European Society For Emergency Medicine position paper on emergency medical systems' response to COVID-19

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The 2019 novel coronavirus acute respiratory epidemic is creating a stressed situation in all the health systems of the affected countries. Emergency medical systems and specifically the emergency departments as the front line of the health systems are suffering from overload and severe working conditions, the risk of contagion and transmission of the health professionals adds a substantial burden to their daily work. Under the perspective of European Society For Emergency Medicine, the recommendations provided by the health authorities are reviewed focus on the emergency department's activity. *European Journal of Emergency Medicine* 27: 174–177 Copyright © 2020 Wolters Kluwer Health, Inc. All rights reserved.

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Coronaviruses, a family of viruses causing primarily respiratory infections, are responsible for 10–30% of all human respiratory infections [1]. The severity of infection ranges from mild respiratory problems, similar to the common cold [2], to bilateral interstitial pneumonia and severe acute respiratory syndrome (SARS).

Since the beginning of the 21st century, several epidemics have demonstrated the apparent ease with which these viruses can transfer from one species to another; along with these mutations comes an increase in the virulence of these new strains. The 2019 novel coronavirus acute respiratory disease, now referenced by the WHO as COVID-19 is caused by a new coronavirus officially named SARS-CoV-2. It is believed to have initially infected animals and was subsequently transmitted to humans, thus, enabling human to human transmission [3]. Being an RNA virus, SARS-CoV-2 has the inherent capacity of a high mutation rate that can make predicting the number of people infected as well as its future virulence virtually impossible. Beginning in December 2019 with infections in China, more and more countries have been affected, and on 30 January 2020, WHO declared this epidemic a 'Public Health Emergency of International Concern' [4].

The SARS-CoV-2 differs from the previous SARS and Middle East respiratory syndrome (MERS) coronaviruses. Although the early clinical manifestations are similar, SARS presented a higher virulence, reaching a mortality rate during the 2002 epidemic of about 9.5% [5], while in 2012 the MERS coronavirus epidemic reached a mortality rate greater than 30% in Saudi Arabia [6]. At the time of this writing, SARS-CoV-2 appears to be more contagious than these other two viruses with over 30 000 cases in a 2-month period; however, the mortality rate has not exceeded 2%, targeting mainly the elderly and the fragile.

Human-to-human transmission of SARS-CoV-2 has been identified from the beginning of the outbreak [3], justifying the rigorous quarantine measures that have been initiated. Healthcare facilities have played an unwillingly significant role in COVID-19 transmission [7] with a transmission rate over 40%, mainly hospital contacts, while domestic transmission remains below 30% [8].

Two important aspects may be noted. First, patients are more contagious during the severe phase of the disease, when they are likely to seek healthcare, although the possibility of contagion from asymptomatic patients cannot be excluded [9]. Second, protective measures by health services, especially in public and open environments like emergency departments (EDs) where isolation of potentially infected patients is a real challenge or clinical wards is vital [10].

Fortunately, unlike previous epidemics of SARS, identification of the infection and the virus itself has been rapid. The prompt response and massive organisation of the Chinese health system have limited its spread. Nevertheless, a large number of cases and the daily increases in cases suggest that we are facing a very contagious strain. The current transmissibility of SARS-CoV-2 is estimated by the basic reproduction number of 2.24–3.5 which is consistent with a highly transmissible virus [11].

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The clinical manifestations of COVID-19 are similar to other coronaviruses, even if, at the moment, the percentage of severe cases is lower and the virus seems to spare children [12].

Global health system impact

The COVID-19 epidemic, as well as previous coronavirus epidemics, has already stressed healthcare systems worldwide. Emergency systems, specifically EDs, are often the first access to healthcare systems, especially for acute conditions. EDs are immediately involved and increasingly affected by the outbreak and by people's natural fear of this new disease. Furthermore, this current epidemic has occurred during peak influenza season; that and other seasonal viral infections are already responsible for ED overcrowding and increased hospital admissions [13].

The nonspecific symptomology, the relatively long 2-week incubation period [14], and the absence of rapid diagnostic tests force EDs to institute standard measures based solely on clinical and epidemiological suspicion.

The 2003 SARS epidemic has provided crucial information about the transmission mode and the role of the healthcare structures. A good example of this is the nosocomial outbreak generated by a patient with respiratory symptoms admitted to an ED that caused a cluster of 128 cases, with half of the victims being healthcare professionals.

This example highlights the role of healthcare professionals and the importance of proper systems and processes to prevent further spread of the virus [15,16].

Role for emergency department

Clinical care of suspected patients with COVID-19 should focus on early recognition, and immediate isolation, as well as appropriate infection prevention measures and control measures with care taken to optimise supportive care.

Although the ED may be considered the logical direction for those affected by this epidemic, it is often crowded with patients seeking care for other illnesses. Few official recommendations have identified the roles of the ED and of Emergency Medical Services (EMS) during outbreaks [17].

The most important actions should focus on limiting the spread of infection, identifying all cases and estimating disease severity.

Preparation

Hospitals must have prepared and organised responses; in particular, EDs should prepare a plan for rapid identification and strict isolation procedures. Recommendations are based on previous coronavirus epidemics [17] and should include the following:

(1) An informative, coordinated campaign for public and healthcare professionals, focused on mechanisms of contagion [4], personal protection equipment (PPE) use, and a clinical pathway for the suspected patients infected with COVID-19.
(2) Development of a validated fast point-of-care diagnostic kit for early detection. A rapid diagnostic test will facilitate patient management considerably.
(3) The identification and availability of isolated rooms, ideally with negative air pressure. Due to the risk of the dissemination of droplets, providers must favour physical barriers between patients.
(4) An additional supply of PPE and the implementation of strict internal discipline, with different levels of protection according to the setting [18,19].
(5) The development and implementation of cleaning protocols, considering that coronavirus has been isolated on inanimate objects, and healthcare workers were infected by SARS, even without direct contact with sick patients [15].
(6) Clinical management protocols must coordinate different services such as EMS, ICU, infectious disease, pulmonary, administrative and admission services.

Training should provide information about viral management, protective measures and PPE use. Simulation is highly recommended. All healthcare professionals including ally workers should be included in training. Visual aids with the aim to immediately recognise potential cases according to epidemiology, travel history and clinical signs would also be useful.

Resource management is crucial regarding PPE and in the management of suspected cases, since the isolation of these patients will increase the need for other medical equipments.

Workforce resources are also affected by isolating patients and a revaluation of the need of professionals at all levels of the chain of care is needed. Special attention of declared sick leave and other absences are vital during the outbreak period, since it is important not only to eliminate the risk of an outbreak within the healthcare personnel, but also to guarantee enough healthcare workers.

General measures to control infection during an outbreak are even more important; hand hygiene, respiratory hygiene and contact prevention measures are the base and should be universally applied [17].

Access to the emergency department

Limit access to the ED to patients with severe symptoms (respiratory or other organ compromises). Asymptomatic patients with epidemiology that may indicate contagion (travel to countries with known outbreaks or proximity to an infected patient) or patients with mild symptoms should not be referred to the ED but should seek advice

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and surveillance through the family doctor and the prevention service of the territory.

Patients may be transported by the prehospital emergency medical service or arrive directly to the ED, creating two scenarios.

Calling the prehospital system

The patient, relative or general practitioner may alert the emergency number indicating that a potential case of SARS-CoV-2 infection with severe symptoms is seeking care. Other online phone systems for health consultation should be used in nonsevere cases.

The prehospital team will meet the patient wearing PPE, will evaluate the patient's clinical condition, analyse the risk whether family members or others who have been in contact are potentially contaminated and either organise transportation to the hospital or home isolation of all the potentially infected people.

This recommended way of seeking assistance to the healthcare system will avoid unnecessary and dangerous passage of an infected patient in the public area of the ED.

Prealerting the ED is recommended in order to facilitate preparation for patient management.

Patients going directly to the emergency department

Triage In this case, when the patient will be arriving at Triage, personnel need to immediately identify a potential case of infection from coronavirus, by evaluating the symptoms and epidemiological data in the triage room [20,21]. Recognition and classification of the case should be based on WHO criteria and the evolution of the recommendations [22]. We recommend the creation of specific triage areas for patients with acute respiratory infection criteria.

Potential case definition A person with acute respiratory infection and no other causes for the infection and at least one of the following:

(1) travel or stay in countries with known outbreak, or in one of the countries where the virus has spread in the previous 14 days or
(2) the patient is a member of a medical team working on patients infected with coronavirus or with a respiratory infection of an unknown cause or
(3) has worked with or has been in close contact with patients with respiratory infections of unknown origin or of known SARS-CoV-2 origin in the previous 14 days.

Once identified as suspected case, the patient should wear a surgical mask. All suspected cases should be located in a dedicated area to complete evaluation.

The suspected patients who will be sent to isolation wards or ICU, or transferred to a dedicated centre ward, or isolated at home should remain in a specific isolated area, minimising movements and contact with other patients within the ER.

Recommendations for contacts as defined in the WHO documents are crucial to reduce the possibility of transmission. Criteria for home or hospital isolation should be established [19].

Healthcare professional's personal protection equipment is intended to reduce the risk for healthcare workers and the risk of viral dissemination, especially amongst other patients.

Policies should be decided by the healthcare authorities and all centres should provide training about the use and disposal of all substances. Recommendations need to be widely disseminated [17]. Special attention should be applied when removing PPE. The operation should be controlled by a trained assistant, who can immediately address any breaches in protocol.

The procedure should include psychological support to protect the healthcare workforce from stress due to the PPE burden and the fear of contamination. More frequent rest breaks are needed, as is planning for beverages, food and comfort for these professionals. Emotional support due to fear of transmission should be managed through educational sessions.

Engineering measures Suspected cases should be isolated, with minimisation of movement in the ED, radiology, bathrooms or other parts of the facility. Combining multiple potentially infected cases into a group is an acceptable measure. Maintaining a security distance of 1 m to reduce droplet transmission is necessary unless the healthcare professionals are wearing the appropriate PPE. The area where patients are to be treated should maintain negative air pressure. Structure permitting, adequate ventilation should be increased in all areas.

Housing Trash management and cleaning personnel will have an increased workload due to the discharged PPE materials and extra cleaning protocols of contaminated areas. It is reasonable to reduce the number of visitors or co-operators or any unnecessary transit in this area. Biological samples from suspected infectious patients should be treated as high-risk biological material.

Uncertainties regarding the transmission and management of COVID-19 require very careful follow-up of the coronavirus epidemic. Emergency medicine should play a fundamental role not only in the management but also in the rapid identification of and as an aid for surveillance and dissemination control of COVID-19.

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Conflicts of interest

There are no conflicts of interest.

References

1 van der Hoek L. Human coronaviruses: what do they cause? *Antivir Ther* 2007; **12**:651–658.
2 Omrani AS, Matin MA, Haddad Q, Al-Nakhli D, Memish ZA, Albarrak AM. A family cluster of Middle East respiratory syndrome coronavirus infections related to a likely unrecognized asymptomatic or mild case. *Int J Infect Dis* 2013; **17**:e668–e672.
3 Li Q, Guan X, Wu P, Wang X, Zhou L, Tong Y, *et al*. Early transmission dynamics in Wuhan, China, of novel coronavirus-infected pneumonia. *N Engl J Med* 2020.
4 WHO. Statement on the second meeting of the International Health Regulations (2005) Emergency Committee regarding the outbreak of novel coronavirus (2019-nCoV). https://www.who.int/news-room/detail/30-01-2020-statement-on-the-second-meeting-of-the-international-health-regulations-(2005)-emergency-committee-regarding-the-outbreak-of-novel-coronavirus-(2019-nCoV). [Accessed 30 January 2020]
5 WHO. Coronavirus disease (COVID-2019) situation reports symptoms. 2020. https://www.who.int/emergencies/diseases/novel-coronavirus-2019/situation-reports/. [Accessed 19 February 2020].
6 WHO. Middle East respiratory syndrome coronavirus (MERS-CoV) monthly summary, November 2019. https://www.who.int/emergencies/mers-cov/en/. [Accessed 19 February 2020].
7 Wang C, Horby PW, Hayden FG, Gao GF. A novel coronavirus outbreak of global health concern. *Lancet* 2020; **395**:470–473.
8 Chowell G, Abdirizak F, Lee S, Lee J, Jung E, Nishiura H, Viboud C. Transmission characteristics of MERS and SARS in the healthcare setting: a comparative study. *BMC Med* 2015; **13**:210.
9 CDC. US Centers for Disease Control and Prevention. Coronavirus Disease 2019 (COVID-19). How COVID-19 spreads. 2020. https://www.cdc.gov/coronavirus/2019-ncov/about/transmission.html. [Accessed 19 February 2020].
10 de Wit E, van Doremalen N, Falzarano D, Munster VJ. SARS and MERS: recent insights into emerging coronaviruses. *Nat Rev Microbiol* 2016; **14**:523–534.
11 Zhao S, Lin Q, Ran J, Musa SS, Yang G, Wang W, *et al*. Preliminary estimation of the basic reproduction number of novel coronavirus (2019-nCoV) in China, from 2019 to 2020: a data-driven analysis in the early phase of the outbreak. *Int J Infect Dis* 2020; **92**:214–217.
12 Chen N, Zhou M, Dong X, Qu J, Gong F, Han Y, *et al*. Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study. *Lancet* 2020; **395**:507–512.
13 Schanzer DL, Schwartz B. Impact of seasonal and pandemic influenza on emergency department visits, 2003-2010, Ontario, Canada. *Acad Emerg Med* 2013; **20**:388–397.
14 CDC. Centers for Disease Control and Prevention. 2019 Novel coronavirus, Wuhan, China Symptoms. https: https://www.cdc.gov/coronavirus/2019-ncov/about/symptoms.html. [Accessed 19 February 2020].
15 Chen YC, Huang LM, Chan CC, Su CP, Chang SC, Chang YY, *et al*.; SARS Research Group of National Taiwan University College of Medicine and National Taiwan University Hospital. SARS in hospital emergency room. *Emerg Infect Dis* 2004; **10**:782–788.
16 Varia M, Wilson S, Sarwal S, McGeer A, Gournis E, Galanis E, Henry B; Hospital Outbreak Investigation Team. Investigation of a nosocomial outbreak of severe acute respiratory syndrome (SARS) in Toronto, Canada. *CMAJ* 2003; **169**:285–292.
17 WHO. Infection prevention and control of epidemic- and pandemic-prone acute respiratory infections in health care. WHO Guidelines. 2014. https://apps.who.int/iris/bitstream/handle/10665/112656/9789241507134_eng.pdf?sequence=1&isAllowed=y. [Accessed 19 February 2020].
18 Chen WK, Wu HD, Lin CC, Cheng YC. Emergency department response to SARS, Taiwan. *Emerg Infect Dis* 2005; **11**:1067–1073.
19 WHO. Rational use of personal protective equipment for coronavirus disease 2019 (COVID-19). 2020. https://apps.who.int/iris/bitstream/handle/10665/331215/WHO-2019-nCov-IPCPPE_use-2020.1-eng.pdf. [Accessed 19 February 2020].
20 Borgundvaag B, Ovens H, Goldman B, Schull M, Rutledge T, Boutis K, *et al*. SARS outbreak in the greater Toronto area: the emergency department experience. *CMAJ* 2004; **171**:1342–1344.
21 Wang LM, Chen YC, Tung SP, Chen CY, Chang SC, Chiang SC, Lee CH. The rationale of fever surveillance to identify patients with severe acute respiratory syndrome in Taiwan. *Emerg Med J* 2006; **23**:202–205.
22 WHO. Global Surveillance for human infection with novel coronavirus (2019-nCoV). 2020. https://www.who.int/publications-detail/global-surveillance-for-human-infection-with-novel-coronavirus-(2019-nCoV). [Accessed 19 February 2020].

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