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PREHOSPITAL TRAUMATIC CARDIAC ARREST: THE COST OF FUTILITY

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Of 12,462 trauma patients cared for by prehospital services from October 1, 1989 to March 31, 1991, 138 patients underwent CPR at the scene or during transport because of the absence of blood pressure, pulse, and respiration. Ninety-six (70%) suffered blunt trauma, 42 (30%) suffered penetrating trauma. Sixty (43%) were transported by air utilizing county-wide transport protocols. None of the patients survived. Aggregate care cost $871,186.00. In 11 cases (8%), tissue for transplantation was procured (only corneas). *Conclusion:* Trauma patients who require CPR at the scene or in transport die. Infrequent organ procurement does not seem to justify the cost (primarily borne by hospitals), consumption of resources, and exposure of health care providers to occupational health hazards. The wisdom of transporting trauma victims suffering cardiopulmonary arrest at the scene or during transport must be questioned. Allocation of resources to these patients is not an insular medical issue, but a broad concern for our society, and society should decide if the "cost of futility" is excessive.

PREHOSPITAL CARE PROVIDERS are trained to save lives. Emergency department physicians and surgeons have ingrained thoughts of saving patients, even trauma victims in the most dire condition. Patient well-being is always placed first—above provider occupational risk, resource consumption, resource allocation, cost, convenience, or any other factors. Recently, it has become more apparent than ever that the dollars and resources available for health care are not infinite. Moreover, nondurable resources are in particularly short supply. Occupational risk to providers is an increasingly frequent concern with communicable diseases receiving constant notice in the lay and professional press. All aspects of health care are under increased scrutiny to ascertain safety, efficacy, and efficiency. With this background, we must re-examine many traditional approaches to health care delivery.

In our county trauma system, there is strong interest in reexamining the traditional approach to prehospital traumatic cardiopulmonary arrest. Increasingly, it is realized that after nontraumatic cardiopulmonary arrest, continued resuscitation efforts in the emergency department following failed prehospital resuscitation are not worthwhile and consume precious resources.[1,2] Numerous authors have reported that after traumatic cardiopulmonary arrest chances of survival are bleak, even when extreme measures are undertaken in the emergency department following arrest.[3–14] Surprisingly, the cost of extreme resuscitative measures have been infrequently examined, and then only in a cursory manner.[3,4,7]

Through the Medical Audit Committee of Hillsborough County Trauma Agency, system and medical review of trauma care has been undertaken since early 1989. Through this review a large number of patients in extremis at the trauma scene or in transport to trauma centers were noted. Collectively, survival of these patients appeared to be nil, apparently at great cost to the county trauma system. These impressions led to this study to determine the outcome and cost of transporting patients with traumatic cardiopulmonary arrest at the trauma scene or during transport to designated trauma centers.

MATERIALS AND METHODS

Hillsborough County, Florida contains 1048 square miles of land and 24 square miles of inland water. In 1989 there were 834,000 county residents. Urban and rural municipalities cover 15% of the total area of the county. Tourism is active with numerous attractions and recreational facilities.

In 1987, efforts to organize a trauma agency to coordinate and review trauma care in Hillsborough County, Florida were earnestly undertaken. In 1988, preliminary plans for a trauma agency were reviewed by a team of nationally recognized experts in the field of trauma care. Formal recognition came to the Hillsborough County Trauma Agency by the State of Florida, Department of Health and Rehabilitative Services, in 1989. Two of the functions of the Agency were to provide medical and system audit of patient care. Filters set forth by Florida statute were utilized to facilitate audit. A partial list of audit

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filters is shown in Table 1. By statute, all patients dying a trauma-related death undergo postmortem examination by the medical examiner, in conjunction with the County Trauma Agency.

Care of trauma patients in Hillsborough County at the time of this study was provided by two prehospital ALS services, three hospital-based aeromedical transport services, and three state designated trauma centers, one level I and two level II. The ALS services were state certified with each ALS unit individually certified and staffed by two Emergency Medical Technician-Paramedics (EMT-Ps). The three aeromedical units were staffed by one certified pilot, at least one extensively trained registered nurse, and one EMT-P capable of advanced procedures. Prehospital care was initiated through a 911 emergency call system. Emergency medical care units moving throughout the county were dispatched to trauma scenes through two dispatch centers, one for the City of Tampa and one for the remaining portions of Hillsborough County. The mobile units were part of a multiple-tiered response system which stresses paramedic education and strong medical control. Prehospital care was undertaken along extensive transport protocols, which emphasized rapid removal from the scene and rapid transport to designated trauma centers.

By formal protocol, trauma scene times are to be as brief as necessary to "package" injured patients. Since transport times in Hillsborough County are generally longer than 5 minutes, pretransport pneumatic antishock garment (PASG) application, venous cannulation, initial volume resuscitation, spinal immobilization, and endotracheal intubation is encouraged, if necessary. For quality assurance, all scene times of 20 minutes or more are reviewed monthly by the County Trauma Agency's Medical Audit Committee. Additionally, by protocol, if anticipated ground transport time exceeds 15 minutes, aeromedical transport is to be utilized for seriously injured patients. Some indications for aeromedical transport are listed in Table 2.

Through Medical Audit Committee review, a large number of patients were noted to have received prehospital care after traumatic cardiopulmonary arrest. By reviewing "run sheets" originated by the two prehospital ALS services, all patients in traumatic cardiopulmonary arrest prior to hospital arrival between October 1, 1989 and March 31, 1991 were identified for review. Cardiopulmonary arrest was defined as loss of pulse and blood pressure, responsiveness, purposeful motor activity, and respirations. Patients in cardiopulmonary arrest could be described as "pulseless nonbreathers," though other signs of life might be present. Such signs of life might include pupil reactivity, purposeless eye movement, agonal or gasping respirations, swallowing, nonpurposeful motor activity, and electrographic cardiac activity. For this study, patients were excluded if cardiopulmonary arrest was the result of medical conditions, drownings, burns, electrocutions, or isolated head injuries. Patients were also excluded if their cardiopulmonary arrest occurred upon or after admission to a trauma center emergency department.

Prehospital transport records, hospital records, and medical examiner reports were reviewed. Charges for prehospital and hospital services were obtained from providers. Ground EMS charges were fixed to a standard fee of $310.00 per transport in the City of Tampa and to $350.00 per transport in Hillsborough County. Aeromedical charges varied among the providers (Table 3) and, unlike EMS costs, often depended upon particular services or procedures rendered. Costs were not adjusted to a reference date and, thereby, were not adjusted for inflation or subsequent increases.

From October 1, 1989 to March 31, 1991, 12,462 trauma patients were transported by the two ALS services in Hillsborough County. Four hundred and ten patients experienced prehospital traumatic cardiopulmonary arrest. Two hundred seventy-two patients in arrest were not transported to designated trauma centers because they had injuries incompatible with life

Table 1
Filters for quality assurance review by the medical audit committee of the Hillsborough County Trauma Agency (partial list)

1. All trauma deaths.
2. The general surgeon on trauma call did not meet the trauma victim upon arrival to Emergency Room.
3. A trauma patient with a prehospital scene time greater than 20 minutes.
4. Aeromedical scene time of more than 10 minutes.
5. A trauma patient with an emergency department admission systolic blood pressure less than 90 mm Hg and total time in the emergency department is over 2 hours from admission to disposition (including radiology time).
6. All complications.
7. An absence of initial and hourly sequential documentation in emergency department record of physiologic measurements for a trauma patient from emergency department arrival until admission to the operating room intensive care unit, transfer to another institution, or death, regardless of physical location of patient.
8. A comatose trauma patient leaving the emergency department prior to establishment of a mechanical airway.
9. A trauma patient with a diagnosis of liver or splenic lacerations receiving a laparotomy greater than 2 hours from emergency department arrival.
10. A trauma patient with a gunshot wound or stab wound to the torso or neck who does not receive surgery.
11. An autopsy was not completed for a trauma death.

Adapted from Trauma System Standards, State of Florida.

Table 2
Indications for aeromedical transport of trauma patients from trauma scene to designated trauma centers

1. Patient involved in traumatic event occurring more than 15 minutes by land transport from a trauma center.
2. Patient involved in a traumatic event requires the presence of an advanced health care team during transport.
3. Head or spinal cord injury with neurologic deficit.
4. Patient involved in MVC and extrication required longer than 15 minutes.
5. Patient suffered a penetration injury in any part of the body between mid-thigh and head.
6. Patient suffered amputation or near amputation requiring rapid transport for reimplantation.
7. Patient experienced paralysis of extremities.
8. Patient requires spinal immobilization and smooth, rapid transport due to worsening motor sensory status.
9. Patient suffered blunt thoracic or abdominal injury with respiratory compromise or hemodynamic instability.
10. Patient sustained multiple orthopedic injuries, especially including pelvic injuries.
11. Patient had a Champion Trauma Score of 12 or less.
12. Patient had a Glasgow Coma Scale score of 10 or less.

Table 3
Charges for aeromedical care and transport from the trauma scene

Service A: $1300.00 minimum fee plus $22.00 per mile
Service B: $2000.00 minimum fee plus $22.00 per mile plus itemized charges
Service c: $450.00 minimum fee plus $14.00 per mile plus itemized charges

or had an extended period of cardiopulmonary arrest without any signs of life, including electrographic cardiac activity. One hundred thirty-eight patients transported to designated trauma centers experienced cardiopulmonary arrest before emergency department admission, either at the trauma scene or during transport. This is a study of these 138 patients, 90 male and 48 female, of average age 36 years ± 1.6 (SEM) to determine their outcome and patient care costs. Ninety-eight patients were white, 34 were black, and 6 were Hispanic. Ninety-six (70%) had experienced blunt trauma and 42 (30%) penetrating trauma. The nature of the penetrating injuries is detailed in Table 4.

RESULTS

For 124 (90%) of 138 patients transported to county trauma centers after cardiopulmonary arrest, vital signs were not present for at least a portion of the time spent at the trauma scene. For 34 (27%) of 124, vital signs were absent initially upon paramedic evaluation, but were restored with PASG application, intravenous volume resuscitation, and endotracheal intubation with ventilation. For 24 of 34 vital signs did not return until after admission to the emergency department. For 20 (16%) of 124, vital signs present on initial paramedic examination were lost despite intervention (PASG application, IV fluids, intubation with ventilation) prior to leaving the trauma scene for transport to the trauma center. Despite intervention, 70 (56%) of 124 patients never had vital signs at the scene of injury.

Eight (6%) of 138 patients lost vital signs for the first time during land transport to trauma centers while 6 (4%) did during aeromedical transport. In all, 60 (43%) of the 138 patients were transported by an aeromedical service to a designated county trauma center.

Scene times were categorized by when vital signs were lost and if or when vital signs were regained (Table 5). Forty-nine percent of all patients transported to trauma centers after cardiopulmonary arrest had scene times greater than 20 minutes. The reasons for prolonged scene times were, in order of decreasing frequency, prolonged extrication, multiple victims at the scene, inclement weather, and inaccessible location. All patients underwent PASG application and spinal immobilization at the scene, while all but one received IV fluids. Endotracheal intubation was unsuccessful in seven (5%) patients—three underwent cricothyroidotomy prior to emergency department arrival. Additionally, five victims underwent thoracostomy prior to emergency department arrival.

Table 4
The nature of penetrating injuries suffered by 42 (30%) of 138 victims of traumatic prehospital cardiopulmonary arrest

Site	Number
Head	1
Neck	4
Chest	28
Cardiac (isolated)	3
Aortic (isolated)	3
Multichest (heart, lungs, aorta, etc.)	18
Unspecified	4
Abdomen	4
Multiple sites (chest, abdomen, etc.)	5

Gunshot injuries in 30 (71%); stab injuries in 12 (29%).

Table 5
Scene times categorized by when vital signs were lost and if or when they were regained*

Vital Signs	Number of Patients	Scene Time (minutes)	Range (minutes)	Number (%) with Scene Time >20 Minutes
Lost at scene	124			60 (48)
Lost, not regained	70	24 ± 1.4†	5–52	36 (51)
Lost, regained	34	22 ± 2.0	3–62	14 (41)
Present, lost, and not regained	20	22 ± 2.9	7–60	10 (50)
Lost in transport	14	20 ± 2.3	5–34	7 (50)

* Does not include time needed to transport victims from scene of injury to emergency department (i.e., does not include transport times).
† Mean ± SEM.

Ten of 138 patients were declared dead upon arrival to a trauma center emergency department, 128 patients received emergency department care. These 128 untyped patients consumed 457 units of type O-positive packed red blood cells in the emergency department. Thirty-five (27%) underwent resuscitative emergency department thoracotomy. In total, 95 of 138 patients were pronounced dead in the emergency department. For further care, 28 patients were transported from the emergency department directly to the trauma operating room and 15 directly to the intensive care unit.

The 28 patients taken to the operating room underwent 39 surgical procedures. Twelve underwent thoracotomy and 20 underwent celiotomy. Seven patients underwent additional procedures, such as placement of intracranial pressure monitors and fracture fixation. Four hundred eight units of packed red blood cells were consumed during surgical treatment of injuries. One patient underwent re-operation for persistent bleeding. Sixteen patients (57%) died in the operating room.

Twenty-seven patients received ICU care, 12 after surviving emergency surgical procedures. The average ICU stay was 1.1 days ± 0.4, but ICU stays ranged from 2 hours to 10 days. No patients survived to be discharged from the ICU.

In summary, patients experiencing prehospital traumatic cardiopulmonary arrest died, 138 after transport to county trauma centers. For patients transported, causes of death were varied, but always related to injury. Death was the result of exsanguination in 42, closed head injury in 31, and multiple organ system injuries in 29 (Table 6). Only one patient died of sepsis complicating injury. No solid organs were obtained for transplantation. Corneas for transplantation were procured from 11 (8%) patients postmortem.

The cost of care for patients transported is shown in Table 7. The range of cost for ground EMS care and

Table 6
Causes of death in 138 patients experiencing prehospital cardiopulmonary arrest prior to or during transport to county trauma centers

Cause	Number of Patients
Exsanguination	42
Closed head injury	31
Multiple organ system injuries	29
Cardiac injuries	12
Pneumohemothorax	7
Progression of preterminal state	4
Coagulopathy	3
High spinal injury	3
Traumatic asphyxia	3
Hypoxia/anoxia	2
Pulmonary edema	1
Late septic death	1

Table 7
Cost of care for 138 patients experiencing prehospital cardiopulmonary arrest prior to or during transport to county trauma centers

	Total	Average	Standard Error
Ground EMS cost	$ 46,100.00	$ 334.00	$ 1.67
Aeromedical cost	$ 63,952.00	$1,105.00	$ 40.50
Hospital cost	$703,180.00	$5,530.29	$1,125.44
Total cost	$871.186.00	$6,453.23	$1,134.79

transport, and aeromedical care and transport was small, $310.00 to $350.00 and $485.00 to $2,494.00, respectively. The range of hospital costs was large, $173.00 to $146,014.00. The lowest costs reflect the cost of pronouncing an obviously dead person "dead on arrival."

DISCUSSION

A layman with a modicum of sense knows that prehospital cardiopulmonary arrest is an ominous event. Prehospital cardiopulmonary arrest, whatever the underlying cause, carries a high mortality. Medical cardiopulmonary arrest not corrected prior to hospital arrival is deadly and expensive if resuscitative efforts continue after admission to the emergency department.[1,2] Traumatic cardiopulmonary arrest is equally foreboding. Most of what is written about prehospital traumatic cardiopulmonary arrest focuses upon patient outcome or the role of aggressive resuscitative measures, such as emergency department thoracotomy, although such resuscitative measures have a limited role and patient outcomes are dismal. The cost of aggressive resuscitative efforts and heroic measures has not been focused upon. This study addresses the cost of resuscitation of patients that have suffered traumatic cardiopulmonary arrest. This study raises the issue of "the cost of futility" rather than resolving it, although the issue appeals to the common sense of everyone even peripherally involved in the care of seriously injured patients.

All the patients in this study experienced prehospital traumatic cardiopulmonary arrest. The majority lost their vital signs at the trauma scene. For most, paramedics never detected vital signs. A small number of patients lost vital signs after paramedics arrived despite aggressive care, involving intubation, immobilization, and initial volume resuscitation. These same measures successfully promoted recovery of vital signs for a slightly larger, but still small number of patients. Scene times were significant, with nearly half lasting 20 minutes. These times reflected written protocols which addressed the priorities of PHTLS. Although "load and go" philosophy has strong support and commending merit, Hillsborough County is large with trauma centers placed at a distance from major thoroughfares. County size and trauma center locations thereby necessitate some scene care and pretransport "packaging." Scene times in our county are also prolonged by many of the factors associated with high speed motor vehicular crashes—long extrication, multiple victims, and country road locations. For us, these latter factors are consequential, since the vast majority of our serious trauma is a result of motor vehicle crashes. An argument could be made that long scene times hurt the patients in this study, but a strict "load and go" philosophy does not seem well-suited for our county. Furthermore, half the patients did have scene times less than 20 minutes, particularly the victims of penetrating urban violence within the City of Tampa.

Short transport times have been a focus of our county trauma agency. Air transport is utilized frequently, even liberally, to avoid longer ground transport times. Of the patients transported after traumatic prehospital cardiopulmonary arrest, nearly half were transported by air. To suppose that more rapid transport from the injury scene to trauma centers is possible does not seem likely in our county.

Trauma center emergency department care seemed aggressive. Although a majority were without vital signs on emergency department admission, only a small number were declared dead on arrival, and over a quarter underwent emergency department thoracotomy. The unknown here is how many of the patients had signs of life in the absence of vital signs. Details regarding purposeless motion, purposeless eye movement, pupillary reflexes, swallowing efforts, and agonal respirations are not generally available because of poor documentation or because PASGs, therapies such as intubation or drug therapy, or drug/alcohol intoxication limited evaluation or interpretation of findings. In the absence of these signs of life, all the patients in this report became "pulseless nonbreathers," but this can be a dishomogeneous group, as noted by others. Nonetheless, nearly one third of all the patients survived to reach the operating room or the intensive care unit.

It would be remiss to overlook the preinjury incidence of alcohol and illicit drug consumption by these patients. Half of these patients had evidence of alcohol or illicit

drug abuse on screening undertaken on emergency department admission. Not only can this limit evaluation, but also outcome. Alcohol and illicit drug consumption needs to receive more attention as it applies to trauma prevention, evaluation, and outcome.

In addition to those undergoing emergency department thoracotomy, just less than one quarter of all patients underwent surgical intervention in the trauma OR, which generally involved exploratory celiotomy and often resuscitative exploratory thoracotomy. The majority undergoing surgical intervention died in the operating room. Just less than one quarter of all patients received intensive care unit support. Generally this was preterminal care with little, if any, chance of survival.

All the patients in this study died. Death was nearly always the result of blood loss, an inability to ventilate, or closed head injury, and was often a result of a combination of these processes. The majority died after blunt trauma. Cardiopulmonary arrest after blunt trauma has long been thought to be a terminal event. Some of the patients of this study suffered penetrating injuries. Despite the more favorable nature of their injuries, they died as well, despite aggressive intervention. Death came quickly; most died in the emergency department and for those that did not, average survival was 1.1 days.

The cost of care given to these patients is easy to determine in one sense and impossible in another. The bill given each family can, in a limited sense, be considered the entire cost of care. In that light, the care of these patients cost nearly 1 million dollars. Truly a formidable cost, especially in light of the results. But really, the cost of care goes beyond any bill, since many costs are not reflected in fees charged. For example, the 128 patients who received care in the emergency department and the 28 who underwent additional surgical intervention consumed nearly 1000 units of red blood cells. In many instances this represents a frivolous waste of a limited and precious resource donated by altruistic citizens who presume their donation is going to a worthy cause. As if resource consumption is not problem enough, there are also issues of resource allocation. Blood, antibiotics, catheters, and intravenous fluids consumed by these patients were not available for others. This is also true for occupied operating rooms, intensive care unit beds, and emergency department beds. Furthermore, everyone involved in their care was drawn away from other patients or projects that, although less pressing in immediacy, were certainly bound to be more successful. The care of these patients consumed resources, time, energy, and attention—all nondurable, even if not nonrenewable, resources.

There is yet another "cost" of providing care which is not directly reflected in fees charged. This is the cost of occupational risk in providing acute and complex trauma care. While no figures are available for occupational needlestick exposures associated with the care of these 138 transported patients, an annual "needlestick report" for 1991 from one county trauma center, the Tampa General Hospital, raises concerns. In 1991, there were 387 health care providers and employees who were injured by needlesticks or sharp instruments, 268 of whom were surgeons, residents, medical students, or registered nurses or students. Generally injuries were the result of drawing blood, handling scalpels or sutures, or starting or handling intravenous catheters, all common acts during resuscitation and care of severely injured patients. Eighty-five of the needlestick and sharp instrument injuries occurred in the operating room (29), emergency department (24), intensive care unit (18), or trauma ward (14). Twenty-two injuries were associated with HIV-positive patients. Three hundred and seven health care workers had HIV titers drawn and 22 are receiving AZT therapy. Some might equate the cost of occupational hazards to the cost of insurance covering such hazards. The real cost of occupational risk must include the loss of health care providers driven from their field because of risk or fears of communicable diseases and the incalculable monies that may be spent in the future on communicable diseases that are yet unrecognized, although acquired today.

Where are we then in the decision to transport patients who have suffered traumatic prehospital cardiopulmonary arrest? Can guidelines be drawn, based upon current knowledge, to determine who should be transported after traumatic prehospital cardiopulmonary arrest? No such guidelines are currently widely accepted. It seems obvious that patients who recover vital signs with or without resuscitation should be transported. Patients without vital signs, but with other signs of life, such as electrocardiographic activity, purposeless eye movement, swallowing activity, or brain stem reflexes, should be transported. Signs of life in the absence of vital signs denote some chance of functional survival,[3,4,5,7,10,15] especially if hypovolemia is the result of a penetrating cardiac wound and transport to the emergency department can be rapidly achieved.[4,5,8,10] Those who lose vital signs during transport should receive emergency department care if they are young, transport to a trauma center has been rapidly achieved, and they have suffered a single exsanguinating injury amenable to quick control. Transport times for these patients must be short despite the support by some[5,8] aggressive prehospital care. Though they feel that prehospital volume resuscitation and CPR play a role in improving survival, even if requiring emergency department resuscitative thoracotomy, evidence supporting this is lacking, even in "ideal" medical systems.[3]

Nonreactive pupils indicate a critical hypoxic insult to the cerebral cortex. If hypoxia persists, the brain stem becomes involved and the respiratory center ceases to drive. At this point, the injured person has passed the point of reversibility and functional survival is inconceivable. To this end, some believe that cardiopulmonary arrest more than 5 minutes prior to emergency department arrival connotes a hopeless outcome.[16] Patients

without vital signs and without signs of life at the scene have no chance of surviving and returning to a premorbid lifestyle,[3,5,7,9,10,11,13,16] regardless of the mechanism of injury, Injury Severity Score, scene time, or transport time, and they should not be transported for further care.

We have raised the issue of "the cost of futility" rather than defined it. Now that the issue has been raised, a formal cost analysis study is warranted. Once such a study has been completed, an elected official or a blue ribbon panel appointed by an elected official should assume the charge. Allocation of resources is not an insular medical issue, but one of the broad concerns of our society, and society should decide if the "cost of futility" is excessive.

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DISCUSSION

Dr. Charles Aprahamian (Milwaukee, Wisconsin): I rose to provide a discussion based on the abstract but after hearing the paper I have other comments. The first thing I want to say is what I said before. Dead people stay dead, and I guess the problem that some EMS systems are having is deciding who is dead. My next statement is, were there any trauma surgeons involved in making the decisions regarding the prehospital definition of death and the emergency room definition of death and the continued care of these patients. It seems to me that the decisions could have been made fairly early on in some of these patients and care could have been stopped. Then I take some exception with having a blue ribbon panel of elected officials telling physicians how to provide care and I would suggest we ought to get the physicians more in tune with deciding who is dead and what is going to be done with them.

Dr. John A. Morris (Nashville, Tennessee): Alex, once again you have challenged us all by asking the question when appropriately do we quit. Your tentative answer is appropriately, maybe we will quit in the pre-hospital environment. Before we abrogate that responsibility to paramedics and other field personnel, I just hope that we would collect the data from a number of systems to be able to validate the information that you have presented to us today. Let me suggest that this organization now has a forum for multi-institutional studies specifically for looking at questions such as these, and I would challenge you to become involved in that process. Your question is a superb one and I think many of us in the room would be delighted to participate in the answer.

Dr. Barbara Bennett-Jacobs (Hartford, Connecticut): The ethical issue of futile care is clearly on the agenda of the entire nation and national health care. My concern is looking at one institution's experience with this rather serious problem, and does this whole question not make the need for a better analysis?

Dr. Alfred S. Gervin (Richmond, Virginia): I enjoyed this controversial paper very much. A question for you. The Governor of Florida sustains a gunshot wound to the chest and loses his signs of life 4 minutes from your institution. Based on your data, do you withdraw? That might be inappropriate. The second is that I am having difficulty with the organ procurement. As you know, John Morris nicely demonstrated 3 years ago that the trauma service drives the transplant service. You got no organs from the 31 closed head injuries who were admitted to your unit and survived. I would suggest that that might portend a difficulty with organ procurement in your hospital. This should be addressed.

Dr. Lenworth M. Jacobs (Hartford, Connecticut): I think this is a very important paper and when published could have a profound impact on the way in which pre-hospital medicine is carried forward. I think that we should think seriously about this and I appreciate your bringing it to us. However, there were people on the scene who had vital signs and this study looked at people who died. The reverse of this would be how many people had similar vital signs who lived. I suspect many in public policy might go home from this presentation with the opinion that if your vital signs are very poor, one should not begin resuscitation. I think before we begin to send such a message you need to look at the other half of the equation and quantify how many who had poor signs went on to live.

Dr. Alexander S. Rosemurgy (Closing): I would like to thank the discussants. Tampa has an organized and experienced trauma system. The issue is not quality of care, but instead, who is dead and the cost of caring for them. The entrance criteria for this study was cardiopulmonary arrest following injury.

Trauma surgeons were involved in the care of these patients. They evaluated them in the emergency room. They took them to the intensive care unit or the operating room. They did not, however, decide who was dead "in the field."

All the patients died—at great cost. The "big" money was spent on the patients taken to the OR and the ICU.

What if the Governor of Florida was shot? If he lost signs of

life 4 minutes from our hospital his chances of meaningful survival would be very, very small and his care would cost a tremendous sum. Is this cost effective? Are his chances too low? That is an issue I will come back to, but for now I would say we should withdraw his care.

There is difficulty obtaining organs from suitable donors in our hospital—in all hospitals. We need to educate Americans about the necessity of donating organs. It is an educational problem. We try very hard in our hospital to obtain donors. The risk of acquiring HIV infection has come up. Do you think that your hospital really cares if you acquire HIV? I think not. If they did, you would have better gowns, gloves, and masks. If you don't care or take precautions that is your choice—but think of your family and loved ones. If we don't force people to take HIV and surgery seriously, they won't and it will be to our detriment.

Why a blue ribbon panel? It is not to exclude physicians but to include a broad cross-section of society. Whether or not the cost of futility is excessive must be a societal decision. The cost is enormous, but is it excessive? That is not for me to decide. It is a societal issue, not an insular medical issue. Others may and can disagree with me on this. In Hillsborough County, Florida, we are addressing this issue with a panel of lay citizens and health care providers. We think the best solution is one with the broadest community support. Thank you.