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Clinical paper

Emotional work stress reactions of emergency medical technicians involved in transporting out-of-hospital cardiac arrest patients with "do not attempt resuscitation" orders

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Abstract

Background: Emergency medical technicians (EMTs) may be subjected to emotional stress during patient treatment/transport. In Japan, dispatched EMTs must attempt resuscitation in all cases of out-of-hospital cardiac arrest (OHCA), including patients with "do not attempt resuscitation" (DNAR) orders and patients whose families do not support resuscitation. We described the characteristics, prevalence, and outcomes of OHCA/DNAR patients, and aimed to identify factors associated with EMT stress when treating them.

Methods: We included OHCA patients transported by EMTs in the city of Okayama from 2015 to 2019. We identified patients with DNAR orders based on emergency medical service (EMS) records, then EMTs completed questionnaires regarding the management of those patients and EMTs' emotions.

Results: Among 3079 eligible OHCA patients, 122 patients (4%) had DNAR orders (DNAR group), and 2957 (96%) patients had no DNAR orders (no DNAR group). Based on responses from 243 EMT participants involved in OHCA/DNAR transports, we divided EMTs into high stress (73/243, 30%) and low stress (170/243, 70%) groups. EMTs experienced emotional stress from treating patients with family physician orders to transport (AOR: 4.74, 95% CI: 2.35–9.56) and those for whom prehospital defibrillation was performed (AOR: 20.7, 95% CI: 3.10–137.9).

Conclusions: Approximately 30% of EMTs providing resuscitation to OHCA/DNAR patients experienced high levels of stress. Establishment of a prehospital emergency system incorporating physician medical direction and updated guidelines for treating patients with DNAR orders may reduce the psychosocial stress of EMTs.

Keywords: DNAR, EMT, OHCA, Stress

Introduction

Emergency medical technicians (EMTs) throughout the world encounter out-of-hospital cardiac arrest (OHCA) patients with do not attempt resuscitation (DNAR) orders reflecting the patient's wishes to avoid cardiopulmonary resuscitation (CPR).[1,2] In the United States, 9.9% of OHCA patients have DNAR orders, of whom 32.3% were resuscitated.[1] EMTs sometimes face ethical and practical challenges when they are unable to rapidly confirm the presence or absence of a DNAR order concerning making an error in not attempting resuscitation.[3] Ethical principles governing the provision of prehospital care for

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OHCA/DNAR patients are not fully established, depend on cultural context, and may vary internationally.[4] Thus, prehospital management of OHCA/DNAR patients is a global concern.[5]

In Japan, EMTs are obligated to initiate resuscitative efforts for all OHCA patients except in cases of obvious death (e.g. decomposition, incineration, or rigor mortis) regardless of DNAR status and are not allowed to terminate resuscitation once initiated in the field. Thus, when CPR has been initiated, EMTs will continue resuscitation efforts for all OHCA patients en route to the hospital.[6] These current circumstances in Japan lead to ethical conflicts between the patient's autonomy and the EMT's obligations, which may contribute to emotional stress for EMTs when treating OHCA/DNAR patients.[3]

Despite increasing interest in the study of the psychosocial risk factors affecting EMTs, little is known about the prehospital management of OHCA/DNAR patients and work-related stress.[7,8] The aim of this study was to identify stressful factors, including the circumstances and prehospital management for EMTs providing care for OHCA/DNAR patients in the Okayama area in Japan. We also investigated the characteristics, prevalence, and outcomes of OHCA/DNAR patients. To the best of our knowledge, the present study is the first to link the emotional work stress of EMTs with treatment/-transport of OHCA/DNAR patients.

Methods

This study conformed to the principles of the Declaration of Helsinki. The Okayama University Ethics Committee approved the study (K 1910-002) and waived the requirement for written informed consent.

Emergency Medical Service system of Okayama City

Okayama City includes a 790 km^2 area with both urban and rural communities and a total population of 0.71 million. The Emergency Medical Service (EMS) system in Okayama City is operated by 20 local fire stations and a single emergency dispatch center.[9] Almost all OHCA transports are operated by city EMS. EMS activity is electronically recorded to the EMS database immediately after the dispatch. Highly trained personnel in the dispatch center are instructed to obtain medical information on OHCA patients for pre-notification if available, including past or recent medical history and information on DNAR orders. EMTs are required to attempt resuscitation except in cases of obvious death (e.g. decomposition, incineration, or rigor mortis) and not allowed to terminate resuscitation in the field. Each ambulance has three or more emergency providers, including at least one emergency life-saving technician (a highly trained emergency care provider).[10] In cooperation with the dispatch center, they also strive to obtain medical information on OHCA patients; this information may occasionally include DNAR orders in some cases such as OHCA in nursing homes. EMTs may acquire advice through on-line medical control about advanced techniques and choice of receiving hospitals; on-line emergency physicians instruct them regarding these concerns. However, currently in our city, on-line medical control cannot influence EMTs' decision to terminate resuscitation. All OHCA patients, regardless of DNAR orders, were treated with the Japanese national protocol of prehospital management of cardiac arrest.[11]

In Japan, family physicians play an important role in long term medical care, including advance care planning (ACP) and discuss DNAR with the patient or their surrogates at their daily medical check-up, allowing patients to end their lives at home. This policy has been promoted by the Japanese Ministry of Health, Labour, and Welfare.[12,13] In Okayama City, EMTs try to contact family physicians during EMS activation in cases of OHCA with DNAR orders to confirm the family physician's explicit orders and whether the family physician will arrive on the scene to pronounce death (terminate resuscitation).

Study design

All OHCA patients with city EMT-transported from 2015 to 2019 were eligible for inclusion in the analysis. Patients under 18 years old were excluded. To assess the incidence, characteristics, and outcomes of OHCA patients with or without DNAR orders, we first obtained records from the Okayama Fire Department database. The database registered all patients with OHCA transported to the hospital by EMTs with a standardized format based on the All-Japan Utstein Registry.[14] Additionally, the database included patients' specific information such as the presence of DNAR orders and individual EMT data. Then, we developed a questionnaire to elucidate the stress reactions of EMTs involved in the care of OHCA/DNAR patients. The questionnaires were sent to all EMTs who transported OHCA/DNAR patients. Data from the returned questionnaires was combined with data from the EMS database using the case identification number.

DNAR orders of OHCA patients

We confirmed DNAR orders by searching the EMS electronic database for keywords, including the data elements "DNAR," "DNR," "end-of-life," "life-sustaining treatment," "withhold resuscitation," or "refusal of treatment" in the Japanese language. Then, records containing the search strings were thoroughly reviewed and confirmed by the study members.

Data collection from the EMS database

Characteristics of OHCA patients included presence of DNAR orders, age, gender, witness status, bystander-initiated CPR, initial recorded cardiac rhythm, presumed cardiac arrest etiology, comorbidity, year, location of cardiac arrest, and EMS-related time data. CPR, use of airway management, establishment of intravenous line, adrenaline administration, defibrillation, and prehospital return of spontaneous circulation (ROSC) were included as binary variables. ROSC was defined as recovery of any spontaneous palpable pulse with any time duration verified with cardiac rhythm monitoring.[15]

EMT questionnaire

We sent questionnaires to the EMTs who transported OHCA/DNAR patients to identify EMT stressors. The survey is shown in **Supplement 1**. The questionnaire was selected based on the results of previous studies and our clinical interests.[6,16] All the EMTs gave voluntary consent, and all the data were anonymized. We asked EMTs to complete every questionnaire for their all experienced (treated/transported) cases of OHCA/DNAR. We designed this questionnaire to obtain demographic information about each EMT and patient pre-hospital information not available in the EMS database, and subjectively assess EMT stress experienced from transporting these OHCA/DNAR patients with a visual analog scale (VAS) (0 - no stress, 10 - worst imaginable stress).[17] A questionnaire about "slow code" was included. Slow code (performing ineffective, half-hearted resuscitation efforts) was determined by EMT as a binary variable.[18] Finally, we asked for EMTs' opinions on OHCA/DNAR cases.

Endpoint and patient grouping

The primary outcome was stress factors of EMTs involved in treating OHCA/DNAR patients. We defined "high stress" as EMTs' stress reaction scores greater than 7 on the VAS, and categorized EMTs into high stress and low stress groups.[17] The secondary outcome was to describe DNAR patient characteristics in the overall cohort. We defined two OHCA patient groups based on EMS activity records: the DNAR group and no DNAR group.

Data analysis

Continuous variables were described using median with interquartile ranges, and categorical variables were described using percentages. We used multivariate-logistic regression to quantify the independent association of documented DNAR orders with high EMT stress after accounting for clinically relevant provider, patient, and encounter characteristics (EMT gender: male, patients with witnessed collapse, absence of family physician, patients with received family physician orders to transport, presence of documentation of DNAR orders, administered defibrillation, and slow code). We selected these variables *a priori* based on the results of previous studies and our clinical interests.[18] Generalized estimating equations were used to account for correlations within the same individual because of possible multiple responses from the same EMT. We expressed regression results using odds ratios (ORs) and 95% confidence intervals (CIs). Statistical analysis was performed using Stata version 15 (StataCorp LP, College Station, TX).

Results

Fig. 1 shows the study design flow chart. A total of 3121 OHCA patients transported were registered in the Okayama Fire Department database during the five-year study period, without patients not transported for obvious death (n = 2026) and pronounced dead by the family physician (n = 6). After excluding patients under 18 years old (n = 42), 3079 cases were included. Of these, 122 patients (4%) were recognized by the EMS as having DNAR orders (DNAR group), while 2957 patients were defined as the no DNAR group.

Table 1 shows the baseline characteristics of both the DNAR and no DNAR groups. Patients in the DNAR group were older than those in the no DNAR group (89 vs. 80 years old). The proportion of males was lower in the DNAR group (45% vs. 57%), while comorbidities, including cancer (15% vs. 9%), cerebrovascular disease (19% vs. 11%), and respiratory disease (12% vs. 7%) were higher in the DNAR group. Bystander CPR (86% vs. 61%) was more likely performed in the DNAR group. OHCA patients in nursing facilities were more likely in the DNAR group than in the no DNAR group (68% vs. 19%). EMS-related time data and initial rhythm did not differ between the groups. Procedures, including supraglottic airways (6% vs. 44%), endotracheal intubation (0% vs. 3%), intravenous line establishment (2% vs. 20%), adrenaline administration (1% vs. 16%), and defibrillation (2% vs. 7%) were more likely performed in the no DNAR group. The proportion of ROSC (9% vs. 25%) was significantly lower in the DNAR group than in the no DNAR group.

A total of 245 questionnaires were sent to EMTs who transported OHCA patients during the study period (Fig. 1). Two-hundred and forty-three surveys (99% return rate) were returned with sufficient responses. Fifty-three EMTs filled out questionnaires more than one time due to their involvement in multiple OHCA/DNAR cases. The distribution of EMTs' emotional stress based on VAS score (4 [0–7]) is shown in **Supplement 2**.

EMT characteristics are shown in Table 2. Seventy-three (30%) of EMTs were in the high stress group and 170 (70%) EMTs were in the low stress group. The high stress group had a median VAS score of 9 and the low stress group had a median VAS score of 2. The proportions of male EMTs (89% vs. 96%) and EMTs who witnessed collapse (34% vs. 46%) were lower, while procedures including defibrillation (5% vs. 1%) performed for OHCA/DNAR patients were higher in the high stress group. The EMTs in the high-stress group were more likely to perform slow code in the case of DNAR resuscitations (76% vs. 61%). The patients with received family

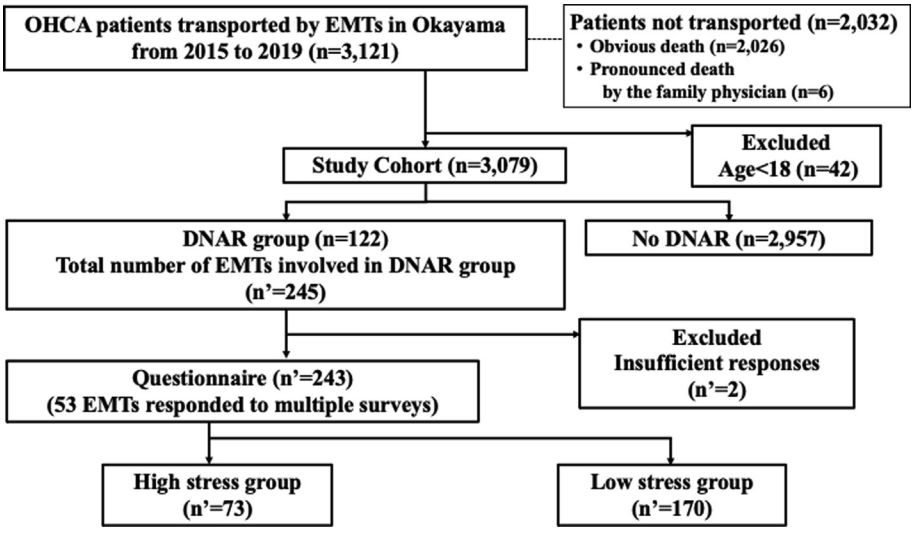

Fig. 1 – Flow chart for OHCA cases enrolled in this cohort study. Two OHCA patient groups were described based on EMS activity records: the DNAR group and the no DNAR group. Then, a questionnaire was sent to all EMTs involved in the DNAR cases. EMTs were categorized based on their stress reactions determined by VAS score: the high stress group and low stress group. OHCA: out-of-hospital cardiac arrest; EMS: emergency medical service; DNAR: do not attempt resuscitation; EMT: emergency medical technician; VAS: visual analog scale.

Table 1 – Characteristics and Outcomes of Patients in the DNAR and no DNAR groups.

	All (n = 3079)	DNAR (n = 122)	no DNAR (n = 2957)
Patient characteristics			
Age, years	80 [69–87]	89 [83–94]	80 [69–87]
Male gender, n	1738/3079 (56%)	55/122 (45%)	1683/2957 (57%)
Witnessed collapse, n	1157/3079 (38%)	51/122 (42%)	1106/2957 (37%)
Bystander CPR, n	1902/3079 (62%)	105/122 (86%)	1797/2957 (61%)
Non-shockable rhythm, n	2760/3079 (90%)	115/122 (94%)	2645/2957 (89%)
Asystole, n	2057/3079 (67%)	84/122 (69%)	1973/2957 (67%)
PEA, n	703/3079 (23%)	31/122 (25%)	672/2957 (23%)
Shockable rhythm, n	149/3079 (5%)	2/122 (2%)	147/2957 (5%)
VF, n	144/3079 (5%)	2/122 (2%)	142/2957 (5%)
Pulseless VT, n	5/3079 (0%)	0/122 (0%)	5/2957 (0%)
Estimated cardiac origin, n	689/3079 (22%)	19/122 (16%)	670/2957 (23%)
Comorbidity			
Cardiovascular disease, n	835/2555 (33%)	41/113 (36%)	794/2442 (33%)
Cancer, n	241/2555 (9%)	17/113 (15%)	224/2442 (9%)
Cerebrovascular disease, n	279/2555 (11%)	22/113 (19%)	257/2442 (11%)
Respiratory disease, n	190/2555 (7%)	14/113 (12%)	176/2442 (7%)
Renal disease, n	65/2555 (3%)	5/113 (4%)	60/2442 (2%)
Mental disorder, n	70/2555 (3%)	1/113 (1%)	69/2442 (3%)
Year			
2015, n	637/3079 (21%)	21/122 (17%)	616/2957 (21%)
2016, n	623/3079 (20%)	35/122 (29%)	588/2957 (20%)
2017, n	571/3079 (19%)	21/122 (17%)	550/2957 (19%)
2018, n	642/3079 (21%)	25/122 (20%)	617/2957 (21%)
2019, n	606/3079 (20%)	20/122 (16%)	586/2957 (20%)
Location			
Home, n	1878/2985 (63%)	35/122 (29%)	1843/2863 (64%)
Nursing facilities, n	630/2985 (21%)	83/122 (68%)	547/2863 (19%)
Public places, n	356/2985 (12%)	3/122 (2%)	353/2863 (12%)
Timing			
Weekend (Saturday-Sunday), n	892/3079 (29%)	41/122 (34%)	851/2957 (29%)
Weekday (Monday-Friday), n	2187/3079 (71%)	81/122 (66%)	2106/2957 (71%)
Daytime (8–17 h), n	1459/3079 (47%)	59/122 (48%)	1400/2957 (47%)
Midnight (0–8, 17–0 h), n	1620/3079 (53%)	63/122 (52%)	1557/2957 (53%)
Time from contact to CPR, min	8 [6–11]	8 [7–10]	8 [6–11]
Procedure			
CPR, n	3035/3079 (99%)	120/122 (98%)	2915/2957 (99%)
Supraglottic airway, n	1228/2911 (42%)	7/120 (6%)	1221/2791 (44%)
Endotracheal intubation, n	97/2911 (3%)	0/120 (0%)	97/2791 (3%)
Intravenous line establishment, n	548/2911 (19%)	2/120 (2%)	546/2791 (20%)
Adrenalin, n	415/2760 (15%)	1/108 (1%)	414/2652 (16%)
Defibrillation, n	224/3079 (7%)	3/122 (2%)	221/2957 (7%)
Outcome			
ROSC, n	688/2861 (24%)	11/120 (9%)	677/2741 (25%)

Patient characteristics, procedures, and outcomes are shown. Continuous variables are presented as median and interquartile range values; categorical variables are shown as frequencies or percentages. CPR: cardiopulmonary resuscitation, DNAR: do not attempt resuscitation, PEA: pulseless electrical activity, ROSC: return of spontaneous circulation, VF: ventricular fibrillation, VT: ventricular tachycardia.

physician orders to transport were more common in the high stress group (34% vs. 13%), while patients with documentation of DNAR orders were more common in the low stress group (1% vs. 5%). The high and low stress group comparison adjusted with multivariate-logistic regression is shown in Table 3. Even after adjustment, transporting OHCA/DNAR patients with received family physician orders (adjusted OR 4.74, 95% CI 2.35–9.56) and administrating defibrillation (adjusted OR 20.7, 95% CI 3.10–137.9) were significantly associated with high levels of stress for EMTs.

EMTs were opposed to transporting OHCA/DNAR patients to the hospital in their experienced cases (202/238, 85%). This view was consistent, even when EMTs were asked to consider a scenario where the patient was a member of their own family (225/236, 95%).

Discussion

Our study demonstrated that 4% of OHCA/DNAR patients were transported by ambulance with a 9% ROSC rate. Approximately 30% of EMTs confronted with transporting OHCA/DNAR patients experienced high levels of stress. Instruction for transporting OHCA/DNAR patients to the hospital given by family physicians was significantly associated with high levels of stress for EMTs. Another significant stress factor was administration of defibrillation to DNAR patients.

In Japan, EMTs generally must provide standard CPR and transport OHCA/DNAR patients to hospitals in the absence of obvious

Table 2 – Characteristics of EMTs who transported OHCA/DNAR patients. EMTs were divided into two groups based on their stress level.

	All (n = 243)	High stress (n = 73)	Low stress (n = 170)
Subjective assessment of stress			
VAS score	4 [0–7]	9 [7–10]	2 [0–5]
EMT's profile			
Age, years	34 [29–40]	34 [30–38]	33 [29–40]
Male gender, n	229/243 (94%)	65/73 (89%)	164/170 (96%)
EMS tenure, years	10 [7–15]	10 [8–12]	10 [7–16]
OHCA/DNAR cases transported by EMTs			
Age, years	89 [83–94]	89 [86–94]	89 [83–94]
Male gender, n	111/243 (46%)	33/73 (45%)	78/170 (46%)
Witnessed collapse, n	103/243 (42%)	25/73 (34%)	78/170 (46%)
Bystander CPR, n	72/126 (57%)	18/31 (58%)	54/95 (57%)
Non-shockable rhythm, n	109/126 (87%)	29/31 (94%)	80/95 (84%)
Shockable rhythm, n	12/126 (10%)	2/31 (6%)	10/95 (11%)
Location			
Home, n	71/243 (29%)	17/73 (23%)	54/170 (32%)
Nursing facilities, n	168/243 (69%)	55/73 (75%)	113/170 (66%)
Public places, n	2/243 (1%)	0/73 (0%)	2/170 (1%)
Timing			
Weekend (Saturday-Sunday), n	82/243 (34%)	29/73 (40%)	53/170 (31%)
Weekday (Monday-Friday), n	161/243 (66%)	44/73 (60%)	117/170 (69%)
Daytime (8–17 h), n	114/243 (47%)	32/73 (44%)	82/170 (48%)
Midnight (0–8, 17–0 h), n	129/243 (53%)	41/73 (56%)	88/170 (52%)
Procedure			
CPR, n	239/243 (98%)	72/73 (99%)	167/170 (98%)
Supraglottic airway, n	14/239 (6%)	5/72 (7%)	9/167 (5%)
Endotracheal intubation, n	0/121 (0%)	0/37 (0%)	0/84 (0%)
Intravenous line establishment, n	4/239 (2%)	0/72 (0%)	4/167 (2%)
Adrenaline, n	2/215 (1%)	2/152 (1%)	0/63 (0%)
Defibrillation, n	6/243 (2%)	4/73 (5%)	2/170 (1%)
Outcome			
ROSC, n	22/239 (9%)	7/72 (10%)	15/167 (9%)
Pre-hospital circumstances			
① DNAR orders			
1. Who provided the information of DNAR orders to the EMTs?			
Family, n	67/243 (28%)	16/73 (22%)	51/170 (30%)
Nursing Facilities staff, n	133/243 (55%)	45/73 (62%)	88/170 (52%)
Family physician, n	20/243 (8%)	5/73 (7%)	15/170 (9%)
2. When did you recognize OHCA patients as DNAR?			
Before CPR, n	94/173 (54%)	30/55 (55%)	64/118 (54%)
Before transport, n	66/86 (77%)	18/23 (78%)	48/63 (76%)
Before intervention, n	30/37 (81%)	11/12 (92%)	19/25 (76%)
Before the hospital arrival, n	43/68 (63%)	10/16 (63%)	33/52 (63%)
3. Did patients have any written documents of DNAR orders?			
Yes, n	9/243 (4%)	1/73 (1%)	8/170 (5%)
②Transportation			
1. Did patient's surrogates refuse to perform CPR or transport to the hospital?			
CPR, n	20/238 (8%)	5/73 (7%)	15/165 (9%)
Transport, n	7/237 (3%)	3/73 (4%)	4/164 (2%)
2. Was the family physician absent in the case of OHCA (Not available on the phone)?			
Yes, n	16/243 (7%)	5/73 (7%)	11/170 (6%)
3. Who instructed the patient transport to the hospital?			
Family/relatives/other surrogate, n	32/243 (13%)	11/73 (15%)	21/170 (12%)
Family physician, n	47/243 (19%)	25/73 (34%)	22/170 (13%)
4. Did you decide to conduct "slow code"?			
Yes, n	155/237 (65%)	55/72 (76%)	100/165 (61%)

(*continued on next page*)

Table 2 (continued)

	All (n = 243)	High stress (n = 73)	Low stress (n = 170)
EMT's opinion			
1. Did your encountered case should be transported to the hospital?			
Yes, n	36/238 (15%)	3/73 (4%)	33/165 (20%)
No, n	202/238 (85%)	70/73 (96%)	132/165 (80%)
2. Would you transport the patient (OHCA/DNAR case) if he/she is your family?			
Yes, n	11/236 (5%)	1/70 (1%)	10/166 (6%)
No, n	225/236 (95%)	69/70 (99%)	156/166 (94%)

VAS score, EMT characteristics, patient characteristics, and pre-hospital circumstances are shown. Continuous variables are presented as median and interquartile range values; categorical variables are shown as frequencies or percentages. EMT: emergency medical technician, OHCA: out-of-hospital cardiac arrest, DNAR: do not attempt resuscitation, VAS: visual analog scale, EMS: emergency medical service, CPR: cardiopulmonary resuscitation, ROSC: return of spontaneous circulation.

sign of death, even in cases of terminal patients at home or at an elderly nursing care facility.[6] Studies on OHCA/DNAR patients have been the subject of four previous publications from the United States or Europe (Table 4).[1,2,19,20] In these reports, the incidence of OHCA/DNAR patients transported to the hospital was less than 10% and ROSC was achieved in approximately 10% of these cases.[1] The proportion of achieved ROSC in our study was similar to previous studies; however, a significantly higher proportions of OHCA/DNAR cases with continued CPR (98%) was observed in our study compared to other studies.

EMTs experience mental, physical, and emotional stress during every shift they work.[21] Failed resuscitation can be a traumatic experience for EMTs.[22] Emotional work stress influences early retirement, higher incidence of malignant, musculoskeletal, and cardiovascular diseases, more frequent post-traumatic stress and anxiety-depressive disorders, increased mortality, and sudden death.[23,24] Sterud et al. also investigated work stress using the Nationwide Sample of Operational Norwegian Ambulance Personnel and reported that EMTs presented higher levels of work-related emotional exhaustion associated with serious suicidal ideation.[25] Work stress reactions in EMS are a significant issue.

Table 3 – Factors associated with high stress for EMTs providing CPR to OHCA/DNAR patients.

	Adjusted OR (95% CI)
Factor	
EMT male	0.27 (0.03–2.67)
Patients with witnessed collapse	0.58 (0.33–1.00)
Absence of family physician	2.64 (0.86–8.13)
Patients with received family physician orders to transport	4.74 (2.35–9.56)
Presence of documentation of DNAR orders	0.22 (0.04–1.38)
Administered defibrillation	20.7 (3.10–137.9)
Slow code	1.94 (0.94–4.02)

Variables including EMT male, patients with witnessed collapse, absence of family physician, patients with received family physician orders to transport, presence of documentation of DNAR orders, administratered defibrillation, and slow code were used to adjust for the factors in the multivariable logistic regression. CI: confidence interval, CPR: cardiopulmonary resuscitation, DNAR: do not attempt resuscitation, EMT: emergency medical technician, OHCA: out-of-hospital cardiac arrest, OR: odds ratio.

Our study revealed that EMTs experienced high levels of stress when hospital transport was instructed by the family physician in OHCA/DNAR cases. In Japan, 60% of family physicians would provide advice for family members to call an ambulance, even though family members found the patients with DNAR orders to be in OHCA. In addition, 67% of physicians answered that they would expect to leave the decision of whether to transport/resuscitate these patients to EMTs.[6] Several possible reasons can be considered for family physicians to give instructions for CPR/transportation of OHCA/DNAR patients. Inadequate resuscitation knowledge, poor experience of family physicians, and/or under-prepared medical resources at their clinics may result in concerns about complaints and difficulty in declaring death at home.[26] Acute, unexpected deterioration or family absence may complicate the decision by family physicians. These circumstances are complex and can produce contradictions by family physicians and dissatisfaction for EMTs.[2]

The family physician plays important roles in the discussion of ACP, which may involve orders to avoid aggressive medical therapies that do not provide any benefit to the patient with the goal of respecting a patient's right to refuse life-sustaining interventions.[27,28] However, even in the United States, only about 20% of patients discussed ACP with family physicians.[12] Appropriate ACP, including DNAR orders, is an important process for patients, their surrogates, and health systems because it increases dignity, autonomy, intimacy, and peace at the time of death, decreases grieving, lessens family members' risk of mental health issues, and decreases utilization of resources and health care costs.[29,30]

Our study also showed that defibrillation of OHCA/DNAR patients was associated with high levels of stress for EMTs. In general, early

Table 4 – Previous studies on OHCA/DNAR patients.

Author	Year	Country	OHCA patients with DNAR orders	CPR	ROSC
Richardson [19]	2014	USA	3% (50/1577)	22% (11/50)	Not described
Rajagopal [20]	2016	UK	6% (711/11,451)	Not described	Not described
Reuter [2]	2017	France	7% (148/1985)	24% (35/148)	3% (5/148)
Counts [1]	2021	USA	10% (313/3152)	32% (101/313)	16% (16/101)

CPR: cardiopulmonary resuscitation, DNAR: do not attempt resuscitation, OHCA: out-of-hospital cardiac arrest, ROSC: return of spontaneous circulation.

defibrillation plays an important role for ROSC with an initial shockable rhythm.[31] The defibrillation success rate following shockable rhythm was as high as 67% in adults; some in Japan may consider shock delivery appropriate, even for DNAR patients.[32] EMTs may be caught in dilemmas between administering defibrillation for saving a life and the patient's wish for peaceful death, resulting in high levels of stress for EMTs.

EMTs more likely withheld prehospital advanced life support care for OHCA/DNAR patients, a finding consistent with another study.[1] This deviation from protocol may suggest a lack of clinical governance and a concern where the responding EMT teams are ostensibly allowing DNAR status to significantly affect their management. Ethical principles governing the provision of prehospital care for OHCA/DNAR patients are not fully established and remain an issue for each medical professional, and secure guidelines have not been established.[4] In Germany, prehospital EMS is based on integration with emergency physicians, which may enable better end-of-life decision making for palliative care patients who have undergone cardiac arrest.[33] However, 92% of emergency physicians cited the fear of litigation as a reason for resuscitation efforts in cases of cardiopulmonary arrest.[34] We need to establish guidelines and laws that are acceptable throughout the community. The establishment of regional rules for terminating CPR once initiated for OHCA/DNAR patients is underway in our country.[35]

Limitations

Our study has several limitations. First, OHCA cases with unrecognized DNAR orders might exist, since we identified pre-existing DNAR orders at the prehospital scene based on EMS activity records. Furthermore, "DNAR" can have diverse meanings. In our study, we searched the EMS electronic database for the word "DNAR"; this was reviewed by multiple investigators. However, it was still difficult to distinguish between the patient's wishes and their surrogate's wishes. Second, we could not obtain detailed information on several factors, including in-hospital treatment and outcomes following hospital discharge. Some other unexamined potential factors may affect EMT stress. Third, the generalizability of the results is limited since this study was performed in a single city (single country and culture) with a small sample size. Fourth, the phenomenon of altered behavior or performance resulting from awareness of being part of an experimental study (Hawthorne effect) may occur.[36] To minimize this effect, not all the EMTs were informed about the main purpose of the questionnaire. Finally, our survey is subject to recall bias, which can affect VAS score. VAS score might be influenced by the fading of memory with time and individual differences in attention and mood of the participants.[37,38] However, the finding of one third of EMTs having high levels of stress is still a serious concern.

Conclusions

Approximately 30% of EMTs providing CPR to OHCA/DNAR patients experienced high levels of stress, especially when there were instructions to transport given by family physicians and when administering defibrillation to these patients. Further clinical studies are needed to resolve ethical dilemmas and improve emotional work stress reactions of EMTs involved in the transportation and care of OHCA/DNAR patients.

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Ethics approval and consent to participate

The study was performed according to the Helsinki Declaration and institutional review board approval was duly obtained (ID: K1910-002).

Consent for publication

Consent for publication was waived.

Availability of data and materials

The data for the study is obtained from database of the out-of-hospital cardiac arrest (OHCA) registry in Okayama Fire Department and questionnaires for all EMTs who transported OHCA patients with do not attempt resuscitation orders; the authors do not have permission to share data.

Conflicts of interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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Appendix A. Supplementary material

Supplementary data to this article can be found online at https://doi.org/10.1016/j.resuscitation.2022.01.028.

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