IRISH & AMERICAN PAEDIATRIC SOCIETY MEETING

Scientific Abstracts of the 43rd Annual Meeting

SEPTEMBER 28- OCTOBER 2, 2011
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The Program Committee had quite a few abstracts to review and many contacts to make in putting everything together. The committee operated smoothly and efficiently and deserves recognition for their efforts.

The committee consisted of:

Courtney Anthony, Chair
Dean Wilcox
Ward Rice
PRESIDENTS of the
IRISH AND AMERICAN PAEDIATRIC SOCIETY

1968-1969  Thomas E. Cone., M.D. (Dec)
1970-1971  Professor Brian McNicholl
1972-1973  John Connolly, M.D. (Dec)
1974-1975  Victoria Coffee, M.D. (Dec)
1976-1977  Frederick G. Burke, M.D. (Dec)
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1982-1983  Pauline O’Connell, M.D.
1984-1985  John Doyle, M.D. (Dec)
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1998-1999  Winifred Gorman, M.D.
2000-2001  Jacqueline Noonan, M.D.
2002-2003  Professor Thomas Clarke
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2006-2007  Professor Tony Ryan
2008-2009  Courtney Anthony, M.D.
2010-2011  Eleanor Molloy, M.D.
2012-2013  Dean Wilcox, M.D.
The Irish and American Paediatric Society was founded by three talented, versatile, caring and effective academicians/practitioners: Tom Cone, M.D., Bill Kidney, M.D., and Fred Burke, M.D.

Dr. Burke, deceased Emeritus Professor and Chair of Georgetown University, was a compassionate practitioner as well as a dedicated and innovative provider of health care to the neediest and a superb teacher of the clinical arts of pediatrics.

The late Dr. Tom Cone, Professor of Pediatrics at Harvard and former Chief of Pediatrics at the National Naval Medical Center at Bethesda, Maryland, devoted his life to doing for others. His joy of the history of pediatrics resulted from his own contributions to and the awareness of the advances that have made modern pediatrics the superb specialty it is today.

Dr. Bill Kidney, unfortunately, did not survive to see even the first meeting of the Society he was so instrumental in establishing. He was, as Professor Sheamus Dundon has said, “Quiet, gentle, humorous, crisp, a singularly fine Irish Paediatrician, who seemed old when he was young and became younger as he grew older - at his peak in all things”.
Irish and American Paediatric Society
Scientific Program

Thursday 29 September 2011

Session 1
Moderator: Dr. Courtney Anthony

8:30 a.m. Medical and neurodevelopmental sequelae of famine.
Bevery Ann Powell M.D.
University of Virginia School of Medicine, Charlottesville, VA and George Washington School of Medicine, Washington D.C., USA

8:45 a.m. Persistent toe-walking in children.
H. Hardison¹, S. Finn¹, H. Marks¹, K. Brown², D. Taylor³, P. Pizzutill³
Sections of Neurology¹, Orthopedic Surgery², and Ambulatory Pediatrics³ St. Christopher’s Hospital for Children, Departments of Pediatrics and Surgery, Drexel University School of Medicine, Philadelphia, USA

9:00 a.m. Too hot to handle – An emerging problem in the ED?
Kathryn Claire Anne Ferris¹, Thomas Bourkebc, Julie-anne Maneyb, Michael Shieldsc
¹Centre for Medical Education, Queen’s University; ²Emergency Department, Royal Belfast Hospital for Sick Children; ³Centre for Infection and Immunity, Queen’s University, Belfast, Northern Ireland

9:15 a.m. An update on autism spectrum disorders for pediatricians.
Bevery Ann Powell M.D.
University of Virginia School of Medicine, Charlottesville, VA and George Washington School of Medicine, Washington D.C., USA

9:30 a.m. Dr. Thomas Cone Founders Lecture (Introduced by Dr. Dean Wilcox)
“A colloid conundrum: Role of albumin in pediatric neurocritical care”
Dr. Mark Wainwright

10:15 a.m. Coffee Break
Session 2
Moderator: Dr. William O’Connor

10:45 a.m.  Adverse outcomes in neonatal encephalopathy are associated with early immune dysregulation and endotoxin tolerance
Fiona M O’Hare1,2,4, RWG Watson2, Amanda O’Neill2, Veronica Donoghue1, Colm O’Donnell1,2,4, John FM Murphy1,2, Anne Twomey1,2 and Eleanor J Molloy1,2,3
1Paediatrics, National Maternity Hospital, Dublin, Ireland; 2University College Dublin, Dublin, Ireland; 3RCSI, Dublin, Ireland and 4National Children’s Research Centre, Dublin, Ireland.

11:00 a.m.  Sex- and Gestational Age-specific Body Fat Percentage at Birth
Colin Patrick Hawkes MB1,2, Jonathan O’B Hourihane MD1, Louise C Kenny PhD1, Alan D Irvine MD4, Mairead Kiely PhD5, Deirdre M Murray PhD1
1Department of Paediatrics and Child Health, University College Cork, Ireland; 2Department of Neonatology, Cork University Maternity Hospital, Cork, Ireland; 3Department of Obstetrics and Gynaecology, University College Cork, Ireland; 4National Children’s Research Centre, Crumlin, Dublin, Ireland; 5School of Food and Nutritional Sciences, University College Cork, Ireland.

11:15 a.m.  Planned hospital discharge: Cost effective strategy for reducing length of stay (LOS) of very low birth weight (VLBW, <1500G) infants
Elaine Neary, MB BCH BAO MRCPI (Medicine of Childhood), Al-Assaf N, Mc Dermott C, Sheehan K, Kirham C, Conway K, Corcoran D, Mc Callion N, Clarke T.
Department of Paediatrics, Rotunda Maternity Hospital, Parnell Square, Dublin 1, Ireland

11:30 a.m.  The in vitro effect of exothermic mattress on temperature in the delivery room.
L. K. McCarthy1,3, C. C. Hensey3, C. P. O’Donnell1,3
1University College Dublin; 2The National Children’s Research Centre, Crumlin, Dublin; 3The National Maternity Hospital, Dublin, Ireland

11:45 a.m.  Effect of thickening milk on duration of NG feeds in neonates.
Carmel Moore1, Raga Mallika2, Naomi McCallion1,2
1Royal College of Surgeons in Ireland, 2Department of Paediatrics, Rotunda Hospital, Dublin, Ireland
Session 1
Moderator: Dr. Eleanor Molloy

8:30 a.m.  *In vivo* red cell survival (RCS) can be measured simultaneously and independently in VLBW infants using multiple erythrocyte populations, each labeled at discrete biotin densities.

**John A. Widness M.D.**, Ronald G. Strauss M.D., M. Bridget Zimmerman Ph.D., Donald M. Mock M.D., Ph.D.

1Department of Pediatrics, Carver College of Medicine, and 1Department of Biostatistics, 2College of Public Health, University of Iowa, Iowa City, IA, USA; 3Department of Biochemistry and Molecular Biology, University of Arkansas Medical Sciences, Little Rock, AR, USA

8:45 a.m. Effect of weaning CPAP on oxygen requirement, respiratory and heart rate.

**Carmel Moore**, Azanna Kamar, Tom Clarke, Naomi McCallion

1Royal College of Surgeons of Ireland, 2Department of Pediatrics, Rotunda Hospital, Dublin, Ireland

9:00 a.m. A randomised controlled trial of prongs or mask for nasal continuous positive airways pressure (NCPAP) in preterm infants: The POM trial

**Emily A. Kieran**, Anne R. Twomey, Eleanor J. Molloy, John F.A. Murphy, Colm P.F. O’Donnell

The National Maternity Hospital, Holles Street; National Children’s Research Centre; University College Dublin, Ireland

9:15 a.m. Neonatology – Iatrogenesis -The hand - Ethics - And small for date infants

**Billy Franklin Andrews, M.D.**

Department of Pediatrics, University of Louisville School of Medicine, Louisville, Kentucky

9:30 a.m. Dr. Frederick Burke Founders Lecture (Introduced by Dr. Courtney Anthony)

“Gestational alloimmune liver disease: Below the tip of the Neonatal Hemochromatosis iceberg.”

**Dr. Peter Whittington**

10:15 a.m. Coffee Break
Session 2
Moderator: Dr. Ward Rice

10:30 a.m.  Warming preterm infants in the delivery room: Polyethylene bags with or without exothermic mattresses?

**L. K. McCarthy**1-3, C. P. F. O’Donnell1-3
1University College Dublin; 2The National Children’s Research Centre, Crumlin, Dublin; 3The National Maternity Hospital, Dublin, Ireland

10:45 a.m.  Using smart phone technology to teach neonatal endotracheal intubation: Application development and uptake

**Colin Patrick Hawkes MB**1-2, Stefan Hanotin BSc MSc3, Brian O’Flaherty BSc MSc PhD3, Simon Woodworth BSc MSc3, C. Anthony Ryan MD FRCPI1-2, Eugene Michael Dempsey MD FRCPI1-2
1Department of Neonatology, Cork University Maternity Hospital, Ireland; 2Department of Paediatrics and Child Health, University College Cork, Ireland; 3Department of Business Information Systems, University College Cork, Ireland.

11:00 a.m.  The first minute of life: How does real life compare to algorithms?

**L. K. McCarthy**1-3, C. P. F. O’Donnell1-3
1University College Dublin; 2The National Children’s Research Centre, Crumlin, Dublin; 3The National Maternity Hospital, Dublin, Ireland

11:15 a.m.  Coagulation profile in very premature infants

**Elaine Neary, MB BCH BAO MRCPI** (Medicine of Childhood), Al-Assaf N, Mc Dermott C, Sheehan K, Kirham C, Conway K, Corcoran D, Mc Callion N, Clarke T.
Department of Paediatrics, Rotunda Maternity Hospital, Parnell Square, Dublin 1, Ireland

11:30 a.m.  Early endotoxin tolerant phenotype in preterm infants with abnormal outcomes

**Fiona M O’Hare**1-2,4, RWG Watson2, Amanda O’Neill2, Veronica Donoghue5, Lisa K McCarthy1,4, Colm O’Donnell1,2,4, John FM Murphy1,2, Anne Twomey1,2 and Eleanor J Molloy1,2,3
1Paediatrics, National Maternity Hospital, Holles Street, Dublin, Ireland; 2University College Dublin, Dublin, Ireland; 3RCSI, Dublin, Ireland and 4National Children’s Research Centre, Dublin, Ireland.
Irish and American Paediatric Society
Scientific Program
Saturday 1 October 2011

Session 1
Moderator: Dr. Ward Rice

8:30 a.m. Primary amebic meningoencephalitis: Case report and review of the literature.
Thein Myint M.D.\textsuperscript{a,d}, Julie A. Ribes M.D., Ph.D.\textsuperscript{b,d}, Laura Patricia Stadler M.Ed., M.D., M.S.\textsuperscript{c,d}
Department of Internal Medicine, Division of Infectious Diseases; \textsuperscript{a}Department of Pathology and Laboratory Medicine; \textsuperscript{b}Department of Pediatrics, Division of Infectious Diseases, Kentucky Children’s Hospital, \textsuperscript{d}University of Kentucky, Lexington, KY

8:45 a.m. Molecular testing of nasopharyngeal specimens has potential as a diagnostic test for meningococcal disease.
Thomas Walter Bourke BMedSc, MB, BAO, BCh, MRCPCH,
James McKenna, Derek Fairly, Peter Coyle, Michael Shields
Royal Belfast Hospital for Sick Children, Belfast, Northern Ireland

9:00 a.m. Procalcitonin is a useful marker in suspected meningococcal disease.
Thomas Walter Bourke BMedSc, MB, BAO, BCh, MRCPCH,
Katherine Dunlop, Jennifer Bell, James McKenna, Derek Fairly, Peter Coyle, Michael Shields
Royal Belfast Hospital for Sick Children, Belfast, Northern Ireland

9:15 a.m. Pulmonary lymphangiectasia secondary to atresia of the common pulmonary vein (ACPV) presenting as neonatal cyanosis: A case study.
Jeremy Hart M.D., Minh Ho M.D., Kristopher Cumbermack M.D., William O’Connor M.D., Nirmala Desai M.D.
Kentucky Children’s Hospital, University of Kentucky Lexington, KY, USA

9:30 a.m. Dr. William Kidney Founders Lecture (Introduced by Dr. Eleanor Molloy)
“Targeted neonatal echocardiography: A useful clinical tool or a fashion trend?”
Dr. Afif EL-Khuffash

10:15 a.m. Coffee Break
Session 2
Moderator: Dr. Dean Wilcox

10:30 a.m. An unusual cause of cardiac enlargement.
Thomas Yohanan M.D., Steven Goldberg M.D.,
Kevin Stamps M.D., Craig Mathis MSN, FNP-PC,
Christopher Knott-Craig M.D., Courtney Anthony M.D.
Memphis TN, USA

10:45 a.m. Rupture of ascending aortic aneurysm secondary to bicuspid aortic valve
(BAV) associated aortopathy: A case study.
Elaina Pirruccello D.O., Kraman Purushothaman M.D.,
Carol M. Cottrill M.D., William O’Connor M.D.
University of Kentucky, Lexington, KY and
Mount Sinai Medical Center, New York, NY, USA

11:00 a.m. Marfan’s with unusual penetrance.
C. M. Cottrill M.D., William N. O’Connor M.D.,
Kelly Vanmetre ARNP, Jacqueline Noonan M.D.
Departments of Pediatrics and Pathology,
University of Kentucky, Lexington, KY, USA

11:15 a.m. A rare association of maternal diabetes with diaphragmatic hernia and
multiple VACTERL spectrum congenital anomalies: A case report.
Rachel Stewart D.O., Carol M. Cottrill M.D., Anjana L.
Pettigrew M.D., William O’Connor M.D.
Department of Pathology and Laboratory Medicine,
and Pediatrics, University of Kentucky, Chandler
Medical Center, Lexington KY, USA

11:30 a.m. Concluding remarks: Dr. Eleanor Molloy, President, Irish and
American Paediatric Society

2011 Len and Arlene Fries Travel Award Winners

Dr. Thomas Bourke
Dr. Colin Hawkes
Dr. Emily Kiernan
Dr. Lisa McCarthy
Dr. Elaine Neary
Dr. Fiona O’Hare
**Biographical Sketches for Founders Lecturers**

**Mark Wainwright, MD, PhD**

Dr. Wainwright, a Pediatric Neurologist, is currently Associate Professor of Pediatrics in the Divisions of Neurology and Critical Care, and Bernard Mirkin Research Scholar, Northwestern University Feinberg School of Medicine, Chicago IL. At Northwestern Dr. Wainwright is Program Director, Pediatric Neurocritical Care, and Director of the Center for Interdisciplinary Research in Pediatric Critical Illness and Injury, Children’s Memorial Research Center. Dr. Wainwright is widely recognized for his scientific expertise in the area of the role of activated glia in the mechanisms of neurologic injury and susceptibility to further neurologic insults after acute neurologic injury.

**Peter F. Whitington, MD**

Dr. Whitington, a Pediatric Gastroenterologist, is The Sally Burnett Searle Professor of Pediatrics and Transplantation at Northwestern University Feinberg School of Medicine, Children’s Memorial Medical Center, Chicago, IL. Dr. Whitington is an internationally recognized authority on the immune mechanisms of pediatric liver disease which is the focus of his extensive research pursuits. His laboratory has identified an alloimmune mechanism of fetal liver injury which is the cause of nearly all cases of neonatal hemochromatosis and is the likely cause of most cases of liver failure in the first three months of life.

**Afif EL-Khuffash MD, MRCPI**

Dr. EL-Khuffash is a Neonatologist at Mount Sinai Hospital and The Hospital for Sick Children, Toronto, and Assistant Professor of Pediatrics at the University of Toronto. He completed his medical education and paediatric training at the Royal College of Physicians of Ireland and University College Dublin, and his subspecialty training in Neonatology in Toronto. Dr. EL-Khuffash is a member of the Royal College of Physicians Ireland (Medicine of Childhood). His research is focused on targeted neonatal echocardiography. He is one of the early adopters of this skill and has established an impressive bibliography in this area.
BACKGROUND: During the period between 1845-50, there was a severe famine in all parts of Ireland especially in County Roscommon and the West. Statistics show that 32% of the population were lost to malnutrition, disease or emigration. Since little information is extent regarding the medical, developmental and psychosocial sequelae of survivors, it is likely that they suffered similar affects to those in countries like Holland which experienced an embargo of food by the Germans during World War II. Longitudinal follow-up of survivors, known as the Dutch Hunger Cohort Study, has gathered data for 50+ years and determined that the timing of gestation when malnutrition occurred correlates with the organ systems most affected later in life. This information can be applied to high-risk infants with Intrauterine Uterine Growth Retardation.

The Dutch Hunger Cohort Study found that many infants conceived during this period of maternal malnutrition were stillborn or had visible malformations of the CNS, eg. Spina Bifida or hydrocephalus, due to Folate deficiency. These conditions were either apparent at birth or in the first 2 years of life. A high rate of cerebral palsy & infant mortality was also present in survivors with IUGR. [Other types of developmental disabilities, such as autism, mental retardation, learning disabilities and AD/HD have been identified in subsequent studies on this population.]

The Barker hypothesis, proposed in 1989, states that disturbed intrauterine growth has an adverse affect on the development and functioning of the cardiovascular system. Follow-up of 2400+ individuals in the Dutch Hunger Cohort Study, not only supports this theory but provides data on the incidence of renal disease, obesity, hypertension & the metabolic syndrome (leading to Type II Diabetes). It appears that individuals adjust their ability to handle carbohydrates in response to exposure to low glucose levels in utero.

Unexpected findings in survivors were the increased incidence of psychiatric conditions, including schizophrenia and mood disorders. During the famine in China from 1959-61, follow-up studies showed the same findings. A cohort study currently being performed at NIMH has shown abnormalities on MRI scans and neuropsychological testing indicating that schizophrenia is a neurodevelopmental disorder involving CNS dysgenesis. Patients in their study were exposed to maternal-placental malnutrition during the first trimester.

Of relevance to Pediatricians is appropriate follow-up of high-risk infants with a history of Intrauterine Growth Retardation for any reason in the prenatal period. Careful monitoring of developmental milestones from birth to age 7-8 years is essential to provide early intervention and obtain optimal outcomes. During childhood and adolescence, regular assessment of weight, blood pressure, cholesterol and lipid levels are important to avoid diabetes and cardiovascular complications.
Background: Gross motor streams of development, along with growth, are the most noticeable manifestations of healthy progress during infancy and early childhood. During the latter half of infancy, social and language streams become manifest and gradually dominate cognitive development. During the transition, there may be some variations of motor, language, and social development that may suggest chronic disease or moderately severe developmental delay. Persistent toe-walking is an example of variation in the area of gross motor development, which may or may not be a sign of alarm. It is not an uncommon finding in the practice of Pediatrics, but only in the past 10 years has there been useful literature available to guide clinicians.

Objective: To elucidate the most effective ways to evaluate and manage children with persistent toe-walking.

Method: Review of articles from Medline (Ovid) that were published on the topic during the past decade.

Results: The following are a summary of the findings:

1. For children with uncomplicated, persistent toe-walking, no treatment or testing is necessary but consider range of motion exercises.

2. For children with acquired persistent toe-walking, consultation to a neuromuscular specialist and consider gait analysis.

3. For children with complicated persistent toe-walking, in addition to above, consultation to an orthopedic surgeon and start physical therapy.

Conclusions: It is important for general pediatricians and subspecialists to be aware of the recent literature on the topic of persistent toe-walking, which may help to guide the patients’ evaluation and management.
TOO HOT TO HANDLE- AN EMERGING PROBLEM IN THE ED?

Kathryn Claire Anne Ferris \textsuperscript{a}, Thomas Bourke \textsuperscript{b,c}, Julie-anne Maney \textsuperscript{b}, Michael Shields \textsuperscript{c}.

a. Medical student. Centre for Medical Education, Queen’s University Belfast.

b. Emergency Department, Royal Belfast Hospital for Sick Children.

b. Centre for Infection and Immunity, Queen’s University Belfast.

Abstract

Background:

Thermal injuries remain a common cause of morbidity in childhood. As part of an ongoing audit of these injuries in our emergency department [ED] we have recognised an emerging problem.\textsuperscript{1} Ceramic hair straighteners are now a common household object. These devices reach temperatures in excess of 200\textdegree{}C and take up to 40 minutes to cool completely.\textsuperscript{2} They are often found within easy reach of children who are naturally inquisitive and unaware of the dangers that face them. These devices have potential to cause significant and painful injury. In order to highlight the problem we describe our experience of managing hair straightener burns in a paediatric ED.

Method:

We identified all children presenting to the ED at the Royal Belfast Hospital for Sick Children between April 2009 and March 2010 with burns and carried out a retrospective chart review using our electronic medical record system [Symphony] to identify the number and severity of hair straightener burns.

Results:

34045 children presented in the study period of whom 187 [0.55\%] had thermal injuries. 17 [9\%] of these had hair straightener burns. The median age was 18 months [range 3 months to 108 months]. 14 [82\%] had burn to their upper limb, 3 [18\%] had burns to their lower limb, one child had a burn to both their hand and head. 5 [29\%] of these burns were dermal or deep dermal. 3 [18\%] children required review by plastic surgery. One child developed a chronic granuloma on the wound which required surgical debridement. Three [18\%] children required morphine and one child was admitted for management of pain. One child was admitted and referred to social services because of young age and burns on two sites. In all other cases the pattern of the burn was consistent with the nature of the injury- a linear burn usually on both sides of the affected area due to the two parallel plates.

Discussion/Conclusion:

Although still relatively uncommon, burns caused by hair straighteners are an emerging problem within the paediatric population. Our experience illustrates that these burns can be serious enough to require significant
analgesia, admission to hospital, referral to plastic surgery and surgical intervention. We support awareness strategies like the Straight Off, Straight In, Straight Away Campaign\(^3\) and we encourage a similar campaign to be launched at a local level. We recommend better advertising on product packaging to alert the public to the dangers associated with hair straighteners and we suggest that manufacturers consider a design modification such as a protective shield to minimise the risks to children.

References:


AN UPDATE ON AUTO-ISM SPECTRUM DISORDERS FOR PEDIATRICIANS

Beverly Ann Powell, MD, University of VA School of Medicine, Charlottesville, VA, and George Washington University School of Medicine, Washington, DC

Background: In previous presentations, red flags were discussed for identifying infants and toddlers with spectrum disorders. Recently the M-CHAT (Checklist for Autism in Toddlers-Modified) was developed as a tool to standardize assessment of all children at their 18 and 24 month well visits. It is sensitive and can be administered easily and quickly by paraprofessionals with a subsequent increase in referrals to early intervention programs. The outcome for children with these disorders is documented to be improved with input from infant development specialists, OT’s and speech pathologists. Equally as important is the sup-port and training of parents in managing negative behaviors and reduction in the child’s frustration level and tantrums with alternative modes of communication.

Differential Diagnosis: In the majority of cases, despite an extensive etiologic work-up, no specific cause of their disability is identified. The exceptions are children with Fragile X syndrome, metabolic disorders, abnormal findings on microarray (especially involving the 22q chromosome), Rett’s syndrome and child-hood degenerative disorder. The latter involve regression in skills following a period of normal develop-ment. In the absence of seizures, EEG and imaging studies are typically negative.

Clinical Findings: On neurodevelopmental assessment, children exhibit significant communication dis-orders affecting receptive, expressive and pragmatic language. Impairments are also noted in oral-motor coordination, fine and visual-motor skills & praxis (i.e. sequencing complex motor tasks involved with all areas of functioning). Their ability to initiate social interaction with adults and peers as well as engage in pretend play at an age appropriate level is limited. Often the child has a limited repertoire of themes in his play and resists attempts by parents to enter in or alter repetitive patterns. Stereotypic movements and lack of awareness of body position in space are noted. Perseveration on a narrow range of topics in speech and play alternates with inability to regulate attention, especially for adult-directed tasks. Cognitive rigidity is manifest through the child’s strong desire to follow their own agenda. Difficulties with eating a restricted variety of foods and resisting toilet training (often associated with encopresis) are common. Atypical sen-sory processing, eg. hyperacusis, is also noted. In order to determine whether a child has PDD/NOS vs. Asperger’s syndrome may require serial observations from 4-7 years of age. Cooperative interaction with peers and complex symbolic play do not develop in typical peers until that stage of development.

Management: A combination of special education, speech and language therapy, Pediatric OT and treat-ment by professionals in the areas of behavior management & Floor Time has been found to provide opti- mal benefit to young children with spectrum disorders. Applied Behavioral Analysis has been documented to improve specific skills & reduce negative behaviors. Floor Time is an intervention designed to enhance social reciprocity and set the stage for conversational skills. If a child’s safety or that of others is at risk, or if attention span compromises their ability to learn, the use of medication can be considered. Drugs that work for AD/HD can be effective though children on the spectrum may be more vulnerable to side effects, eg. dysphoria. In recent years, Risperdol has been approved for severe, impulsive and aggressive outbursts. Generally, referral to a Child Neurologist or Psychiatrist is necessary for management.
Title: Adverse outcomes in neonatal encephalopathy are associated with early immune dysregulation and endotoxin tolerance

Fiona M O’Hare, RWG Watson, Amanda O’Neill, Veronica Donoghue, Colm O’Donnell, John FM Murphy, Anne Twomey and Eleanor J Molloy, National Maternity Hospital, Dublin, Ireland; University College Dublin, Dublin, Ireland; RCSI, Dublin, Ireland and National Children’s Research Centre, Dublin, Ireland.

Background: Activated leukocytes and infection have been implicated in the pathogenesis of brain injury. Infants may also experience perinatal global hypoxia-ischaemia further increasing their susceptibility to brain injury.

Objective: To correlate early neutrophil and endotoxin responses with outcome in infants with neonatal encephalopathy

Design/Methods: Serial blood samples were prospectively collected from term infants who required resuscitation following birth and had evidence of exposure to hypoxia-ischaemia in utero (n=18) on day 1, 2 and 3 of life and from adult controls (n=12). Whole blood CD11b and Toll Like Receptor 4 (TLR4) expression as well as reactive oxygen intermediate (ROI) production were evaluated via flow cytometry both at baseline and following endotoxin stimulation. The study population was divided into Normal and Abnormal outcome groups based on Cranial Ultrasound and MRI brain imaging results (Normal: no abnormality on cranial imaging; Abnormal: abnormality on imaging or death)

Results: Neonatal encephalopathy patients with ‘Normal’ outcome have raised baseline CD11b, TLR4 expression and ROI production compared with adults. Following endotoxin stimulation, an immunocompetant response is demonstrated with upregulation to a greater magnitude than seen in adults.

‘Abnormal’ outcome neonatal encephalopathy patients demonstrate initial endotoxin hyporesponsiveness (with respect to TLR4 expression and ROI production) with a trend toward resolution by day 7.

### Results

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<td>N</td>
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<tr>
<td>CD11b</td>
<td>32133 +/- 9821</td>
<td>27743 +/- 10553</td>
<td>27155 +/- 6787</td>
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<tr>
<td>TLR4</td>
<td>92 +/- 42</td>
<td>159 +/- 120</td>
<td>95 +/- 49</td>
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<td>ROI</td>
<td>11816 +/- 5008</td>
<td>-927 +/- 1770</td>
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Staining Index Response to Endotoxin Stimulation in NE expressed as Mean +/- Std error; DOL= day of life; p value normal v abnormal outcome

Conclusions: Term neonates with abnormal outcome, as defined by two neuroimaging modalities, are endotoxin hyporesponsive over the first few days of life. This may represent a persistence of the compensatory anti-inflammatory response system with immunosupression and increased susceptibility to infection.
Sex- and Gestational Age-specific Body Fat Percentage at Birth

Colin Patrick Hawkes MB\textsuperscript{1,2}, Jonathan O’B Hourihane MD\textsuperscript{1}, Louise C Kenny PhD\textsuperscript{3}, Alan D Irvine MD\textsuperscript{4}, Mairead Kiely PhD\textsuperscript{5}, Deirdre M Murray PhD\textsuperscript{1}

\textsuperscript{1}Department of Paediatrics and Child Health, University College Cork, Ireland.
\textsuperscript{2}Department of Neonatology, Cork University Maternity Hospital, Cork, Ireland.
\textsuperscript{3}Department of Obstetrics and Gynaecology, University College Cork, Ireland.
\textsuperscript{4}National Children’s Research Centre, Crumlin, Dublin, Ireland.
\textsuperscript{5}School of Food and Nutritional Sciences, University College Cork, Ireland.

Abstract

Introduction
There is increasing evidence that in utero growth has both immediate and far-reaching influence on health. Birthweight and length are used as surrogate measures of in utero growth. However, these measures poorly reflect neonatal adiposity. Air displacement plethysmography is validated for the measurement of body fat in the neonatal population. The aim of this study was to show the normal reference values of body fat percentage (%BF) in infants during the first 4 days of life.

Methods
As part of a large population based birth cohort study, fat mass, fat free mass and body fat percentage (%BF) were measured within the first 4 days of life, using air displacement plethysmography. Infants were grouped into gestational age and sex categories.

Results
Of the 786 enrolled, fat mass, fat free mass and %BF was measured in 743 (94.5%) infants within the first 4 days of life. %BF increased significantly with gestational age. Mean (SD) %BF at 36-37\textsuperscript{+6} weeks’ gestation = 8.9% (3.5), 38-39\textsuperscript{+6} = 10.3% (4) and 40-41\textsuperscript{+6} = 11.2 (4.3) (p<0.001). Females had significantly increased mean (SD) %BF at 38-39\textsuperscript{+6} = 11.1(3.9) vs 9.8(3.9) (p=0.012) and at 40-41\textsuperscript{+6} = 12.4(4.4) vs 10(3.9) (p<0.001). Sex and gestational specific centiles were calculated and a normative table generated for reference.

Conclusion
%BF at birth is influenced by gestational age and sex. We have generated accurate %BF centiles from a large population based cohort.
PLANNED HOSPITAL DISCHARGE: COST EFFECTIVE STRATEGY FOR REDUCING LENGTH OF STAY (LOS) OF VERY LOW BIRTH WEIGHT (VLBW, <1500G) INFANTS

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Background: Advantages of early discharge of VLBW infants include decreased exposure to nosocomial infections, convenience for parents and cost savings.

Aim: Evaluate the effect of discharge planning on LOS of VLBW neonates.

Methods: Retrospective review of 1140 VLBW infants admitted to tertiary NICU in a 15 year period (1996 - 2010), and discharged home alive. Exclusion criteria were infants with major congenital abnormalities. A regression model determined significant factors associated with LOS used to predict LOS in 2010.

Results: Of the 1140 eligible infants admitted, 923 were discharged home (Group A) and 167 were transferred to the referring hospital pre discharge home (Group B). The effect of an organised discharge planning process since November 2008, has been to reduce the intensive care LOS for both cohorts and is both statistically (2009 vs. 2004-2008 p < 0.02) and clinically significant, reducing the LOS by 17% since 2005 for Group A (50.81 days 2009, 60.96 days 2005), and 21% since 2005 for Group B (40.5 days 2005, 31.96 days 2009).

The average cost of nursing care per day per infant is €221/nurse/day for SCBU, representing economic gains of greater than €200,000 in 2009 (Group A €221 x 10 days x 74 infants, Group B €221 x 8.5 days x 24 infants). Importantly there was no increase in readmissions in Group A post discharge nor increased LOS in the receiving hospital for Group B (2007 = 67.3 days, 2009 = 57.4 days). There was a reduction in delayed discharge subset (discharge at >42 weeks CGA) of Group A. Multiple regression, analysis of covariance, and chi square tests revealed factors which significantly influenced LOS including gestational age, birth-weight, BPD, home oxygen requirement, sepsis, pneumothorax, and ventilation requirement, allowing prediction of LOS. In 2010, infants had a lower mean birthweight (1170g 2010 vs 1094g 2009) and gestational age (29.6 weeks 2010 vs. 28.6 weeks 2009) and significantly increased rate of PDA and BPD, p<.001. LOS of 61 days in 2010 for group A is reduced relative to predicted LOS for 2010 (68days) for higher rates of PDA/BPD observed. LOS for group B in 2010 reduced to 29.5 days (2010 vs. 2004-2008 p=.05)

Conclusions: Discharge planning is a highly cost effective intervention to reduce neonatal units LOS. We recommend discharge planning initiatives in all units.

References:


THE IN VITRO EFFECT OF EXOTHERMIC MATTRESS ON TEMPERATURE IN THE DELIVERY ROOM

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2. The National Children’s Research Centre, Crumlin, Dublin 12, Ireland.

Introduction

Hypothermia is common in preterm infants at birth. Exothermic mattresses (TransWarmer®) are often used in the delivery room (DR) in combination with radiant heat to provide warmth and prevent heat loss.

In a previous study carried out at the National Maternity Hospital (NMH) we unexpectedly observed an association between hypothermia and the use of exothermic mattresses in preterm infants. We believe that in a number of these cases the TransWramer® mattress was not activated with sufficient time prior to delivery or was not activated at all; thus absorbing heat from the infant.

Aim

To determine if a TransWramer® mattress absorbs heat from an object placed on it when not activated or when not activated within the recommended time.

Design & Setting

In-vitro study carried out in a DR setting.

Methods

Four 1-litre bags of saline (representing 1 kg infants) were warmed to 37.2°C and then placed on an infant resuscitaire under radiant heat. The first bag was not placed on any TransWarmer® mattress. The second bag was placed on an exothermic mattress, which was not activated. The third and fourth bags were placed on mattresses activated 1 minute and 3 minutes prior. A digital thermometer was inserted into each bag and the temperature was taken every 30 seconds for 10 minutes. The DR temperature and the temperature at which the exothermic mattresses were stored prior to activation was 26°C.
RESULTS
(See Fig 1)

CONCLUSION
In the DR care should be taken to ensure that a TransWarmer® mattress is activated prior to placing an infant on top. If left unactivated it may absorb heat, becoming endothermic rather than exothermic.
EFFECT OF WEANING CPAP ON OXYGEN REZUIREMENT, RESPIRATORY & HEART RATE.

Carmel Moore, Royal College of Surgeons in Ireland Final Year Medical Student¹,

Raga Mallika²; Naomi McCallion¹,²

¹The Rotunda Hospital, Dublin 1, Ireland and the ²Royal College of Surgeons in Ireland, Dublin 2, Ireland

BACKGROUND: Premature babies often lack the co-ordination, development and strength to orally feed from the breast or the bottle. Enteral feeding is important in premature infants as it promotes gut development. Indwelling nasogastric tubes have been used since the 1950’s in premature babies. Reflux from the stomach back into the oesophagus due to poor lower oesophageal sphincter tone is common in neonates. It can cause apnoea in premature infants. This is often treated with feed thickeners. Gaviscon Infant is the thickener used in our neonatal unit, and contains sodium and magnesium alginates. It is designed to thicken on contact with stomach acid.

OBJECTIVE: We aimed to the effect of Gaviscon Infant on time required for feeding when given by an NG tube.

DESIGN/METHODS: This study was performed using the Vygon Nutrisafe 2 enteral feeding system (Vygon, France). Polyurethane Nutrisafe 2 french gauge 6 50cm long nasogastric tubes were used. These were attached to Vygon G-con enteral 20 ml syringes. The syringe was taped to a stand and the NG tube was taped at 90 degrees at 15cm and then again at 17cm to mimic the in vivo. Cow and Gate Nutriprem 2 (Cow and Gate Ireland, Ltd) was used. Gaviscon Infant (Reckitt Benckiser Ireland Limited) thickener was used and made up according to the manufacturer guidelines. The syringe was filled and the tube primed. The time required for 20mls to pass through the tube was recorded, and repeated 10 times. First thickened, then non-thickened feeds were repeatedly studied. The order was then reversed. The study was repeated using expressed breast milk (EBM) with and without fortifier in place of the Nutriprem 2. The times were changed into seconds for analysis and data was analysed using SPSS 15 (IBM Ltd, Chicago, IL). Paired T tests tested significance.

RESULTS: Forty episodes of 20mls of milk were recorded, 20 of Nutriprem 2 and 20 of Nutriprem 2 thickened with Gaviscon Infant. The mean time taken for 20mls of Nutriprem 2 to pass through the tube was 74.38 seconds, while for Nutriprem 2 thickened with Gaviscon it was 255.55 seconds, meaning that there was a difference of 181.16 seconds per 20mls on average, which was over three minutes. EBM (with and without fortifier) had a similar time distribution for the mixture without Gaviscon, however it reacted unusually to the Gaviscon and got stuck in the NG on enough occasions to lead to the abandonment of that arm of the study.

CONCLUSIONS: Gaviscon Infant is supposed to reduce reflux by reacting with the acidic stomach contents to form a viscous gel. Our study has shown that Gaviscon Infant thickens the feed in vitro and increases the time required for feeding infants using an NG tube. EBM reacts unusually to Gaviscon Infant and required force to pass through the NG when combined with Gaviscon Infant.
INVIVO RED CELL SURVIVAL (RCS) CAN BE MEASURED SIMULTANEOUSLY AND INDEPENDENTLY IN VLBW INFANTS USING MULTIPLE ERYTHROCYTE POPULATIONS, EACH LABELED AT DISCRETE BIOTIN DENSITIES

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Background: A safe, reliable method for measuring RCS in critically ill neonates is important in investigating the pathophysiology and treatment of anemia.

Methods: We developed and validated a new method to measure RCS in vivo in VLBW infants. Four populations of red blood cells (RBCs) were each labeled at one of 4 discrete biotin densities (BioRBCs), mixed, and infused; then each was enumerated independently by flow cytometry on ≤20 µL volumes. We hypothesized that RCS measurements would closely agree among lower density BioRBCs, but the more heavily biotinylated RBCs would exhibit progressive shortening of RCS.

Results: Five anemic VLBW infants transfused with allogeneic RBCs for clinical indications received 1 mL/kg of adult donor RBCs biotinylated at 4 biotin densities: 6, 18, 54, and 162 µg biotinylating reagent/mL of RBCs. Over the next 5 wk, the percent surviving relative to Day 1 of all 4 populations of BioRBCs was measured on ≤20 µL of blood (Fig). The lowest BioRBC density (6 µg/mL) was designated as the gold standard for comparison over time with the other 3 BioRBC populations. Post hoc testing after one-way repeated measures ANOVA detected: 1) significantly reduced RCS for the highest 162 µg/mL BioRBCs after Wk 1, indicating that heavy biotinylation artifactually shortens RCS; 2) only intermittently reduced RCS of the next highest 54 µg BioRBCs that is likely not an important difference for clinical use; and 3) no significant difference between the 2 lowest BioRBC populations.

Conclusions: This study provides evidence that RCS of three RBC populations can be accurately measured simultaneously using BioRBCs labeled with discrete densities. Because sample volumes required are small and subjects are not exposed to radiation, the BioRBC method can be used to investigate the pathophysiology and treatment of anemia in infants, small children, fetuses, and pregnant women. (Support: NIH HL046925 and Thrasher Research Fund.)
EFFECT OF WEANING CPAP ON OXYGEN REQUIREMENT, RESPIRATORY & HEART RATE.

Carmel Moore, Royal College of Surgeons in Ireland Final Year Medical Student¹,

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¹Royal College of Surgeons of Ireland, Dublin 2, Ireland and ²Department of Paediatrics, Rotunda Hospital, Dublin 1, Ireland.

Background: Non-invasive methods of respiratory support such as nasal continuous positive airway pressure (nCPAP) facilitate weaning of ventilated infants, but there is no published consensus on how to wean infants from nCPAP. Infants may be weaned off gradually via means of reducing the mean airway pressure (MAP) or by cycling infants intermittently on or off CPAP. In our NICU, CPAP is stopped and only restarted if infants have increased work of breathing as judged by the nursing staff. Anecdotally, we observed increased the oxygen requirement in the infants weaned off CPAP. Studies have consistently demonstrated that oxygen exposure can be detrimental to premature neonates, but there is less data on the effects of ongoing exposure to low levels of oxygen.

Objective: to investigate the effect of weaning off CPAP on inspired oxygen concentration (FiO₂), respiratory rate and heart rate in VLBW infants.

Design/Methods: This was a retrospective chart review utilising a convenience sample of VLBW infants with a diagnosis of neonatal respiratory distress syndrome during June 2010. The parameters to be examined included demographic information including birth weight and time spent on mechanical ventilation and hourly observations including heart rate, respiratory rate, FiO₂ and oxygen saturations.

Results: 504 cycles of weaning off CPAP were recorded in 24 infants. Mean gestational age at birth was 27.4 weeks gestation and 91% had previously received mechanical ventilation. Infants in this study received a variable time cycled-off CPAP. 95% of attempts to wean CPAP resulted in infants restarting CPAP: 6.7% restarted within one hour, 62.8% by six hours and 89% by 12 hours off CPAP. The mean number of cycles off CPAP required for full weaning was 21.04. The mean time spent on CPAP was 24.58 days. Supplemental oxygen was administered in 60.5% of infants during CPAP weaning episodes, and 11 infants were still receiving supplemental oxygen after the completion of weaning. Of infants already receiving inspired oxygen (FiO₂) levels > 0.21 on CPAP, 63.3% required a higher FiO₂ when off CPAP. On analysis of all weaning sessions there was a statistically significant increase in FiO₂ when CPAP was removed (p < .001). The mean heart rate was reduced (p = .005) and mean respiratory rate was increased significantly in all infants on removal of CPAP (p < .001).

Conclusions: Weaning CPAP results in increased FiO₂ and respiratory rate. 63% of infants being weaned from CPAP develop symptoms within 6 hours.
A RANDOMISED CONTROLLED TRIAL OF PRONGS OR MASK FOR NASAL CONTINUOUS POSITIVE AIRWAYS PRESSURE (NCPAP) IN PRETERM INFANTS: THE POM TRIAL

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The National Maternity Hospital, Holles Street; National Children’s Research Centre; University College Dublin, IRELAND

Background
Though preterm infants frequently receive NCPAP with either nasal prongs or a nasal mask, it is not clear which is more effective.

Objective
To determine whether NCPAP given with nasal prongs compared to nasal mask reduces the rate of intubation and ventilation in preterm infants within 72 hours of starting therapy.

Design/Methods
Infants < 31 weeks gestation starting NCPAP with the Infant Flow Driver or SiPAP (Viasys Healthcare, Yorba Linda CA, USA) were randomized to either nasal prongs or nasal mask. Randomization was stratified for gestational age (< 28 weeks, 28-30 weeks); and according to whether NCPAP was started as a primary treatment for respiratory distress or post-extubation. Infants were intubated and ventilated if they fulfilled 2 or more of pre-determined criteria. The groups were treated the same in all other respects. We recorded relevant secondary outcomes and analyzed data using the intention-to-treat principle.

Results
We enrolled 120 infants between August 2009 and November 2010. 32/62 (52%) of infants randomized to prongs were intubated < 72 hours, compared to 16/58 (28%) of those randomized to mask (P = 0.007). There were no statistically significant differences in secondary outcomes.

Conclusions
NCPAP given via a nasal mask was more effective than NCPAP given via nasal prongs for preventing intubation and ventilation within 72 hours of starting therapy.

<table>
<thead>
<tr>
<th></th>
<th>PRONGS</th>
<th>MASK</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Intubation &lt; 72 hours, n (%)</strong></td>
<td>32 (52)</td>
<td>16 (28)</td>
<td>0.007</td>
</tr>
<tr>
<td>Duration of ventilation (h)</td>
<td>48 (4, 147)# 108 (162)*</td>
<td>30 (0, 186)# 128 (204)*</td>
<td>0.594</td>
</tr>
<tr>
<td>Duration of NCPAP (h)</td>
<td>240 (74, 480)# 330 (305)*</td>
<td>293 (129, 643)# 391 (331)*</td>
<td>0.332</td>
</tr>
<tr>
<td>Pneumothorax, n (%)</td>
<td>4 (6)</td>
<td>1 (2)</td>
<td>0.325</td>
</tr>
<tr>
<td>Oxygen therapy at 36 weeks PMA, n (%)</td>
<td>6 (10)</td>
<td>14 (24)</td>
<td>0.111</td>
</tr>
<tr>
<td>Death before hospital discharge, n (%)</td>
<td>7 (11)</td>
<td>4 (7)</td>
<td>0.415</td>
</tr>
</tbody>
</table>
Since October of 1958, I have been associated with these topics together and singularly, and have spoken especially in the United States, Canada, Ireland, and the United Kingdom and British Empire. In the 1970's I tried to get away from these subjects and encouraged my faculty and fellows to share and take these responsibilities. Most of you will find and learn that such opportunities may reflect on the journey of your own lives.

In my late seventies I was fortunate to be able to visit with Doctor Alex Goley, son of “My Good Doctor,” General Willard C. Goley. It was Doctor Goley who had cared for me as his smallest baby to live and I also survived many accidents and illnesses under his excellent care. Doctor Goley had always told me from the time I could hear and repeat that I owed my life to medicine. He followed and was associated with all of my medical problems until he was called to active duty in 1940. After World War II on my first visit he again insisted that I owed my life to medicine.

It was Doctor Goley who told me that it was my mother, a primipara with toxemia, who told him that she was 34 weeks gestation. He had also said, “She probably knew the moment she conceived.” I was his smallest baby at less than three pounds to survive. Before my graduation from the Duke University Medical School my mother requested, “What could I give my son that would be most important to him?” My good doctor replied, “The Oath of Hippocrates.” My mother followed his good advice and I have displayed it ever since. His most usual acknowledgement to me personally and even before friends and at meetings was that I was called “Old Top” His son Alex in the presence of many of the elders of Graham, North Carolina, stated this and got great applause when Alex replied, “You were talking before you were a year of age and were always in motion.”

All who have known me have observed my hyper-activity, exuberance, and excessive enthusiasm and girth. I have especially enjoyed so very much my association with the Irish and American Paediatric Society and the late opportunity to acknowledge this influence of my great and good physician and mother who had given me the mission of medicine in life. I have felt an obligation to use my last opportunity to fulfill the originators of my mission in life and to acknowledge the great accomplishments of such a wonderful man, physician, soldier and example as Doctor Goley and the influence of my mother in my quest.

I will acknowledge others in this quest, especially Professor Frederick Burke, Professor and Chairman at Georgetown University who introduced and was responsible for my acceptance to this Society which has given me great pleasure, support and friendship.
WARMING PRETERM INFANTS IN THE DELIVERY ROOM: POLYETHYLENE BAGS WITH OR WITHOUT EXOTHERMIC MATTRESSES?

L.K. McCarthy¹,²,³, C.P. O’Donnell¹,²,³

¹University College Dublin, ²The National Children’s Research Centre, Crumlin, Dublin 12., ³The National Maternity Hospital, Holles St., Dublin, Ireland.

Hypothermia is common in preterm infants and is associated with increased mortality and morbidity. Polyethylene bags and exothermic mattresses may be used in the delivery room to prevent hypothermia; and are often used together at our hospital.

Aims
To compare the temperature on admission to the neonatal intensive care unit (NICU) of infants treated with bags alone to infants treated with mattresses in addition to bags.

Methods
We prospectively studied a cohort of infants born at < 31 weeks’ who were placed in bags at birth. Some infants were also placed on mattresses at the discretion of treating clinicians. Axillary temperatures were measured in all infants on admission to the NICU. We compared the temperatures of infants treated with bags to those of infants treated with mattresses in addition to bags.

Results
We studied 43 infants, 15 were treated with a bag while 28 were treated with a bag and mattress. Mean admission temperature was similar between the groups. However, both hypothermia and hyperthermia occurred more frequently in infants treated with a bag and mattress.

Conclusion
Using exothermic mattresses with polyethylene bags at birth to prevent hypothermia in very preterm infants may result in more hypothermia and hyperthermia on NICU admission. A randomised controlled trial is necessary to determine which strategy results in more infants having admission temperatures in the normal range.
Using smart phone technology to teach neonatal endotracheal intubation: Application development and uptake

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3 Stefan Hanotin BSc MSc
3 Brian O’Flaherty BSc MSc PhD
3 Simon Woodworth BSc MSc
1, 2 C Anthony Ryan MD FRCPI
1, 2 Eugene Michael Dempsey MD FRCPI

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3 Department of Business Information Systems, University College Cork, Ireland.

Introduction
Changes in neonatal practice have reduced the opportunities for trainees to achieve competence in neonatal intubation. Our aim was to develop an iPhone application that might assist intubation skills, and to assess whether there is a demand for such applications from the medical community.

Methods
A team of 3 neonatologists and 3 information technology specialists designed and developed a teaching application for neonatal intubation, using regular feedback and focus groups to guide design. Utilisation of the application was assessed using data collection through Google Analytics and Apple App Store Analytics.

Results
The App at launch consisted as 29 pages, 7 videos, 19 images and a calculations section. It was downloaded 278 times and accessed 914 times in 48 different countries over the first month online. The average time spent using the application was 4 minutes and 14 seconds, and an average 5.1 pages were viewed on each use. Most uses of the application were in Ireland (184), followed by the United States (115) and the United Kingdom (103). The most popular sections were “Airway Anatomy” (442 views, 4:18 minutes average), Videos and Images (370 views, 3:21 minutes average) and Calculations (327 views, 0:27 minutes average).

Discussion
We describe the planning, design, development and on-line evaluation of a procedural iPhone application for neonatal intubation. The uptake and feedback on this software was favourable and indicates that smartphone Apps are an innovative learning tool, and could be further utilised in neonatal resuscitation training.
THE FIRST MINUTE OF LIFE: HOW DOES REAL LIFE COMPARE TO ALGORITHMS?

Lisa K. McCarthy,¹-³ Colm P.F. O’Donnell¹-³

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2. The National Children’s Research Centre, Crumlin, Dublin 12, Ireland.

Background
Within 30 seconds of birth ILCOR recommends that newborns are warmed, have their airways opened and breathing and heart rate (HR) assessed. By 60 seconds, respiratory support should be given if appropriate and pulse oximetry considered. We have video recorded high-risk newborns in the delivery room (DR) since August 2010.

Objectives
To determine the time taken to perform the DR interventions recommended by ILCOR; and the proportion that had the recommended interventions performed within the allotted time.

Methods:
We measured the time taken (from birth and arrival on resuscitation trolley) to warm, assess HR, attach an oximeter and give respiratory support to infants from video recordings. We determined the number who had the recommended interventions completed by 30 and 60 seconds.

Results:
We reviewed recordings of 23 infants [mean (SD) gestational age & birth weight 29 (3) weeks & 1312 (594) g]. All interventions took longer than recommended (see Table). Four infants were not on the trolley within 30 seconds. By 60 seconds, 10/21 infants were in polyethylene bags, 3/23 had their HR determined and 12/23 had an oximeter on. No infant had all tasks completed within 30 or 60 seconds of birth.

Conclusion:
Newborns were not managed within the time frame recommended by ILCOR at our hospital. The 30-second intervals recommended may be too short.

<table>
<thead>
<tr>
<th>INTERVENTION</th>
<th>TIME FROM BIRTH Mean (SD) seconds</th>
<th>TIME FROM ARRIVAL ON TROLLEY Mean (SD) seconds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Placed on table under radiant heat</td>
<td>19 (10)</td>
<td></td>
</tr>
<tr>
<td>N=23</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Placed in polyethylene bag</td>
<td>61 (24)</td>
<td>42 (18)</td>
</tr>
<tr>
<td>N=21*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Airway opened</td>
<td>123 (134)</td>
<td>104 (135)</td>
</tr>
<tr>
<td>N=23</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HR first determined (oximeter or auscultation)</td>
<td>85 (31)</td>
<td>67 (31)</td>
</tr>
<tr>
<td>N=23</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HR Auscultated</td>
<td>84 (33)</td>
<td>65 (35)</td>
</tr>
<tr>
<td>N=14*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pulse oximeter sensor applied &amp; connected</td>
<td>69 (28)</td>
<td>50 (28)</td>
</tr>
<tr>
<td>N=23</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data visible on pulse oximeter screen</td>
<td>92 (32)</td>
<td>73 (30)</td>
</tr>
<tr>
<td>N=23</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Respiratory support given (CPAP, PPV or ET ventilation)</td>
<td>156 (132)</td>
<td>137 (128)</td>
</tr>
<tr>
<td>N=23</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* 2 infants (term &34 weeks' gestation) were not placed in polyethylene bags
§ Only 14/23 infants had their HR auscultated in the DR
COAGULATION PROFILE IN VERY PREMATURE INFANTS

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Background: Premature infants are predisposed to coagulopathy, which may increase intraventricular haemorrhage (IVH). Coagulation values vary by gestation in utero and are different to term values. Limited data exists in literature for coagulation parameters < 26/40 GA. Conservative estimates increase unnecessary blood products, while untreated coagulopathy could increase IVH.

Aim: Describe distribution of day 1 PT, APTT and Fibrinogen for infants < 26/40 GA.

Methods: Retrospective review of infants (< /= 26/40 GA) between 1.1.2004-31.12.2010. Clotting studies performed on < 26/40 GA in our hospital on day 1 of life on admission to NICU, prior to insertion of heparinised saline. Values obtained from computerised laboratory system. Descriptive statistics performed, including sample size assessment of 50 infants required.

Results: Clotting values summarised in Table 1. Cases were excluded if value exceeded laboratory measurement capability (n=6) or not obtained on day 1.

Table 1: Coagulation Values for Infants less than 26 weeks gestation on Day 1 of Life

<table>
<thead>
<tr>
<th>Total = 190 GA &lt;= 26/40</th>
<th>PT = 144</th>
<th>APTT = 136</th>
<th>FIBRINOGEN =80</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean (SD)</td>
<td>21.5 (5.3)</td>
<td>75.2 (27.8)</td>
<td>1.86 (1.1)</td>
</tr>
<tr>
<td>Median (Range)</td>
<td>20.2 (13.3-39)</td>
<td>67.4 (34.9-191.6)</td>
<td>1.4 (0.5-4.8)</td>
</tr>
<tr>
<td>INR / APTT Ratio</td>
<td>1.7</td>
<td>1.8</td>
<td>n/a</td>
</tr>
<tr>
<td>2.5 th – 97.5 th Centile</td>
<td>14.36 – 36.68</td>
<td>40.49 – 158.53</td>
<td>0.7 – 4.8</td>
</tr>
<tr>
<td>Reference Value Advisor Range</td>
<td>14.36 – 36.68</td>
<td>40.49 – 158.53</td>
<td>0.7 - 4.8</td>
</tr>
<tr>
<td>90% CI Lower Limit</td>
<td>13.3-14.9</td>
<td>34.9-45.4</td>
<td>0.5-0.7</td>
</tr>
<tr>
<td>90% CI Upper Limit</td>
<td>31.4-39.0</td>
<td>130-191.6</td>
<td>4.2-4.8</td>
</tr>
<tr>
<td>Pathological values per laboratory reference range term infants</td>
<td>140 (97.2%)</td>
<td>124 (91.2%)</td>
<td>66 (82.5%)</td>
</tr>
<tr>
<td>13.0+/- 1.43 (11.57-14.43)</td>
<td>42.9+/- 5.8 (37.1-48.7)</td>
<td>2.83+/-0.58 (2.25-3.41)</td>
<td></td>
</tr>
</tbody>
</table>

1Narrowing of range between 23-26 /40 GA
Conclusions: Term reference ranges differ from coagulation values for < 26/40 GA. This large cohort provides normative values for interpretation of day 1 coagulation values. Further studies required to determine whether treatment of raised coagulation values is of therapeutic benefit.

References


Title: Early endotoxin tolerant phenotype in preterm infants with abnormal outcomes

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Background: Activated leukocytes and infection are implicated in neonatal brain injury producing toxic ROIs and proteolytic enzymes.

Objective: To assess neutrophil function at baseline and following endotoxin stimulation in premature infants over the first week of life.

Design/Methods: We prospectively collected serial blood samples from premature infants (n=30; <32 weeks gestation) on day 1, 2 and 7 of life and from adult controls (n=12). Whole blood CD11b and Toll Like Receptor 4 (TLR4) expression as well as reactive oxygen intermediate (ROI) production were evaluated via flow cytometry at baseline and following endotoxin. Infants were divided as follows according to Cranial USS findings (Normal: Grade 0-2 intraventricular haemorrhage; Abnormal: Grade 3-4 intraventricular haemorrhage, Periventricular Leukomalacia or death).

Results: Preterm infants with ‘Normal’ outcome have elevated baseline CD11b, TLR4 expression, and ROI production compared with adults as well as a robust immune response following endotoxin stimulation. ‘Abnormal’ outcome preterms have decreased baseline CD11b, TLR4 expression, and elevated baseline ROI production compared with adults. Endotoxin hyporesponsiveness with suppressed upregulation following endotoxin stimulation is displayed across all parameters with some recovery by day 7.
PRIMARY AMEBIC MENINGOENCEPHALITIS: CASE REPORT AND REVIEW OF THE LITERATURE

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Abstract
Primary amebic meningoencephalitis (PAM) is a rare but nearly always fatal disease caused by infection with Naegleria fowleri, a thermophilic and free-living ameba found in fresh water environments. PAM occurs most commonly in healthy children and young adults with recent recreational freshwater exposure. Infection with this organism closely mimics and is often mistaken for bacterial pyogenic meningitis. Patients rapidly progress to coma and death, usually within one week after the onset of illness, often without developing focal neurologic signs and symptoms.

A 10-year-old girl with recent exposure to warm fresh water developed fever, generalized exquisite headache, nausea, and vomiting without any focal neurological symptoms. She rapidly progressed into coma, uncal herniation, and brain death within 4 days of the onset of illness. CSF wet mount studies showed numerous trophozoite forms of Naegleria fowleri and CSF Naegleria fowleri real time PCR (performed at the CDC) was positive.

Clinicians should have a heightened suspicion and include PAM in the differential diagnosis of children and young adults with meningoencephalitis with recent exposure to fresh water, particularly in warm weather. If PAM is suspected, empiric therapy should be initiated while the diagnostic evaluation is performed as mortality is estimated at 98%. In the few patients known to have survived N fowleri meningoencephalitis, early diagnosis and institution of high dose of drug therapy was thought to be important for optimizing outcome.

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MOLECULAR TESTING OF NASOPHARYNGEAL SPECIMENS HAS POTENTIAL AS A DIAGNOSTIC TEST FOR MENINGOCOCCAL DISEASE.

Thomas Walter Bourke BMedSc, MB, BAO, BCh. MRCPCH

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Background
Molecular testing of nasopharyngeal specimens for Neisseria meningitidis (NM) is not widespread because of the risk of detecting asymptomatic carriage. We present our experience of testing nasopharyngeal specimens for NM using Loop Mediated Isothermal Amplification (NM LAMP).

Methods
All children presenting to the Royal Belfast Hospital for Sick Children with suspected meningococcal disease (MD) have a ‘meningococcal pack’ of investigations taken including blood for culture, qPCR & NM LAMP and a throat swab for NM LAMP. We compare the results of the throat swab with laboratory confirmed MD over a 12 month period.

Results
160 children had a meningococcal pack completed. 14 had laboratory confirmed MD (14 qPCR, 3 blood culture, 1 CSF culture). There was one false negative (throat swab negative, blood culture and qPCR positive) and one false positive (throat swab positive, blood culture, qPCR negative). This gives NM LAMP testing of nasopharyngeal specimens a sensitivity of 92.8% (95% CI: 76 to 98) and a specificity of 99.3% (95% CI: 97.7 to 99.8).

<table>
<thead>
<tr>
<th>Lab confirmed MD</th>
<th>Not MD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Throat swab LAMP +ve</td>
<td>13</td>
</tr>
<tr>
<td>Throat swab LAMP -ve</td>
<td>1</td>
</tr>
</tbody>
</table>

Conclusions
LAMP testing is simple and inexpensive and has potential as a rapid near patient test. Molecular testing of nasopharyngeal specimens has potential as a relatively non-invasive diagnostic test for MD. We believe the potential to diagnose this life threatening disease early outweighs the risk of detecting asymptomatic carriage (which is relatively low in young children).


2. Bourke TW, Fairley DF, Shields MD. Rapid diagnosis of meningococcal disease.. Expert review in anti-infective therapy. 2010;8:1321-3
PROCALCITONIN IS A USEFUL MARKER IN SUSPECTED MENINGOCOCCAL DISEASE.

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Background
Serum procalcitonin (PCT) is an excellent biomarker for invasive bacterial disease in children. We present a study evaluating PCT as a diagnostic marker in children presenting with suspected meningococcal disease (MD).

Methods
Blood was obtained from children presenting to the Emergency Department of the Royal Belfast Hospital for Sick Children with suspected MD. Receiver operator characteristic (ROC) curves were used to compare PCT, C reactive protein (CRP) and white cell count (WCC) as predictors of MD.

Results
55 of the 104 children presenting in a 12 month period had sufficient serum remaining after routine biochemistry analysis for PCT evaluation. 22 of these 55 children had confirmed MD. The area under the ROC curve for PCT was 0.92 (95% CI: 0.77 to 0.98), CRP was 0.63 (95%CI: 0.45 to0.78) and WCC 0.73 (95%CI: 0.55 to 0.86), figure 1. The area under the curve for PCT was significantly greater than CRP (p=0.005) and WCC (p=0.02). PCT had a sensitivity of 82% and specificity of 82% using a cut off of 1.01 ng/ml.

Conclusion
In children with suspected MD, PCT is significantly better than either CRP or WCC for the prediction of this disease. PCT can be measured rapidly in the near patient setting and has real potential to assist in the earlier diagnosis of this life threatening infection.
Pulmonary lymphangiectasia secondary to Atresia of the Common Pulmonary Vein (ACPV) presenting as neonatal cyanosis: A case study

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Background: An obstructive form of total anomalous pulmonary venous return (TAPVR) is one of five major congenital heart differential diagnostic considerations in the cyanotic newborn. ACPV constitutes the rarest pathologically recorded variant of TAPVR in which obstruction can lead to development of pulmonary lymphangiectasia during fetal life with profound consequence for the liveborn neonate. We present a case illustrating this differential diagnostic dilemma.

Clinical Summary: A 39 week gestation infant girl born to an 18 year-old primigravida mother had an uneventful prenatal course. Delivered vaginally following artificial rupture of membranes, she was cyanotic with vigorous cry. Progressive poor respiratory effort despite resuscitative interventions necessitated transfer to our NICU for tertiary treatment. Admission vital signs: temperature 96.9F, pulse 162, respiratory rate 60, blood pressure 50/30 (37), oxygen saturation 33%, and glucose 152. The baby was placed on maximum ventilatory support, and a bedside echocardiogram was suspicious for TAPVR (non-isolated) accompanied by a large ventricular septal defect (VSD). The foramen ovale and ductus arteriosus were patent. Despite 90 minutes of ultrasound evaluation, return blood flow to the heart from the confluence of the pulmonary veins could never be visualized. An initial x-ray demonstrated a left pneumothorax requiring chest tube placement and increased markings suspicious for severe pulmonary interstitial emphysema and pulmonary edema or lymphangiectasis.

Consultation among the various teams ensued with a plan for nitric oxide treatment to address the potential persistent pulmonary hypertension and further imaging to ascertain the more likely diagnosis of an obstructive TAPVR. CT angiography confirmed the previous echocardiogram findings, and the clinical team planned for cardiac catheterization the following morning. However, despite aggressive intervention the infant continued to have respiratory failure and severe acidosis with death following less than twenty-four hours after birth.

Prominent autopsy findings: Heart – ACPV with VSD. The bilateral pulmonary veins joined together posterior to the left atrium to form a sclerotic small caliber confluence that measured 1.5 cm long with a diameter of 3 mm. The only egress for this confluence consisted of a 1 cm long atretic ascending vertical vein that arose from the left upper lobe vein near its junction with the confluence. This structure had a pinpoint lumen measuring less than 0.1 mm on cross section. The presence of a thymus and a single spleen was confirmed.

Lungs – lymphangiectasia. The pleural surface was cobbled. Histologic examination of the pulmonary parenchyma demonstrated dramatic dilation and proliferation of the subpleural and interstitial lymphatics with associated fibrosis.

Cause of death: Atresia of the common pulmonary vein

Discussion: Necessary urgent neonatal management including fluid resuscitative efforts led to progressive worsening of pulmonary lymphangiectasia. Marked hypoplasia with sclerosis of the pulmonary venous confluence, even if defined by imaging, combined with established prenatal lung changes limits any treatment options in this very rare condition.
Pediatric cardiac tumors are rare and, as a result, incidence is difficult to estimate. Reported studies indicate an incidence ranging from 0.0017% in autopsy series to as high as 0.2% in studies based on echocardiography. Approximately 90% of pediatric cardiac tumors are benign with rhabdomyoma being the most common followed by fibromas, teratomas and myxomas in variable frequency, depending on the age group. Myxomas tend to be more common in older children whereas teratomas are more common in fetuses and infants. Cardiac lipoma is a rare tumor in the pediatric age group. We are reporting a unique case of a cardiac lipomyxomatous tumor which initially came to light because of an abnormal chest x-ray and which was successfully resected under cardiopulmonary bypass.
Rupture of ascending aortic aneurysm secondary to Bicuspid Aortic Valve (BAV) Associated Aortopathy: A case study

By Elaina Pirruccello D.O., Kraman Purushothaman MD, Carol M. Cottrill M.D. and William O'Connor M.D.
University of Kentucky, Lexington, KY, USA and Mount Sinai Medical Center, New York, NY, USA

Background: Bicuspid aortic valve is associated with coarctation of the aorta, aortic dissection, and thoracic aortic aneurysm. BAV patients have underlying pathology of the aortic medial layer (aortopathy) which is independent of valve disease or other associations but increases the risk for aneurysm, dissection, and rupture in the patient and first degree relatives.

Clinical Summary: A 9 year old healthy asymptomatic male is referred to pediatric cardiology clinic for evaluation of severe hypertension and is found to have aortic coarctation, a near interruption in the juxtaductal region with a luminal diameter of only 1 to 2 mm; and a dilated ascending aorta, 4.5 cm diameter with moderate aortic insufficiency. At surgery, the coarctation was repaired but a major aortic root replacement with mechanical valve was postponed. It was thought best to delay that procedure as long as possible and continue his follow-up with low dose Lisinopril and Lasix therapy. At age 16, the patient presented to the emergency department (ED) via EMS in cardiac arrest. Earlier, the patient had gone upstairs to shower when his father heard a loud “thud” from the bathroom. He found him lying on the floor, unresponsive. Paramedics found him in extremis. An echocardiogram showed no cardiac activity. Cardiopulmonary resuscitation was performed for 20 minutes without any response, and the patient was pronounced dead.

Prominent autopsy findings: Upon opening of the chest cavity a large hemopericardium of 780 cc was noted. Further examination of the heart and aorta showed a fusiform aneurysm, 6.0 cm in diameter located 2.5 cm above the sinotubular junction. An intimal transverse tear (2.1 cm long) was noted with transmural rupture (without a dissecting hematoma) into the pericardial sac. Congenital bicuspid aortic valve and abnormal anteroseptal/basal insertion of the anterior left ventricular papillary muscle was seen.

Cause of Death: Congenital BAV associated medial aortopathy resulting in acute rupture of ascending aortic aneurysm with hemopericardium and cardiac tamponade.

Discussion: This case highlights the significance of the related aortopathy associated with congenital BAV. Microscopic findings demonstrated cystic medial degeneration, discontinuous lamellae, and coexisting collapsed lamellae not only of the ascending but also the descending aorta. Patients with BAV are 10 times more likely to develop thoracic aortic dissection than patients with a normal 3 cusp aortic valve. In BAV patients with dilation of ascending aorta, close follow up by cardiac ultrasound is necessary to measure progressive increase in aortic diameter over time in planning for surgical intervention.
A family from Eastern Kentucky is presented in which Marfan’s disease has unusually high prevalence. In addition, the manifestations of Marfan’s in this family are unusually severe with many individuals having early death.

Four generations of this family are discussed and possible mechanisms are put forth.
A rare association of maternal diabetes with diaphragmatic hernia and multiple VACTERL spectrum congenital anomalies: A case report

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Department of Pathology and Laboratory Medicine, and Pediatrics, University of Kentucky Hospital, Chandler Medical Center, Lexington, Kentucky, USA

Background: Diaphragmatic hernia in association with maternal diabetes and VACTERL features is rarely reported. We describe a case of hemidiaphragmatic hernia in association with complex congenital cardiovascular disease and multiple congenital anomalies in an infant born to a diabetic mother.

Clinical summary: A male infant was born at 31 weeks and 6 days to a 30 year old gravida 2, para 1 mother with a history of insulin-dependent diabetes. A diagnosis of congenital cardiovascular disease had been made antenatally by ultrasound. The mother presented in preterm labor with spontaneous rupture of membranes approximately 3 hours prior to delivery. Apgar scores were 5 and 5 at 1 and 5 minutes respectively. The infant was cyanotic, had poor respiratory effort and was subsequently intubated. He was transferred to the NICU on mechanical ventilation. A chest x-ray revealed right sided hemidiaphragmatic hernia and multiple hemivertebrae. His condition deteriorated and he required multiple pressors. He became bradycardic and the decision was made to provide palliative care.

Prominent autopsy findings: The cardiovascular system showed multiple abnormalities consistent with double outlet right ventricle [DORV]. There was pulmonary valve atresia, patent ductus arteriosis, a large subaortic ventricular septal defect and right ventricular hypertrophy. A right sided hemi-diaphragmatic hernia was present with herniation of colon and right lobe of liver into the right hemi-thorax. The right lung was hypoplastic, atelectatic and incompletely trilobate. There were skeletal anomalies including anterior rib agenesis and multiple hemivertebrae. There was renal and thymic agenesis and a single umbilical artery. Cytogenetic analysis showed a normal 46, XY chromosome pattern and a FISH probe for 22q11.2 was negative for deletions.

Cause of death: Complications of chest wall and diaphragmatic hernia related pulmonary insufficiency and complex congenital cardiovascular disease with multiple congenital abnormalities.

Discussion: While complex congenital cardiovascular disease can be seen in infants born to diabetic mothers, hemidiaphragmatic hernia and the constellation of findings in this case are rarely reported in association with maternal diabetes. DiGeorge syndrome was considered due to the presence of cardiovascular disease and thymic aplasia, however, a deletion at 22q11.2 was not identified. The spectrum of abnormalities seen fits with the VACTERL association, with the infant having three of the six features including vertebral, cardiovascular and renal defects. This case is particularly unusual due to the high number of congenital anomalies, the association with maternal diabetes and the finding of diaphragmatic hernia in association with VACTERL. While diaphragmatic hernia is rarely seen with the VACTERL association, mouse models with mutations in the Sonic hedgehog (Shh) signaling pathway have been found to have diaphragmatic hernia in addition to the classic VACTERL features.
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* Met in conjunction with AAP
THE SOCIETY

The Irish and American Paediatric Society was conceived by Doctors Bill Kidney (Dublin), Fred Burke (Georgetown), and Thomas Cone, Jr. (Boston) at the International Congress of Pediatrics in Lisbon, Portugal in 1962. The first scientific meeting was held in Dublin, Ireland during which the Founders and Charter Members were guests in the home of Ireland’s President Eamon de Valera. The aims of the Society are to promote the exchange of scientific and cultural information in the broad area of child health and life in Ireland, Northern Ireland, Canada, and the United States. Alternate meetings held in Ireland or North America on an annual basis provide a greater awareness of local color, historic and scenic vistas as well as a genuine feeling of camaraderie and warm fellowship among members and spouses.

Edmund C. Burke, M.D.