Where Are All the Patients? Addressing Covid-19 Fear to Encourage Sick Patients to Seek Emergency Care

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Emergency department volume is down nearly 50% as the United States struggles with the Covid-19 epidemic. There is increasing evidence that patients with medical emergencies are avoiding the emergency department because of fear of contracting Covid-19, leading to increased morbidity and mortality. Here, the authors describe efforts taken in a community hospital to understand and combat this public health concern by using human-centered design. They share interview themes, the brainstorming process, and implementation of prototypes, as well as challenges faced in the early stages of implementation. They show that addressing patient fears by dividing the emergency department into respiratory and non-respiratory pods and through targeted messaging can result in increased visits to the emergency room. Time will tell if this results in improved health outcomes for community members.

As health care systems around the world struggle with the Covid-19 pandemic, Adventist Health Lodi Memorial (LMH), a 150-bed community hospital in California's Central Valley, is experiencing record low emergency department (ED) volume. California was one of the first states to report a confirmed case of Covid-19 and was the first to issue a statewide shelter-in-place order on March 19, 2020. The volume of patients presenting to the LMH ED dropped significantly after the shelter-in-place mandate (Figure 1). By the first week in April, volume was down approximately 50% since the first week of March, when the LMH ED treated 1,098 patients, to the second week of April, when 611 patients were treated.

FIGURE 1

Emergency Department Volume by Day and Timeline of Key Events

The number of patients begins to decrease relative to the prior year on March 8, 2020, coincident with the first case in San Joaquin County and significantly decreases on March 20, 2020, when shelter-in-place began, to a volume approximately 50% of the prior year. Of note, 2019 and 2020 were experiencing similar volumes until widespread U.S. news coverage of Covid-19 cases began at the end of February. The number of visits began to recover concurrent with a local newspaper article, implementation of Respiratory and Non-respiratory Pods, and online communications to patients. The volume has remained steady at approximately 70% of baseline during the last week of April.

Emergency Department Volume by Day and Timeline of Key Events
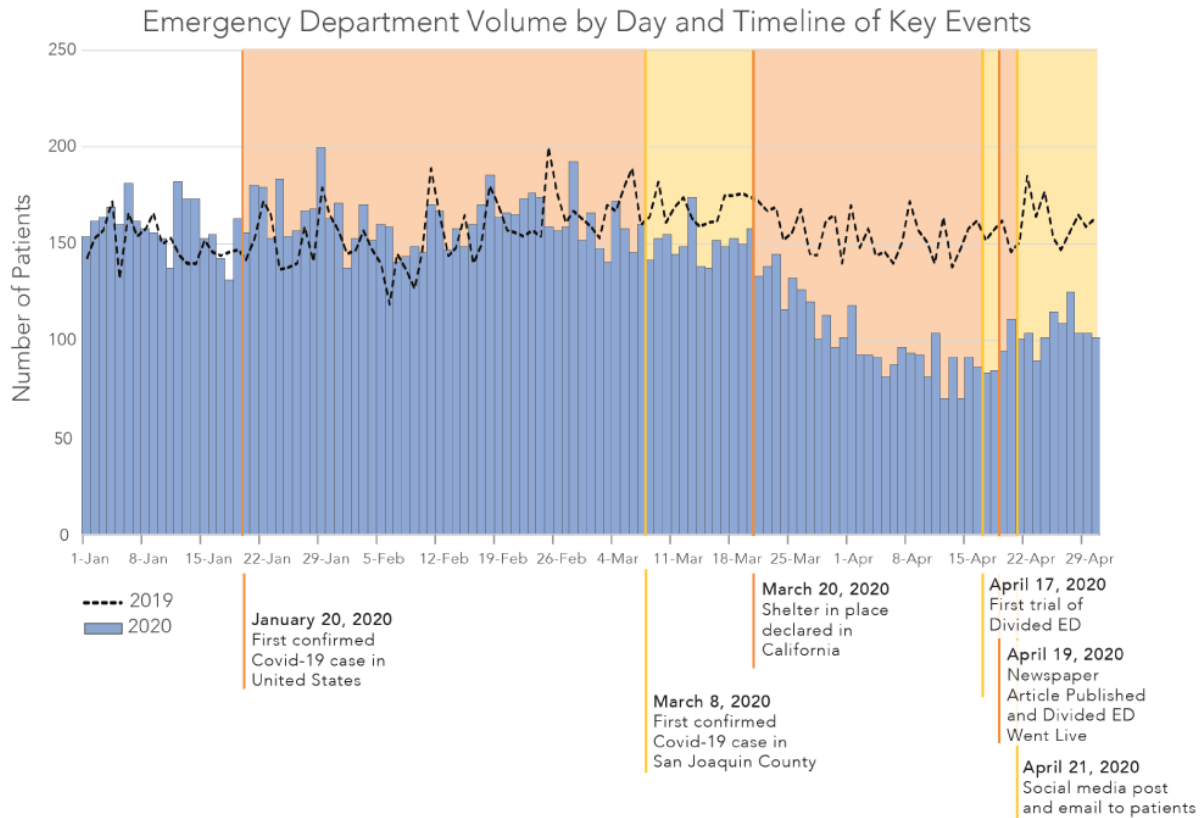
Source: The authors

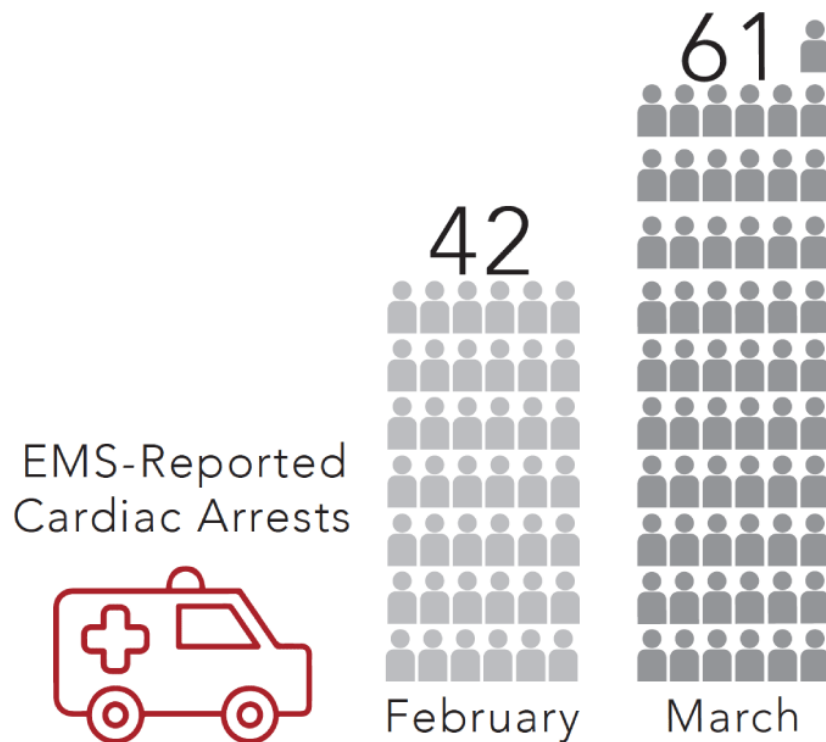NEJM Catalyst (catalyst.nejm.org) © Massachusetts Medical Society

This decrease was initially welcomed as the hospital prepared for a potential surge in respiratory patients. With time, however, the decrease in ED volume persisted and was accompanied by alarming statistics. First, data suggested that a proportion of high-acuity patients expected to need medical care were not presenting to the hospital. Despite significantly lower daily volume, the percentage of patients admitted to LMH from the ED remained unchanged at 13%. If the expected high-acuity patients were presenting to the hospital and low-acuity patients were staying home, the percentage of patients admitted should be expected to increase. Second, emergency medical

services (EMS) reported the highest-ever number of cardiac arrests in the field — 45% more than the previous month — suggesting that patients were waiting too long to seek cardiac care (Figure 2). Of note, all of these EMS heart patients tested negative for Covid-19.

FIGURE 2

EMS-Reported Cardiac Arrests

The EMS-reported number of cardiac arrests increased dramatically in March 2020 when compared to February. Most of these patients were declared dead at the scene and were not taken to the ED. This was the most field deaths reported by EMS and suggests patients were waiting until they collapsed before seeking emergency care. All patients tested negative for Covid-19; the increase does not represent an increase due to Covid-19 deaths. April data was not available.

EMS-Reported Cardiac Arrests

42 — February

61 — March

Source: The authors

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Third, in the month of March, all stroke patients arrived too late to receive tissue plasminogen activator (tPA), which is surprising given that LMH administers tPA for three to eight stroke patients every month. This information again suggested a new culture of waiting to seek emergency care and was supported by subsequent histories of patients who reported they chose to wait several days after the onset of stroke symptoms to present for care. The initial relief of having lower volumes turned to concern as it became clear that members of the community were avoiding the ED even when they had life-threatening emergencies.

This decrease in ED volume is not unique to Lodi. The Covid-19 pandemic has altered the lives of [approximately 316 million Americans](#) who are under shelter-in-place orders as of April 15, 2020. Nationally, visits to EDs are down nearly 50% since mid-March (2020 week 11) when weekly ED visits exceeded 2.23 million, to mid-April (2020 week 15) when weekly ED visits had declined to 1.18 million.[1] News media around the U.S. are reporting lower ED volumes and publishing stories of patients afraid to go to the hospital — in some cases with dire consequences.[2-7] Internationally, Italy and Hong Kong are reporting fewer strokes and delayed presentation of myocardial infarctions, respectively.[8,9] This suggests a global problem.[10]

The Human-Centered Design Method

Human-centered design (HCD) is a methodology that employs qualitative research to understand human behavior in order to develop and implement innovative solutions.[11] HCD is well-suited to address challenges arising from the Covid-19 pandemic because it is rapid, iterative, and grounded in addressing real human needs. On March 17, 2020, a group of individuals came together to found the Emergency Design Collective, a collaboration of human-centered designers, health care providers, makers, and academics who donated their time to take a systemic, human-centered approach to understanding and solving novel challenges during the Covid-19 epidemic.

What began as an initial meeting of about 30 individuals in mid-March has grown to a group of more than 325 individuals as of early April. Members of the Emergency Design Collective organized around discrete projects in multidisciplinary groups. Our HCD team — composed of physicians and medical students with experience in HCD; visual, user experience, and user interface designers; and a product manager with experience at Google — partnered with LMH leadership. Here, we report our efforts to understand and address reduced ED usage during the Covid-19 pandemic.

We conducted 10 phone interviews with patients and five in-person provider interviews regarding hospital usage. Purposive sampling was used to identify a diverse group of patients in regard to age, experience with health care, and socioeconomic status. Interviews were semi-structured, allowing for a natural flow of conversation, and were conducted until thematic saturation was achieved (See Appendix).

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These interviews were used to identify themes, synthesize insights, and brainstorm and prototype several solutions, which were rapidly implemented in parallel. This method allowed us to quickly develop a multipronged solution and implement improvements immediately. The experience at our community hospital can inform other hospital systems that are facing similar challenges.

Themes and Insights

Semi-structured interviews with patients were focused on their experiences with health care, changes in behavior since the start of the Covid-19 pandemic, and attitudes regarding hospital use. Providers were interviewed regarding their experiences in the ED and the types of patients they were encountering. The overarching theme from these interviews was *fear*. One patient stated, "the cons of getting Covid outweigh my normal health concerns." A second reported a "fear of contagion, fear that if I got this virus I would die." Through these interviews, we identified a number of subthemes that informed our interventions, and these are described below.

Theme #1: Hospitals are seen as infectious reservoirs. Patients reported wanting to avoid the hospital because it carried the greatest risk of exposure to the virus. One patient in particular said hospitals "are crawling with Covid-19." Most patients interviewed were highly concerned about the aerosolized spread of the virus through being exposed to coughing respiratory patients and aerosol-generating procedures. Several patients were concerned that they may not be able to appropriately maintain a safe social distance in the ED.

Theme #2: Patients are not informed about the current risk-mitigation efforts at the hospital. Patients see the hospital as a risky location and know nothing of the cleaning precautions or screening methods. "Just the message that you will be provided with a mask would make a difference," stated one person. Another stated she wanted to "smell the scent of bleach" and know what cleaning protocols were being implemented. One interviewee stated he would feel more reassured if he received an email that described the cleaning practices — similar to what he was receiving from commercial entities like airlines. Patients reported a strong desire to know what to expect when they went to the hospital. Almost everyone expressed concern about screening and testing, but more specifically wanted to know what measures would be taken once a patient screened positive to keep the remaining patients in the area safe.

> " *The overarching theme from these interviews was fear. One patient stated, 'the cons of getting Covid outweigh my normal health concerns.' A second reported a 'fear of contagion, fear that if I got this virus I would die."*

Theme #3: Patients need confirmation from their doctors or health system about when to go to the ED. Patients have a relationship with the hospital system and are more trusting of recommendations and information when it comes from a provider. One interviewee said he would feel more comfortable if he received an email or text from his hospital system stating that "even if you don't have the virus, but some other concerns, don't hesitate to come in." Several patients stated that if they were having a health emergency, they would first call their primary care provider or hospital help line. Before the Covid-19 pandemic, these patients would have gone straight to the ED.

Theme #4: The national news focus on extreme cases skews local perceptions. Many of the patients interviewed recalled images of hospitals in New York inundated with patients, which made them

concerned that the local ED would not be able to provide adequate care; "they might not do anything unless I had the virus." Patients had fears about resource shortages such as personal protective equipment and that masks may not be available to protect themselves and the providers. Another patient was "concerned with resource scarcity" due to New York news coverage. He anticipated longer-than-usual wait times, longer stays waiting for test results, and was concerned that he would take resources away from another, more critically ill patient.

Theme #5: In the setting of shelter-in-place, the most vulnerable patients are disconnected. Providers raised concerns that the higher-risk patients may not be presenting because they do not have the means. An emergency medicine provider was fearful that this may be a reason for delayed care. "I think about all my patients who come to the hospital in a delayed fashion. I ask them, 'What's different today that made you come in?' The answer is often, 'My . . . wife, husband, daughter, son . . . made me come.'" In an environment of physical separation, seniors and other vulnerable individuals are less connected with their families and communities, which makes them more vulnerable to delays in care.

Opportunities, Brainstorming, and Initial Prototypes

Reframing the themes into actionable statements revealed opportunities in two areas. The first focused on the environment of the ED and the perception of risk. The second focused on the development of thoughtful, community-minded communication tools.

Opportunity #1: Create a physical divide to create an emotional divide. Patients indicated that they saw the hospital as an infectious reservoir. We brainstormed that dividing the ED and visibly cohorting respiratory and non-respiratory patients would make individuals more comfortable coming to the ED. This concept was well received in our interviews and quickly implemented.
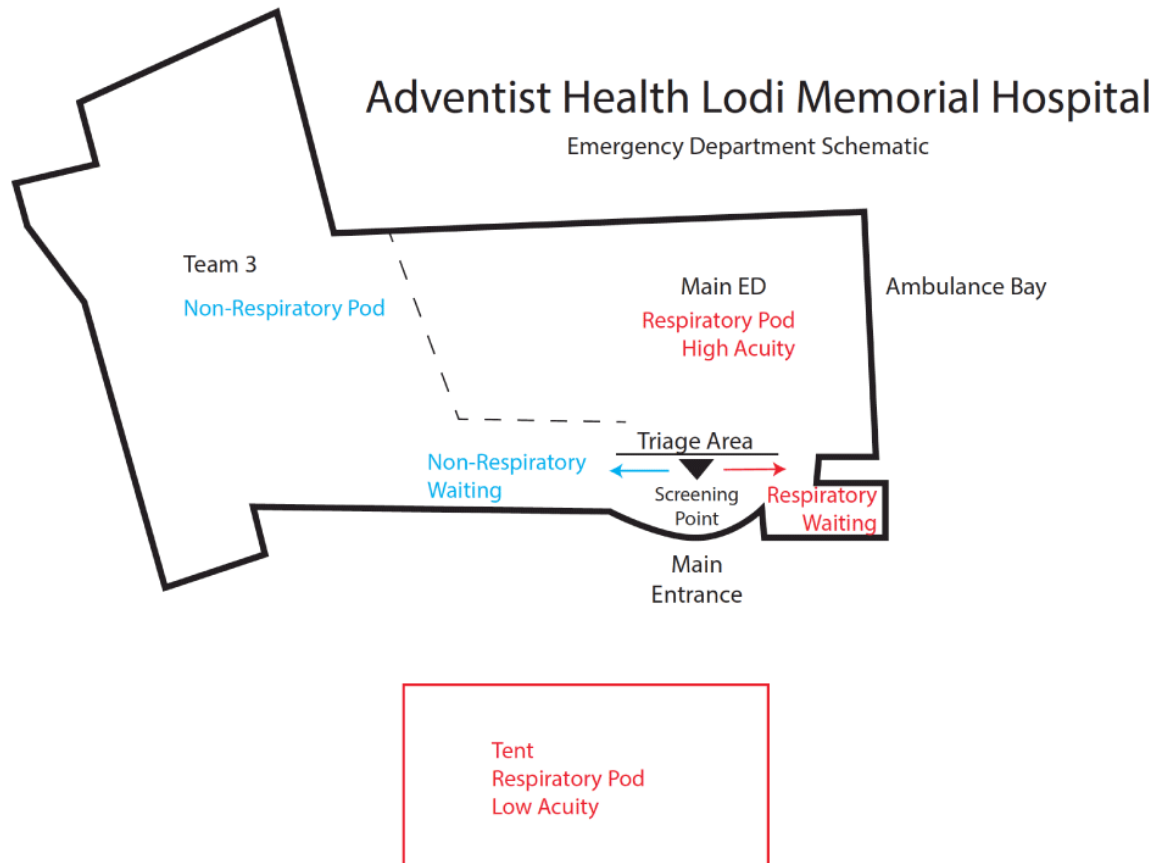
To begin, patients at high risk for Covid-19 needed to be appropriately screened, triaged, and separated. LMH was already screening every visitor at the main door for fever and respiratory symptoms. Routine respiratory patients were being tested and treated in a tent outside. However, the severely ill were still being sent to the main ED with other patients who did not have Covid-19–related concerns.

The first step was to divide the space (Figure 3).

FIGURE 3

Adventist Health Lodi Memorial Hospital Emergency Department Schematic

We divided the ED into Respiratory and Non-Respiratory Pods with physically separate waiting areas and treatment rooms. Providers, staff, and equipment were kept separate when possible. While the main entrance screening point is relatively small, questions surrounding symptoms and taking a temperature were rapid enough that maintaining social distance was not a problem during implementation.

Adventist Health Lodi Memorial Hospital
Emergency Department Schematic

Team 3
Non-Respiratory Pod

Main ED
Respiratory Pod
High Acuity

Ambulance Bay

Non-Respiratory
Waiting

Triage Area

Screening
Point

Respiratory
Waiting

Main
Entrance

Tent
Respiratory Pod
Low Acuity

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The ED already had a low-acuity area called *Team 3* that was physically separate from the main ED area. Screening at the main entrance allowed patients without respiratory symptoms to be triaged into a waiting area to the left of the triage desk and then be moved directly to the Team 3 *Non-Respiratory Pod* for evaluation. Meanwhile, patients with respiratory symptoms were seated to the right, 20 feet away, and ushered into the main ED, now serving as the *Respiratory Pod*, through a separate door. A system was also established to quickly move newly symptomatic patients from the Non-Respiratory Pod to the Respiratory Pod and to coordinate with environmental services for rapid room cleaning.

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Separate spaces required separate providers, staff, and equipment where feasible. One challenge in dividing the ED into Respiratory and Non-Respiratory pods was addressing overnight staffing, when there was only one provider. Low volume and the resultant loss of revenue ruled out an additional provider. Instead, support staff were separated in the different pods when possible, and the provider covered both pods.

Lastly, patients and providers needed to feel personally protected, so everyone entering the hospital was provided a mask, hand sanitizer, and sanitizing wipes for their belongings.

Opportunity #2: Communicate clear and transparent information about services and risk. Because of widespread media coverage focused on national hot spot areas where hospitals were being overwhelmed by a high volume of infected patients and a severe shortage of equipment and personnel, some Lodi patients had incorrectly estimated the incidence, virulence, and resources available in their local hospital. Contradictory information from news media sources and public agencies had led to a loss of confidence in available information and uncertainty about the best source of information. As a result, communications needed to come from the hospital as a trusted source of information and convey that the hospital was open for business, be transparent about local resources, communicate the precautions in place to keep patients and staff safe, and provide guidance about when to come and what to expect in the ED.

Our design team brainstormed with ED leadership to determine the best ways to reach patients, focusing on venues that would reach broad demographics of patients. The ideas were ranked based on ease and impact, and ideas with the highest impact and the greatest ease were used to develop prototypes for messaging (Figure 4).

FIGURE 4

2x2 Prioritization Matrices for Brainstorming Online and Offline Communication Methods

Our Human-Centered Design team brainstormed for the prompt "How might we disseminate information with patients?" Six designers produced 61 ideas (some were duplicates), which were then prioritized based on ease of implementation and impact and divided into online and offline modalities of communication. Those with red stickers have been implemented. Those with orange stickers are in the process of being prototyped.
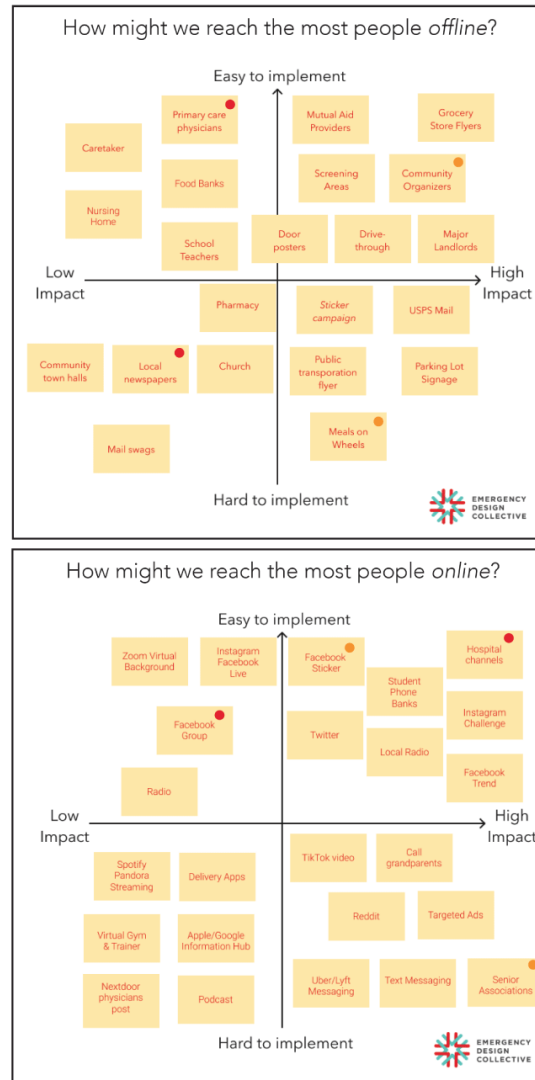
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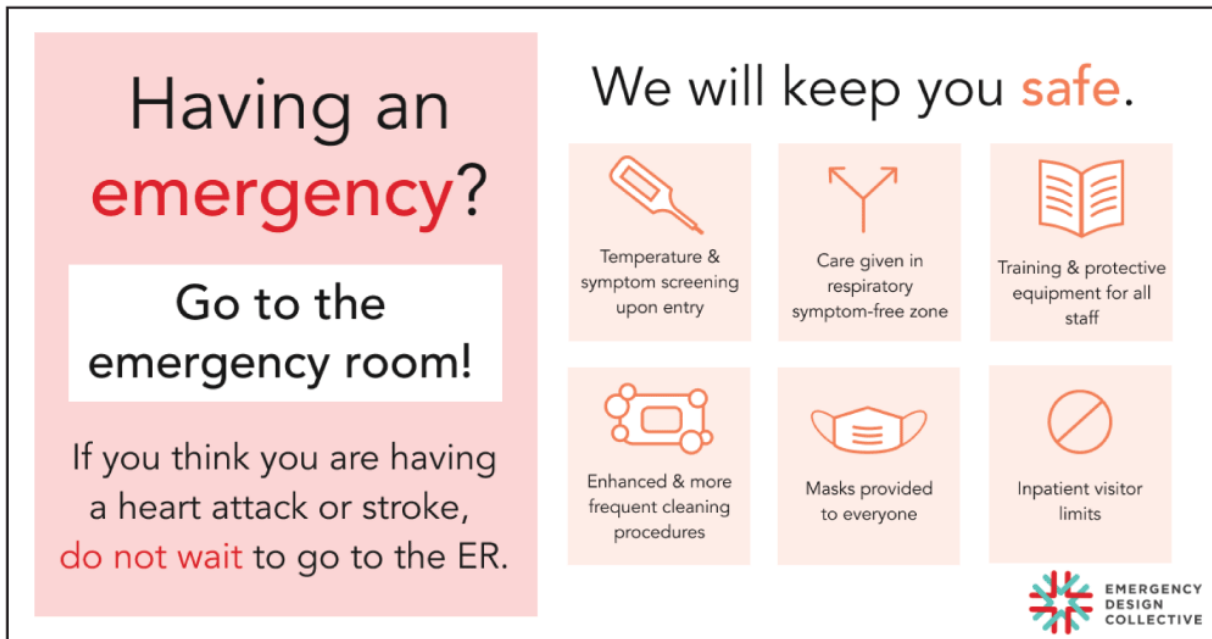NEJM Catalyst (catalyst.nejm.org) © Massachusetts Medical Society

Following this brainstorm, the first step was to align patient perceptions to local health care conditions. The hospital system sent emails to existing patients telling them that the ED was open. The medical director and nursing director reached out to the local newspaper to share information about ED volume and resources; an article was published on April 16.[12] The second step was to encourage more appropriate self-triage. We leveraged social media to inform patients what symptoms constitute an emergency. Our last step was to explain what to expect when coming to

the hospital. We prototyped a document to tell patients, in clear language, the measures that were being done to protect them from exposure to Covid-19, and developed iterations of this document for social media outlets (Figure 5).

FIGURE 5

Example Prototype of Simple Messaging from the ED

This prototype is sized for a Facebook post. Similar prototypes have been developed for Instagram. EDC designs will be available for use by other hospitals in an open source forum.

Having an emergency?

Go to the emergency room!

If you think you are having a heart attack or stroke, do not wait to go to the ER.

We will keep you safe.

Temperature & symptom screening upon entry

Care given in respiratory symptom-free zone

Training & protective equipment for all staff

Enhanced & more frequent cleaning procedures

Masks provided to everyone

Inpatient visitor limits

EMERGENCY DESIGN COLLECTIVE

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The next phase will focus on messaging for particularly vulnerable populations, such as at-risk senior patients.

Looking to the Future

In the era of the Covid-19 pandemic, some patients' perception of the hospital has changed from a place of safety and shelter to one of danger and fear. The patients in Lodi perceived the hospital as a place where there was a high risk of acquiring Covid-19 and, as such, were avoiding treatment at the hospital for even the most serious medical conditions. Although it is too early to evaluate the success of our interventions, we have seen improvement in ED volumes in the first week since our interventions were implemented (Figure 1). It is tempting to speculate that our actions may be part of the reason for this increased volume. While this is a start, true success is fewer cardiac arrests in the field and stroke patients receiving the timely care they need. Time will tell if our interventions achieve this measure of success.

Avoiding the ED is both harming patients and contributing to hospital financial hardship. The discussion has moved from how to prepare for a surge to how to avoid cutting staff amidst reduced volume. As we reopen the country, we may find that patients' fears of the health care environment extend beyond this immediate crisis. It will become increasingly important to engage the community in order to mitigate the public health risk of avoiding care for life-threatening illnesses. The insights presented in this article offer actionable opportunities to improve the perception of risk in the ED so that our doors can remain open and we can care for our communities as we did before this crisis.

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Semi-Structured Interview Guide for Patient Interviews.

Acknowledgements

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