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Decision-making process, outcome, and 1-year quality of life of octogenarians referred for intensive care unit admission

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Abstract *Objective:* To describe triage decisions and subsequent outcomes in octogenarians referred to an ICU. *Design and setting:* Prospective observational study in the medical ICU in a tertiary nonuniversity hospital. *Participants:* Cohort of 180 patients aged 80 years or over who were triaged for admission. *Measurements:* Age, underlying diseases, admission diagnoses, Mortality Probability Model score, and mortality were recorded. Self-sufficiency (Katz Index of Activities of Daily Living) and quality of life (modified Perceived Quality of Life scale and Nottingham Health Profile) were measured 1 year after triage. *Results:* In 132 patients (73.3%) ICU admission was refused, including 79 (43.8%) considered too sick to benefit. Factors independently associated with refusal were nonsurgical status, age older than 85 years, and full unit. Greater self-sufficiency was associated with ICU admission. Hospital mortality was 30/48 (62.5%), 56/79 (70.8%), 9/51 (17.6%), and 0/2 in the admitted, too sick to benefit, too well to benefit, and family/patient refusal groups, respectively; 1-year mortality was 34/48 (70.8%), 69/79 (87.3%), 24/51 (47%), and 0/2, respectively. Self-sufficiency was unchanged by ICU stay. Quality of life (known in only 28 patients) was significantly poorer for isolation, emotional, and mobility domains compared to the French general population matched on sex and age. *Conclusions:* More than two-thirds of patients aged over 80 years referred to our ICU were denied admission. One year later self-sufficiency was not modified and quality of life was poorer than in the general population. These results indicate a need to discuss patient preferences before triage decisions.

Keywords Intensive care unit · Triage · Elderly · Quality of life · Ethics

Introduction

The demographic revolution that is sweeping across industrialized countries will dramatically increase the absolute number of elderly over the next 40 years. In France the population aged 85 years or more will expand from 1.6 to 6 million between now and 2050, according to data from the Institut National de Statistiques et de la

Recherche Medicale (www.http//insee.fr). Therefore the number of elderly patients requiring critical care will grow substantially in the near future. Identifying the patients most likely to benefit from critical care is essential both to prevent suffering related to unnecessary treatments and to ensure optimal use of finite resources. Of the 1,266 patients older than 80 years in the Hospitalized Elderly Longitudinal Project [1], 5.7% died during the enrollment. Among these, 70% reported their baseline quality of life as fair or poor, and most wanted comfort care as opposed to life-prolonging care; nevertheless, 54% were admitted to ICUs. Many older adults were unwilling to trade time with their current quality of life for a shorter life in excellent health, in contradiction to the opinion of surrogates [2]. Because the elderly often have many acute and chronic diseases associated with physical impairments and psychological distress, their perceptions of quality of life may rest on different values from those important to younger individuals [3]. A prospective cohort study found that age was not independently associated with ICU mortality [4], but another study did find age to be associated with long-term mortality, presence of an underlying fatal condition, and severe functional limitation [5]. Three studies found that older age was an independent determinant of ICU refusal [6, 7, 8]. To our knowledge, no studies have focused on ICU triage for patients older than 80 years of age. Few studies [9, 10, 11] have investigated long-term survival, self-sufficiency, and quality of life after ICU admission in octogenarians.

The aim of this study (reported previously as an abstract [12]) was to describe triage to the ICU in patients older than 80 years of age and to determine 1-year survival, self-sufficiency, and quality of life.

Methods

Setting

The study was performed at the Saint Joseph Hospital, a 460-bed tertiary-care nonuniversity hospital for adults, located in Paris, France. The hospital provides services in all the medical specialties and in all the fields of surgery except neurosurgery. The ICU is a ten-bed medical unit that admits about 400 emergency cases per year (mean age, 62 years) including 70% of medical patients. In addition to the ICU, the hospital has 5 coronary beds for medical and postoperative cardiac patients, 15 intermediate beds for postoperative patients, and one room with 7 immediate recovery rooms, managed by non-ICU physicians. There is no geriatric unit.

Triage study

All ICU admission requests between 1 March 2002 and 31 November 2003 were studied. For each request from the emergency unit or general wards of the hospital the triaging intensivist completed a questionnaire used in previous studies [13, 14] to collect the following data: date and time of the ICU triage decision, number of available beds, number and seniority of the ICU physicians involved in the decision (with senior intensivists being defined as having more than 2 years of ICU experience), patient age, and admission diagnosis. Comorbidities were assessed using the McCabe and Jackson [15] score and the Knaus et al. [16] classification system. The McCabe score defines underlying disease likely to cause death within 5 years (ultimately fatal disease), and underlying disease likely to cause death within 1 year (fatal disease). We defined severity of illness at ICU referral using the only model validated for this situation (the Mortality Prediction Model, MPM0) [17]. Self-sufficiency was evaluated using the Katz Index of Activities of Daily Living (ADL) [18] which uses three categories (no help, partial assistance, and complete assistance) for each of five activities (bathing, dressing, toileting, transferring, continence, and feeding). As proposed by Ridley and Wallace [19], we evaluated the need for special equipment to carry out each activity. When the patient was unable to answer questions, we interviewed the relatives to obtain information on self-sufficiency.

The reasons for refusal were categorized as follows: too well to benefit, too sick to benefit, and patient or family refusal. When the ICU was full, patients admitted by the triaging intensivists were transferred to other ICUs; we included these patients in the group of admitted patients. For patients considered too sick to benefit, the triaging physician indicated the main reasons for refusing admission among the following: advanced age, severe underlying disease, dependency, and severity of the acute illness. Preferences of patients or families were collected at triaging.

In the admitted patients we recorded the Simplified Acute Physiology Score (SAPS) II [20] to assess severity of illness at admission. It was computed using the worse physical and laboratory data during the first 24 h in the ICU. ICU stay length and ICU mortality were recorded, as well as the number of withholding and withdrawal decisions according to the recommendations of the Francophone Society for Critical Care (SRLF) [21].

Follow-up measures

To assess 1-year outcomes patients were contacted by telephone. Patients who failed to answer the first call were called again on different days, for a maximum of four calls. When we were unable to contact the patient by phone, we sought vital status information by calling the primary care physician and by looking for a death certificate at the appropriate registry office or, if the patient was not French, at the appropriate consulate. Self-sufficiency (ADL) [18] and quality of life (Perceived

Quality of Life (PQoL) [22] scales and the Nottingham Health Profile (NHP) [23]) 1 year after ICU admission were evaluated during a telephone interview conducted by one of the investigators (M.G.O.). The PQoL and NHP scores are provided in Tables E1 and E2 of the Electronic Supplementary Material (ESM). Because quality of life is a subjective personal concept that cannot be readily evaluated by relatives, we interviewed patients only. Patients were interviewed about their current condition and asked to retrospectively evaluate their prehospitalization self-sufficiency regarding activities of daily living. A retrospective evaluation of quality of life was not sought: this would have increased the interview time.

This study was approved by the Institutional Review Board of the Saint Joseph Hospital, which waived the requirement for written informed consent at the time of triage but requested that patients or proxies be told they would receive a phone call 1 year later, and that they be asked for their consent at the time of the call. The study was explained again to the patient during the 1-year phone call, and the patient was then asked for consent to the interview.

Statistical analysis

Univariate analysis was performed using Fisher's exact test or the Mann–Whitney test. Variables associated with the dependent variable at the $p \leq 0.10$ level were introduced into a stepwise logistic regression model. The variables entered in the logistic regression are listed in the ESM. Backward elimination was used to select variables for the final model. Differences below the level of $p \leq 0.05$ were considered statistically significant. We calculated the Standard Mortality Ratio (SMR) for the admitted patients, which is the ratio of observed hospital mortality over mortality predicted by the SAPS II. Comparisons between self-sufficiency at triage and 1 year later were performed using the Wilcoxon rank sum test. The NHP of the survivors was compared to a random sample of the general French population (5:1) matched on age and sex using two-way analysis of variance by rank. SAS version 8.0 (SAS Institute, Cary, N.C., USA) and Medcalc 5.00 (Medcalc, Ghent, Belgium) were used for the statistical tests.

Results

Factors associated with ICU refusal

During the 20-month study period a request for ICU admission was made for 180 patients older than 80 years (mean age 86 ± 5.09 years, range 80–99). The requests came from the emergency unit in 129 cases (71.6%), medical wards in 59 (32.7%), and surgical wards in 13 (7.2%). Of the 180 patients 48 were admitted (42 to our ICU and 6 to another ICU on the same day). Of the 132 refused patients (73.3%) 51 (28.3%) were considered too well to benefit, 79 (43.8%) too sick to benefit, and for two the family/patient refused. Most patients ($n = 129$, 71.6%) were not informed of the triage decision, about one-fourth ($n = 49$, 27.3%) agreed with the decision (directly at the time of triage in 44, via advance directives in 1, and via proxies in 4), and two families refused ICU admission.

In the 79 patients considered too sick to benefit the main reasons given by the ICU triage physician were advanced age ($n = 72$), presence of an underlying disease ($n = 52$), dependency before the current hospital admission ($n = 52$), and severity of the acute illness ($n = 53$). Parameters associated with ICU refusal are reported in Table 1. In the logistic regression analysis (Table 2) factors independently associated with ICU refusal were medical status, age older than 85 years, and full unit. Greater self-sufficiency was associated with ICU admission.

Mortality

Figure 1 shows the patient flow chart. Crude hospital mortality was 95 of 180 (52.7%). Vital status at hospital discharge was available for all study patients. Hospital mortality was 62.5% (30/48) in the admitted patients, 70.8% (56/79) in those too sick to benefit, and 17.6% (9/51) in those too well to benefit (0/2 in the patients whose families refused ICU admission). The mortality predicted by the MPM0 was, respectively, $22.8 \pm 14.5\%$, $30.9 \pm 16.5\%$, and $22.4 \pm 10.5\%$. ICU mortality was 50% (20/48). SMR using SAPS II was 1.63 among admitted patients. Seventeen patients (70%) died after treatment limitation. The time from ICU admission to treatment limitation was 13.2 ± 20.8 days (median 6).

Eighty-five patients were discharged from the hospital. Of these, 32 (37.6%) died within the 1st year following the ICU triage decision. Mortality after 1 year was 70.8% (34/48) in the admitted patients, (87.3%) 69/79 in those too sick to benefit, and (47.0%) 24/51 in those too well to benefit and 0/2 in the patients whose families refused ICU admission.

Self-sufficiency and quality of life 1 year after the ICU triage decision

Forty-two patients were contacted by phone. Of these, 14 were not interviewed, for the following reasons: dementia ($n = 3$), aphasia ($n = 3$), unwillingness to be interviewed ($n = 4$), and deafness ($n = 4$). This left 28 patients for whom data on self-sufficiency and quality of life were obtained. The ADL score used to evaluate self-sufficiency was not significantly changed compared to the pretriage score assessed retrospectively by the patients (see Table E3 in the

Table 1 Univariate analysis of factors associated with ICU admission or refusal including the characteristics of the patients admitted to the ICU (*MU* medical unit, *EU* emergency unit, *SU* surgical unit, *ADLs* Activities of Daily Living [18], *WE* weekend, *NA*: not applicable, *SMR* Standard Mortality Ratio, *MPM0* Mortality Predicted Model [17])

	Admitted ($n=48$)	Not admitted ($n=132$)[a]		p[b]
		Too well to benefit ($n=51$)	Too sick to benefit ($n=79$)	
Age (years)	84 ± 3.92	86.9 ± 4.5	87.0 ± 5.4	0.0007
Female gender	26 (54.1%)	32 (62.7%)	44 (55.6%)	0.61
Referred from MU, EU, SU	16/22/8	18/32/1	24/51/4	0.006
Patient status				0.0038
Medical	38 (79.1%)	50 (98%)	74 (93.6%)	
Scheduled surgery	1 (2%)	0	2 (2.5%)	
Unscheduled surgery	9 (18%)	1 (1.9%)	3 (3.7%)	
Underlying diseases				0.03
No fatal disease	24 (50%)	27 (52.9%)	17 (21.5%)	
Disease fatal within 5 years	21 (43.7%)	21 (41.2%)	36 (45.5%)	
Disease fatal within 1 year	3 (6.2%)	2 (3.9%)	26 (32.%)	
ADLs (no help in the category)				
Dressing	35 (73%)	28 (54.9%)	18 (22.7%)	0.0001
Transfer	33 (68.7%)	29 (56.8%)	24 (30.3%)	0.0007
Toileting	36 (75%)	28 (54.9%)	18 (22.7%)	0.0001
Feeding	36 (75%)	32 (62.7%)	29 (36.7%)	0.0008
Continence	35 (73%)	33 (64.7%)	28 (35.4%)	0.002
Institution[c]	1	6 (11.7%)	23 (29.1%)	0.0015
Circumstances of triage				
Phone	4 (29%)	3 (5.8%)	5 (6.3%)	0.0001
Examination by an ICU physician	34 (70.8%)	47 (92.1%)	74 (93.6%)	0.0001
On duty, 8 pm–8 am or WE	26 (54.1%)	37 (72.5%)	38 (48.1%)	0.61
ICU experience of the triaging physician				0.004
Senior (>2 years of ICU experience)	41 (85.5%)	32 (62.7%)	60 (75.9%)	
Junior	7 (14.5%)	19 (37.2%)	18 (22.7%)	
Beds available				0.002
None	8 (16.6%)	21 (41.1%)	33 (41.7%)	
One	25 (52%)	17 (33.3%)	28 (35.4%)	
Multiple	15 (30.6%)	13 (25.4%)	18 (22.7%)	
Number of physicians involved in the triage				0.13
One	45 (93.7%)	47 (92.1%)	72 (91.1%)	
Multiple	3 (6.6%)	4 (7.8%)	7 (8.8%)	
Patients ventilated at triaging	12 (25%)	0	0	0.0001
SAPS II at admission	46 ± 16	NA	NA	
Length of ICU stay (days)	12.6 ± 15.5	NA	NA	
ICU mortality	24 (50%)	NA	NA	
SMR using the SAPS II[d]	1.63	NA	NA	
Mortality predicted by the MPM0	$22.8 \pm 14.5\%$	$22.4 \pm 10.5\%$	$30.9 \pm 16.5\%$	

[a] Among the 132 nonadmitted patients there were 51 too well to benefit, 79 too sick to benefit, and 2 family/patient refusals

[b] Admitted vs. nonadmitted

[c] Includes nursing homes with or without medical care and extended- and chronic-care facilities

[d] Ratio between the observed hospital mortality and the predicted mortality using SAPS II [20]

Table 2 Logistic regression analysis to identify factors independently associated with refusal of ICU admission (*CI* confidence interval)

	Odds ratio for refusal	95% CI	p
Medical patient	5.96	1.26–28.2	0.02
Examination by an ICU physician	5.75	1.21–27.2	0.02
Full unit	4.72	1.37–16.2	0.01
Age > 85 years	4.16	1.44–12.0	0.008
No help needed for toileting	0.04	0.21	<0.0001

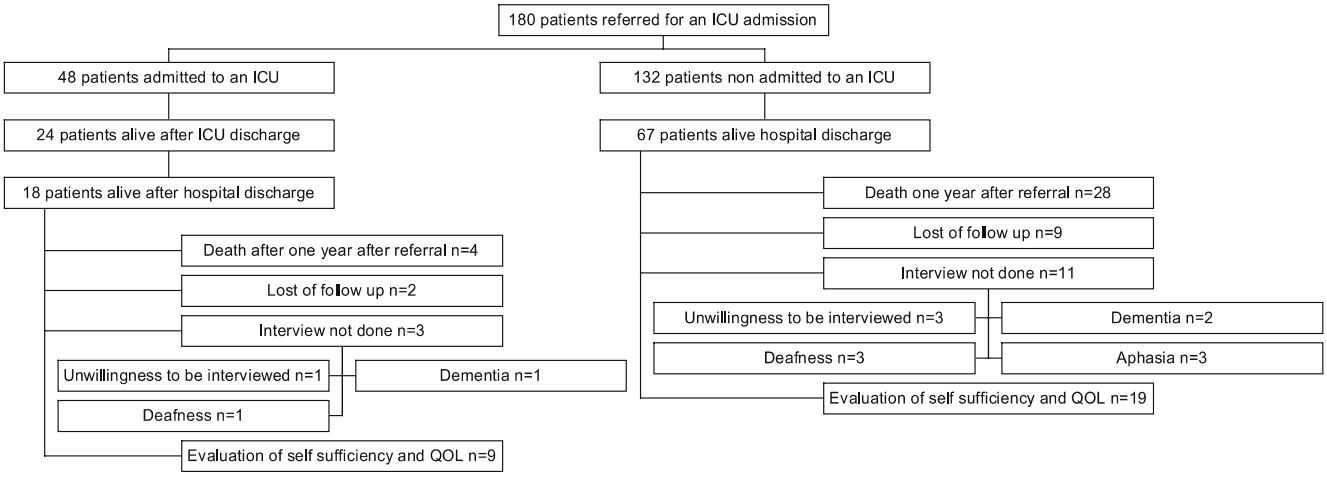

Fig. 1 Flow chart of the 180 patients referred for ICU admission.

ESM). One year after the triage decision 11 patients lived at home and the remaining 17 in retirement homes ($n = 5$) or extended-care facilities ($n = 12$); regarding place of residence only 4 patients reported a change compared to the time of the triage decision.

The PQoL scale showed good levels of satisfaction regarding respect by others (6.78 ± 3.23), memory (6.75 ± 2.41), help from family and friends (6.57 ± 3.51), income (6.57 ± 2.64), and happiness (6.37 ± 2.62). Satisfaction was fair regarding physical health (5.39 ± 3.07), seeing friends (5.96 ± 3.22), and being retired (5.88 ± 3.28). Lower levels of satisfaction were noted regarding leisure (4.14 ± 3.33), contribution to the community (4.89 ± 3.14), and meaning and purpose of life (5.46 ± 3.16). The comparison of the quality of life as assessed by NHP compared to that in the general age- and sex-matched population is provided in Table E5 in the ESM. Our elderly survivors were significantly more depressed, more isolated, and less mobile. Of the 28 patients 16 (57%) said they did not want ICU admission should they experience a life-threatening health problem.

Discussion

The main findings from this single-center study are the very high ICU refusal rate in octogenarians and the high 1-year mortality rates both in admitted patients and in patients considered too sick to benefit from ICU admission. Self-sufficiency in survivors was unchanged compared to the pretriage estimate, and quality of life was poor. About one-half the survivors stated that they did not want further ICU admission.

Several groups have investigated the factors associated with refusal of ICU admission [6, 7, 8, 13, 14]. Patient-related factors and organizational factors were found to be independently related to ICU refusal. Several studies [6, 7, 13, 14] found a strong effect of bed availability; the only exception is a study that failed to evaluate the admission process when the unit was full [8]. Older age was independently associated with refusal [6, 7, 8, 13, 14], particularly in patients with greater disease severity [8, 13]. None of these studies focused on specific age groups. In our study age was related to ICU admission. Age older than 85 years and dependency were associated with refusal of ICU admission. The higher hospital mortality in dependent patients reported in several studies [6, 7, 8, 24] is consonant with the reluctance of ICU physicians in our study to admit strongly dependent patients.

Hospital mortality in admitted patients, those too sick to benefit, and those too well to benefit was 62.5%, 70.8%, and 17.6%, respectively. In admitted patients ICU mortality was 50% higher than in recent studies of similar-age patients conducted in France (26.7% [4], 16.3% [5], and 28% [25]) and in other countries (26% [8], 5.6% [1], and 10% [26]). It was also higher than in another French study with similar severity of illness at admission [5]. The high ICU mortality rate may be due to several factors: the large proportion of medical patients in our cohort, the 50% rate of patients transferred from wards, and the large proportion (70%) of patients with treatment withholding or withdrawing decisions, which have been found to independently predict ICU mortality [27]. The relationship between age and mortality warrants further comment. Although age per se is a major determinant of hospital mortality [28, 29], the most important determinant of ICU mortality is severity of illness, as shown by studies taking this confounding factor into account [4, 5]. However, in a study of about 150,000 ICU patients older than 80 years Rosenthal et al. [30] showed that the odds ratio for death increased at each 5-year interval after adjustment on severity of illness (Acute Physiology and Chronic Health Evalua-

tion III score), gender, comorbidities, admission diagnosis, and place of stay before ICU admission. Although age was reliable for predicting benefits from ICU admission, the reported impact of age on mortality after ICU discharge [4, 5, 30, 31] influenced the triage decisions made by our ICU physicians.

There is general agreement that quality-of-life parameters such as self-sufficiency and psychological well-being are important patient outcomes, particularly in older patients [10]. Measuring these outcomes provides crucial information for determining whether aggressive therapy is warranted. Patients older than 80 years have been reported to receive less aggressive treatment than younger patients with similar disease severity [25]. Quality of life after ICU discharge is a dynamic process that depends on several factors including advanced age, severity of illness at admission, and diagnostic category [31, 32, 33]. Preadmission status and specific events in the ICU [26, 34] are associated with discharge to healthcare facilities. In our study self-sufficiency was not changed by the hospital stay. Most survivors (17/28, 60.7%) were discharged to an extended-care facility. Quality of life in our cohort was poorer than in our previous study of patients older than 70 years [35] and differed significantly in the emotional, isolation, and mobility domains compared to the general population matched on age and sex. One-half the survivors said that they did not want further ICU admission. This finding contrasts with that of previous studies [9, 35]. This discrepancy indicates that older patients must think about their wishes should they experience a life-threatening condition, and that they must communicate those wishes to their relatives or physicians.

This study has several limitations. First, because it was conducted in a single medical ICU, the results may not apply to all populations of octogenarians for whom ICU admission is requested. The large proportion of referred medical patients may have introduced a bias in the triage process. Second, we did not measure quality of life at the time of triage, and consequently we were unable to determine whether the poor quality of life after 1 year indicated deterioration after the hospital stay or merely reflected the baseline status. The time constraints that surround ICU admissions and the limited reliability of surrogates in this area are major obstacles to quality-of-life evaluation at the time of triage to the ICU. Third, 11 patients could not be contacted for the 1-year evaluation. We were unable to obtain outcome data from their physicians or families. Thus quality of life was reported in only 28 patients.

In conclusion, decisions to admit patients older than 80 years to our ICU were influenced only by preadmission patient-related factors and by bed availability. More than two-thirds of ICU admission requests for patients older than 80 years were denied. Among the few survivors in this age group 1-year survival was low, and quality of life was poor. These results invite physicians in all fields of clinical care to discuss preferences about ICU admission with their elderly patients.

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