42.63)
\$100,000–149,999	138 (13.76)	41 (16.34)
\$150,000–250,000	63 (6.28)	16 (6.38)
\$250,000 or more	16 (1.60)	2 (0.80)
No response	21 (2.09)	8 (3.19)
Marital status, <i>n</i> (%)		
Single, never married	380 (37.89)	36 (14.34)
Married or domestic partnership	531 (52.94)	160 (63.75)
Widowed	16 (1.60)	13 (5.18)
Divorced	61 (6.08)	38 (5.14)
Separated	15 (1.50)	4 (1.59)
Miscellaneous		
I consider myself a religious person [1, 7]	3.61 (2.18)	4.60 (2.10)
Admitted to hospital in last 5 years	419 (41.77)	95 (37.85)
Friend or family member admitted to the hospital from COVID-19	431 (42.97)	97 (38.65)
Friend or family member passed away from COVID-19	279 (27.82)	73 (29.08)
Currently works in a healthcare setting	220 (21.93)	39 (15.54)
Has conditions that predispose to higher risk of dying from COVID-19	315 (31.41)	111 (44.22)

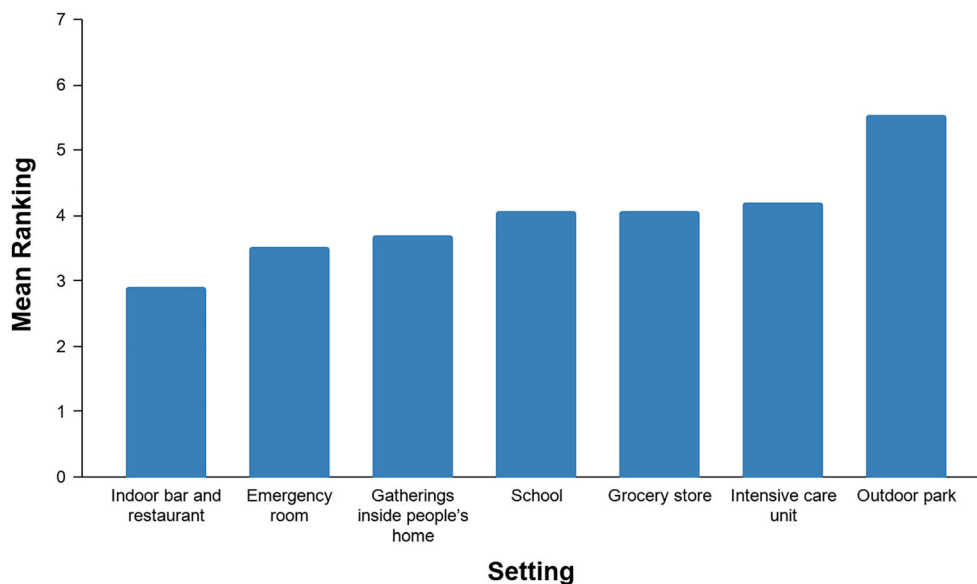


Fig. 1 Participant ranking of different settings by perceived risk of COVID-19 transmission. Participants were asked to rank the seven locations depicted from highest to lowest perceived risk of coronavirus transmission. The highest rank received a score of 1, while the lowest rank

received a score of 7. Indoor bars and restaurants ranked as the riskiest place of transmission, followed by the emergency room. Outdoor parks were ranked as the least risky place of transmission

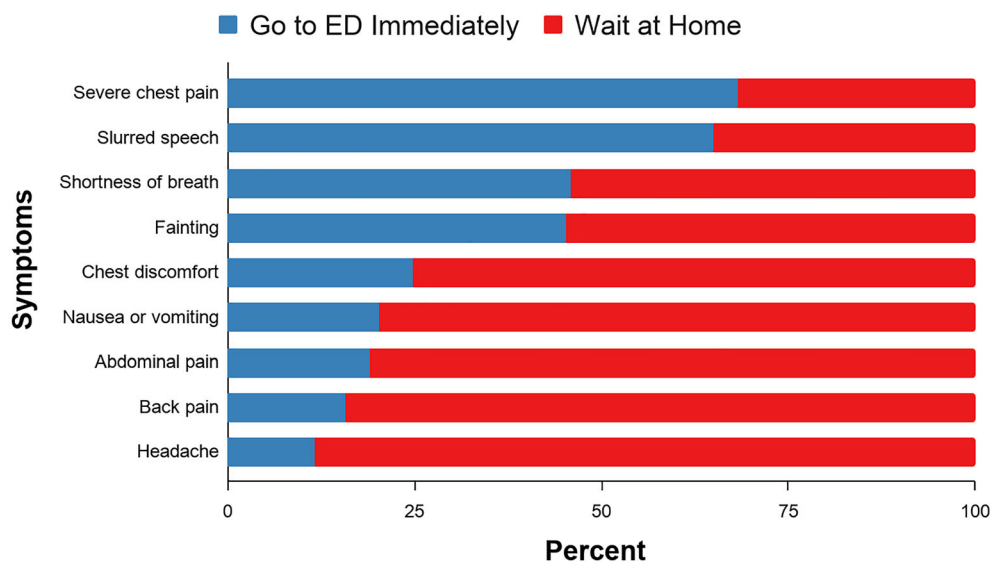


Fig. 2 Proportion of participants who would present immediately to the emergency room with the given symptom. Participants were asked to indicate whether or not they would immediately present to the emergency room upon experiencing the following symptoms. The

symptoms were associated with potentially life-threatening cardiovascular events. Severe chest pain and slurred speech elicited the highest sense of urgency, followed by shortness of breath, fainting, and chest discomfort

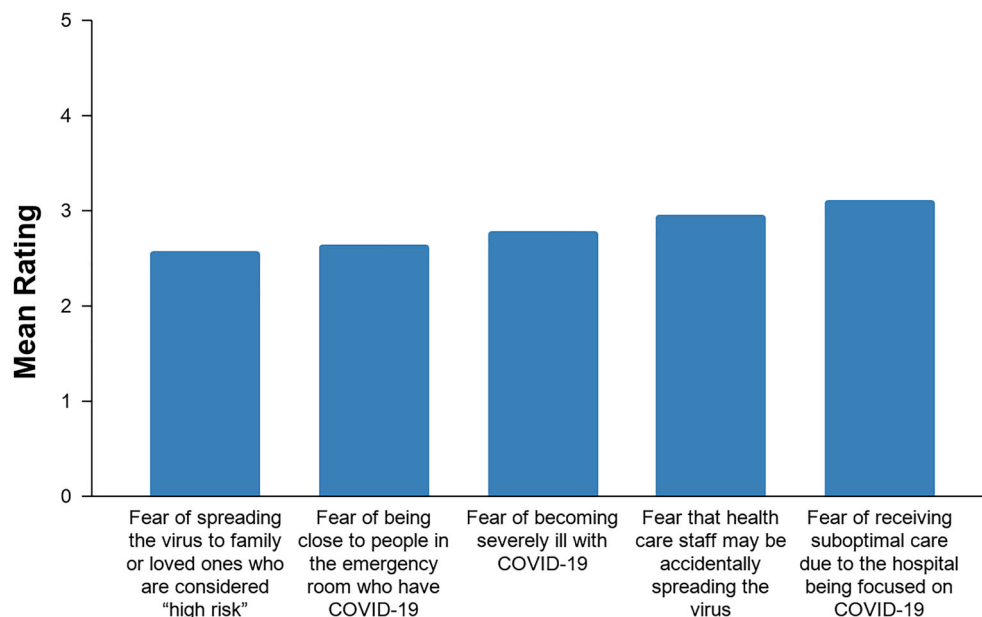


Fig. 3 Participant rating of fears that would deter presentation to the emergency room. Participants were asked to rate the fears shown above on a five-point Likert scale from “a great deal” to “none at all.” The greatest fear of presenting to the emergency room was the potential to

spread the virus to family or loved ones who were at “high risk,” followed by fear of being in close proximity to others with COVID-19. Participants were least fearful that COVID-19 would lead to suboptimal care for themselves

Perception of Risk of COVID-19 Transmission

When asked to rank various settings from highest to lowest based on perceptions of transmission risk, indoor bars and restaurants were ranked highest (2.9), followed by the ED (3.5), people’s homes (3.7), schools (4.1), grocery stores (4.1), the intensive care unit (4.2), and outdoor parks (5.5) (Fig. 1). In fact, 16.7% ($n = 168$) perceived the ED as having the highest risk of COVID-19 transmission among the categories listed.

When presented with hypothetical scenarios in which they were asked to imagine experiencing certain symptoms, participants were most likely to go to the ED right away instead of waiting at home for severe chest pain (68.3%, $n = 685$) and slurred speech (64.9%, $n = 651$). Less than half of the participants intended on going to the ED for shortness of breath (45.9%, $n = 460$), syncope (45.5%, $n = 456$), chest discomfort (24.6%, $n = 247$), nausea or vomiting

(20.3%, $n = 204$), and back pain (15.7%, $n = 157$), which can be atypical or insidious presentations of myocardial infarctions or aortic dissection (Fig. 2).

A majority of people stated they would want to know the COVID-19 census of the ED. When asked to what degree on a five-point Likert scale certain reasons may contribute to their delay in going to the ED with significant symptoms, fear of spreading the virus to loved ones who are at high risk (2.57) and being close to people with COVID-19 in the ED (2.64) ranked highest, above fear of becoming sick oneself (2.78), fear of healthcare staff spreading the virus (2.96), and fear of receiving suboptimal care because the hospital was focused on COVID-19 (3.11) (Fig. 3).

Multivariate Regression

Multivariate regression analysis demonstrated that participants within the age range of 50 to 64 years [odds ratio (OR) 1.67, 95% confidence

Table 3 Results of multivariable regression model showing demographics associated with intent to present to the emergency room with severe chest pain

Variable	Odds ratio (95% CI)	<i>p</i> value
Age (years) (18–29 as reference)		
30–49	1.28 (0.93–1.76)	0.12
50–64	1.67 (1.10–2.56)	0.02
≥ 65	2.69 (1.26–6.46)	0.02
Unemployed*	0.46 (0.29–0.73)	< 0.01
Religious ⁺	0.71 (0.52–0.97)	0.03
Death of close contact ⁺⁺	0.54 (0.39–0.73)	< 0.01
Healthcare worker [§]	0.51 (0.36–0.73)	< 0.01

CI confidence interval

*Unemployed for wages

⁺“Agree” or “strongly agree” to being religious

⁺⁺Have a friend or a family member who passed away from COVID-19

[§]Currently working in a healthcare setting

interval (CI) 1.10–2.56] and 65 years or older (OR 2.69, 95% CI 1.26–6.46) were far more likely to present to the ED immediately upon experiencing severe chest pain compared to those within the reference age range of 18 to 29 years (Table 3). On the contrary, those who were unemployed (OR 0.46, 95% CI 0.29–0.73) and those who were religious (OR 0.71, 95% CI 0.52–0.97) were less likely to present to the ED. Ethnicity, relationship status, and income were not independent predictors. Those who identified themselves as healthcare workers (OR 0.51, 95% CI 0.36–0.73) and had a family member or friend who had died from COVID-19 (OR 0.54, 95% CI 0.39–0.73) were also less likely to go to the ED. The regression model demonstrated adequate goodness of fit [χ^2 (8, $N = 685$) = 8.19, $p = 0.42$] and did not have any outliers.

Conjoint Analysis

When faced with the discrete decision task, chest pain was identified as the most important

feature in the decision to present to the ED (50.4%), followed by risk of becoming ill or dying (20.8%), risk of exposing others who are vulnerable (15.9%), and COVID-19 census in the ED (12.9%) (Fig. 4). Within features the average utility of severe chest pain was the most influential level in the decision to present the ED (1.6), followed by a high risk of becoming severely ill (−0.5), higher COVID-19 census in the ED (−0.4), and high risk of exposing others who are vulnerable (−0.3) (Fig. 5). Although severe chest pain had 3.2 (1.6/0.5) times greater influence on the decision to present to the ED than the risk of becoming severely ill from COVID-19, the remaining three factors were weighted more equivalently.

DISCUSSION

To our knowledge, this is the first large-scale survey study to evaluate salient perceptions and factors associated with people’s decisions to present to the ED with cardiovascular symptoms during the COVID-19 pandemic. It is concerning that participants overall perceived the risk of viral transmission in the ED to be higher than what is empirically supported, and a significant percentage reported they would wait at home despite experiencing severe chest pain and other symptoms that could be insidious or atypical presentations of acute cardiac events. Young age, unemployment, religiosity, having lost a loved one to COVID-19, and working in healthcare predisposed participants to waiting. Based on discrete conjoint analysis, severity of symptoms was the most impactful feature behind people’s decision to come into the ED. Fear of transmitting the virus to other people afterwards was the most significant motivation to avoid the hospital.

COVID-19 is a potentially lethal disease that primarily causes respiratory collapse. However, in addition to its direct pathologic effects, the pandemic has also led to ramifications across other vital operations within our society. At a global level, we observed a significant decrease early on in the number of hospitalizations and ED presentations for treatment of acute cardiopulmonary diseases as well as other

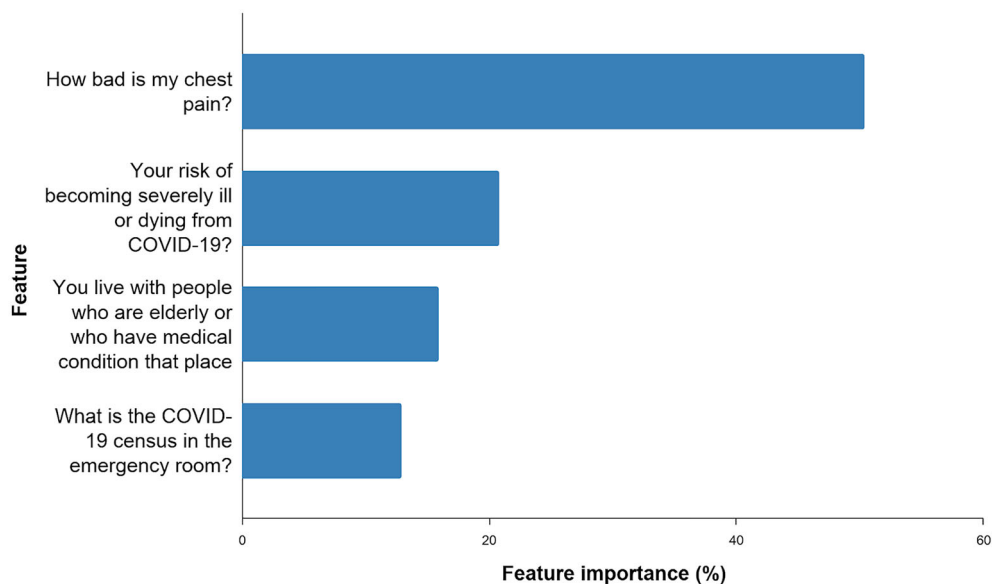


Fig. 4 Importance of individual features in the discrete choice experiment. Participants were presented with a series of two-scenario choice experiments consisting of four features, shown above, which each had two levels [e.g., “severe (crushing)” or “moderate (painful but not crushing)” for the feature “How bad is my chest pain?”]. This

figure shows the weight (feature importance) of each feature in a participant’s choice of scenarios. In the overall population (blue), degree of chest pain was the most important feature, followed by personal risk, risk to others, and the least of all was the COVID-19 census in the emergency room

conditions such as cancer and common pediatric conditions, in addition to COVID-19 [13–15]. Some of these changes concerned patients at elevated risk of cardiovascular diseases such as ST-segment elevation myocardial infarction (STEMI), type A aortic dissections, and heart failure exacerbations [16]. As there is no evidence or rationale to suggest that the natural incidence of such deleterious cardiovascular conditions has decreased during the pandemic, we assume that other barriers must have emerged to negatively influence these patients’ abilities or choices to present to the hospital. Moreover, limited or altered provision of basic primary and other outpatient care, in addition to significantly increased financial and social stressors related to the pandemic, will surely continue to result in exacerbations of many patients’ health downstream. In addition to these patients, surely, those who may not carry prior diagnoses or comorbidities, but nevertheless experienced severe illness such as acute pulmonary embolism, arrhythmia, early-onset cardiomyopathy, myocarditis, or

endocarditis, were also confronted with the difficult decision of whether to seek care during the pandemic.

Faced with these challenging circumstances, we must re-imagine the role of a comprehensive cardiovascular provider beyond the conventional medical aspects. The psychosocial and economic factors that influence patients’ decision-making and behaviors may have equally dramatic consequences for their health. We must strive as a community to become more aware of our patients in a holistic sense, and tailor our medical guidance and communication accordingly.

One such barrier to address during the pandemic may be fear. Among all participants, ED was consistently perceived as conferring a high risk of COVID-19 transmission, ranked second only to indoor dining in restaurants and bars, which drastically overestimates the risk of nosocomial COVID-19 infections in the ED [17]. These findings are consistent with previous studies’ findings that people and even health-care providers may have heightened or

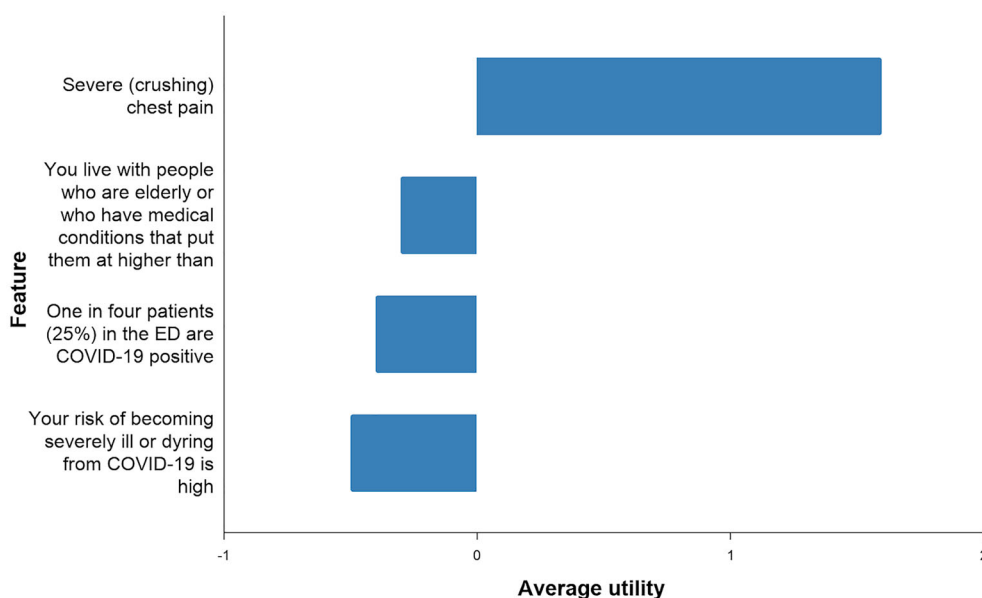


Fig. 5 Importance of feature level in the discrete choice experiment. Participants were presented with a series of two-scenario choice experiments consisting of four features (Fig. 4) which each had two levels [e.g., “severe (crushing)” or “moderate (painful but not crushing)” for the feature “How bad is my chest pain?”]. The figure shows the average utility of the more severe level of the features, revealing

how important a level is to each feature’s overall importance in scenario choice. In the overall population (blue), having severe chest pain was over five times as important in the decision to present to the emergency room than was living with others who were at high risk for COVID-19 complications

exaggerated fears of being infected with the virus in hospital settings, indicating the need for more explicit and targeted communication [18, 19]. In a retrospective study by Wee et al. analyzing nearly 2000 patients who presented to the ED with respiratory symptoms, there were zero confirmed cases of COVID-19 transmission. Although the prevalence of COVID-19 patients in the ED was low ($\sim 4\%$), their study demonstrated that transmission risk can be effectively mitigated with safe triage policies and preparations.

Severe chest pain and slurred speech appropriately elicited the highest sense of urgency to present to the ED; however, even in these scenarios, nearly a third of the participants planned to wait at home. What is perhaps more concerning is that the majority of the participants indicated they would wait at home with symptoms that may accompany insidious or atypical presentations of acute, deleterious cardiac events such as shortness of breath, syncope, chest discomfort, nausea, and back pain.

Younger, unemployed, and religious participants were more likely to delay presentation, which may be due to their having a higher threshold for seeking medical help given their youth, lack of finances/insurance, and reliance on other forms of support. Intuitively, older age was one of the most important factors that led to the decision to present to the hospital with symptoms, and correlated in a dose-dependent manner. Those who have lost loved ones to COVID-19 were also intuitively deterred. Notably, healthcare workers also belonged to this group, perhaps because we may feel more self-assured about our ability to monitor and discern the seriousness of our symptoms at home. Although these scenarios are hypothetical and it is impossible to calculate the true percentage of patients who report immediately to the ED as opposed to waiting at home with these symptoms during and prior to the pandemic, these results may partially explain the significant decrease in the observed volume of STEMI activations and type A aortic dissections over

the last 9 months, and provide guidance on specific communication strategies [4, 6].

The results of the conjoint analysis support the general findings in the survey while providing additional insights. Naturally, the relative weight of severe chest pain in the decision to present to the ED is high; however, risk aversion to COVID-19 features carried substantial weight, ranging from 19 to 31% of that of chest pain. The potential of exposing family members was more important than ED COVID-19 census and almost as important as risk of severe personal injury from the virus. It is unclear whether this is altruistic, but it serves to emphasize that social context plays a particularly important role in caring for patients during this time. Overall, the findings of this study offer compelling evidence of the need for improved communication and education regarding safe practices during COVID-19, particularly with regard to seeking acute, potentially life-saving medical care.

This study has several limitations. First, intrinsic or unintended bias in sampling may lead to a limited representation of the at-risk population for these conditions, although it is unclear which direction our findings may have been skewed due to sampling bias. MTurk users are more likely to be young, White, educated, and savvy with technology, signifying privilege, as described in their demographic profiles. These participants' viewpoints are not directly generalizable to patients who are at risk of or currently have cardiovascular diseases, many of whom are more socioeconomically disadvantaged, and may lack access to technology or healthcare systems. Yet it does bear some relevance to the population at large, who share minimal, yet universal risk of experiencing conditions such as acute pulmonary embolism, arrhythmia, myocarditis, and endocarditis. Second, although discrete conjoint analysis simulates more realistic decision-making conditions, there are inherent limitations in simulating health-related decisions. While significant findings can inform future hypothesis generation or direction of education, policy, or communication initiatives, they should acknowledge the fact that people's behaviors can differ from what they predict. Third,

features and levels, although informed by prior studies and known statistics, may not be entirely comprehensive and generalizable regarding people's decision-making. Future studies are warranted to replicate these findings in different settings and populations. Fourth, this initial set of data was collected during one of the first waves of COVID-19. While attitudes may have shifted during consequent waves of COVID-19, this study's findings are resemblant of general human tendencies that hold relevance for future waves of COVID-19 or other transmittable diseases.

CONCLUSIONS

Perceptions regarding COVID-19 may result in delayed presentation to the ED for potentially life-threatening cardiovascular symptoms, including severe chest pain. This may be driven by an at times inflated fear of contracting or spreading COVID-19 as a result of visiting the ED. While severity of chest pain was the most important motivator in the decision to present to the ED, those who are young, unemployed, or religious, as well as those who work in healthcare or experienced a death of a close contact due to COVID-19 were less likely to present to the hospital. These findings can help inform communication strategies for cardiovascular providers to ensure prompt and adequate treatment of potentially life-threatening conditions.

PERSPECTIVES

Competency in Interpersonal and Communication Skills

Participants in a large survey representative of the United States population expressed an irrationally high perceived risk of contracting COVID-19 at emergency departments. Only 68% reported they would go immediately to the emergency department if they experienced severe, crushing chest pain. Fear of becoming severely ill from COVID-19, exposing close contacts, and the COVID-19 emergency room

census influenced this decision to varying degrees, particularly for those with higher religiosity, recent hospital admission, and with family or friends affected by COVID-19. Providers should be aware of this opportunity to thwart preventable collateral COVID-19-related morbidity and mortality in patients by discussing harmful risk aversion.

Translational Outlook

This work should help inform tools to improve timely risk communication to patients on salient issues such as risk aversion to emergency room presentation and vaccine utilization.

ACKNOWLEDGEMENTS

Funding. 1. Division of Cardiovascular Surgery, Department of Surgery, Perelman School of Medicine, University of Pennsylvania.

2. Author WLP is funded by a National Institutes of Health T32 Training Grant (T32HL007843).

3. No funding or sponsorship was received for this study or publication of this article.

Author Contributions. Jason J. Han and William L. Patrick analyzed data and drafted manuscript. Akhil Rao aided in data collection and analysis and contributed to the drafting and the revision of the manuscript. Benjamin Smood, Mark Helmers, Amit Iyengar, John J Kelly, Saiesh Kalva, Pavan Atluri, Nimesh Desai, and Marisa Cevasco contributed to the drafting and the revision of the manuscript and finalized manuscript.

Disclosures. Jason J. Han, William L. Patrick, Akhil Rao, Benjamin Smood, Mark Helmers, Amit Iyengar, John J Kelly, Saiesh Kalva, Pavan Atluri, Nimesh Desai, and Marisa Cevasco have nothing to disclose.

Compliance with Ethics Guidelines. This study was approved by the University of

Pennsylvania IRB #8. IRB Protocol number: 845065 and IRB confirmation number: dcjihaha.

Data Availability. The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

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