“The art of medicine consists of amusing the patient while nature cures the disease” - Voltaire

In medicine, more intervention is often equated with better care. However, as we reflect on the quality of the care we provide, growing evidence supports that in some scenarios less intervention actually amounts to more for the patient. “Less is more” strategies include restrictive transfusion thresholds, less sedation in the critically ill, fewer applications for invasive hemodynamic monitoring and less intensive glycemic control. While critical care has driven much of the support for these practices, there are likely a number of other unidentified conditions in which less intervention will prove superior to current practice.

Many subspecialties within medicine have fallen prey to the “more is more” mentality. This seems to be most evident as new disciplines emerge. Among these fields is pre-hospital care, surfacing in its modern format in the wake of motorized transportation.

EMS systems had been undergoing evolution since the advent of volunteer based ambulance corps in the 1920s. It was not until 1966, however, when the “white paper” was published that wide reaching attention was given to accidental death and disability, the neglected disease of modern society, which highlighted the need for a more advanced pre-hospital care.

Published by the national academy of sciences and national research council, this paper addressed a number of issues, including a general lack of on-scene medical care. It concluded, in part, that both the public and government were "insensitive to the magnitude of the problem of accidental death and injury" in the U.S.; that the standards to which ambulance services were held were diverse and "often low"; and that "most ambulances used in this country are unsuitable, have incomplete … equipment, carry inadequate supplies, and are manned by untrained attendants."
In 1966, 50% of ambulance services were provided by morticians, in part because hearses easily accommodated a supine adult and morticians were available, albeit medically untrained. The transition to the modern civilian pre-hospital care system really began at this time, and was built on the issues laid forth in the white paper.

Shortly after its publication, training paradigms for EMTs were developed, followed by the training paradigm for more advanced paramedics. Advanced trauma life support and advanced cardiac life support were developed and implemented during the following decade. As the modern EMS systems of care emerged, much of the focus was on the cultivation of a medical skill set that could be applied to care for patients in field, prior to arrival at the hospital. This was the era of MORE intervention is better.

However, in 2008 the American Heart Association (AHA) published a science advisory committee paper calling into question the approach to a fundamental pre-hospital intervention, CPR. They found that the rates of inaction among bystanders witnessing a cardiac arrest was unacceptably high and proposed hands-only CPR as a means to remove some of the barriers to action; in other words, to remove the mouth-to-mouth rescue breathing component of CPR so that people would actually do chest compression (CC) only CPR. This change was supported by a number of animal model studies indicating that rates of neurologically intact survival were actually higher in the chest compression only groups compared to CC plus rescue breathing. This recommendation was followed in 2010 with the publication of the dispatcher-assisted resuscitation trial or DART, a pre-hospital exception from informed consent study.³ The findings of this study led the AHA to a massive and aggressive public health campaign to modify the approach of bystanders to CPR and to substitute the algorithmic ACLS teaching of A-B-C to C-A-B.

This study, and many other animal model and retrospective trials, have laid the groundwork for our research, investigating whether pre-hospital interventions benefit patients who have been shot or stabbed and have evidence of exsanguination.

Philadelphia is among a few cities in the country which routinely transport penetrating trauma patients by police. From the outside, this may actually seem like it would increase the risk to the patient. However, in a review of over 4000 penetrating trauma patients there was no difference found in overall mortality when groups transported by EMS were compared to those transported by police. In fact, if the patient had an injury severity score greater than 15, or was shot or stabbed, they did better if brought in by police.⁴ This is a testament that “scoop and run” may be superior to “stay and play” for select patient populations.
The Philadelphia Immediate Transport in Penetrating Trauma (PIPT) Trial is an exception from informed consent (EFIC) study that will enroll patients who have been shot or stabbed and have evidence of exsanguination. We will be randomizing patients who are injured in Philadelphia and are transported by an advanced life support (ALS) medic unit to receive either standard advanced (ALS) or standard basic (BLS) pre-hospital care. We hypothesize that pre-hospital procedures offered by ALS units, including intubation and IVF resuscitation, confer no mortality advantage for this narrow cohort of patients, and may actually worsen outcomes. We believe that these patients should be immediately transported to the hospital with minimal pre-hospital intervention.

The pre-hospital interventions on which we are focusing include intravenous fluid resuscitation and intubation. Much of the data informing our study hypothesis and design is retrospective in nature, in part due to the challenges surrounding pre-hospital research. However, Bickell, et al published the findings of their randomized, controlled trial in the New England Journal of Medicine in 1994 in which they found that there was an 8% absolute survival advantage amongst patients who were shot or stabbed with evidence of hemorrhagic shock if fluid resuscitation was delayed until the patient was in the operating room.5

The physiologic rationale behind lower mortality with delayed fluid resuscitation results from three main issues with crystalloid resuscitation (CR). First, CR offers no oxygen carrying capacity. Second, CR actually dilutes the circulating clotting factors. Third, and probably most importantly, CR can elevate the blood pressure enough to “pop the clot”, resulting in a second exsanguination.

There is additional robust animal model data supporting the concept that intubation of the patient in hemorrhagic shock leads to acute reduction in preload due to increases in intrathoracic pressure with positive pressure. Clinically we believe that this can contribute to the precipitation of cardiac arrest for the exsanguinated patient.

If we are able to definitively show that there is no mortality advantage to pre-hospital interventions for patients who have been shot or stabbed, broad scale change in the pre-hospital management of this very narrow patient population will occur. We will be able to add to the list of conditions in which LESS intervention does MORE for the patient.

References


