The Very Elderly Admitted to ICU: A Quality Finish?*

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***See also p. 1526 and 1527.**

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Objective: Very elderly persons admitted to ICUs are at high risk of death. To document life-sustaining interventions (mechanical ventilation, vasopressors, renal replacement therapy) provided in the ICU and outcomes of care.

Design: Multicenter, prospective cohort study.

Setting: ICUs of 24 Canadian hospitals.

Participants/Setting: Patients 80 years old or older admitted to the ICU.

Interventions: None.

Measurements and Main Results: One thousand six hundred seventy-one patients were included. The average age of the cohort was 85 years (range, 80–100 yr). Median total length of stay in ICU was 4 days (interquartile range, 2–8 d) and in hospital was 17 days (interquartile range, 8–33 d). Of all patients included, 502 (30%) stayed in ICU for 7 days or more and 344 (21%) received some form of life-sustaining treatment for at least 7 days. ICU and hospital mortality were 22% and 35%, respectively. For nonsurvivors, the median time from ICU admission to death was 10 days (interquartile range, 3–20 d). Of those who died ($n = 585$), 289 (49%) died while receiving mechanical ventilation, vasopressors, or dialysis. The presence of frailty or advance directives had little impact on limiting use of life-sustaining treatments or shortening the time from admission to death.

Conclusions: In this multicenter study, one third of very elderly ICU patients died in hospital, many after a prolonged ICU stay while continuing to receive aggressive life-sustaining interventions. These findings raise questions about the use of critical care at the end of life for the very elderly. (*Crit Care Med* 2015; 43:1352–1360)

Key Words: critical illness; end-of-life care; follow-up study; octogenarian; outcome assessment; palliative care; quality of life

At or near the end of life (EOL), most seriously ill, hospitalized, elderly patients prefer to avoid unnecessary prolongation of life by life-sustaining therapy (1). In addition, many very elderly persons are reluctant to accept any use of life-sustaining therapy, such as that provided in an ICU, because preserving quality of life is more important to them than prolonging their survival (2, 3). Despite often being able to express their preferences, more than 70% of seriously ill hospitalized elderly patients do not discuss these preferences with their healthcare providers. As a result, medical orders for life-sustaining therapy are incongruent with their previously stated preferences 70% of the time (3). Furthermore, life-sustaining therapy is often provided to patients during their final months of life, even when these patients prefer care that is focused on comfort and quality of life (4–7). This kind of discordant care, or care that is inconsistent with patient preferences, may be considered a misallocation of healthcare resources (8).

Recent reports of critical illness among the very elderly suggest that ICU admission may fail to improve, or even worsen survival and quality of life for these patients (9, 10). This questionable evidence of benefit, coupled with the preferences of many elderly patients for less technologically intense care at the EOL raises questions about the appropriateness of admission to an ICU for this population. Describing current ICU practices and outcomes is foundational before trying to improve the quality of communication and decision-making with respect to the use of life-sustaining treatments for critically ill elders. Therefore, our primary objective was to describe the treatments and outcomes of care of patients 80 years old or older who were admitted to 22 participating ICUs in Canada; our secondary objective was to describe the treatments and outcomes of those patients who have a prolonged dying experience.

METHODS

We conducted a multicenter, prospective, observational cohort study with a nested cohort from September 2009 to February 2013 in 24 Canadian ICUs (for participating centers, see **Appendix 1**, Supplemental Digital Content 1, http://links.lww.com/CCM/B299). We report here an analysis of the ICU treatments and hospital outcomes in all patients (hospital cohort). Details of long-term outcomes of the nested cohort have been reported elsewhere (Heyland et al, unpublished observations, 2015). Institutional research ethics board approval was obtained from each center. Written informed consent was obtained from each patient's next of kin before enrollment.

In participating centers, all patients aged 80 or more were eligible for the hospital outcomes cohort; inclusion was based on research coordinator availability and resources to support the data collection. We obtained a waiver of informed consent to collect data that was readily available from the hospital charts. However, patients in the hospital were eligible for enrollment into a nested cohort study for which consent was required. An eligible family member was required for participation in the follow-up study. Patients were excluded from the nested cohort if they were imminently dying, were not expected to stay in ICU for more than 24 hours, had no permanent address, or were not Canadian residents (due to anticipated challenges in posthospital follow-up). An eligible family member consisted of a family member including partner, significant other, and/or close friend who: 1) provided the most care to the patient before hospital admission and was not paid to do so; 2) visited the patient at least once during the index ICU admission; and 3) was 18 years old or older. We also excluded patients from the nested cohort who did not have a French- or English-speaking family member.

Study Procedures

Baseline demographic and clinical data collected from the medical chart for all patients included: age, sex, ICU admission diagnosis, admission type (medical vs surgical), Acute Physiology and Chronic Health Evaluation II score (11), functional comorbidity index (12), and Charlson comorbidity index (13). We assessed sequential organ failure assessment scores at admission and daily while in ICU (14).

For patients who were enrolled in the nested follow-up, research coordinators met with the family member to collect additional data, including a measure of baseline frailty using the Clinical Frailty Scale. This score ranges from 1 (very fit) to 7 (very frail) and has been previously validated in the ICU (15). In addition, we documented whether the patient had a living will or advance directive about preferred medical care if he/she was seriously ill. We did not record the contents of the advance directive; just whether the patient had completed one. Finally, we asked the patient's family member which of the following three options they preferred for their loved one: 1) "*Life Support.* This option can include the use of a breathing machine as well as drugs and procedures to maintain body functions. Efforts are made to keep the patient as comfortable as possible." 2) "*Comfort Care without Life Support.* Comfort care aims to relieve suffering and preserve the dignity of the patient, without prolonging the dying process. There are usually fewer tests, fewer tubes, and no life support machines or monitors connected to the patient." 3) "*I am unsure.*"

Use of life-sustaining treatment (mechanical ventilation, vasoactive drugs, and renal replacement therapy) and ICU and hospital length of stay were abstracted from the medical record in all patients. Medical orders for administration, withholding, or withdrawing of life-sustaining treatment before ICU admission and during ICU stay were also recorded. Withholding life-sustaining treatment was defined as no current receipt of any such treatment followed by a written order not to start or restart it. Withdrawing life-sustaining treatment was defined as current receipt of any such treatment followed by a written order to discontinue it in anticipation of death.

Statistical Analysis

Our primary outcome was a prolonged dying experience defined arbitrarily as staying in ICU for 7 days or longer and

dying during the hospitalization. Baseline patient characteristics, treatments, and outcomes were compared between patients who 1) died within 7 days of ICU admission, 2) died at any point in hospital after staying in ICU for at least 7 days, and 3) survived to hospital discharge. In addition to the overall analyses, in the nested cohort, we conducted several subgroup analyses. Based on the hypothesis that frail patients would have lower utilization of life-sustaining therapy, greater withholding/withdrawal of life-support orders, and worse clinical outcomes than patients who were not frail, we compared treatments and outcomes in patients based on a Clinical Frailty Scale score of 5 or more versus less than 5 (15). We also examined whether there were differences in treatments and outcomes of care based on the presence or absence of advance directives and family preferences for medical treatments at the EOL. The Kruskal-Wallis test (for three-group comparisons) or the Wilcoxon-Mann-Whitney test (for two-group comparisons) was used to compare continuous variables between groups. Categorical variables were compared between groups by the chi-square test. Continuous variables were described as means, SD, and the minimum and maximum values except for length of stay variables, which were described by their quartiles due to their positive skew. Categorical variables were described by counts and percentages. A multinomial logistic regression model was used to examine the independent association between various patient characteristics and the odds of dying within 7 days or surviving to hospital discharge, compared with dying in the hospital after remaining in the ICU for at least 7 days. All analyses were done using SAS Version 9.3 (SAS, Cary, NC).

RESULTS

Of 3,064 patients screened, 1,671 had hospital records abstracted and were included in this study; 610 (37%) met the inclusion criteria and were consented to be enrolled in the nested cohort (**Fig. 1**). The average age of the hospital cohort was 85 years (range, 80–100 yr).

Hospital Cohort

In the hospital cohort, 300 (18%) of patients had some limitation of treatment order documented in the chart before ICU admission; an additional 419 (25%) patients had a similar order after ICU admission. In ICU, 72% were mechanically ventilated, and 85% received at least one of mechanical ventilation, vasopressors, or dialysis (**Table 1**). In nonsurvivors, the median time from ICU admission to the first order to withhold treatment was 3 days (interquartile range [IQR], 2–5 d); the median time to the first order to withdraw treatment was 4 days (IQR, 2–9 d).

For all patients, median length of ICU stay was 4 days (IQR, 2–8 d), and 17 days in hospital (IQR, 8–33 d). ICU and hospital mortality were 22% and 35%, respectively (**Table 2**). For nonsurvivors, the median time from ICU admission to death was 10 days (IQR, 3–20 d); for hospital survivors, the median time from ICU admission to ICU discharge was 4 days (IQR, 2–7 d).

Of the hospital cohort, 501 (30%) remained in ICU for at least 7 days, and 344 (21%) remained on some form of life-sustaining treatment for at least 7 days. Of those who died, 289 (49%) died while receiving mechanical ventilation, vasopressors, or dialysis. **Table 3** shows the results of a multinomial

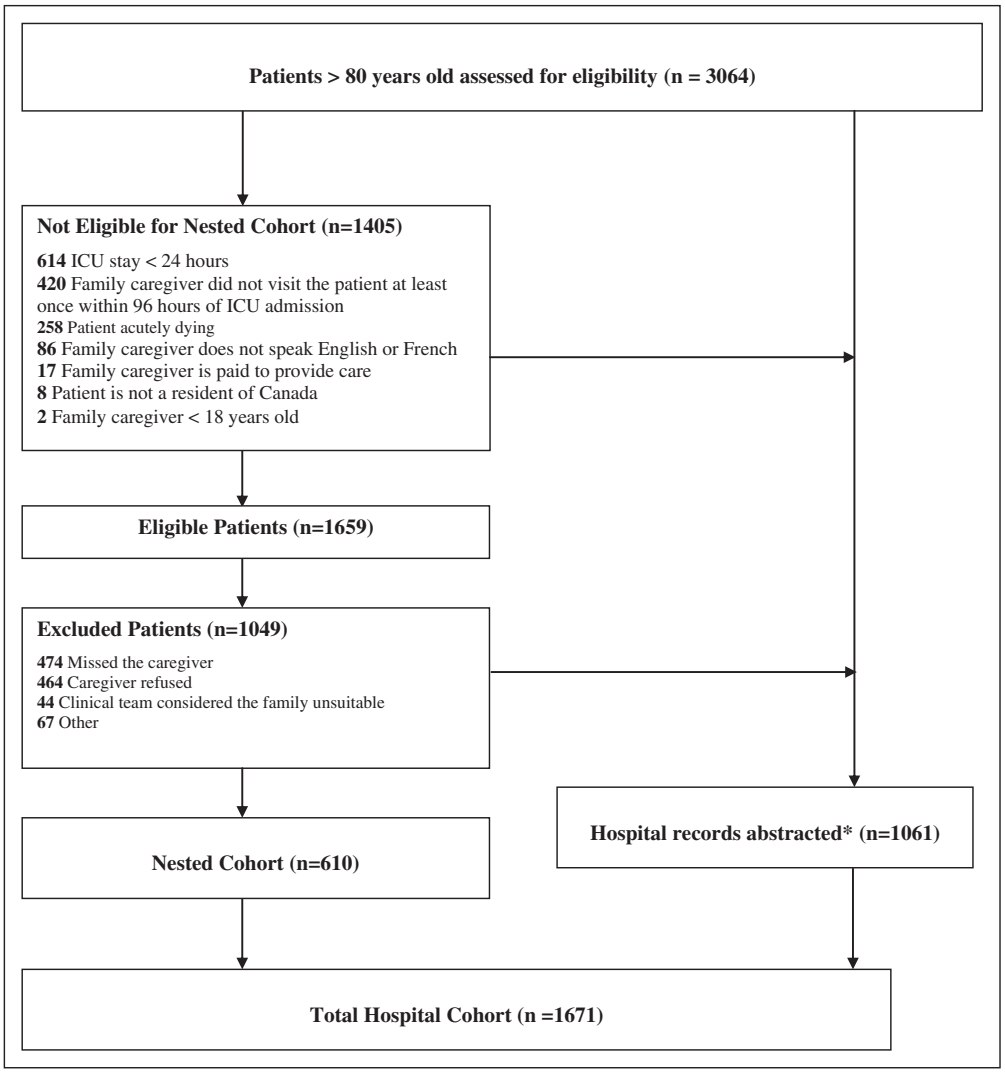

Figure 1. Patient flow through the study: identification of the hospital and nested cohorts.

TABLE 1. Use of ICU Treatments by Survivors and Nonsurvivors of Hospital Cohort

Treatments	All (n = 1,671)	Death Within 7 D (n = 361)	Death ≥ 7 D (n = 224)	Survivors (n = 1,086)	p[a]
Withheld at ICU admission (%)					
Vasopressor	34 (2)	14 (4)	4 (2)	16 (2)	0.02
Ventilation	86 (5)	31 (9)	9 (4)	46 (4)	0.004
Dialysis	38 (2)	16 (4)	2 (1)	20 (2)	0.006
CPR	297 (18)	98 (27)	38 (17)	161 (15)	< 0.001
Any life-sustaining treatments withheld	300 (18)	100 (28)	38 (17)	162 (15)	< 0.001
Withheld after ICU admission (%)					
Vasopressor	170 (10)	76 (21)	49 (22)	45 (4)	< 0.001
Ventilation	197 (12)	62 (17)	51 (23)	84 (8)	< 0.001
Dialysis	153 (9)	74 (21)	42 (19)	37 (3)	< 0.001
CPR	427 (26)	170 (47)	114 (51)	143 (13)	< 0.001
Any life-sustaining treatments withheld	494 (30)	201 (56)	125 (56)	168 (16)	< 0.001
Withdrawn after ICU admission (%)					
Vasopressor	158 (10)	115 (32)	38 (17)	5 (1)	< 0.001
Ventilation	236 (14)	155 (43)	71 (32)	10 (1)	< 0.001
Dialysis	31 (2)	17 (5)	12 (5)	2 (0.2)	< 0.001
Any life-sustaining treatments withdrawn	275 (17)	185 (51)	78 (35)	12 (1)	< 0.001
Days from ICU admission to first withhold order in ICU	3 [2–5] (1–92)	2 [1–3] (1–8)	8 [3–11] (1–92)	2 [2–5] (1–36)	< 0.001
Days from ICU admission to first withdrawal order in ICU	3 [2–8] (1–54)	3 [2–4] (1–8)	12 [10–21] (4–54)	2 [1–4] (1–11)	< 0.001
Days from first withhold order in ICU to ICU death	2 [1–5] (1–52)	2 [1–2] (1–15)	7 [2–10] (1–52)	NA	< 0.001
Days from first withdrawal order in ICU to ICU death	1 [1–1] (1–6)	1 [1–1] (1–6)	1 [1–2] (1–5)	NA	0.002
Vasopressors, n (%)	942 (56)	234 (65)	174 (78)	534 (49)	< 0.001
Duration (d)	3 [2–4] (1–33)	2 [2–3] (1–8)	5 [3–8] (1–33)	2 [2–4] (1–33)	< 0.001
Noninvasive ventilation, n (%)	258 (15)	53 (15)	48 (21)	157 (15)	0.03
Duration (d)	2 [1–4] (1–39)	2 [1–3] (1–6)	4 [2–6] (1–17)	2 [1–4] (1–39)	0.001
Invasive ventilation, n (%)	1,201 (72)	276 (77)	207 (92)	718 (66)	< 0.001
Duration (d)	3 [2–8] (1–573)	3 [2–4] (1–36)	11 [8–19] (1–573)	3 [2–6] (1–116)	< 0.001
Dialysis, n (%)	103 (6)	27 (8)	26 (12)	50 (5)	< 0.001
Duration (d)	5 [2–16] (1–92)	2 [2–4] (1–70)	10 [4–23] (1–92)	7 [3–18] (1–45)	< 0.001
Patients ever received dialysis, vasopressors, or ventilation in the ICU, n (%)	1,425 (85)	327 (91)	220 (98)	878 (81)	< 0.001

CPR = cardiopulmonary resuscitation, NA = not applicable.

[a]p values test against the null hypothesis that all three groups are similar.

Statistics are median [Q1–Q3] (min–max) or count (%).

TABLE 2. Clinical Outcomes of Hospital Cohort

Outcome	All (*n* = 1,671)	Death Within 7 D (*n* = 361)	Death ≥ 7 D (*n* = 224)	Survivors (*n* = 1,086)
Index ICU LOS (d)	4 [2–8] (0–371)	2 [1–4] (0–11)	11 [9–18] (1–321)	4 [2–7] (0–371)
Total ICU LOS (d)	4 [2–8] (0–596)	2 [1–4] (0–7)	13 [10–22] (7–596)	4 [2–7] (0–371)
Patients with at least one ICU readmission (%)	102 (6)	13 (4)	42 (19)	47 (4)
Total hospital LOS (d)	17 [8–33] (0–629)	6 [2–15] (0–90)	23 [14–40] (7–629)	19 [10–38] (0–228)
ICU mortality (%)	365 (22)	231 (64)	134 (60)	0 (0)
Hospital mortality (%)	585 (35)	361 (100)	224 (100)	0 (0)
Discharged from hospital (%)				
Ward in another hospital	288 (27)			288 (27)
ICU in another hospital	30 (3)			30 (3)
Long-term care facility	216 (20)			216 (20)
Home	504 (46)			504 (46)
Rehab	34 (3)			34 (3)
Palliative care	7 (1)			7 (1)
Other	7 (1)			7 (1)

LOS = length of stay.
[a]*p* values test against the null hypothesis that all three groups are similar.
Statistics are median [Q1–Q3] (min–max) or count (%).

logistic regression estimating the independent association between baseline patient characteristics and dying within 7 days or surviving hospital stay, both compared with dying after 7 or more days of ICU care. Higher age, comorbidity index, and illness severity, and medical admission type were associated with decreased odds of survival as compared with death after 7 days. No factors significantly discriminated between short stay versus long stay decedents (Table 3).

Nested Cohort

The average age of the nested cohort was 84 years (range, 80–99 yr), and 32% were characterized as frail at baseline as indicated by a Clinical Frailty Scale score of 5 or more (**Table 4**). According to the family member, 300 (49%) patients had a living will or advance directive which stated preferred medical care if he/she was seriously ill. Most family members preferred that life support be used (51%), whereas 21% preferred comfort measures

TABLE 3. Death Within 7 Days or Survival, Each Compared to Death After 7 Days in the ICU (Hospital Cohort)

Variables	Died Within 7 D OR (95% CI)	Survivors OR (95% CI)	*p*[a]
Age (per yr)	1.04 (0.99–1.09)	0.97 (0.93–1.01)	0.0008
Sex (male vs female)	0.67 (0.48–0.95)	0.84 (0.61–1.14)	0.06
Acute Physiology and Chronic Health Evaluation II score (per 5 points)	1.10 (0.99–1.22)	0.63 (0.57–0.70)	< 0.0001
Charlson comorbidity index (per 1 unit)	0.98 (0.90–1.07)	0.91 (0.84–0.99)	0.03
Admission type			< 0.0001
Surgical elective vs medical	0.92 (0.40–2.13)	4.37 (2.24–8.54)	
Surgical emergency vs medical	1.02 (0.68–1.53)	1.45 (1.01–2.07)	

OR = Odds ratio.
[a]*p* values test against the null hypothesis that all three groups are similar while the odds ratios separately compare those that died within 7 d group and the survivor group to the group that died after 7 d.

TABLE 4. Baseline Characteristics of Study Patients

Characteristic	Hospital Cohort ($n = 1,671$)	Longitudinal Cohort ($n = 610$)
Age	85 ± 3 (80–100)	84 ± 3 (80–99)
Sex (%)		
Male	915 (55)	338 (55)
Female	756 (45)	272 (45)
Admission Acute Physiology and Chronic Health Evaluation score	22 ± 8 (6–49)	22 ± 7 (7–49)
Baseline Sequential Organ Failure Assessment	5 ± 3 (0–17)	5 ± 3 (0–15)
Charlson comorbidity index	2 ± 2 (0–11)	2 ± 2 (0–11)
Admission type (%)		
Medical	1,033 (62)	377 (62)
Surgical elective	220 (13)	83 (14)
Surgical emergency	418 (25)	150 (25)
Primary ICU diagnosis (%)		
Cardiovascular/vascular	408 (24)	143 (23)
Respiratory	389 (23)	157 (26)
Gastrointestinal	298 (18)	110 (18)
Neurologic	186 (11)	58 (10)
Sepsis	178 (11)	72 (12)
Trauma	74 (4)	24 (4)
Metabolic	18 (1)	8 (1)
Hematologic	43 (3)	18 (3)
Renal	9 (1)	2 (0.3)
Gynecologic	1 (0.1)	1 (0.2)
Orthopedic	67 (4)	17 (3)
How fit or frail was the patient 2 wk prior to hospitalization? (%)		
1. Very fit	NA	35 (6)
2. Well	NA	67 (11)
3. Managing well	NA	164 (27)
4. Vulnerable	NA	150 (25)
5. Mildly frail	NA	86 (14)
6. Moderately frail	NA	82 (13)
7. Severely frail	NA	25 (4)
Missing	NA	1 (0.2)
Does the patient have a document about preferred medical care if he/she is seriously ill? (%)		
Yes	NA	300 (49)
No	NA	228 (37)
Unsure	NA	72 (12)
Do not know what these documents are	NA	6 (1)
Missing	NA	4 (1)
Family preference for care (%)		
Life support	NA	310 (51)
Comfort care without life support	NA	129 (21)
I am unsure	NA	77 (13)
No/unclear choice	NA	24 (4)
Missing	NA	70 (12)

NA = not available.
Statistics are mean ± SD (min–max) or count (%). Hospital cohort ($n = 1,671$) includes 610 patients from longitudinal cohort.

only, 13% were unsure of their treatment preferences, and 15% of family members did not provide their preferences.

For the 610 patients in the nested cohort, median length of stay was 6 days in ICU (IQR, 3–10 d), and 21 days in hospital (IQR, 12–40 d). ICU and hospital mortality were 14% and 26%, respectively. For nonsurvivors, the time from ICU admission to death was a median of 16 days (IQR, 9–28 d; minimum of 3, maximum of 182 d), whereas the time from ICU admission to ICU discharge for surviving patients was 5 days (IQR, 3–8 d).

Prespecified Subgroups

Patients who had a frailty score of 5 or more were more likely to have a limitation of treatment order at admission to ICU (25% vs 15%; $p = 0.003$) and after ICU admission (36% vs 25%; $p = 0.003$) and were less likely to undergo mechanical ventilation (66% vs 75%; $p = 0.04$). However, frail patients were just as likely as nonfrail patients to receive other life-sustaining treatments and had similar time to death, ICU readmission rates, and durations of ICU and hospital stay (**eTable 1.2**, Supplemental Digital Content 2, http://links.lww.com/CCM/B300). However, hospital and 12-month mortality rates were higher among frail than nonfrail patients (eTable 1.2, Supplemental Digital Content 2, http://links.lww.com/CCM/B300).

Elderly patients who had advance directives were less likely than those who did not have an advance directive to have life-sustaining treatment withheld on or after ICU admission (23% vs 33%; $p = 0.009$), or withdrawn after ICU admission (7% vs 13%, $p = 0.01$). Time from ICU admission to death is longer among patients with documented preferred medical care ($p = 0.001$). We did not identify other differences in treatments or outcomes of care between these two groups (**eTables 2.1** and **2.2**, Supplemental Digital Content 2, http://links.lww.com/CCM/B300).

Use of ICU treatments differed significantly among patients whose family members preferred life-sustaining treatments versus comfort measures only versus those who were unsure (**eTable 3.1**, Supplemental Digital Content 2, http://links.lww.com/CCM/B300). On ICU admission and shortly thereafter, the patients whose families preferred comfort measures only had more life-sustaining treatments withheld, and the time from ICU admission to the first order to withhold or withdraw a treatment was shorter than for patients in the other two groups (eTable 3.1, Supplemental Digital Content 2, http://links.lww.com/CCM/B300). Despite family members' stated preferences for comfort measures only, 84% of patients received life-sustaining treatments, 20% received one or more for more than 7 days, and the time from ICU admission to death was on average 16 days amongst nonsurvivors. Among nonsurvivors, median time from ICU admission to death was longest in patients whose family members were unsure of their treatment preferences (24 d vs 12 d in comfort group vs 18 d in life-sustaining treatments group; $p = 0.05$).

DISCUSSION

In this multicenter study of patients 80 years old or older who were admitted to 22 ICUs across Canada, the most striking finding was the prolonged stay in the ICU, and the life support modalities employed before death and on the day of death. Overall, 35% of these very elderly ICU patients died in hospital, and mortality rates were much higher in frail compared with nonfrail patients. For those who died in hospital, this occurred a median of 10 days after ICU admission for the entire cohort. In the nested cohort, the average time from admission to death was 16 days with the dying experience being significantly prolonged if family members were "unsure" of their preferences for care. In nonsurvivors, previously documented advance directives and prior frailty had minimal to no impact on limiting the use of life-sustaining treatment or shortening the time from ICU admission to death. One quarter of family members of these very elderly patients preferred comfort measures, yet almost all of them received life-sustaining treatments in the ICU and time from ICU admission to death was 12 days. We did not identify predictors for prolonged period of life support before death in this population.

Our findings contrast starkly with data from other countries where the average time from ICU admission to death ranges from 1 to 2 days, and is shorter in patients 80 years old or older compared with younger patients (16, 17). Our findings raise questions about the process of EOL care for very elderly patients admitted to the ICU in Canada. In a prior Canadian study, elderly patients reported that avoiding unnecessary prolongation of life through the use of technology was among the most important aspects of EOL care (1). Our findings challenge whether this "right to quality EOL care" (18) is being realized for many very elderly patients and their families. Furthermore, this kind of high-intensity care provided at the EOL is associated with reduced quality of life in the patients' remaining days, and increased risk of poor health outcomes for surviving family members (19). The fact that a proportion of families were expressing a preference for comfort measures only for a proportion of these patients experiencing an "intensified death" further illustrates our concerns with quality care at the EOL.

There are economic implications of our findings. The cost of providing prolonged and nonbeneficial care to ICU patients is considerable. Furthermore, there is an opportunity cost in that ICU beds occupied by patients who receive nonbeneficial treatment are unavailable for other patients more likely to benefit from ICU admission. Delayed access to critical care for seriously ill patients has been associated with increased patient morbidity and mortality (20).

Given the interest in EOL care among the public, professionals, and politicians, it is imperative that care of the very elderly who have life-threatening illnesses be improved. First, we need to be sure that admission to the ICU and life-sustaining treatment is congruent with patient preferences; this should be determined in advance of critical illness. In another Canadian study of patient preferences among very elderly patients who were admitted to non-ICU hospital wards, fewer than 12% preferred full medical care including mechanical ventilation and cardiopulmonary resuscitation (3).

Furthermore, we found that advanced directives, as currently defined and implemented, did not appear to have an impact on limiting the overexposure to life-sustaining technologies at

the EOL. The documents may contain expressed wishes for the use of life-sustaining treatments but this would be inconsistent with prior published studies of cohorts of very elderly patients expressing a predominant desire for comfort measures only (2–7). Or, this may reflect the inaccessibility, lack of awareness, or lack of clarity of such documents, or their ineffectiveness at influencing treatments. We posit that advance care planning, which includes reflections, values clarifications and conversations with others that prepare the patient and family for "in the moment decision-making," are more likely to be clinically useful than instructional directives (21). Evidence for this assertion comes from a randomized trial of very elderly hospitalized patients indicating that advance care planning discussions with adequate documentation of their wishes result in enhanced quality EOL care, greater family satisfaction, and fewer unwanted ICU admissions (22). Given that patients of families that were "unsure" of their treatment preferences had the longest dying experience (median of 24 d), a process that helps families clarify values early in the course of stay has potential for both improving quality EOL care and significantly reduce wasted healthcare resources.

Ideally, communication interventions, conversations, and decisions should occur in advance of a life-threatening illness and before admission to the ICU. However, very elderly hospitalized patients report that doctors rarely ask them about their prior wishes or treatment preferences (3). As a consequence, we found that the expressed patient preference agreed with the medical order on the chart only a third of the time. One approach to this problem would be for healthcare providers to elicit treatment preferences and support a shared decision-making process before ICU admission. Accordingly, we have initiated the "Just Ask" campaign, to encourage healthcare providers to probe all "at-risk" patients admitted to hospital about their prior wishes, named decision-makers, and current treatment preferences; this is followed by provision of tools to enable and guide such conversations (23).

At the same time as we encourage healthcare professionals to engage with elderly patients in these conversations, we need better decision-making tools to help clinicians identify nonbeneficial treatment earlier in the ICU stay. Frailty is associated with increased morbidity and mortality in the short and long term (15). Systematic measurement of patient frailty (and other key determinants to long-term outcomes), as well as the development and dissemination of validated clinical prediction rules may help to better identify elderly patients who are very unlikely to benefit from ICU admission, or when admitted, will be unlikely to benefit from prolonged critical care (identified earlier in the ICU stay).

Strengths of our study include the multicenter design, national engagement, and large sample size which increase the representativeness and utility of our findings. However, most of the patients in our sample were Caucasian, and had to have a family member who spoke English or French, which may limit the generalizability of these findings. The presence of an unselected hospital cohort in conjunction with a nested cohort where we were able to obtain better characterization of patients at baseline is another strength.

There are several limitations. Our data describe practices in Canada and consequently, our findings may not be generalizable to other healthcare systems. We have no control group of either younger patients or elderly patients who were not admitted to ICU, for comparative analyses. When comparing treatment limitations between those with and without advance directives, we do not have the detailed information on the content of the directive to know whether treatments were concordant or discordant with the requests of patients. Paradoxically, there were fewer treatment limitations made by physicians and longer dying periods in those patients who had preexisting advance directives compared with those who did not. We further note that we enrolled a family member who was not necessarily the legally appointed substitute decision-maker, to obtain an understanding of the patient's baseline characteristics and preferences for care. In soliciting these preferences, we provided standard definitions or statements describing different goals of care. However, we acknowledge that lay people may not understand the true meaning of life supports or use of mechanical ventilation. This may explain why so many family members preferred "comfort care" and yet their loved one had a prolonged stay in the ICU. Finally, we acknowledge that our definition of "prolonged dying" (> 7 d in ICU) is somewhat arbitrary.

In summary, we report the use of ICU treatments and outcomes of care of patients 80 years old or older who were admitted to 24 participating ICUs in Canada. We have observed that it is common for elderly patients to die in hospital, often after a prolonged ICU stay and while still receiving life sustaining-technologies. Our findings question whether hospitalized very elderly patients are achieving a "quality finish." We are not advocating that we triage potential ICU patients based on age; but rather, these results serve as a call to action to improve communication and decision-making in this high-risk population and thereby improve EOL care for our very elderly patients.

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