Title
"Paediatric Acute Care: Highlights from the PAC- APLS Conference , Sydney, 2015".

Authors
Stephen Teo 1,2
s.teo@westernsydney.edu.au

Jane Stanford 3
jane.stanford@apls.org.au

Arjun Rao 4
Arjun.Rao@sesiahs.health.nsw.gov.au

Franz E Babl 5-7
franz.babl@rch.org.au

Affiliations

1. Blacktown and Mt Druitt Hospitals, NSW, Australia
2. Western Sydney University NSW, Australia
3. APLS Australia, Melbourne, Victoria, Australia
4. Sydney Children's Hospital, Randwick, New South Wales, Australia\
5. Emergency Department, Royal Children's Hospital, Parkville, Victoria Australia.
6. Murdoch Children's Research Institute, Parkville Victoria Australia.
7. Department of Paediatrics, Faculty of Medicine, Dentistry and Health Sciences, University of Melbourne, Victoria Australia.

Corresponding Author:

Franz E Babl
Department of Emergency Medicine
Royal Children's Hospital
Flemington Rd
Parkville, Vic. 3052
Australia
Phone 61 3 9345 6153
Fax 61 3 9345 6006
Email franz.babl@rch.org.au

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Ms Jane Stanford is an employee of Advanced Paediatric Life Support (APLS) Australia. Drs Teo, Rao and Babl are APLS instructors. Dr Babl is a section editor of Emergency Medicine Australasia.

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The Paediatric Acute Care Conference (PACC) is an annual conference organised by Advanced Paediatric Life Support (APLS) Australia to advance paediatric acute care topics for clinicians in prehospital medicine, emergency departments, acute paediatrics, intensive care and anaesthesia. All PACC content is made available free online (https://vimeo.com/aplsaustralia). The PAC conference 2015 was held at Coogee, Sydney. We provide a summary of some of the presentations.

ECMO in children

Warwick Butt, an intensivist from Melbourne, provided an insight into the use of ECMO (extracorporeal membrane oxygenation) in children. ECMO should now be regarded as standard rather than experimental care and a supportive rather than curative modality.

Depending on the circuitry, ECMO can support the lungs, the heart, or the circulation, either singly or in combination. Blood leaves the patient and is pumped around a circuit, gas exchange occurs, blood is rewarmed and then returned to the patient. The nomenclature of ECMO is specific; the *catheter* location that drains the blood out of body is named first and the return catheter is named second, i.e. VA is veno-arterial, from a vein to an artery and VV is venovenous, from a vein to a vein. In terms of *circuit configuration*, the vessel that drains the blood out of the vessel is named first, then the vessel that returns blood to the body so, jugulo-carotid VA would be from jugular vein to carotid artery. Finally, the *insertion technique* will be either peripheral (percutaneous or surgical cut-down) or central (transthoracic).

Patients do have an increased risk of death both from the disease requiring the use of ECMO and from complications of ECMO treatment. Complications are inevitable and include access, mechanical, thrombo-embolic, haemorrhage, infection and the blood/plastic interface.

The uses of ECMO which are of particular relevance to the ED and acute care physician are in the resuscitation after cardiac arrest or severe shock, in severe progressive cardio-respiratory disease, and the facilitation of other treatment strategies such as hypothermia or rewarming after hypothermia.

Indications for ECMO have changed over recent years. The indication of having a reversible acute disease has been expanded to having a “definable destination.” The pre and post illness “quality of life” has changed from “good” to “reasonable,” and rather than being very likely to die, a child need only be “very sick.” Contraindications have also changed with chronic disease no longer an absolute

e.g. transplantation. Immunosuppression is not a contraindication, nor is ECMO absolutely contraindicated if the likely outcome will be a poor quality of life. However ECMO CPR does not clearly improve survival for patients with out of hospital cardiac arrest.

The indigenous child in ED

David McDonald and the panel of Cathy McAdam, Hasantha Gunasekera, Paul Bloomfield, Andrew McDonald representing rural, remote, and tertiary clinical paediatric practice, provided advice for how cultural competence to improve the healthcare of indigenous children can be developed.

The key elements drawn from this session were: respect and responsiveness to the child's socio-cultural environment, being flexible with how services are delivered, providing continuity of care and being sensitive to the region's cultural customs.

A key resource for providing care is the Aboriginal Liaison Officer, who supports both the families/kinship and the clinicians. Clinicians often need support to understand the specific socio-cultural issues relevant for the community they are caring for, appreciating that there are more than 300 indigenous languages and many regional customs across Australia. Clinicians may inadvertently misinterpret non-verbal communication, thus creating a barrier to their therapeutic relationship with the child and family.

For children to be seen regularly there needs to be flexibility in clinic and hospital practices. As an example, the ward paediatric registrar assesses all indigenous children under the age of two when they arrive in the Broome emergency department. This minimises the risk of families leaving when there are extended waiting times, which is particularly important given the high prevalence of bacterial sepsis in indigenous children.

For clinicians who rarely see indigenous children, systems that identify children as Aboriginal and Torres Strait Islanders (ATSI) are important so they can draw on appropriate resources, be alerted to the unique areas of disadvantage and can obtain advice on local disease patterns and for conditions that may be rarely seen in metropolitan centres. All clinicians benefit from accessing available online resources to gain cultural competence in the care needs of ATSI children (http://www.healthinfonet.ecu.edu.au/cultural-ways-home/cultural-ways-workforce/training).

M&Ms: Recurring themes in the paediatric emergency department

Karen Dunn, a paediatric emergency physician from Melbourne highlighted 6 conditions which can be difficult to diagnose in the acute care setting and reappear repeatedly in morbidity and mortality reviews in paediatric emergency patients:

Children with ***walled off CNS infections*** may be afebrile, may not have neck stiffness, and may have normal or only slightly elevated inflammatory markers.

Neurologic conditions in young children such as subdural haemorrhage, Guillain Barre syndrome, or acute demyelinating encephalomyelitis (ADEM) may be associated with delayed

diagnosis. Caution is needed when there are challenges in in performing a full neurological examination, or in an uncooperative child. Get the child to walk; and do not ignore reported symptoms and signs which are not present while the child is in the ED.

Invasive ***Group A streptococcal infections*** can cause non-specific symptoms; clues include disproportionate pain, fever, tachycardia and rash.

Patients with complex medical conditions may be difficult to assess. The list of differential diagnoses to be considered should include sepsis, UTI, limb fractures and dislocations, and bowel obstruction.

Bowel obstruction is a often missed as a cause of vomiting or non specific abdominal pain in children. Clues include: abdominal pain, tachycardia, history of previous surgery, absence of diarrhoea.

Adolescent patients often present with non organic causes but serious pathology needs to be considered in all.

Allergy and anaphylaxis for the acute care clinician

Domenic Cincotta, a paediatric emergency physician and allergy specialist, provided an update and practical pointers on paediatric allergy. While death from anaphylaxis is more common in adults, risk factors in children include known food allergy, poorly-controlled asthma, being female, food prepared outside the home, and delayed access to adrenaline. The diagnosis of anaphylaxis in younger children can be challenging and the mild initial reactions or warning signs such as crying or lethargy can be easy to miss, while rash may be absent. Photos taken on parents' phones of any rashes can be helpful for an allergist following up the child.

Investigations such as a mast cell tryptase are not very clinically useful or practical during the acute presentation, but may be considered if there is diagnostic doubt, or in cases of drug or insect sting allergy.

Management of anaphylaxis with adrenaline as the cornerstone remains unchanged but there is evidence of poor adherence to guidelines. There is no mortality benefit from steroids or antihistamines though there may be some symptomatic benefit. Longer periods of observation after treatment are warranted in children who have received multiple doses of adrenaline or have severe asthma, and practicalities such as location and time must be taken into account. Clinicians should provide families with action plans and green (no Epipen) and red (Epipen prescribed) plans are available on the Australasian Society of Clinical Immunology and Allergy (ASCIA) website (www.allergy.org.au).

Chest Trauma in Children

Donovan Dwyer, an emergency physician and director of paediatric trauma in Sydney, presented a talk on chest trauma in children. These children almost always have multiple traumatic injuries and management of the chest injury is overwhelmingly supportive. The highest mortality is in 10-15 year olds and mortality from chest trauma is mostly from co-existent injuries. Lung contusion is the most common injury and can be diagnosed on early CXR with routine CT scanning unnecessary.

One third of major chest injuries are associated with pneumothorax. The old adage that you should never see a tension pneumothorax on a CXR does not hold true in children who may have radiological tension despite being clinically stable due to their more compliant chest physiology and more mobile mediastinum. Simple pneumothorax can be treated with a small bore intercostal catheter but if there is an associated haemothorax, a large bore catheter with a three-bottle underwater seal drain is recommended.

In penetrating chest trauma, the immediate availability of surgical intervention can be life-saving. FAST ultrasound in the context of penetrating chest trauma can be useful to help diagnose haemothrorax, cardiac tamponade, pneumothorax and abdominal solid organ injury.

Myocardial contusion should be considered where there is persistent tachycardia or hypotension. Troponin combined with electrocardiogram is specific and if abnormal should prompt an echocardiogram to exclude functional or structural pathology.

Traumatic cardiac arrest differs from other forms of cardiac arrest. The use of extended FAST scanning is invaluable. The benefit of chest compression, adrenaline, DC cardioversion, and fluid boluses over intubation, stopping bleeding, and giving blood is not clear and these latter interventions should be the priority, especially in the pre-hospital setting.

Refugee Children in the Acute Care Setting

Karen Zwi, a community paediatrician from Sydney, spoke about health issues in refugee children and how we might interface with these in acute care. In general

Refugee children are a heterogeneous group with different medical problems based on their area of origin. However, common health issues include growth and development problems, anaemia, vitamin D deficiency, under-immunisation, tuberculosis, schistosomiasis (always think about this with haematuria), malaria, psychological disorders and dental problems. Health care for this population is complicated by multiple medical conditions, poor transport access, language barriers, financial constraint, psychological adjustment and their knowledge of available services. Their health needs should also be considered within the context of difficulties they may be experiencing with "acculturation" which is the process in which members of one cultural group adopt the beliefs and behaviours of another group. Families will be at various stages from marginalisation to bicultural integration.

Helpful resources are available from the Royal Australian College of Physicians (https://www.racp.edu.au/advocacy/policy-and-advocacy-priorities/refugee-and-asylum-seeker-health) and the Australian Society for Infectious Diseases (http://www.asid.net.au/resources/clinical-guidelines.