

Commentary

A call to arms to reduce premature deaths by using inexpensive resuscitation care

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See related research by Graf *et al.*, <http://ccforum.com/content/12/4/R92>

Abstract

Two hundred seventy thousand people in the US and 450,000 people in Europe experience out-of-hospital cardiac arrest each year. Perceived poor prognosis and expense of care of patients resuscitated from cardiac arrest remain barriers to implementation of effective therapies. In this issue of *Critical Care*, Graf and colleagues have provided a programmatic evaluation of the costs and consequences of intensive care after resuscitation from cardiac arrest. Thirty-one percent of the cohort that survived to be cared for in the intensive care setting were still alive 5 years after hospital discharge. The health-related quality of life of this group of 5-year survivors was similar to that of matched healthy controls, and the cost per quality-adjusted life year gained was similar to or less than the cost of other commonly used medical interventions. We need to change the culture of resuscitation and recognize that cardiac arrest is a treatable condition that is associated with acceptable quality of life and costs of care after resuscitation.

In this issue of *Critical Care*, Graf and colleagues [1] describe a long-term cohort study of the costs and consequences of intensive care after resuscitation from cardiac arrest. We took particular interest in this study because health care costs in the US exceed those of any other nation. This study was a programmatic evaluation rather than an assessment of a specific intervention such as therapeutic hypothermia. Thirty-one percent of the cohort that survived to be cared for in the intensive care setting were still alive 5 years after hospital discharge. The health-related quality of life of this group of 5-year survivors was similar to that of matched healthy controls. The cost per quality-adjusted life year (QALY) gained was 14,487 euros (approximately US \$22,900 at current rates). The cost per life year gained increased by 18% when it included the 6.4% of 5-year survivors who had severe neurological disability (that is, Glasgow Coma Scale score of less than 6).

How much to pay for a health intervention is a poignant question most societies have yet to answer formally. Such decisions are complex and are predicated not only on the absolute and incremental cost of the intervention but also on the quantity and quality of effectiveness data related to the intervention. Countries with a centralized planning process for health care may imply their answer when they approve or disapprove for national formulary a drug designed to extend life in a terminal disease. The UK's National Health Service recently declined approval of bevacizumab (Avastin, with a cost of therapy per year of approximately \$100,000) as first-line therapy for lung and breast cancer [2]. In the US, there appears to be a general consensus that \$50,000 to \$100,000 per year of life gained is acceptable [3]. An analysis based on economic principles suggested that we should be willing to spend up to twice the average annual income on health care [4]. In this light, less than 15,000 euros per QALY for intensive care after resuscitation from cardiac arrest is similar to or less than the cost of other commonly used medical interventions.

This study has some limitations relative to current standards for economic evaluation of health interventions [5]. It was performed in a single institution in a single country. The application of *post hoc* subgroup analysis based on neurologic status tended to underestimate the costs and overestimate the cost-effectiveness of the program. Restricting the analysis to consider a health care rather than a societal perspective underestimated costs and made it difficult to compare the results of this analysis with comprehensive economic evaluations of health care and other interventions. However, such limitations are unlikely to change the central messages of the study. These are that quality of life after

OHCA = out-of-hospital cardiac arrest; QALY = quality-adjusted life year.

resuscitation from cardiac arrest is good and that the costs of care after resuscitation are acceptable.

The study of Graf and colleagues is a timely one. Survival after out-of-hospital cardiac arrest (OHCA) has been static over time [6], but a recent analysis suggests that outcomes are improving [7]. Therapeutic hypothermia [8,9] is likely to be the first of several effective hospital-based interventions for cardiac arrest [10-12]. However, adoption of hypothermia has been slow [13]. The perceived poor prognosis and expense of care of patients resuscitated from cardiac arrest are key barriers to the implementation of effective therapies such as cooling. We need to change the culture of resuscitation and recognize that cardiac arrest is a treatable condition that is associated with good quality of life after resuscitation as well as acceptable costs of care.

In many countries, a high percentage of health care costs occur in the last year of life. Imminent death is not always predictable, and a persistent vegetative state is associated with poor quality of life. Therefore, we require better methods of predicting who will recover and who will have disability after resuscitation from cardiac arrest [14], especially in the era of hypothermia.

Two hundred seventy thousand people experience OHCA each year in the US (G. Nichol, unpublished data). About 450,000 do so in Europe based on extrapolation from population-based incidence estimates [15]. Only 7% of those with OHCA survive to discharge [16]. If we double survival after OHCA, then 18,900 premature deaths in the US and 31,500 in Europe would be averted each year. There are many ways to improve the chain of survival, including improved communications from citizens to emergency medical services, delivery of care to the patient, delivery of the patient to the hospital, and delivery of cardiac and critical care once there. The time has come for us to come together to do so.

Competing interests

SAW is a member of the American Heart Association (AHA) (Dallas, TX, USA) National Registry for Cardiopulmonary Resuscitation Adult Research Task Force. GN is a member of the AHA Advanced Cardiac Life Support Subcommittee, the Scientific Advisory Board of the AHA National Registry for Cardiopulmonary Resuscitation, and the Board of Directors of the Medic One Foundation (Seattle, WA, USA). He has received grants from the National Institutes of Health (Bethesda, MD, USA) for the Resuscitation Outcomes Consortium (2004-2009), the Laerdal Foundation for Acute Medicine (Stavanger, Norway) for a randomized trial of a CPR training aid (2007), and the Canadian Institutes of Health Research (Ottawa, ON, Canada) and Medtronic Inc. (Minneapolis, MN, USA) for a randomized trial of a resynchronization therapy (2005-2009). He has received equipment, including mannequins (Laerdal Medical, Stavanger, Norway) and

monitor/defibrillators (Physio-Control Inc., a division of Medtronic, Redmond, WA, USA), donated to support overseas medical missions. Travel expenses were provided to him by INNERCOOL therapies Inc. (San Diego, CA, USA) and Radiant Medical Inc. (Redwood City, CA, USA) for single trips in 2006. He consulted for Northfield Laboratories Inc. (Evanston, IL, USA) and Paracor Medical Inc. (Sunnyvale, CA, USA) in 2007.

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