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Emergency medical services knowledge and attitudes about non-heart-beating donors: Effect of an educational intervention

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BACKGROUND: More than 750,000 people die of sudden death each year, and many are potential non-heart-beating donors (NHBDs) for lung transplant. Although critical, the role of emergency medical services (EMS) personnel in assisting with recovery of NHBD lungs has not been studied. The purpose of this study was to assess knowledge of and attitudes about NHBDs among EMS personnel, evaluate the extent to which knowledge and personal experience with organ donation is associated with attitude, and ascertain the effectiveness of an intervention designed to teach EMS professionals about NHBDs.

METHODS: EMS professionals ($n = 361$) completed measures of knowledge of and attitudes about NHBDs and then watched a presentation by a transplant doctor about traditional organ donation, NHBDs, and transplantation. Participants were able to ask questions during and after the presentation. Participants completed the measures again 3 months later.

RESULTS: EMS professionals had a high rate of personal experience with organ donation and positive attitudes toward traditional organ donation. However, they showed lack of knowledge about NHBDs and felt less skilled in being part of the NHBD process, consistent with knowledge scores. The educational intervention was somewhat effective in improving knowledge about NHBDs. Scores improved significantly on 5 of 13 items.

CONCLUSIONS: Lung recovery from NHBDs offers the potential of a very large supply for transplantation. This research suggests that with additional training, EMS professionals may be willing to be part of a NHBD recovery team.

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Because of a shortage of organ donors for transplantation, more than 117,000 people in the United States await solid organ transplants.[1] The extreme need for donor organs contributes to decreased quality of life and death among wait-listed patients, high costs of medical care, and strict criteria for transplant eligibility. This is particularly true for lung transplant candidates.

Organ donors for lung transplant candidates have been brain-dead patients on mechanical ventilation, known as heart-beating donors (HBDs), and, more recently, donation after cardiac death donors (DCDs).[2] These represent a tiny fraction of annual deaths. Each year, there are more than

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750,000 sudden deaths from all causes.[3] In particular, 424,000 people a year experience out-of-hospital cardiac arrest, and resuscitation is initiated in 60% of these by emergency medical services (EMS) personnel.[4] The median age is 60 years, and survival is less than 10%. These individuals are potential non-heart-beating donors (NHBDs).

At a conference in Maastricht, Netherlands, in 1995, NHBDs were categorized according to where death occurs, which is a surrogate for ischemic time after circulatory arrest.[5] Category I donors die outside of hospital, or "in the field." Category II donors die in a hospital (emergency department, intensive care unit, or floor). Category III NHBDs do not meet criteria for brain death but are judged to have an irreversible severe brain injury. If life support is withdrawn, many of these individuals progress to circulatory arrest and death. If consent is obtained, these Category III NHBDs—DCDs—are providing increasing numbers of kidneys, livers, and lungs for transplant, but the number of DCDs is very small. Category I and II NHBDs are a large potential source of tissue and corneal donors.

In the wake of increasing use of Category III NHBDs, this classification was revised so that donation after circulatory determination of death (DCDD) was subdivided into controlled DCDDs—formerly Maastricht Category III—and uncontrolled DCDDs, which unfortunately, combines Maastricht Category I and II NHBDs.[6] Because design of our questionnaire began before this revision, we used the term NHBD and the Maastricht Categories in this project.

Egan et al[7,8] were was the first to demonstrate the feasibility of transplantation of lungs retrieved hours after death from Category I NHBDs. This was based on the notion that lung tissue lives for hours after death because it does not rely on perfusion for cellular respiration.[9] Steen et al[10] performed the first human lung transplant from a Category II NHBD after ex vivo lung perfusion (EVLP) and determined the lung functioned well, even though it was retrieved hours after death. Although interest in using EVLP to evaluate lungs from HBDs and DCDs is growing,[11,12] the potential to substantially increase the lung donor pool is limited by the number of these donors. EVLP of NHBD lungs has potential to dramatically improve the number of lungs for transplant. Varela et al[13] began to transplant lungs from Category I NHBDs and recently began to use EVLP to evaluate lungs from NHBDs.[14] Mateos Rodríguez et al[15] reported the transfer of 160 NHBDs to a transplant hospital in Madrid between 2005 and 2010. From these 160 deceased donors, 13 double-lung and 7 single-lung transplants were performed. Survival was 90% at 30 days. They noted the critical importance of involving EMS personnel in the process of obtaining organs from NHBDs for transplant.

In a prior project directed at retrieving lungs from Category I NHBDs to assess transplant suitability,[16] we encountered challenges in engaging EMS personnel in identifying potential donors and interacting with next-of-kin at the scene of a sudden death. We hypothesized this was related to lack of knowledge about the process of organ and tissue donation and the potential benefit of transplant. However, the role of EMS personnel in NHBD organ and tissue donation has not been studied. We sought to (1) assess knowledge of and attitudes about NHBD organ and tissue donation among EMS personnel, (2) evaluate the extent to which knowledge and personal experience with organ donation was associated with attitude, and (3) ascertain the effectiveness of an educational intervention designed to teach EMS professionals about organ donation, transplantation, and NHBDs.

Methods

The University of North Carolina at Chapel Hill (UNC) Institutional Review Board (IRB) (study #09-1292) and the New Hanover Medical Center IRB (study #1011-7), in Wilmington, NC, approved this study protocol. Ethical guidelines for protection of human subjects were followed.

Participants

Directors of 5 North Carolina county EMS programs agreed to participate in this study. A representative sample was recruited by sampling participants at rural (Person, Alamance) and urban (Orange, Wake, New Hanover) county EMS centers, defined by demographic reports from the North Carolina Department of Commerce.[17] A total of 361 North Carolina EMS professionals participated in the study.

Procedure

Participants were informed that their participation in the study was voluntary. They were then given consent forms, educated about the study's purpose and aims, and allowed to ask questions before providing informed consent. We distributed paper-and-pencil questionnaires for consented participants. Twelve participants (3%) took questionnaire packets but did not complete them. Ample time was given to participants to complete the questionnaires. Questionnaires were distributed repeatedly at scheduled meetings of EMS personnel so that all shifts could participate.

After all participants had completed the questionnaires, Dr Egan or Dr Noone gave an hour-long PowerPoint (Microsoft, Redmond, WA) presentation about organ donation, transplant (focused on lungs), and NHBDs. They answered audience questions throughout and after each presentation. The interactive live lecture format was chosen because it was shown to be as effective or more effective than Web-based instruction.[18] To assess retention of knowledge gained, the questionnaire was distributed again to the EMS participants 3 months after the presentation. The 3-month post-lecture assessment was based on research that showed a decrease in knowledge at 3 months, with no further erosion of knowledge at a 6-month follow-up.[18]

Measures

Information about basic demographics of the participants, personal and professional experience with transplant, and years of EMS work experience was collected. The NHBD Knowledge Questionnaire was designed to assess participants' knowledge of NHBDs in transplant. Questionnaire items were developed by Dr Egan, an expert in lung transplantation and NHBDs. After he created the items, Dr Burker compiled the measure and then consulted with Teresa Edwards, an expert in scale measurement at UNC's Odum Institute for Research in Social Science; Ms Edwards' edits were incorporated into the questionnaire. The