**Editor's note:**
Prof. Blair Henry (Sunnybrook Health Sciences Center): It is my honor to be named the inaugural chair of the newly created Ethics column for the *Annals of Palliative Medicine*. My motto has always been: Know better—do better! Palliative care and more specifically end-of-life care are natural nexus for ethical quandaries. In this column I hope to be able to provide our readers with interesting, topical and challenging ethical issues relevant to your clinical setting.

Editorial on Ethics

# The meaning of do-not-resuscitate and its relationship to morality and outcomes research

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Numerous studies have reported an increase in mortality associated with DNR status in hospitalized patients. This association has been seen in conditions ranging from pneumonia, to ARDS, to vascular surgery, to intracerebral hemorrhage (1-4). In these studies, DNR's association with increased mortality has been independent of age and other variables.

Clinically this worries us. We know that in the strictest sense DNR means that clinicians should not attempt cardiopulmonary resuscitation (CPR) once death has occurred (5). And we know that, particularly in the elderly, survival to discharge after inpatient CPR rarely exceeds 10% (6). So DNR status should not have a large impact on mortality. The fact that it does have an impact begs the question of whether we are treating patients with a DNR status appropriately. And there is indeed literature suggesting we may be withholding other interventions in patients with a DNR order (7,8).

If we assume that physicians in general are making decisions in accordance with patient wishes, why would they withhold interventions from DNR patients? Although DNR started as a singular limitation on care stating that no CPR was to be performed in the event of the patient's death, I would argue that DNR is now usually only the first of what may be several limitations to care (5). As our medical prowess has increased, so has the number of medical and surgical interventions that patients may refuse, such as the refusal of tracheostomy, a do-not-intubate (DNI) order, a decision for no "artificial" nutrition, a decision against any invasive procedures, declining vasopressors, declining chemotherapy, or the decision to treat with "comfort care measures only". In a recent NEJM article Burns *et al.* state "By providing a formal framework for the decision-making process and the communication of this decision, DNR policies filled a void at health care institutions" (5). But over time, that void has grown with an increasing number of potentially life-saving interventions that patients may refuse, and yet "Code Status" still remains the mainstay of labels for relaying that a patient has put limitations on their care.

The electronic medical record (EMR) used where I am currently practicing is ubiquitous across the United States. Yet, the Advance Care Planning data consists of a Code Status (Full, DNR, No Code or TBD), information on if an advanced care paper document is signed at the hospital, and whether there is a "goals of care" free text note. This data

is, to a great extent, generic information that essentially points the physician to a paper form or a free-text note for any details. There is more granular data recording for Allergies than there is for Advance Care Planning.

How can we possibly know retrospectively if we are inappropriately withholding interventions when patients' wishes are recorded in such a vague manner? I believe that this lack of "a formal framework", as Burns *et al.* put it (5), for documenting other limitations on care has caused the term DNR to move from a phrase with the concrete denotation of "No CPR" to a phrase with subjective connotations that may or may not accurately represent patients' wishes. This may explain some of the discrepancies in the care for DNR patients seen in the literature.

Given this idea, the fact that patients who choose a DNR status may have a higher mortality should not surprise anyone. The association has now been demonstrated in such a variety of different conditions that further studies linking this or that specific disease to a higher mortality in the presence of a DNR order are a waste of researchers' resources. Associating DNR with mortality in further conditions is low-hanging fruit. More importantly, a patient's decision to change to DNR status is associated with age, marital status, underlying medical conditions and poor prognosis (9). Therefore, it should not surprise anyone that patients with underlying comorbidities and poor prognosis who choose DNR may also refuse other interventions that may increase their burden of illness or decrease their quality of life, even if we believe these interventions may prolong their life. In this way, the increased mortality associated with DNR status may be related to further limitations on care that have not been documented in a clear and accessible data format in the EMR.

If we accept that DNR status is associated with a higher mortality and that this does not necessarily indicate poor medical care, we still need to know how to adjust for this from a research perspective. In randomized controlled trials, investigators can easily exclude patients with a DNR status or adjust for its presence in their analysis. Where this becomes problematic is in observational comparative effectiveness research (CER). CER is methodology that is complementary to randomized controlled trials and evaluates therapies for their external validity in large "real-world" patient populations. Observational CER relies on administrative databases maintained by hospital systems, government agencies and private organizations. But the validity of the results of observational CER relies on the proper identification of all confounding variables so they can be integrated into outcomes analyses. DNR is one of these confounding variables. And the inclusion of DNR status into observational CER can change the expected benefit or harm of a therapy (10). But at this time, very few of the databases used for CER include DNR status.

To further complicate the issue, from a research perspective there is a potential difference between an early DNR order (an order signed within the first 24 hours of admission) and a late DNR order (an order signed after the first 24 hours of care). An early DNR order is more likely representative of a patient with significant baseline comorbidities, whereas a late DNR more likely represents treatment failure for the principle admission diagnosis (11).

Whether other limitations on care influence mortality outcomes remains to be seen. But one could easy imagine that an early DNI order may be associated with increased mortality in COPD patients admitted to the ICU, or that an early no vasopressors order may be associated with increased mortality in patients with severe sepsis.

This leaves us with two future mandates. First we should consider building on the framework started by DNR to further document limitations on care in our EMRs as discrete data points. Better documentation of limitations on care beyond DNR will, in my opinion, help to disambiguate the term DNR, returning it to its original meaning of "no CPR". And with improved codification of these limitations we will be better able to determine whether or not we are withholding interventions from DNR patients from which they may benefit. Secondly, we must begin to account for patient limitations on care in the administrative databases used for observational CER. This should begin with the wide spread inclusion of early DNR status, which is a proven confounding variable, into these databases. But it may also extend to the inclusions of other limitations on care if they are proven to be significant independent confounding variables as well.

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## Footnote

*Conflicts of Interest:* The author has no conflicts of interest to declare.

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