Pediatric in-hospital cardiac arrest and therapeutic hypothermia: Where we are and where we are going*

Induced therapeutic hypothermia (TH) after cardiac arrest in adult patients may be one of the most important developments in post-arrest care in the last decade. From the time of the publication of two landmark studies (1, 2), most centers now employ this therapy. TH is appealing in its relative simplicity and its ability to improve neurologically intact survival as well as its potential to extend the period of low-flow time (i.e., time receiving cardiopulmonary resuscitation [CPR]) that the patient can tolerate. Within the pediatric critical care community, there is keen interest in learning if postarrest hypothermia will be beneficial in children. In this issue of Pediatric Critical Care Medicine, Meert and colleagues (3) have published an important study, the primary purpose of which was to describe patient characteristics, cardiac arrest events, and outcomes necessary for the design of a study of TH in pediatric patients. These observations themselves, however, add greatly to our general understanding of in-hospital cardiac arrest in children.

Studying cardiac arrest is not easy. These events often occur capriciously and the underlying physiology and arrest-inciting events vary widely—from electrolyte derangement to progressive hypoxia to sudden arrhythmia. Despite a protocolized approach from the Pediatric Advanced Life Support training that most clinicians use, specific interventions and therapies remain at the discretion of the code team and are variable. Gathering the data to best understand an arrest event and the conditions leading up to it is challenging after the windstorm of activity that is often a cardiac arrest.

The evolution of the study of cardiac arrest has been interesting. Early work varied widely in the end points examined, making studies difficult to compare. Therefore, leaders in the field met at Utstein Abby near Stavanger, Norway, in June 1990 to agree on a framework for uniform reporting in CPR (4). This initiative advanced immeasurably our ability to learn from arrest events and essentially all publications in CPR since this consensus conference have followed the “Utstein Style” (5). Through the American Heart Association, several member hospitals now participate in the National Registry of Cardiopulmonary Resuscitation. This has yielded several benefits, including the ability of members to compare their institutions with the aggregate for ongoing quality improvement. In addition, the National Registry of Cardiopulmonary Resuscitation is a robust database on in-hospital CPR available to researchers for scientific inquiry. Several important contributions to the pediatric medical literature attest to this (6–8). The authors of the present study note correctly that the National Registry of Cardiopulmonary Resuscitation database is limited in its ability to report exhaustively on all possible variables in CPR. This is not by accident as the National Registry of Cardiopulmonary Resuscitation balances the desire to gather as much data as possible surrounding a cardiac arrest against the workload required to do this by member hospitals. Keeping the data collection requirement manageable has been important in maintaining member participation. For the detail needed to answer difficult questions in an expanded patient population, we have PECARN. As a federally funded research network, PECARN can design and implement studies beyond the scope of other research networks, answering the most complex research questions using a full breadth of data.

To this end, Meert et al have achieved a great success. The GIGO (Garbage In, Garbage Out) phenomenon of computer programming applies here. The final results of any process can only be as good as the quality of the original data examined. During the data collection process for this study, nearly 20% of the abstracted records were reviewed by the investigators in 27 areas. They achieved an accuracy of >96%. The quality of these data should confirm our belief in the certainty of the conclusions drawn.

There are several interesting findings in this study. First, CPR for pediatric in-hospital cardiac arrest is not futile, despite the fact that many still believe this. In 353 cases of cardiac arrest with a sustained return of spontaneous circulation for >20 mins, 172 (48.7%) survived to hospital discharge, 124 of whom had no change in their neurologic status from their prearrest baseline. A pediatric code is not a time to despair, but rather to focus one’s efforts on good-quality CPR to produce the best outcome.

Second, the authors developed three elegant logistic regression models from these data to predict hospital mortality. The presence of hematologic, oncologic or immunologic disease (odds ratio = 2.61) or electrolyte imbalance (odds ratio = 3.35), among other factors, was positively correlated with mortality.

Third, there is the question of who is at highest risk of cardiac arrest. Predicting this will be increasingly important because effective resource utilization requires us to place the patients at highest risk in the safest environments, often pediatric intensive care units. In this study, most patients were <1 yr of age with a preexisting chronic condition, often cardiac in nature, or respiratory failure. Some researchers in our community believe that any unmonitored arrest in the hospital represents an error in care, specifically patient placement, and should be reviewed as a sentinel event. One large pediatric intensive care unit in the United States is moving to a daily determination of the patients most likely to have a cardiac arrest, and training their staff to this

*See also p. 544.

Key Words: therapeutic hypothermia; in-hospital cardiac arrest; pediatrics; PECARN

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Venous thromboembolism in children: Are we targeting a real or imagined risk?*

Despite the increasing human and financial costs associated with venous thromboembolism (VTE) events in children, there remains controversy in understanding at-risk groups or having data-driven algorithms for children regarding appropriate prophylaxis, diagnosis, and treatment. Admittedly, the overall incidence of these events, particularly in children, is low, with estimates ranging from 0.07 to 28.8 per 10,000 in general pediatric admissions (1–5), thereby complicating the ability to study effectively this problem. Although it is tempting to shift the discussion of VTE in pediatric populations out of routine dialogue, it would be a mistake to do so. There are risks associated with both diagnosing and treating this class of conditions and clinicians need to be able to understand the attributable risks of doing nothing and the risk-benefit profiles associated with doing something.

In this issue of Pediatric Critical Care Medicine, Candrilli and colleagues (6) provide a Brief Report using the 2003 Healthcare Cost and Utilization Project Kids’ Inpatient Database (KID) to analyze the impact of VTE on pediatric trauma inpatients and continue to advance the dialogue for these patients. They stratified the study sample by injury severity, using the validated Injury Severity Score classification system, and found important differences in health outcomes.

REFERENCES


*See also p. 554.

Key Words: critical care; cost; venous thromboembolism; intensive care; children; pediatrics

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among the four patient groups: 1) minor; 2) moderate; 3) severe; or 4) critical injury. Their analysis revealed a higher likelihood of VTE in older patients (16.6 vs. 12.2 yrs, \( p < .001 \)) and more severely injured patients (odds ratio for VTE of 3.53 for critical vs. minor Injury Severity Score). They also found that VTE increased both length of stay and hospital costs, independent of injury severity for this subset of patients.

Our review of the work of Candrilli et al left us with four important observations. First, they have shared concisely and effectively that VTE in pediatric trauma patients impacts outcomes. Second, they used a large and publicly available data set to derive their findings. This is precisely the type of work that should be performed with these data sets because they are particularly well suited for the analysis of infrequent events. Third, there are important limitations to this type of data analysis, which need to be understood. Finally, there are important follow-up steps using these or other methods that they or others can take to help us improve our understanding of VTE in children.

First, the “Brief Report” venue of Pediatric Critical Care provides a mechanism for authors to share with other readers important findings about their original research or evaluations, in a direct and concise manner. Although there are several different manuscript categories available to authors, including case reports, review articles, and original submissions, the “Brief Report” option is particularly beneficial when solid results are found, but there may be insufficient data to generate a full-length manuscript. Here, the authors used this venue to illustrate that VTE adversely impacted resource utilization, as measured by an average length of stay difference of approximately 18 days and increased mean total costs of nearly $60,000; these findings are consistent with previously reported adult and pediatric studies (7, 8).

Second, although medical complications occur in a variety of settings, hospitals provide a useful venue to further understand the scope and magnitude of these problems. Administrative data sets, like the Healthcare Cost and Utilization Project and KID, provide extensive information on hospital encounters, patient characteristics, organizational structures, and resource utilization associated with each diagnosis. Their analysis has informed the discussion of topics ranging from disease surveillance to resource utilization. These data sets are particularly useful for population subsets in which the patient events are particularly rare, like VTE. Children who experience VTE during hospitalization represent a small subset of patients who can be better understood because of their rarity, by examination in a large national dataset. In addition, because these events and the diagnostic and therapeutic activities surrounding these events are billable and often lead to the requirement for further medical care, they are particularly well documented in discharge records, thereby attenuating one of the major limitations to the use of these data sets—namely, poor documentation in the medical record. For these reasons, the data source for the current study was an excellent choice to better understand the rare and important events of VTE in pediatric trauma patients.

Third, although there are major methodologic advantages to the use of administrative data sets, there are also important limitations. The authors have identified many of these in their report. Generically, these limitations fall into several broad categories. First, because these analyses are based on coded records, there are several biases that arise from how the physician documents care in the record to how it gets coded by the health information management department (9). It is incumbent on all providers to document as thoroughly as possible in the medical record so that downstream research reflects as accurately as possible the care that was actually delivered (9). Second, the use of administrative data does not allow the investigator to distinguish cause and effect relationships. Whether the longer length of stay caused the VTE or the VTE led to a longer length of stay is not something that can be answered using these methods. Third, it is not unusual for there to be lag times from the most recently available data set year. In this case, the authors used the most recently available data set KID 2003. For the purposes of their report, this is perfectly fine; however, there will be research questions in which the lag of 5 or so years would be inappropriate because of significant medical advances that occurred after the data set was created. Finally, readers often have an appetite for more information than can be supported by these types of analyses. The severity adjustment measures in most of the publicly available data sets are not based on physiologic scoring systems (e.g., Pediatric Risk of Mortality and Pediatric Index of Mortality) and for critically ill patients can be described as crude at best. Nonetheless, these data sets and the approaches used to analyze them do help in advancing incrementally our knowledge for many conditions that are dependent on a robust sample size, a consideration of how outcome is affected by patient and organizational characteristics, and provision of national estimates when the potential risk of a problem may not be appreciated.

Finally, there are a number of “next steps” that can better elucidate the use of these data. From a simply descriptive perspective, understanding the risk profiles associated with VTE in other subsets of hospitalized children are important and easy to perform and can be done using KID or other data sets (10). Some examples include pediatric inpatient groups like those hospitalized in intensive care units, with congenital cardiac disease, or with malignancies. In addition to KID, there are a number of other databases available in Healthcare Cost and Utilization Project that provide important information on a state level or in the settings of ambulatory surgery and the emergency department. These data allow us the opportunity to inform our research from these complementary settings. From a methodologic perspective, these data sets and the work provided by the authors establish important foundations on which modeling exercises, such as Monte-Carlo simulation, probabilistic risk assessment for understanding the potential risks and benefits of diagnosis and treatment, and cost-effectiveness analyses can be performed. These modeling tools can benefit from the large population estimates contained in these data sets and used as substrate to drive the models regardless of type.

The work by Candrilli and colleagues provides timely and definitive work that is likely to be referenced for years to come. The authors have benefited us all by limiting intentionally the scope of their work to pediatric trauma inpatients to highlight the health-related impact of VTE in an understudied yet high-risk population. They have provided a brief and compelling analysis, the credibility of which is evident and could extend potentially to other pediatric inpatient subgroups. They have used tools and methods that are straightforward and elegant in their simplicity. Although the frequency of pediatric VTE events is low, the associated human and financial burden may simply be too substantial to ignore and we appreciate...
the authors’ interest in keeping the conversation and potentially our patients alive.

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REFERENCES


Relative risks of recombinant factor VII*

In this issue of Pediatric Critical Care Medicine, Warren and colleagues (1) provide a detailed review of literature related to the use of recombinant factor VII (rFVIIa) in pediatric cardiac surgery. From the time initial Food and Drug Administration approval was granted for its use as an agent to treat bleeding episodes in patients with hemophilia A or B and inhibitors to factor VIII or factor IX in 1999, “off-label” use of rFVIIa has become increasingly common, with several randomized controlled trials being published during the previous year (2–4). However, as noted by Dr. Warren and colleagues, the number of published reports describing the use of rFVIIa in pediatric cardiac surgical patients is limited. Although not absolutely applicable to pediatric patients, insights garnered from the adult literature often provide an important framework from which pediatric therapeutic guidelines may be formulated.

During the first 6 yrs after rFVIIa received Food and Drug Administration licensing, 431 adverse events were reported to the Food and Drug Administration’s Adverse Event Reporting System (5). Approximately 40% of these events were thromboembolic in nature, including cerebrovascular accidents, acute myocardial infarction, arterial thrombosis, pulmonary embolism, venous thrombosis, and clotted devices. Thromboembolic complications were determined to be the probable cause of 72% of the deaths reported. Notably, off-label use of rFVIIa accounted for 90% of the adverse events reported. During the first 10 mos postexpiration of Food and Drug Administration-approved indications in 2005, 61 additional thromboembolic adverse events and seven thrombosis-related deaths were reported. Off-label use accounted for 88% of the additional reported events. A recent meta-analysis of 22 randomized controlled trials involving predominantly adult nonhemophilic patients demonstrated a tendency toward reduced transfusion requirement (odds ratio = 0.54), reduced mortality (odds ratio = 0.88), and increased arterial thromboembolic complications (odds ratio = 1.50) in patients receiving rFVIIa compared with placebo (6). Another recently published review of adult cardiac surgery patients who received rFVIIa similarly describes reduced transfusion requirements post rFVIIa administration (7). However, 4% of the patients in the study also developed thromboembolic complications that were attributable to rFVIIa. Importantly, rFVIIa-associated thrombotic complications may be associated with significant morbidity and mortality. In a review of 46 pediatric patients with postcardiotomy bleeding, Agarwal and colleagues reported that 21% patients who received rFVIIa required surgical reexploration of the mediastinum for evacuation of clots (8). Overall, 25% of the patients in the series developed thromboses after rFVIIa therapy.

Administration of rFVIIa to patients who require extracorporeal life support seems to be a particularly important risk factor for thrombotic complications. There have been several recent reports of adult (9) and pediatric (8, 10, 11) patients experiencing life-threatening or fatal intracardiac thrombosis after receiving rFVIIa at the time they were on extracorporeal support. As described in the paper by Dr. Warren et al, approximately 20% of extracorporeal membrane oxygenation patients who require rFVIIa develop symptomatic thrombotic complications (1). Although the authors suggested that the rate of venous thrombosis is similar to that observed in rFVIIa-naïve ex-
tracorporeal membrane oxygenation patients who undergo screening color Doppler sonography (12), careful review of the cited reference reveals that venous thromboses occurred in only 10% of patients during extracorporeal membrane oxygenation support. Furthermore, it is important to make a distinction between significant thrombotic complications that impact clinical outcome and thromboses that are detected by sonographic screening (12).

Results of a 2007 Cochrane review of the use of rFVIIa for the prevention and treatment of bleeding in patients without hemophilia indicated that there is a trend in favor of the use of rFVIIa for reducing mortality (risk ratio = 0.82) (13). However, a trend was also noted against the use of rFVIIa with respect to thromboembolic adverse events (risk ratio = 1.50). The authors concluded that the use of rFVIIa outside of its current licensed indications should be very limited and its wider use should await the results of ongoing and possibly newly commissioned, randomized controlled trials. In the interim, rFVIIa use should be restricted to clinical trials. The results of a randomized, prospective clinical trial completed in 2006, which examined the use of rFVIIa in bleeding extracorporeal membrane oxygenation patients post cardiac surgery, have yet to be published (14).

Without question, rFVIIa is an important therapeutic agent that has a powerful effect on postoperative hemorrhage in cardiac surgery patients. However, careful consideration must be given to potential thrombotic complications associated with its use in pediatric patients, especially those who require extracorporeal life support. As with other therapeutic agents, appropriate patient selection is critical. In general, the literature does not support the use of rFVIIa as a prophylactic or first-line therapeutic option for postoperative hemorrhage. The importance of early correction of "surgical" bleeding, accurate determination of coagulation factor deficiencies, and careful proactive administration of blood products during the intraoperative and perioperative periods cannot be overstated. In patients with truly refractory, life-threatening postoperative hemorrhage, judicious use of rFVIIa may be justified.

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A picture is worth a thousand words: Critical care consultations to emergency departments using telemedicine*

The Institute of Medicine in one of its reports on the future of emergency care entitled, “Emergency Care for Children: Growing Pains” states that “Most children receive emergency care in general (not children’s) hospitals, which are less likely to have pediatric expertise, equipment, and policies in place for the care of children” (1). This report also notes that while children make up for 27% of all emergency department (ED) visits, only 6% of EDs in the United States have all the necessary supplies for pediatric emergencies, and that these disparities likely result in deficiencies in the quality of care delivered to children presenting to EDs, particularly those EDs located in underserved and rural communities.

This report and its conclusions are based on health services and clinical literature that demonstrate that the lack of access to pediatric specialty care can result in delayed diagnoses and inappropriate medical management for specific injuries or conditions (2–6), and that acutely ill and injured children receive higher quality of care when the care is provided by pediatric subspecialists at pediatric hospitals (4, 5, 7–9).

Although the Institute of Medicine report and the evidenced-based research support the regionalization of pediatric specialty services and transfer of all sick and injured children to pediatric centers of excellence (10, 11), in reality, regionalization can result in geographical barriers in access, particularly for those living in very remote regions. In fact, with regard to emergency medical services, the need for timely and intensive intervention for acutely ill and injured children makes long travel times to regionalized services potentially harmful (12).

A potential solution to this paradox is the use of telemedicine—through the application of this technology, pediatric specialists can remain regionalized, maintaining volume, efficiency, and quality, while still making it possible to provide immediate expert consultation and treatment to children at any remote site at any time. Telemedicine has long been proven as an efficient and improved means of providing specialty consultation over long distances to rural and/or underserved communities in the outpatient setting (13–21). Using the same technology, telemedicine could allow regionalized specialists to assist in the acute treatment of critically ill children whenever their point of first medical contact is. However, despite its proven usefulness in the delivery of nonurgent specialty consultations, there is a paucity of data supporting the clinical effectiveness of telemedicine when used in the ED or other emergency settings (22). Although there have been several published reports in the literature describing the use of telemedicine in the ED, (21, 23, 24) the majority of the publications are descriptive, reporting feasibility and anecdotal results. In more objective studies, both Brennan et al (25) and Kofos et al (23) have demonstrated that the use of telemedicine in the ED is a feasible means of providing care and results in similar diagnostic accuracy compared with face-to-face consultations for some nonemergent diagnoses.

In this issue of Pediatric Critical Care Medicine, Heath et al describe their experience using telemedicine to provide critical care consultations to acutely ill children presenting to a network of ten remote EDs (26). In addition to demonstrating that this model is feasible, the authors use postconsultation questionnaires to report the perceived benefit of the consultations from both the consulting and referring physicians. The authors also describe the 236 recommendations made over telemedicine and the resulting changes in care of the 63 children receiving consultations. Significant contributions to care include the fact that 12 patients (19%) avoided intubation as a result of the telemedicine consultation—a contribution to care that likely could have only been accomplished using telemedicine. Many of the recommendations of the critical care physicians could have only been made after actually seeing the patients. This program and the authors’ findings are a key first step and significant contribution to literature on the use of telemedicine to provide pediatric critical care consultations in remote EDs.

Although this study suggests that telemedicine consultations are superior to telephone consultations and result in improvements in patient care, like many studies on telemedicine, the report is primarily descriptive, lacks a scientifically sound control group, and relies on subjective measures of quality of care. As a result, the report lacks design power to significantly contribute to the causal hypothesis that telemedicine improves care. There is also the obvious possibility of an inherent bias as the evaluations are based on the treating physician’s subjective perception on the quality of care that they provide. Finally, as noted by the authors, the difference in the perceived value of telemedicine could simply be the product of using a novel and exciting technology.

Although many clinicians who use telemedicine firmly believe that this technology can result in additional clinical recommendations and improved clinical outcomes, to date, there have been no published objective measures of its clinical effectiveness in the ED. Postconsultation questionnaires, as used by Heath et al (26), can be used to suggest if consultations improve care, but cannot directly measure the differential clinical impact of the intervention. The limitations of this and other reports on telemedi-
cine is no fault of the authors; instead, there is a dearth of simple objective clinical process or outcome measures, particularly in pediatric emergency medicine. As evidence of this, in a systematic review (22) by Cochrane on the impact of telemedicine on clinical outcomes, the authors concluded that, in general, there is an overall paucity of data demonstrating the clinical benefits of telemedicine. The review recommends that further research is needed to evaluate the effects of telemedicine on the processes and quality measures before the wide spread clinical implementation of this mostly unproven technology.

Donabedian’s quality of care model suggests that the structure in which care is delivered influences the process of care, which in turn influences patient outcomes (27). Although outcomes represent the most important measure of health system performance, in the ED adverse outcomes such as morbidity or mortality do not occur often enough to provide useful information about quality of care. Without objective measurable outcomes, it is obviously difficult to measure the impact on quality of care of technologies such as telemedicine. Because of this, the Institute of Medicine has recommended that more research be done to determine the appropriateness of many medical treatments, medications, and medical technologies for the care of children (1).

Telemedicine has changed and will continue to change the way in which many of us practice critical care medicine. As noted by the authors of this report, as well as others that use telemedicine in pediatric emergencies, the potential benefits of telemedicine are many-fold—we can be immediately available (virtually) to any ED thus reducing disparities in access to our expertise; we can become involved earlier in care and recommend changes in therapies before patient transport; and we can potentially reduce unnecessary transfers. As the use of telemedicine increases, it is our duty as academic clinicians to investigate exactly how, when, and if telemedicine improves patient outcomes, and in which clinical area.

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Twenty-three thousand unnecessary deaths every day: What are you doing about it?*

“Although three-quarters of the population in most developing countries live in rural areas, three-quarters of the spending on medical care is in urban areas, where three-quarters of the doctors live. Three-quarters of the deaths are caused by conditions that can be prevented at low cost, but three-quarters of the medical budget is spent on curative services, many of them provided for the elite at high cost.”—David Morley, 1976 (1)

In 2007, 136 million children were born in the world, and 9.2 million died before they reached 5 years of age (2). Documentation shows that 98.8% of the 9.2 million deaths occurred in developing countries—an extraordinarily high proportion. If the whole world had the same mortality rate as the industrialized world, there would have been only 0.8 million child deaths. Thus, there were 9.2–0.8 million, or 8.4 million unnecessary deaths. This is 23,000 unnecessary deaths every day, or 960 every hour.

The most common causes of death in children <5 yrs of age are acute respiratory infections (19%), diarrhea (17%), prematurity (10%), neonatal sepsis (8%), birth asphyxia (8%), and malaria (8%) (3). As David Morley pointed out in 1976, most of these conditions can be prevented or treated at low cost (1, 4). Although more than half the world’s population now lives in urban areas (5), mortality rates are >40% higher among children in rural areas (6). In high mortality areas, the most effective strategy is to concentrate on the provision of effective primary health care and district hospital services, rather than critical care facilities that are only accessible to a minority of the population (1, 7). The educational level of mothers is also crucially important: a recent analysis of data from 152 countries found that the gross national income (GNI) per capita, female illiteracy, and income equality (the Gini index) predicted 92% of the variance in child mortality, whereas public spending on health and the poverty rate were not predictive when adjusted for confounding (8). In low-income countries, where most child deaths occur, female illiteracy was more important than GNI per capita, and both were more important than public expenditure on health.

Because people in low-income countries need to have surviving children to look after them in illness or old age, fertility rates will not decrease until there are substantial reductions in child mortality (9). Reduction in child mortality requires increased equity both within and between countries (7, 10); to achieve the latter, we need increased international aid and improved terms of trade. International development aid can play a crucial role by supporting investment in education, health, and economic infrastructure (11); there is an urgent need for the establishment of a Global Fund to reduce child mortality and improve maternal health. Unfortunately, very few rich countries donate anywhere near the United Nations minimum government target of 0.7% of GNI (12). Only Norway, Sweden, Luxembourg, the Netherlands, and Denmark achieve the 0.7% target—and the governments of Japan, Greece and the United States all give <0.2% (Table 1). If all the Organisation for Economic Co-operation and Development countries had donated 0.7% of their GNI in 2000, aid would have increased by $114 billion, which is five to 20 times the amount required to reduce child deaths by >50% (13).

Improved terms of trade are even more important than aid. Oxfam has estimated that, if developing countries had increased their share of world exports by just 5% in 2002, this would have generated US $550 billion—seven times as much as they received in aid (11). Unfortunately, many wealthy countries have high tariffs that prevent the entry of goods from low-income countries, and they provide huge subsidies to farmers—the European Union and the United States spend more than one billion dollars every day on farm subsidies that severely disadvantage farmers in low-income countries (11). The Oxfam Double Standards Index is a measure of free trade rhetoric vs. protectionist practice in rich countries: the worst offenders are the

*See also p. 597 and 610.

Key Words: child; Child Health Services; child mortality; child welfare; comprehensive health care; critical care; developing countries; health services accessibility; health status indicators; infant mortality; mothers/ed [Education]; poverty; public health practice

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Table 1. Development aid in 2007 and barriers to agricultural trade (tariffs and subsidies)

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<th>Country</th>
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<th>Aid, US Billions</th>
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</table>

GNI, gross national income; UN, United Nations.
When a country has an under-5 mortality rate of <20 per 1000 live births, few deaths are caused by infections, and critical care (which we define as “endotracheal intubation” or “mechanical ventilation”) can make an important contribution by reducing mortality from noninfectious causes, such as congenital heart disease and trauma (14). When under-5 mortality is >30 per 1000, many deaths are caused by infections, and a high proportion of these deaths can be prevented by immunization and primary and district level health care, which cost far less than critical care (14).

In this issue of Pediatric Critical Care Medicine, the Board of Officers of the World Federation of Pediatric Intensive and Critical Care Societies (WFPICCS) discuss the global agenda of the Society (15). In countries with an under-5 mortality rate of <20 to 30 per 1000, the Society clearly has a responsibility to foster the expert provision of intubation and ventilation. In countries with an under-5 mortality rate of >30 per 1000, great care needs to be taken not to divert public resources away from primary health care. In these circumstances, WFPICCS should support efforts to improve primary and district level health care, and it may be helpful for the Society to state clearly that governments of those countries should decide their own priorities based on local conditions, and not feel obligated to fund the routine provision of intubation and ventilation. WFPICCS should state that its members in developing countries have a role to play as leaders who promote the equitable distribution of health resources in their countries.

What can individual members of WFPICCS who live in rich countries do to help children in the poorest countries? Rather than try to help these children directly, citizens of the European Union, the United States, Canada, and Japan might do more good if they systematically campaigned for a reduction in tariffs and farm subsidies. The citizens of rich countries that give <0.7% of GNI as aid could campaign for an increase in developmental assistance. Note that every single country listed in the table either has strong barriers to agricultural imports, or gives <0.7% of GNI as aid, or both.

All of us who live in a rich country should consider giving at least 0.7% of our own income to assist poor countries. Peter Singer gives 20% of his income, and we challenge you to read his article on The New York Times Web site (16). Charity should begin where it will do the most good; for example, a donation of $1,000 a month to Oxfam will work miracles in the 50 least-developed countries, where 800 million people live on an average income of $1.35 per day and under-5 mortality is 130 per 1000 live births (2).

Child mortality would be reduced if low-income countries had better education of girls, and their economies were improved by increased international aid and increased exports brought about by elimination of agricultural subsidies and tariffs in rich countries. There is a danger that the world recession and legitimate concerns about global warming will divert attention away from the plight of children in developing countries. It is up to the members of WFPICCS to do what we can to see that this does not happen.

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