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The training in SHARE communication course by physicians increases the signing of do-not-resuscitate orders for critical patients in the emergency room (cross-sectional study)

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ABSTRACT

Background: Communication skills may be an important skill for the front-line emergency physicians.
Aim: This study aimed to investigate the effect of training in a SHARE communication course by emergency physicians on patient notification and signing of do-not-resuscitate (DNR) orders for critical patients in the emergency room.
Design: From a total of 29 attending physicians in the emergency department, 19 physicians had been trained in the SHARE communication course. An observation form designed based on the SHARE training was completed by two observers who noted the communication process between physicians and patients and family members during patient notification and signing a DNR order. To assess the influence of physicians trained in a SHARE communication course on the signing of DNR orders, a propensity score-matched population was created to reduce the potential selection bias of patients and family members.
Setting: Level 1 trauma medical center in southern Taiwan.
Results: There were 145 individuals enrolled in the study, of which 93 signed the DNR order, and 52 did not sign it. Analysis from 23 matched pairs from this population revealed that significantly more family members would sign a DNR order if the physician had been trained in the SHARE communication course than when they did not receive this training (78.3% vs. 39.1%, respectively, $p = 0.017$). The overall score of the observation form for physicians was higher in those individuals who had signed a DNR order than in those who did not sign it (29.48 ± 3.72 vs. 26.13 ± 3.52, respectively, $p = 0.003$), especially when the physician had chosen a quiet environment (1.35 ± 0.65 vs. 0.87 ± 0.69, respectively, $p = 0.020$), understood the patient's wishes and confirmed them (1.78 ± 0.42 vs. 1.30 ± 0.70, respectively, $p = 0.008$), and expressed concern (1.48 ± 0.79 vs. 0.96 ± 0.77, respectively, $p = 0.028$). In addition, a feedback survey about the feelings experienced by these physicians during the process of patient notification did not reveal a significant difference during the communication with those who had or had not signed DNR orders.
Conclusion: The training in a SHARE communication course can improve the communication skills of emergency physicians in patient notification and signing of DNR orders for critical patients.

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1. Background

Effective communication techniques can greatly enhance the quality of medical care and help prevent medical disputes and conflicts [1]. Appropriate doctor-patient communication not only helps physicians clarify patients' problems and enhance the accuracy of diagnoses but also increases patients' compliance with their doctor's instructions. These communication skills may be even more important for the front-line emergency physicians, who are frequently in contact with patients with sudden deteriorated conditions and unexpected illness. Although Article 12–1 of Taiwan's Physician Act, Article 81 of the Medical Care Act, and Article 8 of the Hospice Palliative Care Statute repeatedly emphasize that notifying patients of their condition is a duty that physicians must fulfill with patients and their families, unfortunately, such training has been infrequently implemented adequately [2]. The relevant factors affecting physicians' communication skills when informing patients about their condition have been investigated in many studies of patients with cancer [3–5]; however, this subject has been less explored in emergency physicians.

It had been reported that a combined hospice care could significantly improve in the sign rate of DNR orders from 41.5% to 71.5% ($p < 0.0001$) in the terminal cancer patients [6]. In addition, an advance care planning (ACP) program, a process of discussion between individuals and their physicians, formal caregivers, families and friends about their preferences and wishes for future care would have significant positive effects on the patients' willingness to sign a DNR order [7]. Furthermore, clinical observations have revealed that emergency physicians lack a standard and consistent notification model when explaining health conditions to patients and family members [8]. In recent years, the application of hospice and palliative medicine has been increasing at emergency and critical units [9]. Under such circumstance, an order of do-not-resuscitate (DNR) is important to instruct all the involved healthcare providers not to perform further interventions and procedures [10,11]. It is extremely important for emergency physicians to understand how to explain the condition to those critical patients with not-yet-diagnosed but probably deteriorated conditions or their family members, and assess their understanding and attitude regarding an order of DNR. Therefore, appropriate communication models for training emergency physicians in patient notification concerning the choice of signing a DNR order is important in the clinical setting.

SHARE communication course emphasizes effective communication in order to provide patients with psychological support when they receive health conditions notification containing bad news [12]. The acronym SHARE stands for the four main components of this structured model: supportive environment, how to deliver the bad news, additional information, reassurance, and emotional support. For those patients with cancers, the SHARE communication course has provided an emotional cushion to help patients endure their time of grief [12] and has generated excellent communication among patients, family members, and doctors [3–5]. The detailed emotional support training provided by the SHARE communication course has shown to have a positive effect in the areas of notification skills, emotional support, and provision of information [13]. Such training in communication skills is also recommended for those experienced attending physicians to develop the ability to explain the facts competently for those cancer patients [14]. Therefore, this study was designed to investigate the effect of emergency physicians participating in the SHARE communication course on patient notification and signing of DNR orders for critical patients in the emergency room.

2. Methods

2.1. Research design and sample estimation

This was a non-randomized prospective study and the work has been reported with the STROCSS criteria [15]. This study utilized a descriptive correlational research design with purposive sampling in a medical center in southern Taiwan [16–18]. The research subjects consisted of attending physicians, who were willing to inform consent forms, in the emergency department between May 2017 and April 2018. Unwillingness to sign the subject consent form constituted an exclusion criterion. The sample consisted of the 29 attending physicians in the emergency department. There were 19 physicians who had been trained in the SHARE communication course and 10 physicians had not. The SHARE communication training course was organized by hospital in a 4-h course with 2 teachers and 12 trainees involving in the presentation, discussion, and role playing of two clinical cases. At the end of the course, all the trainees should pass an end-test but no certification was granted. G*Power software, version 3.1 [19], was used to calculate the sample number, and a sample number of 145 was obtained based on data collection (observation) of five patient condition notifications for each physician. Before its implementation, this study was first reviewed by the institutional review board of the hospital with project number 201700429B0. Researchers explained the goals of the project in detail to the subjects before obtaining their consent. All the DNR orders in this study were signed by the family members. The research data were used only for the purpose of this study and were kept confidential.

2.2. Measurement parameters

This study employed an observation form to perform data collection when the physicians giving the patient condition notification. This observation form was revised based on in-depth interviews with cancer patients performed in 2005 by the Japanese scholars Fujimori et al., which involved the re-arrangement of patient condition notification perspectives as a result of that study. The present study involved five experts with experience related to the topic of this research: an attending physician from the department of radiation oncology, an oncological nurse, an emergency department attending physician, and an attending physician specializing in family medicine. Accordingly, the observation form was designed based on the SHARE communication course, and the form's content included four main aspects according to its acronym: supportive environment (S), how to communicate bad news (H), additional information (A), reassurance and emotional support (RE). Each question had three possible responses: “I have not done it,” “I have partially done it,” and “I have done it fully,” which were scored with 0, 1, and 2 points, respectively. The overall questionnaire score was the sum of the scores for each question, and possible total scores ranged from 0 to 34 points. Higher scores indicated there was a greater fit of the SHARE communication course regarding patient condition notification. The scale's content validity index (CVI) was tested by assessing the comprehensiveness, appropriateness, and clarity of content of each question using a 5-point Likert scale. Questions that received 3 points or less from the experts were deleted, and those questions receiving at least 4 points but assessed by the experts as having unclear wording were revised. Consequently, the original 20-question questionnaire was shortened to 17 questions, which had a CVI of 0.93. Before starting the actual research, a pretest was first implemented with a sample of 30 individuals which presented a Cronbach's α of 0.71.

In addition, for those attending physicians involved in this study, a feedback survey of the feelings experienced during the process of patient notification was performed. Physicians had to respond with “yes” or “no” to the questions contained in this survey: Does the physician feel calm during the communication? Can the physician clearly express the purpose? Does the physician have enough confidence? Are physician's feelings influenced by family members?

2.3. Research observers

In order to achieve consistency within the results of the observers, they received observation training before the research began. To obtain objective observations and reduce the Hawthorne effect, nurse practitioners assigned by the emergency department were identified as "observers." The main researcher selected two observers, who had at least 20 years of experience in emergency care work. Only the main researcher was aware of the observers' status; since the observers were in fact members of the medical team, selecting these observers was not expected to influence the results during the assessment.

2.4. Data collection and analysis

Before performing data collection, researchers explained the study's goals and steps to the participating physicians. After acquiring their informed consent, the observers started observing the attending physicians who participated in patient notification and DNR order acquirement. The content of the observation form was filled by observers during the explanation process. The demographic characteristics of patients including age, gender, triage level (level I, resuscitation; level II, emergency; level III, urgent; level IV, less urgent; and level V, non-urgent [20,21]), owner status of major injury card or handicapped card, Charlson Comorbidity Index (CCI), Glasgow Coma Scale (GCS), acute complications, and source of medical expenses (multiple-choice) were collected. In addition, the demographic characteristics of the involved family members including age, gender, level of education, relationship with the patient, religious belief, related situational experience of signing DNR orders (multiple-choice), and reasons for considering signing DNR orders (multiple-choice) were obtained.

To evaluate the association of demographic characteristics of patients and family members with the signing of DNR orders, the studied population was divided in two groups depending on whether the DNR order was signed or not. Analysis was performed using Mann-Whitney U-tests for the non-normally distributed data and the chi-squared test for categorical variables. During the assessment of the influence of physicians who had been trained in SHARE communication course on the signing of DNR orders, a propensity score-matched population was created to reduce the potential selection bias of patients and family members, including the demographic characteristics, related situational experience in signing a DNR order, and reasons for considering signing a DNR order. We used the greedy method to create 1:1 matched study population with a 0.1 caliper width by utilizing R statistical software (version 3.5, package: Matchit). All continuous variables were presented as mean ± standard deviation. A p-value < 0.05 was considered statistically significant.

3. Results

3.1. Demographic characteristics of patients and family members who signed a DNR order

From a total of 145 individuals who were enrolled in this study, 93 signed the DNR order and 52 did not sign it. As shown in Table 1, there was a significantly higher number of patients who did not sign the DNR orders than those who signed them among those individuals whose medical expenses were covered by insurance payments (55.8% vs. 19.4%, respectively, $p < 0.001$). Regarding the related situational experience in signing DNR orders (Table 2), there were significantly more family members who would sign a DNR order if they had discussed the subject with the patient (49.5% vs. 15.4%, respectively, $p < 0.001$) or with the physician (49.5% vs. 15.4%, respectively, $p < 0.001$), and when they had experienced signing a DNR order for another family member (19.4% vs. 5.8%, respectively, $p = 0.047$).

Regarding the reasons for considering signing a DNR order, there were significantly more family members would sign it based on the patient's own intention (46.2% vs. 15.4%, respectively, $p < 0.001$). However, there were fewer family members would sign a DNR order based on the condition that the physician would initiate the discussion with family members (11.8% vs. 73.1%, respectively, $p < 0.001$), when they receive notification of the patient's critical condition (43.0% vs. 78.8%, respectively, $p < 0.001$), when the subject was discussed among the patient's family members (44.1% vs. 71.2%, respectively, $p = 0.003$), and if a limited life expectancy was predicted (14.0% vs. 40.4%, respectively, $p < 0.001$).

There were average 5 patients, ranging from 4 to 7 patients, per physician had been asked for the consideration of signing DNR orders (Fig. 1). Of 57 patients whose physicians did not be trained in SHARE course, 32 patients had signed DNR orders and 17 patients not. In contrast, of 96 patients whose physicians had been trained in SHARE course, 76 patients had sign DNR orders and 20 patients not (Fig. 2). This result revealed that, in comparison with those physicians who did not be trained in SHARE course, when the physicians had been trained in a SHARE course, there were significant more patients had signed DNR orders ($p < 0.001$). Regarding the role of physicians involved in the signing of DNR orders (Table 3), there were significantly more family members would sign it if the physician had been trained in the SHARE communication course (81.7% vs. 38.5%, respectively, $p < 0.001$). The feedback survey about the feelings experienced by these physicians during the process of patient notification did not reveal a significant difference during the communication with those who had or had not signed DNR orders.

3.2. Analysis of the matched population

The propensity score-matched population was created to reduce the potential selection bias of patients and family members in assessing the influence of physicians who had been trained in a SHARE communication course on the signing of DNR orders. A total of 23 well-balanced pairs of patients were created for analysis. Among these matched patients, there were no significant differences in the demographic characteristics of patients (Table 1) and family members (Table 2). The analysis from this matched population also revealed that there were significantly more family members would sign a DNR order if the physician had not been trained in the SHARE communication course (78.3% vs. 39.1%, respectively, $p = 0.017$). In addition, there were no significant differences regarding the feedback survey about the feeling of these physicians during the process of patient notification.

As shown in Table 4, the overall observation score for physicians was higher in those individuals who had signed the DNR order than in those who did not sign it (29.48 ± 3.72 vs. 26.13 ± 3.52, respectively, $p = 0.003$). Regarding the detailed situations where the SHARE communication course was applied during the process of patient notification, there was a higher score for physicians when family members had signed a DNR order compared to when it was not signed, if the physician had chosen a quiet environment (1.35 ± 0.65 vs. 0.87 ± 0.69, respectively, $p = 0.020$), had understood the patient's wishes and confirmed them (1.78 ± 0.42 vs. 1.30 ± 0.70, respectively, $p = 0.008$), and the physician had expressed concern (1.48 ± 0.79 vs. 0.96 ± 0.77, respectively, $p = 0.028$).

4. Discussion

This study revealed that there were significantly more family members who would sign a DNR order if the physician had been trained in the SHARE communication course; additionally, the overall score of the observation form for physicians was higher in those individuals who had signed a DNR order than in those who did not sign it. This result indicates that appropriate communication models can help emergency physicians with patient notification in signing a DNR order. Interpersonal communication skills are recognized as essential clinical abilities for physicians and their importance is stated in the seven goals

Table 1
Demographic characteristics of patients with or without DNR order before and after matching cohorts.

Variables	Before matching (n = 145)			After matching (n = 46)		
	with DNR (n = 93)	without DNR (n = 52)	p value	with DNR (n = 23)	without DNR (n = 23)	p value
Age (years)	74.3 ± 13.9	78.0 ± 12.3	0.114	79.6 ± 15.2	77.0 ± 11.6	0.510
Gender			0.250			0.529
Male, n (%)	39(41.9)	16(30.8)		9(39.1)	6(26.1)	
Female, n (%)	54(58.1)	36(69.2)		14(60.9)	17(73.9)	
Triage level	1.9 ± 0.8	1.9 ± 0.7	0.920	1.6 ± 0.6	1.7 ± 0.8	0.667
Major injury card, n (%)	52(55.9)	28(53.8)	0.947	10(43.5)	14(60.9)	0.376
Handicapped card, n (%)	8(8.6)	1(1.9)	0.215	2(8.7)	1(4.3)	1.000
CCI	3.12 ± 1.94	3.10 ± 2.00	0.948	2.61 ± 1.53	2.96 ± 2.06	0.518
GCS	9.96 ± 4.53	10.12 ± 4.56	0.841	9.00 ± 4.31	8.70 ± 4.79	0.822
Acute complications, n (%)	73(78.5)	48(92.3)	0.056	16(69.6)	20(87.0)	0.284
LOS in hospital (days)	12.1 ± 9.9	14.1 ± 11.8	0.289	10.1 ± 7.6	13.1 ± 14.1	0.366
Source of medical expenses						
Self savings, n (%)	26(28.0)	19(36.5)	0.377	4(17.4)	9(39.1)	0.190
Spouse payment, n (%)	15(16.1)	10(19.2)	0.806	3(13.0)	5(21.7)	0.697
Sharing of children, n (%)	66(71.0)	42(80.8)	0.271	20(87.0)	16(69.6)	0.284
Insurance payment, n (%)	18(19.4)	29(55.8)	< 0.001	6(26.1)	9(39.1)	0.529

CCI = Charlson Comorbidity Index; DNR = do-not-resuscitate; GCS = Glasgow Coma Scale; LOS = length of stay.

of medical education issued by the World Federation for Medical Education in 2003 [22] and the six core skills of resident physicians issued by the Accreditation Council for Graduate Medical Education in 2007 [23]. However, effective communication skills are lacking in clinical settings [24]. While the focus has consistently been on the acquisition of knowledge and development of professional skills, there is little effort to cultivate the communicational abilities of physicians [5]. To build trust with patients, doctors' ability to communicate with patients is more important than their professional skills [5]. To improve communication skills, the SHARE communication course can make an important contribution to this topic.

In this study, physicians who obtained a DNR order tended to choose a quiet environment, understand patients' wishes and confirm them, and express empathy for those family members who had signed the DNR order, compared to physicians who did not obtain a DNR order from family members. Selection of a quiet environment is important for establishing trusting relationships between physicians, patients, and family members, considering especially that when the patient's

Table 2
Demographic characteristics of family members and their related situational experience and consideration of signing a DNR order in the before and after matching cohorts.

Variables	Before matching (n = 145)			After matching (n = 46)		
	with DNR (n = 93)	without DNR (n = 52)	p value	with DNR (n = 23)	without DNR (n = 23)	p value
Age (years)	53.3 ± 11.9	52.4 ± 12.3	0.643	50.8 ± 9.9	55.2 ± 9.2	0.123
Gender			0.339			0.541
Male, n (%)	41(44.1)	28(53.8)		16(69.6)	13(56.5)	
Female, n (%)	52(55.9)	24(46.2)		7(30.4)	10(43.5)	
Level of education			0.337			0.332
Junior high school and below, n (%)	27(29.0)	9(17.3)		8(34.8)	3(13.0)	
Senior high school, n (%)	33(35.5)	22(42.3)		8(34.8)	11(47.8)	
University and above, n (%)	33(35.5)	21(40.2)		7(30.4)	9(39.1)	
Relationship with patient			0.109			0.270
Spouse, n (%)	5(9.6)	20(21.5)		4(17.4)	2(8.7)	
Children, n (%)	42(80.8)	55(59.1)		17(73.9)	18(78.2)	
Other, n (%)	5(9.0)	18(19.0)		2(8.7)	3(12.9)	
Religious beliefs			0.066			0.372
Buddhism or Taoism, n (%)	68(73.2)	40(77.0)		21(91.3)	18(78.2)	
Other (including those without), n (%)	25(26.9)	12(23.1)		2(8.7)	5(21.7)	
Related situational experience in signing a DNR order						
Totally understood, n (%)	92(98.9)	51(98.1)	1.000	22(95.7)	22(95.7)	1.000
Discussed DNR order with patient, n (%)	46(49.5)	8(15.4)	< 0.001	7(30.4)	7(30.4)	1.000
Discussed DNR order with physician, n (%)	46(49.5)	8(15.4)	< 0.001	6(26.1)	6(26.1)	1.000
Experienced signing a DNR order for another family member, n (%)	18(19.4)	3(5.8)	0.047	3(13.0)	2(8.7)	1.000
Have been told that the condition is being critically handled, n (%)	84(90.3)	49(94.2)	0.614	20(87.0)	21(91.3)	1.000
Have received a critical notice, n (%)	19(20.4)	4(7.7)	0.076	5(21.7)	3(13.0)	0.697
Reasons for considering signing a DNR order						
Physician initiated the discussion with family members, n (%)	11(11.8)	38(73.1)	< 0.001	9(39.1)	10(43.5)	1.000
Receiving notice of the patient's critical condition, n (%)	40(43.0)	41(78.8)	< 0.001	12(52.2)	14(60.9)	0.766
Patient's own intention, n (%)	43(46.2)	8(15.4)	< 0.001	7(30.4)	6(26.1)	1.000
Discussion among the patient's family members, n (%)	41(44.1)	37(71.2)	0.003	14(60.9)	12(52.2)	0.766
Predicting that the patient cannot be cured, n (%)	36(38.7)	22(42.3)	0.805	4(17.4)	6(26.1)	0.721
Patient has been in and out of the hospital frequently, n (%)	13(14.0)	5(9.6)	0.616	1(4.3)	4(17.4)	0.343
A limited life expectancy is predicted, n (%)	13(14.0)	21(40.4)	0.001	5(21.7)	5(21.7)	1.000

DNR = do-not-resuscitate.

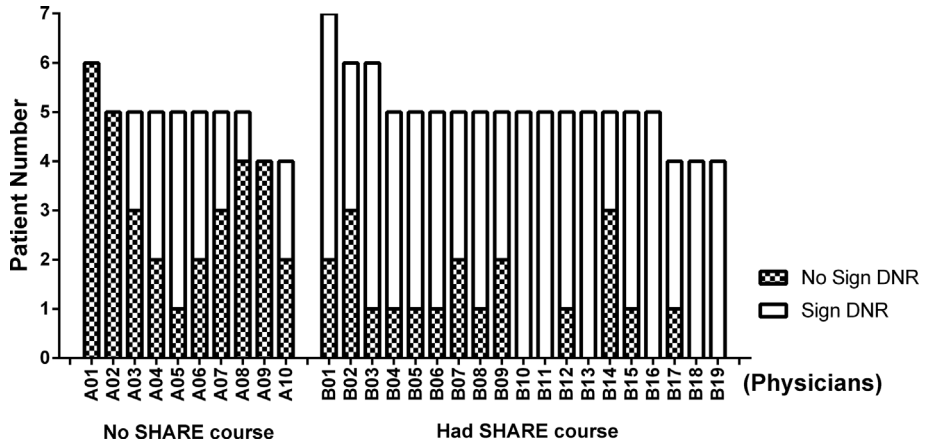

Fig. 1. The number of patients had and had not signed DNR orders per physician. Physicians B01 to B19 and physicians A01 to A10 indicated those physicians had or had not received SHARE training course, respectively.

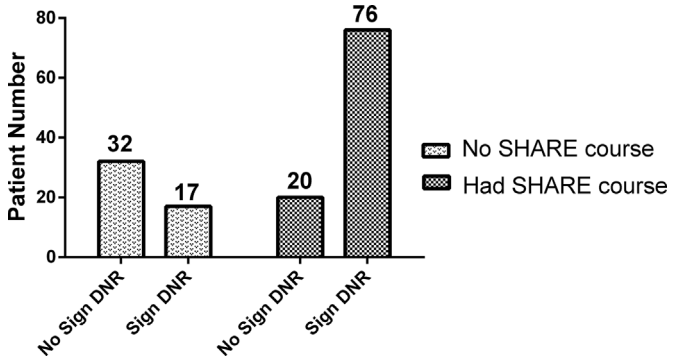

Fig. 2. The number of patients had and had not signed DNR orders in the physicians had or had not received SHARE training course.

condition is severe and time critical, physicians may fail to select a quiet environment in which to explain the situation to family members. This is consistent with other studies which have found that the establishment of a supportive environment is a risk factor that affects whether patients and family members sign the DNR order when the physician explains the patient's condition [5]. In addition, this study also revealed that when emergency physicians understand patients' wishes and confirm them, a significant increase in the rate of DNR order signing can be achieved. This result is consistent with the findings of a study in cancer patients who did not want physicians to conceal their condition and related medical information and expected to participate in medical decisions [4]. The physician has the duty to provide additional information to cope with patients with severe conditions, such as alternative treatment plans, second opinions, or prognostic outlook, or even consulting relevant specialists for further assessment and treatment. Knowing when to ask for assistance or engage in team cooperation can promote individual learning growth, boost the effectiveness of teamwork, and improve patient care results [25]. Furthermore, expressing concern has been associated with a significant increase in DNR order signing rate, indicating that emergency physicians must clearly improve their provision of pledges and emotional support. Another study based on the SHARE communication course found that social psychology experts were doing better than physicians in patient condition notification because they could express concern and consider patients' potential needs more effectively [26]. This result is consistent with the conclusions of another research indicating that physicians should increase their sensitivity toward family members' reactions when communicating upsetting news, explaining the non-technical mental and psychological adaptation methods that family members may not know, and aiming to help resolve the problems of patients and family members [27].

This study revealed that irrespective of whether emergency physicians give a self-introduction, enhancing their professional image resulted in no significant improvement in DNR order signing, implying that ordinary good manners and attitude can express a professional image just as well as a self-introduction [28,29]. This study further suggests that physicians should strive to create a supportive environment and make sure that their explanations of the patient's condition are understood by all; physicians should also observe and respond to patients' and family members' words, expressions, and mood swings, favoring emotional support over purely rational explanations of patient condition. Moreover, physicians should encourage family members to express their emotions, make a sincere effort to understand and accept family members' emotions, and express concern for them. Therefore, to notify critical patients and their family members about their conditions and obtain the signing of the DNR order, the physicians should

Table 3
Involvement and the feedback survey of physicians before and after matching cohorts adjusting for demographic characteristics of patients and family members.

Variables	Before matching (n = 145)			After matching (n = 46)		
	with DNR (n = 93)	without DNR (n = 52)	p value	with DNR (n = 23)	without DNR (n = 23)	p value
The physicians have been trained in the SHARE communication course, n (%)	76(81.7)	20(38.5)	< 0.001	18(78.3)	9(39.1)	0.017
The feedback from the physicians						
During the process of informing condition, do you:						
Feel calm during the communication, n (%)	17(18.3)	5(9.6)	0.249	5(21.7)	2(8.7)	0.412
Clearly express the purpose, n (%)	8(8.6)	1(1.9)	0.215	4(17.4)	0(0.0)	0.116
Have enough confidence, n (%)	5(5.4)	0(0.0)	0.220	2(8.7)	0(0.0)	0.470
Are your feelings influenced by family members, n (%)	26(28.0)	20(38.5)	0.264	4(17.4)	10(43.5)	0.109

Table 4
Observation form scores of the applied situations according to the SHARE communication course for the patients with or without DNR order.

Variables	Before matching (n = 145)			After matching (n = 46)		
	with DNR (n = 93)	without DNR (n = 52)	p value	with DNR (n = 23)	without DNR (n = 23)	p value
Supportive environment						
Introduce yourself	1.25 ± 0.65	1.27 ± 0.81	0.886	1.22 ± 0.90	1.22 ± 0.67	1.000
Choose a quiet environment	0.81 ± 0.63	1.35 ± 0.70	< 0.001	1.35 ± 0.65	0.87 ± 0.69	0.020
Establish a relationship with the patient	1.52 ± 0.70	1.74 ± 0.53	0.033	1.83 ± 0.39	1.61 ± 0.72	0.210
Invite family members to understand the condition	1.42 ± 0.54	1.77 ± 0.42	< 0.001	1.65 ± 0.49	1.48 ± 0.51	0.244
How to deliver bad news						
Avoid technical terms	1.77 ± 0.47	1.83 ± 0.43	0.449	1.74 ± 0.54	1.78 ± 0.42	0.763
Explain whole process of the disease	1.88 ± 0.32	1.95 ± 0.27	0.222	2.00 ± 0.00	1.87 ± 0.34	0.076
Changes in related emergency procedures	1.88 ± 0.38	1.99 ± 0.10	0.013	2.00 ± 0.00	1.87 ± 0.34	0.076
Explain possible causes of cardiac arrest	1.92 ± 0.27	1.98 ± 0.15	0.11	2.00 ± 0.00	1.87 ± 0.34	0.076
Express the role of medical care at the time	1.90 ± 0.30	1.88 ± 0.36	0.705	1.87 ± 0.34	1.83 ± 0.39	0.689
Confirm family members' understanding of the relevant condition	1.65 ± 0.48	1.94 ± 0.25	< 0.001	1.83 ± 0.39	1.74 ± 0.45	0.486
Request assistance if you cannot explain the condition clearly	1.79 ± 0.46	1.87 ± 0.40	0.258	1.91 ± 0.29	1.74 ± 0.45	0.125
Additional information						
Understand the patient's wishes and confirm them	1.40 ± 0.69	1.82 ± 0.46	< 0.001	1.78 ± 0.42	1.30 ± 0.70	0.008
Explain the future treatment policy	1.90 ± 0.36	1.74 ± 0.49	0.037	1.83 ± 0.39	1.91 ± 0.29	0.393
Provide other medical information	1.81 ± 0.40	1.53 ± 0.60	0.003	1.87 ± 0.34	1.65 ± 0.49	0.087
Reassurance and Emotional support						
Express empathy	1.35 ± 0.68	1.82 ± 0.42	< 0.001	1.74 ± 0.45	1.39 ± 0.72	0.056
Encourage and comfort patients and their families to think positively	1.02 ± 0.58	1.59 ± 0.66	< 0.001	1.39 ± 0.78	1.04 ± 0.64	0.106
Express concern	1.04 ± 0.79	1.54 ± 0.73	< 0.001	1.48 ± 0.79	0.96 ± 0.77	0.028
Overall score	26.33 ± 3.74	29.60 ± 3.31	< 0.001	29.48 ± 3.72	26.13 ± 3.52	0.003

participate in the SHARE communication course to improve their communication skills and the patient-doctor relationship.

The main strength of this study is to assess the effect of training in the SHARE course in the matched population. With such approach, the variation of baseline patient characteristics due to non-randomized assignment can be greatly attenuated. However, this study had some limitations. First, propensity score-matching was utilized to attenuated the influence of various baseline demographic characteristics of patients and family member; however, a relatively small sample number after matching may have affected the analysis results; in this regard, certain variables may not have reached the level of statistical significance. Second, prior willingness of patients and family members to sign a DNR order was not considered in this study, thus possibly leading to a selection bias. Third, although physicians could be classified as those who had been trained in the SHARE communication course or not, the variation in communication skills of these physicians before this training was not assessed and deemed as similar, maybe resulting in a selection bias. Fourth, from a total of 93 and 52 patients who had or had not signed the DNR orders, there were only 23 individuals could be selected as matched groups of patients. Analysis on the relatively low proportion of matched population may lead to a selection bias. Finally, the study was limited to the emergency department of one medical center in Taiwan, where many residents believe that life and death are predetermined and that an individual must not plan for or discuss the end-of-life care [30] and most families here may choose life-sustaining therapy to prolong the life of the patient because of filial piety, especially when the patient is a parent or other family elder [31]. Therefore, the results may not be generalizable to other hospital or hospice departments in other countries.

5. Conclusion

The training in a SHARE communication course communication course can improve the communication skills of emergency physicians in patient notification and signing of DNR orders for critical patients.

Credit author statement

Ya-Hui Cheng: Writing – Original Draft, Writing – Review & Editing, Conceptualization. **Chih-Hung Chen**: Writing – Original Draft. **Fen-Ju Chen**: Methodology. **Eng-Yen Huang**: Resources. **Po-Ming Liu**: Visualization. **Chia-Te Kung**: Investigation. **Hsien-Li Huang**: Writing – Review & Editing. **Li-Hui Yang**: Writing – Review & Editing. **Peng-Chen Chien**: Formal Analysis. **Ching-Hua Hsieh**: Validation, Supervision.

Provenance and peer review

Not commissioned, externally peer-reviewed.

Data statement

Data sharing not applicable to this article as no datasets were generated or analyzed during the current study.

Ethical approval

This study was approved by the institutional review board of the Kaohsiung Chang Gung Memorial Hospital (reference number 201700429B0).

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Author contribution

YHC wrote the manuscript and designed the study; CHC drafted the manuscript; FJC assisted with the study design; EYH was involved in the literature review; PML contributed to the interpretation of data; CTK is responsible for collected and integrated the data; HLH revised the manuscript; LHY proofread the manuscript; PCC performed the

statistical analyses and edited the tables; CHH contributed to the data analysis and interpretation.

Research registration number

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Guarantor

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Conflicts of interest

The authors declare no competing interests.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ijsu.2019.06.005.

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