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# Resuscitation

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## Editorial

# After the lights and sirens: Patient access delay in cardiac arrest



Out-of-hospital cardiac arrest (OHCA) is a leading cause of global mortality.<sup>1</sup> Survival after OHCA is associated with many factors including rapid initiation of cardiopulmonary resuscitation (CPR) and defibrillation.<sup>2–4</sup> Every minute of delay in providing CPR and defibrillation correlates with a 7%–10% decrease in survival.<sup>2</sup> Previous investigations have demonstrated improved survival with a decrease in the 9-1-1 call to emergency medical service (EMS) arrival on scene interval,<sup>5–7</sup> but few have looked at the vehicle arrival on scene to personnel arrival at the patient, or curbside-to-care (CTC) interval.<sup>5,6</sup> Delay in access to patients not on the ground floor, or “vertical access delay,” has been shown to cause longer CTC intervals and lower survival to hospital discharge.<sup>8–10</sup> This led to the question: is a shorter CTC interval associated with better outcomes for patients with OHCA?

In this issue of *Resuscitation*, Sinden and colleagues investigate this question for patients with non-traumatic OHCA.<sup>11</sup> The authors performed a secondary analysis of the data obtained in the Resuscitation Outcomes Consortium’s “A Randomized Trial of Continuous Versus Interrupted Chest Compressions in Out-of-Hospital Cardiac Arrest” (the “CCC Trial”).<sup>12</sup> This trial included over 26,000 participants with non-traumatic OHCA between June 6, 2011 and May 28, 2015 and spanned 10 regional centers in both the United States and Canada. The CTC intervals were grouped into quartiles ( $\leq 62$ , 63–115, 116–180 and  $\geq 181$  s) and compared using a logistic regression model adjusted for covariates associated with OHCA outcomes. The authors found significant differences between the shortest quartile and each of the two longest quartiles for both survival with favorable neurological status [aOR 0.77 (0.66–0.89) and aOR 0.66 (0.56–0.77)] and survival to hospital discharge [aOR 0.79 (0.68–0.89) and aOR 0.67 (0.58–0.78)].

Sinden et al. further hypothesized that the adverse effect of increased CTC could be potentially blunted by bystander CPR. While favorable outcomes were more common in patients who received bystander CPR for all quartiles, bystander care did not ameliorate the impact of longer CTC intervals. Much of the previous literature investigating CTC was performed in urban settings<sup>8,10</sup>; the “CCC Trial” dataset includes participants from rural and suburban regions in addition to urban environments. This diversity and the large sample size support the generalizability of these findings.

It is essential to consider the limitations of this study. Event times were collected in two forms: manually recorded provider “watch” times and times recorded by dispatch or on the defibrillator. The manually recorded times introduce potential error. Another possible reason for

inaccuracy of time documentation is that providers may have initiated other interventions before turning on the defibrillator, which was used as the marker for arrival at patient. While the authors controlled for many of the common variables associated with OHCA outcomes, they did propose an additional potential confounder: EMS personnel motivation. They suggest that shorter CTC intervals may in part represent more motivated providers who not only hasten to the patient, but also perform superior care. While not directly investigated in this study, this conjecture is potentially valid and deserves further inquiry.

The results of this study are not unexpected, but they are still important. The findings support implementing mechanisms to facilitate faster EMS access to patients once the wheels stop. Given the superior outcomes in the  $\leq 62$  s group when compared to the  $\geq 116$  s groups, the authors suggest a 2-min CTC threshold as a quality metric for EMS agencies. Cases that fail to meet this cutoff could be retrospectively reviewed in order to develop new strategies or processes to improve EMS access to patients in those locations. These might include having dispatch centers directing callers to meet EMS if entry site is not obvious and assuring responders have building entry codes or access keys/devices. The authors discovered variation in CTC intervals between the 49 enrolling clusters. While not directly evaluated, this variability suggests that some regions may have better systemwide methods in place to optimize patient access after arrival on scene and that opportunity for improvement exists in other systems.

This report might be considered untimely news as it comes when the Covid-19 pandemic now requires responders to don additional personal protective equipment (PPE) from what has historically been used for EMS response to OHCA.<sup>13</sup> Application of this additional PPE may be associated with longer CTC intervals<sup>14</sup>; however, there are proposed strategies to help mitigate this delay.<sup>15,16</sup>

So where do we go from here? This study provides good-quality evidence that the CTC interval is an important component of the total response time and impacts survival and neurological outcomes. EMS agencies should assess their CTC intervals and make efforts to shorten these times as much as possible. Facilitating prompt access to the patient after the lights and sirens are no longer able to help will improve patient outcomes.

## Conflict of interest

Dr Mosesso participates in post-market AED surveillance research for Philips.

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