



Simple and Individual Chest Stands for Chest X-Ray May Decrease the Risk of Potential COVID-19 Cross-Infection in the Emergency Department—A Short-Term Observation Study

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To the Editor

Until July 13, 2020, the outbreak of coronavirus disease 2019 (COVID-19) has globally infected over 13 million people and caused at least 571,000 deaths. The routes of transmission could be various, including direct/indirect contact, respiratory droplets (cough or sneezing).^{1,2} Studies have shown that the COVID-19 virus could survive for up to 72 hours on plastic materials in environment.³ The risk of cross-infection could be higher in cabin or hermetic space.^{4,5}

Unfortunately, for most emergency departments (EDs), radiation related examinations (e.g., X-ray or computed tomography scan) were acutely set up in hermetic space. Inappropriate sterilization (for room, device, or bed) would obviously increase the spread of virus and even induce the following in-hospital infection. For a busy ED, enough time or large area of sterilization on single X-ray examination room usually results in long waiting time and slows patient flow. To handle this problem, we suspect that chest X-ray might be portable and performed in different waiting (or buffer) areas according to the risk of patients.

Time and area of sterilization might be shortened by only using simple floor or wall model chest stands.

In our ED (2,500-bed medical center in central Taiwan, average 9,000 ED visits per month), we conducted a short-term (March 15–31, 2020) observation study (Institutional Review Board of Changhua Christian Hospital permission: 200409). Before coming into ED, patients would be checked for body temperature and travel, occupation, contact, and cluster histories. Each patient with fever or respiratory tract symptoms would be identified as “high risk (area A)” or “potential risk” (area B) (Table 1). After initial assessments, each of them received portable chest X-ray (standing, posteroanterior view, using simple floor, or wall model chest stands) for confirming the possibility of lung lesions in their own areas (Fig. 1). The mean sterilization times were also compared between using X-ray room (n = 52; mean: 21.2 mins), negative-pressure room (n = 32; mean: 36.1 mins), and floor/wall chest stands (n = 210; mean: 1.2 mins). Finally, all risk patients also received virus tests. The sterilization time in this study was measured as “time between cleaning staff entering the room/area and

Received: May 19, 2019; Revised: July 8, 2020; Accepted: July 17, 2020.

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Table 1. Criteria of risk identification

Risk of infection	Criterion
High	Fever or respiratory tract symptoms AND 1 of the followings in recent 14 days: 1. Travel to highly endemic area ^a 2. Had direct contact with confirmed cases 3. Abnormal smell/taste 4. Unexplainable gastrointestinal tract symptoms
Potential	Fever or respiratory tract symptoms AND 1 of the followings in recent 14 days: 1. Recurrent fever or respiratory tract symptoms 2. High risk occupation (e.g., medical staff, flight attendants)

^aHighly endemic areas were defined by and updated according to a statement from Taiwan Centers for Disease Control (CDC).

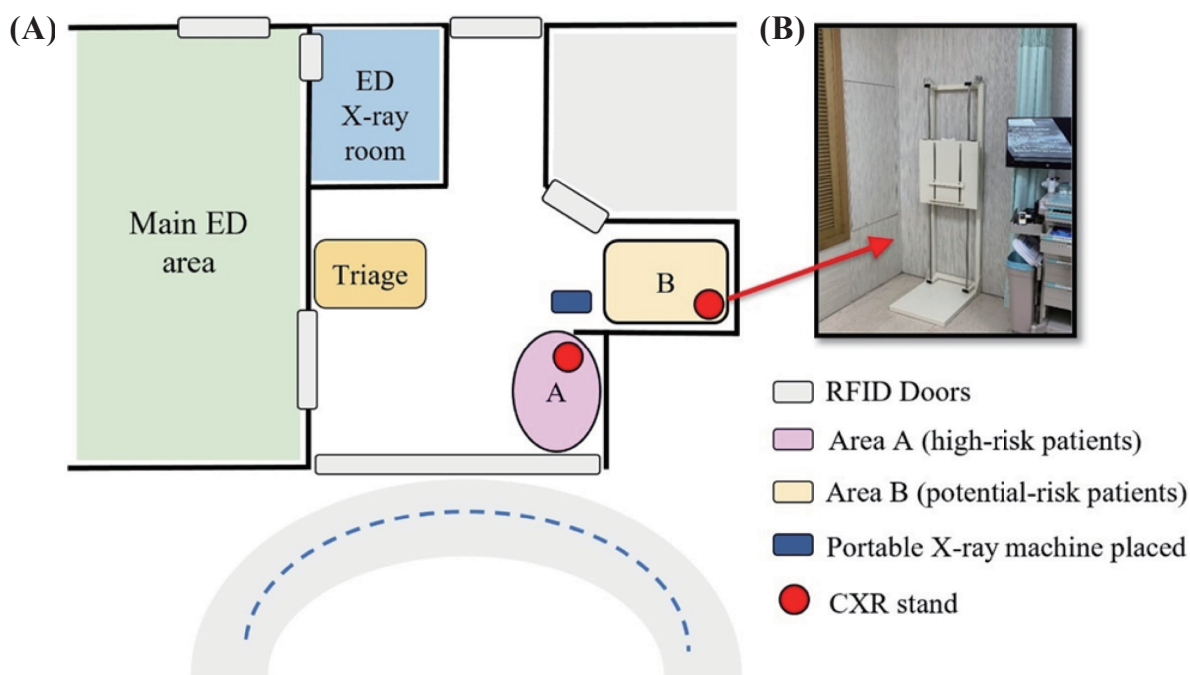


Fig. 1. (A) Patients received individual portable chest X-ray (standing, posteroanterior view, and using simple floor/wall chest stands) for confirming the possibility of lung lesions in area A and B. Each risk patient was asked to keep at least 1.5 m distance from the others. (B) Setting chest stand in area B. Portable radiation barriers were used to block radiation leakage. Before coming into emergency department (ED), each patient would be checked for body temperature and travel, occupation, contact, and cluster histories by ED triage. Once they were identified as “high risk (area A)” or “potential risk” (area B), they would be asked to move in their screening areas (following the instructions and walking by themselves). Critical risk patients would be arranged in individual negative-pressure room (not classified as area A or B).

CXR: chest X-ray; RFID: radio frequency identification.

leaving the room/area.” The chlorine-based products were used for sterilization.

During this period, total 294 patients were included (135 were potential-risk and 159 were high-risk patients). Floor/wall chest stands could reduce

much sterilization time than using X-ray room or negative-pressure room (respectively reduced 20 and 35 minutes in average, per case). Among the high-risk patients, 25 (8.5%) had pneumonia and 2 (0.68%) were confirmed as COVID-19 infection. However,

among those with potential-risk, only 4 (1.4%) had pneumonia and none of them had COVID-19 infection. Of all, the COVID-19 patients did not cause any cross-infection. In conclusion, setting floor/wall chest stands in different risk areas in ED would save much sterilization time. More important, it potentially decreases the chance of cross-infection.

Conflicts of Interest Statement

The authors report that they have no potential conflicts of interest to disclose.

References

1. Rothe C, Schunk M, Sothmann P, et al. Transmission of 2019-nCoV infection from an asymptomatic contact in Germany. *N Engl J Med* 2020;382:970-971. doi:10.1056/NEJMc2001468
2. Liu YC, Liao CH, Chang CF, Chou CC, Lin YR. A locally transmitted case of SARS-CoV-2 infection in Taiwan. *N Engl J Med* 2020;382:1070-1072. doi:10.1056/NEJMc2001573
3. van Doremalen N, Bushmaker T, Morris DH, et al. Aerosol and surface stability of SARS-CoV-2 as compared with SARS-CoV-1. *N Engl J Med* 2020;382:1564-1567. doi:10.1056/NEJMc2004973
4. Rahimi F, Talebi Bezmin Abadi A. Challenges of managing the asymptomatic carriers of SARS-CoV-2. *Travel Med Infect Dis* 2020;37:101677. doi:10.1016/j.tmaid.2020.101677
5. Mizumoto K, Chowell G. Transmission potential of the novel coronavirus (COVID-19) onboard the Diamond Princess Cruises Ship, 2020. *Infect Dis Model* 2020;5:264-270. doi:10.1016/j.idm.2020.02.003