Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Dangerous Misperceptions About Negative-Pressure Rooms

To the Editor:

We would like to shed light on a common yet dangerous misperception in the medical community about so-called negative-pressure rooms. The preferred terminology is airborne infection isolation room, which is defined as having negative pressure, 6 to 12 air exchanges per hour (12 preferred), and direct exhaust to the outside or through a high efficiency particulate air filter.[1]

In its zeal to protect health care professionals, the Centers for Disease Control and Prevention recommends that aerosol-generating procedures, such as noninvasive positive-pressure ventilation and intubation, "ideally" be conducted in an airborne infection isolation room.[2] Many of our colleagues believe this is endorsed because they are safer in such a room. Unfortunately, these rooms do little to protect individuals in the room with the patient during the aerosol-generating procedure. They help protect individuals outside the room by keeping more aerosol within the room when the doors are opened and offer the benefit of enhanced air exchanges, which reduces the time from completion of an aerosol-generating procedure until it is safe to reenter the room without complete airborne personal protective equipment precautions.

Twelve air exchanges per hour is recommended for an airborne infection isolation room, meaning 23 minutes is required for 99% air removal efficiency and 35 minutes for 99.9% efficiency. For comparison, a standard patient room with 6 air exchanges per hour requires 69 minutes for 99.9% efficiency.[1] Even with enhanced air exchanges in airborne infection isolation rooms, we have no evidence that physicians, nurses, or respiratory therapists performing an aerosol-generating procedure are protected in any way. If the patient is continuously generating aerosolized particles, as occurs with normal breathing without a mask, coughing, or ongoing noninvasive respiratory support, negative pressure and air exchanges will not make the room much safer, especially if one is close to the patient.

Our greatest concern about this misconception is that providers will use insufficient personal protective equipment precautions or withhold essential treatments because such a room is not available. If providers are performing an aerosol-generating procedure for a patient with known or suspected COVID-19, we recommend that they take the same airborne and contact precautions whether or not the procedure occurs in an airborne infection isolation room. If an airborne infection isolation room is not available, aerosol-generating procedures may still be safely performed as long as the providers are wearing appropriate respiratory personal protective equipment, extra attention is paid to keeping the doors closed, and reentry without airborne precautions does not occur until the time needed to ensure at least 99% removal efficiency, based on air exchanges per hour for each room as determined by hospital engineering.

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Time to Implement the European Society of Cardiology 0/1-Hour Algorithm

To the Editor:

We read with great interest the High-Sensitivity Cardiac Troponin I Assays in the United States (HIGH-US) study conducted by Nowak et al,[1] which found that the European Society of Cardiology 0/1-hour algorithm has a high sensitivity and specificity when applied to a diverse US population. The high-sensitivity cardiac troponin–based 0/1-hour algorithm has been mainly studied in European cohorts, with fewer data from outside the region. This is a landmark study that showed that the 0/1-hour algorithm can be safely applied to patients in the United States.

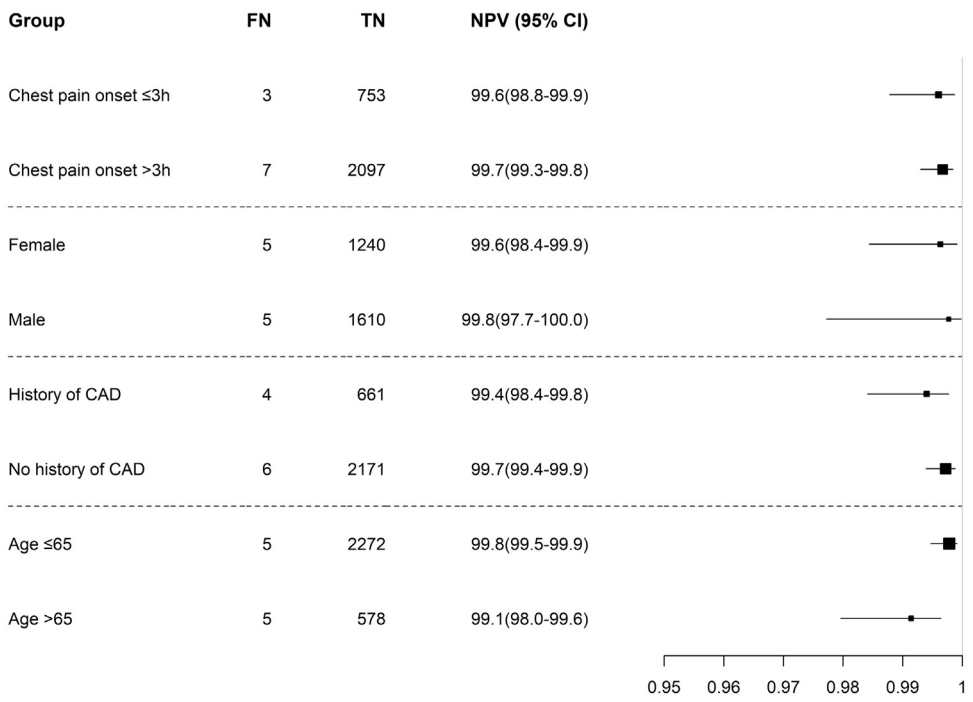

Figure. Performance of the 0/1-hour algorithm in clinically important subgroups. These are pooled data derived from 4 distinct cohorts: Advantageous Predictors of Acute Coronary Syndromes Evaluation, Biomarkers in Acute Cardiac Care, High-Sensitivity Troponin in the Evaluation of Patients With Acute Coronary Syndrome, and HIGH-US. *FN*, False negative; *TN*, true negative; *NPV*, negative predictive value; *CAD*, coronary artery disease.

In a recent meta-analysis, we found that the 0/1-hour algorithm has very good diagnostic accuracy across 10 distinct cohorts.[2] In that analysis, we included the preliminary data from the HIGH-US cohort. Additional data from the HIGH-US cohort reported in this study allowed us to conduct an updated meta-analysis to address important questions pertaining to the 0/1-hour algorithm.

Even though there have been many investigations on the 0/1-hour algorithm, there are still concerns regarding its safety in several clinically important subgroups of patients. We conducted an updated meta-analysis and found that the rule-out performance of the algorithm was comparable in patients who presented early (≤3 hours) versus those who presented late (>3 hours), female versus male patients, patients with a history versus no history of coronary artery disease, and patients who were young (≤65 years) versus old (>65 years) (Figure).

To further validate the safety of the algorithm in the United States, we conducted a comparative meta-analysis and found that the United States has a sensitivity and negative predictive value for the 0/1-hour algorithm comparable to that of other regions (sensitivity 98.4% [96.5% to 99.3%] versus 97.8% [93.3% to 99.3%]). The specificity and positive predictive value of the algorithm were also similar between the United States and other regions (specificity 92.1% [96.4% to 95.5%] versus 94.4% [86.0% to 97.9%]).

Previously, we analyzed the 30-day mortality of patients triaged by the algorithm, using the Roche high-sensitivity cardiac troponin T assay.[2] We performed an additional meta-analysis based on the Siemens high-sensitivity cardiac troponin I assay. Patients in the rule-out, observation, and rule-in group had pooled 30-day mortality rates of 0%, 2%, and 4%, respectively, consistent with the pooled estimates for the Roche high-sensitivity cardiac troponin T assay. Collectively, results from the HIGH-US study and our additional analyses indicate that the European-derived 0/1-hour algorithm has high diagnostic and prognostic value.

Recent influential studies have demonstrated safety performance of the 0/1-hour algorithm comparable to that of the standard care arm, and resulted in a higher proportion of discharge (45.1% versus 32.3%) and shorter length of stay in the emergency department (4.6 versus 5.6 hours).[3] Although many centers in Europe have adopted the 0/1-hour algorithm, most other countries in the world are using the high-sensitivity cardiac troponin–based 0/3-hour algorithm or conventional troponin-based algorithms.[4] We believe there is now ample evidence to show that the European Society of Cardiology 0/1-hour algorithm is safe and efficacious across different populations. In the wake of the coronavirus disease 2019 pandemic, a safe and rapid mean of triaging patients with suspected acute coronary syndromes is urgently needed.[5] It

is time to promote the use of the 0/1-hour algorithm to lessen ED congestion and reduce the risk of nosocomial coronavirus disease 2019 infection.

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In reply:

We thank Chiang et al[1] for their meta-analysis and resulting recommendation for the global use of the European Society of Cardiology (ESC) 0/1-hour algorithm for the rapid assessment of patients presenting to the emergency department (ED) with symptoms suspicious for acute myocardial infarction and also for its update that has incorporated the results of the High Sensitivity Cardiac Troponin I in the United States study.[2] Although we agree with the overall recommendation that the use of the ESC 0/1-hour algorithm for the rapid assessment of patients presenting with symptoms suspicious for acute myocardial infarction should be more broadly implemented in the ED in countries around the world, we suggest some precautions. Data from Europe, the United States, Australasia,[1] and South America[3] support the overall use of this ESC algorithm. However, there is no information available about how it might perform in other individuals (race, size, diet, comorbidities, etc) such as those in Asia, India, and Africa. In these other populations, the ESC algorithm should be the preferred one used until further studies are completed and the algorithm is either validated or an alternative one recommended.

We report, as others have, that the ESC high sensitivity cardiac troponin I acute myocardial infarction rule-out cut points are also applicable to many subgroups of patients presenting to the ED, including those with symptoms onset in less than or equal to 3 hours. However, we do not know whether outcomes will be the same for patients presenting to the ED with even shorter symptoms onset ($\leq$1 hour) because few of these patients have been studied. Consequently, in our opinion, it remains prudent to consider a third high sensitivity cardiac troponin I test later for the rule-out of acute myocardial infarction in these very early presenters until more data concerning this patient population are available.

The good news is that using the ESC 0/1-hour acute myocardial infarction assessment algorithm in the