

# Measuring Outcomes After Critical Illness

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## KEYWORDS

• Critical illness • Survivorship • Disability • Functional status

## KEY POINTS

- Heterogeneity in studies of survivors of critical illness limits knowledge of outcomes. Conceptual models of outcomes developed in other fields can be used to understand better outcomes after critical illness.
- Outcomes after critical illness fall into 5 distinct, but interrelated, domains.
- Knowledge of the 4 components that comprise functional status (functional capacity, functional performance, functional reserve, and functional capacity utilization) serves as a foundation for understanding the dynamics of functional outcomes after critical illness.
- Impairments and disabilities are related but not synonymous.
- Careful consideration of these models is needed when selecting an outcome of interest for clinical trials and observational studies.

## INTRODUCTION

Critical care medicine, in its modern form, has been in existence for more than a half century. Since its inception, several shifts in the focus of care have occurred.<sup>1</sup> In the 1960s and 1970s, when the first modern intensive care units (ICUs) were established, the goals of care were to resuscitate shock and to support via mechanical ventilation. Once our specialty became familiar with these therapies, we began to look for ways to improve outcomes for patients with critical illness. This effort ushered in the era of the 1990s and 2000s whereby numerous clinical trials that focused on reducing mortality were conducted and modern evidenced-based critical care became possible. Mortality from critical illness began to decline as the result of these trials and our growing experience in caring for the critically ill.

These long-sought-after reductions in mortality, however, revealed a new problem facing critical care medicine: a growing number of patients who survive their illness.

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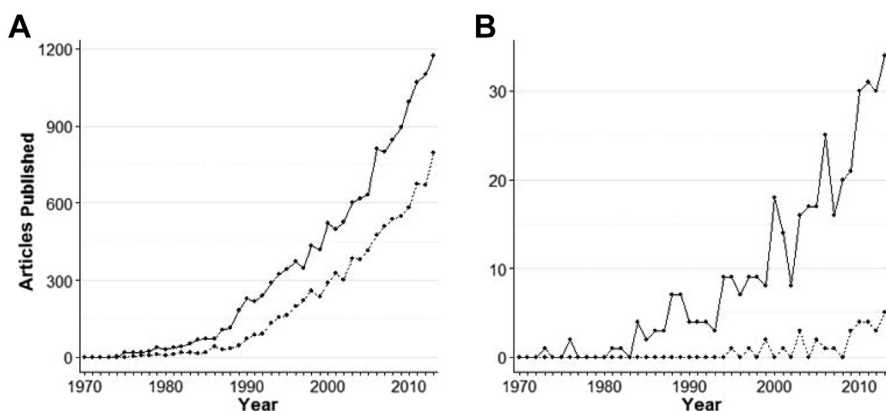
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Some of those who survive critical illness with recover with no or only minor sequelae of their illness. Others will suffer with newly acquired (or worsened) alterations to physical, cognitive, and mental health function that alters their lives in fundamental ways, including in the ability to live independently. Thus, the focus of the modern era of critical care medicine has expanded to not only save lives while patients are in the ICU but toward a goal of understanding and improving the long-term outcomes after critical illness.

Yet many factors contribute to our limited knowledge about outcomes after critical illness. First, relatively few studies have been published as illustrated by a comparison of the number of articles published in critical care medicine in contrast with those studies focused on outcomes among survivors of critical illness (Fig. 1).<sup>2</sup> Although the number of published studies in both critical care in general and in critical illness survivorship has increased since the beginning of our field; those with a focus on critical care outpace those focused on survivorship nearly 40 to 1. Second, these studies are heterogeneous. For example, a scoping review of cognitive, physical, and mental health outcomes in survivors of critical illness found that in the 425 articles published on the topic over the past 40 years, 250 different tools were used to assess outcomes.<sup>2</sup> Third, the outcome domains considered important differ between researchers and survivors and their families.<sup>3</sup> As a first step toward standardizing outcomes, a consensus panel composed of clinicians, researchers, patients, and funding agencies used a Delphi process to address these gaps through the development of a core outcomes set for survivors of mechanical ventilation.<sup>4</sup> Nevertheless, additional work to understand better outcomes after critical illness remains.

A second means by which to inform outcomes used in clinical trials is to increase the understanding conceptually how clinical variables are related to outcomes, such as functional status and health-related quality of life. Although the study of outcomes



**Fig. 1.** Critical care publications from 1970 until 2013. (A) Demonstrates the overall number of publications in critical care (solid line) and the number of randomized trials in critical care (dashed line). (B) Demonstrates the number of publications focused on outcomes among survivors of critical illness. As with (A), the solid line represents the overall number of publications and the dashed line represent the number of randomized trials. Although both panels demonstrate that the number of publications and randomized trials have increased over time, the scale of the y-axes should be noted. The number of overall publications is approximately 40 times larger than number of publications focused on outcomes for survivors of critical illness. (From Turnbull AE, Rabiee A, Davis WE, et al. Outcome measurement in ICU survivorship research from 1970 to 2013: a scoping review of 425 publications. *Crit Care Med* 2016;44(7):1267–77.)

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