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Knowledge gaps, attitudes, and practices regarding end-of-life medical care among physicians in an academic medical center

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ABSTRACT

Introduction: End-of-life medical care (ELMC) plans and do-not-resuscitate (DNR) decision-making are usually affected by multiple factors compared to other medical care decisions. ELMC and DNR policy implementation are still diversified and heterogeneous, especially in Saudi Arabia, because policymakers have adopted no guidelines. Thus, this study investigated physicians' knowledge, attitude, and practice regarding ELMC and DNR.

Methods: A cross-sectional study design was adopted. Three hundred physicians working at King Fahad Hospital of the University, Khobar, Saudi Arabia, were randomly selected and administered an anonymous self-administered questionnaire using the Likert scale. Data analysis was carried out using SPSS 23.0.

Results: Of 300 distributed questionnaires, 264 (88%) were completed and analysed. Knowledge gaps and negative attitudes were observed, a quarter of the participants were opposed to issuing a DNR order, and 29.0% considered DNR as equal to euthanasia as they practice. The participants' patient age and religious factors were the most critical factors in the ELMC plan and DNR decision. The physician's level of acceptance regarding a set of ELMC interventions and DNR decisions showed heterogenicity and uncertainty among participants.

Conclusions: The ELMC plan and DNR decision-making should be appropriately addressed in the medical residents' training programs to bridge the knowledge gap and the physicians' negative attitudes during their practice. Additionally, there is a need to update and unify the DNR policies at the national level, considering the patient's right to be informed and involved actively during the decision process making. Finally, more prospective research is needed for the global standardization of ELMC.

Keywords: end-of-life medical care, physicians, perspectives, teaching hospitals, Saudi Arabia

INTRODUCTION

The aspects of end-of-life medical care (ELMC) are essential in daily clinical practice. However, in contrast to most other medical decisions, do-not-resuscitate (DNR) decision-making and ELMC plans are usually affected by the cultural and ethical backgrounds of decision-makers, along with arrays of other factors that may have had a tremendous influence on the physicians' practice. These include religious and legal concerns, economic issues, availability of health care resources and advanced technologies, patient's quality of life, the type of the point of care, and applied DNR and ELMC policies [1].

DNR was accepted in the mid-1970s as part of ELMC due to harmful results or poor cardiopulmonary resuscitation (CPR) outcomes, especially in terminally ill patients [2-5]. Proper and timely physician communication with their patient, patient family, or surrogate is vital to discuss the patient's diagnosis, prognosis, preferences, and quality-of-life issues such as DNR to make the right decisions and provide advisable ELMC [2, 6, 7]. Physicians should consider that the patient's knowledge, values, and preferences may differ from their own. Patient education about ELMC options and CPR efficacy will play a critical role in reaching an acceptable consensus regarding ELMC. Likewise, medical employees also require additional training on communicating end-of-life options with the patients [6, 8, 9].

Furthermore, in the era of personalized medicine, the care provider-patient relationship has changed from medical paternalism to an autonomy-based relationship, in which patient participation in decision-making is an obligation rather than an opportunity [10]. Unfortunately, such a provider-patient relationship is rarely established with the patient or patient's surrogate in Arabian countries.

The patient or patient's surrogate is usually not involved in DNR decision-making or ELMC planning, and documents such as "advanced directives" regarding ELMC are not part of the social culture and may not be recognized under Islamic law [11-

14]. Advance directive law, as practiced in the west, does not exist in Saudi Arabia. However, Saudi law recognizes the patient's right to decide about the care they want to receive and the decisions they want to make at the end of their life through the will, which could include anything they wish if it does not contradict Islam. Lack of DNR order standardization and diversity of applied ELMC policies globally and even at regional or national levels reflect the dilemma of ELMC, misunderstandings of DNR orders, and uncertainty toward controversial ethical and legal approaches in this regard [15].

To regulate DNR practice in Saudi Arabia, the Presidency of the Administration of Islamic Research and Ifta issued Fatwa No. 12086 on 1409 H (1989 AD) [11, 16]. According to that Fatwa, a DNR order should be signed by three knowledgeable and trustworthy physicians. The family members and the patient's surrogates are not qualified to make such clinical decisions and are usually uninvolved in the decision-making process. Recently, the Saudi Health Council published the National Policy and Procedure for DNR status [11, 17]. However, the newly published articles from Saudi Arabia indicate a lack of knowledge regarding DNR and the need for continuous optimization of ELMC practice [18].

Thus, considering the absence of evidence-based guidelines adapted by health policymakers in Saudi Arabia, this study looks to evaluate physicians' knowledge, attitude, and practices of ELMC and the role from ethical, legal, and other cultures' points of view of DNR decision-makers as part of ELMC provided to terminally ill patients. In addition, this study specifically attempted to uncover those factors to consider while making a DNR decision, the physician's agreement on DNR orders for patients with specific diagnoses, and their agreement on ELMC interventions.

MATERIALS AND METHODS

Study Design

This study adopted a cross-sectional study design to investigate the physicians' knowledge, attitudes, and practice regarding DNR order and ELMC in terminally ill patients.

Study Settings

This study was conducted at King Fahad Hospital of the Imam Abdulrahman Bin Faisal University (KFHU), Al-Khobar, located in the Eastern Province of Saudi Arabia, between April 01, 2019, and March 31, 2020.

Participants

All physicians (n=810), both male and female, including medical interns, residents, specialists and consultants working at KFHU were considered as the population of this study. A simple random sampling technique was adopted to select participants from total number of physicians working at KFHU during the study period. Taking into consideration of the population size, confidence level (95%), and acceptable margin of error (5%), 300 samples were randomly selected to participate in this study. Each participant received a hard copy of an invitation letter that contained brief information about the aim of the study, its importance, the value of their participation, and instructions on how to fill the questionnaire, ensuring their confidentiality and implied consent statement.

Instrumentation

A pre-tested 65-item-based questionnaire was used to collect data from the participants. The questionnaire consists of five parts: part 1 was dedicated to collecting sociodemographic information (age, gender, nationality, religion, level of training, years of practice, and familiarity of the physicians toward DNR); part 2 focused on items related to physicians' knowledge and perspectives regarding DNR whereas items under parts 3, 4, and 5 focused on factors that may affect the DNR decision, general diagnoses in which DNR order usually discussed, and a list of interventions/investigations that should be done for DNR patients when indicated. The responses for those items under parts 3, 4, and 5 were captured using a five-point Likert scale, and consisted of 'strongly disagree', 'disagree', 'neutral', 'agree', 'strongly agree'. A pilot study was conducted with a sample size of 30 physicians before data collection (not enrolled later in thy study population) to assess the tool's reliability. The Cronbach's alpha was estimated to be 0.850, demonstrating a substantial internal consistency of the questionnaire. In addition, the researchers carried out a content validity of the questionnaire through a panel of experts assessing whether each item in the questionnaire was appropriate for the construct being measured.

Analytical Methods

Physicians' knowledge and perspectives regarding DNR were analyzed using a simple frequency count of those who opted for 'yes' or 'no' to each item of the questionnaire using the dichotomous response option ('yes' or 'no') (12 items). Additionally, physicians' agreement on DNR decisions, general diagnoses in which DNR orders are discussed, and a list of ELMC interventions/investigations adopted were determined using the simple percentage of those who opted for various Likert Scale options in parts 3, 4, and 5 of the questionnaire tools.

Finally, the Chi-square statistics were applied to determine whether there were significant association between demographic variables and those factors, such as physicians' DNR decisions, DNR order made by the physicians for different categories of patients, and their agreement on different ELMC interventions. A p-value less than 0.05 was considered significant. SPSS 23.0 was used for the analyses.

RESULTS

Of the 300 questionnaires administered, 264 completed questionnaires were returned, demonstrating an 88% response rate. **Table 1** shows the demographic characteristics of the participants. Among those who responded, 69% have learned about DNR decision-making processes, and 85% of the participating physicians are familiar with the concept of DNR. Further, it is observed that 85% of physicians (n=225) were familiar with DNR, and 68.6% (n=183) had learned about it.

Physicians' Awareness and Perspectives Regarding DNR

Table 2 depicts the findings concerning physicians' awareness and perspectives regarding DNR. 72% (n=191) of the physicians agreed that DNR practice is uncommon in Saudi Arabia, whereas 25% of them (n=69) oppose DNR orders under any circumstances. 29% of physicians (n=76) consider DNR as equal to euthanasia, 38.3% stated that there is no "Fatwa" regarding DNR in Saudi Arabia, and 39% (n=103) were not

Table 1. Demographic details of physicians & their familiarity on DNR (n=264)

Characteristics	n	%	Characteristics	n	%
Age (years)			Years of practice		
Median (inter quartile range)	25.0 (24.0, 31.5)		Median (inter quartile range)	1.0 (1.0, 6.0)	
Mean±Standard deviation	30.96±11.5		Mean±Standard deviation	6.67±11.4	
Sex			Are you familiar with the concept of DNR?		
Female	114	44.1	No	39	15.0
Male	150	55.9	Yes	225	85.0
Nationality			Have you learned about DNR?		
Non-Saudi	53	20.8	No	81	31.4
Saudi	211	79.2	Yes	183	68.6
Level of training			Religion		
Intern	116	44.6	Non-Muslim	5	1.6
Resident	74	28.1	Muslim	259	98.4
Specialist	45	16.2			
Consultant	29	11.2			

Table 2. Physicians' awareness and perspectives regarding DNR

Items	Yes [n (%)]	No [n (%)]
Do you think that DNR practice is common in Saudi Arabia?	73 (28.0)	191 (72.4)
Is there a "Fatwa" in Saudi Arabia that regulates DNR?	163 (61.7)	101 (38.3)
At your institution, is there a DNR policy?	161 (61.0)	103 (39.0)
Do you have an idea about "advanced directive" or "living will"?	83 (31.4)	181 (68.6)
Have you ever discussed a DNR order with a patient or his/ her relatives?	39 (14.8)	225 (85.2)
Have you ever participated in DNR order?	51 (19.3)	213 (80.7)
Is it possible to undo the DNR order?	127 (48.1)	137 (51.9)
Is it mandatory to review the DNR periodically?	141 (53.4)	123 (46.6)
Would you like additional resources or training for DNR decision?	148 (54.9)	116 (45.1)
Are you opposed to the DNR order under any circumstances?	69 (26.1)	195 (74.9)
Is DNR equal to euthanasia?	76 (29.0)	188 (71.0)
Do you prefer that your patients have "advanced directive" or "living will"?	108 (40.9)	156 (59.1)

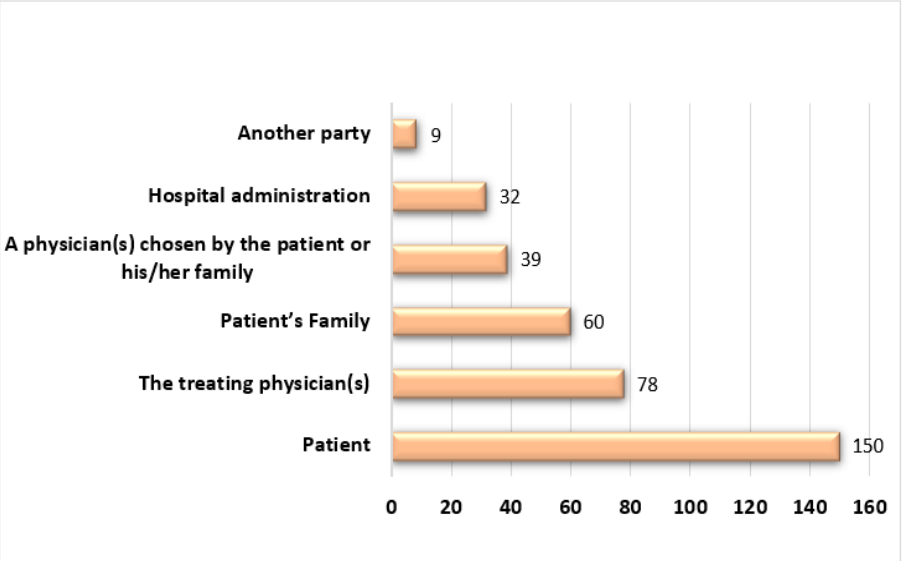

Figure 1. Physicians agreement on various authorized party to issue DNR (Source: Authors' own elaboration)

aware that there is a DNR policy established in their respective hospital (**Table 2**).

Only 14.8% (n=39) of all enrolled physicians have discussed a DNR with a patient or patient's relatives, and 19% (n=51) have participated in a DNR order. 83 (31.4%) of the physicians had an idea about "advance directive" or "living will," and 41% of them preferred that their patients have such documents. 48% of physicians stated that it is possible to undo the DNR order and 53.4% (n=141) felt that it is essential to review DNR order periodically. More than half of participating physicians wanted additional resources or training for DNR decision-making.

In addition, to answer the question about the authorized party for the DNR order, the physicians were allowed to choose more than one of six options (i.e., the patient, the patient's family, the treating physician, physician(s) selected by the patient or their family, hospital administration or other parties). There were 368 responses; 150 stated that the patient is authorized to take the DNR decision, followed by the treating physicians with 78 replies, and then the patient's family with 60 responses (**Figure 1**).

Table 3. Physicians' agreement on factors to consider in making DNR decision (n [%])

Decision factor	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Age	20 (7.6)	36 (13.6)	30 (11.4)	58 (22.0)	120 (45.5)
Patient's income	66 (25.0)	59 (22.3)	41 (15.5)	76 (28.8)	22 (8.3)
Patient's dignity	29 (11.2)	52 (20.2)	60 (23.3)	51(19.8)	72 (25.6)
Patient's quality of life	25 (9.5)	46 (17.6)	48 (18.3)	69 (26.3)	76 (28.2)
Emotional relative	44 (16.9)	70 (26.8)	101 (38.7)	28 (10.7)	21 (6.9)
Specialty of physician who order DNR	44 (16.7)	66 (25.0)	57 (21.6)	65 (24.6)	32 (12.1)
Length of hospital stay	43 (16.4)	74 (28.2)	55 (21.0)	53 (20.2)	39 (14.1)
Limited ICU space	42 (16.0)	59 (22.4)	53 (20.2)	71 (27.0)	39 (14.4)
Availability of advanced technology	53 (15.3)	107 (40.5)	57 (22.3)	39 (18.1)	8 (3.7)
Length of ICU stay	30 (11.4)	72 (27.4)	53 (20.2)	57 (21.7)	52 (19.4)
Type of hospital	35 (13.4)	70 (26.7)	81 (30.9)	48 (18.3)	30 (10.7)
Economic issues	28 (10.6)	58 (22.1)	53 (20.2)	89 (33.8)	36 (13.3)
Ethical issues	25 (9.5)	78 (29.7)	65 (24.7)	68 (25.9)	28 (10.3)
Legal concerns	26 (9.8)	37 (14.0)	79 (29.9)	76 (28.8)	46 (17.4)
Cultural differences	43 (16.5)	78 (29.9)	57 (21.8)	57 (21.8)	29 (10.0)
Religious concern	21 (8.0)	40 (15.2)	52 (19.8)	93 (35.4)	58 (21.7)

Table 4. Physicians' agreement on DNR order for patients with certain diagnoses (n [%])

Diagnosis	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Drug abuse for long period	56 (21.2)	103 (39.0)	47 (17.8)	38 (14.4)	20 (7.6)
Advanced Alzheimer's disease	47 (17.8)	90 (34.1)	43 (16.3)	64 (24.2)	20 (7.6)
Severe mental retardation	42 (16.0)	75 (28.5)	56 (21.3)	64 (24.3)	27 (10.2)
Brain death for any reason	3 (1.1)	14 (5.3)	36 (13.7)	89 (33.8)	122 (46.2)
Extensive brain damage for any reason	13 (4.9)	21 (8.0)	51 (19.5)	75 (28.6)	104 (39.4)
Alcoholism	60 (22.8)	124 (47.1)	37 (14.1)	31 (11.8)	12 (4.6)
Advanced incurable cancer	9 (3.4)	37 (14.1)	38 (14.4)	80 (30.4)	100 (37.9)
AIDS	37 (14.1)	115 (43.7)	62 (23.6)	35 (13.3)	15 (5.3)
Permanent suffering from unbearable pain	13 (4.9)	60 (22.8)	109 (41.4)	54 (20.5)	28 (10.3)
Permanent bedridden for any reason	17 (6.4)	115 (43.6)	54 (20.5)	57 (21.6)	21 (8.0)
Terminal heart failure	5 (1.9)	45 (17.0)	54 (20.5)	51 (19.3)	109 (41.3)
Terminal respiratory failure	5 (1.9)	42 (15.9)	58 (22.0)	59 (22.3)	100 (37.9)
Advanced liver failure	9 (3.4)	38 (14.4)	63 (23.9)	56 (21.2)	98 (37.1)
End stage renal disease	10 (3.8)	40 (15.2)	60 (22.7)	58 (22.0)	96 (36.4)
Multiple organ failure	3 (1.1)	27 (10.3)	49 (18.7)	79 (30.2)	106 (39.7)

Physicians' Agreement in Making DNR Decision

The physicians choose their level of acceptance on 16 factors to be considered in making the DNR decision using a 5-point Likert scale (**Table 3**). Among all the mentioned factors, age was the most agreed factor, with 178 (67.5%) of the physicians either agreeing or strongly agreeing. The second most agreed factor was the religious concern, with 151 (57.1%) agreements. Finally, the least agreed factor was the emotional relative, with 49 physicians (18.6%) agreeing.

Physicians' Agreement on Issuing DNR Order for Patients with Specific Diagnosis

Table 4 shows the physician's agreement on issuing the DNR order for patients with specific diagnoses. Of the 15 given diagnoses, more physicians (80%) agreed upon a DNR order for a patient with brain death for any reason, followed by a patient with multiple organ failure (70.3%). The least accepted diagnoses were alcoholism and AIDS, with 16.4% and 18.6%, respectively.

Physicians' Level of Acceptance on Various Interventions for ELMC

The physicians' level of acceptance of 16 interventions for ELMC is illustrated in **Table 5**. Of the given interventions, some physicians were uncertain about using antiarrhythmic drugs, performing dialysis and surgeries, and invasive procedures with neutral response rates of 52.7%, 45.8%, and 50.8%, respectively.

Table 5. Physicians' agreement on ELMC interventions (n [%])

Characteristics	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Physical examination	131 (49.8)	32 (12.2)	6 (2.3)	7 (2.7)	88 (33.1)
Clinical rounds	107 (40.5)	30 (11.4)	7 (2.7)	2 (0.8)	118 (44.7)
Chest compression	52 (19.8)	28 (10.7)	49 (18.7)	107 (40.8)	28 (9.9)
Intubation	76 (29.0)	43 (16.4)	49 (18.7)	58 (22.1)	38 (13.7)
Mechanical ventilation	71 (27.2)	46 (17.6)	51 (19.5)	57 (21.8)	39 (13.8)
Defibrillation/direct-current shock	51 (19.5)	25 (9.5)	47 (17.9)	115 (43.9)	26 (9.2)
Vasopressors	90 (34.2)	82 (31.2)	34 (12.9)	21 (8.0)	37 (13.7)
Antiarrhythmic drugs	51 (23.5)	139 (52.7)	30 (13.8)	19 (8.8)	25 (11.5)
Surgery	72 (33.2)	121 (45.8)	27 (12.4)	20 (9.2)	24 (11.1)
Invasive procedures	50 (23.0)	134 (50.8)	35 (16.1)	23 (10.6)	22 (10.1)
Intravascular fluid	136 (51.9)	31 (11.8)	18 (6.9)	7 (2.7)	72 (26.7)

Table 5 (continued). Physicians' agreement on ELMC interventions (n [%])

Characteristics	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Dialysis	72 (33.3)	121 (45.8)	18 (8.3)	21 (9.7)	32 (14.8)
Blood & blood product transfusion	127 (48.7)	69 (26.4)	12 (4.6)	3 (1.1)	53 (20.0)
Analgesia and pain management	138 (52.7)	28 (10.7)	16 (6.1)	3 (1.1)	79 (29.9)
Chemotherapy	62 (28.7)	85 (32.2)	70 (32.4)	13 (6.0)	34 (15.7)
Antibiotics	145 (55.1)	30 (11.4)	15 (5.7)	8 (3.0)	66 (25.0)

Table 6. Chi-square statistic showing association between demographic variables & physicians' response to various factors while making DNR decisions in Saudi Arabia (n [%])

Demographic variables		Physicians' response to various factors while making DNR decisions						
		Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Chi-square test	p-value
Gender	Male	3 (2.0)	23 (15.3)	83 (55.3)	38 (25.3)	3 (2.0)	3.64	0.456
	Female	3 (2.6)	25 (21.9)	61 (53.5)	21 (18.4)	4 (3.5)		
Age	20-40	3 (1.4)	24 (11.4)	124 (59.0)	54 (25.7)	5 (2.4)	52.91	0.000*
	41-60	3 (7.0)	15 (34.9)	18 (41.9)	5 (11.6)	2 (4.7)		
	61 & above	0 (0.0)	9 (81.8)	2 (18.2)	0 (0.0)	0 (0.0)		
Nationality	Saudi	3 (1.4)	22 (10.4)	133 (63)	49 (23.2)	4 (1.9)	54.62	0.000*
	Non-Saudi	3 (5.7)	26 (49.1)	11 (20.8)	10 (18.9)	3 (5.7)		
Religion	Non-Muslim	0 (0.0)	0 (0.0)	3 (60.0)	2 (40.0)	0 (0.0)	1.92	0.751
	Muslim	6 (2.3)	48(18.5)	141 (54.4)	57 (22.0)	7 (2.7)		
Clinical category	Interns	0 (0.0)	8 (6.9)	86 (74.1)	21 (18.1)	1 (0.9)	58.75	0.000*
	Residents	2(2.7)	13 (17.6)	34 (45.9)	22 (29.7)	3 (4.1)		
	Specialists	3 (2.2)	9 (40)	13 (24.4)	3 (28.9)	1 (4.4)		
	Consultants	6 (10.3)	48 (31)	144 (44.8)	59 (10.3)	7 (3.4)		
Familiarity with DNR concept	No	0 (0.0)	17 (43.6)	18 (46.2)	3 (7.7)	1 (2.6)	22.28	0.000*
	Yes	6 (2.7)	31 (13.8)	126 (56)	56 (24.6)	6 (2.7)		
Have you learned about DNR?	No	5 (6.2)	26 (32.1)	35 (43.2)	14 (17.3)	1 (1.2)	25.25	0.000*
	Yes	1 (0.5)	22 (12)	109 (59.6)	45 (24.6)	6 (3.3)		

Note. *Significant at 0.05 levels

Table 7. Chi-square statistic showing association between demographic variables & physicians' agreement on DNR order for patients with certain diagnoses (n [%])

Demographic variables		Physicians' agreement on DNR order for patients with certain diagnoses						
		Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Chi-square test	p-value
Gender	Male	3 (2.0)	23 (15.3)	83 (55.3)	38 (25.3)	3 (2.0)	4.70	0.320
	Female	1 (0.9)	20 (17.5)	48 (42.1)	44 (38.6)	1 (0.9)		
Age	20-40	1 (0.5)	14 (6.7)	78 (38.1)	113 (53.8)	4 (1.9)	89.31	0.000*
	41-60	0 (0.0)	18 (41.9)	22 (51.2)	2 (4.7)	1 (2.3)		
	61 & above	0 (0.0)	9 (81.8)	2 (18.2)	0 (0.0)	0 (0.0)		
Nationality	Saudi	0 (0.0)	17 (8.1)	86 (40.8)	106 (50.2)	2 (0.9)	58.73	0.000*
	Non-Saudi	1 (1.9)	24 (45.3)	16 (30.2)	9 (17.0)	3 (5.7)		
Religion	Non-Muslim	0 (0.0)	1 (20.0)	2 (40.0)	0 (0.0)	2 (40.0)	1.92	0.751
	Muslim	1 (0.4)	40 (15.4)	100 (38.6)	115 (44.4)	3 (1.2)		
Clinical category	Interns	1 (0.9)	4 (3.4)	27 (23.3)	82 (70.7)	2 (1.7)	108.43	0.000*
	Residents	0 (0.0)	5 (17.6)	45 (45.9)	22 (29.7)	2 (4.1)		
	Specialists	0 (0.0)	18 (40.0)	19 (42.2)	8 (17.8)	0 (0.0)		
	Consultants	0 (0.0)	14 (48.3)	11 (37.9)	3 (10.3)	1 (3.4)		
Familiarity with DNR concept	No	1 (2.6)	14 (35.9)	10 (25.6)	13 (33.3)	1 (2.6)	21.20	0.000*
	Yes	0 (0.0)	27 (12.0)	92 (40.9)	102 (45.3)	4 (1.8)		
Have you learned about DNR?	No	0 (0.0)	25 (30.9)	31 (38.3)	24 (29.6)	1 (1.2)	23.61	0.000*
	Yes	1 (0.5)	16 (8.7)	71 (38.8)	91 (49.7)	4 (2.2)		

Note. *Significant at 0.05 levels

Association Between the Participants' Demographics and Physicians' DNR Decisions, DNR Order, and Their Agreement on Different ELMC Interventions

Table 6 shows association between demographic variables and physicians' response to various factors while making DNR decisions in Saudi Arabia. **Table 7** shows association between demographic variables and physicians' agreement on DNR order for patients with certain diagnoses.

Table 8 shows the association between demographic variables and the Physicians' agreement on ELMC interventions. The findings imply there is a significant association ($p<0.05$) between all the factors and the demographic variables except gender ($p=0.456$ for DNR decision, $p=0.320$ for physician agreement on DNR order, and $p=0.247$ for the physicians' consensus on ELMC interventions) and religion ($p=0.751$ for DNR decision, $p=0.751$ for physician agreement on DNR order and $p=0.052$ for the physicians' agreement on ELMC interventions) where there is no significate association was observed. Further, there is no significate association among participating physicians concerning their familiarity with DNR concept ($p=0.070$).

Table 8. Chi-square statistic showing association between demographic variables & physicians' agreement on ELMC interventions (n [%])

Demographic variables		Physicians' agreement on ELMC interventions						
		Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Chi-square test	p-value
Gender	Male	0 (0.0)	2 (15.3)	89 (55.3)	51 (25.3)	8 (2.0)	4.14	0.247
	Female	0 (0.0)	6 (1.3)	60 (59.3)	40 (34.0)	8 (5.3)		
Age	20-40	0 (0.0)	2 (1.0)	135 (64.3)	63 (30.0)	10 (4.8)	49.88	0.000*
	41-60	0 (0.0)	6 (14)	13 (30.2)	18 (41.9)	6 (14.0)		
	61 & above	0 (0.0)	0 (0.0)	1 (9.1)	10 (90.9)	0 (0.0)		
Nationality	Saudi	0 (0.0)	4 (1.9)	135 (64)	58 (27.5)	14 (6.6)	30.49	0.000*
	Non-Saudi	0 (0.0)	4 (7.5)	14 (26.4)	33 (62.3)	2 (3.8)		
Religion	Non-Muslim	0 (0.0)	0 (0.0)	0 (0.0)	4 (80.0)	1 (20.0)	7.73	0.052
	Muslim	0 (0.0)	8 (3.1)	149 (57.5)	87 (33.6)	15 (5.8)		
Clinical category	Interns	0 (0.0)	1 (0.9)	94 (81)	19 (16.4)	2 (1.7)	64.39	0.000*
	Residents	0 (0.0)	1 (1.4)	34 (45.9)	33 (44.6)	6 (8.1)		
	Specialists	0 (0.0)	5 (11.1)	12 (26.7)	24 (53.3)	4 (8.9)		
	Consultants	0 (0.0)	1 (3.4)	9 (31.0)	15 (51.7)	4 (13.8)		
Familiarity with DNR concept	No	0 (0.0)	0 (0.0)	20 (51.3)	19 (48.7)	0 (0.0)	7.07	0.070
	Yes	0 (0.0)	8 (3.6)	129 (57.3)	72 (32.0)	16 (7.1)		
Have you learned about DNR?	No	0 (0.0)	1 (1.2)	31 (38.3)	46 (56.8)	3 (3.7)	26.04	0.000*
	Yes	0 (0.0)	7 (3.8)	118 (64.5)	45 (24.6)	13 (7.1)		

Note. *Significant at 0.05 levels

DISCUSSION

Building a well-organized and smooth process of ELMC is not easy for healthcare providers in the absence of evidence-based guidelines and lack of proper medical training related to ELMC and DNR approach during the internship, clerkship, and residency. Moreover, after over three decades of issuing the first regulation rule (Fatwa) of the DNR process in Saudi Arabia, a controversial debate about DNR decision-making and other aspects of ELMC is still ongoing. Therefore, the results of this study shed light on physicians' knowledge gaps and try to analyze their attitudes and practice regarding DNR order and ELMC aspects.

The study findings showed higher familiarity among physicians with the DNR concept than the findings of other studies conducted earlier in Saudi Arabia [12, 19], which indicates some improvement in medical teaching and learning in this regard. However, our results reveal a significant knowledge gap, where 72% thought that DNR practice is uncommon in Saudi Arabia; 38% stated that there is no "Fatwa" regarding DNR, which conformed to findings of previous studies [12, 20, 21]. Only 14.8% have discussed a DNR decision with a patient or patient family, and less than 20% have participated in a DNR order, which is far less than expected and found in other regional studies [20, 22, 23]. Around 39% of the physicians registered their opinion that they were not aware of the existence of a DNR policy in their institution, and such findings are contradictory to the one reported in [18], where 96.4% of the emergency and intensive care physicians agreed their awareness of a DNR policy. However, such disparity might be because DNR familiarity is affected by the training background and physician specialties [24, 25]. Reviewing the DNR orders periodically and possibly undoing them are important points in any ELMC policy. However, our findings reveal that around 50% of the participants stated that it is unimportant to review the DNR order periodically and that there is no need to undo it for any reason. Furthermore, 68.6% of physicians did not know about "advance directives" or "living will". This can be explained by the fact that issuing "advance directives" documents regarding ELMC is uncommon in Arab countries, and "living will" documents are not accepted under Islamic law [14]. On the other hand, 41% of the participating physicians ever had their patients have "advanced directive" or "living will". As indicated in other studies from Saudi Arabia [18, 22, 26], the majority of participating physicians are looking for additional learning materials and training related to DNR decision-making and ELMC as what is become standard practice to have a continuous professional development program for basic life support (BLS) is to have ELMC and DNR program. There is also a need for proper and new guidelines to deliver standardization of DNR practices and decision-making.

Among the interesting findings of this study was the physicians' perspective regarding the DNR order; 26% of the participating physicians were against the DNR order under any circumstances, and 29% found that DNR is equal to euthanasia. These findings are comparable with the results of a study targeting Muslim doctors, in which 66.8% of participants stated that the DNR order is allowed in Islam [27], in contrast with the findings in [18] noted that the DNR order is not against Islamic instructions according to 95.5% of the participating physicians. It was also observed that 83.8% of physicians in Saudi Arabia believed that DNR is permitted in Islam [20]. In fact, the physicians' perspectives were influenced by religious beliefs; however, the heterogeneity was also observed among the followers of the same religion and can be explained by the place of origin, education level, cultural background, and level of intrinsic religiosity [20, 28].

As illustrated in **Figure 1**, 40.7% of the physicians stated that the patient should be authorized to issue a DNR order, followed by the treating physician and the patient's family (21.2% and 16.3%, respectively). These findings surprisingly contrasted with other studies investigating physicians' perspectives regarding DNR in the Middle East and concluded that treating physicians should be the ultimate party in issuing DNR orders [19, 25, 29]. Nevertheless, the treating physician should play a critical role in the process of DNR decision-making; however, the patient or patient's surrogate should be involved in such processes. In this regard, this study is consistent with other conducted studies on the general population regarding the ELMC decision authorization [7, 12, 30]. According to previous studies from Saudi Arabia, the DNR

order is influenced mainly by religious and legal concerns, patient dignity, and cultural backgrounds [12, 18, 20, 25, 30, 31].

In our study, the physicians were asked to choose their level of agreement on 16 factors to be considered in DNR decision-making (**Table 3**). The most crucial factor was age, with 67.5% of the physicians either agreeing or strongly agreeing, followed by religious concerns, patient's quality of life, economic issues, legal concerns, and patient dignity (57.1%, 54.5%, 47.1%, 46.2%, and 45.4%, respectively). This finding is in line with previous studies regarding religious and legal concerns and patient's dignity as essential factors to be considered during the DNR decision process [21, 32]. However, other factors in this study become more critical compared with previous studies, the patient's age, economic issues, and quality of life. These may reflect the increasing number of elderlies among long-term hospitalized patients in our institution, as well as the increasing influence of economic issues on ELMC and better realization of the limitations of medical care provided to terminally ill patients. According to the present study, the other two rational factors were the length of ICU stay and limited ICU space, which may reflect the economic impact again on ELMC and the limited availability of health resources. With regard to the influence of physician specialty, 36.7% of the physicians stated that the physician specialty influenced DNR decision-making. This finding correlates with the results of other previous studies and indicates the influence of education, training background, and personal characteristics on the DNR order [33-35].

The cultural differences were documented as an important factor to consider in ELMC [18, 28, 36]. In this regard, three dimensions were identified: the communication ways to break bad news, the decision-making place, and attitudes toward ELMC [24]. However, less than a third of participating physicians (31.8%) stated that cultural differences as a factor to be considered in the ELMC process.

The heterogeneity of available DNR policies reflects, in part, the absence of clear DNR indications. This uncertainty is often related to the absence of a definitive diagnosis and unclear prognosis. As estimated in previous studies, the overall mortality following PCR is estimated to be 82.5%-84% [37, 38]. Around 50% of survivors suffer from significant neurological deficits depending on pre-CPR patient diagnoses that interplay as critical determinants of PCR outcome [39]. To identify certain diagnoses in which the DNR decision is likely based on a clear indication (or CPR most likely will be futile and inappropriate), this study reveals the physicians' agreement on DNR orders for patients with 15 categories of diagnoses frequently presented in the background scenarios of DNR issuing (**Table 4**). Of the 15 given diagnoses, physicians greatly agreed upon a DNR order for a patient with brain death for any reason (80%), followed by a patient with multiple organ failure, advanced incurable cancer, or extensive brain damage (70.3%, 68.3%, and 68.1%, respectively). Our findings are in consistent with previous studies, which have discussed a set of predictors to guide end-of-life decision making, including DNR order [20, 39].

DNR, by definition, is an order instructing the healthcare provider to withhold CPR measures in case of respiratory or cardiac arrest, i.e., patient nutrition, hydration, medications, and other necessary comfort measures should be continued. However, a previous study showed that DNR order in daily practice affects other components of ELMC [40]. It was concluded a decrease in vital sign measurements, test completion, documentation, and physicians' visits after issuing a DNR order [41]. Authors evaluate participating physicians' agreements on 16 ELMC interventions; some of them should be withheld according to DNR order (**Table 5**). Surprisingly, 29.7% of participants agreed upon chest compression, and 28.7% agreed upon defibrillation/direct-current shock. Furthermore, the level of agreement was higher regarding intubation, mechanical ventilation, and the use of vasopressors and antiarrhythmics drugs (42.7%, 41.0%, 47.9%, and 35%, respectively). This can be explained by the fact that 25% of participants oppose the DNR order under any circumstances. In addition, these findings indicate a degree of physicians' uncertainty and knowledge gaps regarding the DNR process. On the other hand, most physicians agreed that medical care for DNR patients should include continuation of periodic clinical rounds, physical examination, proper pain management, blood product transfusion, and infusion of necessary intravascular fluid.

Around 80% of participating physicians agreed to use antibiotics; however, it's well documented that giving antibiotics as part of ELMC may prolong the dying process without any beneficial outcome [42-44]. Moreover, in the era of emerging dangerous antimicrobial resistance, the prolonged courses of antibiotics to treat recurrent infections in this group of patients have undesirable ecological effects resulting in an increased rate of healthcare-associated infections caused by multidrug resistance pathogens among other patients.

This study also reveals that there is no association between gender concerning physicians' DNR decisions, their DNR orders for different categories of patients, and their agreement on various ELMC interventions where both male and female physicians reveal them differently and explore the reasons for such differences is beyond the scope of this study and further research is warranted. Furthermore, even though the physician's religion also fails to demonstrate an association, the findings could not be generalized due to the smaller sample size of non-Muslim physicians who participated in this study (n=5), and a future study with a larger sample is required. Further, the physician's familiarity with the DNR concept fails to show the association with the physicians' agreement on ELMC interventions. This might be because different categories of physicians, including residents and interns, participated in this study, and their familiarity might vary by their clinical exposure.

Thus, while comparing the observations of this study with the previously published literature on end-of-life care from the physicians' perspectives, some similarities and differences were observed. The observed similarities include:

(i) DNR practice is uncommon in Saudi Arabia, and there is no "Fatwa" regarding DNR [12]. Age, religious and legal concerns, and the patient's dignity must be considered during the DNR decision process [21, 32],

(ii) besides physicians, the patient and the patient's surrogate must be involved in such processes [7, 12, 22],

(iii) the physician's education, training background, and personal characteristics influence the DNR order [34]. Physicians always seek continuous development and training related to DNR decision-making and ELMC [18, 22], and

(iv) a set of predictors guides end-of-life decision-making, including DNR orders [20, 39]. It is mainly issued for patients with brain death, followed by a patient with multiple organ failure, advanced incurable cancer, or extensive brain damage [39].

On the other hand, the study's findings differ from earlier studies, including:

(i) Participating physicians showing higher familiarity with the DNR concept [12, 19]. However, physicians need more awareness about DNR policies in the respective hospitals [18],

(ii) a limited number of the participating physicians (14.8%) discussed a DNR decision with a patient or patient's family, as well as participated in a DNR order (20%) [22, 23], and

(iii) patients (40.7%) should be authorized to issue a DNR order, followed by the treating physician and the patient's family (21.2% and 16.3%, respectively), and it is contradictory to earlier studies which state that treating physicians is the ultimate party in issuing DNR orders [19, 25, 29].

Accordingly, this study adds to the existing literature by bringing out the physicians' knowledge, attitude, and practice regarding ELMC and DNR order and sheds light on the physician knowledge gaps of the DNR process at a university teaching hospital in eastern Saudi Arabia; however, as a survey-based study had inherited limitations such as the different understanding of survey questions, answers bias, and respondent's preference in a relatively young physician cohort. Therefore, further research should focus on a larger scale by covering different study settings within and outside Saudi Arabia.

CONCLUSION

This study brings out physicians' awareness and perspectives regarding DNR, where most physicians agreed that DNR practice is uncommon in Saudi Arabia. The findings shed light on those factors to consider while making a DNR decision and the physician's agreement on DNR orders for patients with specific diagnoses. Finally, this study also uncovers physicians' agreement on ELMC interventions. The presence of different DNR policies, lack of physicians' knowledge, and negative attitudes regarding DNR emphasize a need to update and unify the DNR policies at the national level. Through this study, the authors emphasize multiple aspects of managing ELMC.

- Updated rules are needed to consider the patient and patient family's right to be informed and actively involved during the decision-making process toward ELMC and CPR orders. In addition, the recently published National Policy and Procedure for DNR status in Saudi Arabia would play an important role in standardizing the practice or at least decreasing the variations at the national level.
- Including ELMC topics within the medical and nursing ethics courses curricula. Further emphasis should be given during internship and residents' training programs since it is one of the essential steps to improve the medical practice compared to BLS course that has become mandatory elsewhere for healthcare workers. Further, it should be adapted by the national and international health associations as pre-registration requirements, like BLS training.

Furthermore, more prospective randomized research is needed for an evidence-based approach and global standardization of ELMC to identify each intervention's benefits and harms, including the DNR order.

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