

Original Article

Withholding and Withdrawal of Life-Sustaining Treatments in critically ill ICU patients: A study on attitude of Physicians of Bangladesh

Mohammad Omar Faruq^{1*}, ARM Nooruzzaman², Rownak Jahan Tamanna³, Amina Sultana⁴, Uzzwal Kumar Mallick⁵, Mohammad Asaduzzaman⁶, Mohammad Motiul Islam⁷, Md. Sirajul Islam⁸, Rawshan Arra Khanam⁹, Samira Humaira Habib¹⁰, Ashiq Haider Choudhury¹¹.

Abstract:

Background : This study is a sub analysis of data submitted on behalf of Bangladesh in an International study (ACME 2012) involving physicians working in Asian ICUs.

Objective : To describe attitude of physicians of ICUs of Bangladesh toward withholding and withdrawal of life sustaining treatments in end of life care, to assess factors associated with these observations and to compare the findings especially with those of physicians of low – middle income Asian ICUs.

Method : Self-administered pre-set structured and scenario based survey conducted among 101 physicians working in 38 ICUs of Bangladesh.

Results : For patients with no real chance of recovering a meaningful life, 20 of 101 respondents reported that they almost always or often withheld life-sustaining treatments and 18 of 101 respondents almost always or often withdrew life-sustaining treatments. 44 respondents in our study reported that they almost always or often withheld life sustaining treatments whereas 10 respondents almost always or often withdrew life sustaining treatments. 72% of all our respondents would implement DNR orders. In Bangladesh, religion (Islam) does not influence decision of complying with DNR order requested by family. Our study showed 71% of physicians were more likely to “do everything” if a patient with hypoxic-ischaemic encephalopathy developed septic shock. In our study, physicians were more ready to withdraw vasopressors and hemo dialysis than enteral feeding and intravenous fluids. Physicians from Bangladesh generally perceived more legal risk with limitation of life sustaining treatments because of lack of legislation for such practices. When it comes to limit aggressive lifesaving treatments, Bangladeshi physicians were less likely accede to families request to withdraw them on financial ground.

Conclusion : Like physicians of low-middle income countries of Asia, Bangladeshi ICU physicians' self-reported practice of limiting life sustaining treatments, role of families and surrogates and perception of legal rights were significantly different than physicians of high income countries of Asia. However unlike physicians from other low income Asian countries, physicians from Bangladesh were less likely to accede to families request to withdraw life sustaining treatments on financial ground.

Key words : ICU physicians, life sustaining treatment, end of life care.

Introduction:

Attitudes of physicians working in Intensive Care Units (ICUs) in Bangladesh toward end of life care practices was studied as part of a multinational study involving Asian ICUs done in May -Dec 2012 by ACME (Asian Collaboration of Medical Ethics) group. The results of the Asian study¹ was published in 2015. The aim of that study was twofold. First : Many ethical questions on the use of life sustaining treatments for terminally ill patients in ICUs exist across the world^{2,3} but scenarios of Asian ICUs was never highlighted in a group. Second : It was deemed necessary to compare a multinational study to be done in Asia with the multinational studies done in Europe and North America^{4,5} on attitudes of physicians towards end of life.

Asia accounts for at least half of all critically ill patients and half of ICU deaths internationally⁶. Literature search mentions only a few national studies done on end of life care in ICUs in few countries like HongKong⁷, China⁸, Pakistan⁹, India¹⁰, Lebanon¹¹ etc. Such study was never done on physicians of Bangladesh prior to the ACME study.

Studies suggest that end of life care practices vary considerably and are influenced by many factors¹²⁻¹⁴. They include personal attitudes and religious affiliations of physicians¹⁵⁻¹⁷, the involvement of patients families¹⁸ and organizational characters of ICUs¹⁹, social culture²⁰, legislation²¹ and economic status²² were also found to be important factors.

The ACME study¹ described the current attitudes and reported practice of physicians who manage critically ill patients at the end of life with emphasis on the withholding and withdrawal of life sustaining treatments and to evaluate the factors associated with these attitudes. This study involved 16 countries and regions of Asia and in this study total 1465 physicians of 466 ICUs participated. Participation from Bangladesh included 101 physicians of 38 ICUs.

Our study is a domestic sub analysis of ACME study to assess current attitude and practice of physicians working in Bangladeshi ICUs with emphasis on withholding and withdrawal of life sustaining treatments and to evaluate the factors associated with these attitudes.

Methods :

This was a questionnaire survey of physicians who managed patients in ICUs of Bangladesh. Corresponding author of our study approached ICU directors or representatives in person or via e mail and in turn individual participating ICU physicians were contacted by them or at times individual participating ICU physicians were directly approached to participate.

We defined ICUs as adult units that were capable of providing invasive mechanical ventilation and considered by their hospitals to be ICUs. We included intensivists as well as non-intensivists who are primary consultant physicians of patients in ICUs. We defined an intensivist as a physician who has passed as critical care postgraduate examination or who has postgraduate qualification in other medical disciplines and treats patients with multi organ failure and is recognized by his or her institution as an intensivist.

The ACME study group developed a study questionnaire for survey which was filled by participating ICU physicians of Bangladesh and selective parts of the questionnaire with its responses were analyzed in our study. The survey initially included fields of responsible demographic characteristics, religion, specialty, ICU and hospital. Responses were ranked on a 5 point Likert scale where relevant.

The survey also included physician responses in withholding or withdrawing life support treatments including cardiopulmonary resuscitation as part of end of life care.

1. Professor of Critical care Medicine, Chief consultant, General ICU and Emergency dept., United Hospital Ltd, Dhaka 1212, Bangladesh.
2. Consultant ICU, Bangladesh specialized hospital, Dhaka1207, Bangladesh.
3. Consultant cardiologist and intensivist, Uttara Crescent Hospital, Dhaka 1230, Bangladesh.
4. Junior Consultant, GICU, United Hospital Ltd, Dhaka 1212, Bangladesh.
5. Registrar and In charge of ICU, National Institute of Neurosciences Hospital, Dhaka 1207.
6. Assistant Registrar, ICU, National Institute of Neurosciences Hospital, Dhaka 1207.
7. Associate consultant, Asgar Ali Hospital, Dhaka 1204, Bangladesh.
8. Assistant Professor, Dept. of Critical Care Medicine, National Institute of Neurosciences Hospital, Dhaka 1207.
9. Consultant, Dept. of Pulmonary medicine. United Hospital Ltd, Dhaka 1212, Bangladesh.
10. Principal Research Officer and Associate Professor, Health Economics Unit, Diabetic Association of Bangladesh, Dhaka 1000.
11. Research Assistant, GICU, United Hospital Ltd, Dhaka 1212, Bangladesh.

***Corresponding Author:**

Professor Mohammad Omar Faruq
Chief Consultant, General ICU and Emergency Department
United Hospital Ltd, Dhaka 1212, Bangladesh.
Email : faruqmo@yahoo.com

The perceived frequency of implementing such decisions, and factors relating to the provision of end-of-life care including attitudes to communication with patients, families and surrogates were explored. Other questions examined factors that respondents considered important for deciding on limitation of life-sustaining treatments, the presence of local policies on end-of-life care and perceptions of legal risk.

Three case scenarios were adapted. The first (case 1) aimed to understand practice and attitudes in situations when prognosis and quality of life are likely to be extremely poor¹. A second scenario (Case 2) aimed to understand the influence of families' or surrogates' views on perceived end-of-life practices and examined whether respondents modified their management on the basis of three hypothetical situations.¹ The third scenario (Case 3)²³ aimed at understanding attitude of Bangladeshi physicians when family or surrogate requests to withdraw life sustaining treatments on financial ground.

Statistical Analysis:

It was an observational study, analytical in nature. Through a preset self-administered questionnaire data were collected from the hospitals with ICUs from all over the country specially from capital city of Dhaka. Data was collected purposively as per availability of the response. Data from public and private, teaching and non-teaching hospital were compiled.

We expressed categorical variables as frequencies (percentage). To dichotomize answers from the Likert scale, we categorized “strongly agree”/ “agree” separately from “neither agree nor disagree”/ “disagree”/ “strongly disagree.” For statistical purpose we only chose “Strongly agree” and “Strongly disagree” as responses on treatments that can usually be withheld or withdrawn.

We aimed to identify factors independently associated with a response that suggested an inclination against limitation of life-sustaining treatments: specifically, non-implementation of DNR (Do Not Resuscitate) orders in case 1 and change in decision to full active support on the family's or surrogate's insistence in case 2 and physicians attitude towards families request to withdraw aggressive life sustaining treatments on financial grounds in case 3.

We chose independent variables for the models that were previously shown to affect end-of-life care: hospitals' and ICUs' characteristics including policies on end-of-life care¹⁹ and respondents' personal characteristics and attitudes²⁴⁻²⁹. These attitudes included factors that respondents deemed important when considering limitation of life-sustaining treatments^{26,27}, their perception of communication with patients and families or surrogates and legal risk^{2,21,30-31}.

Data were primarily analyzed by Statistical Package for the Social Sciences (SPSS) version 16 and basic percentage, number of respondents and Standard Error Mean (SEM) were evaluated. Case studies were described with the description of the findings and percentage distribution against various questions. Later the data were studied through Graph Pad Prism 6.0 for further analysis. We have evaluated the

interactions among the group by using one-way ANOVA. We considered a *P* value of < 0.01 as statistically significant and related to the 99% confidence level.

Results:

In total, 38 ICUs and 101 physicians participated in the study. All participating physicians happened to be Muslims. Omission of physicians of other religions in our study was un intentional and we did not find any interested physician of other religion to participate in the study.

Most of the respondent of the ICU are above age 50 years and were male predominant when they got admitted in the study. Primary Specialty of the consultants were mostly Internal Medicine 31 (30.7%), followed by Anesthesiology 26 (25.7%), Others 15 (14.9%), Neurology 8 (7.9%), Neurosurgery 5 (5.0%) and so on. 39 (38.6%) were providing intensive care for more than 10 years. 39 (38.6%) respondents worked in ICU with six or less beds. 51 (50.5%) respondents belonged to hospitals with less than 250 beds. 49 (48.5%) respondents came from non-teaching hospital (private funded). (Table 1)

Table 1:

Characteristics of respondents	
Age, year	No. (%)
<40	28 (27.7)
40-49	26 (25.7)
≥50	47 (46.5)
Sex	
Male	89 (88.1)
Female	12 (11.9)
Intensivist	
Yes	45 (44.6)
No	56 (55.4)
Primary specialty	
Anesthesiology	26 (25.7)
Chest physician/pulmonologist	4 (4.0)
Chest surgeon	1 (1.0)

General surgeon	1 (1.0)
Intensive/Critical care	10 (9.9)
Internal Medicine	31 (30.7)
Neurology	8 (7.9)
Neurosurgery	5 (5.0)
Others	15 (14.9)

Background in intensive care, year

≤ 4	39 (38.6)
5-10	28 (27.7)
≥ 10	34 (33.7)

(Size of ICU) No. of beds

≤ 6	39 (38.6)
7-12	36 (35.6)
13-18	17 (16.8)
> 18	9 (8.9)

(Size of hospital) No. of beds

<250	51 (50.5)
250-499	32 (31.7)
500-749	9 (8.9)
≥750	9 (8.9)

Type of hospital

Teaching hospital (public funded)	17 (16.8)
Teaching hospital (private funded)	31 (30.7)
Non-teaching hospital (public funded)	4 (4.0)
Non-teaching hospital (private funded)	49 (48.5)

The majority of respondents reported that life-sustaining treatments, including Cardiopulmonary resuscitation (CPR), Mechanical ventilation, Vasopressors/ inotropes, Hemodialysis, Tracheotomy and Endotracheal intubation, could usually be withheld or with drawn in end-of-life care, but not Enteral feeding, Total parenteral nutrition, Intravenous fluids, Broad spectrum antibiotics, Diuretics and Oral suctioning (Table 2).

Table 2: Treatments that can usually be withheld or withdrawn

Questions	Strongly agree (%)	Strongly Disagree (%)	SEM	Interactions	P-value
Enteral feeding	6 (5.9)	27 (26.7)	0.12153	0.9908	< 0.0001
Total Parenteral Nutrition	11 (10.9)	12 (11.9)	0.12626	0.9896	< 0.0001
Intravenous fluid therapy	2 (6.9)	15 (14.9)	0.11780	0.9926	< 0.0001
Broad spectrum antibiotics	11 (10.9)	13 (12.9)	0.12304	0.9726	< 0.0001
Diuretics	5 (5.0)	20 (19.8)	0.11375	0.9932	< 0.0001
Oral suctioning	7 (6.9)	22 (21.8)	0.12237	0.9891	< 0.0001

Endotracheal intubation	16 (15.8)	11(10.9)	0.12890	0.9774	< 0.0001
Tracheotomy	17 (16.8)	7 (6.9)	0.11963	0.9852	< 0.0001
Hemodialysis	16 (15.8)	8 (7.9)	0.12112	0.9923	< 0.0001
Vasopressors/inotropes	7 (6.9)	6 (5.9)	0.11124	0.9933	< 0.0001
Mechanical ventilation	18 (17.8)	6 (5.9)	0.12339	0.9848	< 0.0001
Cardiopulmonary resuscitation	32 (31.7)	8 (7.9)	0.13007	0.9881	< 0.0001

Case 1 (**TABLE 3**) describes the scenario of a 55-year old woman severe hypoxic-ischaemic encephalopathy after cardiac arrest. The commonest responses were to decide on treatment after a reaching a consensus with other physicians, to implement DNR orders, to keep the patient in the ICU (with or without tracheostomy) and start further interventions if a complication occurs even when stable, and to maintain mechanical ventilation and start antibiotics and vasopressors if the patient developed pneumonia and septic shock.

Table 3: Case Studies

Case 1 Scenario	Respondents, Overall %
-----------------	------------------------

A 55-y-old woman was resuscitated from a cardiac arrest due to ischemic cardiac disease and admitted to the intensive care unit (ICU) with severe post anoxic lesions. Twenty-four hours later, she has decerebrate movements and the evoked potentials are absent. The consensus (including the senior neurologist) is that her best possible outcome is a persistent vegetative state. She has no close relative or advance directive.

Question 1. Which process do you follow to decide on the treatment for this patient in the ICU?

(A) Decide by yourself	9 (8.9)
(B) Decide after a consensus is reached with other physicians	75 (74.3)
(C) Decide after discussions involving other physicians and nurses	11 (10.9)
(D) Refer to the ethical committee in your hospital	3 (3.0)
(E) Refer to court	3 (3.0)

Question 2. Is this process likely to result in do-not-resuscitate (DNR) orders being applied in the event of recurrent cardiac arrest?

(A) No	29 (28.7)
(B) Yes, verbal DNR orders	34 (33.7)
(C) Yes, written DNR orders	38 (37.6)

Question 3. The patient remains absolutely stable for 5 d and, although still receiving mechanical ventilation, can breathe spontaneously. What would be the usual strategy in your institution?

(A) Keep the patient in the ICU (with or without tracheostomy) and start further interventions if a complication occurs	40 (39.6)
(B) Keep the patient in the ICU (with or without tracheostomy)—“wait and see”—but withhold therapy if a complication occurs	18 (17.8)
(C) Keep the patient in the ICU and start increasing doses of morphine or sedatives with the intent to decrease ventilatory conditions (“terminal weaning”)	1 (1.0)
(D) Perform a tracheostomy and transfer the patient to the general ward for continued care	26 (25.7)
(E) Extubate her and transfer the patient to the general ward for continued nursing care	16(15.8)

Question 4. While the possible options are being considered, let us imagine that the patient rapidly develops fever and septic shock, presumably due to lung infection. What would likely be done in your institution?

(A) Maintain mechanical ventilation and start antibiotics and vasopressors	71 (70.3)
(B) Maintain mechanical ventilation and start antibiotics but no vasopressor	20 (19.8)
(C) Maintain only mechanical ventilation	8 (7.9)
(D) Give Morphine and reduce ventilator conditions (“terminal weaning”)	1 (1.0)
(E) Extubate and support nursing care (“terminal weaning”)	1 (1.0)

Case 2 (**Table 4**) describes a 50-year-old man with irreversible and likely terminal disease, with the respondent faced by 3 hypothetical surrogate situations. Where no family or surrogate or advance directives exist, 32.7% of respondents would continue full life-sustaining treatments including CPR, but if a family or surrogate insisted on withdrawal of therapy, this proportion decreased to 8.9%. If the family or surrogate insisted on the most active treatment, it increased to 59.4%. Respondents who did not agree that the expected long-term quality of life was a factor to consider for limitation of life-sustaining treatments, who were uncomfortable discussing limiting life-sustaining therapy with families or surrogates, and who perceived greater exposure to legal risk with DNR orders were most likely to change their decision.

Table 4: Case Studies

Case 2 Scenario	Respondents, Overall %		
	No Family or Surrogate or Advance Directive	Family or Surrogate Insists on Withdrawal of Therapy	Family or Surrogate Insists on the Most Active Treatment
A 50-y-old patient suffering from chronic obstructive pulmonary disease for many years has been admitted repeatedly due to respiratory failure, and has required prolonged ventilatory support. This time he is suffering from respiratory failure again, together with prolonged cardiac arrest. After 72 h, he is still deeply comatose and requires ventilatory support.			
Continue full active support treatment including CPR	33 (32.7)	9 (8.9)	60 (59.4)
Continue the most active support treatments except CPR	40(39.6)	23 (22.8)	24 (23.8)
Continue current treatment but no complicated treatments (eg, hemodialysis, surgical intervention)	23 (22.8)	25 (24.8)	13 (12.9)
Continue current treatment but no additional treatments (eg, antibiotics for sepsis)	2 (2.0)	9 (8.9)	1 (1.0)
Stop mechanical ventilation (allow the patient to die)	1 (1.0)	10 (9.9)	1 (1.0)
Stop all treatment (intravenous infusion, nasogastric feeding) except mechanical ventilation	2 (2.0)	15 (14.9)	0 (0.0)
Obtain ethics consultation	0 (0.0)	10 (9.9)	2 (2.0)

Table 5 : Case 3

A 64 year old female patient with severe pneumonia was admitted to your ICU 3 days ago and is receiving mechanical ventilation, intravenous vasopressor infusion and antibiotics in your ICU. She has coagulopathy and mild renal dysfunction, not requiring dialysis. Other organ function is within normal limits. Her neutrophil count remains high, but the temperature is decreasing. You advise the family that the patient has a reasonably good chance of recovery. The family repeatedly and forcefully express that they are concerned about the increasing cost (financial burden) of the patient ‘s stay in ICU. They insist on immediate withdrawal of life-support treatment to avoid further medical bills. Do you withdraw or withhold life support therapy ?

Almost Always	10 (9.9)
Often	22 (21.8)
Sometimes	27 (26.7)
Seldom	8 (7.9)
Almost Never	34 (33.7)

Case 3 (Table 5) shows that Bangladeshi physicians are less inclined to limit aggressive life sustaining treatments on financial ground and usually in some form or other (56%) accede to requests by families to withdraw such treatments and 34% never accede to such request.

Discussion:

It is important to understand the variability in physicians’ practice of withholding and withdrawal of life sustaining treatments because it affects how patients lose their lives¹⁴.

Phua et al¹ reported that for patients with no real chance of recovering meaningful life, 70.2% Asian respondents from

ACME study claimed that they almost always or often withheld life sustaining treatments, 20.7% almost always or often withdrew life sustaining treatments. Whereas respondents from Bangladesh had 44% and 10.1% responses under similar scenario responses respectively¹.

In a hypothetical setting of hypoxic-ischaemic encephalopathy, 72% of all respondents would implement DNR orders (Table 3). All our respondents were Muslims (although 10% population of Bangladesh are Hindus, Buddhists and Christians) and religion of our respondent doctors did not seem to affect implementation of DNR orders. According to ACME study¹, Asian respondents were less likely (82%) to implement DNR orders than physicians from North America, Australia and Europe (all>90%).

Our study participants were more likely (71%) to “do everything” if a patient with hypoxic-ischaemic encephalopathy developed septic shock (Table 3) than those in the United States (<40%), Southern Europe (<30%), Canada (<20%), and Australia and Northern and Central Europe (< 10%).⁵ and ACME study participants (53.8%)¹.

Our study participants like most physicians participating in ACME study were more ready to withdraw vasopressors and hemodialysis than enteral feeding and intravenous fluids (Table 2). Although American guidelines recommend reviewing the role of artificial nutrition for the dying,² Islam views nutritional support as basic care and not medical treatment.³² Obviously this view point was reflected in the response of study participants in our study as the participants were all Muslims.

According to Phua et al²³ physicians from low –middle income countries and regions were generally less likely to limit CPR, mechanical ventilation, vasopressors and inotropes, tracheostomy and hemodialysis—all of which are typically

seen as fairly aggressive artificial life support—than physicians from high income countries and regions (even though they were more likely to limit more routine treatments like enteral nutrition, intravenous fluid therapy and oral suctioning). Finding from our study even when considered separately from other low-middle income countries of ACME study are similar in these respects (Table 2). There are some possible explanations for these observations. Firstly, physicians from high-income countries in Asia from the ACME study are more exposed to practice of palliative care with intensive care and this has resulted in more limitation of life sustaining treatments for terminally ill³³. In contrast palliative care is significantly under developed in low income countries and regions³⁴. This observation is equally true for Bangladesh. Secondly physicians from low-middle-income countries like Bangladesh generally perceived more legal risk with limitation of life sustaining treatments because of lack of legislation for such practices. On the other hand high-income countries in the ACME study¹ do have laws or published professional guidelines which support limitation of life sustaining treatments for the terminally ill.

Bangladeshi physicians like those of low –middle –income countries²³ and regions are less inclined to limit aggressive lifesaving treatments and were also less likely to accede to families request to withdraw them on financial ground (Case 3 Table 5) in contrast to other low- income Asian countries of ACME study. However if family or surrogate gives written request to limit life support particularly Intubation, the patient is discharged to the custody of family so that hospital does not have to bear the responsibility of death resulting from discontinuation of intubation. Variations across Asian countries is extreme, with majority of Chinese physicians reporting that they would almost always or often withhold or withdraw these treatments on financial grounds²³

In conclusion, Bangladeshi physicians were more likely to limit Life sustaining treatment compared to Asian physicians in general in patients with no real chance of recovering meaningful life. In Bangladesh religion (Islam) does not influence decision of complying with DNR order requested by family. Attitude of Bangladesh physicians working in ICUs are fairly similar to those of Low –Middle income countries of Asia. Palliative care in ICU is poorly practiced in Bangladesh and this is partly responsible for lesser tendency of limitation of life sustaining treatment by physicians here. Absence of legislation on legality of withdrawing or withholding life sustaining measures is another reason for such trend by Bangladeshi physicians. Lastly our study shows that Bangladeshi physicians will do almost everything for critically ill patients, more than their Asian, North American and European counterparts.

Acknowledgements:

We acknowledge with thanks primary Asian study authors for allowing us to sub analyze the data of participating physicians of Bangladesh, submitted on self-administered questionnaire designed by ACME study authors and Asian Critical Care and Clinical Trials Group (ACCTG).

Our study was self-funded and there was no conflict of interest.

References :

- 1) Phua J, Joynt GM, Nishimura M, Deng Y, Myatra SN, Chan YH et al. for ACME study investigators and Asian Critical Care Clinical Trials Group. Withdrawing and withdrawal of life-sustaining Treatments in Intensive care Units in Asia. *JAMA Int. Med.* 2015; 175(3):363-71.
- 2) Truog RD, Campbell ML, Curtis JR. American Academy of Critical Care Medicine. Recommendations for end-of-life care in the intensive care unit: a consensus statement by the American College of Critical Care Medicine [published correction appears in *Crit Care Med.* 2008; 36 (5): 1699]. *Crit Care Med.* 2008; 36 (3): 953-63.
- 3) Sprung CL, Truog RD, Curtis JR. Seeking worldwide professional consensus on the principles of end-of-life care for the critically ill: the Consensus for Worldwide End-of-Life Practice for Patients in Intensive Care Units (WELPICUS) Study. *Am J Respir Crit Care Med.* 2014; 190 (8): 855-66.
- 4) Vincent JL. European attitudes towards ethical problems in intensive care medicine: results of an ethical questionnaire. *Intensive Care Med.* 1990; 16 (4): 256-64.
- 5) Cook D, Ricker G, Marshall J. Level of Care Study Investigators and the Canadian Critical Care Trials Group. Withdrawal of mechanical ventilation in anticipation of death in the intensive care unit. *N Engl J Med* 2003;349(12):1123-32.
- 6) Adhikari NK, Fowler RA, Bhagwanjee S, Rubinfeld GD. Critical care and the global burden of critical illness in adults. *Lancet.* 2010; 376 (9749): 1339-46.
- 7) Yap HY, Joynt GM, Gomersall CD. Ethical attitudes of intensive care physicians in Hong Kong: questionnaire survey. *Hong Kong Med J.* 2004; 10 (4): 244-50.
- 8) Weng L, Joynt GM, Lee A, Du B, Leung P, Peng J et al. Chinese Critical Care Ethics Group. Attitudes towards ethical problems in critical care medicine: the Chinese perspective. *Intensive Care Med.* 2011; 37 (4): 655-64.
- 9) Salauddeen N, Shafiqat S, Mapara S, Khan S, Siddiqui S, Manasia R et al. End of life in the intensive care unit :Knowledge of practice of clinicians from Karachi, Pakistan. *Intern Med J.* 2008; 38(5):307-313.
- 10) Mani RK, Mandal AK, Bal S, Javeri Y, Kumar R, Nama DK et al. End-of-life decisions in an Indian intensive care unit. *Intensive Care Med.* 2009; 35 (10): 1713-9.
- 11) Yazigi A, Riachi M, Dabbar G. Withholding and withdrawal of life-sustaining treatment in a Lebanese intensive care unit: a prospective observational study. *Intensive Care Med.* 2005; 31 (4): 562-7.
- 12) Yaguchi A, Truog RD, Curtis JR, Luce JM, Levy MM, Mélot C et al. International differences in end-of-life attitudes in the intensive care unit: results of a survey. *Arch Intern Med.* 2005; 165 (17): 1970-1975
- 13) Vincent JL. Forgoing life support in western European intensive care units: the results of an ethical questionnaire. *Crit Care Med.* 1999;27(8): 1626-33.
- 14) Frost DW, Cook DJ, Heyland DK, Fowler RA. Patient and healthcare professional factors influencing end-of-life decision-making during critical illness: a systematic review. *Crit Care Med.* 2011; 39 (5): 1174-89.
- 15) Wilkinson DJ, Truog RD. The luck of the draw: physician-related variability in end-of-life decision-making in intensive care. *Intensive Care Med.* 2013; 39 (6): 1128-32.

- 16) Sprung CL, Maia P, Bulow HH, Ricou B, Armaganidis A, Baras M et al; Ethicus Study Group. The importance of religious affiliation and culture on end-of-life decisions in European intensive care units. *Intensive Care Med.* 2007; 33 (10): 1732-1739.
- 17) Huynh TN, Kleerup EC, Wiley JF, Savitsky TD, Guse D, Garber BJ et al. The frequency and cost of treatment perceived to be futile in critical care. *JAMA Intern Med.* 2013; 173 (20): 1887-1894.
- 18) Carlet J, Thijs LG, Antonelli M, Cassell J, Cox P, Hill N et al. Challenges in end-of-life care in the ICU—Statement of the 5th International Consensus Conference in Critical Care: Brussels, Belgium, April 2003. *Intensive Care Med.* 2004; 30 (5): 770-784.
- 19) Azoulay E, Metnitz B, Sprung CL, Timsit JF, Lemaire F, Bauer P et al; SAPS 3 Investigators. End-of-life practices in 282 intensive care units: data from the SAPS 3 database. *Intensive Care Med.* 2009; 35 (4): 623-630.
- 20) Crawley LM, Marshall PA, Lo B, Koenig BA; End-of-Life Care Consensus Panel. Strategies for culturally effective end-of-life care. *Ann Intern Med.* 2002; 136 (9): 673-679.
- 21) Luce JM, White DB. A history of ethics and law in the intensive care unit. *Crit Care Clin.* 2009; 25 (1): 221-237.
- 22) Luce JM, White DB. The pressure to withhold or withdraw life-sustaining therapy from critically ill patients in the United States. *Am J Respir Crit Care Med.* 2007; 175 (11): 1104-1108.
- 23) Phua J, Joynt GM, Nishimura M, Deng Y, Myatra SN, Chan YH et al. Withholding and withdrawal of life sustaining treatments in low-middle-income versus high-income Asian countries and regions. *Intensive Care Med.* 2016. 42(7):1118-27
- 24) Vincent JL. Forgoing life support in western European intensive care units: the results of an ethical questionnaire. *Crit Care Med.* 1999; 27 (8): 1626-1633.
- 25) Sprung CL, Cohen SL, Sjøkvist P, Baras M, Bulow HH, Hovilehto S et al; Ethicus Study Group. End-of-life practices in European intensive care units: the Ethicus Study. *JAMA.* 2003; 290 (6): 790-797.
- 26) Wilkinson DJ, Truog RD. The luck of the draw: physician-related variability in end-of-life decision-making in intensive care. *Intensive Care Med.* 2013; 39 (6): 1128-1132.
- 27) Cook DJ, Guyatt GH, Jaeschke R, Reeve J, Spanier A, King D et al. Canadian Critical Care Trials Group. Determinants in Canadian health care workers of the decision to withdraw life support from the critically ill. *JAMA.* 1995; 273 (9): 703-708.
- 28) Christakis NA, Asch DA. Physician characteristics associated with decisions to withdraw life support. *Am J Public Health.* 1995; 85 (3): 367-372.
- 29) Bülow HH, Sprung CL, Reinhart K, Prayag S, Du B, Armaganidis A et al. The world's major religions' points of view on end-of-life decisions in the intensive care unit. *Intensive Care Med.* 2008; 34 (3): 423-430
- 30) Pope TM, Hexum M. Legal briefing: POLST: physician orders for life-sustaining treatment. *J Clin Ethics.* 2012; 23 (4): 353-376.
- 31) Curtis JR, Patrick DL, Shannon SE, Treece PD, Engelberg RA, Rubenfeld GD. The family conference as a focus to improve communication about end-of-life care in the intensive care unit: opportunities for improvement. *Crit Care Med.* 2001; 29 (2): 26-33.
- 32) Alsolamy S. Islamic views on artificial nutrition and hydration in terminally ill patients. *Bioethics.* 2014; 28 (2): 96-99.
- 33) Aslakson RA, Curtis JR, Nelson JE. The changing role of palliative care in the ICU. *Crit Care Med.* 2014; 42(11) : 2418-2428.
- 34) Dünser MW, Baelani I, Ganbold L.A review and analysis of intensive care medicine in least developed countries. *Crit Care Med.* 2006; 34(4): 1234-1242.