Biagio Allaria
Editor

Practical Issues in Anesthesia and Intensive Care

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This is the English version of the Italian edition published under the title
Excerpta Anestesiologica – Volume 1, edited by Biagio Allaria

Translation: Jonathan C. Spurrell and Ludovica Arcelli Betts
The translation of this work has been funded by SEPS
SEGRETARIATO EUROPEO PER LE PUBBLICAZIONI SCIENTIFICHE

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ISBN 978-88-470-2459-5 e-ISBN 978-88-470-2460-1

DOI 10.1007/978-88-470-2460-1

Springer Milan Dordrecht Heidelberg London New York

Library of Congress Control Number: 2011940269

7 6 5 4 3 2 1 2012 2013 2014

Cover design: Ikona S.r.l., Milan, Italy
Typesetting: Graphostudio, Milan, Italy
Printing and binding: Fotoincisione Varesina, Varese, Italy

Printed in Italy

Springer-Verlag Italia S.r.l. – Via Decembrio 28 – I-20137 Milan
Springer is a part of Springer Science+Business Media (www.springer.com)

Preface

For specialists whose work involves caring for critical patients, it is particularly useful to assess matters that are of considerable interest in the management of such patients, where clear ideas and the ability to make important decisions quickly are necessary.

These assessments must be up-to-date and concise, and include clear and useful messages for clinical practice.

This has been our aim in compiling this easy-to-read work, with each question being addressed by an expert in that field, and with an assessment of the latest developments.

The material used to compile this book is taken from recent works that are arranged every year by *Medical Evidence Italia* for those who work in the fields of anaesthesia and resuscitation.

Medical Evidence Italia produces accredited updates for the Italian Ministry of Health. We would like to express our thanks to the Ministry, along with all the authors who have contributed to this book, Springer, who came up with the idea, and Jonathan C. Spurrell and Ludovica Arcelli Betts, who have translated it.

Milan, December 2011 Biagio Allaria

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Marco Dei Poli and Marco Resta

1.1 Introduction

Nearly every work on the issues surrounding intensive care for elderly patients starts out with the same premise: that in the western world the future is likely to bring a shortage of young people and an increasing number of over-80s.

The second premise is the growing impact of the elderly population on social, healthcare and pension systems, and on the need for an ethical justification of expenditure that is based on finite resources.

The third point is to identify prognosis markers that influence the admission to or refusal of more complex and costlier treatment, as well as the point at which treatment is withheld or withdrawn, taking into account the wishes of the patient and his or her family.

It is useful for us to begin with this premise, too. If, on the one hand, population aging is the result of improved living conditions in our society (referring to the western, or industrialised, world), there is, on the other hand, an urgent need for every country to bring its social and healthcare systems under control. In Italy at the moment, 20% of the population is over 65, compared to the European average of 15.7%. Eurostat predicts that within 50 years Italy's elderly will account for 33.4% of the total population. In terms of the very elderly (or the "oldest old", as the Americans say), Italy has the highest rate in Europe, with 3.9% of the overall population belonging to this category.

In biological and medical terms, an elderly person is someone who has reached a specified age, usually around 60 years. The end of adulthood marks the beginning of old age, followed by very old age (over 80 years) and then death. The most useful classification is that of *young old* (65-75 years), followed

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Biagio Allaria (ed.), *Practical Issues in Anesthesia and Intensive Care*

by *old old* (between 75-80 years and 85-90 years) and *oldest old* (85-90 years or more). The descriptions "survival beyond life expectancy at birth" and "life expectancy without disability" are equally useful.

But even these descriptions, even when adjusted, are essentially limited. We know from daily experience that age itself is rarely a reflection of the aging process. For example, a 40-year-old may be considered "old" because of heart and circulation problems while a 70-year-old may, on the other hand, have a "young" heart and arteries despite the obvious signs of aging. The elderly person may have retained a substantial amount of physical energy, and it is often the case that good memory, concentration, logic and creativity go hand in hand with the physical appearance of an old person as a result of advanced aging. However, there are those who, as well as maintaining relatively young physical characteristics, show the distressing signs of mental aging with short-term memory loss, impaired concentration, etc. These examples show that physical, or biological, aging often does not reflect psychological aging, and that making clear distinctions between the different stages of life, particularly aging and old age, is not only inappropriate but also leads to prejudice.

These concepts converge in the word "fragility", which is commonly used in gerontology to imply vulnerability to adverse events, with "fragile" having a worse outcome than "non fragile" in patients with a similar same state of health receiving the same care.

Furthermore, as previously stated, a so-called "demographic transition" is underway in the world, characterised by a drop in fertility and a corresponding reduction in mortality rates, especially among the elderly. The chances of surviving longer into old age are higher, leading to a relative swell in the number of elderly people, at an annual growth rate of 2%, which is higher than the overall population growth rate. This trend is expected to continue for at least 25 years.

Hospitalisation of elderly patients for acute diseases is on the rise, as is the demand for access to intensive care. In Europe, as in the United States of America, intensive care for elderly patients is the subject of much debate as well as a cause for concern. In Italy, the GiViTi database compiled by the Mario Negri Institute (Margherita II project) calculated an admission rate of 31.5% in 2006 for intensive care in over 75s for a total of 46,401 admissions. This rate was almost identical to admission rates for medical reasons (33.1%), elective surgery (31.9%) or emergency surgery (31.3%).

Most of the literature tends to regard old age as 80 years and over, but often the age limit for intensive care is considered to be 85.

Various issues arise in the wide-ranging debate on intensive care for elderly patients. The first issue concerns the decisions made during triage as to whether or not to admit a patient to intensive care. The second involves the admissions procedure, which often depends on length of time the patient is expected to stay in hospital, the use of resources and discharge procedures. The third issue concerns long-term success after intensive care in terms of death, quality of life and autonomy.

1.2 Admissions Criteria

It is understandable that the elderly, including the over 80s, should have greater access to intensive care [1]. Each day doctors working in ICUs (*intensive care units*) must make difficult decisions about who should be given rare, specialist beds and who should be refused. This is the process of triage. There are many reasons and circumstances for these decisions, which include the request for admission, followed by an assessment of the severity of the disease as well as an assessment of the number of beds available [2].

Triage is based on a probability assessment of the disease outcome, the expected effect of treatment on the disease, the predicted relationship between the benefit of treatment and the suffering involved for the patient and his or her family, and the social cost of treatment. The ethical and religious views of everybody involved are also taken into consideration, often without all the information that would ideally be required for triage.

Very few studies have been conducted on the triage process for over 80s in intensive care [3]. An analysis of studies into admissions and refusals for intensive care in all age brackets shows that the refusal rate varies greatly, from 23% to 72%. Factors associated with refusal of admission were advanced aged, significant comorbidity or pre-existing disabilities. The refusal rate in these cases was 72%.

Other studies show that only advanced age is a risk factor for death in intensive care [4]. Numerical age alone, however, would not be the sole reason for refusing to admit an elderly patient to an ICU, since there are many cases of favourable outcomes and a good quality of life after discharge [5]. Furthermore, it is interesting to note that the outcome of long-term care in elderly patients is affected more by pre-existing and underlying disorders that by age. This accounts for the growing availability of treatment for elderly patients in intensive care.

It has, however, been shown that the elderly, once admitted to intensive care, do in fact receive less care (mechanical ventilation, CRRT) than younger patients, once a statistical adjustment has been made for the severity of the disease [6]. It is also clear that the increase in admission rates for elderly patients in intensive care has not been matched by a similar willingness to provide intensive treatment. This is due to the potential harmful effects of radical treatment approaches, fear of failure and financial restrictions.

Nevertheless, it can be said that technological advancements and social progress have improved conditions for the admission of the oldest old to intensive care. Who, therefore, should we admit to ICUs, and which cases should be discussed?

It is easy to explain to those who, like the patient's family, do not spend every day in the ICU that the methods used in intensive care are a double-edged sword. It is clear from the now mandatory and widespread use of analgesia that a great deal of pain is often experienced in ICUs. Everyone can see that the artificial maintenance of vital functions may be nothing more than a temporary step towards increased autonomy for the patient.

Amongst other things, separation from loved ones, promiscuity and sometimes a conscious inability to communicate are evident and can be fully justified in young patients or in the event of unforeseen postoperative complications. But in the oldest old, in whom there is some uncertainty, these factors turn into a series of difficult questions regarding treatment. The problem is intensified when access to intensive care is requested by elderly patients with a poor short-term prognosis for related diseases (such as surgery-resistant or chemotherapy-resistant tumours, malignant tumours with a prognosis of under 12 months, or non-reversible, advanced, chronic organ failure), or when it is requested by immunodepressed patients, those with cachexia as a result of chronic malnutrition, or those with very advanced cognitive-behavioural disorders. It is very common for experienced care providers (internists, oncologists, endocrinologists, nephrologists) to base their judgements only on their area of expertise, often giving a favourable opinion regarding a patient's outcome based on the disease in question whilst failing to contemplate his or her overall condition and age. The concept of triage, especially in Italian culture, is often forgotten faced with the opportunity of admitting a patient to intensive care, often prompted by extensive medical technology and the "non-culture" of death.

As well as the provision of more space for geriatric patients, we shall discuss the reasonable use of resources and treatment approaches, a clear and coherent admissions protocol, full transparency with the patient's family and with other specialists, the use of objective criteria to assess the patient's prospects, the course, the time at which to alter the treatment approach, and above all a mature attitude regarding end-of-life care and the reduction of suffering.

1.3 Outcome

There must be a clear starting point when discussing the influence of age on outcome, in order to correctly understand the works that have been published on the subject.

Since intensive care for elderly patients is often postponed, those with the highest comorbidity can be underrepresented in case reports, leading to an excessively favourable view of the effect that age has on mortality rates [7]. However, the decision to withdraw or not to initiate aggressive treatment can lead to increased mortality in elderly patients, to whom this practice is more commonly applied.

Based on these premises, though, it seems reasonable enough to suppose that there is a relationship between old age (the *oldest old*) and favourable outcomes in intensive care. In a 1995 study [8] it was shown that the mortality rate in one hospital for patients with mechanical ventilation was 70% among the over-80s compared to 32% in patients aged less than 30 years.

Prematurely discharging elderly patients from ICUs may result in higher readmission rates, as demonstrated in a multicenter study in 30 ICUs in Austria [9].

Data from the SUPPORT study [10] show that the risk of death during a stay in an ICU increases by 1% per year from the age of 16 to 70, but by 2% per year after 70. In the Dutch NICE study [11] the death rate for over 85 year olds in hospital was four times higher than for patients aged under 65.

It may therefore be thought that it is rational to restrict the admission of over 80s to intensive care or even to limit treatment. To complicate the problem and prevent hasty conclusions, numerous studies based on multivariate analyses [12] show that age is not an independent predictor of mortality, and it is worth mentioning that not all octogenarians admitted for intensive care are lost causes. What, therefore, are the factors that affect the prediction of survival or death in this type of patient?

As stated above, assessments of outcome will be analysed based on a range of works available in the literature using the following criteria: intensive care length of stay (ICU LOS), hospital length of stay (Hospital LOS), type of severity score and points awarded (APACHE, II, SAPS II, etc.), ventilation rate, extent of intensive care according to type of care and number of points (TISS, NEMS, Omega), ICU mortality rate, hospital mortality rate, and long-term mortality rate with various follow-up periods (3 months, 1 year, etc.).

In various studies, the diagnosis on admission is a key factor when predicting the outcome. For example, the mortality rate for patients aged between 80 and 84 years who were diagnosed with an infection on admission to hospital is 85%, compared to 58% for patients in the same age bracket who had gastrointestinal disorders [8].

Treatment success for geriatric patients admitted with head injuries is known to be half that of younger patients in terms of mortality and brain function [13]. In a Dutch study of elderly patients receiving elective and emergency surgery [14], the survival rate is similar to that observed in the general population for elective surgery, whilst for emergency surgery the mortality rate after one year is about 65%.

Similar data emerge from a Spanish study [15] which assessed events following intensive care, i.e. in Intermediate Care Units (IMCUs), in which short-term mortality was correctly predicted based on the seriousness of the disease on admission and the extent of intensive care, while comorbidity mainly had an effect on mortality after one year. The age brackets used for these elderly patients were relevant only for long-term mortality.

The role of comorbidity has been widely explored in an attempt to identify accurate predictors of treatment success. Comorbidity is the overall effect of diseases that are unrelated to the main diagnosis on admission, but which contribute to the clinical outcome and economic consequences (use of resources, functional status on discharge and length of hospitalisation). Curiously, although it would be easy to imagine the potentially long list of major comorbidities seen in elderly patients on admission to ICUs, no studies are available that specifically cover the over 80s.

In studies conducted in patients who were not selected according to age, it is easy to observe that comorbidity is taken into account with the APACHE II and

III points systems, but not with SAPS II or the MPM (Mortality Probability Model). In these studies, the status of the chronic disease prior to admission to an ICU did not affect mortality, but the points system was a good overall predictor [16].

Other factors affecting the outcome of intensive care for elderly patients are malnutrition (expressed as baseline BMI (body mass index) and often diagnosed by internists, leading to delays in the restoration of bodily functions and a greater need for care at home [17]), delirium as a predictor of reintubation, prolonged hospitalisation and death [18]. Further complications that may influence prognosis include serious adverse drug reactions, hospital-acquired infections and bedsores [19].

1.4 Residual Quality of Life, Disability on Admission and Discharge

As with comorbidity, it has been suggested that the level of dependence (or rather the level of disability) may be associated with a worse prognosis on discharge from intensive care, leading to a debate on the use prognosis markers. In 2005 only 16 studies (conducted over a 13-year period) were available on the assessment of autonomy and residual quality of life following the admission of elderly patients to intensive care. In 1991 Mayer Oakes [20] showed that among the elderly survivors of treatment in ICUs, the number of entirely dependent patients was considerably lower than the number of non-survivors. In a more recent work [19] the prognosis of elderly patients in ICUs depended not only on the APACHE II score on admission, but also on the extent to which functional independence had been lost as well as the presence of cognitive impairment on admission. The ADL (activities of daily living) score has proved useful in this respect (Table 1.1).

Disability and comorbidity prior to the start of intensive care are both danger signs: this is confirmed by the fact that the peak mortality rate for the oldest old is three months after discharge from ICU [21].

Still more remarkable, however, is the assessment of disability symptoms on discharge from hospital in patients who have spent time in critical care: a much greater level of dependence may reduce quality of life to what would probably have been too low for admission in the first place. An example of this is a cohort of elderly patients without dementia for whom hospitalisation for a critical disease increased the risk of debilitating cognitive impairment in contrast with a control group that was not admitted to hospital [22]. In reality, in a 2005 review by Hennessy et al. [23] involving 3,347 patients from 16 studies, HRQOL (health-related quality of life) and functional status in elderly patients who survived intensive care is moderate, even if ADL independence in the various subgroups was considerably reduced in patients who stayed in ICUs for more than 30 days, as it was in those who stayed for more than 5 days.

There is undoubtedly a problem with the methods used to assess patient ability and quality of life. Regardless of any other considerations, excessive empha-

Table 1.1 ADL Point

Activity	Independence 1 point	Dependence 0 points
	No supervision, direction or personal assistance	With supervision, direction, personal assistance or total care
Bathing	Bathes self completely or needs help in bathing only a single part of the body such as the back, genital area or disabled extremity	Needs help with bathing more than one part of the body, getting in or out of the tub or shower. Requires total bathing
Dressing	Gets clothes from closets and drawers and puts on clothes and garments complete with fasteners. May have help tying shoes	Needs help with dressing self or needs to be completely dressed
Toileting	Goes to toilet, gets on and off, arranges clothes, cleans genital area without help	Needs help transferring to toilet, cleaning self or uses bedpan or commode
Transferring	Moves in and out of bed or chair unassisted. Mechanical transferring aids are acceptable	Needs help in moving from bed to chair or requires a complete transfer
Continence	Exercises complete self control over urination and defecation	Is partially or totally incontinent of bowel or bladder
Feeding	Gets food from plate into mouth without help. Preparation of food may be done by another person	Needs partial or total help with feeding or requires parenteral feeding

The table contains a series of activities that identify the level of autonomy of a patient. Points vary from 6 (complete autonomy) to 0 (complete dependence with total dependence in daily life).

sis on physical ability may underestimate the acceptance level for limitations in elderly patients who may in turn consider their affective and cognitive abilities to be moderately good.

Of the 1,266 patients aged over 80 included in the Hospitalized Elderly Longitudinal Project, very few said they would want to swap a longer life with varying degrees of disability for a shorter life of perfect health. In the study by Garrouste Orgeas [3] in a cohort of 180 over-80s, half stated that they did not want to be admitted to intensive care. In reality, autonomy did not deteriorate after admission, but in 60% of the survivors (50% of the 180 patients admitted) who were transferred to intermediate care facilities, quality of life (QOL) was decidedly worse than levels reported in previous studies.

Where care was withheld from a patient because of a bad prognosis based on mental performance on admission, it was seen that no prognosis markers had yet been made available to doctors and nurses [24]. Even with many limitations and areas for further discussion, it is currently only possible to use indexes that have already been authorised for rehabilitation facilities, but which are not appropriate for intensive care. Two of the most common indexes are included (Tables 1.2 and 1.3).

It is hoped that in future there will be many more contributions to this crucial debate in the literature, since intensive care patients and major users of resources are always most deeply involved.