CPR for Patients Labeled DNR: The Role of the Limited Aggressive Therapy Order

Niteesh K. Choudhry, MD, FRCPC; Sujit Choudhry, LLB, LLM; and Peter A. Singer, MD, MPH, FRCPC

Patients who sustain a cardiac arrest have a less than 20% chance of surviving to hospital discharge. Patients may request do-not-resuscitate (DNR) orders if they believe that their chances for a meaningful recovery after cardiopulmonary arrest are low. However, in some identifiable circumstances, cardiopulmonary resuscitation (CPR) has a higher chance of success and lower likelihood of neurologic impairment. The probability of survival from a cardiac arrest influences patients' wishes regarding resuscitation; thus, when CPR has a higher likelihood of success, patients' expressed preferences for treatment as contained within a DNR order may not accurately reflect their intended goals. Patients should be offered the option of consenting to CPR for "higher-success" situations, including a witnessed cardiopulmonary arrest in which the initial cardiac rhythm is ventricular tachycardia or fibrillation, cardiac arrest in the operating room, and cardiac arrest resulting from a readily identifiable iatrogenic cause. This new level of resuscitation could be called a "limited aggressive therapy" order.

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For author affiliations, see end of text.

Patients who sustain a cardiopulmonary arrest have a 3% to 14% chance of surviving to hospital discharge if the arrest occurs outside of the hospital (1–3) and a 10% to 20% chance of surviving if they have an in-hospital cardiopulmonary arrest (4, 5). Furthermore, among patients who sustain a cardiac arrest and survive in either setting, 11% to 44% have neurologic impairment on discharge, and 26% have at least some restrictions in performing activities of daily living (2, 6, 7).

Few data in the literature indicate what factors drive patients to request do-not-resuscitate (DNR) orders; however, when presented with evidence on the low probability of survival after cardiac arrest, most patients prefer not to be resuscitated (8). Therefore, patients may request DNR orders because they believe their chances for a meaningful recovery after sustaining cardiopulmonary arrest are low. In this context, a meaningful recovery for patients may be defined by the prospects for a neurologic recovery, since patients may consider conditions causing neurologic damage or severe functional limitation to be worse than death (9). Thus, the goal of DNR orders may be to prevent patients from undergoing an intervention (that is, chest compressions, defibrillation, intubation, or other resuscitative efforts, which will be collectively referred to as cardiopulmonary resuscitation [CPR] for the purposes of this article) to treat a medical event that, if successfully treated, may leave them with substantial neurologic impairment.

In some circumstances, however, CPR has a higher chance of success and lower likelihood of neurologic impairment. Despite the favorable chances for recovery in these cases, preexisting DNR orders must currently be followed. The probability of survival from a cardiac arrest influences patients' wishes regarding resuscitation (8, 10); thus, when CPR has a higher likelihood of success, patients' expressed preferences for treatment (as contained within a DNR order) may not accurately reflect their intended goals (life without substantial functional impairment) (11, 12). This may be especially relevant for patients with DNR orders but without imminently terminal medical conditions, rather than for terminally ill patients with DNR orders, whose goals and preferences are probably aligned.

We provide examples of three distinct circumstances in which CPR has a high likelihood of success. We suggest that patients' wishes in these and similar situations be reevaluated. Finally, we propose a novel order that could be offered to patients as an intermediary position between full resuscitation and DNR—a "limited aggressive therapy" order—which is intended to align patients' expressed treatment preferences with their treatment goals.

Evidence in Three Situations

Cardiac arrests in patients undergoing surgery and those resulting from iatrogenic complications have been independently identified as situations in which DNR orders should be rescinded or reconsidered (11, 12). In these situations, among others—notably, defibrillation for patients with ventricular dysrhythmias—CPR has a high probability of success (these patients are twice as likely to survive as those whose arrests are not witnessed) (13–15). Survival is likely because patients are being continuously monitored and are in close proximity to personnel trained in at least basic cardiac resuscitation (that is, the arrests are "witnessed"). However, it is the prognosis associated with arrests in these situations that is relevant, not the location of the arrest; because it is often difficult to determine which arrests are associated with a good prognosis, the location of the arrest serves as a surrogate for prognosis.

Witnessed "Shockable" Rhythms

The cause and nature of a cardiac arrest are likely to have a substantial effect on the outcome of resuscitative efforts. Certain pre-arrest and intra-arrest factors help predict the outcome (4, 15–17); the most widely accepted factors are the initial cardiac rhythm recorded at the time of the arrest, the length of the resuscitative effort, and the location of the arrest.

Ventricular tachycardia or fibrillation (the "shockable" rhythms) are the initial cardiac rhythm in at least 11% to 42% (and possibly more [18]) of cardiac arrests (1, 5, 6, 15, 19). Up to 90% of patients with ventricular fibrillation or tachycardia can be resuscitated if defibrillation is administered rapidly after the onset of the arrhythmia (20, 21). Moreover, patients with ventricular fibrillation or tachycardia as the initial rhythm are more than twice as likely to survive as those with other rhythms (5, 16, 19).

Since the success of rapid defibrillation is negatively related to the time between arrhythmia onset and the restoration of a normal cardiac rhythm (22), survival depends on where the arrest occurs. This, in turn, relates to whether the arrest is witnessed. A regular heart rhythm must be restored shortly after onset of cardiac arrest to ensure adequate brain perfusion, thereby minimizing the likelihood of neurologic compromise. The exact length of time before brain damage occurs is unknown, but basic life support (chest compressions, artificial ventilation) is much more successful if it is started within 4 to 5 minutes (14) and the entire effort takes less than 10 to 15 minutes (5, 14–16).

Given the higher likelihood of successful resuscitation when defibrillation is administered rapidly for ventricular tachycardia or fibrillation, its use may align with the goals of some patients who currently have DNR orders in effect.

DNR in the Operating Room

The management of witnessed shockable rhythms and other rapidly reversible medical conditions (for example, anesthesia-induced respiratory arrest) is particularly relevant in the operating room since cardiac arrests in this setting are common (6.8 cases per 10 000 instances where anesthesia was used, of which 4.6 cases per 10 000 instances were ascribed to the induction of anesthesia itself) (23) and up to 8% to 15% of patients undergoing operations have preexisting DNR orders (24). There has been considerable debate over whether DNR orders should be overridden in the operating room to reverse intraoperative cardiopulmonary arrest or, at the very least, be reconsidered before surgery (25–29).

The overall success of CPR in the operating room may be as high as 65% (23, 30) and may, in fact, be more than 90% when the arrest is related to anesthesia (30). This relatively high rate of success may result from the arrest's being "witnessed" or the arrest's being caused by an identifiable and reversible precipitant resulting from the operation or anesthesia; it may also occur because patients who are offered operative procedures are more likely to be healthier (24) and, therefore, more likely to survive an intraoperative cardiac arrest. Although no existing data address this issue, resuscitative efforts—similar to witnessed shockable rhythms—are most likely to be successful if done rapidly and completed within approximately 10 minutes.

Clearly, the resuscitative choices of individual patients are central to this debate. When presented with accurate information on perioperative resuscitative outcomes, some patients with preexisting DNR orders may wish to have a trial of resuscitation. A mechanism is required to clarify and encapsulate patients' true values.

Iatrogenic Complications

Cardiac arrests that result from iatrogenic complications (that is, from a therapy, procedure, or error of omission) are also a type of witnessed arrest and are similar to cardiac arrests in the operating room. They may account for up to 14% of in-hospital cardiac arrests (31–35), a large proportion of which may have been preventable. Casarett and Ross (11) have argued against resuscitating patients with DNR orders who sustain a cardiac arrest based on an iatrogenic complication because it is inconsistent to carry out resuscitation simply because the effort is more like to succeed. However, patients' resuscitative choices are probably influenced by the probability of their survival from a cardiac arrest (8, 36); thus, if patients who sustain an iatrogenic cardiac arrest knew that resuscitation would be more likely to succeed, they may not have requested or consented to a DNR order to begin with.

As for patients who sustain a cardiac arrest due to a witnessed shockable rhythm or in the operating room, those with an iatrogenic arrest have much higher rates of survival than those who experience noniatrogenic arrests (39% vs. 11%, respectively) (31). Therefore, CPR for arrests that are readily identified as iatrogenic may be consistent with patients' goals.

PROPOSED SOLUTION: THE "LIMITED AGGRESSIVE THERAPY" ORDER

The preceding examples are situations in which CPR may further, rather than frustrate, the treatment goals of patients with DNR orders since they have a higher chance of successful resuscitation (37). We propose that patients should be offered the option of consenting to a "limited aggressive therapy" order (LATO) in which patients' expressed preferences align with their treatment goals. A LATO allows for CPR in cases including but not limited to one or more of the following: cardiac arrest in which the initial rhythm is ventricular tachycardia or fibrillation, cardiac arrest in the operating room, or cardiac arrest resulting from a readily identifiable iatrogenic cause.

The idea of refining end-of-life decision making to enable patients to selectively consent to some interventions and to decline consent to others has been suggested with respect to interventions other than CPR. The U.S. President's Commission for the Study of Ethical Problems in Medicine and Biomedical and Behavioral Research (38) and others (39, 40) have argued that certain forms of "aggressive" therapy (for example, admission to an intensive care unit) may be consistent with a DNR order. Accordingly, consenting to a DNR order should not be construed as declining to give consent to other forms of treatment.

Clearly, there are patients who under no circumstances

would want an attempt at CPR; therefore, their DNR orders accurately express their treatment goals. Conversely, there may be patients who want to be resuscitated in all circumstances. However, as we have argued, LATOs should be considered when goals and preferences are not aligned. These may include patients who currently have DNR orders but want to be resuscitated when their chances of recovery are good, in addition to patients who have opted for full resuscitation but want to be resuscitated only in these same particular circumstances. Consequently, LATOs may apply to many patients. If LATOs are implemented, three options should be available to patients: 1) Default: receive CPR in all circumstances; 2) DNR: no CPR at all; and 3) LATO: CPR (in whole or in part) in certain circumstances (a new intermediate position).

It is certainly arguable that the routine reevaluation of DNR orders before surgery and discouraging the use of DNR orders on telemetry units would probably achieve the same goal as a LATO, without adding a third and potentially confusing option for patients. However, LATO has two added benefits. First, patients' stated preferences and true values may not be aligned. Providing patients with the option of consenting to a LATO mandates that a patient's resuscitative choices be reevaluated, rather than potentially allowing preexisting stated preferences to continue unchecked. Second, the LATO applies to many conditions in which the prognosis for cardiac arrests is similarly good. The use of one order (LATO) to incorporate patients' wishes in all of these similar circumstances would be more efficient because it eliminates the need for several separate decisions—the decision to choose between CPR and DNR when they undergo surgery, when they are admitted to a telemetry unit, and in all other circumstances.

It is important for patients to be aware that, although the risk for neurologic injury associated with any successful resuscitative effort is reduced in situations in which a LATO applies, the risk remains; that is, patients may end up in a state that is inconsistent with their goals. Thus, patients' wishes regarding their care if they are successfully resuscitated but neurologically impaired should be clarified.

There are several possible objections to the LATO. First, clinicians often prefer to have dichotomous choices: DNR or full CPR. We believe, however, as do others (12, 25, 26, 29), that the existing DNR–CPR dichotomy may be misleadingly simple because it does not entirely capture the true wishes of some patients. Moreover, a clearly defined trichotomous choice may be easy for clinicians and patients to understand.

Second, physicians may have difficulty determining whether a LATO applies when they are called to resuscitate a patient and how the policy should be implemented. We suggest that discussions of patients' resuscitative choices be operationalized in a manner similar to current local policies regarding DNR orders. For example, at the Toronto General Hospital (Toronto, Ontario, Canada), as outlined in our hospital policy manual, resuscitative decisions are documented in the hospital chart, the order sheet, and the patient's administrative record (the nursing Kardex). If patients who arrest do not have a DNR order written on their charts, a cardiac arrest team is called. Similarly, if patients with a LATO were to have an arrest, the cardiac arrest team should be called and they should determine whether the LATO applies. For patients who are being monitored and are in a shockable rhythm and for those who have an arrest in the operating room, the correct course of action should be self-evident. We acknowledge that determining whether an arrest is iatrogenic may be more difficult, although still clearly possible in certain circumstances. For example, if an arrest occurs during an interventional procedure or during the administration of a blood product in an otherwise stable patient, it would be reasonable to assume that these arrests are iatrogenic and, therefore, that resuscitation should be attempted.

Third, some physicians may abuse the LATO and attempt to resuscitate patients who would not wish to be resuscitated, making the LATO the equivalent of a full CPR order. Conversely, a LATO may be used to justify less aggressive therapy in a patient on whom resuscitation would otherwise have been attempted, thereby interpreting the LATO as the equivalent of a DNR order. We believe that the potential for abuse in either direction should not prevent the introduction of this concept if the LATO confers greater benefits than the potential harm of abuse.

CONCLUSION

This paper makes three specific contributions. First, to the best of our knowledge, no one has argued that these diverse clinical problems (witnessed shockable rhythms, DNR in the operating room, and iatrogenic complications) are united by the same underlying issue; that is, the prognoses of cardiac arrest in these three circumstances are relatively good. Second, although there have been recommendations for the reconsideration of DNR orders in the operating room, we propose a clear and easy-to-implement policy such as the LATO. Finally, the LATO, if implemented, will considerably enhance the quality of patient care by ensuring a closer fit between patients' expressed treatment preferences and underlying treatment goals.

From Harvard University, Cambridge, Massachusetts; and University of Toronto, Toronto, Ontario, Canada.

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Requests for Single Reprints: Peter A. Singer, MD, MPH, FRCPC, University of Toronto, 88 College Street, Toronto, Ontario M5G 1L4, Canada.

Current author addresses are available at www.annals.org.

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Current Author Addresses: Dr. Choudhry: Toronto General Hospital, Eaton North, Ground Floor-246, 200 Elizabeth Street, Toronto, Ontario M5G 2C4, Canada.
Mr. Choudhry: Faculty of Law, University of Toronto, 78 Queen's Park, Toronto, Ontario M5S 2C5, Canada.
Dr. Singer: University of Toronto Joint Centre for Bioethics, 88 College Street, Toronto, Ontario M5G 1L4, Canada