

Children's Hospital ICU Resource Allocation in an Adult Pandemic

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Imagine the following situation: A 25-year-old is intubated in the emergency department for coronavirus disease 2019 (COVID-19)-related acute respiratory distress syndrome. The adult ICU is full. The nearby PICU has many available beds and staff. The pediatric intensivist and their administrators must decide how to respond. Do ethical considerations permit, require, or forbid extending PICU care to this adult patient?

Two features of the COVID-19 pandemic make situations like this increasingly likely. First, there is significant variation in disease incidence. Adults are at much higher risk of serious COVID-19-related illness requiring ICU care than are children.^{1,2} Children generally have had fewer infections and milder disease.^{3,4} Second, there is significant variation in available capacity. According to the Society of Critical Care Medicine, there are only 68 558 adult ICU beds, 5137 PICU beds, 22 901 NICU beds, 25 157 step-down beds, and 1183 burn beds in the United States today.⁵ In a moderate or severe outbreak, with tens of thousands of adults requiring ICU care,¹ the need will quickly outstrip available resources.⁶ Children's hospitals, by contrast, likely will have surplus capacity. We are at the end of the typical influenza and respiratory syncytial virus seasons. We have canceled nearly all elective surgery nationwide, easing demand for postoperative care in the PICU. This has left many children's hospitals with excess ICU resources.

Excess demand in adult ICUs, combined with excess capacity in PICUs, raises an important ethical question: Should pediatric resources, including staff, ICU beds, and ventilators, be made available to treat adults who are critically ill, and if so, to what degree?

There are two ways that resources could be shared: importing patients or exporting resources. Through import, PICUs begin admitting and caring for older patients, expanding their patient population. Through export, health professionals and medical equipment are transferred temporarily from children's hospitals to adult ICUs. The trade-offs among available choices are clear. Choosing either option would leave fewer resources for children. But rejecting both options means that more adults will likely die.

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The ease of sharing depends in part on the location of the children's and adult hospitals and ICUs. In children's hospitals that are physically part of larger medical centers, sharing is simpler. Staff, patients, or equipment could be moved from one unit to another within the center. In freestanding children's hospitals, especially those that are distant from general hospitals, sharing requires more thought and anticipatory planning. Although the logistics differ, the ethical issues are the same.

Decisions can be made by individual hospitals or through coordinated efforts at the regional level. The latter better comports with the ethical principle of justice, which requires fair and impartial sharing of benefits and burdens. In this crisis, individual hospitals should not withhold resources from other hospitals in their community, or even in other parts of the country, that are in desperate need. These decisions will need to be made on the basis of best estimates of the pandemic course balanced with the ongoing needs at each facility, community, region, and country as a whole. In any scenario, clinicians and administrators will each face different ethical challenges.

Clinicians must weigh the ethical demands of practicing outside their usual scope of practice and comfort against the ethical principle of justice that would require them to accept their fair share of burdens to meet urgent needs in the community (ie, to reduce suffering and save lives). Pediatric and adult physicians and nurses are, of course, not entirely interchangeable, and pediatric clinicians should not be expected to care for 60-year-olds with advanced comorbidities. However, although it is not ideal, many PICU staff could, in a crisis, provide safe and adequate care for adults with respiratory failure, a common PICU disease process. At the least, this should be considered for patients up to the age of 30 and, perhaps, even for older

patients depending on the urgency and gravity of the circumstances. Decisions regarding upper age limits for admitted patients should be considered proactively, in cooperation with adult hospitals, in anticipation of a surge of patients. This will be an ongoing process of negotiating and coordinating resource sharing on the basis of current conditions.

Administrators, meanwhile, must balance the primary mission of a children's hospital (to prioritize the care of children) with acting in solidarity with the community of hospitals (within the principle of justice) by providing scarce critical resources to help save adult lives. Even during a pandemic, children's hospitals still will need to serve all the patients who currently and potentially require PICU care for needs unrelated to COVID-19, including those needing postoperative care for emergency surgeries, trauma, sepsis, etc. Moreover, those children with complex chronic conditions who develop COVID-19 will require the expertise that only PICU professionals can provide.

Children's hospitals have a mission to care for children, and PICU staff have special expertise in the care of children; COVID-19 does not change that. A PICU accepting adult patients, along with its adult hospital partners, must coordinate triage between children and adults. If a child and adult both have complex heart disease with similar prognoses, triage protocols should prioritize PICU access for the child because this might be the only regional institution with the special expertise needed to properly care for such a child. Still, with anticipated excess capacity, we believe that children's hospitals can meet their primary mission and still increase the maximum age of patients who they will admit. This bending of usual standards is appropriate and serves the principle of justice.

The questions are tougher when NICUs and their resources are considered. NICUs may not have excess capacity. NICUs cannot control the number of admissions they see. They do not have elective admissions that can be canceled. Rates of premature birth can be expected to remain steady or, perhaps, increase during the stress of a pandemic. Still, some NICUs may have more resources than they expect to need.

Adults cannot be admitted to NICUs, but some NICU resources could be allocated for older children and adults, including ventilators and intravenous pumps, many of which can be adapted for use in adult patients. We recommend that each NICU consider its average daily census to strategically plan for anticipated needs. If they have sufficiently greater resources than are likely to be needed to care for the anticipated patients and if those resources, such as equipment or staff, could benefit older children or adults, then they should be shifted upward toward PICUs and adult ICUs.

The unique challenge of the COVID-19 pandemic will require children's hospitals and clinicians to balance their primary commitment to children, their expertise in the care of children, and justice in the allocation of desperately needed scarce resources. There are strong ethical grounds, based on considerations of justice and social utility, for treating all ICU resources (whether neonatal, pediatric, or adult) as equal during a pandemic. There are equally strong grounds from the standpoint of solidarity for accepting that child health professionals may need to practice outside their comfort zones if their services can be beneficial for adults who are critically ill.

As pediatric clinicians confront this pandemic, they will be called on to make difficult decisions under nonideal conditions. How well they navigate this unique challenge will

depend on an extraordinary balancing of ethical tensions between their commitment to individual children and the larger needs of the community.

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ABBREVIATION

COVID-19: coronavirus disease
2019

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