

“Do Not Resuscitate” Orders Among Deceased Patients Who Received Acute Neurological Care

An Observation Analysis

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Abstract: There were many reports about the “do not resuscitate” (DNR) order while practicing in the critical care units and conducting hospice affairs but limited in the neurological issues. This study investigated the possible flaws in the execution of the DNR order among patients who received acute neurological care in Taiwan.

Over a 3-year period, we retrospectively reviewed the medical records of 77 deceased patients with neurological conditions for DNR orders. Registry and analysis works included demography, hospital courses, DNR data, and clinical usefulness of the lab and image examinations.

Sixty-seven DNR orders were requested by the patients’ families, and more than half were signed by the patients’ children or grandchildren. The main DNR items were chest compression, cardiac defibrillation, and pacemaker use, although several DNR patients received resuscitation. The mean duration from the coding date to death was 7.6 days. Two-thirds of the patients with DNR requests remained in the intensive care unit, with a mean stay of 6.9 days. Several patients underwent regular roentgenography and blood tests on the day of their death, despite their DNR orders.

Hospital courses and DNR items may be valuable information on dealing with the patients with DNR orders. The results of this study also suggest the public education about the DNR orders implemented for neurological illnesses.

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Abbreviations: DDD = days from signing the DNR to death, DNR = do not resuscitate, HSD = hospital-stay day, ISD = ICU-stay day.

INTRODUCTION

Various techniques for cardiopulmonary resuscitation have been developed over the previous decades, and the outcomes typically depend on the premorbid condition(s).¹

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However, the utilization of futile medical procedures increased much during the past decades, especially among patients with a terminal illness. Therefore, a “do not resuscitate” (DNR) order represents not only a medical issue but is also applied to patients in surgical intensive care units (ICUs),² who have longer hospital stays, higher mortality, and higher complication rates.³ However, the use of DNR orders may be complicated by ethnical, cultural, economic, and family values. Therefore, combining clinical and hospice care in the acute ward can enhance the acceptance of DNR,⁴ as well as natural death.⁵

In Taiwan, >70% of patients who are admitted to hospitals require noncancer palliative care.⁶ Several neurological diseases have been legally considered terminal illnesses since 2011 and are eligible for hospice care, which is reimbursed by Taiwan’s National Health Insurance.⁷ Over the previous decades, the use of DNR for neurological diseases has been advocated in many countries, especially for stroke patients^{8,9} and patients with advanced dementia.^{10,11} In Taiwan, a policy for DNR orders has been proposed for many years, although difficulties and disputes still exist between the medical staff and patients’ families regarding the management of treatment and related emotional issues. In this study, we investigated the exploitation of DNR orders among patients who were receiving acute neurological care in the ward and the ICU. We retrospectively reviewed information regarding DNR signatories and proxies with the power of attorney, background diseases, total hospital-stay days (HSDs), ICU-stay days (ISDs), and the days from signing the DNR to death (DDD). We hope this information will be useful in educating the public regarding the use of our healthcare system’s limited resources.

METHODS

We retrospectively reviewed medical records from neurology patients who passed away in the ward or the ICU of our institution, between January 1, 2009 and December 31, 2011. Patients who underwent neurosurgery were excluded from our analysis. This study was approved by the Ethics Committee of the Cardinal Tien Hospital, and the requirement for informed consent was waived based on the retrospective study design (chart review) (IRB No. CTH-101-3-5-002, issued on August 14, 2012).

The data we gathered for this study included the following domains: the patients’ demographic data such as age, sex, and background illnesses; hospital course, including ICU stay, HSD, ISD, and DDD; DNR data, including the relationship of the DNR signatories and proxies (eg, spouse, children, grandchildren, siblings, or parents), the DNR items for resuscitation management (including the following 7 items: endotracheal intubation, chest compression, drug intervention, cardiac defibrillation, cardiac pacing, artificial ventilation, and other resuscitation procedures), and instances where the DNR order was

reversed; clinical laboratory testing on the date of death and enrollment in hospice care.

Drug interventions on the DNR registry included dopamine, dobutamine, epinephrine, norepinephrine, vasopressin, atropine, sodium bicarbonate, calcium gluconate, and lidocaine. Dosages of these drugs were not recruited into analyses. Patient data were anonymized by deidentification and use of numerical data orders, and all data from 2 groups, those with or without DNR requests, were subjected to descriptive analyses.

RESULTS

Seventy-seven medical records were included in this study (42 women and 35 men). The mean age at death was 78.8 years (range, 22–96 years). The causes of death were vascular events (cerebral infarction, 15; intracranial hemorrhage, 5), heart diseases (18, including 5 acute myocardial infarction), infectious etiologies (38, mainly pneumonia and/or sepsis), and 1 case of metastatic brain tumor (lung cancer) (Table 1). We also observed that 6 patients were <60 years old. The causes of death among these young patients were acute hemorrhagic infarction (1), hypertensive intracranial hemorrhage (1), pneumonia (1 with pontine hemorrhage and 1 with cerebral palsy), pulmonary edema (1, Guillain-Barré syndrome), and symptomatic seizure attributed to thrombotic thrombocytopenic purpura (1).

There were 10 patients (13%) who died without any DNR order and 7 (70%) of them were men. The remaining 67 patients (87.0%) had DNR orders, and this group comprised 39 women (92.9% of all female patients) and 27 men (77.1% of all male patients) (Table 2). Year-by-year analysis of documented DNR orders among neurological patients indicated that the prevalence of DNR orders in the ward ranged from 81.1% to 94.1% (16/17 in 2009, 21/23 in 2010, and 30/37 in 2011). DNR orders were requested in the first 24 hours after admission for 16 patients (23.9%; 11 women and 5 men), and although 3 of these patients passed away in the first 24 hours after admission, only 1 patient stayed in the ICU.

We further reviewed the hospital course data regarding HSD, ISD, and DDD (Table 2). The mean HSD for the 67 patients with DNR orders was 25.34 days (range, 1–385 days), which was much shorter than that for the 10 patients without DNR (mean, 61.81 days; range, 1–193 days). Two patients had DNR orders that had been requested by their families during their prior hospitalization. The mean DDD was 4.95 days (range, 0–30 days), which was 48.3% of their mean HSD. After excluding the 2 patients with existing DNRs, the mean DDD of the remaining 65 patients was 4.77 days, which accounted for 39.3% of their HSD (Table 2), indicating that the DNR order occurred in the latter half of the patient's hospitalization.

TABLE 1. Causes of Death for 77 Patients With Neurological Diseases

| | |
|---|----|
| Vascular etiology (n = 38) | |
| Stroke | 15 |
| Cerebral infarct | |
| Intracranial hemorrhage | 5 |
| Heart disease | 18 |
| Infectious etiology (mainly pneumonia, sepsis) (n = 38) | |
| Neoplastic etiology (metastatic lung cancer) (n = 1) | |

TABLE 2. Hospital Courses for Patients With or Without DNR Orders

| | With DNR (n = 67) | Without DNR (n = 10) |
|---------------------------------|----------------------|-------------------------|
| Female (n = 42) | 39 (92.9%) | 3 (7.1%) |
| Age, y | 84.46 | 72.33 |
| Male (n = 35) | 28 (80.0%) | 7 (20.0%) |
| Age, y | 73.64 | 78.42 |
| HSD | 25.34 | 61.81 |
| DDD | 4.95 | NA |
| Individual DDD/HSD ratio (mean) | 39.3% | NA |
| Patients with ICU stay | 48 (71.6%) | 9 (90.0%) |
| ISDs | 7.70 | 9.22 |
| Individual ISD/HSD ratio (mean) | 73.9% | 88.1% |

DDD = days from signing the DNR to death, DNR = do not resuscitate, HSD = hospital-stay day, ICU = intensive care unit, ISD = ICU-stay day, NA = not available.

Regarding ICU stays, 20 patients did not stay in ICU before their death, and 19 (95%) had DNR orders (23.4% of patients with DNR orders). However, >70% (48/67) patients with DNR orders had stayed in the ICU, with a mean ISD of 7.70 days (range, 1–27 days) (Table 2). Of the overall 57 patients who had stayed in the ICU, the mean ISD was 7.95 days (range, 0–27 days), accounting for 74.5% of their average HSD. Among the same patients, 21 stayed in the ICU for >7 days (36.8%), including 16 patients with DNR orders (28.0% of patients with ICU stays, and 23.9% of patients with DNR orders). However, 9/10 patients without DNR orders had used the ICU facilities, with a mean ISD of 9.22 days (range, 1–27 days), which was longer than the ISD for patients with DNR orders. The ISD/HSD for patients without DNR orders was higher than for patients with DNR orders (88.1% vs 73.9%). Of the 57 patients with ICU stays, 9 patients died in the general ward and 2 patients died on the same day that they were admitted to the ICU (both had previous DNR requests from their families).

Only of 67 patients with a DNR order requested hospice care in the ward, and none had living wills or advance directives in their medical records. Fifty-five (82.1%) signatories for the 67 DNR records were children or grandchildren; other signatories included spouses (6), parents (3), and siblings (3). Seven of the 67 patients with DNR orders died on the day that the DNR was signed by the family.

The “No” items for the DNRs were mainly refusals of chest compression, cardiac defibrillation, and cardiac pacing, followed by artificial ventilation assistance and endotracheal intubation (Table 3). After reviewing the medical records, we found that there were resuscitations (reversion in status) without documented causes on the medical records of 25 patients (37.3% of the patients with DNR) who had previously requested a DNR order. These reversions were mainly regarding the administration of resuscitation medicines (23 patients), such as dopamine, norepinephrine, epinephrine, and sodium bicarbonate. Nine of the 23 patients had previously refused drug intervention as a DNR item, although the reversion occurred later. Upon nested analysis, 2 of these 9 patients also received other resuscitations, including endotracheal intubation and ventilator assistance.

TABLE 3. The Resuscitation Items for DNR Orders Among DNR Patients and Those Eventual Resuscitations

| Requested DNR items | DNR Patients (n = 67) | Eventual Resuscitation (n = 25) |
|-----------------------------------|--------------------------|------------------------------------|
| Endotracheal intubation | 46 | 4 |
| Chest compression | 64 | 2 |
| Drug intervention | 41 | 23 |
| Cardiac defibrillation | 63 | 1 |
| Cardiac pacing | 63 | 0 |
| Artificial ventilation | 52 | 2 |
| Plasma exchange (other procedure) | 1 | 0 |

DNR = do not resuscitate.

Another issue was the execution of clinical laboratory examinations on the day of death. We found that 18/77 patients (23.4%) underwent roentgenography on the day of death (17 with chest radiography and 1 with kidney, ureter, and bladder radiography), and 12 of these 18 patients (66.7%) had valid DNR orders. Blood sampling for bacteriological, biochemical, or hematological analyses was performed for 27 patients, including 20 (74.1%) patients whose family had requested a DNR. Two patients with DNR orders underwent ultrasonographic examination (echocardiography and abdominal ultrasonography) to determine/confirm diagnosis on the day of death. No invasive procedures were carried out on the day of death for all 77 patients.

DISCUSSION

Although each patient's disease has its own natural course, medical intervention may prolong the illness or/and postpone death, possibly resulting in the administration of futile medical procedures. Hospice teams have significant experience in caring for terminal patients with cancers. Neurologists have also grown increasingly aware of the importance of DNR recently, as many neurological diseases are irreversible and progressive in nature, especially cerebrovascular diseases and advanced neurodegeneration. Our hospital-based study is the first descriptive report of DNR use among Taiwanese patients with neurological diseases and has reported the utility of the hospital facilities (eg, ICU stay), the signatories for the DNR requests, the specific DNR items, and the prevalence of laboratory testing on the day of death.

In this study, several patients had numerous comorbid conditions, especially coronary artery disease and infections, which were the main causes of death. A similar observation was reported in a study of patients with advanced dementia.¹² In the present study, approximately 87% of the patients who died in our hospital had a DNR order, with women more likely than men to have a DNR order (92.9% vs 77.1%, respectively). This difference may be attributed to the older age of the female patients compared with the male patients (84.46 years vs 73.64 years, respectively). Similarly, female patients are older than male patients among noncancer patients receiving hospice care⁶ and those with acute intracerebral hemorrhage.¹³ In addition, women were more likely than men to request a DNR order within the first 24 hours after admission. However, the percentage of our patients with early DNR requests within the first day in the hospital (23.9%) was much lower than in previous studies

of intracerebral hemorrhage (71.2%)¹⁴ and ischemic stroke (71.0%),⁹ possibly due to the more complicated medical conditions of our patients. Another reason might be the higher mortality among those with early DNR orders for the sake of disease severity, especially among ischemic stroke patients.¹⁵ We also observed a shorter HSD among patients with DNR orders, even though the DNR order generally occurred during the latter half of the hospital stay. Although the quality of care is not impacted by DNR orders,⁹ the late DNR requests may be attributed to the families' desire to avoid "giving up" on the patients, fear of compromised care, or the delayed proposition suggested by the medical personnel.

Someone may believe that shorter hospital stays result in fewer futile medicine procedures, including the use of ICU facilities, thereby lowering health care costs. We explored HSD as an indicator of the quality of care, rather than the less reliable mortality-based analysis.¹⁵ Our observation of shorter ICU stays and lower ISD/HSD ratios among those with DNR orders does not agree with that of a previous study that reported similar hospital stays and costs for patients with and without DNRs.¹⁶ Another recent report stated that more DNR requests reduce the number of positive ICU stay outcomes compared with the implementation of a rapid response team.¹⁷ One explanation for this discrepancy between our finding and the prior report is our exclusion of surgical cases. Disappointing feeling about the quality of care may be present for the families or proxies after end-of-life decisions, even after multiple visits with caring personnel.¹⁸

This study also provided positive information regarding the implementation of DNRs. More than 50% of the signatories were the patients' immediate family members, typically the children or grandchildren. However, none of this study's patients had advance directives. We found that the most common DNR items were chest compression, cardiac defibrillation, and cardiac pacing, which are regarded as physically damaging procedures. However, drug intervention was the item with the highest rate of reversion. This may be caused by family members asking medical staff to help the patient in times of suffering, resulting in resuscitations. Futile medications that were administered according to the family's request were mainly vasopressors to maintain the blood pressure and heart rates. Although these medications prolonged the stay in the ICU or ward, they did not improve the patient's outcome and even worsened the quality of care. During hospital stay, the families of patients with deteriorating consciousness may withdraw their DNR order, thereby reverting it to a "partial" resuscitation order. Similar changes in treatment preferences had been reported among elderly patients with advanced illness.¹⁹ However, there may be less satisfactory outcomes for advanced directives in clinical practice.^{20,21}

Some limitations existed in this study. First, this study limited the cases in 1 hospital, instead of the hospitals in a district of Taiwan. Different means on dealing with the DNR affairs in other hospitals may not have different results as ours, especially for those on dying. Second, we did not recruit the patients from nonneurological services in this hospital-based analysis. Diverse disease backgrounds may possess different medical decisions by the staff and the families. The CCI scoring may be an alternative issue on weighing the decisions. Third, there were difficulties on recruiting age- and sex-matched patients with or without DNR requests in this study, although our study duration spanned 3 years. Fourth, we did not find any information such as the proxies' religions for the decisions of DNR or not during this chart-reviewing work. Religious status

may affect the living wills of the patients and the DNR requests of the families. This may be another important topic to explore.

Controversy may still exist regarding the use of DNR orders. At first, DNR implied “do not resuscitate” and “do not resign” which urged health care providers to not abandon patients if recovery was still possible²² and was considered a patient’s legal right. However, as “advances can be made not only by doing, but also by ceasing to do,”²³ patients may become dispirited. Both statements have individual humanitarian meaning. Although medicine is known to be an uncertain science, as the words initially mused by William Osler, the introspection by Wellbery²⁴ considered it as an opportunity for growth. Individual decision regarding DNR requested by a patient’s family is a lesson for all of us. Neurological diseases may share similarities with other medical fields, although ethnic differences may create diverse viewpoints regarding the use of DNRs. We hope that our report helps to inform clinical practice, public education, and medical development, regardless of the type of acute neurological illness, genetic, or degenerative disorders such as dementia and movement diseases. Sharing these experiences is of value to the global community.

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