The Impact of the COVID 19 Pandemic on Emergency Department Attendance: What Seems To Be Keeping the Patients Away?

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Abstract

During outbreaks such as severe acute respiratory syndrome and COVID 19, many Emergency Departments across the world had a reduction in the general attendance, including the attendance of more serious and critical diagnoses. Here, the author shares the numbers seen at Singapore General Hospital, the largest public hospital in Singapore during the period of February to June 2020. The reduction ranged from 13% to 28% compared to the same period in 2019, before the outbreak. Patient and healthcare system-related factors which may have caused these observations are discussed. The author also puts forth the Behavioral Immune System and Response mechanism as a possible explanation for patients staying away from the hospitals during the outbreak.

Keywords: Behavioral immune system, COVID 19, emergency department attendance

Introduction

Singapore is a small country with a land area of 720 square kilometers and a population of 5.7 million. This makes Singapore’s population density one of the highest in the world.1There are a total of 9 public general hospitals and at 200 years, Singapore General Hospital (SGH) is the oldest. SGH is a tertiary referral center, with 1800 beds and also houses the only Burns Centre and Burns Intensive Care facilities in South-East Asia. The emergency department (ED) at SGH tends to some 130,000 patients annually. The first COVID 19 positive patient in Singapore, a tourist from Wuhan, China, was seen and managed at SGH on January 22, 2020.2

COVID 19 has affected every country and every healthcare system throughout the world. Workflow in our healthcare institutions across Singapore changed quickly to a pandemic model of preparedness, which we have trained for and executed previously with other outbreaks of infectious diseases such as severe acute respiratory syndrome (SARS).3–6 Our healthcare system, like many others, represent a complex system. As such, the preparedness plans are also multi-faceted, multi-layered, multi-disciplinary and are made up of multiple algorithmic steps. As all our public or government healthcare institutions in Singapore also serve as learning institutions for the training of doctors, nurses, and other healthcare students and professionals, our educational plans were also affected by this. The impact has been tremendous, especially at the frontline. There has been changes in some of the following including, protocols for entry screening into EDs, triage protocols, the taking of travel history, upscaling of infection control measures, and the donning of personal protective equipment (PPE).7 These are critical and essential elements in our preparedness for handling any crisis, mass casualty incidents, infectious diseases outbreaks or pandemics. They have now become part and parcel of our day to day practice. What is important is that these practices are very dynamic and their pattern is regularly updated and renewed at strategic intervals.8 At times, there is a need for the incorporation of critical new information

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as it becomes available. This versatility is very important, especially in the early phases of handling new and emerging infectious diseases, where new information on the offending agent is evolving as we move along.\cite{2,8,9} From the early stages when Singapore was in Disease Outbreak Response System Condition (DORSCON) Yellow, we move on to DORSCON Orange and have stayed at this level till today\cite{10} [Table 1].

During the 2003 SARS outbreak, we saw a significant reduction in daily ED attendance, especially in the first half of the outbreak. Since the beginning of the COVID 19 outbreak, we have also seen a decrease in attendance at the ED at SGH. This was particularly obvious in certain categories and types of patients and diagnoses, as will be discussed in the next section.\cite{4}

### The Emergency Department @ Singapore General Hospital

Since the beginning of the COVID 19 outbreak, the attendance at the ED has started to decrease. This trend has been noted from February to June 2020. The decrease is significant as compared to the same period in 2019.\cite{13} [Figure 1]. Some of the important timelines to note would be:

1. The identification of the first COVID 19 positive case in late January. This may help to explain the beginning of the significant drop in attendance in February 2020. The February 20 attendance of 8182 patients is a 14% reduction compared to February 2019.

2. The “circuit breaker” interventions commenced in April 20 and the numbers again demonstrated a “dip” to 7474 patients, which is a 27% drop compared to April 2019. The “circuit breaker” measures represent a series of initiatives by the government restricting numbers of persons who can gather, a ban on any large scale gathering and events, stay home advisories, workers to work from home in nonessential/non frontline services, no visitation of relatives who live in separate households and the such. We did not term it a “lock-down” as in some other countries, as people were still able to go about with their essential activities with the mandatory wearing of masks. The attendance from February to June for 2019 and 2020 is shown below:

| Month | Year 2019 | Year 2020 | Reduction/% |
|-------|-----------|-----------|-------------|
| February | 9485 | 8182 | 1303/13.7% |
| March | 10,757 | 9380 | 1377/12.8% |
| April | 10,254 | 7474 | 2780/27.1% |
| May | 10,619 | 7656 | 2963/27.9% |
| June | 10,284 | 8540 | 1744/16.9% |

With reference to Figure 2, this gives the breakdown of the numbers of cases according to the triage category. The details of the Patient Acuity Categorization Scale (PACS) used in Singapore is shown in Table 2. Figure 2 shows the numbers of “Clean” cases (which refers to patients with the usual ED presentations, who were not at risk for COVID 19, had no contacts with any COVID 19 clusters locally, had no high-risk travel history and does not need to be isolated to our negative pressure areas), seen at the ED over the same period.

It shows the number of P1 patients decreased significantly from February to June 2020 compared to the same periods for 2019 [Figure 2]. P1 patients are usually made up of the following diagnoses: chest pain (unstable angina pectoris, ST-elevation acute myocardial infarction [AMI]), fluid overload disorder, acute pulmonary edema, shock, multiple trauma, poisoning, and ingestions. The changes in the P2, P2+, P3 numbers are multi-faceted in nature, with our changes in workflow during the COVID 19 period. As we were more interested in looking at the reduction in P1 patients, we will not be discussing the other categories.

This trend is not unique to Singapore EDs, but was also seen in many other countries across the globe.\cite{11-24} For example, in the USA, ED attendances for AMI and the acute coronary syndrome were noted to be reduced.\cite{11-13,17} Suspected AMI numbers were halved in early March 20 across many European EDs.\cite{14,15,18-22} Of those numbers presenting, some 48% were noted to present late and out of the recommended timeline for interventions by the British Heart Foundation. In the British Heart Foundation survey of 167 cardiologists across UK, 84% said the number of patients with ST-elevation myocardial infarction (STEMI) coming to hospitals between March
Lateef: COVID 19 and ED Attendance

and April 2020 decreased by some 61%,[18,19,22] Thornton J noted the decrease as well in his study but claimed that these observations could be guided by the location of the institution, i.e., whether it was a national or a regional hospital as well as the population living in the vicinity.[20] In Melbourne, Victoria, the recent state of emergency restrictions caused a reduction of 37.3% across all types of diagnoses, including circulatory and injury-related diagnoses.[24] In Hong Kong, EDs have experienced reduced daily attendances since January 25th this year. STEMI patients had longer “symptom-to-first-medical” contact time, and amongst those who turned up, the majority had presentation times beyond the revascularization window period. The authors also noted that the composite outcomes for this group included increase in the in-hospital death, cardiogenic shock, sustained ventricular tachycardia and ventricular fibrillation as well as mechanical ventilation rates. They quoted a figure of 29.7% for these complications compared to 14.1% for the months before the COVID 19 outbreak.[23]

In fact, this reduction in attendance was seen across both adult as well as pediatric EDs. Some pediatric EDs across Ireland reported decreases of between 73% and 88% in their daily attendances. A combination of biological, psychological, and social factors may be the reasons for these observations.[25,26]

**Factors for Delayed or Nonpresentation to the Emergency Department**

The reduction in ED attendances across the world, especially in the early phases of the COVID 19 pandemic is an interesting observation. In looking at the possible root causes, there are the more generic factors, which may be common across many nations, as well as the more specific, localized factors which are peculiar to certain countries and maybe culturally driven. The media hype in a very connected world can also affect decision making. For example, in the early stages of the outbreak, the reported number of cases increased rapidly can instill fear and discomfort in public.

Below are some examples of the patient-related as well as healthcare system-related factors, which may have been the possible causes and explanation for the trends observed in the EDs. Some of these may be more applicable in certain communities or groups.[27,31]

**Patient-related factors**

1. Many patients encountered anxiety during the outbreak and especially so during the early phases of COVID 19, when much debate was ongoing on issues such as the exact mode of transmission and whether to wear a mask or not in certain settings
2. Fear of contracting the infectious disease, knowing its contagious nature
3. Possible alteration in the health-seeking behavior of patients, which is affected by what they hear from both formal as well as informal sources
4. Not wanting to add further to the perceived work-burden the healthcare workers were facing. This perception could have been shaped by media hype, word of mouth when speaking to friends and relatives etc
5. Concern on spreading the virus to other family members if the patient were to be infected whilst visiting the hospitals/clinics
6. The fear and concern driven by various factors may cause patients to down-play their symptoms, misinterpret them or even ignore them
7. There may be misperceptions on multiple fronts with COVID 19 and patients may not have had the opportunity to clarify these

8. Attempts to self-manage or self-medicate at home. This may have been pushed further by the call by governments and also the media hype to stay home and not move out or interact with others, unless really essential
9. Some patients and their family members may be on “Stay Home Notices” or “Quarantine Order” and thus the fear or concern to “break the law” if they were to go out
10. For some patients, especially the elderly and the disabled living alone with no support due to the restrictions on visitations by family members, there may be no support to help them to come out to receive treatment
11. Some diseases may have a spectrum of symptoms, ranging from the “silent” and mild ones, to the more severe ones. An example may be chest pain in acute coronary syndrome, whereby the early and milder symptoms or the “silent heart attack” may tend to not present early
12. Fear of the loss of personal healthcare benefits in some countries. This is linked to the looming financial and economic crisis
13. There may be alterations in the activity pattern of people with lock-downs and stay home notices, which may have had an impact on presentations and symptomatology
14. Due to closure of many shops and businesses, there may be less places for the public to access alcohol and other commodities, which may be triggers of symptoms in some patients
15. Cultural influences. These can be community, race or country specific. For example, many from the older generation of Chinese believe that the hospital is a place with negative energy. With more publicity during pandemics and outbreaks, this may exacerbate this notion and strengthen their perceptions and beliefs.

Healthcare system-related factors
1. Many healthcare systems may have been portrayed as being busy and over-whelmed. The public may interpret this as an inability to cope, and thus, they may make a decision to not come forth to worsen the burden
2. There may be longer waiting times in departments such as the ED, especially with compulsory PPE donning and heightened infection control measures. This may deter people from coming forward for treatment
3. In some countries, patients may not have been able to get appointments made, as many operations were streamlined and made more lean during the pandemic
4. Many care pathways may have been disrupted, and this may be due to several reasons, one of which is the distancing initiatives
5. “Blindspots” by healthcare workers facing the pandemic, which may cause misdiagnosis/under-diagnosis of non-COVID-related cases
6. Lack of healthcare workforce. This can be due to a variety of reasons, for example, being infected by COVID 19, being quarantined from exposures, having to stay home to look after sick family members
7. Other policies such as lock down, stay home notices, closure of child-care centers and schools can also affect healthcare workers availability to work during these busy times.

**Behavioral Immune System and Response**

The human body’s physiological immune system helps us build defense and immunity against infections and infectious organisms. The behavioral immune system (BIS) on the other hand, is a separate one and yet can be complementary to the physiological immune system. Behavioral immune response (BIR) refers to the psychological processes that infer infection risks based on perceptual cues through the activation of aversive emotions, cognition, and behavioral impulses. These processes can be engaged with some flexibility on the nature and magnitude of aversive response. This would mean an impact on human’s social cognition and social behavior, which may tend to have an influence on implicit action for human health and wellbeing.[32,33] [Figure 3].

BIR evolved as the first line of defense against infection. It has been observed in humans and also some animal species.[33,34] In short, the BIS directs the BIR and is designed to help avoid infected individuals. It motivates pathogen avoidance. BIS comprises of a detection mechanism and BIR is a response mechanism. The former would evolve a set of unconscious psychological response to act as the first line of defense to a contagion, infectious agent, or undesirable agent. This BIS-BIR may be the reasoning behind the significant decrease in the numbers of patients with more critical diagnoses, not coming forward to seek treatment during the COVID 19 pandemic. This may explain the fact that those with symptoms or illnesses are perceptive of their vulnerabilities during this COVID 19 pandemic and thus react with adoption of quiet vigilance and avoidance in coping with their fears and perceptions. It may also be that the threat of the infectious agent can twist the psychological response to ordinary interaction or circumstances, leading people to behave in unexpected ways. This may be one of the main underlying reasons or explanations as to why patients were staying away from the ED or not seeking medical care as they normally would during the pandemic. The number of visits for non specific chest pain, AMI and a few other PI diagnoses may suggest that some patients have been delaying care for conditions that may result in increased morbidity and mortality if left untreated.

**Conclusion**

Knowing some of the above facts may help in educating the public as well as planning public health messaging, during an outbreak. As busy and overwhelmed the healthcare systems can be during a pandemic, it is important to try various options and strategies, in order not to lose additional lives. Managing misinformation, mis-perceptions, and lack of understanding is important. The onus is on governments, public health experts and every one of us to correct this, as much as we can. One example of an appropriate intervention may be to designate certain institutions/departments in the country as the ones to be receiving and managing patients related to the outbreak or pandemic, such as was done in Singapore during the SARS outbreak. One of our public general hospital was designated as “SARS Central” then. However, such decisions depend very much on operational and logistics unique to cities and countries.

**The learning points**

1. Pandemics and outbreaks can alter utilization rates and utilization patterns of healthcare and emergency services
2. A certain proportion of patients with significant and serious symptoms/diagnoses may choose to stay away from seeking healthcare due to a variety of reasons
3. It is important to understand some of these reasons, whether generic or more culturally-specific as this will help strategize interventions and educational outreach with the next outbreak
4. The BIS and response can help healthcare providers understand some of the reactions of the public and patients observed during outbreaks.

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There are no conflicts of interest.

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Lateef: COVID 19 and ED Attendance

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