Will the Combination of Public Education and Medical Innovation Improve the Outcomes of Sudden Cardiac Death?

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“Imagination is raising the level of reality”

Gaston Bachelard (1884–1962)

Sudden cardiac death (SCD) remains a major public health problem, with overall survival rates ranging between 2% and 5%. Community-based interventions have demonstrated effectiveness in increasing the number of patients who reach hospital alive. However, public awareness programs are hard to implement and their effectiveness difficult to estimate in clinical practice. Hence, many guidelines are based on consensus. The 2010 Cardiopulmonary Resuscitation (CPR) guidelines recommended that citizens previously trained in CPR provide 30 : 2 CPR and that emergency medical system (EMS) dispatchers provide telephone instruction in chest-compression-only CPR for citizens not trained in CPR. However, there are few studies comparing both techniques.¹

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In this issue of the Journal, Nago et al report their results of dispatcher-assisted instruction in CPR using data from the All-Japan Utstein registry.² An impressive number of SCDs (173,565) were analyzed. On arrival at the scene, EMS responders assessed the status of dispatcher-assisted CPR instruction and bystander CPR technique (chest compression with or without rescue breathing). The primary endpoint was favourable neurological outcome 30 days after cardiac arrest. Chest-compression-only CPR resulted in better neurological outcome than standard CPR in the whole cohort and in the subgroup of cardiac cause. These results support the use of chest-compression-only CPR for bystander witnessed out-of hospital cardiac arrest in all adults.

The authors should be congratulated on the impressive amount of data available in the registry. Furthermore, the proportion of dispatcher-assisted CPR instruction was already high at the beginning of the study and increased year by year, up to 43.9%. This clearly shows that Japan is at the forefront of public awareness programs on cardiac arrest. However, despite this huge investment, 30-day neurological favourable survival was low, slightly over 4%. How can we improve these results?

Public Education: Young and Simple

More than half of the bystanders hung up before dispatcher CPR instruction and one-third of the bystanders receiving dispatcher CPR instruction did not attempt bystander CPR. Bystanders are often unable or unwilling to perform CPR regardless of whether dispatcher CPR instruction is provided or not.³ The future is most certainly in public education programs provided in schools to children who are quick learners and have less apprehensive of performing CPR.⁴ Furthermore, chest compression-only CPR is easier to learn and is most certainly easier to accept compared with CPR using mouth-to-mouth ventilation. Cardiologists should be involved in these programs and volunteer to teach at schools on a regular basis.

Automatic External Defibrillators: Great, But Not Enough

Automatic external defibrillators (AEDs) have been available for more than 10 years.⁵ It is difficult to avoid seeing them when you land from a long and gruelling flight and are walking towards customs in an international airport. AEDs are an efficient method of delivering defibrillation to persons experiencing out-of-hospital cardiac arrest (OHCA) and their use by both traditional and non-traditional first-responders is safe. However, the availability of AEDs will reduce SCD mortality only if they are associated with a program of public education on CPR for SCD, which must be repeated on a regular basis. Each country or region must find the magic solution with programs organized by the government, health ministries, or non-profit organizations.

Chain of Survival: Learn to Work Together

Treatment of cardiac arrest is a chain with many “links”. The majority of SCDs are presumed to be of cardiac arrest. Data on the use of coronary angioplasty is lacking in the All-Japan Utstein registry, but other registries have reported favourably on the use of immediate coronary angioplasty in survivors of OHCA.^{6,7} Close collaboration of prehospital EMS, interventional cardiologists and intensive care unit physicians in hospitals specializing in cardiac arrest is necessary to improve the outcome of survivors of OHCA.⁸ Furthermore, the same collaborators should also be actively involved in primary and sec-

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ondary prevention. People must be educated to call the EMS if they experience chest pain.

Pushing the Limits: Refractory Cardiac Arrest

What should be done when patients remain in refractory cardiac arrest despite multiple defibrillations? Chen et al reported on the use of extracorporeal life support (ECLS) in cases of refractory in-hospital cardiac arrest. Of 975 patients with in-hospital cardiac arrest events who underwent CPR for longer than 10 min, 113 were enrolled in the conventional CPR group and 59 in the extracorporeal CPR group. In the propensity score analysis, there was a significant difference in survival to discharge (hazard ratio [HR] 0.51, 95% confidence interval [CI] 0.35–0.74, $P<0.0001$), 30-day survival (HR 0.47, 95% CI 0.28–0.77, $P=0.003$), and 1-year survival (HR 0.53, 95% CI 0.33–0.83, $P=0.006$) favouring extracorporeal CPR over conventional CPR.⁹ More recently, Lamhaut et al¹⁰ reported a pilot study on the implantation of ECMO by non-surgeons in patients with OHCA. Prehospital use of ECLS seems feasible. Larger studies are obviously necessary, but this provocative approach could be part of the jigsaw puzzle being put in place by numerous players to reduce the mortality of SCD.

The All-Japan Utstein registry is a good example of what should be done in every country waging war against the high mortality of SCD. Registries must monitor the outcome of each patient, and the data must be analyzed objectively to improve the global management of SCD. In the past 20 years, the mortality and morbidity of acute coronary syndromes have been lowered drastically by using a combination of medical therapy and interventional cardiology. One of the “New Frontiers” for innovation and imagination for the next 20 years will be to reduce the mortality of SCD. This may be achieved by a combination of public education and medical innovation. Let’s all encourage the team players who are ready to embark on this difficult mission.

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