

The Practice of Foregoing Life Support in the Critically Ill “Old Old”: A Singapore Perspective

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Abstract

Objective: To study the practice of foregoing life support (FLS) therapy between the young old and the old old. **Patients and Methods:** This is a retrospective case-control study of case records for FLS events and illness characteristics among young old patients (55 to 74 years) and old old patients (75 years and older) admitted in 1998 to the medical intensive care unit (MICU). **Results:** Fifty-seven out of 282 patients (20.2%) had FLS orders. There was no statistical difference in the use of FLS orders between the young old and the old old (17.1% versus 27.0%, $P = 0.06$), although there was a trend towards more frequent use in the old old. APACHE II(M) score (APACHE II score calculated without inclusion of points for age) and a high risk admitting diagnosis correctly predicted 80.5% of FLS events. A higher frequency of relatives of old old patients (20.8%) initiated FLS discussions compared to the young old (6%). In both groups, the child was the main surrogate decision-maker ($n = 38$, 66.7%). Medical futility/poor prognosis was the most common reason for FLS, accounting for 86.9% of patients. Withdrawing or withholding of mechanical ventilation was the most common mechanism (66.7%) of FLS. The majority (61.4%) died in the MICU after FLS. Of the 57 patients who had FLS orders, 1 young old and 3 old old survived till hospital discharge. **Conclusion:** Illness severity, as reflected by the APACHE II(M) score and the presence of a high-risk diagnosis, rather than age, predicted FLS orders.

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Key words: Elderly, Ethics, Intensive care unit

Introduction

Studies on the foregoing of life support (FLS) in North America, Europe and Australia have shown diversity in terms of the incidence, decision-making process and outcome.¹⁻¹⁰ However, they have not specifically looked into such practice in the elderly. The “old old” (more than 75 years)¹¹ segment of the elderly population is the fastest growing.¹² Age has not been shown to be an acceptable prognostic factor for mortality,¹³ but some authors have suggested an age-determined rationing of intensive care.^{14,15} Intensity of care for a similar severity of illness has been shown to be less in the elderly in some centres.^{16,17} Sprung et al¹⁸ have recently shown that age was a factor determining refusal for intensive care admission. These facts make one wonder if FLS is also occurring disproportionately in the elderly. Therefore, to study whether there is such a bias, we compared the practice of FLS in our MICU between the young old and the old old.

Patients and Methods

This is a retrospective case notes review of patients from

the 8-bedded medical intensive care unit (MICU) of Tan Tock Seng Hospital. Tan Tock Seng Hospital is an acute, general, university-affiliated hospital with a total bed complement of 1100. The MICU serves 7 medical departments: general medicine (with specialities in endocrinology and gastroenterology), respiratory medicine, rheumatology and immunology, geriatric medicine, infectious diseases, rehabilitation medicine and psychological medicine.

Study Subjects

The case notes of all patients aged 55 and above admitted to the MICU in the year 1998 were reviewed. Patients were divided into two strata: the young old (55 to 74 years old) and the old old (75 years and older). Patients were followed up till death or discharge from hospital. The case records of survivors were again analysed 12 months after discharge. Age 75 was used for stratification as it approximates the life expectancy in Singapore.¹² Some studies have also shown increased mortality in the old old age group.^{17,19} Patients more than 55 years were studied

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as they have a more homogeneous educational and cultural background.¹²

Definitions

Foregoing life support included both withdrawal and withholding of therapy. Withdrawal of therapy was defined as withdrawal or discontinuation of life-support therapy including intermittent therapy such as haemodialysis. Withholding of therapy was when a medical intervention, including cardiopulmonary resuscitation, was not initiated or when an existing therapy was not escalated (for example, increasing the inotrope infusion rate).¹⁰

Data Collection

Information regarding demographic features, illness characteristics and the pattern of FLS were obtained from the case notes by the first author.

The APACHE II score was used for prognostication in this study. A modified APACHE II score [APACHE II(M)] was calculated without inclusion of points for age. Wu et al²⁰ found that after using this to control for disease severity, age was not an independent prognostic factor. Admitting diagnoses were further classified into high-risk and low-risk diagnoses based on the coefficient to predict mortality in the APACHE II system.²⁰⁻²² The coefficients have both positive and negative values. High-risk diagnoses were where the coefficient was more than 0 and included cardiac arrest, septic shock, hypovolaemic shock and respiratory failure from pneumonia. Low-risk diagnoses were those with negative coefficients and included cardiac shock, acute pulmonary oedema and respiratory failure from chronic obstructive lung disease.

A decision for FLS was either initiated by the MICU consultant or the relatives. An FLS event was said to have

occurred when there was consensus between the MICU team and the relatives, followed by execution of the order. The mechanism of FLS and outcomes were obtained from the documentation in the case notes.

Statistical Analysis

Results were considered statistically significant when $P < 0.05$. The differences in the means of the APACHE II score, the APACHE II(M) score, the predicted mortality, the lengths of MICU and hospital stay between the young old and the old old were analysed using the Mann-Whitney U test. The difference in the frequency of reasons for FLS, conditions associated with FLS, mechanisms of FLS and modality of life support foregone in the young old and old old was analysed using the chi-square test. In addition, a logistic regression model was used to determine the contribution of age, APACHE II(M) score and high risk diagnosis in predicting an FLS event. Analysis was made using SPSS version 9.0 program.

Results

Patients

There were 479 patients admitted to the MICU in 1998. Of these, 203 (42.4%) were between 55 and 74 years (young old) and 90 (18.8%) were more than 75 years of age (old old). Records of 193 young old patients and 89 old old patients were available for analysis. The mean age of the study population was 70.9 ± 9.2 years. Fifty-seven (20.2%) patients in our study had FLS orders with a trend towards more frequent FLS orders in the old old when compared to the young old (27.0% versus 17.1%, $P = 0.06$).

Illness Characteristics and Diagnostic Categories

Table I shows the admitting diagnoses to the MICU. The

TABLE I: ADMITTING DIAGNOSES FOR PATIENTS WITH FOREGOING LIFE SUPPORT (FLS) PERFORMED

Admitting diagnosis	Patients who had FLS		Patients who did not have FLS	
	Young old n (%)	Old old n (%)	Young old n (%)	Old old n (%)
Pneumonia	8 (24.2%)	4 (16.7%)	16 (10%)	13 (20%)
Post-cardiac arrest	4 (12.1%)	6 (25%)	11 (6.9%)	5 (7.7%)
Chronic obstructive airway disease	2 (6.1%)	6 (25%)	24 (15%)	20 (30.8%)
Post respiratory arrest	4 (12.1%)	2 (8.3%)	3 (1.9%)	3 (4.6%)
Septic shock	3 (9.1%)	0	23 (14.4%)	5 (7.7%)
Hypovolaemic shock	1 (3.0%)	2 (8.3%)	2 (1.3%)	3 (4.6%)
Acute pulmonary oedema	0	1 (4.2%)	16 (10%)	6 (9.2%)
Asthma	0	0	12 (7.5%)	0
Drug overdose	0	0	7 (4.4%)	2 (3.1%)
Cardiogenic shock	1 (3.0%)	1 (4.2%)	7 (4.4%)	0
Chronic renal failure	0	0	4 (2.5%)	0
Massive haemoptysis	0	0	6 (3.8%)	0
Others	13 (39.4%)	2 (8.3%)	29 (18.1%)	8 (12.3%)
Total	33 (100%)	24 (100%)	160 (100%)	65 (100%)

TABLE II: ILLNESS CHARACTERISTICS OF PATIENTS WHO HAD FOREGOING LIFE SUPPORT ORDERS

	Young old n = 33	Old old n = 24	P value
Age (years)	66.9 ± 5.2	82.9 ± 4.2	<0.005
Median APACHE II(M) score	17	20	0.80
Median APACHE II score	22	26	0.41
Predicted mortality (%)	56.7 ± 24.8	61.2 ± 28.4	0.50
Length of MICU stay (days)	7.1 ± 8.4	5.3 ± 4.5	0.58
Length of hospital stay (days)	11.2 ± 11.1	12.7 ± 15.8	0.97
High:low risk diagnosis	1.75:1	1.4:1	0.79

MICU: medical intensive care unit

old old had a higher though statistically non-significant APACHE II(M) score, APACHE II score and predicted mortality (Table II). A logistic regression model using age, APACHE II(M) score and the presence of high risk diagnosis showed that APACHE II(M) score [odds ratio (OR) = 1.04 per point increase in the score, $P = 0.008$] and a high-risk diagnosis (OR = 1.96, $P = 0.03$) correctly predicted 80.5% of FLS events ($P < 0.005$). The age group (OR = 1.74, $P = 0.08$) did not significantly predict this, although there was a trend towards it.

Mechanisms of FLS

The attending MICU consultant initiated discussions regarding FLS 87.7% (50/57) of the time. The family initiated discussions 12.3% of the time: this occurred in 6% (2/33) and 20.8% (5/24) of young old patients and old old patients respectively ($P = 0.099$). The reasons and the conditions for initiation of FLS discussions are shown in Table III. Three (12.1%) young old patients had intact decision-making capacity (DMC), and made their own decisions regarding FLS. Only 1 (4.1%) old old patient was cognitively intact. He left the decision to his son. The main surrogate decision-makers were the adult child in 57.6% of the young old and 79.2% of the old old, and the spouse in 15.2% of the young old and 8.3% of the old old. The parent was the decision-maker in 1 young old patient. For patients without relatives and without intact DMC ($n = 8$), the MICU consultant acted as their moral advocate and withdrew on medical grounds. Of these 8, only 1 patient survived. FLS was carried out when there was consensus between patients/relatives and the MICU team. When there was disagreement, FLS was not carried out. Foregoing mechanical ventilation was the most common mechanism of FLS (Table III). No patient had enteral fluids or nutrition foregone. Of those who had ventilation foregone, 42.1% ($n = 16$) died in the general ward, 47.4% ($n = 18$) died in the MICU and 10.5% ($n = 4$) survived. This is in contrast to all other mechanisms where 10.5% ($n = 2$) died in the general ward and 89.5% ($n = 17$) died in the MICU. This difference was statistically significant ($P = 0.008$).

Timing of Various FLS Events and Outcome

The timing for the various FLS events is shown in Table IV. The outcomes of the two age groups are summarised in Table V. The difference in survival between the young old and the old old group was not significant ($P = 0.3$). Of these 4 survivors, one was vegetative on discharge. Another had severe dementia and was bed-bound and non-responsive 8 months after MICU discharge. One died a month later. The last patient was room bound from severe angina 1 year after discharge from the MICU.

TABLE III: REASONS FOR, CONDITIONS ASSOCIATED WITH, AND MECHANISMS OF FOREGOING LIFE SUPPORT (FLS)

	Young old n = 33	Old old n = 24
Reasons for FLS		
Medical futility/poor prognosis	27 (81.8%)	22 (91.6%)
Extreme suffering	1 (3.0%)	1 (4.2%)
Brain death	5 (15.2%)	1 (4.2%)
Conditions associated with FLS		
Terminal metastatic malignancies	5 (15.2%)	1 (4.2%)
Septicaemia with multiorgan failure	4 (12.1%)	3 (12.5%)
Severe cerebrovascular disease and hypoxic encephalopathy	6 (18.2%)	8 (33.3%)
Severe cardiorespiratory failure	14 (42.4%)	10 (41.7%)
Disorders unresponsive to therapy	3 (9.1%)	2 (8.3%)
Severe dementia	1 (3.0%)	0
Mechanism of FLS		
Withdrawing	10 (30.3%)	11 (45.8%)
Withholding	16 (48.5%)	11 (45.8%)
Both withdrawing and withholding	1 (3.0%)	1 (4.2%)
No CPR only	6 (18.2%)	1 (4.2%)
Modality of life support foregone		
Ventilation	21 (63.6%)	17 (70.8%)
Vasoactive drugs	5 (15.2%)	4 (16.7%)
Antibiotics	1 (3.0%)	1 (4.2%)
Dialysis	0 (0%)	1 (4.2%)
Parenteral nutrition	1 (3.0%)	0 (0%)
Others	5 (15.2%)	1 (4.2%)

CPR: cardiopulmonary resuscitation

Discussion

There was no statistically significant difference in the rate of FLS orders between the young old and the old old, although there was a trend towards more frequent FLS orders in the old old. The frequency of FLS in previous studies was 5% to 22%.¹⁻¹⁰ Our frequency of FLS (20.2%) was higher as the age of our population was older (mean age = 70.9 years) than in previous studies (mean age ranging from 51.9 years to 68 years). Superficially, age appears to affect decisions to forego life support; however, age also positively correlates with illness severity.¹⁶ Our logistic regression model confirms that illness severity as measured by the APACHE II(M) score and a high-risk diagnosis, rather than age, were associated with an FLS event. Furthermore, there was no statistical difference in the time from MICU admission to the making of an FLS decision (either withholding or withdrawing therapy) between the young old and the old old. These suggest that the threshold towards initiating FLS orders in the old old and the young old was essentially the same.

More relatives (12.3%) in our MICU initiated discussions about FLS, with a trend towards more surrogate-initiated discussions in the old old. The frequency was 0% to 3% in other studies.^{3,8,9} This desire for a decreased intensity of care may reflect the attitude towards death of most Asian religions. Buddhism stresses the transitory nature of life. Taoism advocates non-resistance to futile situations.²³ In Islam, one should be resigned to one's death and the death of others. It is also thought that death in old age is considered

a good death as one has finished one's tasks. The Asian family sees its role as having to protect the sick during their illness;²³ this could mean avoiding unnecessary prolongation of suffering or futile care. However, relatives may hold the view that the elderly should not require expensive care. What about patients' views? In a recent Singapore study, 51.2% of geriatric day care patients thought that euthanasia should be allowed and 55.8% would request for it.²⁴ Conceivably, this would also mean that such patients would desire limitation of care in futile situations. Further studies should be done to elucidate the reason for the higher rate of surrogate-initiated decision-making in the old old patient.

Previous studies indicate the rate of intact DMC to be from 0% to 10%.¹⁻¹⁰ Of the 33 young old patients, 3 had intact DMC and decided for themselves regarding FLS. Of the 24 old old patients, 1 had intact DMC, but did not make his own decision. An explanation for the old old not making their own decisions could be in keeping with the family orientated decision making model by the older Asian population,²³ where they feel that decisions, including matters of life and death, should be made in consultation with the entire family. In a Singapore geriatric day care centre, 39.5% of patients thought that a living will was not necessary, as their children or doctor would know what to do.²⁴

Withdrawal and withholding of mechanical ventilation was the most common mechanism in both age groups. In previous studies, after a do-not-resuscitate order, vasoactive

TABLE IV: TIMING OF VARIOUS FOREGOING LIFE SUPPORT (FLS) EVENTS (DAYS)

	Young old	Old old	P value
Days from MICU admission to FLS	5.9 ± 7.0	4.6 ± 4.5	0.65
Days from MICU admission to withholding therapy	4.6 ± 5.1	4.2 ± 4.1	0.78
Days from MICU admission to withdrawing therapy	7.3 ± 8.5	5.2 ± 5.0	0.44
Days from FLS to death/discharge from MICU	0.9 ± 1.6	0.7 ± 1.2	0.16
Days from withholding therapy to death/discharge from MICU	0.7 ± 0.6	1.1 ± 1.6	0.45
Days from withdrawing therapy to death/discharge from MICU	1.0 ± 2.2	0.1 ± 0.4	0.17

MICU: medical intensive care unit

TABLE V: OUTCOME OF PATIENTS FOLLOWING A FOREGOING LIFE SUPPORT (FLS) ORDER

	Study population		Young old		Old old	
	All patients n = 282	Underwent FLS n = 57	All patients n = 193	Underwent FLS n = 33	All patients n = 89	Underwent FLS n = 24
Died in MICU	110 (39.0%)	35 (61.4%)	72 (37.3%)	21 (63.6%)	38 (42.7%)	14 (58.3%)
Died outside MICU	33 (11.7%)	18 (31.6%)	18 (9.3%)	11 (33.3%)	15 (16.9%)	7 (29.2%)
Survivors	139 (49.3%)	4 (7.0%)	103 (53.4%)	1 (3.0%)	36 (40.4%)	3 (12.5%)

MICU: medical intensive care unit

drugs were usually first curtailed and ventilation later weaned down.^{3,8} Sedatives and opiates were introduced as palliation.^{5,25} In our unit, it is our practice that all patients who are intolerant of mechanical ventilation, whether they be for FLS or not, be put on sedatives and/or opiates for comfort. Foregoing vasoactive drugs has been thought to cause less suffering compared to foregoing mechanical ventilation.^{5,8} With adequate palliation, foregoing ventilation need not be distressing to the patient or the family. Foregoing ventilation has the advantage of allowing discharge from the MICU to the general ward for continuation of palliative care. Sprung and Eidelman²⁶ have previously remarked that the low rate of discharge from the intensive care unit (range of 0% to 50%, mean rate being 22%) reflects poor utilisation of a valuable resource. Overall, our discharge rate from the MICU is higher (38.5%) as foregoing ventilation allows us to do so. Our study showed that 42.1% of patients who had ventilation foregone could be discharged to the general ward for their demise. All other mechanisms only allowed 11.1% of patients to do so.

The main limitation of our study is that it was a retrospective study. Decisions about FLS, which were discussed with the family but not carried out, and actual FLS events may not have been documented in every case. The presence of other illnesses and functional deficits should ideally have been studied but these were not possible because of the study design. The numbers were also small and differences could have been non-significant because of type II error.

Conclusion

There was no difference found in the rate of FLS or in the time to initiating such orders between the young old and the old old. The increased trend of FLS in the old old is associated with a higher APACHE II(M) score and a higher proportion of patients with a high-risk diagnosis in the old old.

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