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The authors respond: Public health intervention in the ED for hypertension

We thank Mr. Oscar M. Jolobe for the interest in our article. Exercise is certainly a highly beneficial activity, and an emergency department visit does indeed present an opportunity for promoting such prevention strategies. Emergency departments are increasingly being asked to deploy public health interventions such as HIV testing with risk reduction counseling, and mental health and substance abuse screening among others. We posit that substantial barriers remain to achieving the behavior change required to improve health outcomes through a brief intervention. There is a considerable need for research, practice, and policy change to balance the competing missions of acute care and public health, identify the resources required for emergency departments to adopt a public health mission, and promote linkage to more appropriate venues for longitudinal interventions needed to achieve sustained behavior change.

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Cranial CT of nontrauma emergency department patients

I have greatly enjoyed reading the recently published article by Covino et al. [1]. In this retrospective study, the authors evaluated 1156 patients presenting to the ED for neurological deficit, postural instability, acute headache, altered mental status, seizures, confusion, dizziness, vertigo, syncope, and pre-syncope. The authors built a score for positive cranial computed tomography prediction by using a logistic regression model on clinical factors significant at univariate analysis. I congratulate the authors for their successful article. However, I have some concerns about article. First, this study was retrospective and did not include ED patients who did not undergo cranial computed tomography. Therefore, it must be stressed that the true effect of applying these clinical predictors cannot be assessed. There is need for prospective validation of the clinical predictor variables that identified in this consecutive series of ED patients with nontraumatic neurologic symptoms who did undergo cranial computed tomography. Second, as a result of the retrospective nature of this study, patient assessment and documentation of clinical findings were not standardized. Finally, owing to the retrospective design of the study, there was no standardization of the terminology contained within the computed tomography requisitions.

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The author responds: The need for prospective studies of cranial CT for ED head trauma patients

Dear Sir,

I sincerely appreciate your interest in our work, and I thank you for the questions about our paper. In our study we retrospectively reviewed clinical data of 1156 patients presented to our ED for several clinical condition non-related to trauma, and build a score for positive cranial CT scan prediction in the ED setting. We furtherly validated our score on a prospective population of 508 patients.

Our data confirmed that risk stratification could reasonably reduce head CT utilization in the emergency department patients, keeping high standards of sensitivity.

In the first point of your letter you underline that the true effect of applying this clinical predictor could not be assessed since we did not include patients that did not undergo CT scan. However since the purpose of our work was to give a tool to emergency physicians to reduce just urgent head CT scan in the ED, we think that the design of our study is adequate to our endpoint. Furthermore it would be very difficult to design a study were every patient should undergo a urgent head CT scan regardless of clinical evaluation and physician judgement. So, in our opinion, the true incidence of any head CT rule cannot be mathematically estimated at 100% in the real world.

As concern the second point of your letter, we completely agree with you regarding the need of further prospective validation of our work. Although limited by retrospective design, the need for a standardization of sign and symptoms was clear to us, and we analyzed our clinical records wisely to achieve that. This point was facilitated by our single center design, since our emergency physician staff, and neuro-radiologist staff, was the same in the whole period observed into the study. However our study limitations remains very clear to us, and this point is underlined at the end of the manuscript were we state: "*Limitation of this study include the single center design, and the reduced sample observed. An independent validation of the score is obviously necessary, possibly by prospective controlled trials, prior to consider it in common clinical practice*".

I hope that further authors could contribute to better define these issues that are of sure interest for emergency physicians and could surely reduce unnecessary use of CT scan in the ED.

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"The authors reply" Prehospital Ventilation and Oxygen strategy in septic patients

Dear Editor,

We thank Karim et al. [1] for their interest and relevant comments about our article [2].

First, as they underlined in their letter, our work suggests an association between hyperoxemia in patients with septic shock subjected to prehospital mechanical ventilation and mortality at 28 days upon intensive care unit admission (ICU) [2]. We agree that these observations raise an important issue, even considered as a controversial "hot topic".

Interestingly, many teams are currently evaluating the benefit/risk balance between only strictly correcting hypoxemia, versus applying a more liberal oxygen strategy in patients presenting with life-threatening critically ill conditions [3]. The use of a conservative oxygen strategy to avoid patient exposure to unnecessary hyperoxemia is close to be admitted by many physicians [4]. A clinical trial, prematurely stopped, simultaneously evaluated hyperoxia versus normoxia associated with hypertonic versus isotonic saline infusion in a 2×2 factorial design in septic patients. The authors reported an increased mortality rate in the hyperoxia arm (NCT01722422) [5]. A randomized study is currently ongoing to assess short- and long-term effects of two different arterial partial pressures of oxygen (PaO_2) targets for ICU patients presenting with systemic inflammatory response syndrome (105–135 mmHg versus 60–90 mmHg, O_2-ICU study, NCT02321072). This study might provide answers as to whether or not hyperoxemia may have beneficial or deleterious effects in septic patients.

Hyperoxemia and molecular downstream mechanisms are time-dependent. Most data gathered in the ICU have focused on patient's outcomes associated with relatively prolonged hyperoxemia, from the first 24–72 h of ICU stay to the entire period of mechanical ventilation [6]. In the first 24 h after ICU admission, deleterious effects of hyperoxemia were reported on mortality [7]. Data from animal studies reported negative effects of hyperoxemia after only a few hours of exposure, leading to changes in inflammation and pulmonary mechanics [8, 9]. Overstimulation of mitochondrial functioning increases the release of cytochrome *c*, which induces the activation of apoptotic pathways. In parallel, hyperoxemia depletes cellular ATP, and increases the production of reactive oxygen species (ROS) leading to oxidative damage. ROS produce mitochondrial damage impacting ATP production [10]. Nevertheless, the effects of hyperoxemia and their time to onset in the prehospital setting remain unclear. A recent work evaluating relatively brief exposure (3.5–7.5 h) to hyperoxemia in the emerging department prior to ICU admission in critically ill patients showed negative clinical outcomes [11].

The exact exposure time to hyperoxemia was not precisely given in our work [2]. However, our patients were approximately exposed to high oxygen levels in the prehospital setting of average of 99 ± 39 min. In our study, patients were intubated and mechanically ventilated because they needed to, as they presented with acute respiratory failure, so that the use of non-invasive ventilation was not appropriate in this context.

The absence of accurate monitoring of partial arterial pressure of oxygen (PaO_2) in the prehospital setting is inherent to the specificities of this working environment. This situation is unfortunately frequent in the prehospital setting, where liberal oxygen therapy is generally performed. Modification of the fraction of oxygen concentrations (FiO2) induces changes in the PaO2 in time interval of 30 to 60 min approximately. Consequently, good clinical practices in the prehospital setting are harder to evaluate compared to inside the hospital, since precise monitoring of gas exchanges is less accessible.

However, our study described real clinical practices in the prehospital setting and consequently emphasizes the need for more accurate data on prehospital patients, and the need for guidelines on ventilator settings, especially regarding FiO2.

Secondly, we included all patients above 18 years with septic shock criteria according to the surviving sepsis campaign definition [12], and subjected to assisted-mechanical ventilation before hospital admission [2]. Our patients did not have conditions associated with ischemia/reperfusion injury, such as post-cardiac arrest or stroke.

Thirdly, in emergency situations, patient's medical history should not affect the patient's management. The priority of care is driven by neurological, respiratory and hemodynamic failures. The SOFA score was not different between our two groups ($p = 0.12$). Statistical analysis was performed using propensity scoring ensuring adjustment on confounding factors. A Student *t*-test is not an adequate test for a small population and data were not distributed according to a normal distribution. Wilcoxon test might be used for non-gaussian distribution but is not appropriate in this type of studies. Using propensity score analysis including SOFA score, pre-hospital duration, lactate, and prehospital fluid volume expansion, association with mortality at 28 days only remained significant for a $PaO_2 > 150$ mm Hg ($p = 0.02$, OR [CI95] = 1.59 [1.20–2.10]). Deceased patients had higher PaO2/FiO2 ratio, meaning that deceased patients were more frequently exposed to hyperoxemia. This observation is an agreement with the conclusion of our work.

Hyperoxemia deleterious effects appear early in the management of mechanically ventilated patients. Hyperoxemia is frequent in patients subjected to mechanical ventilation due to acute respiratory failure in emergency conditions. Therefore, FiO2 should be set with awareness as fast as possible even in the prehospital setting, to avoid over exposure