

Improving the long-term outcomes after critical illness



Heterogeneity in studies of survivors of critical illness limits knowledge of outcomes in this patient population. Conceptual models of outcomes developed in other fields can be used to better understand outcomes after critical illness, says Nathan E. Brummel, MD, MSCI, Department of Medicine, Vanderbilt University Medical Center, Center for Quality Aging, Nashville, TN.

The emergence of modern evidenced-based critical care has helped reduce mortality from critical illness. "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," notes Dr. Brummel in an article to appear in the journal *Critical Care Clinics*.

"Some of those who survive critical illness will 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 towards a goal of understanding and improving the long-term outcomes after critical illness."

Outcomes after critical illness fall into five distinct, but interrelated, domains as described in the model proposed by Wilson and Cleary. These outcome domains consider the effects of individual and environmental characteristics.

1. Biological and physiologic variables. In this first domain, outcomes describe the function of cells, organs, and organ systems. These outcomes comprise measures that are focused on the pathophysiologic basis of disease, physiologic outcomes, and clinical outcomes (e.g., physical examination findings, laboratory data, and other biomarkers of organ function).
2. Symptoms. This second domain is focused on patients' subjective perceptions of abnormalities in physical, emotional, and cognitive states that are integrated from several sources. Symptoms (e.g., pain, fatigue, anxiety) can be related to biological and physiologic variables (e.g., pain and a broken leg) but not always (e.g., dyspnoea and left ventricular ejection fraction). Thus, interventions that target biological and physiologic variables may not affect symptoms.
3. The third domain, functional status, defines an individual's ability to perform a defined physical, cognitive, or social task or set of tasks (e.g., self-care activities, test of cardiorespiratory fitness, test of cognition). Functional status integrates biological and physiologic variables and symptoms along with factors related to individuals (e.g., intrinsic motivation) and environment (e.g., modifications to one's home environment for a wheelchair, using lists to remember things).
4. The fourth domain is health perception – the subjective integration of biological and physiologic variables, symptoms, functional status, and mental health. Perceptions can vary widely from patient to patient (e.g., some may care very little about major health problems and some may care a lot about minor health problems).
5. Health-related quality of life (HRQOL). HRQOL describes one's satisfaction and happiness as related to one's health. Those with significant impairments in function or disabilities can have high levels of HRQOL related to the fact that people may change their expectations and goals as life circumstances change (e.g., adjust to the new normal).

Because HRQOL represents patients' perspective on life based on the integration of objective and subjective data (with each of these interacting at multiple levels), interventions that target different domains (e.g., biological or physiologic variables, symptoms, or functional status) may not alter HRQOL. "This key point has important implications for researchers when considering outcomes for clinical trials and may explain, in part, the negative findings of trials focused on the recovery of survivors of critical illness," says Dr. Brummel.

Another conceptual model links critical illness with the ability to perform independent activities of daily living (ADLs). Also, several models describing how acute illness or injuries can result in impairments and disabilities have been proposed. One of the most informative of these models is that proposed originally by Nagi in the 1960s and adopted by the World Health Organization in 1980. This framework states that diseases, illnesses, and injuries (pathology) lead to anatomic, physiologic, mental/cognitive, or emotional abnormalities in body structures and functions (impairments), which in turn lead to the inability to perform physical and cognitive tasks (limitations), which decreases the ability of patients to perform routine self-care activities (disabilities).

"The study of outcomes after critical illness is a new field, and wide-ranging knowledge is being generated to describe outcomes after critical illness. A better understanding of conceptual models of outcomes research is needed to move the field forward," the author writes. "Informed by

existing models of outcomes domains, functional status, and the disability process, advances in the study of outcomes after critical illness will facilitate the design and conduct of future interventional trials."

Source: [Critical Care Clinics](#)

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