



Proceedings of the 3rd World Congress on Pediatric Intensive Care 25–29 June 2000, Montreal, Canada

Gideon Paret MD and Zohar Barzilay MD*

Pediatric Intensive Care Unit, Sheba Medical Center, Tel-Hashomer and Sackler Faculty of Medicine, Tel Aviv University, Israel

IMAJ 2000;2:880–883

This highly successful meeting was attended by leaders in all aspects of pediatric intensive care as well as over 3,000 participants worldwide. It was organized into several tracks, each representing a major area in the field of pediatric intensive care. We summarize here the essential points of the papers presented at the meeting and in the various panel discussions.

The trauma, emergency and transport track

This subject area is particularly relevant to practitioners in a pediatric intensive care unit. The general sentiment that was expressed is that in many cases, regardless of the available techniques, technologies and equipment, the die is already cast by the time the child arrives at the doors of the PICU.

One of the first sessions dealt with the "golden hour." Dr. Daniel Mollitt from the University of Florida spoke about the "great epidemic" of trauma in children: 50 to 80% of deaths occur before these children arrive at medical facilities. He also discussed the brain injury that is present in 90% of the children who die, and emphasized the importance of avoiding secondary in-

jury and of providing adequate oxygen and perfusion. He claimed that we are clearly not doing a good enough job of educating the public in on-the-scene cardiopulmonary resuscitation and that there is a need to improve transport facilities in order to obviate some of these morbidities.

Dr. Jeffrey Blummer of Rainbow Babies and Children's Hospital (USA) spoke about basic toxicology in pediatric emergencies and summarized what he called the A-B-C approach: airway, breathing and circulation. He highlighted the significant rate of upper airway obstruction caused by corrosives and the need for airway support very early on for these children.

Dr. Arno Zaritsky addressed the issue of emergency management of shock and stressed the importance of PALS (Pediatric Advanced Life Support), which teaches the early recognition and treatment of shock. He stressed the importance of aggressive fluid therapy in cases of shock, and stated that the issue of using colloids versus crystalloids to deliver enough fluid that remains in the vascular space has yet to be decided.

Dr. James Tibballs from Royal Children's Hospital, Melbourne, gave an interesting talk on pediatric emergencies related to snakes and spiders throughout the world. He said there were over 5.5 million bites and 125,000 deaths, with most of those deaths occurring in Asia, especially in India. He spoke about the importance of

pressure immobilization as an important first aid measure, and on the need for efficient early transport. He stressed the point that if we are going to use anti-venom, we must also give epinephrine in all cases and be prepared to treat the anaphylactic problems that may arise.

In a very sobering talk, Dr. Grim Haddock from Glasgow University in Scotland asserted that in 10 years of war worldwide, 10 million children had died, 4 million became disabled and over one million were orphaned. He reminded us that in addition to physical disabilities, wars are inevitably accompanied by emotional disability, displacement, loss of family, and upheaval of social structures.

Dr. Duncan McCrae from Royal Brompton Hospital, London, dealt with the subject of transport in the future and took a very interesting look at the various issues that would impact us in the next decade, namely teamwork, equipment, and access to care. The recurring theme throughout this talk was that the composition of the team is not as important as appreciating the unique physiology of children, having the necessary skills, and being dedicated to do what is right for the child. In terms of essential equipment, he spoke about the importance of certain bedside tests and monitors, especially during longer transport time, which enables the monitoring of blood gases, electrolytes and end-tidal CO². Two other issues he addressed were the

* One of the founders and current member of the executive board of the World Federation of Pediatric Intensive and Critical Care Societies (WFPICCS).

PICU = pediatric intensive care unit

inequity of access to care and the importance of telemedicine for enhancing the ability of providing care remote from an emergency medicine system

An important session regarding the emergency management of the pulseless child was conducted by Dr. Daniel Mollitt from the University of Florida who addressed the questions of when CPR should be withheld and when it should be terminated. All the speakers agreed with the clear-cut recommendation of the American Heart Association Consensus Panel of 1992: to withhold CPR if the interval between injury or asystole access access to the EMS is greater than 30 minutes. The guidelines for terminating CPR in children vary: the consensus of this panel was that it is reasonable to stop if there is no return of spontaneous circulation after 20–30 minutes of aggressive CPR. (It should be borne in mind that these two aspects are undergoing certain changes in light of the possibility of obtaining organ donations as a result of supporting these patients.)

The pulmonary sciences track

Dr. Hugh O'brodovitch of Toronto University, also known as the "Pope of Sodium Channels," gave a very comprehensive talk on lung edema and reviewed the role of the alveolar sodium pump. Sodium channels are composed of three components, the alpha, beta and gamma subunits. Dr. O'brodovitch presented studies showing how macrophages impair these channels and promote lung edema. Most intriguing was the notion that oxygen was a signal for the induction of these channels and that the expression of channels would be down-regulated during hypoxia. On the other hand, he showed that various hormones, such as thyroxine, cortisone and progesterone, reduce these channels.

The technology information communication track

(Those of us computer dilettantes who suffer the indignities of falling victim to computer glitches were immensely gratified that the co-convenor for technology had a great deal of difficulty with his laptop!)

Dr. James Fackler of Johns Hopkins University was the opening speaker of this session and spoke talk about the excess of auditory and visual stimuli in the ICU. He described the magical number 7 ± 2 : this means that most of us can, for a short term, retain from five to nine facts that we can retrieve quickly and accurately. The aviation industry has learned that an excess of auditory and visual stimuli will cut down the ability to handle even the 7 ± 2 . This can have implications on the ability of the PICU team to work at peak efficacy in such substandard conditions.

A discussion on current bedside information systems revealed that human beings are still easily winning the race against computers. Nevertheless, there are certain expectations that the computer can satisfactorily fulfill: vigilance for data collection, reduction of duplicate data entry, remembering the rules to be following in given situations, and providing advice in given circumstances. In describing ICU bedside clinical information systems, Dr. Fackler showed that they are currently poorly integrated with the hospital-wide clinical information system, but that this situation is expected to improve considerably in the future. Some specific features that need to be enhanced include providing real-time support in decision making for the retrieval of lab results and in the orderly gathering of data. He also made a plea for the development of standards for data sharing around PICUs worldwide.

The next talk on new frontiers of communication was given by Dr. Barry Markovitz of Washington University who described how the Internet was providing new media for communication and new paradigms. He reviewed

the function of the *Ped's CCM* web site as a portal for pediatric intensive care, specifically highlighting the PICU book, e-mail listing and the evidence-based medicine journal club. He also supported the idea of data sharing through a virtual PICU group. In his opinion, traditional methods of training are faltering probably because there is such a huge volume of new knowledge, thus creating a real need for more synthesis of the evidence that emerges from published results.

The telemedicine spectacular included a presentation by Dr. Katsuyuki Miyasaka from Japan, who stated that while there is a serious shortage of critical care specialists, there is an abundance of access to ISDN 64K communication. In fact, one out of five households in Japan has ISDN access and it was actually less expensive than ordinary telephone service. They have an ISDN-based video terminal in his hospital's PICU that is used to maintain contact with their home ventilator patients. They also have this setup in the staff physicians' offices. His team felt that this produced some significant savings in time and, therefore, savings in cost for families and the health care providers. There was also a demonstration of telesurgery with a remote surgeon observing a monitor and giving advice to the local surgeon who was performing a tracheal stenting procedure. Dr. Miyasaka mentioned the unexpected benefit of having a video conferencing setup available in the patient's home. Children who are dependent on life-support machines and therefore limited in their mobility may have little social life outside the home. This technology was able to provide that kind of social contact, even with other children with similar dependencies.

Dr. Zohar Barzilay (Israel) chaired a pro/con debate on the application of new technologies in the ICU. Dr. Max Klein from the University of Cape Town in South Africa, representing the developing countries, stressed the importance of the tried and true "good old" clinical approach and tools for patient evaluation, monitoring and

CPR = cardiopulmonary resuscitation
EMS = emergency medical system

therapy. Dr. Fackler from Baltimore, Maryland countered this approach by presenting a case in favor of incorporating new and expensive tools. The panel's conclusion was that good medical practice is not always resource dependent and that limitations associated with geography and economics must not hamper patient care. Dr. Klein led an erudite, thoughtful, and distinctly delightful discussion that included an eloquent plea for elegance and simplicity in health care and an appeal to avoid accepting the new and complex simply for their novelty.

Finally, a workshop was held on PICU equipment for developing nations with representatives from San Jose, Costa Rica, Slovenia, Kuala Lumpur and Malaysia. This was another moving presentation by all of the panelists on some of the enormous problems they face with regard to equipment – either in obtaining adequate equipment and/or in maintaining the equipment already in place. The problems with maintenance stem from a lack of technical support from vendors and dealers within their own countries as well as within their own hospitals because of the difficulty in finding trained technicians to do this work. It was also stated that developing nations and especially small markets within them, such as pediatric and intensive care departments, are likely to have low priority with manufacturers and dealers. (It was something of a shock to many of us to learn that the element of bribery as a fact of life in some developing areas of the world also impacts pediatrics and intensive care by presenting a huge barrier in doing the work that needs to be done.)

The cardiovascular sciences track

This, including the peri-operative management of the child with a congenital heart disease, was one of the most important sessions of the congress. In his talk, Dr. John Meliones of Duke University reviewed the importance of diastolic function and the significance of the finding of mid-diastolic flow reversal as an indication of a very sick

non-compliant ventricle following cardiac surgery.

Extra-corporeal membrane oxygenation support is applied in many children with severe resistant ventricular failure. Forty percent of children requiring ECMO following cardiac surgery are expected to survive to possible discharge. Dr. Gil Wernowsky of Children's Hospital in Philadelphia emphasized the importance of cardiac catheterization of a pediatric patient with low cardiac output for unexplained reasons, and the potential for diagnosing residual lesions, shunt lesions, and residual branch pulmonary stenosis in the cardiac catheterization lab.

Dr. Newberger of Harvard University discussed the issue of neurological damage following repair of congenital heart disease: the bad news was that the occurrence of fits in the early postoperative period is associated with a significant risk of long-term neurological impairment. However, the number of babies who have early neurological evidence of neurological damage is lower than ever before. We hope this will mean that long-term neurological outcomes will be better in parallel.

Dr. Gideon Paret of Israel spoke on the role of the inflammatory response in the child following repair of congenital heart disease and the current and future options to decrease the incidence of this devastating complication. Our recent investigations showed that chemokines are involved in postoperative inflammatory response and that steroids have an important role in decreasing complications. A new finding that we presented was the association of leptins with the postoperative course.

The pharmacology, pain and sedation track

Dr. Jeffrey Blummer of Rainbow Babies and Children's hospital spoke on ways to eliminate drug and medication errors, which were found to be 3–5 times

ECMO = extra-corporeal membrane oxygenatio

the reported numbers. The prevention of these errors requires that physicians, nurses and pharmacists learn to work in collaboration on the issues of drug delivery in the PICU.

Dr. David Nichols of John Hopkins University presented an overview of the use and abuse of muscle relaxants. He succeeded in sensitizing all the members of the audience to the fact that muscle relaxants may result in an increased morbidity and may not be particularly associated with long-term benefits. He said that we should reserve this class of drugs primarily for patients in whom an absolute degree of immobility is required and advised a somewhat more judicious use of them as, indeed, has become the practice over the past few years.

The economics track

A symposium on the impact of re-organization on cost-effective health care practice was held by Dr. Frank Shann from Australia, who described a centralized cost-effective system in which specialized personnel provide care for the patients in the ICU.

Dr. Reinoud Genke from the University Hospital in The Netherlands described a widespread uncontrolled growth of PICUs over the past few years. In contrast, Switzerland has decided not to provide ECMO therapy within its borders because they do not have the patient volume to support such a program and it is more economically sound to send the patients outside the country. He made the astonishing statement that doctors' egos cost lives because of the high costs in that unregulated system.

The ethics track

Dr. Sol Goldstein, a Toronto psychiatrist, initiated the discussion on ethics by commenting on why our work as PICU physicians is so stressful and giving us some insights into that problem. First, he noted the kind of people who enter the field of intensive care medicine: "All you have to do is look at your colleagues. They tend to have a rather intensive personality... They often see the tragic tip of the

iceberg of life... On a bright sunny day when thousands of people are at the beach enjoying themselves, what they see are the victims of drowning." He pointed out that the world of industry recognizes that assembly-line work is about as stressful as it gets and that much of what we do in intensive care has more than a few similarities to assembly-line work: we are constantly on the move around the unit, constantly making rounds, constantly assessing the same variables of vital signs, etc. To make matters worse, the act of curing itself sometimes hurts, and an inextricable part of our job is inflicting pain on children, or, as one member of the audience put it, he sometimes feels that his work is like legalized child abuse. And, finally, Dr. Goldstein brought up the fact that many of us are parents and that it is very hard not to identify with the parents of our patients.

A personal note from Dr. Paret

I came away from this excellent congress with mixed feelings. The good news is that we do have a much wider understanding and far greater mechanical means to do what has to be done to optimize the number of children who survive to go home from the PICU. The Internet will keep us well informed and the inventors will provide us with what we need to apply this information. However, even cutting-edge technology can be worthless for the child who did not receive appropriate on-the-scene care and who did not reach the PICU in time; and not even the most brilliant among us can make a silk purse out of state-of-the-art equipment in disrepair, let alone carry out procedures if we lack the tools they require. There was some comfort in knowing that the appalling inequality of access to care might be compensated

for by telemedicine facilities; and, while I must give points to computers for having better memories than mine, I couldn't help feeling smug to hear that my bedside information capability – and maybe even my bedside manner – is better than theirs. PICU by definition will never be a bed of roses, but as Dr. Goldstein said, we are a caring lot and although the pace is far slower than we hope for, things are getting better.

Note: the 4th World Congress on Pediatric Intensive Care will take place in Buenos Aires, Argentina in 2003.

Acknowledgment. The authors thank Esther Eshkol for editorial assistance.

Correspondence: Dr. G. Paret, Pediatric Intensive Care Unit, Sheba Medical Center, Tel-Hashomer 52621, Israel. Phone/Fax: (972-3) 530-2562, email: gparet@post.tau.ac.il

It was the best of times, it was the worst of times, it was the age of wisdom, it was the age of foolishness, it was the epoch of belief, it was the epoch of incredulity, it was the season of light, it was the season of Darkness, it was the spring of hope, it was the winter of despair, we had everything before us, we had nothing before us, we were all going direct to Heaven, we were all going direct the other way.

*Charles Dickens, English novelist (1812–70),
opening sentence of A Tale of Two Cities*

Capsule



Ensuring an even split

The spindle checkpoint provides a mechanism by which cells ensure that chromosomes are properly connected to the mitotic spindle before the cell begins anaphase. How is chromosome alignment and attachment monitored during meiosis I, when sister centromeres remain attached and homologous chromosomes are separated, one to each daughter cell? Shonn et al. analyzed checkpoint mutants of budding yeast and found that components of the mitotic checkpoint have a key role in meiosis I. Whereas the checkpoint is dispensable for normal mitosis, less than half the checkpoint mutant cells underwent normal segrega-

tion of chromosomes in meiosis I. The checkpoint apparently delays the onset of anaphase in response to the lack of tension on the chromosomes. This process appears to allow time for reorientation before anaphase begins. The results suggest that abnormalities in the spindle checkpoint could contribute to Down syndrome, a birth defect caused by improper segregation of human chromosome 21 during meiosis I.

Science 2000;289:300