

Can resuscitation run like a fine Swiss timepiece?

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This editorial refers to ‘Better management of out-of-hospital cardiac arrest increases survival rate and improves neurological outcome in the Swiss Canton Ticino’ by R. Mauri *et al.*, on page 398–404.

Resuscitation of cardiac arrest involves a number of time-dependent steps including early activation of the emergency response system, bystander cardiopulmonary resuscitation (CPR), early defibrillation, advanced care, and post-cardiac arrest care, widely known as the chain of survival.¹ Each link in this chain plays a critical role in determining the ultimate outcome of the patient. More recently, a sixth component in this sequence has emerged, described as early community activation.² This occurs when the public itself participates in the organized response to a cardiac arrest thru use of social media technologies that summon volunteer lay rescuers who are in close proximity to the arrest scene.³ Taken together with a comprehensive cardiac arrest surveillance system, high-performance CPR by professional providers and an emphasis on continuous quality improvement, these measures offer the hope of improving survival outcome from out-of-hospital cardiac arrest in any community where they are applied. The question is do they?

In this issue of the journal, Mauri *et al.* respond with a resounding yes. Based on their 10-year experience of resuscitating patients with out-of-hospital cardiac arrest in the Swiss Canton Ticino, they report a more than three-fold increase in survival (from 15 to 55%) among 454 patients with bystander-witnessed out-of-hospital cardiac arrest due to ventricular fibrillation, nearly all of whom were discharged from hospital with a cerebral performance category score of 1–2 (meaning at most only mildly neurologically impaired).⁴ How was this remarkable outcome achieved?

First, the ability to accrue and report such findings would not be possible without the systematic capture and characterization of all incidents of cardiac arrest in a comprehensive registry.⁵ While not specifically mentioned, the acquired database for the current study was described as containing comprehensive Emergency Medical Service (EMS)-related data that ideally would include CPR process measures such as compression rate and pauses, hopefully with a mechanism for regularly relaying this feedback to EMS providers. Such registry-related work is arguably the least glamorous, most

tedious, and time-consuming aspect of EMS activities, yet along with patient care serves as perhaps its most important one. Without proper surveillance, a system's actual performance remains unknown. In the absence of such data, even well-intentioned desires for improvement will lack focus, face greater challenges in gaining acceptance from providers, and have limited impact. Conversely, knowledge of one's performance can itself incentivize and promote better practice. This in part is why creation of a national registry of cardiac arrest is strongly advocated by the Institute of Medicine and its partners in the USA, as it should be around the world.⁶ But is this necessarily sufficient?

A second requirement for successful resuscitation is a well-organized and rapidly responsive system of care.⁷ It takes precisely such a system to save a patient. The system of care deployed in the Canton Ticino is remarkable not only for its implementation of a chain of survival that stretched from the cardiac arrest event to post-cardiac arrest hospital care, but is perhaps unique in how it so successfully solicited the early participation of lay responders along the way. Both professional (defibrillator-equipped police and EMS) and lay responders simultaneously joined in the resuscitation effort, the latter guided to the location of arrest by a messaging system which also identified a nearby automated external defibrillator (AED). Over time, this was observed to result in a growing proportion of patients who received bystander CPR before EMS arrival, a shorter interval from collapse to initiation of CPR and greater deployment of AEDs. In addition, during later years, resuscitated patients in whom a cardiac cause of arrest was suspected were directed to a tertiary care centre offering immediate coronary revascularization and targeted temperature management. This comprehensive system of very early prehospital and hospital care in which each component contributed to what the other could not, undoubtedly led to saving many lives than might otherwise have been achievable. But is such success generalizable and able to be replicated in other communities?

The answer again is a resounding yes. In 2008, the Seattle-King County Resuscitation Academy (www.ResuscitationAcademy.org) was launched in an effort to provide the practical tools, insights, training, and motivation for communities to assess and improve their local outcomes from out-of-hospital cardiac arrest.⁸ Included

in the Academy agenda are instructions for how to create and deploy a cardiac arrest registry, how to establish partnerships with dispatch centres to foster telecommunicator-prompted CPR, utilization of social media to solicit and enhance lay response to cardiac arrest, hands-on exposure to high-performance CPR, and other pragmatic measures. The effort has been so successful that Resuscitation Academies modelled on this endeavour are now being independently conducted across the USA, Europe, and Asia, including the creation of a 'virtual' online Resuscitation Academy (<https://www.canvas.net/browse/uwashington/courses/resusc-acad>). Motivated communities that have deployed the principles taught and demonstrated at these academies and described in this editorial have seen a significant improvement in survival from cardiac arrest. In short, the answer as to whether we can do it is—Yes, we can!

Finally, it should be acknowledged that there is no magic potion or secret sauce that sustains the reported high success of resuscitation in the Swiss Canton Ticino, nor Rochester Minnesota, or Seattle-King County, Washington in the USA or in other similar communities. Rather, it is the culmination of hard work and application of the same principles needed to build and maintain the running of a fine Swiss timepiece. Account for all the pieces, link the critical components, and recalibrate periodically to insure that all parts continue working together in a manner that achieves the intended

result—whether that be keeping proper time or in this case saving lives.

Conflict of interest: None declared.

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