Allocating Resources Across the Life Span During COVID-19—Integrating Neonates and Children Into Crisis Standards of Care Protocols

Pandemics rarely affect all age groups equally. Historically, pandemic influenza has disproportionately impacted children. Coronavirus disease 2019 (COVID-19) primarily threatens adult populations. Yet in many hospitals, critical care resources are shared between adult and pediatric patients. Most ventilators can be used to treat both adults and children. Other resources—including medications, physical space, and staff—can be shared too.

Most protocols for resource allocation in the setting of scarce critical care resources urge hospitals to enact policies that apply to all patients in need of critical care resources—for example, a patient with a congestive heart failure exacerbation should compete for the same resources as a patient with a respiratory failure related to COVID-19. According to this framework, critically ill neonates and children, regardless of COVID-19 status, must be accounted for in hospital resource allocation protocols.

However, most policies struggle to lay out what to do when adults and children vie for the same resources. Adult allocation protocols typically focus on 4 variables: the predicted in-hospital mortality; short-term mortality, usually defined as a 1-year mortality risk; near-term mortality, usually framed as the risk of mortality over the next 5 years; and maximizing the total number of life-years saved. Widely adopted adult resource allocation protocols rely on the Sequential Organ Failure Assessment (SOFA) score to assess in-hospital mortality. The SOFA has been adapted to pediatric (pSOFA) and neonatal (nSOFA) populations. Although both of these scores show promise, they lack sufficient validation data to support widespread use in allocation protocols as isolated metrics.

How can resource allocation protocols be meaningfully translated to the pediatric population? Some advocate for a so-called life cycle approach, which contends that children should receive priority because they have not yet had a chance to experience the full range of life experiences. Protocols designed to save the most life-years favor children, although several such protocols have been urgently revised in response to concerns that they discriminate against those with disabilities and those from vulnerable populations who experience chronic diseases. Most protocols give preference to children over adults only in situations in which a tiebreaker is needed.

We offer several recommendations for how to allocate resources across the life span. First, protocols must account for the challenges associated with assessing in-hospital, short-term, and near-term mortality in neonates and children. We advocate that pediatric analogues of adult scoring systems be used to assess the immediate risk of mortality from the current illness. In pediatric critical care populations, the Pediatric Logistic Organ Dysfunction Function 2 score has been validated to predict mortality risk in children with multiorgan dysfunction between birth and 18 years.

Second, to address limitations in all available scoring systems, we recommend reserving the use of objective scoring systems for clinical conditions for which they have been developed. For some children, especially those with rare diseases and preterm infants in the weeks after birth, no appropriate scoring system will be available. In these cases, we recommend relying on clinical judgment to estimate in-hospital mortality, informed by experts in the relevant field. These assessments should be guided by the best available evidence and informed by the acute severity of the child’s illness and epidemiology of his or her condition. Given the potential subjectivity of mortality assessments, such judgments should be subject to appeal and regular review. A top priority in critical care research should be to work toward the development and/or validation of a measure designed to predict mortality risk across neonatal and pediatric populations, including premature infants. This should include the prospective validation of the neonatal and pediatric SOFA scores across age groups, disease conditions, and centers.

The assessment of short-term (1-year) and near-term (5-year) mortality also differs between adults and children. In adults, these risks are typically associated with adult-onset comorbidities, such as heart failure or emphysema. In children, these risks are more commonly related to chromosomal abnormalities, metabolic diseases, and congenital anomalies. Since objective tools for comparing risks across age groups do not exist, clinical judgment guided by expert opinion is currently the best way of making these apples-to-oranges comparisons.

Third, allocation protocols should disentangle disability status from mortality risk. Allocation protocols should not give lower priority to people with non-life-
limiting disabilities. This principle is particularly relevant in neonatal and pediatric critical care populations in which underlying neurologic diagnoses are common. Any comorbidities outlined in resource allocation protocols should be exclusive to those portending an elevated mortality risk and avoid reliance on judgments about quality of life. For patients with baseline disability, care should be taken to ensure that objective measures (for example, measures that use the Glasgow Coma Scale) do not penalize baseline impairment.

Neonatal and pediatric outcome data often conflate mortality risk with risk of neurologic morbidity. Many children who die in the setting of intensive care do not die because advanced medical treatment could not keep them alive. Instead, they die after parents and clinicians make a decision to withdraw or forego life-sustaining treatment in the face of the potential for significant neurologic morbidity. Many outcome studies lack the granularity necessary to separate what proportion of children die after such a decision from those who would die regardless of intervention. Assessment of in-hospital, short-term, and near-term mortality should focus on assessment of mortality in isolation.7

Fourth, hospitals must outline a triage process that promotes equity across the life span. Triage teams should include members with expertise in both neonatal and pediatric critical care. For some hospitals, this may take the form of a single integrated team. At hospitals with high volumes of neonatal and pediatric patients, a dedicated pediatric triage team may be more appropriate. Hospitals must identify a streamlined process for adult and pediatric triage teams to communicate about resource availability in real time and to adjudicate between adults and children in the absence of a unifying measure.

Hospitals should take active measures to protect against explicit and implicit bias. Many resource allocation protocols suggest that triage officers should have access only to objective information about mortality risk from scoring systems. This protection will be more challenging to operationalize for situations in which clinical judgment is necessary. Pediatric triage officers should receive training in (1) the recognition and avoidance of implicit bias, (2) the protection of the rights of those with disabilities, and (3) the impact of social inequalities on health outcomes.8 All triage teams should include diverse stakeholders attuned to the intersection between social determinants of health, baseline disability, and mortality risk. Triage decisions and the mortality assessments that underlie them should be documented, regularly reviewed, and subject to appeal.

Shared resource allocation protocols must address the unique challenges posed by assessing mortality risk in neonates and children. To address the threat of critical care shortages amid COVID-19 and beyond, health systems must develop and implement protocols that ensure equity across the life span.

ARTICLE INFORMATION
Conflict of Interest Disclosures: Dr Lemmon reported receiving salary support from the National Institute of Neurological Disorders and Stroke and compensation for medicolegal work. Dr Truog reported receiving salary support from the National Institute of Neurological Disorders and Stroke and compensation for his contribution. Other authors did not report any financial compensation for his contribution.

REFERENCES