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Part 3: Ethics

2010 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care

Laurie J. Morrison, Chair; Gerald Kierzek; Douglas S. Diekema; Michael R. Sayre; Scott M. Silvers; Ahamed H. Idris; Mary E. Mancini

The goals of resuscitation are to preserve life, restore health, relieve suffering, limit disability, and respect the individual's decisions, rights, and privacy. Decisions about cardiopulmonary resuscitation (CPR) efforts are often made in seconds by rescuers who may not know the victim of cardiac arrest or whether an advance directive exists. As a result, administration of CPR may be contrary to the individual's desires or best interests.¹⁻³ However, practice is evolving as more emergency physicians reportedly honor legal advance directives in decisions about resuscitation.⁴⁻⁷ This section provides guidelines for healthcare providers who are faced with the difficult decision to provide or withhold emergency cardiovascular care.

Ethical Principles

Healthcare professionals should consider ethical, legal, and cultural factors^{8,9} when caring for those in need of CPR. Although healthcare providers must play a role in resuscitation decision making, they should be guided by science, the individual patient or surrogate preferences, local policy, and legal requirements.

Principle of Respect for Autonomy¹⁰

The principle of respect for autonomy is an important social value in medical ethics and law. The principle is based on society's respect for a competent individual's ability to make decisions about his or her own healthcare. Adults are presumed to have decision-making capability unless they are incapacitated or declared incompetent by a court of law. Truly informed decisions require that individuals receive and understand accurate information about their condition and prognosis, as well as the nature, risks, benefits, and alternatives of any proposed interventions. The individual must deliberate and choose among alternatives by linking the decision to his or her framework of values. Truly informed decisions require a strong healthcare provider-patient relationship/communication and a 3-step process: (1) the patient receives and understands accurate information about his or her condition, prognosis, the nature of any proposed interventions, alternatives, and risks and benefits; (2) the patient is asked to paraphrase the information to give the provider the opportunity to assess his or her understanding and

to correct any misimpressions; and (3) the patient deliberates and chooses among alternatives and justifies his or her decision.¹¹

When decision-making capacity is temporarily impaired by factors such as active illness, treatment of these conditions may restore capacity. When the individual's preferences are unknown or uncertain, emergency conditions should be treated until further information is available.

Advance Directives, Living Wills, and Patient Self-Determination

A recent study documented that more than a quarter of elderly patients require surrogate decision making at the end of life. Advance directives, living wills, and executing a durable power of attorney for health care ensure that when the patient is unable to make decisions, the preferences that the individual established in advance can guide care. These decisions are associated with less aggressive medical care near death, earlier hospice referrals for palliation, better quality of life, and caregiver's bereavement adjustment.¹²

A **healthcare advance directive** is a legal binding document that in the United States (US) is based on the Patient Self-Determination Act of 1990.¹³ It communicates the thoughts, wishes, or preferences for healthcare decisions that might need to be made during periods of incapacity. The Patient Self-Determination Act mandated that healthcare institutions should facilitate the completion of advance directives if patients desire them.¹³ Advance directives can be verbal or written and may be based on conversations, written directives, living wills, or durable power of attorney for health care. The legal validity of various forms of advance directives varies from jurisdiction to jurisdiction. Courts consider written advance directives to be more trustworthy than recollections of conversations.

A **living will** may be referred to as a "medical directive" or "declaration" or "directive to physicians," and it provides written direction to healthcare providers about the care that the individual approves should he or she become terminally ill and be unable to make decisions. A living will constitutes evidence of the individual's wishes, and in most areas it can be legally enforced.

A **durable power of attorney for health care** is a legal document that appoints an authorized person to make healthcare decisions (not limited to end-of-life decisions). Simply put, a

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living will affects the care received, and a durable power of attorney accounts for unforeseen circumstances. The latter decisions may be in conflict with the living will or advance directive; at the time of the unforeseen circumstances they are considered to be valid expressions of the patient's best interests.¹⁴

A **comprehensive healthcare advance directive** combines the living will and the durable power of attorney for health care into one legally binding document.

As a patient's medical condition and desire for types of medical treatment may change over time, all types of advance directives should be revisited regularly. Most importantly the presence of an advance directive, a living will, or a durable power of attorney for health care is closely associated with ensuring that personal preferences match the actual care received, as documented in a survey of surrogates for patients of at least 60 years of age who died between 2000 and 2006 and required surrogate decision making at some point in their care.¹⁴

A **Do Not Attempt Resuscitation (DNAR) order** is given by a licensed physician or alternative authority as per local regulation, and it must be signed and dated to be valid.^{15,16} In many settings, "Allow Natural Death" (AND) is becoming a preferred term to replace DNAR, to emphasize that the order is to allow natural consequences of a disease or injury, and to emphasize ongoing end-of-life care.¹⁷ The DNAR order should explicitly describe the resuscitation interventions to be performed in the event of a life-threatening emergency. In most cases, a DNAR order is preceded by a documented discussion with the patient, family, or surrogate decision maker addressing the patient's wishes about resuscitation interventions. In addition, some jurisdictions may require confirmation by a witness or a second treating physician.

Surrogate Decision Makers

In the event of incapacity, an adult may require a surrogate decision maker to make medical decisions. In the event that the individual has a durable power of attorney for health care, the person appointed by that document is authorized to make medical decisions within the scope of authority granted by the document. If the individual has a court-appointed guardian with authority to make healthcare decisions, the guardian becomes the authorized surrogate.

If there is no court-appointed or other authority, a close relative or friend can become a surrogate decision maker. Most jurisdictions have laws that designate the legally authorized surrogate decision maker for an incompetent patient who has not identified a decision maker through a durable power of attorney for health care. Surrogate decision makers should base their decisions on the individual's previously expressed preferences, if known; otherwise, surrogates should make decisions based on their understanding of what constitutes the best interests of the individual.

Pediatric Decision Making

As a general rule, minors are considered incompetent to provide legally binding consent about their health care. Parents or guardians are generally empowered to make healthcare decisions on their behalf, and in most situations, parents are given wide latitude in terms of the decisions they make on behalf of their children. Parental authority is not absolute, however, and when a parent or guardian's decision appears to place the child at significant risk of serious harm as compared to other options, medical providers may seek to involve state agencies (eg, child

protective services or a court determination) to allow treatment of the child over parental objections.¹⁸

A child should be involved in decision making at a level appropriate for the child's maturity. Children should be asked to consent to healthcare decisions when able within the legal definition of a consenting adult based on local policy and legislation. Children <14 years of age (in Canada) and <18 years of age (in the US) rarely possess the legal authority to consent to their health care except under specific legally defined situations (emancipated minors, mature minors, and for specific health conditions such as sexually transmitted diseases and pregnancy-related care). In situations where an older child will not consent, the dissent should be carefully considered by the treating provider.

Principle of Futility

Patients or families may ask for care that is highly unlikely to improve health outcomes. Healthcare providers, however, are not obliged to provide such care when there is scientific and social consensus that the treatment is ineffective. If the purpose of a medical treatment cannot be achieved, the treatment can be considered futile.

An objective criterion for medical futility was defined in 1990 for interventions and drug therapy as imparting a <1% chance of survival.¹⁹ Although this criterion may be controversial, it remains a basis for current futility research. An obvious example of an inappropriate or futile intervention is providing CPR for a patient who has suffered irreversible death. Without objective signs of irreversible death (eg, decapitation, rigor mortis, or decomposition) and in the absence of known advance directives declining resuscitative attempts, full resuscitation should be offered.

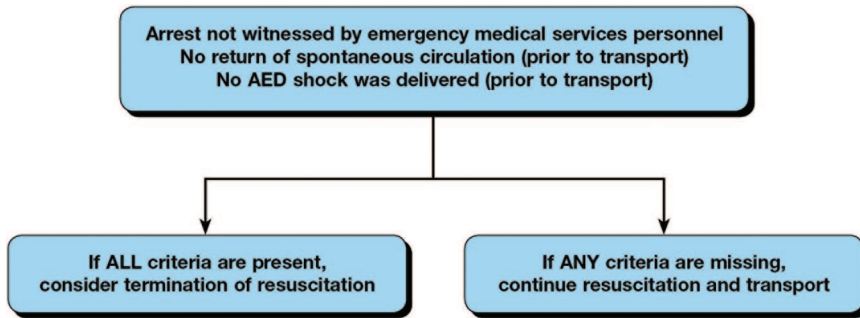
Conditions such as irreversible brain damage or brain death cannot be reliably assessed or predicted at the time of cardiac arrest. Withholding resuscitation and the discontinuation of life-sustaining treatment during or after resuscitation are ethically equivalent. In situations where the prognosis is uncertain, a trial of treatment may be initiated while further information is gathered to help determine the likelihood of survival, the patient's preferences, and the expected clinical course (Class IIb, LOE C).

Withholding and Withdrawing CPR (Termination of Resuscitative Efforts) Related to Out-of-Hospital Cardiac Arrest (OHCA)

Criteria for Not Starting CPR in All OHCA

Basic life support (BLS) training urges all potential rescuers to immediately begin CPR without seeking consent, because any delay in care dramatically decreases the chances of survival. While the general rule is to provide emergency treatment to a victim of cardiac arrest, there are a few exceptions where withholding CPR might be appropriate, as follows:

- Situations where attempts to perform CPR would place the rescuer at risk of serious injury or mortal peril
- Obvious clinical signs of irreversible death (eg, rigor mortis, dependent lividity, decapitation, transection, or decomposition)
- A valid, signed, and dated advance directive indicating that resuscitation is not desired, or a valid, signed, and dated DNAR order



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Figure 1. BLS termination-of-resuscitation rule for adult OHCA.²³

DNAR Orders in OHCA

Out-of-hospital DNAR protocols must be clearly written and easily implemented for all involved (all members of the health-care team, patients, family members, and loved ones). DNAR documentation can take many forms (eg, written bedside orders, wallet identification cards, identification bracelets, or predefined paper documents approved by the local emergency medical services [EMS] authority). The ideal out-of-hospital DNAR documentation is portable and can be carried on the person.¹⁶

Delayed or token efforts such as so-called “slow-codes” (knowingly providing ineffective resuscitative efforts) are inappropriate. This practice compromises the ethical integrity of healthcare providers, uses deception to create a false impression, and may undermine the provider-patient relationship. The practice of “pseudo resuscitation” was self-reported by paramedics to occur in 27% of cardiac arrests in a community where a prehospital DNAR and termination-of-resuscitation protocols were not in place.²⁰

Some EMS systems have extended the DNAR protocol to include verbal DNAR requests from family members as grounds to withhold therapy.^{21,22} Paramedics withheld care to patients in cardiac arrest with a history of a terminal illness, who were under the care of a physician, and when at the time of the cardiac arrest the family requested that resuscitation not be attempted. The numbers of patients for whom resuscitation was withheld doubled after implementation (from 45 to 99 a year). This is an important first step in expanding the clinical decision rule pertaining to when to start resuscitation in OHCA, however there is insufficient evidence to support this approach without further validation.

Advance Directives in OHCA

Advance directives do not have to include a DNAR order, and a DNAR order is valid without an advance directive. A significant number of cardiac arrest victims for whom EMS is summoned have a terminal illness, and many have written advance directives. Laws detailing the actions of a prehospital provider in response to an out-of-hospital DNAR order vary across jurisdictions. In general, EMS professionals should initiate CPR and advanced life support if there is reasonable doubt about the validity of a DNAR order, if there is concern that the victim may have had a change of mind, or if there is a question about whether the patient intended the advance directive to be applied under the actual conditions for which EMS has been called.

The DNAR order should be shown to EMS responders as soon as they arrive on the scene. If the EMS professional cannot

obtain clear information about the victim’s wishes, they should not hesitate to start resuscitation. Sometimes within a few minutes of starting resuscitation, relatives or other medical personnel will arrive and confirm that the victim had clearly expressed a wish that resuscitation not be attempted. CPR or other life-support measures may be discontinued by following local directives or protocols, which may include real-time consultation with medical direction.

Terminating Resuscitative Efforts in OHCA

Terminating Resuscitative Efforts in Neonatal or Pediatric OHCA

No predictors of neonatal or pediatric (infant or child) out-of-hospital resuscitation success or failure have been established. No validated clinical decision rules have been derived and evaluated. Further research in this area is needed.

In the absence of clinical decision rules for the neonatal or pediatric OHCA victim, the responsible prehospital provider should follow BLS pediatric and advanced cardiovascular life support protocols and consult with real-time medical direction or transport the victim to the most appropriate facility per local directives.

Terminating Resuscitative Efforts in Adult OHCA

Terminating Resuscitative Efforts in a BLS Out-of-Hospital System

Rescuers who start BLS should continue resuscitation until one of the following occurs:

- Restoration of effective, spontaneous circulation
- Care is transferred to a team providing advanced life support
- The rescuer is unable to continue because of exhaustion, the presence of dangerous environmental hazards, or because continuation of the resuscitative efforts places others in jeopardy
- Reliable and valid criteria indicating irreversible death are met, criteria of obvious death are identified, or criteria for termination of resuscitation are met.

One set of reliable and valid criteria for termination of resuscitation is termed the “BLS termination of resuscitation rule” (see Figure 1).²³ All 3 of the following criteria must be present before moving to the ambulance for transport, to consider terminating BLS resuscitative attempts for adult victims of out-of-hospital cardiac arrest: (1) arrest was not witnessed by EMS provider or first responder; (2) no return of spontaneous

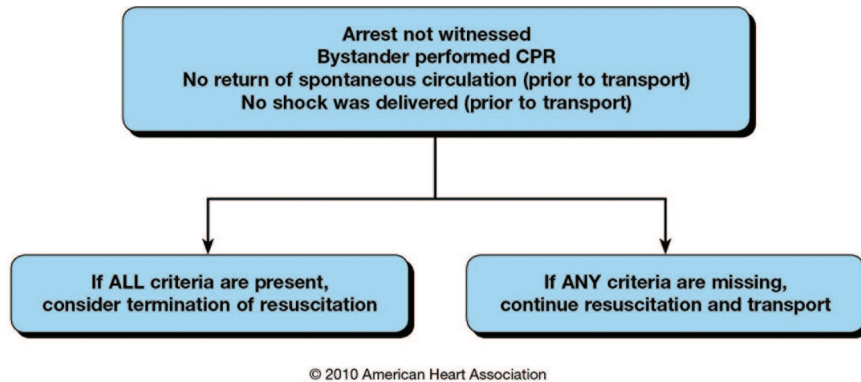


Figure 2. ALS termination-of-resuscitation rule for adult OHCA.³³

circulation (ROSC) after 3 full rounds of CPR and automated external defibrillator (AED) analysis; and (3) no AED shocks were delivered.

The BLS termination of resuscitation rule can reduce the rate of hospital transport to 37% of cardiac arrests without compromising the care of potentially viable patients. This was prospectively validated in rural and urban EMS services²³ and externally validated in additional locations in the US, Canada, and Europe.^{24–29} The rule should be applied before moving to the ambulance for transport.³⁰ This clinical prediction rule consistently generates the highest specificity and positive predictive values when compared to previous guidelines.²⁹ It is recommended that regional or local EMS authorities use the BLS termination rule to develop protocols for the termination of resuscitative efforts by BLS providers for adult victims of cardiac arrest in areas where advanced life support is not available or may be significantly delayed (Class I, LOE A). The reliability and validity of this rule is uncertain if modified (Class IIb, LOE A).

Implementation of the rule includes real-time contacting of medical control when the rule suggests termination. Before the protocol is implemented, EMS providers require training in sensitive communication with the family about the outcome of the resuscitative attempt.³¹ This strategy will help to ensure comfort of the provider and appropriate support of the grieving family. Support for the prehospital protocol should be sought from collaborating external agencies (eg, destination hospital emergency departments [EDs], coroner, medical directors, and police) before implementation.

Terminating Resuscitative Efforts in an ALS Out-of-Hospital System

A different rule may be useful when the additional diagnostic and therapeutic capabilities of an advanced life support EMS response are available to the victim. The National Association of EMS Physicians (NAEMSP) suggested that resuscitative efforts could be terminated in patients who do not respond to at least 20 minutes of ALS care.³² An ALS termination of resuscitation rule was derived from a diverse population of rural and urban EMS settings.³³ This rule recommends considering terminating resuscitation when ALL of the following criteria apply before moving to the ambulance for transport (see Figure 2): (1) arrest was not witnessed; (2) no bystander CPR was provided; (3) no ROSC after full ALS care in the field; and (4) no AED shocks were delivered.

This rule has been retrospectively externally validated for adult patients in several regions in the US, Canada, and Europe,^{25,27–29} and it is reasonable to employ this rule in all ALS services (Class IIa, LOE B).

Terminating Resuscitative Efforts in a Combined BLS and ALS Out-of-Hospital System

In a tiered ALS- and BLS-provider system, the use of a universal rule can avoid confusion at the scene of a cardiac arrest without compromising diagnostic accuracy.^{25,28,29} The BLS rule is reasonable to use in these services (Class IIa, LOE B).

Termination of Resuscitative Efforts and Transport Implications

Field termination reduces unnecessary transport to the hospital by 60% with the BLS rule and 40% with the ALS rule,²⁵ reducing associated road hazards^{34,35} that put the provider, patient, and public at risk. In addition field termination reduces inadvertent paramedic exposure to potential biohazards and the higher cost of ED pronouncement.^{36–38} More importantly the quality of CPR is compromised during transport, and survival is linked to optimizing scene care rather than rushing to hospital.^{39–41}

Withholding and Withdrawing CPR (Termination of Resuscitative Efforts) Related To In-Hospital Cardiac Arrest

Criteria for Not Starting CPR in Newly Born Infant IHCA

There are prescribed recommendations to guide the initiation of resuscitative efforts in newly born infants. When gestational age, birth weight, or congenital anomalies are associated with almost certain early death and when unacceptably high morbidity is likely among the rare survivors, resuscitation is not indicated. Examples may include extreme prematurity (gestational age <23 weeks or birth weight <400 g), anencephaly, and some major chromosomal abnormalities such as trisomy 13 (Class IIb, LOE C).

In conditions associated with uncertain prognosis where survival is borderline, the morbidity rate is relatively high, and the anticipated burden to the child is high, parental desires concerning initiation of resuscitation should be supported (Class IIb, LOE C).

There should be a consistent and coordinated approach from the obstetric and neonatal teams in applying these guidelines and in communicating with the parents in developing an agreed-upon management plan when possible.

Criteria for Not Starting CPR in Pediatric and Adult IHCA

Few criteria can accurately predict the futility of continued resuscitation. In light of this uncertainty, all pediatric and adult patients who suffer cardiac arrest in the hospital setting should have resuscitative attempts initiated unless the patient has a valid DNAR order or has objective signs of irreversible death (eg, dependent lividity).

DNAR Orders in IHCA

Unlike other medical interventions, CPR is initiated without a physician's order, based on implied consent for emergency treatment. A licensed physician's order is necessary to withhold CPR in the hospital setting. Physicians should initiate a discussion about the use of CPR with all patients admitted for medical and surgical care or with their surrogates. Terminally ill patients may fear abandonment and pain more than death, so physicians should also reassure the patient and family that control of pain and other symptoms as well as other aspects of support will continue even if resuscitation is withheld.

The attending physician should write the DNAR order in accordance with local policy in the patient's chart, with a note explaining the rationale for the DNAR order, other specific limitations of care, and documenting discussions with the patient, surrogate, and family. Oral DNAR orders are not acceptable. The limitation-of-treatment order should provide explicit instructions for specific emergency interventions that may arise, including the use of vasopressor agents, mechanical ventilation, blood products, or antibiotics. The scope of a DNAR order should specify which interventions are to be withheld.

It is important to emphasize that all other care should be administered without delay and as appropriate for all patients. A DNAR order does not automatically preclude interventions such as administration of parenteral fluids, nutrition, oxygen, analgesia, sedation, antiarrhythmics, or vasopressors, unless these are included in the order. Some patients may choose to accept defibrillation and chest compressions but not intubation and mechanical ventilation. DNAR orders carry no implications about other forms of treatment, and other aspects of the treatment plan should be documented separately and communicated to members of the healthcare team. DNAR orders should be reviewed periodically as per local protocol, particularly if the patient's condition changes.⁴² DNAR orders should also be reviewed before surgery by the anesthesiologist, attending surgeon, and patient or surrogate to determine their applicability in the operating suite and during the immediate postoperative recovery period.⁴³

Terminating Resuscitative Efforts in IHCA

Terminating Cardiac Arrest Resuscitative Efforts in Neonatal IHCA

Noninitiation of resuscitation and discontinuation of life-sustaining treatment during or after resuscitation are ethically equivalent, and clinicians should not hesitate to withdraw support when functional survival is highly unlikely.⁴⁴ The following guidelines must be interpreted according to current regional outcomes.⁴⁵

In a newly born infant with no detectable heart rate, it is appropriate to consider stopping resuscitation if the heart rate remains undetectable for 10 minutes (Class IIB, LOE C⁴⁶⁻⁴⁸).

The decision to continue resuscitative efforts beyond 10 minutes with no heart rate should take into consideration factors such as presumed etiology of arrest, gestational age, presence or absence of complications, and the parents' previous expressed feelings about the acceptable risk of morbidity.

In the absence of clinical decision rules to guide the termination of resuscitation in the neonatal patient, the responsible clinician should stop the resuscitative attempt if there is a high degree of certainty that the newborn will not respond to further advanced life support.

Terminating Cardiac Arrest Resuscitative Efforts in Pediatric IHCA

No predictors of pediatric (infant or child) resuscitative success or failure have been established.⁴⁹⁻⁵¹ No validated clinical decision rules to guide the termination of resuscitative efforts in pediatric cardiac arrest have been reported, and the decision to stop resuscitation may vary considerably across physicians and institutions. Further research in this area is needed.

In the absence of clinical decision rules, the responsible clinician should stop the resuscitative attempt if there is a high degree of certainty that the patient will not respond to further pediatric advanced life support. Arrest characteristics to be considered by physicians making decisions may include duration of CPR, witnessed event, number of doses of epinephrine, etiology of arrest, first and subsequent rhythm, and age.^{49,52-56} Prolonged efforts are typically made for infants and children with recurring or refractory VF or VT, those who demonstrate some ROSC, those with drug toxicity, or those experiencing an event causing primary hypothermia. Prolonged efforts are also indicated when a decision to employ extracorporeal CPR (ECPR) has been made (see Part 14: "Pediatric Advanced Life Support").

Terminating Cardiac Arrest Resuscitative Efforts in Adult IHCA

In the hospital the decision to terminate resuscitative efforts rests with the treating physician and is based on consideration of many factors, including witnessed versus unwitnessed arrest, time to CPR, initial arrest rhythm, time to defibrillation, comorbid disease, prearrest state, and whether there is ROSC at some point during the resuscitative efforts. Clinical decision rules for in-hospital termination of resuscitation may be helpful in reducing variability in decision making⁵⁷; however, the evidence for their reliability is limited, and rules should be prospectively validated before adoption.

Providing Emotional Support to the Family

Providing Emotional Support to the Family During Resuscitative Efforts in Cardiac Arrest

In the past, family members have often been excluded from being present during the attempted resuscitation of a child or other relative. Surveys suggest that healthcare providers hold a range of opinions about the presence of family members during resuscitative attempts.⁵⁸⁻⁶⁹ One theoretical concern is the potential for family members to become disruptive, interfere with resuscitative procedures, or develop syncope, and another is the possibility of increased exposure to legal liability; however, these are not reported in the literature.

Several surveys suggested that most family members wish to be present during a resuscitative attempt.⁶²⁻⁶⁶ Family members

with no medical background have reported that being at a loved one's side and saying goodbye during the final moments of life was comforting.^{62,63,67} Family members have also reported that it helped them to adjust to the death of their loved one,^{68,70} and most indicated that they would do so again.⁶⁷ Several retrospective reports note positive reactions from family members,^{58–60} many of whom said that they felt a sense of having helped their loved one and of easing their own grieving.⁶¹ Most parents surveyed indicated that they wanted to be offered the option of being present during the resuscitative effort for their child.^{60,71–79}

In the absence of data documenting harm and in light of data suggesting that it may be helpful, offering select family members the opportunity to be present during a resuscitation is reasonable and desirable (assuming that the patient, if an adult, has not raised a prior objection) (Class IIa, LOE C for adults and Class I, LOE B for pediatric patients). Parents and other family members seldom ask if they can be present unless they are encouraged to do so by healthcare providers. Resuscitation team members should be sensitive to the presence of family members during resuscitative efforts, assigning a team member to remain with the family to answer questions, clarify information, and otherwise offer comfort.⁶⁶

Providing Emotional Support to the Family After Termination of Resuscitative Efforts in Cardiac Arrest

Notifying family members of the death of a loved one is an important aspect of a resuscitation that should be performed compassionately, with care taken to consider the family's culture, religious beliefs and preconceptions surrounding death, and any guilt they may feel associated with the event or circumstances preceding the event.⁸⁰

Limitation of Care and Withdrawal of Life-Sustaining Therapies

Limitation of care or withdrawal of life-sustaining therapies is an emotionally complex decision for family and staff. Withholding and withdrawing life support are ethically similar. A decision to limit care or withdraw life support is justifiable if the patient is determined to be brain dead, if the physician and patient or surrogate agree that treatment goals cannot be met, or if the burden to the patient of continued treatment is believed to exceed any benefits.

Patients in the end stage of an incurable disease should receive care that ensures their autonomy, comfort, and dignity. Interventions that minimize suffering and pain, dyspnea, delirium, convulsions, and other terminal complications should always be provided. For such patients it is ethically acceptable to gradually increase the doses of narcotics and sedatives to relieve pain and other suffering, even to levels that might concomitantly shorten the patient's life. The care team should initiate plans for future care by collaborative discussions and the resolution of any conflicts with nurses, consultants, residents, fellows, the patient (when capable of participating), surrogate decision makers, and the family. Nursing and comfort care (eg, oral hygiene, skin care, patient positioning, and measures to relieve pain and suffering) must always be continued.

In the absence of evidence of an incurable disease in the end stage, decisions to withdraw or limit care in the post-arrest

patient are often challenging, given the difficulties of accurate prognostication, especially in the era of treatment advances such as therapeutic hypothermia.

Prognostication in Neonatal and Pediatric Patients After Cardiac Arrest—Determining When to Withdraw Life-Sustaining Therapies

There is insufficient evidence about clinical neurologic signs, electrophysiologic studies, biomarkers, or imaging modalities to describe an approach to prognostication in the neonatal or pediatric patient after cardiac arrest. In the absence of prognostication guidelines, the decision to withdraw life-sustaining therapies rests with the treating physician and may vary considerably across physicians and institutions. Further research in this area is needed.

Prognostication in Adult Patients After Cardiac Arrest—Determining When to Withdraw Life-Sustaining Therapies

There are no clinical neurologic signs, electrophysiologic studies, biomarkers, or imaging modalities that can reliably predict death or poor neurologic outcome (eg, Cerebral Performance Category of 3, 4, or 5) within the first 24 hours after cardiac arrest in patients treated with or without therapeutic hypothermia (see Part 9: "Post-Cardiac Arrest Care"). There is a tendency to withdraw care prematurely in the post-arrest patient, and this has contributed to a selection bias in the current literature on prognostic testing.

Prognostic Testing in the Adult Post-Arrest Patient Not Treated With Therapeutic Hypothermia

In adult post-cardiac arrest patients who are *not* treated with therapeutic hypothermia, it is recommended in comatose patients that pupillary light and corneal reflexes as well as vestibular-ocular reflexes and Glasgow Coma Scale (GCS) Motor Score be documented at 72 hours after sustained ROSC and thereafter at least daily (Class I, LOE B). When available, recording the unprocessed electroencephalography interpretation between 24 and 72 hours after sustained ROSC may be helpful to assist in the prediction of a poor outcome in the absence of sedatives, hypotension, accidental hypothermia, or hypoxemia; specifically the finding of generalized suppression to $<20 \mu\text{V}$, burst suppression pattern with generalized epileptic activity, or diffuse periodic complexes on a flat background (Class IIb, LOE B⁸¹).

Prognostic Testing in the Adult Post-Arrest Patient Treated With Therapeutic Hypothermia

Based on limited available evidence, potentially reliable prognosticators of poor outcome in patients treated with therapeutic hypothermia after cardiac arrest include bilateral absence of N20 peak on median nerve somatosensory evoked potential ≥ 24 hours after cardiac arrest^{82,83} and the absence of both corneal and pupillary reflexes ≥ 3 days after cardiac arrest. Limited available evidence also suggests that (1) GCS Motor Score of 2 or less at day 3 after sustained ROSC,⁸² and (2) presence of status epilepticus^{84–86} are potentially unreliable prognosticators of poor outcome in post-cardiac arrest patients treated with therapeutic hypothermia. Similarly, recovery of consciousness and cognitive functions is possible in a few post-cardiac arrest patients treated with therapeutic hypothermia despite bilateral absent or minimally present N20 responses of median nerve somatosensory-evoked potentials, suggesting that they may be unreliable as

well.⁸⁷ Serum biomarkers such as neuron-specific enolase^{88–90} are potentially valuable as adjunctive studies in prognostication of poor outcome in patients treated with hypothermia, but their reliability is limited by the relatively small number of patients studied and the lack of assay standardization.

In the adult post–cardiac arrest patient treated with therapeutic hypothermia, it is recommended that clinical neurologic signs, electrophysiologic studies, biomarkers, and imaging be done where available at 3 days after cardiac arrest. There is limited evidence to guide decisions to withdraw life-sustaining therapy currently and the clinician should document all available prognostic testing after 72 hours post–cardiac arrest for patients treated with therapeutic hypothermia (Class I, LOE C) and use clinical judgment based on this testing to make a decision to withdraw life-sustaining therapy when appropriate.

Ethics of Organ and Tissue Donation

Most communities do not optimize the retrieval of organ and tissue donations; this has created protracted waiting time and greater suffering for patients awaiting organ transplantation. The Emergency Cardiovascular Care community of the American Heart Association supports efforts to optimize the ethical acquisition of organ and tissue donations. Studies suggest no difference in functional outcomes of organs transplanted from patients who are determined to be brain dead as a consequence of cardiac arrest when compared with donors who are brain dead from other causes.^{91–94} Therefore it is reasonable to suggest that all communities should optimize retrieval of tissue and organ donations in brain dead post–cardiac arrest patients (in-hospital) and those pronounced dead in the out-of-hospital setting (Class IIa, LOE B).

Most important to this process is advance planning and infrastructure support to allow organ donation to occur in a manner sensitive to the needs of the donor’s family and without undue burden on the staff. Medical directors of EMS agencies, emergency departments (EDs), and critical care units (CCUs) should develop protocols and implementation plans with the regional organ and tissue donation program to optimize donation following a cardiac arrest death (Class I, LOE C), including

- A process by which permission for organ and tissue donations will be obtained
- The establishment of clearly defined guidelines for organ and tissue procurement that will be available to all health-care providers both in and out of the hospital
- Information to address the possible differences between applicable laws and societal values in procedures for organ procurement
- The emotional support to be offered to providers post event
- A system to acquire organ and tissue donations from individuals pronounced dead in the out-of-hospital setting. This discussion should include input from the coroner, EMS, police, and lay people representing the target community

Ethics and Privacy Issues Related to Resuscitation Research

Conducting clinical research in patients with cardiopulmonary arrest is challenging. In general, research involving

human subjects requires the consent of the subject or, in some cases, a legally authorized surrogate decision-maker.^{95,96} This has proven to be a challenge for research involving patients in cardiac arrest because research interventions must frequently be implemented at a time when it is impossible to obtain consent.^{97,98} After much public discussion and in recognition of the value of this type of human research, the United States government, through the Food and Drug Administration and the National Institutes of Health, adopted regulations that allow an exception for the need to obtain informed consent in certain limited circumstances.⁹⁹ These exceptions to informed consent for research enrollment apply only if the following conditions are met:

- The subject is unconscious or incapacitated and facing a life-threatening or permanently disabling situation for which the only known therapy is investigational, unproven, or unsatisfactory.
- The subject is incapable or unable to provide valid consent and the surrogate decision maker cannot be reached for permission before the time the investigational treatment must be started.
- The investigational therapy offers the prospect of direct benefit to the participant, and there is no accepted therapy that is clearly superior to the experimental therapy.
- The research protocol is approved by an institutional research board (IRB).

In addition these regulations require that input from community representatives be sought before IRB approval in order to gain a form of “community consultation” to proceed with the research.^{96,100,101} Before its initiation, public disclosure of the research and its risks and benefits must be made to the community from which potential participants will come. Public disclosure of study results is also required. This process attempts to assess the opinions and thoughts of the community in which the research will take place and enables a two-way exchange that may, in fact, modify the implementation or research design in light of the community dialogue.

If a patient is enrolled in such a study, once the legal decision maker has been identified and informed of the research, the decision maker may choose to discontinue participation at any time after being fully informed of the consequences of doing so.

Healthcare providers involved in training and research must be careful to protect patient privacy and the confidentiality of patient data and to minimize the collection of personal health information. Provisions to protect the privacy of patients’ health information and medical records are included in the US Health Insurance Portability and Accountability Act, commonly referred to as HIPAA. For details pertaining to the US regulations see <http://www.hhs.gov/ocr/privacy/hipaa/administrative/privacyrule/index.html> (accessed April 22, 2010).

Ethics of Training on the Newly Dead

The use of newly dead patients for training raises important ethical and legal issues. Obtaining consent from family members shows respect for the newly dead patient and those who will survive the patient. It may not always be possible or practical to obtain such consent immediately after the death of a patient. One argument is that presuming consent in these situations serves a

“greater good” that will benefit the living. An alternate viewpoint is that consent is unnecessary because the body is “non persona” and without autonomy or interests. These arguments, however, fail to adequately weigh the potential for harm to surviving family members who may oppose using a recently deceased loved one for the purpose of training or research. This view also ignores significant cultural differences in the acceptance or nonacceptance of the use of cadavers in medical education. The American College of Emergency Physicians practice guidelines summarizes the issues on their website, offering a more detailed discussion at <http://www.acep.org/content.aspx?id=30104> (accessed April 18, 2010).¹⁰²

Ultimately, the respect for the individual should prevail over the need for healthcare providers to practice lifesaving techniques. The technical advances of high-fidelity simulation and the use of cadaver labs where consent has been obtained in advance should reduce the need for use of recently deceased patients for educational purposes.

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Guidelines Part 3: Ethics: Writing Group Disclosures

Writing Group Member	Employment	Research Grant	Other Research Support	Speakers' Bureau/ Honoraria	Ownership Interest	Consultant/ Advisory Board	Other
Laurie J. Morrison	St Michael's Hospital—Clinician Scientist, Director Rescu Robert and Dorothy Pitts Chair in Acute Care & Emergency Medicine Keenan Research Centre Li Ka Shing Knowledge Institute St Michael's Hosp. Univ of Toronto	None	None	None	None	None	None
Gerald Kierzek	Assistance Publique Hopitaux de Paris & Univ of Paris, Emerg Dept & EMS & Forensic Med, Hotel-Dieu Cochin Hosp; MD	†Pitts Foundation/ StMichaels Hosp Toronto, 1 yr research Fellow Emerg Med CCM	None	None	None	*Steering Com (Study LMWH in traumatic injury) GSK	None
Douglas S. Diekema	Children's University Medical Group—Professor of Pediatrics	None	None	None	None	None	None
Michael R. Sayre	The Ohio State University; Assoc Prof	none	None	None	None	None	None
Scott M. Silvers	Mayo Clinic Chair Emergency Medicine	None	None	None	None	None	None
Ahamed H. Idris	UT Southwestern Medical Center at Dallas—Professor of Surgery	†NIH grant for the Resuscitation Outcomes Consortium Dallas-Fort Worth Site. I serve as the site PI. All payments to UT SWMC, at which I'm employed	*In kind support from Philips, Medtronic, and ZOLL consisting of defibrillators, software, and manikins used for training purposes	None	None	None	None
Mary E. Mancini	Univ of Texas at Arlington, Professor	None	None	None	None	None	None

This table represents the relationships of writing group members that may be perceived as actual or reasonably perceived conflicts of interest as reported on the Disclosure Questionnaire, which all members of the writing group are required to complete and submit. A relationship is considered to be “significant” if (a) the person receives \$10 000 or more during any 12-month period, or 5% or more of the person's gross income; or (b) the person owns 5% or more of the voting stock or share of the entity, or owns \$10 000 or more of the fair market value of the entity. A relationship is considered to be “modest” if it is less than “significant” under the preceding definition.

*Modest.

†Significant.

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KEY WORDS: arrhythmia ■ automatic external defibrillator ■ cardioversion ■ ventricular fibrillation