

Comprehensive geriatric assessment as an essential tool to register or update DNR codes in a tertiary care hospital

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Geriatric assessment and DNR registration

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Key Summary Points

Aim: Investigate the effect of comprehensive geriatric assessment on ‘Do not Resuscitate’ code registration in patients with a geriatric profile admitted to a tertiary care hospital.

Findings: After comprehensive geriatric assessment, the ‘Do not Resuscitate’ code registration increased significantly in this context. Patients were consulted about code registration in 55.8% and agreed with the registered codes in 52.1% of cases.

Message: ‘Do not Resuscitate’ code discussion is a feasible and useful addition to the comprehensive geriatric assessment.

Abstract

Purpose

To investigate the prevalence of Do not Resuscitate (DNR) code registration in patients with a geriatric profile admitted to Antwerp University Hospital, a tertiary care hospital in Flanders, Belgium, and the impact of comprehensive geriatric assessment (CGA) on DNR code registration.

Patients and Methods

Retrospective analysis of a population of 543 geriatric patients (mean age 82.4 ± 5.19 years, 46.4% males) admitted to Antwerp University Hospital from 2018 to 2020 who underwent a CGA during admission. An association between DNR code registration status before and at hospital admission and age, gender, ethnicity, type of residence, clinical frailty score (CFS), cognitive and oncological status, hospital ward and stay on intensive care was studied. Admissions before and during the first wave of the pandemic were compared.

Results

At time of hospital admission, a DNR code had been registered for 66.3% (360/543) of patients. Patients with a DNR code at hospital admission were older (82.7 ± 5.5 vs. 81.7 ± 4.6 years, $p=0.031$), more frail (CFS 5.11 ± 1.63 vs. 4.70 ± 1.61 , $p=0.006$) and less likely to be admitted to intensive care. During the hospital stay, the proportion of patients with a DNR code increased to 77% before and to 85.3% after CGA ($p<0.0001$). Patients were consulted about and agreed with the registered DNR code in 55.8% and 52.1% of cases, respectively. The proportion of patients with DNR codes at time of admission or registered after CGA did not differ significantly before and after the start of the COVID-19 pandemic.

Conclusion

After CGA, a significant increase in DNR registration was observed in hospitalized patients with a geriatric profile.

Introduction

Advances in medical treatment and technology, in combination with a progressively aging population, often results in a difficult balancing act between fully using available treatment options and preventing futile or overly aggressive treatment. Many older persons admitted to a hospital suffer from a number of comorbidities that decrease their chances of survival after cardiopulmonary resuscitation (CPR) [1,2]. These facts have made timely discussion and communication about “Do not resuscitate” (DNR) orders and other end of life decisions an indispensable part of qualitative patient-centered care.

In the strictest sense, DNR orders are advance medical directives to forego cardiopulmonary resuscitation (CPR) in the event of cardiac arrest for patients who would not benefit from such

intervention. However, the term ‘DNR’ is sometimes also interpreted more broadly to encompass other types of advance care directives intended to reflect the patients’ wishes for the type of care they still want to receive in case of a life threatening disorder, with considerable variation between countries and hospitals. [3–6]

As a balancing act between beneficence, i.e. acting in the patient’s best interest, and respecting patient autonomy, DNR code registration practices differ between countries, hospital type and culture, as well as between different medical specialties. [7–11] Reported prevalence of DNR code in hospitalized patients varies between 7 and 46%. [12–14] Patient involvement in DNR code status discussions typically remains low. [4,15,16] Physician factors such as experience, training and communication skills influence how likely physicians are to initiate DNR discussions. [15,17–19]

Ideally, reanimation preferences are discussed and DNR codes registered in the patient’s medical file well before an actual life-threatening event occurs, as part of advance care planning (ACP). ACP is defined by international consensus as a process that enables individuals to define goals and preferences for future medical treatment and care, to discuss these goals and preferences with family and health-care providers, and to record and review these preferences if appropriate [20]. Early DNR code registrations are associated with increased mortality risk in geriatric surgery patients [21], patients with hemorrhagic stroke [22] or hip fracture [23], whereas DNR decisions made with a surrogate tend to be taken later and are also associated with increased in-hospital mortality rates. [24]

Patient factors influencing DNR decisions include age [25,26], comorbidity, [25–27] religion [28,29] and family preferences, [30] in addition to knowledge about resuscitation procedures and prognosis. [31]

In hospitalized geriatric patients, the presence of DNR orders or limitation of life sustaining treatment orders is associated with better quality of end-of-life care. [32] Geriatric patients are generally open to DNR discussions, but these are held infrequently. [18]

In 2002, 86% of hospital geriatric wards in Flanders had a DNR policy in place [33], but only about one fifth of patients hospitalized in acute geriatric wards had a registered DNR status. [16] The patient was only involved in the DNR decision making in 15.7% of cases, the patient's general practitioner in 22.6% of cases. Only 28.3% of the documented DNR decisions were taken before or at the time of hospital admission. [16]

DNR code discussions could be incorporated into the comprehensive geriatric assessment (CGA), a multidisciplinary approach to optimize treatment and quality of care in geriatric patients, as the CGA provides the information on clinical profile, pathologic risk, residual skills and quality of life needed to make a personalized advance care plan for older people. [34]

In this retrospective, cross sectional study we investigated the prevalence of DNR code registration in patients with a geriatric profile admitted to Antwerp University Hospital (UZA), a tertiary care hospital in Flanders, Belgium, and the impact of CGA on DNR code registration.

Methods

Study design

This retrospective study was conducted at UZA, a tertiary care hospital in Belgium. The study was approved by the hospital ethics committee (Reference number: 001447). Informed consent was waived for this retrospective study.

The study included patients with a geriatric profile [35] admitted to UZA in the period 2018 to 2020 who underwent a comprehensive geriatric assessment while hospitalized in a non-geriatric care setting. Inclusion criteria were at least 75 years of age and a Variable Indicative of Placement Risk (VIP) score [36] higher than 2. In Belgium, patients of 75 years or older are eligible for a specific comprehensive geriatric care program as part of standard care. This program includes screening to detect patients with a geriatric profile [35]. The inclusion criteria of the study match the operational definition of geriatric profile at the study hospital. No specific exclusion criteria were defined.

The first five patients who received a comprehensive geriatric assessment counted from the first, tenth and twentieth of every month of the study period were selected for inclusion in the study, except for the first two months of the study, when 22 and 11 patients were included, respectively.

Data collection

Patient data, as well as DNR registration and geriatric assessment data were collected retrospectively from the hospital's electronic health record system and pseudonymized before analysis.

The collected patient data included age, gender, ethnicity, type of residence, clinical frailty score (CFS) at admission, cognitive status, oncological status, date of admission, date of geriatric assessment, type of hospital ward they were admitted to, whether or not they had stayed on intensive care.

Patients with proven dementia, diagnosed by a neurologist or geriatrician and patients with a suspicion of dementia formulated by a neurologist or geriatrician during admission were classified as having cognitive impairment.

Patients with a cancer diagnosis for which they were still actively or palliatively treated or in scheduled follow-up were scored as having active oncological disease, whereas patients with a history of cancer that were disease-free more than 5 years after diagnosis were judged to have no active oncological status.

DNR code registration is performed at UZA since 2014, with a 4-tier DNR code system using the codes DNR 0: full code, DNR 1: do not resuscitate, DNR 2: limitation on invasive treatment (e.g. intubation, dialysis), DNR 3: focus on symptomatic and comfort treatment.

Data on DNR registration retrieved from the patient record included whether or not the patient had a DNR code at the time point of admission and geriatric assessment, whether DNR registration was performed at the emergency department or the hospital ward, time between hospital admission and DNR code registration, status of the registering physician, and whether or not the DNR code was discussed with the patient, his/her family, or general practitioner or during multidisciplinary consultation. Only formal DNR code registrations in the designated DNR tab of the patient record were taken into account, mentioning of DNR or DNR codes in patient notes were ignored.

From the comprehensive geriatric assessment the following data were retrieved: whether or not DNR code registration was discussed with the patient; if so, the patient's preferred DNR code, whether or not the treating physician was exhorted to perform DNR registration for a patient.

The DNR code preference indicated by the patient during the comprehensive geriatric assessment was compared with the actual DNR code registered. We further checked whether DNR code registration or adaptation took place after the geriatric assessment, and if so, whether this happened within 72 hours; whether additional follow-ups on the geriatric assessment were needed.

In order to be able to assess the influence of the coronavirus disease 2019 (COVID-19) pandemic on DNR code registration, every admission record was indicated to have taken place before or after the start of the COVID-19 pandemic, i.e. after March 1st, 2020.

Statistical analysis

DNR code registration and findings of the comprehensive geriatric assessment are expressed as percentages and frequencies. Age, CFS and duration of hospitalization were compared between patients with a DNR present at admission versus patients without a DNR present at admission using an independent samples t-test (or Welch test in case of non-equal variances or Mann Whitney test in case of non-normality). Gender, type of hospital ward, ICU stay, type of residence, oncological status, cognitive impairment, and ethnicity were compared between these groups using Chi-square test or Fisher's exact test if assumptions were not met. These analyses were also done in the patients with and without a preregistered DNR. Follow-up on recommendation to change/register DNR during the CGA was compared between the types of hospital wards using a Chi-square test. The percentage of DNR registrations before and after CGA were compared using a McNemar's test. For patients where no other discussions were recorded in the medical file, discussion of DNR during multidisciplinary consultation was examined using Fisher's exact test. The proportion of patients for which no DNR discussion were held or who were not aware of their DNR status and code, was compared between high CFS (≥ 6) and low CFS using a Chi-square test. DNR status at different times were compared prior to and during the pandemic using a Chi-square test. Analyses were done in R version 4.1.2.

Results

Patient characteristics

This study included 543 patients with a geriatric profile who were admitted to the UZA hospital in the period 2018-2020 and underwent a CGA during admission. The study population comprised on average 10.6% of the patients who underwent a CGA at the UZA hospital in the period 2018-2020. The mean age of the study population was 82.4 ± 5.19 years, 46.4% of included patients were male.

Before hospital admission. In 33.2% (n=180) of patients a DNR code was in place before the current admission. In comparison with patients without preregistered DNR, patients with a DNR code were more likely to have oncological disease (28.3% vs 15.2%, $p=0.0003$, Chi-square), but clinical frailty scores were comparable (5.07 ± 1.55 vs 4.93 ± 1.67 , $p=0.325$, t-test).

At hospital admission. DNR code registration was present in 66.3% (360/543) of patients at the time of admission to the hospital ward. This group comprised patients with preregistered DNR codes, as well patients who had a DNR code registered at the emergency ward before admission to the hospital ward. Patient characteristics in function of DNR registration status at admission are summarized in Table 1.

Patients with a DNR code at the time of hospital admission were significantly older (82.7 ± 5.5 vs. 81.7 ± 4.6 years, $p=0.031$) and had higher clinical frailty scores (CFS, 5.1 ± 1.6 vs. 4.7 ± 1.6 , $p=0.006$) (Table 1).

A significantly higher fraction of patients without a DNR code at admission was admitted to intensive care during their hospital stay ($p<0.0001$, Table 1) and a significantly higher proportion of patients admitted to internal medicine wards had a DNR code in comparison with patients admitted to a surgical ward (72.3% vs 50.3%, $p<0.0001$).

Gender, place of residence (home versus care facility), oncological status, cognitive impairment, or ethnicity did not differ significantly between patients with and without DNR code registration at admission. The duration of hospital admission did not differ significantly between patients with and without DNR code at the time of admission: mean hospital duration was 13 (7-21) days in patients with and 14 (8-23) days in patients without DNR code at time of admission ($p=0.077$).

DNR codes were registered by residents in training in 51.2% and by supervising specialists in 48.8% of cases.

Effect of CGA on DNR code registration

In the time between hospital admission and CGA, the percentage of patients with a registered DNR code increased from 66.3% to 77.0%, due to the treating physician performing DNR registration for their hospitalized patients

The CGA significantly increased the likelihood of DNR registration: before the CGA, 77.0% (418/543) of patients had a registered DNR status, whereas after the CGA, the overall proportion of patients with a DNR code registered had increased to 85.3% (463/543) ($p<0.0001$, McNemar's test) (Table 2). In 82.3% of cases ($n=447$), the DNR code registration was in place within 72 hours after CGA. In 76.6% of cases where DNR was not discussed during the CGA, a DNR code was already in place at the time of the CGA.

At the time of the CGA, 23% (125/543) of patients did not have a DNR code registration. For 80% of these patients ($n=100$), the geriatrician recommended DNR registration. In 43% ($n=43$) of cases this recommendation was followed and DNR registration was performed.

For 24.2% (n=101) of the patients who had a DNR code registered at the time of the CGA (77%, n=418), the geriatrician recommended a DNR code change. This recommendation was followed in 76.2% (n=77) of cases.

A recommendation to register or change a DNR code was issued to 45.6% (n=68) of patients admitted to a surgical ward versus 33.8% (n=133) of patients admitted to an internal medicine ward. The distribution between 1) patients that did not receive a recommendation to change/register DNR during the CGA and 2) patients for whom such recommendation was implemented or 3) not implemented differed significantly between internal medicine and surgical wards ($p < 0.0001$, Chi square). On surgical wards, 16.8% (n=25) of recommendations for patients were implemented versus 24.1% (n=95) on internal medicine wards ($p = 0.07$, Chi square).

Patient consultation and DNR preferences

Overall, the concept of DNR code registration was discussed with the patient in 55.8% (n=303) of cases, not discussed in 26.7% (n=145) of cases, whereas it was impossible to discuss the concept of DNR in 17.5% (n=95) of cases. Table 3 summarizes the percentage of DNR code discussions with patients, their family and general practitioner registered in the medical file. Family members were consulted relatively often (34.1%), but remarkably, the patient's general practitioner was only consulted in 6.3% of DNR decisions.

In 17.5% of patients (n=95) no discussion with either the patient, his/her family, or the general practitioner was recorded in the medical file. For 14.7% of these patients (n=14) DNR was discussed during multidisciplinary consultation, which was significantly associated with higher DNR codes ($p = 0.003$, Fisher's Exact test).

In 46% of cases (n=250) patients were aware of their registered DNR code, whereas 4.4% (n=24) did not know their registered DNR code, this information was not available for 32.0% (n=174) and could not be evaluated because it was not feasible to discuss DNR with the patient in 17.5% of cases (n=95).

DNR codes were discussed with the patients during CGA in 34.8% (n=189) of cases, whereas DNR discussion did not take place during CGA in 65.2% (n=354) of cases. In the subpopulation of patients with a DNR code after CGA (n=463), the registered DNR code corresponded with the patient's preferences in 52.1% (n=241) of cases and did not correspond with the patient's preferences in 4.5% (n=21) cases. DNR could not be discussed with the patient in 18.1% (n=84) of cases, whereas the patient's preferences were unknown in 25.3% (n=117) of cases.

In patients with high clinical frailty score ($CFS \geq 6$, n=169), the proportion of patients with whom DNR discussions were held and who were aware of their DNR status and code (62.1%, n=105) was significantly lower than in less frail patients ($CFS < 6$, n=200), where this was the case for 72.5% (n=145) of patients ($p=0.034$, Chi square test).

Effect of COVID-19

For hospital admissions before the start of the coronavirus pandemic, 66.2% of patients had a DNR code registered at the time of admission (264/399) versus 66.7% of patients admitted during the first COVID-19 wave (96/144) (chi-square, $p=0.913$). The proportion of newly registered DNR codes after CGA or DNR code registration altered after CGA was likewise not significantly different for admission before or after the start of the pandemic (Table 4).

Oncological patients admitted to hospital during the first wave of the pandemic were significantly less likely to have a DNR code registered prior to admission (38.9%) in

comparison with admissions prior to March 2020, when 52.9% of patients with an active oncological status had a DNR code registered prior to admission ($p=0.0003$, chi square).

Keywords

Advance care planning, DNR, comprehensive geriatric assessment, COVID-19, hospitalization, frailty, older patients

Discussion

In this study we retrospectively investigated DNR code registration in geriatric patients admitted to UZA, a Belgian tertiary care hospital, and the effect of CGA on DNR code registration. The presence of a DNR code in this context encompasses all documented advance care directives, not restricted to reanimation alone. As we specifically aimed to investigate the current DNR code registration practices, the percentages reported reflect the proportion of patients for whom such registration took place, irrespective of the content of the registered code. It is well-known that both the definition of DNR orders and their application are highly variable between hospitals [37].

We did not define specific exclusion criteria and thus the study did not exclude patients with dementia, lowered consciousness, speaking a different language etc. to give an accurate overview of the day to day reality in geriatric care. Patients not able to discuss their care preferences are a substantial part of the geriatric population in a hospital and a reality physicians need to deal with.

Although awareness regarding the need for advance care planning is increasing, clear and generally accepted guidelines concerning medical futility are still lacking [38]. Advance care planning is not yet a core element in the CGA for non-oncological patients, despite emerging evidence it is a feasible and useful addition to the CGA in all geriatric patients. [39]

We observed both new and adapted DNR registrations in response to the recommendations made during CGA for patients hospitalized on non-geriatric wards. The morbidity and functional status of the patient likely are important determinants for how receptive patients are to DNR discussion and advance care planning proposals, as a recent systematic review found palliative care to be associated with an improved rate of advance care planning [40] and a

cross-sectional study found poorer functional status to be significantly associated with successful advance care planning discussions during CGA [39].

In our study, the DNR concept was only discussed with the patient in 34.8% of CGA consultations, as this can be considered a responsibility of the treating physician. During the CGA, the geriatrician does not explain the diagnosis of prognosis to the patient in line with their advisory role. In over 40% of cases, the correspondence of the registered DNR codes with the patient's preferences could not be confirmed. Either because this was not or could not be discussed with the patient, or because the registered DNR code did not correspond with the patient's preferences. Possibly, the patients' limited understanding of their often complex pathology influenced their DNR preferences [41].

A substantial part of patient care and communication in a tertiary teaching hospital is taken up by physicians in training with limited experience in these complex and emotionally loaded conversations. This stresses the importance of training in this type of communication and supervision of DNR and advance care planning discussions for physicians still in training.

Our findings are in line with studies indicating that discussing advance care and end of life treatment planning are uncomfortable topics for both patients and physicians [15]. A 2020 study from Switzerland reported that 72.4% of physicians recalled defining a DNR status without prior discussion with the patient [15], whereas a large retrospective study from the US found that code status discussions are often poorly documented [42]. The quality of physicians' explanations of resuscitation procedures and advance care options has also been found to be suboptimal in many cases [15,43].

We observed that registered DNR codes were mostly in accordance with the patient's preferences, although in 4.5% of cases the registered DNR code did not correspond to the patient's wishes. Possibly this can be attributed to patients' limited knowledge regarding their

prognosis, or a discrepancy between the preferences of the patient and their family [30,44].

While DNR was often discussed with the patient's family, the rate of consultation with general practitioners about DNR was surprisingly low. Possibly consultation of the general practitioner was not deemed useful in cases where the patient had a clear preference regarding advance care, or documentation of these discussions was incomplete.

Patients with a DNR code at admission to the hospital ward had a higher frailty score than those without DNR. Higher frailty levels are associated with worse outcomes and lower survival rates after CPR in hospitalized patients [2]. While 70-84% of frail older adults were found to be receptive to advance care planning, advance care plans were only in place in 0-5% of cases [45]. In our study, DNR was discussed less with patients that had a high frailty score. Possibly the proportion of patients with whom it was not possible to discuss DNR because of cognitive impairment or the patient's condition, was also higher in this group.

In our study, oncological disease or cognitive impairment were not associated with a higher proportion of patients with a DNR code at hospital ward admission, nor with more DNR registrations after CGA, but the proportion of patients with DNR code registration preceding the current hospitalization was higher in cancer patients, in line with the fact that palliative and end of life care are well embedded into oncological care [46,47].

DNR code registration prior to hospital admission was not higher for patients residing in a care facility in our study population, indicating that additional efforts are still needed to integrate advance care planning in the standard practices of a care facility.

In patients with dementia, the reported time interval between diagnosis and discussing advance care is rather long [48], potentially making advance care discussions difficult to impossible. This explains why internationally only 40-49.9% of patients with dementia are reported to have an advance care plan [46,49,50]. Our observations that DNR was impossible

to discuss with almost one in five patients are in line with these findings. It is important for clinicians to build the reflex to raise the topic of advance care planning with family, the general practitioner or their multidisciplinary team in these cases, despite the additional workload and challenges this entails.

The proportion of patients with a DNR code at hospital submission and after CGA did not differ significantly before and after the start of the COVID-19 pandemic. While several publications report on DNR choices and advance care planning for geriatric patients during the pandemic, these publications focus on patients hospitalized for COVID-19 [51–53], whereas our study included all admitted patients with a geriatric profile who underwent a CGA, regardless of the reason for hospitalization. We did observe a decrease in the proportion of oncological patients with a preregistered DNR code during the first wave of the pandemic. Possibly, patients that had a DNR code were less likely to be admitted to hospital at that time because of restricted hospital admission capacity and fear of infection.

In conclusion, a retrospective analysis of 543 patients with a geriatric profile admitted to the Antwerp University Hospital revealed that DNR code registration increased significantly after CGA, with the geriatrician recommending DNR code registration in 80% of patients without DNR code. DNR discussions need to be considered an essential part of the CGA. DNR discussions were only held with 55.8% of patients and the patient's preferences regarding DNR remained unknown in 25.3% of cases. We want to stress the importance of training and supervising physician trainees in advance care discussions with patients. No general effect of the COVID-19 pandemic on DNR code registration was observed in this study.

Statements and Declarations

The authors have no relevant financial or non-financial interests to disclose regarding this work. No specific funding was received for conducting this study.

Tables

Parameter	DNR (n=360)	No DNR (n=183)	p-value
Age (mean, SD)	82.7±5.5	81.7±4.6	0.031
Gender, male	47.2% (170)	44.8% (82)	0.594
CFS (mean, SD)	5.1±1.6	4.7±1.6	0.006
Duration of hospitalisation (days) (median, IQR)	13 [7-21]	14 [8-23]	0.077
Hospital ward type			<0.0001
Surgical	20.8% (75)	40.4% (74)	
Intensive Care			<0.0001
Yes	12.8% (46)	27.9% (51)	
Place of residence			0.956
Home	91.7% (330)	91.8% (168)	
Oncological status			0.124
Yes	72.6% (77)	27.4% (29)	
Cognitive impairment			0.900
Yes	21.4% (77)	15.8% (40)	
Ethnicity			
Caucasian	95.8% (345)	98.9% (181)	0.690

Table 1: Population characteristics and DNR code registration at admission to the hospital ward.

Comparison of patients with and without DNR code registered at time of hospital admission. Continuous data are expressed as mean \pm standard deviation or median [interquartile range] as appropriate. For categorical variables, data are expressed as percentage and number of patients: % (n).

For the analysis of the place of residence, the 'Home' category' comprised all patients with their permanent residence at home, and thus included patients who were hospitalized during a short stay in a care or revalidation facility. The remaining subjects stayed in a long-term care facility. Types of hospital wards were surgical versus internal medicine wards.

Abbreviations: CFS: Clinical Frailty Score, IQR: interquartile range, SD: standard deviation.

DNR code	After CGA		Total
Before CGA	No	Yes	
No	14.7% (80)	8.3% (45)	23.0% (125)
Yes	0% (0)	77.0% (418)	77.0% (418)
Total	14.7% (80)	85.3% (463)	100% (543)

Table 2: Effect of comprehensive geriatric assessment (CGA) on DNR code registration. Reported as % (number of patients).

DNR discussion with	Patient	Family	General practitioner
No	26.7% (145)	52.7% (286)	79.7% (433)
Yes	55.8% (303)	34.1% (185)	6.3% (34)
Not possible	17.5% (95)	-	-
Unknown	-	13.3% (72)	14.0% (76)

Table 3: Discussion of DNR with patients, family, and general practitioner. Overall registration of these discussions anywhere in the patient's medical file. Reported as % (number of patients).

	Before (n=399)	During (n=144)	p-value
DNR code at admission	66.2% (264)	66.7% (96)	0.913
DNR code registration after CGA	85.2% (340)	85.4% (123)	0.953
DNR code registered/changed after CGA	29.6% (118)	31.9% (46)	0.595

Table 4: Effect of COVID-19 on DNR registration. DNR code registration at admission, after CGA and DNR code registration or change after CGA were compared for admissions prior to and during the first wave of the pandemic (with March 1st, 2020 used as the starting date) using chi-square test. Data are expressed as percentage and number of patients.

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