


RESEARCH ARTICLE

“Do not resuscitate” order and end-of-life treatment in a cohort of deceased in a Norwegian University Hospital

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Abstract

Background: A “Do not resuscitate” (DNR) order implies that cardiopulmonary resuscitation will not be started. Absent or delayed DNR orders in advanced chronic disease may indicate suboptimal communication about disease stage, prognosis, and treatment goals. The study objective was to determine clinical practice and patient involvement regarding DNR and the prevalence of life-prolonging treatment in the last week of life.

Methods: A cross-sectional observational study was made of a cohort of 315 deceased from a large general hospital in Norway. Data on DNR and other treatment limitations, life-prolonging treatment in the last week of life, and cause of death were obtained from medical records.

Results: A DNR order was documented for 287 (91%) patients. Almost half the DNR orders, 142 (49%), were made during the last 7 days of life. The main causes of death were cancer (31%), infectious diseases (31%), and cardiovascular diseases (19%). The most frequent life-prolonging treatments during the last week of life were intravenous fluids in 221 patients (70%) and antibiotics in 198 (63%). During the last week of life, 103 (36%) patients received ICU treatment. Death by cancer (odds ratio 2.5, 95% confidence interval 1.24–5.65) and DNR decision made by a palliative care physician (odds ratio 3.4, 95% CI 1.21–3.88) were predictors of not receiving life-prolonging treatment.

Conclusion: The findings of a high prevalence of life-prolonging treatment in the last week of life and DNR orders being made close to the time of death indicate that decisions about limiting life-prolonging treatment are often postponed until the patient's death is imminent.

KEYWORDS

“Do not resuscitate” orders, end-of-life care, palliative medicine, treatment limitations

Editorial Comment

This study analyzed clinical practice concerning “Do not resuscitate” orders and advanced treatment at the end of life in 315 deceased patients from a university hospital in Norway. DNR

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orders were observed for most, and for half of the cases initiated in the last week of life. Approximately 1/3 of the cases were admitted to an ICU during the last week of life.

1 | INTRODUCTION

A “Do not resuscitate” (DNR) order implies that cardiopulmonary resuscitation (CPR) will not be started. According to Norwegian guidelines, a DNR order can be made either by the physician, when CPR treatment will be futile, or by the patient if they do not wish to receive life-prolonging treatment such as CPR.^{1,2}

Lack of a DNR order for a patient with advanced chronic disease may have several negative consequences, such as tie up of emergency response resources,^{3,4} and potential pain and discomfort during a temporary return of spontaneous circulation.^{5,6} Furthermore, the lack of DNR order may imply that the patients have not been given realistic information about their disease and prognosis, and therefore, might have lost the opportunity to spend the last days of their life according to their own priorities. If a DNR order is not made until the patient's death is imminent, it may indicate suboptimal communication about disease stage, prognosis, and treatment goals.

The overall DNR order rates for critically ill patients differ between countries and between institutions, depending on different juridical policies and requirements.⁷ The rate of DNR orders prior to death varies from 25% in Brazil to 98% in Australia.^{8–12} In addition, the philosophy of the institution, patient involvement, and referral to palliative care play important roles in the DNR rate. A study conducted in both UK and USA demonstrated that at hospitals with an autonomy-focused culture, physicians offered patients the choice of resuscitation regardless of whether they thought resuscitation would be appropriate.¹³ Another study revealed that referral to palliative care was associated with 100% of patients being given a DNR order at death, compared with 82% in cancer patients not referred to palliative care.⁸

In a study of patients dying in Veterans Health Administration centers in the USA, approximately one-third of DNR orders were made during the last 24 h of life.¹⁴ In Australia, Batten et al. found that late DNR orders were associated with increases in life-prolonging treatment.¹⁰ In a Korean study, a DNR order during the last 3 days of life was associated with a significantly higher prevalence of several life-prolonging treatment interventions compared with patients who were given DNR status less than 3 days before death.¹⁵ Regardless of DNR order, other types of life-prolonging treatment at the end of life tend to be continued even after the DNR order has been made.¹⁶ In an Australian study, life-prolonging treatments were provided to 64% of the patients within 48 h before death.⁹ However, there has been a lack of research on the relationship between DNR orders and decisions regarding other limitations of life-prolonging treatments.

The primary aim of our study was to examine the timing of DNR orders relative to time of death, the reasons for DNR orders, and patient involvement in DNR orders in an unselected cohort of deceased patients. The secondary aim was to describe the prevalence

of life-prolonging treatment in the last week of life and whether decisions to limit other life-prolonging treatments were made at the same time as DNR orders.

2 | METHODS

2.1 | Study design

The study was a cross-sectional observational study of a cohort of deceased.

2.2 | Study population and setting

The study was performed at Akershus University Hospital (abbreviated as Ahus) in the Greater Oslo Region, Norway. Ahus is a publicly funded university hospital serving an unselected population of approximately 600,000, which is equivalent to more than one-tenth of the Norwegian population. Patients who died between February 2nd and June 1st 2017 were included retrospectively. Patients who died within 6 h of admission as well as patients who were younger than 18 years at the date of death were excluded.

2.3 | Data collection and management

Patients were identified by the data-retrieval group at AHUS, based on the recorded date of death in electronic hospital files. The study population was subsequently stratified based on whether a DNR order had been recorded. Data on sociodemographic variables, cause of death, DNR status, DNR decision process, and life-prolonging treatments during the last week of life were obtained from patient records held by the hospital. Life-prolonging treatments were categorized as either aggressive (invasive ventilation, ICU treatment, or chemotherapy) or less aggressive (noninvasive ventilation, antibiotic treatment, intravenous fluid treatment, or parenteral nutrition).

Two of the investigators retrieved data from patient records. To minimize investigator variability, data from 10 records were collected independently by both investigators and compared before all four authors decided on classification in cases of doubt or discrepancies. In cases of uncertainty regarding classification of variables during the data collecting process, the patient file was reviewed by a second author.

The cause of death was identified from the official death certificate and organized into four main groups: cancer, cardiovascular, infectious, and “other” causes. Patient involvement in DNR orders was categorized as “informed,” “shared decision,” “implicit,”

TABLE 1 Demographic data, length of stay and causes of death in a cohort of 315 deceased patients

	Study population (N = 315)
	N (%) ^a
Age (years)	
Mean	76.2
SD	12.8
Gender	
Female	150 (48)
Length of stay in the hospital (days)	
Mean	7.1
SD	9.2
Cause of death	
Cancer	97 (31)
Cardiovascular diseases	59 (19)
Infectious diseases	97 (31)
Miscellaneous	61 (19)
Unknown	1 (0,3)

^aPercentages are rounded to the nearest whole number or reported with one significant digit for values <1.

“incapacitated,” or “not documented.” Involvement of next-of-kin was categorized as “asked”, “informed”, “implicit,” or “not documented.”

Functional status at the time the DNR decision was made was graded according to the Eastern Cooperative Oncology Group (ECOG) scoring system.¹⁷ When ECOG status was recorded in the patient files, that value was recorded. In patients lacking an ECOG score, a score was estimated based on the description of the patient's performance status.

For patients with a DNR decision, we recorded whether the DNR order was accompanied by concomitant treatment limitations regarding invasive ventilation, noninvasive ventilation, intensive care treatment (i.e., in an ICU), antibiotic treatment, intravenous fluids or parenteral nutrition, or limitation of treatment to symptom relief only.

2.4 | Statistical analyses

Descriptive statistics were used to summarize the data. ANOVA one-way test was used for comparison of means for continuous variables and a Pearson's chi-squared test for comparison of categorical variables. Variables found to be significant at $p < 0.05$, in addition to age and gender, were included in the nominal logistic multivariate analysis. Results from the logistic multivariate analysis are presented in odds ratio (OR) and 95% CI (confidence interval). A p -value of <0.05 was considered significant. Statistical methods were performed using the IBM[®] Statistical Package for Social Sciences (SPSS), version 25 (SPSS[®] Inc, Chicago, Illinois).

TABLE 2 Clinical practice in connection with a do not resuscitate (DNR) order in 287 patients with a documented DNR order at time of death out in a cohort of 315 deceased patients

	Documented DNR at death
	N = 287 (%) ^a
Physician responsible for DNR order	
Palliative care physician	31 (11)
Other	256 (89)
ECOG performance when DNR order was made	
1 Strenuous physical activity restricted; fully ambulatory and able to carry out light work	12 (4)
2 Capable of all self-care but unable to carry out any work activities. Up and about >50% of waking hours	58 (20)
3 Capable of only limited self-care; confined to bed or chair >50% of waking hours	100 (35)
4 Completely disabled; cannot carry out any self-care; totally confined to bed or chair	98 (34)
Unknown	19 (7)
Patient involvement	
Informed	45 (16)
Shared decision	17 (6)
Implicit	13 (5)
Incapacitated	97 (31)
Not documented	129 (45)
Next-of-kin involvement	
Asked	8 (3)
Informed	115 (40)
Implicit	14 (5)
Not documented	150 (52)
Treatment limitations made together with DNR order ^b	
Invasive respiration	164 (57)
Non-invasive respiration	10 (4)
Intensive care treatment	31 (11)
Antibiotics	6 (2)
Intravenous fluids	4 (1)
Nutrition	4 (1)
Symptom relief only	18 (6)
More than one limitation made	38 (13)
No other limitations made	113 (40)

^aAll percentages have been rounded to the nearest whole number.

^bCombinations of limitations possible.

2.5 | Research ethics

The study was approved by the Regional Committee for Medical and Health Research Ethics for south-east Norway (REC South East) (Reference number 2018/100) and the institutional data protection officer at Ahus.

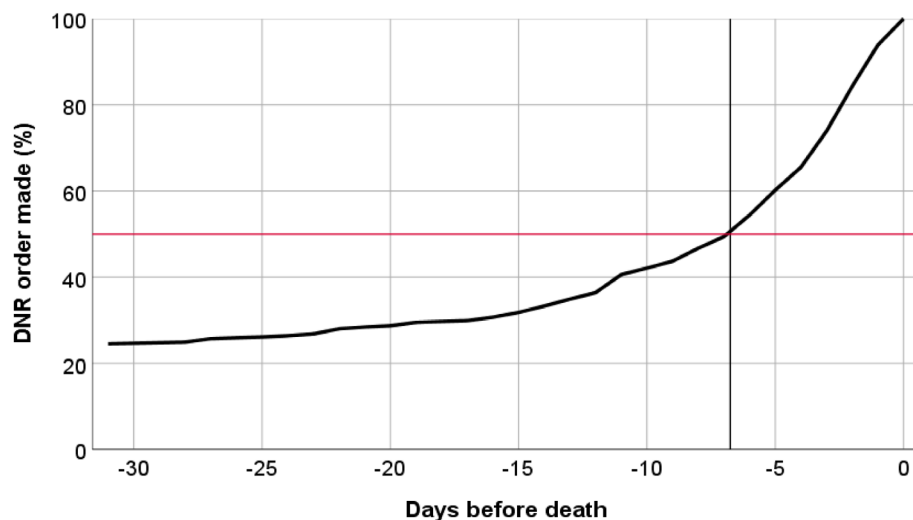


FIGURE 1 Cumulative % of patients with “do not resuscitate” (DNR) orders during the last month before death

3 | RESULTS

3.1 | Study population

In the study population of 315 patients, the mean age was 76.2 years and 48% were female (Table 1). The most common causes of death were cancer (31%), infectious diseases (31%), and cardiovascular diseases (19%).

3.2 | DNR orders

A DNR order had been made in 287 (91%) patients. In 270 (94%) of them, the DNR order had been documented according to hospital procedure as “critical information,” while in the remaining 17 cases (6%), the DNR order was documented elsewhere in the medical record. A DNR order had been made in 98% of patients who died from cancer, 92% of patients who died from cardiovascular diseases, 81% of patients who died from infectious diseases, and 89% of patients with other causes of death.

Next-of-kin had been informed about the DNR order in 115 (40%) cases (Table 2). Incapacitation was the most frequent reason for nondisclosure with 97 (31%) cases. In 86 (89%) of the incapacitated patients, next-of-kin had been informed (not shown in Table 2). In 246 (86%) patients with a DNR order, the physician had documented that CPR would be a futile treatment (not shown in Table 2).

In 68 (24%) patients with a documented DNR order at time of death, the DNR order had been made more than 1 month before death (Figure 1). This number increased towards death, with 142 (49%) having a DNR order 1 week before death. In 64 (23%) patients, the DNR order was made less than 48 h before death.

3.3 | Other treatment limitations

At the same time as the DNR order was made, a decision not to provide invasive ventilation was made in 164 (57%) patients

TABLE 3 Life-prolonging treatment in the last week of life in a cohort of 315 deceased patients

	Total population N = 315
	N (%) ^a
Treatment provided within last week of life	
Invasive ventilation	27 (9)
Intensive care treatment	113 (36)
Chemotherapy	4 (1)
Noninvasive ventilation	81 (26)
Intravenous antibiotics	198 (63)
Intravenous fluids	221 (70)
Parenteral nutrition	56 (18)

^aAll percentages have been rounded to the nearest whole number.

(Table 2). More extensive treatment limitations were decided in 38 (13%) of patients, while 113 (40%) had no other treatment limitations.

3.4 | Treatment during the last week of life

The most frequently provided life-prolonging treatments during the last week of life were intravenous fluids in 221 (70%) patients and antibiotics in 198 (63%) (Table 3). A total of 113 (36%) patients received ICU treatment during their last week of life.

In the bivariate analyses, a significant association was found between level of treatment, cause of death, DNR decision made by palliative care physician, and age (Table 4).

In multivariate analyses, death by cancer OR 2.5 (95% confidence interval 1.24–5.65), and a DNR decision made by a palliative care physician OR 3.4 (95% confidence interval 1.21–3.88) were predictors of no life-prolonging treatment being given compared with highly intensive life-prolonging treatment at the end of life.

TABLE 4 Life-prolonging treatment received during the last week of life in a cohort of 315 deceased patients

		Total	Advanced treatment	Moderate treatment	No life-prolonging treatment	P (Pearson's chi-squared test) ^a
		N	N (%) ^a	N (%) ^a	N (%) ^a	
Gender	Male	165	65 (39)	75 (45)	25 (38)	Not significant
	Female	150	55 (37)	68 (45)	27 (18)	
Do not resuscitate (DNR) order at death	Yes	287	109 (38)	132 (46)	46 (16)	Not significant
	No	28	11 (39)	11 (39)	6 (21)	
Palliative physician ^b	Yes	31	1 (3)	12 (39)	18 (58)	<0.001
	No	256	108 (42)	120 (47)	28 (11)	
Patient involvement ^b	Yes	62	18 (29)	30 (48)	14 (23)	Not significant
	No	225	91 (40)	102 (45)	32 (14)	
ECOG status ^b	1	12	7 (58)	3 (25)	2 (17)	Not significant
	2	58	19 (33)	29 (50)	10 (17)	
	3	100	35 (35)	51 (51)	14 (14)	
	4	98	38 (39)	42 (43)	18 (18)	
	Unknown	19				
Cause of death	Cancer	97	14 (14)	49 (51)	34 (35)	<0.001
	Infectious diseases	97	50 (52)	46 (47)	1 (1)	<0.001
	Cardiovascular	59	22 (37)	25 (42)	12 (20)	Not significant
	Miscellaneous	61	34 (56)	22 (36)	5 (8)	0.005
	Unknown	1				
Age	(mean)		77.4	76.8	71.7	0.020 ^c
	(SD)		11	12.8	17.5	
Days lived after DNR order	(mean)		81.0	84.4	120.9	Not significant
	(SD)		222.8	225.9	250.4	

^aAll percentages have been rounded to the nearest whole number.

^bN = 287.

^cOne way ANOVA-test.

4 | DISCUSSION

The process of dying, which was once considered a natural occurrence, is often marked by medical interventions.¹⁸ The availability of life-prolonging treatments has rendered treatment limitations, including DNR orders, particularly relevant in end-of-life care.

Our finding that a DNR order was made and correctly documented prior to death in the vast majority of patients in Akershus University Hospital, indicates an awareness among physicians of the futility of CPR in cases of patients with advanced diseases. However, many of the DNR orders were made within a few days of death. This might indicate that DNR orders often were postponed until the patient had reached a stage of imminent death, rather than being made when a progressive disease had reached the stage when CPR would be futile. That the DNR decision was made close to death is in line with a previous finding of two thirds of patients dying within 30 days of a DNR decision made in Norwegian hospitals and a hospital mortality of 50% in stroke patients where a DNR order was made.^{19,20} Furthermore, the low prevalence of other treatment limitations and the high

prevalence of provision of life-prolonging treatments in the last week of life may indicate a low awareness of the futility of many life-prolonging treatments in patients with advanced and progressive diseases. This finding is also in line with a previous finding of DNR decisions being three times as common as decisions to refrain from invasive ventilation.²¹

In some countries, a DNR order requires patient consent.²² In Norway, the attending physician makes the final decision regarding life-prolonging treatments. Although patients and/or their next-of-kin have the right to be heard and receive information, physicians cannot be required to prescribe life-prolonging treatment that is futile or not in the best interest of the patient.¹ Based on clinical experience, it was not surprising that futility was the most prevalent reason for DNR orders. However, it was surprising that shared decision making was described in only a few cases. Shared decision-making in advance care planning presupposes accurate information about not only cardiopulmonary resuscitation procedures and the consequences, but also of patients' disease, prognoses, and life expectancy. It is well known that patients who are realistically informed are more likely to

forgo cardiopulmonary resuscitation in certain health situations.²³ It has also been demonstrated that patients who understand resuscitation in a more abstract sense as something that restores life are more dismissive and less willing to participate in conversations about a DNR code, in contrast to those who view a DNR order in terms of alleviation of suffering, and of caring.²⁴ However, discussions about a DNR code are often experienced as a challenging task by physicians and can give rise to ethical dilemmas.²⁵ Not wanting to do harm by destroying hope, anxiety about disrupting doctor-patient relationships, and physicians' personal discomfort have been reported as important barriers in discussions about DNR orders with patients and their families.²⁶ Overall, physicians' attitudes and communication efforts have been shown to be an important barrier to patient involvement in DNR order discussions and adequate end-of-life treatment.²⁷ In addition, more holistic and patient- and relative-centered treatment escalation plans have been tested. Evaluation of such treatment escalation plans addressing not only DNR but also other life-prolonging treatments has demonstrated positive experience scores.^{28,29} This finding is in line with common palliative care culture and advance care planning strategies for critically ill patients, in order to ensure their dignity and autonomy, and to avoid unnecessary overtreatment at the end of life.³⁰ Worldwide, campaigns such as "Slow Medicine" with the slogan "doing more does not mean doing better" and "Choosing Wisely" aim to improve clinical appropriateness through the reduction of unnecessary tests and treatments, particularly at the end of life.^{31,32} In clinical practice, it is important to distinguish between clinical situations where futility of treatment must be clearly communicated to a patient and next-of-kin, and situations earlier in the disease trajectory where shared decision making can be applied to decide on treatment limitations. Discussions of treatment goals and limitations of treatment before the patient reaches the terminal phase might enhance shared decision making, improve patient autonomy, and reduce harmful overtreatment.

A common misperception regarding DNR orders is that other life-prolonging treatments, such as treatment with antibiotics or mechanical ventilation, will no longer be provided.^{16,18} The findings from our study do not support this interpretation of the DNR order. For instance, a large number of patients did receive life-prolonging treatment in the last week of life, which indicates significant overtreatment and the need for a revision of strategies and treatment culture for critically ill patients in the last phase of life. Even though a DNR order should in itself never be interpreted as an intention to withhold other treatments, it is crucial that indications for other life-prolonging interventions are considered when DNR decisions are made and during the remaining disease trajectory. Not unexpectedly, predictors for fewer life-prolonging interventions were patients dying from cancer compared with patients dying from other diseases with a more unpredictable trajectory, and a DNR decision made by palliative care physicians. This finding supports the importance of early involvement of palliative medicine in palliative disease trajectories.^{33,34} The finding that cancer patients differed from other patient groups might indicate both that the timing of DNR orders might be easier in the disease trajectory of cancer patients, and differences in attitude to life-

prolonging treatments between physicians treating cancer patients and other patients. Even though the findings indicate overtreatment in the last week of life in patients with advanced and progressive disease, it must be emphasized that our study population also includes patients with no or minimal premorbidity and thus a clear indication for even intensive care treatment. In such patients a very rapid clinical deterioration might follow withdrawal of treatment, contributing to a high prevalence of life-prolonging treatments in the last days of life in such patients.

The futility of treatment is a key concept related to life-prolonging interventions at the end of life. Futility has previously been defined as treatment that does not "benefit the person as a whole," even though the treatment might have a positive effect on some part of the patient's.³⁵ In line with this, the present findings indicate that life-prolonging treatments which are in reality futile are provided close to death because physicians fail to realize that the effects of treatment are too limited to "benefit the person as a whole."

The major strengths of the study on which this paper is based were a complete cohort of deceased patients from a large hospital serving an unselected population and thorough collection of data from both physicians' and nurses' notes by senior consultants in palliative medicine. These ensured that the findings had high internal validity. With cause of death being one of the variables in the regression analyses, differences between patient groups in the heterogenous study population can be detected. A limitation with regard to external validity is that the findings might have been influenced by hospital traditions and treatment culture.

In conclusion, although a high number of correctly documented DNR decisions were found, many were made shortly before death and with lacked information on patient involvement. In addition, the level of life-prolonging treatment in the last week before death indicates a need for improved decision making and advance care planning at the end of life.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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