CEASE: A guide for clinicians on how to stop resuscitation efforts

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Abstract:

Resuscitation programs such as Advanced Cardiac Life Support, Cardiac Life Support, Pediatric Advanced Life Support and the Neonatal Resuscitation Program offer inadequate guidance to physicians who must ultimately decide when to stop resuscitation efforts. These decisions involve clinical and ethical judgments and are complicated by communication challenges, group dynamics, and family considerations. This article presents a framework, summarized in a mnemonic (CEASE: Clinical Features, Effectiveness, Ask, Stop, Explain), for how to stop resuscitation efforts and communicate that decision to clinicians and ultimately the patient’s family. Rather than a decision rule, this mnemonic represents a framework based on best evidence for when physicians are considering stopping resuscitation efforts and provides guidance on how to communicate that decision.
By the end of intern year, every physician-in-training knows how to initiate a resuscitation for cardiopulmonary arrest (a “code”), but few learn how to stop it. Detailed guidelines for initiating resuscitation to adults, children and neonates are taught through the Advanced Clinical Life Support (ACLS),1,2 Pediatric Advanced Life Support (PALS)2,3 and Neonatal Resuscitation Program (NRP)4 programs as well as European guidelines.5 However, deciding when resuscitation efforts should be stopped is an equally difficult decision that is mostly left to individual physicians, with almost no specific instruction from experts or adequate algorithms to assist in decision making. Since the 1970s there have been efforts to empirically define clinical features that predict a low likelihood of survival from resuscitation and to develop clinical prediction rules for when to stop. These are not in widespread use, possibly due to factors such as the poor quality of empirical evidence,6 the risk of stopping resuscitation prematurely for some patients, and a medical culture that resists death at all costs. Additionally, the few prediction rules that exist for in-hospital cardiac arrest have not been updated for the latest versions of ACLS or PALS. For this reason, published resuscitation guidelines provide only general statements regarding when and how to stop resuscitation efforts (Tables 1,2).

The lack of guidelines for stopping resuscitation has left a void. Stopping a code takes place in a complex, often chaotic clinical setting. Additionally, much like a decision to write a do not resuscitate (DNR) order, stopping resuscitation is a clinical judgment based on both subjective and objective information.7 In the absence of identified uniform clinical rules for stopping resuscitation, clinicians need an easily remembered framework for how to discontinue resuscitation efforts and effectively communicate with other clinicians and family. This kind of decision entails both ethical and communication elements, all of which must be considered in the heat of the moment.
The decision to discontinue resuscitation requires considerable clinical competence and judgment. Clinicians must address key ethical and communication factors but make decisions in a time pressured situation that is not conducive to pondering these questions in the moment. We believe a framework to help clinicians organize their thinking and consider several key factors would be of great use in the clinical setting. To help clinicians with these difficult tasks, we propose the brief mnemonic, CEASE. Below we outline each element of the CEASE approach and base our recommendations on clinical evidence and ethical principles.

The communication strategies we include as part of our approach should be just one step in a longer process of addressing goals of care and advance care planning. Good communication about code status before cardiopulmonary arrest may avoid unwanted or nonbeneficial resuscitative efforts. Clinician guidance for these discussions has been previously published.

**CLINICAL FEATURES that predict survival**

There is a growing body of evidence that clinical characteristics of the patient predict survival and neurologic outcomes from resuscitation. While prediction models are imperfect at predicting outcomes for any individual patient, key clinical factors should be taken into consideration when determining the duration of resuscitation. Key pre-arrest factors associated with poor outcomes for adults include: pneumonia, metastatic cancer, hypotension, renal failure, and poor functional status (Table 3). Ebell et al developed a prediction model for neurologic outcome and found that good neurologic function on hospital admission is most highly associated with a good neurologic outcome after resuscitation (able to work with minimal impairment), while trauma, stroke and age 85 or older are associated with greater impairment. In children, renal failure and epinephrine infusion prior to the arrest were associated with
Therefore knowing the patient’s history is critical. In some situations, physicians perform resuscitation on a patient they know well and are aware of these clinical factors already. Unfortunately, given the complexity of the modern hospital, many resuscitation efforts are performed by physicians who are unaware of the patient’s history. Providing the team leader with quick, accurate information about the patient’s clinical history is critical to good decision making. For purposes of acutely refining the patient’s immediate prognosis members of the team should work together to quickly access clinical information and provide it to the code team, especially the clinician who is in charge of resuscitation efforts.

**EFFECTIVENESS of resuscitation efforts**

The quality of resuscitation interventions is associated with arrest outcome. Clinicians must carefully adhere to CPR quality metrics: adequate compression rate, adequate compression depth, full chest recoil after each compression, minimizing pauses in compressions and avoiding excessive ventilation (Table 3). It is the entire sequence of actions (flow) rather than single events that determine the success of the intervention.

Other clinical features of the pre-arrest period have also been shown to be predictive of outcomes. Initial rhythm of ventricular fibrillation or pulseless ventricular tachycardia is associated with better outcomes than asystole or pulseless electrical activity. One decision aid found a negative predictive value of 98.9% for being discharged alive if the patient did not have any of the following: an initial rhythm of ventricular fibrillation or ventricular tachycardia or return of a pulse within 10 minutes of chest compressions. Some researchers have found that few patients survive prolonged resuscitation efforts, with a steep decline in survival for increased resuscitation time. However, more recent evidence suggests that children with
cardiac conditions have a higher (>20%) rate of survival with resuscitation over 35 minutes.\textsuperscript{22} Indirect evidence for longer efforts in adults comes from a large patient registry, which found that hospitals with longer resuscitation times have better overall survival.\textsuperscript{23} It is hard to determine if this finding is due to the duration of resuscitation or to other factors such as the cause of the cardiac arrest.

Given these complex and sometimes contradictory data, there is no specific clinical decision aid that is widely accepted as a guide to stop in-hospital resuscitation efforts or that has ever been included in resuscitation guidelines for in-hospital use. Clinicians are left with the difficult task of weighing key clinical factors to determine when resuscitation has such a low likelihood of success that it should be stopped. Clearly the length of the resuscitative efforts and the patient’s physiological response in real time are key clinical factors and should be considered when evaluating whether or not to continue resuscitation efforts.

\textbf{ASK the other clinicians present for input}

ACLS guidelines now focus on the importance of good communication and teamwork among the resuscitation team. One aspect of communication is knowledge sharing.\textsuperscript{1} It is essential for the team leader to have input from other clinicians at the bedside who can contribute to decision making. Other members of the interdisciplinary team may have relevant knowledge about the patient’s clinical history or current clinical condition. Examples may include a nurses’ concern about a recent potassium value of which the physician is unaware or a respiratory therapist’s observation that there is considerable resistance with bag-valve-mask ventilation. Additionally, patients or their surrogates may have revealed key information to clinicians about values and preferences that would support a focus on quality of life rather than quantity of life.
Other participating clinicians may be able to suggest potentially useful interventions overlooked in the heat of the moment by the team leader.

In the hierarchical environment of the hospital, it may be hard for trainees or non-physicians to speak up; research from both aviation\(^1\) and medicine\(^24\) have demonstrated the importance of a non-hierarchical approach to offering information to providing safe, effective, beneficial patient care. It is essential that the team leader be proactive about asking for input from other team members. It is up to the clinician running the code to make a decision about which suggestions require immediate action.

**STOP resuscitation efforts**

If resuscitation efforts are unsuccessful in achieving return of spontaneous circulation or the interventions needed to support circulation are unsustainable, it is the responsibility of the clinician running the resuscitation to decide when to stop further efforts.\(^{25,26}\) Although this may seem intuitively obvious, ceasing resuscitation is an emotionally and cognitively difficult task. More than any other event, this places the physician in the position of determining the timing of the patient’s death. This may be part of the reason why many codes continue well beyond the duration that they are likely to be effective.

There are several factors that may contribute to the difficulty of stopping resuscitation efforts. First, once advance treatment interventions are started, there is tremendous momentum to continue them. This “technologic imperative”\(^27\) may lead to continued treatment when it is no longer of benefit. Second, efforts to improve hospital quality have included general and disease specific in-hospital mortality as quality indicators.\(^{28-30}\) The pressure to reduce hospital mortality may place tacit pressure on team members to continue resuscitation. Finally, these important life
or death decisions are frequently made under pressure of time and emotion, about patients unfamiliar to the treating clinicians.

Mounting evidence supports a change in practice from escorting family out of the room to allowing them to witness resuscitative efforts.\textsuperscript{2,26,31-33} Family presence has the advantage of allowing family members to witness the aggressive care provided to the patient, permits them to be present at the time of death, and may have lasting positive psychological benefits.\textsuperscript{34,35} There are guidelines to help support families during the process and to debrief afterwards.\textsuperscript{26,33} However, there is evidence that clinicians vary in their support of family presence.\textsuperscript{36} The presence of family may make stopping the resuscitation efforts more challenging, particularly if the family has been strongly in favor of continued aggressive care.

We cannot overemphasize that it is not acceptable to ask the family whether or not resuscitation efforts should continue or stop,\textsuperscript{26} a strategy that several of us have witnessed in our clinical practices. While surrogates play a key role in the decision making process related to goals of care and treatment decisions such as code status,\textsuperscript{37} stopping resuscitation efforts is a decision that should be based on the patient’s clinical status and the likely success of ongoing resuscitation efforts (as discussed above), and therefore is not within the purview of family members. Additionally, asking a family member whether to stop resuscitation puts the burden of determining the time of death on the shoulders of the patient’s loved one. For both of these reasons, asking a family member whether resuscitation should be discontinued is ethically unacceptable.
**EXPLAIN what has happened to the family**

When resuscitation efforts cease, the clinical team has important obligations to the family: inform them about what has occurred, answer questions, and provide emotional support. In many cases, physicians will be assisted in these tasks by nurses, social workers, or chaplains. Evidence has shown that family members of critically ill adults and children are at high risk for posttraumatic stress, anxiety and depression and that this risk is especially high if the patient dies. Compassionate disclosure about the events of the resuscitation, including the death of the patient if this has occurred, is an essential part of medical practice and can be taught successfully. Core skills include showing empathy and responding to family emotion.

The discussion will vary considerably depending on whether the patient survived and whether the family has witnessed the resuscitation. For family members who were present, the act of witnessing resuscitation may require immediate emotional support and attention from a member of the team who was not directly involved in the resuscitation efforts. For family members who were not present, clinicians need to inform them about the death in a compassionate manner, avoiding medical jargon and providing emotional support. Trainees may be helped by expert guidance for how to inform families about bad news, such as the SPIKES protocol and may benefit from training that includes role play and other active learning strategies.

**Discussion**

In the absence of a DNR order, the decision to start resuscitation is automatic and rests frequently with nurses who are the providers most likely to be present when a patient has a cardiopulmonary arrest. However, the decision to continue or terminate resuscitative efforts
rests with the clinician leading resuscitation efforts, usually a physician. The lack of clinical prediction rules means that clinicians involved in the code must use the available information about the patient’s premorbid condition, current acute illness, and the trajectory of the resuscitation to determine when to discontinue efforts. This lack of clear guidelines requires that clinicians make the judgment to stop resuscitation efforts in a situation of uncertainty.

We propose the CEASE framework as a helpful framework for physicians and other clinicians who are learning resuscitation skills. Instead of providing a decision rule for stopping resuscitation based on clinical factors, we have outlined a process for considering when to discontinue resuscitative efforts and how to effectively communicate with clinicians and family. It is meant to complement existing ACLS, PALS, CLS and NRP guidelines to provide care that is clinically sound, respectful of the patient, family, and the clinical team, and flows from ethically sound principles. We emphasize that the clinician directing the resuscitation must decide when to stop efforts and cannot look to family members to make this decision. Finally, our obligation to family involves providing information and support during their time of loss.
Table 1. Adult guidelines for stopping cardiopulmonary resuscitation

<table>
<thead>
<tr>
<th>Resource</th>
<th>Clinical Factors</th>
<th>Arrest-related factors</th>
<th>Decision Making</th>
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<tbody>
<tr>
<td>European Resuscitation Council Guidelines for Resuscitation: Ethics&lt;sup&gt;25&lt;/sup&gt;</td>
<td>“medical history and anticipated prognosis, the period between cardiac arrest and start of CPR, the interval to defibrillation and the period of advanced life support (ALS) with continuing asystole and no reversible cause.”</td>
<td>Continue as long as VF persists Acceptable to stop after asystole of 20 minutes or more</td>
<td>Decision should be “made by the team leader, but after consultation with other team members, who may have valid points to contribute.” “…the decision is based on the clinical judgement that the patient’s arrest is unresponsive to ALS”</td>
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<tr>
<td>American Heart Association Guidelines: Ethics&lt;sup&gt;38&lt;/sup&gt;</td>
<td>Witnessed arrest Time to CPR Initial rhythm Time to defibrillation Comorbid disease Prearrest state ROSC* during resuscitative efforts</td>
<td>The evidence for clinical decision rules for adults is limited.</td>
<td>For adults: the decision to stop rests with the treating physician.</td>
</tr>
<tr>
<td>American Heart Association Advanced Cardiac Life Support Provider Manual&lt;sup&gt;1&lt;/sup&gt;</td>
<td>Not addressed</td>
<td>Not addressed</td>
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*ROSC: Return of Spontaneous Circulation
<table>
<thead>
<tr>
<th>Resource</th>
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<th>Decision Making</th>
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<tbody>
<tr>
<td>European Resuscitation Guidelines for Resuscitation: Paediatrics&lt;sup&gt;26&lt;/sup&gt;</td>
<td>Newborns: Where gestation, birth weight and/or congenital anomalies are associated with almost certain early death, and unacceptably high morbidity is likely among the rare survivors, resuscitation is not indicated.</td>
<td>Newborns: “After 10 min of continuous and adequate resuscitation efforts, discontinuation of resuscitation may be justified if there are no signs of life.”</td>
<td>Not addressed?</td>
</tr>
<tr>
<td>American Heart Association Guidelines: Ethics&lt;sup&gt;38&lt;/sup&gt;</td>
<td>Newborns: Resuscitation is not indicated for newborns with “almost certain early death and when unacceptably high mortality is likely among the rare survivors. Children: Duration of CPR Witnessed event Number of doses of epinephrine Etiology of arrest Rhythm Age</td>
<td>In a newborn with no detectable heart rate, “it is appropriate to consider stopping resuscitation if the heart rate remains undetectable for 10 minutes.” There are no validated clinical rules for children.</td>
<td>For children: “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 life support.”</td>
</tr>
<tr>
<td>American Heart Association Pediatric Provider Manual&lt;sup&gt;3&lt;/sup&gt;</td>
<td>interval from collapse to initiation of CPR; quality of CPR; duration of resuscitation; underlying conditions. Consider prolonged efforts in:</td>
<td>Not addressed</td>
<td>Not addressed</td>
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| Neonatal Resuscitation Program Textbook<sup>4</sup> | Considerations for noninitiation of resuscitation:  
- Confirmed gestational age of less than 23 weeks or birth weight under 400g  
- Anencephaly  
- Confirmed lethal genetic disorder or malformation  
- When available data suggests an unacceptably high likelihood of death/severe disability | “If you can confirm that no heart rate has been detectable for at least 10 minutes, discontinuation of resuscitation may be appropriate.” | Promote shared decision making with parents prior to delivery when noninitiation is considered. |
Table 3: Potential factors in adult in-hospital resuscitation outcome

<table>
<thead>
<tr>
<th>Pre-Arrest Clinical Factors</th>
<th>During Arrest</th>
<th>Resuscitation efforts</th>
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</thead>
<tbody>
<tr>
<td>• Age‡¹³,⁴⁸</td>
<td>• Witnessed arrest*⁴⁹</td>
<td>• Compression rate*¹⁸</td>
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<tr>
<td>• Cancer*¹¹ or metastatic‡¹³,⁴⁸ or hematologic cancer‡¹³,⁴⁸</td>
<td>• Initial rhythm, ventricular fibrillation, pulseless ventricular tachycardia*⁴⁹</td>
<td>• Compression depth*¹⁸</td>
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<tr>
<td>• Poor functional status:</td>
<td>• Return of pulse within 10 minutes of chest compressions*⁴⁹</td>
<td>• Full chest recoil after each compression§¹⁸</td>
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<tr>
<td>• Dependent for ADLs*⁴⁸</td>
<td>• Duration of arrest¹¹* (conflicting data about direction of effect)</td>
<td>• Minimize interruptions in compression*¹⁸</td>
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<tr>
<td>• Homebound*¹¹</td>
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<td>• Avoid excessive ventilation§¹⁸</td>
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<td>• Living in SNF†¹³</td>
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<td>• Neurologic status†¹³</td>
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<tr>
<td>• Altered mental status*⁴⁸</td>
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<tr>
<td>• Medical noncardiac diagnosis‡¹³,⁴⁸</td>
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<tr>
<td>• Pneumonia†¹¹,¹³,⁴⁸</td>
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<td>• Hypotension*¹¹,⁴⁸</td>
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<td>• Renal insufficiency/failure‡¹¹,¹³,⁴⁸</td>
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<td>• Acute stroke†¹³</td>
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<tr>
<td>• Septicemia†¹³</td>
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<tr>
<td>• Respiratory insufficiency†¹³</td>
<td></td>
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<tr>
<td>• Major trauma‡¹³,⁴⁸</td>
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*Associated with survival
†Associated with neurological outcome
‡Associated with both survival and neurological outcome
§Based on expert opinion, or data from laboratory or out of hospital arrest studies
References


