

# The Baby Boom and later life: is critical care fit for the future?

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## Abstract

Populations around the world are ageing while in many developed countries the proportion of elderly patients admitted to critical care is rising. It is clear that age alone should not be used as a reason for refusing intensive care admission. Critical care in this patient group is challenging in many ways: with advancing age, several physiological changes occur which all lead to a subsequent reduction of physical performance and compensatory capacity, in many cases additionally aggravated by chronic illness. Subsequently, these age-dependent changes (with or without chronic illness) increase the risk for death, treatment costs and a prolonged length of intensive care and hospital stay. This review explores the potential of using co-morbidity and frailty to predict outcome and to help to make better decisions about critical care admission in the elderly.

The authors explore the challenges of using different frailty assessment tools and offer a model for holistic approach to answer these questions.

Anestezjologia Intensywna Terapia 2017, tom 49, nr 5, 452–455

**Key words:** elderly, frailty; critical care, outcome

Populations around the world are ageing [1]. In 1948, early in the post-war Baby Boom and the year in which the NHS was founded, 48% of the UK population died before the age of 65. This proportion has now fallen to 14% and by 2040, one in seven people in the UK will be aged over 75 years [2]. However, as recently observed by the UK Chief Medical Officer, although life expectancy is rising, overall morbidity in the UK appears to remain unchanged [3]. For healthcare and social systems, this ageing demographic poses an unprecedented challenge to deliver equitable care to appropriate patients.

In many, but not all developed countries, the proportion of elderly patients admitted to critical care is rising [4–6]. Historically, the oldest critically ill patients have received a lower intensity of therapy those who are younger [7]; however, recent trends suggest that the treatment intensity among

elderly patients is also increasing and, perhaps as a consequence, some have observed a fall in the risk-adjusted hospital mortality for older ICU patients [4, 5].

## HEALTH TRAJECTORIES AMONG OLDER PATIENTS

There are four major trajectories which have been identified among older decedents using medical claims data from more than 15 years ago [8]. The distribution of healthcare resource utilization for these four “final pathways to death” have been unchanged, with approximately 7% of patients experiencing a sudden event (trauma, cardiac arrest), 20% a quick decline in function, typically within 6–8 weeks before the end-of-life secondary to cancer, 16% worsening organ failure due to relapse of their chronic disease and almost 50% having significant frailty with at least one diagnosis of stroke, dementia, Alzheimer’s disease, Parkinson’s disease or hip fracture [8].

**Należy cytować wersję:** Pugh R, Subbe C, Thorpe C, Szakmany T. The Baby Boom and later life: is critical care fit for the future? *Anaesthesiol Intensive Ther* 2017, vol. 49, no 5, 441–444. doi: 10.5603/AIT.a2017.0078

The last group has the largest healthcare resource use during the final years of life and are often admitted to hospitals from nursing care facilities [8, 9]. However, as symptom control and supportive care for the mainly neurocognitive dysfunctions improve, many from the baby-boomer population will be admitted from home, where they have become used to increased help and support from families or caregivers outside of the healthcare sector.

Critical care admission in this group varies considerably between western countries [4, 6]. Interestingly, although critical care outcomes are generally improving amongst the elderly, resource limitations will almost certainly play a role, and there is likely to be variation in triage criteria applied to certain patient groups before admittance to the ICU [10]. It is clear that on the societal level, admission of elderly patients to the ICU provides diminishing return (from 22 QALYs in those under 65 years old to 4.1 QALYs to those over 80 years old) but also that chronological age is too crude a criterion by which to select ICU candidates [11].

### OUTCOMES FROM CRITICAL ILLNESS IN THE ELDERLY

Age is a robust predictor of poorer short- and long-term outcomes following critical care admission [4, 12, 13]. However, the “mortality benefit of intensive care admission”, meaning the difference in mortality between those admitted to intensive care and those refused admission, appears greatest among the oldest referrals to critical care [14]. Declining ICU admission purely on the grounds of age is unjustified, and data which can aid prediction of survival, short- and long-term resource requirements, functional dependence, and quality of life following critical care admission in older patients are, therefore, essential for informed discussion and decision-making for clinicians, patients and their families.

Examining age cohorts, of those aged 80 years and over admitted to an ICU, approximately half do not survive to hospital discharge; at 12 months, mortality rises to 70% and at 24 months to 80% [13, 15]. Strikingly, for those aged over 85, the use of vasopressor therapy in ICU is associated with 97% mortality at 12 months, according to some investigators [13]. Comparing those aged 65 or over with those under 65, 3-year survival among ICU survivors is significantly worse (57% versus 40%), with the majority of the deaths in those over 65 occurring within the first month of discharge [11].

For longer-term survivors, mechanical ventilation is associated with a significantly higher level of disability among elderly patients twelve months after discharge when compared with a hospitalised cohort not requiring this level of support [16]. Sepsis too appears to lead to persistent cognitive and functional disability for years compared with hospitalisation for other reasons [17]. Despite this, quality of

life following critical illness appears comparable to that of patients from age-matched controls. Thus, emotional well-being and social functioning often return to the expected range, despite physical limitations [18, 19].

### FRAILITY AND CRITICAL CARE

Clearly, there is a spectrum of comorbidity and of pre-existing dependence and disability which will affect outcome from critical illness. However, the concept of “frailty” — described as “a condition characterized by loss of biological reserve and vulnerability to poor resolution of homeostasis following a stressor event” — is relatively new to critical care [20]. Although frailty is not exclusive to older populations, it becomes more common with age and is considered a phenomenon distinct from chronic illness. Among frail patients, recovery may be more protracted and incomplete, with persistent physiological instability and continued vulnerability to further stresses.

In the wider literature, a number of methods to capture and quantify frailty have been described [21–24]. To a varying extent, these methods attempt to identify frailty on the basis of a number of relevant domains, including nutritional status, physical activity, mobility, energy, strength, cognition, mood, and social support [23]. These domains have typically been operationalised in terms of an assessment tool which identifies frailty according to a phenotype (e.g. the presence of 3 or more frailty factors) or cumulative deficits (e.g. on the basis of the presence or absence of variables as a proportion of the total number of items in a frailty index). Some frailty assessment tools may be considered relatively “short, fast and crude” and others “sophisticated” and potentially “time-consuming”. It is, therefore, clear that the appropriateness of a particular tool will depend upon the setting, the purposes of the assessment, the background of the assessor and the time available [22, 24]. The majority of the 38 frailty assessment tools identified in a recent systematic review had been applied in a community setting, and among which only two had evidence of reliability and validity that appeared statistically significant, namely: the Frailty Index- Comprehensive Geriatric Assessment (FI-CGA) and the questionnaire-based Tilburg Frailty Indicator (TFI) [24].

For critical care, there are particular challenges. A critically ill patient may be unable to participate in interviews, or to complete questionnaires, or to demonstrate gait speed or grip strength. A reliance on proxies brings into question the validity of responses (compared with those which might have been provided by the patient themselves). Furthermore, it may be difficult to make a distinction between features of acute illness and those better attributed to underlying frailty.

A recent systematic review focused on study of the prevalence and outcomes from critical illness among frail versus non-frail cohorts [25]. The included studies all utilized

the Clinical Frailty Scale — a 9-point ordinal scale — which may lend itself to the critical care environment, perhaps as one such “short, fast and crude” measure, while four also used a frailty index and two, a frailty phenotype assessment. This review provided useful evidence of the predictive validity of frailty assessment in critically ill populations, with a significant association between frailty and both in-hospital and long-term mortality, as well as increased likelihood of discharge disposition other than home [25].

Moreover, the subsequently published VIP-1 study, including a contemporary cohort of over 5,000 patients over the age of 80 years from 311 ICUs in 21 European countries confirmed that the increasing scores on the Clinical Frailty Scale assessments were independently associated with increased ICU and 30-day mortality, regardless of the elective or emergency nature of the ICU admission [26]. Although the simple Clinical Frailty Scale appears to be a useful adjunct when deciding about ICU admission, the wider psychometric properties of frailty assessment in the critically ill have been under-explored, while the ideal method of assessing frailty in this population is still unclear [27].

### **FRAILITY MEASUREMENT AS APPLIED TO CLINICAL PRACTICE**

Study of the interplay of age, frailty and critical care outcome has exploded in the last decade, though as yet little appears to have impacted directly on the practice of critical care medicine. For those with a particular susceptibility to the effects of critical illness, in terms of short- and long-term mortality, longer term dependence, disability and quality of life, an understanding of frailty may guide expectations, inform discussions and perhaps aid clinical decision-making. The need is pressing, as although we currently lack a comprehensive business intelligence, the demand on critical care services posed by an ageing population will be hugely significant.

For many patients, the identification of frailty could theoretically trigger a number of interventions, which might include specialist geriatrician input, and/or particular attention to processes relevant to an older population, for example, nutrition, mobilization, and screening for delirium [28]. It is clear, though, that an evidence-base for interventions targeted at the frail critically ill is currently absent.

In the last decade, much effort has gone into promoting the need for co-production of treatment goals on the ICU, though most discussions regarding advanced care and limitation of treatment are taking place with patients who suffer from cancer [29]. Despite the widespread belief that shared decision-making is firmly embedded in clinical practice, a recent French study reported that only 13% of elderly competent ICU patients had been asked about their treatment preferences [30]. Studies from both North America

and Europe also documented that information about a patient’s wishes regarding EOL decisions was available in only 20% of competent patients [31, 32]. Outside the Western hemisphere, a recent study of elderly patients in an ICU similarly reported that pre-acute event advance directives were documented in less than 3% of reviewed cases [33]. It is clear that much work is required to ensure that patients’ wishes are systematically sought after in elderly patients, especially since recent data suggests that patients and caregivers in the elderly population are more likely to choose comfort measures and less-intensive treatments, when the prognosis and interventions are explored in detail [29].

Many patients and families are uncertain, and sometimes unwilling to address end-of-life discussions during an acute deterioration leading to hospital admission [31]. However, many will be acutely aware of their increasing frailty and growing dependence on outside help. This common understanding could help the health care providers to initiate these difficult conversations with patients and carers.

Recently, Flaatten *et al.* [10] compiled a list of ten important critical care trials urgently needed in this field. Thus, the need for greater epidemiological understanding, the lack of objective assessment tools for prognosticating in this group and, possibly most importantly, the lack of understanding on how patients and relatives would view the prospect of ICU admission and the resulting burden, underline the fundamental issues facing our specialisation [10].

### **CONCLUSIONS**

To the bedside clinician, it is clear that we will deal with an increasing number of older patients. In order to meet and manage the expectations of patients, their families and fellow clinicians, it is likely that critical care will need even greater engagement in the discussion over the goals of care in this population. In practice, this may mean giving informed advice on the description of different treatment modalities, their effects and side-effects, as well as on a probable range of outcomes. This is dependent on healthcare systems in those developed countries particularly affected by the Baby Boom surge and preparing for the coming tide. In particular, with the advent of increasingly integrated electronic health care records, the degree and progression of frailty could theoretically be identified well before the patient needs critical care admission. Though work to demonstrate the validity and reliability of such methods is still at an early stage, the appeal of this while working in an increasingly digital environment is significant. In particular, the early identification of older patients particularly at risk for acute deterioration should provide a timely opportunity to discuss and share goals of care. Rearranging the critical care workflow, incorporating these discussions and identifying the particular needs of a frail

population much earlier in their journey may significantly help preparations for the impact of an ageing Baby Boom generation on critical care.

## ACKNOWLEDGEMENTS

1. Source of funding: none.
2. Conflicts of interest: none.

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Otrzymano: 1.10.2017 r.  
 Zaakceptowano: 12.11.2017