47th - 47ième

Annual Meeting - Réunion Annuelle
2015
Niagara Falls, Ontario
Canada
September 17-19 Septembre
CAPS 2016 Annual Meeting
ACCP 2016 Réunion Annuelle

September 22-24 Septembre
Vancouver, British Columbia
Canada

PLAN TO JOIN US!
Joignez-vous à nous!
CANADIAN ASSOCIATION of
PAEDIATRIC SURGEONS
ASSOCIATION CANADIENNE de
CHIRURGIE PÉDIATRIQUE

47th Annual Meeting
47 ième Réunion Annuelle

September 17-19 Septembre 2015
Marriott Gateway on the Falls
Niagara Falls, Ontario
CANADA
This event is an Accredited Group Learning Activity (Section 1) as defined by the Maintenance of Certification Program of the Royal College of Physicians and Surgeons of Canada and approved by the Canadian Association of General Surgeons for which an attendee may claim up to 14 credits (1 hour = 1 Maincert credit). Participants should claim the number of hours consistent with their attendance.

Cet événement est une activité de formation collective agréée (section 1) tel que défini par le programme de Maintien du Collège Royal des Médecins et Chirurgiens du Canada et approuvé par l'Association Canadienne des Chirurgiens Généraux pour lesquels un participant peut avoir jusqu'à 14 crédits (1 heure = 1 Maincert crédit). Les participants devraient déclarer le nombre d'heures compatibles avec leur présence.

In keeping with CMA Guidelines, program content and selection of speakers are the responsibility of the planning committee. Support is directed toward the costs of the course and not to individual speakers. All speakers have indicated no involvement with industry that may be perceived as potentially influencing the presentation of the educational material.
Educational Objectives

The Annual meeting of the Canadian Association of Paediatric Surgeons is intended to provide 3 days of comprehensive continuing education in the field of pediatric general and thoracic surgery. Specifically, the objectives are to:

- Present current updates on advances in clinical pediatric surgery
- Present current updates on advances in the pathophysiology of pediatric surgical disorders
- Provide for group discussion on controversial issues in pediatric general and thoracic surgery through:
  - Discussion of presented scientific papers
  - Interactive panel discussion on the management of clinical pediatric problems

Over the three days of the meeting, the breadth of pediatric general and thoracic surgery topics will be covered through presentation of original works by trainees, professional colleagues and allied health care workers involved in the field. The works will acquaint participants with the latest clinical and basic science research findings and trends influencing the clinical practice of pediatric surgery, as well as reacquaint participants with interesting pediatric surgical entities. Controversial topics will invite participatory discussion by the delegates.

A panel of 6 members of the CAPS Program Committee has chosen the abstracts presented, based on quality of abstracts submitted and reflecting what is commonly relevant to the practice of pediatric surgery. Input for subsequent meetings and how to improve this one will be solicited from the delegates at the conclusion of the meeting.
<table>
<thead>
<tr>
<th>DATE</th>
<th>EVENT</th>
<th>TIME</th>
<th>LOCATION</th>
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<tr>
<td>Wednesday, September 16</td>
<td>Executive Finance Meeting</td>
<td>08:00 – 11:45</td>
<td>Peninsula Room, Lobby Level</td>
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<td>Council Meeting</td>
<td>11:45 – 17:00</td>
<td>Peninsula Room, Lobby Level</td>
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<td>CAPSNet Meeting</td>
<td>17:00 – 19:00</td>
<td>Peninsula Room, Lobby Level</td>
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<td>Thursday, September 17</td>
<td>Publications Meeting</td>
<td>06:30 – 10:00</td>
<td>Maple Room</td>
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<td>Registration</td>
<td>09:00 – 17:00</td>
<td>Oakes Foyer Hallway</td>
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<td></td>
<td>CaPSNIG Meeting</td>
<td>08:00 – 14:00</td>
<td>Hennepin North</td>
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<td>Research Committee</td>
<td>07:00 – 09:00</td>
<td>Executive Boardroom</td>
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<td></td>
<td>Global Partnership Meeting</td>
<td>10:00 – 11:45</td>
<td>Executive Boardroom</td>
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<td>Scientific Meeting Sessions</td>
<td>12:00 – 17:15</td>
<td>Oakes North</td>
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<td>Speaker Ready Room</td>
<td>08:00 – 17:00</td>
<td>Coat Check Room off Foyer</td>
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<td>Welcome Reception &amp; Buffet</td>
<td>18:30 – 23:00</td>
<td>Oakes South</td>
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<td>Friday, September 18</td>
<td>RCPSC Meeting</td>
<td>06:30 – 08:00</td>
<td>Ontario Room</td>
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<td>07:00 – 16:30</td>
<td>Oakes Foyer Hallway</td>
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<td></td>
<td>Speaker Ready Room</td>
<td>07:00 – 16:30</td>
<td>Coat Check Room off Foyer</td>
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<td>Meeting Sessions</td>
<td>08:00 – 17:30</td>
<td>Oakes North</td>
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<td>Exhibits</td>
<td>07:00 – 17:00</td>
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<td>Poster Viewing</td>
<td>07:00 – 17:00</td>
<td>Oakes South</td>
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<td>All Breaks &amp; Lunch</td>
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<td>Education Committee</td>
<td>18:00 – 19:30</td>
<td>Ontario Room</td>
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<td>Saturday, September 19</td>
<td>Annual Business Breakfast</td>
<td>06:30 – 07:00</td>
<td>Hennepin South</td>
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<td>Non-members Breakfast</td>
<td>08:00 – 09:00</td>
<td>Oakes South</td>
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<td>Registration</td>
<td>09:00 – 12:00</td>
<td>Oakes Foyer Hallway</td>
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<td>Exhibits</td>
<td>08:00 – 14:00</td>
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<td>Poster Viewing</td>
<td>07:00 – 13:30</td>
<td>Oakes South</td>
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<td>Speaker Ready Room</td>
<td>07:00 – 12:00</td>
<td>Coat Check Room</td>
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<td></td>
<td>Travel by bus to Stratus</td>
<td>17:30 – 18:30</td>
<td>Stratus Vineyard</td>
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<td>Vineyard</td>
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<tr>
<td></td>
<td>Presidential Reception &amp;</td>
<td>18:30 – 24:00</td>
<td>Stratus Vineyard</td>
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<td>Banquet</td>
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11th Annual Meeting September 17, 2015
Niagara Falls Marriott Gateway on the Falls
6755 Fallsview Boulevard
Room-Hennepin North

7:00-7:45 am  CaPSNIG business meeting-members only
Breakfast will be served

7:45 – 8:00 am  Registration

8:00 – 8:30 am  Welcome & Introduction of CAPS’ President - Dr. Peter Fitzgerald
Monping Chiang & Kimberly Colapinto – Co-Chairs CaPSNIG

8:30 – 9:30 am  Education session – TEF/EA management: Toronto to Rotterdam
M. Chiang & N. van Beelen

9:30 – 10:00 am  Coffee Break & Mingle

10:00 - 10:30 am  GIFT program introduction – C. Kosar
Long term complications in the paediatric intestinal failure population – C. Kosar

10:30 - 10:50 am  Long term management challenges of intestinal failure patients – K. Steinberg

10:50 - 11:30 pm  Constipation Management – K. Colapinto

11:30 - 12:30 pm  Lunch
Discussion of interesting cases

12:30- 1:30 pm  1. Growth retardation in patients with esophageal atresia – N.van Beelen
2. Blenderized table food: an alternative to traditional commercial formula for enteral tube feeding – B. Haliburton
3. Ins and outs of adolescent bariatric surgery - S. Lira

12:50 - 1:00 pm  Closing remarks - CAPS conference

This meeting was made possible by the generous donation of CAPS. Please thank your surgeons!
Welcome to Niagara Falls and thank you for attending the 47th Annual Meeting of the Canadian Association of Paediatric Surgeons. We are very fortunate to be meeting in one of the most unique places in Canada, surrounded by the Falls, exciting vineyards and the wonderful people of southern Ontario. This year we again have both an excellent scientific program and first class social events.

I would like to thank BJ Hancock, our hardworking secretary-treasurer, Priscilla Chiu, Program Committee Chair and Leslie Scott, Local Arrangements Chair for their hard work and dedication to making this meeting a success. A special thank you goes to Arlene Ein, our meeting coordinator, for making everything run like clockwork.

This year we welcome Dr. Kevin Lally from Houston Texas as our JPS/MacLeod lecturer. Dr. Lally is the A.G. McNeese Chair in Pediatric Surgery, Richard Andrassy Distinguished Professor and Chairman of the Department of Pediatric Surgery. He is Surgeon-in-Chief of the Children’s Memorial Hermann Hospital, and Director of the ECMO Program.

The CAPS Annual meeting is a wonderful opportunity to exchange ideas, learn something new to take back to your respective hospitals and enjoy the company of our peers. I know you will enjoy Niagara Falls!

Peter Fitzgerald Hon BA, MA, MD, FRCSC
President
Canadian Association of Paediatric Surgeons
MOT DE BIENVENUE DU PRÉSIDENT

Bienvenue aux Chutes Niagara et merci pour avoir assisté à la 47e réunion annuelle de l'Association canadienne de chirurgie pédiatrique. Nous sommes très heureux d'être réunie à l'un des endroits les plus uniques au Canada, entourés par les chutes, les vignobles et les gens merveilleux du sud de l'Ontario. Cette année, nous avons à nouveau à la fois un excellent programme scientifique et des événements sociaux de première classe.

Je tiens à remercier BJ Hancock, notre secrétaire-trésorier qui travaille très fort à chaque année, Priscilla Chiu, président du Comité du programme et Leslie Scott, président des arrangements locaux pour leur efforts et leur dévouement à faire de cette réunion un succès. Un merci tout spécial à Arlene Ein, notre coordinatrice de la réunion, pour faire tout fonctionner comme sur des roulettes.

Cette année, nous accueillons le Dr Kevin Lally de Houston au Texas comme notre professeur JPS / MacLeod. Il est le A.G McNeese « chair » en chirurgie pédiatrique, Richard Andrassy distingué professeur et le chef du département de chirurgie pédiatrique. Il est chirurgien en chef de Memorial Hermann Hospital pour enfants, et qui est le directeur du programme d'ECMO.

La réunion annuelle de CAPS est une merveilleuse occasion d'échanger des idées, d'apprendre quelque chose de nouveau à ramener à vos hôpitaux respectifs et apprécier la compagnie de nos collègues. Je sais que vous allez profiter des Chutes de Niagara!

Peter Fitzgerald Hon BA, MA, MD, FRCSC
Président,
Association canadienne de chirurgie pédiatrique
Dr. Sigmund H. Ein (Siggie) passed away on January 25, 2015. Dr. Ein began his career at SickKids on July 1, 1969 in the Division of General Surgery where he remained until his retirement in 2004. During his 35 years at the University of Toronto, he held many leadership positions within Sick Kids and was President of the Canadian Association of Paediatric Surgeons. After retirement he remained an Honorary member of staff at SickKids and an Associate Professor of Surgery at the University of Toronto.

Dr. Ein was all about patient care. He was devoted to the children and their families, and his advocacy on their behalf served as a powerful role model for several generations of trainees and colleagues. Dr. Ein was internationally known for promoting and documenting the natural history and non-operative management of a variety of paediatric surgical conditions. The respect with which he was held by his peers led to the renaming of the annual Simpson Lecture to the Simpson-Ein lecture.

Dr. Ein will be remembered for many things including playing Santa at the annual Perioperative Holiday Grand Rounds at Sick Kids, his “den” (which was an eclectic mix of sporting memorabilia and gifts from patients that covered every wall and the ceiling and always drew people in to see it when they walked by the office), and his many “Einisms” as his fellows would call them that were heard daily including his most favorite one especially when his wife Arlene was nearby. “Happy Wife, Happy Life”.

Dr. Ein was a dedicated surgeon, teacher, mentor, husband and father whose signature purple marker will be remembered by everyone who was lucky enough to have met him.
ABOUT THE CANADIAN ASSOCIATION OF PAEDIATRIC SURGEONS

The Canadian Association of Paediatric Surgeons was granted its charter in 1967. Its goal is to improve the surgical care of infants and children in Canada. Its areas of interest include all aspects of general and thoracic pediatric surgery with recognition of its unique responsibility to infants born with congenital anomalies and children with malignancies. While its responsibility to pediatric trauma is not unique, it assumes a pivotal role in issues related to pediatric trauma.

The Canadian Association of Paediatric Surgeons presents an opportunity, particularly through its annual meetings, to share information concerning diagnosis, treatment, and research with regards to its areas of interest. In addition, it assumes responsibility to participate in the education of not only its members, but other members of the community interested in and involved in related aspects of pediatric care.

EDUCATION AND RESEARCH FUND: To help achieve its responsibility to education and research for issues related to pediatric surgery, the Association has an Education and Research Fund. This fund was established and continues to exist through the generosity of donations from individuals and groups, both medical and non-medical, interested in the surgical care of children. The Association solicits annual donations to the fund to maintain an adequate working capital to support annual education programs and research endeavors endorsed by the CAPS membership. This fund is registered with the federal government and all contributions are fully tax-deductible. It is audited annually.

Contributions to the Education and Research Fund can be made online at www.caps.ca or send a cheque to:

Dr. B.J. Hancock
CAPS Secretary-Treasurer
Children’s Hospital of Winnipeg
AE401 – 840 Sherbrook Street
Winnipeg, Manitoba R3A 1S1
Email: admin@caps.ca
Telephone: (204) 787-1246
Fax: (204) 787-4618
AU SUJET DE L’ASSOCIATION CANADIENNE DE CHIRURGIE PÉDIATRIQUE

L'Association canadienne de chirurgie pédiatrique a reçu sa charte en 1967. Son objectif est d'améliorer les soins chirurgicaux aux nouveau-nés et aux enfants du Canada. Elle s'intéresse à tous les aspects de la chirurgie pédiatrique générale et thoracique tout en reconnaissant sa responsabilité unique à l'égard des bébés nés avec des anomalies congénitales et des enfants atteints de tumeurs malignes. Bien que sa responsabilité en matière de traumatismes pédiatriques ne soit pas unique, elle exerce un rôle crucial dans les questions relatives à ces traumatismes.

L'Association canadienne de chirurgie pédiatrique offre la possibilité, particulièrement dans le cadre de son assemblée générale annuelle, d'échanger des informations concernant le diagnostic, le traitement et la recherche liés à ses domaines de travail. De plus, elle assume la responsabilité de participer à l'éducation non seulement de ses propres membres, mais aussi des autres membres de la communauté qui s'intéressent à des aspects apparentés des soins pédiatriques et qui travaillent dans ces domaines.

LE FONDS D’ÉDUCATION ET RESEARCH : Pour l'aider à remplir ses engagements en matière d'éducation et du research sur les sujets relatifs à la chirurgie pédiatrique, l'association a créé un fonds pour l'éducation et research. Ce fonds a été établi et continué d'exister grâce à la générosité des individus et des associations, de nature médicale ou autre, intéressées par les soins chirurgicaux aux enfants. L'association sollicite annuellement des dons en faveur de son fonds afin de maintenir un fonds de roulement suffisant pour soutenir les programmes d'éducation et les projets des research approuvés par les membres de l'ACCP. Ce fonds est enregistré auprès du gouvernement fédéral et toutes les contributions sont pleinement déductibles d'impôts. Le fonds fait l'objet d'une vérification comptable annuelle.

Les dons pour le fonds d'éducation et du research peuvent être envoyés par courriel à www.caps.ca ou adressés par chèque à :

Dr. B.J. Hancock
Secrétaire-trésorier de l’ACCP
Children’s Hospital of Winnipeg
AE401 – 840 Sherbrook Street
Winnipeg, Manitoba R3A 1S1
Email: admin@caps.ca
Telephone: (204) 787-1246 Fax: (204) 787-4618
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<th>Years</th>
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<td>Harvey Beardmore*</td>
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<td>1973-1975</td>
<td>Colin Ferguson*</td>
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<td>1975-1977</td>
<td>Jim Simpson*</td>
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<td>1977-1979</td>
<td>Sam Kling*</td>
<td>Edmonton</td>
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<td>1979-1981</td>
<td>Pierre-Paul Collin</td>
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<td>Gordon Cameron</td>
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<td>1985-1987</td>
<td>Stanley Mercer*</td>
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<td>1987-1989</td>
<td>Alex Gillis</td>
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<td>1991-1993</td>
<td>Sigmund H. Ein*</td>
<td>Toronto</td>
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<td>1993-1995</td>
<td>Angus Juckes</td>
<td>Regina</td>
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<td>Jean G. Desjardins</td>
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<td>1997-1999</td>
<td>David P. Girvan</td>
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<td>1999-2001</td>
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<td>Mike Giacomantonio</td>
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<td>2003-2005</td>
<td>Salam Yazbeck</td>
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<td>2005-2007</td>
<td>Nathan Wiseman</td>
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<td>2007-2009</td>
<td>Geoffrey Blair</td>
<td>Vancouver</td>
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<td>2009-2011</td>
<td>Jean-Martin Laberge</td>
<td>Montreal</td>
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<td>2011-2014</td>
<td>Jacob Langer</td>
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<tr>
<td>2014-2016</td>
<td>Peter Fitzgerald</td>
<td>Hamilton</td>
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* deceased/ décédé
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<td>Peter G. Fitzgerald</td>
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<td>2006-2011</td>
<td>Juan Bass</td>
<td>Ottawa</td>
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<td>2011-2017</td>
<td>BJ Hancock</td>
<td>Winnipeg</td>
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FOUNDING MEMBERS
Membres fondateurs

ALLEN Michael
ASHMORE* Phillip
BEARDMORE* Harvey
CAMERON Gordon
COLLIN Pierre-Paul
DESJARDINS Jean G.
DUCHARME Jacques C.
DUVAL* Frederick
FALLIS James
FERGUSON* Colin
GILLIS Alex
GUTTMAN Frank M.
JUCKES Angus
KARN* Gordon
KENNEDY* Richard
KLIMAN* Murray
KLING* Samuel
MARSHALL* Donald
MARSHALL* Russell
MERCER* Stanley
MURPHY* David
OWEN* Herbert
SHANDLING Barry
SHRAGOVITCH* Israël
SIMPSON* James
STEPHENS* Clinton
THOMSON* Stuart
TURCOT* Jacques
BURRINGTON John
FRASER Graham

* deceased / décédé

1st ANNUAL MEETING was held January 22, 1969 in VANCOUVER

Le premier CONGRÈS ANNUEL eut lieu le 22 janvier, 1969 à VANCOUVER
THE COAT OF ARMS OF
THE CANADIAN ASSOCIATION OF PAEDIATRIC SURGEONS

LES ARMOIRIES DE
L'ASSOCIATION CANADIENNE DE CHIRURGIE PÉDIATRIQUE
Heraldic Blazon

Per pale gules and purpure, dexter a scalpel erect entwined by a serpent, sinster a child standing, all argent.

Crest: On the three maple leaves slipped gules and blacked purpure, the date 1967. Motto: "Je le pensay, Dieu le guérit".

Description
The red and purple of the arms are also the colours of the Royal College of Physicians and Surgeons of Canada and represent the blood met in surgery - arterial and venous. The scalpel with the healing serpent of Aesculapius, and the figure of a well child combine to symbolize the practice of Paediatric Surgery.

The crest is the Canadian maple leaf and the founding date of the Association (1967).

The Motto is a quotation from Ambroise Pare, a father of modern surgery. The sixteenth-century French translates, "I treated him, God cured him".

Le Blason

Au gauche, un bistouri droit entouré d'un serpent alors qu'à droite se tient un enfant, tout argent.

Au sommet se trouvent trois feuilles d'érable ainsi que la date 1967. Devise: "Je le pensay, Dieu le guérit".

Description
Le rouge et le violet des armoiries sont les couleurs du Collège Royal des Médecins et Chirurgiens du Canada et représentent le sang artériel et veineux vu au cours de la chirurgie. L'association du bistouri avec le serpent guérisseur d'Esculape ainsi qu'avec l'image d'un enfant en bonne santé symbolise la pratique de la chirurgie pédiatrique.

La couronne du blason est la feuille d'érable du Canada et la date de fondation de notre association (1967).

La devise est une citation d'Ambroise Paré, père de la chirurgie moderne.
Visiting Lecturers:

1969  Vancouver  Davenport/Segal
1970  Montreal  F. Wiglesworth
1971  Ottawa  A. Sass-Kortsak
1972  Toronto  MacIntyre
1973  Edmonton  L. Stern
1974  Montreal  J. Folkman

Fred MacLeod Lecturers:

1975  Winnipeg  D. J. Waterston
1976  Quebec City  D. Pellerin
1977  Toronto  F.D. Stephens
1978  Vancouver  J.H. Louw
1979  Montreal  O. Swenson
1980  Ottawa  D. Cohen
1981  Toronto  H.W. Clatworthy
1982  Quebec  P. Mollard
1983  Calgary  K. Kimura
1984  Montreal  M. M. Ravitch
1985  Vancouver  P. Jones
1986  Halifax  A. F. Schärli
1987  Winnipeg  S. L. Gans
1988  Ottawa  J. G. Raffensperger
1989  Edmonton  J.C. Molenaar
1990  St-John’s  K. D. Anderson
1991  Quebec City  J. L. Grosfeld
1992  Ottawa  A. G. Coran
1993  Victoria  K. W. Ashcraft
1995  Cheribourg Magog, Quebec  J. A. Tovar
1996  Halifax  N. P. Kenny
1997  Banff  R. Satava
1998  Toronto  R. Resnick
1999  Montreal  P. K. Donahoe
2000  Montebello  J. A. O’Neill, Jr
2001  9 / 11
2002  Vancouver  Birabwe-Male

JPS/Fred MacLeod Lecturers:

2003  Niagara-on-the –Lake  S. Adzick
2004  Winnipeg  K. Georgeson
2005  Quebec City  A. Al-Rabeeah
2006  Calgary
2007  St- John’s  C. J. H Stolar
2008  Toronto  Jose Boix-Ochoa
2009  Halifax  M. Gauderer
2010  Saskatoon  H. A. Heij
2011  Ottawa  Marcelo Martinez-Ferro
2012  Victoria  John M. Hutson
2013  Charlottetown  Keith Oldham
2014  Montreal  Ronald B. Hirsch
2015  Niagara Falls  Kevin P. Lally
The Canadian Association of Paediatric Surgeons
L’Association canadienne de chirurgie pédiatrique

is pleased to invite
est fière d’inviter

**Dr. Kevin Patrick Lally**

To give the JPS / Fred MacLeod Annual Lecture.
À donner la conférence annuelle JPS/ Fred MacLeod:

“CDH: the past 25 (or so) years”

The visit by La visite du
Dr. Kevin Patrick Lally

is made possible with the financial support of
est rendue possible grâce à la générosité de

Elsevier Publishing Company
Kevin Patrick Lally, MD, MS
CAPS’ 2015 JPS / Fred MacLeod Lecturer

Dr. Kevin Lally is the A.G. McNeese Chair in Pediatric Surgery, Children’s Memorial Hermann Hospital and Chief of Pediatric Surgery at the University of Texas MD Anderson Cancer Centre. He is the Richard Andrassy Distinguished Professor and Chairman, Department of Pediatric Surgery, University of Texas Health Science Centre, Houston, Texas. He is the Program Director for the Pediatric Surgery Training Program. He trained in Pediatric Surgery at the Children’s Hospital of Los Angeles and completed a Masters of Science in Clinical Research at the University of Texas Health Science Centre, Houston. He is Board Certified in Surgery, Pediatric Surgery and Surgical Critical Care.

Dr. Lally’s research areas of interest are in Extracorporeal Membrane Oxygenation (ECMO) and Congenital Diaphragmatic Hernia (CDH). He was Director of the ECMO Program at Children’s Memorial Hermann Hospital for 20 years. He has supervised over 20 Research and Clinical Postdoctoral Fellows and Residents and has received numerous grants and awards for his work. His publications are extensive including 167 peer – reviewed publications, 2 systematic reviews, 41 review articles and book chapters and numerous abstracts. He has served as editor of several books and journals.

We are honoured to have Dr. Lally participate in our 2015 CAPS Annual Meeting Program and look forward to his JPS / Fred MacLeod Lecture on «CDH : The Past 25 (or so) Years ».
RESIDENTS’ OR MEDICAL STUDENTS’ PAPERS
A panel of members from the Publication Committee adjudicates the oral presentations presented by medical students or residents. A panel of members from the Program Committee adjudicates the posters presented by medical students or residents.

PRÉSENTATIONS DES RÉSIDENTS OU DES ÉTUDIANTS EN MÉDECINE
Les présentations orales faites par les étudiants ou les résidents sont jugées par un jury constitué des membres du comité de publication. Les présentations d'affiches faites par les étudiants ou les résidents sont jugées par un jury constitué des membres du comité de programme.

Trainee Prizes: CAPS 2014, Montreal, Quebec, September 18-20, 2014

A. President’s Prize - Prix Du Président

For Outstanding Presentation by a Student- Pour La Meilleure Présentation Par Un(E) Étudiant(E)

Name: Isabelle Hardy (Supervisor: Dr. Dickens St Vil)
Paper Title: Neck and spine injuries in Canadian cheerleaders: An increasing trend
Institution: CHU Ste-Justine (Montréal, Québec)
Prize: Monetary award

B. Poster Prizes

First: Laura Baker (Supervisor: Dr. Robert Baird)
Paper Title: A systematic review and meta-analysis of gastrostomy insertion techniques in children
Institution: Montreal Children’s Hospital, (Montréal, Québec)
Prize: 1-year subscription to Journal of Pediatric Surgery

Second: Catherine K. Beaumier (Supervisors: Drs. Pramod Pulingandla/Erik Skarsgard)
Paper Title: Clinical characteristics and outcomes of patients with right congenital diaphragmatic hernia: A population-based study
Institution: BC Children’s Hospital (Vancouver, BC) / Montreal Children’s Hospital (Montréal, Québec)
Prize: 1-year subscription to Seminars in Pediatric Surgery

C. Oral Presentations

Name: Michael H Livingston (Supervisors: Drs. Sarah A Jones/J Mark Walton)
**Paper Title:** Fundoplication versus percutaneous gastrojejunostomy for gastroesophageal reflux in children with neurologic impairment: A systematic review and meta-analysis  
**Institution:** Western University (London, Ontario) and McMaster University (Hamilton, Ontario)  
**Prize:** 1-year subscription to *Journal of Pediatric Surgery*

**Name:** David Lim (Supervisor: Dr. Paul W. Wales)  
**Paper Title:** Glucagon-like peptide 2 therapy induces changes in morphology, histology, mRNA expression and barrier function consistent with intestinal adaptation in a piglet model of neonatal short bowel syndrome  
**Institution:** University of Alberta (Edmonton, Alberta)  
**Prize:** 1-year subscription to *Seminars in Pediatric Surgery*

### D. Bilingualism Prize

**Name:** Peter Ehrlich (Supervisor: N/A)  
**Paper Title:** Impact of host factors in predicting abdominal injuries from motor vehicle crashes (MVC) in children: the importance of analytical morphomics  
**Institution:** University of Michigan (Ann Arbor, Michigan, USA)  
**Prize:** Monetary

### E. Innovation Prize

**Name:** Danielle McLaughlin (Supervisor: Dr. Prem Puri)  
**Paper Title:** Altered expression of BMP target genes involved in epithelial-mesenchymal transition suggests a pathogenic mechanism for esophageal atresia/tracheo-esophageal fistula in adriamycin mouse model  
**Institution:** Our Lady’s Children’s Hospital (Crumlin, Ireland)  
**Prize:** Monetary
THE CANADIAN ASSOCIATION OF PAEDIATRIC SURGEONS WOULD LIKE TO ACKNOWLEDGE THE FINANCIAL SUPPORT OF THE FOLLOWING SPONSORS

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B.J. Hancock
Secretary-Treasurer
ABBREVIATIONS

O  oral presentation- présentation orale
R  resident paper- présentation par résident
C/T case/technique report- présentation de cas ou de technique
P  poster presentation- présentation d'affiche
O, R, P  Adjudicated- éligible pour les prix
C/T Not adjudicated (except for bilingual effort)- non-éligible pour les prix (sauf pour le bilinguisme)
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<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Authors</th>
<th>Institutions</th>
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<tr>
<td>12:39 - 13:03</td>
<td>O R</td>
<td>Biomarkers to predict outcome in congenital diaphragmatic hernia: results obtained from an international multicenter study.</td>
<td>Kitty G. Snoek¹, Ulrike Kraemer², Irma Capolupo², Arno van Heijst², Anne Greenough⁴, Thomas Schaible⁵, Irwin Reiss⁵, Dick Tibboel¹, René Wijnen¹</td>
<td>¹Department of Intensive Care and Pediatric Surgery, Erasmus Medical Center- Sophia Children’s Hospital, Rotterdam, The Netherlands; ²Department of Medical and Surgical Neonatology, Bambino Gesu Children’s Hospital, Rome, Italy; ³Department of Pediatrics, Division of Neonatology, Radboud University Medical Centre, Nijmegen, The Netherlands; ⁴Division of Asthma, Allergy and Lung Biology, King’s College London, London, United Kingdom; ⁵Department of Pediatrics, Universität medizin Mannheim, Mannheim, Germany; ⁶Department of Neonatology, Erasmus Medical Center- Sophia Children’s Hospital, Rotterdam, The Netherlands</td>
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<tr>
<td>12:51 - 13:03</td>
<td>O R</td>
<td>Increased C-KIT and stem cell factor expression in the pulmonary vasculature of nitrofen-induced congenital diaphragmatic hernia.</td>
<td>Toshiaki Takahashi, Florian Friedmacher, Julia Zimmer, Prem Puri</td>
<td>National Children’s Research Centre, Our Lady’s Children’s Hospital, Crumlin, Dublin, Ireland</td>
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<tr>
<td>13:03 - 13:15</td>
<td>O</td>
<td>Congenital diaphragmatic hernia: observed/expected lung-to-head ratio as a predictor of long-term morbidity.</td>
<td>Sebastian K. King¹, Rose Gaiteiro⁶, Karel O’Brien³, Theo Moraes⁴, Tilman Humpl⁵, Margaret Marcon⁶, Monping Chiang¹, Janette Reyes⁵, Beth Haliburton¹, Greg Ryan⁶, Peter Cox⁵, Priscilla P. L. Chiu¹</td>
<td>¹Department of Intensive Care and Pediatric Surgery, Erasmus Medical Center- Sophia Children’s Hospital, Rotterdam, The Netherlands; ²Department of Medical and Surgical Neonatology, Bambino Gesu Children’s Hospital, Rome, Italy; ³Department of Pediatrics, Division of Neonatology, Radboud University Medical Centre, Nijmegen, The Netherlands; ⁴Division of Asthma, Allergy and Lung Biology, King’s College London, London, United Kingdom; ⁵Department of Pediatrics, Universität medizin Mannheim, Mannheim, Germany; ⁶Department of Neonatology, Erasmus Medical Center- Sophia Children’s Hospital, Rotterdam, The Netherlands</td>
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| 6 | O R | 13:15 - 13:27 | microRNA miR-200b is essential for normal lung development in CDH.
Naghmeh Khoshgoo¹,²,³ Robin Visser¹,², Ramin Kholdebarin¹,², Patricia Terra⁴, Arzu Öztürk⁵,⁶, Sujata Basu¹,³, Barbara Iwasiow¹,², Molly Pind⁴,⁵,⁶, Jorge Coreia-Pinto⁷, Geoff Hicks⁴,⁵,⁶, Andrew Halayko¹,³, Vinaya Siragam¹,², Richard Keijzer¹,²,³
¹Children's Hospital Research Institute of Manitoba; ²Department of Surgery; ³Department of Physiology & Pathophysiology; ⁴Manitoba Institute of Cell Biology; ⁵Department of Biochemistry & Medical Genetics; ⁶Regenerative Medicine Program, University of Manitoba, Winnipeg, Canada; ⁷Department of Pediatric Surgery, Hospital de Braga, Braga, Portugal |
| 7 | O  | 13:27 - 13:39 | Laparoscopic Thal fundoplication, Is it worth the trouble?
Tamer Ashraf Wafa¹, Tarek Barakat⁶, Nabil Dosouky³, Mohamed El-Ghazaly Waly¹, Adham Wafaa Esaed¹
¹Mansoura University, Pediatric Surgery Unit, ²Mansoura University, Pediatric Gastroenterology and Hepatology Unit, ³Cairo University, Pediatric Surgery Unit, Cairo, Egypt |

**Poster Session #1**

**Moderators:** Jean-Martin Laberge, Andrea Winthrop

Michael H Livingston¹,², Anna C Shawyer¹,³, Peter L Rosenbaum⁴,⁵, Sarah A Jones¹, J Mark Walton¹,⁵
¹McMaster Pediatric Surgery Research Collaborative; ²Clinician Investigator Program; ³CanChild Center for Childhood Disability Research; ⁴Department of Pediatrics; ⁵Division of Pediatric Surgery, McMaster University, Hamilton, Ontario, Canada. ⁶Division of Pediatric Surgery, Alberta Children's Hospital, Calgary, Alberta, Canada; ⁷Division of Pediatric Surgery, Western University, London, Ontario, Canada |
Jun Tashiro¹, Bo Wang¹, Eduardo A. Perez¹, David S. Lasko², Juan E. Sola³
¹Division of Pediatric Surgery, DeWitt-Daughtry Family Department of Surgery, University of Miami Miller School of Medicine; ²South Florida Pediatric Surgeons, P.A., Plantation, Florida, USA |
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| 11 | P | Extracorporeal shockwave lithotripsy (ESWL) for the treatment of bile duct stones in children.  
Yasuhiro Okada, Toru Yamazaki  
Department of Paediatric Surgery, Toyama Prefectural Central Hospital, Toyama, Japan |

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| 12 | P R | MicroRNA 200b is up-regulated in the Fetal Rabbit Lung Following the Surgical Creation of Congenital Diaphragmatic Hernia  
Mary Patrice Eastwood¹, Robin Visser², Fuqin Zhu², Barbara Iwasiow², Drew Mulhall³, Jaan Toelen¹, Richard Keijzer², Jan Deprest¹,4  
¹Cluster Organ Systems, Department of Development and Regeneration, Faculty of Medicine, Katholieke Universiteit Leuven, Belgium; ²Departments of Surgery, Division of Pediatric Surgery, University of Manitoba, Manitoba Institute of Child Health, Winnipeg, Canada; ³Department of Paediatrics, UZ Leuven, KU Leuven, Belgium; ⁴Fetal Medicine Unit, Department of Obstetrics and Gynaecology, UZ Leuven, Belgium |

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| 13 | P R | miR-200 family expression during normal and abnormal lung development due to congenital diaphragmatic hernia.  
Drew Mulhall, Naghmeh Khoshgoo, Robin Visser, Barb Iwasiow, Fuqin Zhu, Richard Keijzer  
Departments of Surgery, Division of Paediatric Surgery, Paediatrics & Child Health and Physiology & Pathophysiology, University of Manitoba, Winnipeg, Manitoba, Canada |

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| 14 | P R | A propensity-matched analysis of inhaled nitric oxide for congenital diaphragmatic hernia.  
Robert Baird, Kartik Pandya, Pramod Puligandla  
Pediatric General and Thoracic Surgery, Montreal Children’s Hospital, McGill University Health Center, Montreal, Quebec, Canada |

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| 15 | P R | Space occupying lesions in the presence of congenital diaphragmatic hernia.  
Stephanie M. Cruz¹, Adesola C. Akinkuotu¹, Darrell L. Cass¹,2, Timothy C. Lee¹, Christopher I. Cassidy², Amy R. Mehollin-Ray², Jennifer L. Williams², Rodrigo Ruano², Stephen E. Welty², Oluyinka O. Olutoye,1,3  
¹Texas Children’s Fetal Center and the Michael E. DeBakey Department of Surgery and ²Departments of Radiology, Obstetrics and Gynecology, and ³Pediatrics - Newborn Section, Baylor College of Medicine, Houston, TX |

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| 16 | P R | 3D printing to simulate laparoscopic choledochal surgery.  
Olie Burdall, Niyi Ade-Ajayi  
Department of Paediatric Surgery, King's College Hospital, London |

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<th>14:16 - 14:20</th>
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| 17 | P R | Altered bile acid metabolism mediates the improvement of neonatal parenteral nutrition associated liver disease with glucagon-like peptide-2 therapy.  
David W. Lim¹, Justine M. Turner¹, Si Mi, MSc², Jason Y. K. Yap,2,3  
Jonathan M. Curtis³, Diana R. Mager³, Vera C. Mazurak³, Pamela R. Wizzard³, David L. Sigalet³, Paul W. Wales³  
¹Department of Surgery, University of Alberta, Edmonton, AB; ²Department of Pediatrics, University of Alberta and Stollery Children’s |
The role of ERCP in biliary atresia.
Melanie I. Morris¹, Wael El-Matary², Jennifer Griffin², Dana C. Moffatt³
¹Department of Surgery, Section of Pediatric Surgery, University of Manitoba; ²Department of Pediatrics, Section of Pediatric Gastroenterology, University of Manitoba; ³Department of Internal Medicine, Section of Gastroenterology, University of Manitoba, Winnipeg, Manitoba, Canada

15:00 - 15:15 A historical note: "Who won the War of 1812?" Dr. Frank Guttman

### Scientific Session #2 Midgut Oral Presentations

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<tr>
<th>Time</th>
<th>Speaker</th>
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<tr>
<td>15:15</td>
<td>O</td>
<td>The role of ischemia in the pathogenesis of necrotizing enterocolitis.</td>
<td>Chen Yong¹, Kenneth Tou En Chang¹, Derrick Wen Quan Lian¹, Narasimhan Kannan Laksmi¹, Yee Low¹, Gita Krishnaswamy², Hao Lu³, Sudipto Roy³, Agostino Pierro⁴, Caroline Choo Phaik Ong³ ¹KK Women's and Children's Hospital, Singapore; ²DUKE- NUS Graduate Medical School, Singapore; ³Institute of Molecular and Cell Biology, Singapore; ⁴The Hospital for Sick Children, Toronto, Canada</td>
</tr>
<tr>
<td>15:39</td>
<td>O</td>
<td>Intestinal epithelial cell injury is rescued by administration of hydrogen sulfide donor.</td>
<td>B. Li, C. Lee, E. Zani-Ruttenstock, A. Zani, A. Pierro Division of General and Thoracic Surgery, The Hospital for Sick Children, University of Toronto, Toronto, Ontario, Canada</td>
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<tr>
<td>16:03</td>
<td>O</td>
<td>Mortality trends in infants with necrotizing enterocolitis in Canada: a population based study.</td>
<td>Nada Gawad¹, Dina El Demellawy², Mary Hanna¹, Juan Bass³, Ahmed Nasr¹ ¹Department of Pediatric Surgery, Children's Hospital of Eastern Ontario, University of Ottawa, ²Department of Pediatric Pathology, Children's Hospital of Eastern Ontario, University of Ottawa, Ottawa, Ontario, Canada</td>
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14:30 - 15:00 Coffee break
Augusto Zani1, Kyong-Soon Lee2, Christopher Tomlinson2, Sharifa Himidan1, Hazel Pleasants1,2, Simon Eaton3, Prakesh S Shah4, Agostino Pierro1 and the Canadian Neonatal Network
1Division of General and Thoracic Surgery, The Hospital for Sick Children, University of Toronto, Toronto, Ontario, Canada; 2Division of Neonatology, The Hospital for Sick Children, University of Toronto, Toronto, Ontario, Canada; 3UCL Institute of Child Health, London, United Kingdom; 4Department of Pediatrics, Mount Sinai Hospital, University of Toronto, Toronto, Ontario, Canada.

Patrick B Murphy1, Kelly N Vogt1, Jennifer Winick-Ng3, Andrew McClure5, Blayne Welk1,3, Sarah A Jones1,2
1Department of Surgery, Schichul School of Medicine & Dentistry, University of Western Ontario, London, ON, Canada; 2Department of Pediatric Surgery, Schichul School of Medicine & Dentistry, University of Western Ontario, London, ON, Canada; 3Institute for Clinical Evaluative Sciences, London, ON, Canada.

Fouad Youssef, Andrew Gorgy, Ghaidaa Arbash, Pramod Puligandla, Robert J Baird
Pediatric General and Thoracic Surgery, Montreal Children's Hospital, McGill University Health Center, Montreal, Quebec, Canada.

16:45 - 17:15  CAPSNet/CBAR update

18:30 - 23:00  Welcome Reception

FRIDAY, SEPTEMBER 18, 2015

08:00 - 09:30  Scientific Session #3- Hindgut/Appendicitis
Oral Presentations
Moderators: Dan Poenaru, Sherif Emil

26  O  08:00 - 08:12  The retrograde continence enema in children with spina bifida: not as effective as first thought.
Sebastian K. King1,2,3, Lefteris Stathopoulos2, Loretto Pinuck6, Judy Wells5, John Hutson2,3,6, Yves Heloury6
1Department of Paediatric and Neonatal Surgery, The Royal Children’s Hospital, Melbourne, Victoria, Australia; 2Surgical Research Laboratory, Murdoch Childrens Research Institute, Melbourne, Victoria, Australia; 3Department of Paediatrics, University of Melbourne, Victoria, Australia; 4Department of Stoma Therapy, Monash Medical Centre, Melbourne, Victoria, Australia; 5Department of Stoma Therapy, The Royal Children’s Hospital, Melbourne, Victoria, Australia; 6Department of Urology, The Royal Children’s Hospital, Melbourne, Victoria, Australia.

27  OR  08:12 - 08:24  Outcome of loop versus divided colostomy in the management of anorectal malformations.
Ali Al-Assiri, Osama Almosallam, Saud AlShanafey
King Faisal Specialist Hospital & Research Center, Riyadh, Saudi Arabia

28*  O  08:24 - 08:30  Decreased expression of NEDL2 in Hirschsprung’s disease colon.
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<td>O R</td>
<td>08:30 - 08:37</td>
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<td><strong>Altered expression of retinoblastoma 1 in the aganglionic colon.</strong></td>
<td>Anne-Marie O'Donnell, David Coyle, Prem Puri</td>
<td>National Children's Research Centre, Our Lady's Children's Hospital Crumlin, Dublin, Ireland</td>
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| 30 | O | 08:37 - 08:49 |
| **Non-operative management of simple appendicitis is a safe and effective alternative to appendectomy.** | Shant Shekherdimian, Daniel DeUgarte, Stephen Shew, Steven Lee, Harry Applebaum, James Dunn | Division of Pediatric Surgery, University of California, Los Angeles |

| 31 | O R | 08:49 - 09:01 |
| **Hospital preference of laparoscopic vs. open appendectomy: effects on outcomes in simple and complicated appendicitis.** | Jun Tashiro¹, Stephanie A. Einstein¹, Eduardo A. Perez¹, Steven N. Bronson², David S. Lasko², Juan E. Sola¹ | ¹Division of Pediatric Surgery, DeWitt-Daughtry Family Department of Surgery, University of Miami Miller School of Medicine; ²South Florida Pediatric Surgeons, P.A., Plantation, Florida, USA |

| 32 | O R | 09:01 - 09:13 |
| **Non-operative management vs immediate appendectomy for perforated appendicitis: a matched analysis** | Jui-Hsia Cleo Hung¹, Carolyn Wayne¹, Emily Chan¹, Nazih Shenouda², Ahmed Nasr¹ | ¹Department of Pediatric surgery, Children's Hospital of Eastern Ontario, University of Ottawa; ²Department of Radiology, Children's Hospital of Eastern Ontario, University of Ottawa, Ottawa, Ontario |

| 33 | O | 09:13 - 09:25 |
| **Audit of emergent and urgent surgery for acutely ill pediatric patients: is access timely?** | Grace Chan¹, Sonia Butterworth¹,² | ¹University of British Columbia; ²British Columbia Children's Hospital, Vancouver, British Columbia |

*Abstracts 28 and 29 are 4-minute presentations with 2 minutes for discussion.*

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**CAPS Global Partnership Session**

**Introductions: Geoff Blair**

| 09:30-10:00 | CAPS Travelling Resident Presentation | Dr. Shant Shekherdimian |

| 10:00 - 10:30 | **Coffee Break** |

| 10:30 - 10:45 | **CAPS Global Pediatric Surgery Scholar Presentation** | Dr. Aiah Lebbie |

| 10:45 - 12:30 | **CAPS Educational Session and Inaugural Ein Debate**

**Moderators: Andrea Winthrop, Steve Lopushinsky**
"Global international pediatric surgery and the role of CAPS: the Inaugural Ein Debate"

The Education Session will start with a Global Health jeopardy to gauge audience baseline knowledge about global pediatric surgery. This will be followed by presentations by panel members with discussion of their experiences and views about global international pediatric surgery. We will then engage in the inaugural Ein Debate, with audience participation to questions regarding issues/areas of controversy, using the audience response results to ask the panel members to debate the issues. Debate: audience participation with questions to the audience/audience response system on issues/areas of controversy, and then using the results to ask the panel members to respond and debate the issues.

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<td>12:30-12:45</td>
<td><strong>Lunch box pick up</strong></td>
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<td>12:45 - 13:15</td>
<td><strong>2-Minutes 2-Slides Presentations</strong>&lt;br&gt;Moderators: Suad Abul, Alana Beres</td>
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<td>13:20 - 14:30</td>
<td><strong>Video/Technique Session</strong>&lt;br&gt;Moderators: Peter Ehrlich, Roshni Dasgupta</td>
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<tr>
<td>13:34 - 13:41</td>
<td>Repair of esophageal atresia with endoscopic magnetic anastomosis after staged lengthening.</td>
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<td>13:55 - 14:02</td>
<td>A simplified laparoscopic technique for secure gastrostomy tube placement using guided transabdominal U-stitches gastropexy.</td>
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<td>14:02 - 14:09</td>
<td>A minimally invasive technique for ventriculocholecystic shunt placement.</td>
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<td>14:09 - 14:16</td>
<td>Validation of a dry-lab model for laparoscopic PIRS training.</td>
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14:30 - 15:00 Coffee break

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<td>15:00 - 15:30</td>
<td>CAPS President's Address</td>
<td>Peter Fitzgerald</td>
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<tr>
<td>15:30 - 16:55</td>
<td>Scientific Session #4 Oncology/Fetal/Trauma Oral Presentations</td>
<td>Moderators: Ted Gerstle, Kathryn Bass</td>
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<tr>
<td>48</td>
<td>15:15-15:27</td>
<td><strong>Fetal surgery for lung masses: indications, operative details and outcomes.</strong></td>
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<tr>
<td>49</td>
<td>15:42-15:54</td>
<td><strong>Rate of increase of lung-to-head ratio over the course of gestation is predictive of survival in left-sided congenital diaphragmatic hernia.</strong></td>
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<td>50</td>
<td>15:54-16:06</td>
<td><strong>Racial and ethnic disparities in children with malignant solid tumors.</strong></td>
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<td>51</td>
<td>16:06-16:18</td>
<td><strong>Induction of N-myc overexpression in neuroblastoma causes global changes in gene expression that correlate with differential virus replication and oncolytic effects of vesicular stomatitis virus.</strong></td>
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<tr>
<td>52</td>
<td>16:18-16:30</td>
<td><strong>Serum metabolomic analysis may enhance risk group prediction in neuroblastoma.</strong></td>
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<td>53</td>
<td>16:30-16:42</td>
<td><strong>Are some children with empyema at risk for treatment failure with fibrinolytics? A multicenter cohort study.</strong></td>
</tr>
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</table>
Transfer Impact on Pediatric Trauma Outcomes
Tiffany Locke\(^1\)\(^2\) Janelle Rekman\(^2\), Maureen Brennan\(^1\), Ahmed Nasr\(^1\)\(^2\)
\(^1\)University of Ottawa Medical School; \(^2\)Department of Pediatric Surgery, Children's Hospital of Eastern Ontario. University of Ottawa, Ottawa, Ontario.

<table>
<thead>
<tr>
<th>Poster Session #2</th>
<th>Moderators: Melanie Morris, Paul Beaudry</th>
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<tr>
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<tr>
<td>55 P R 16:55 - 16:58</td>
<td>Evaluating the impact of Infliximab use on surgical outcomes in pediatric Crohn's disease. Paulette I. Abbas(^1)(^2), Michelle L. Peterson(^1)(^2), Sara C. Fallon(^1)(^2), Monica E. Lopez(^1)(^2), David E. Wesson(^1)(^2), Seema M. Walsh(^3)(^4), Richard X. Kellermayer(^3)(^4), J. Ruben Rodriguez(^1)(^2)</td>
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<td>56 P R 16:58 - 17:01</td>
<td>Early coagulopathy and metabolic acidosis predict transfusion requirements in pediatric trauma patients. Shane Smith(^1), Michael H. Livingston(^2), Neil H. Merritt(^1)(^3)</td>
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<td>57 P R 17:01 - 17:03</td>
<td>Assessing quality of life in pediatric gastroschisis patients using the Pediatric Quality of Life inventory survey: an institutional study. Jennifer L. Carpenter(^1)(^2), Taylor L. Wiebe(^2), Darrell L. Cass(^1), Oluyinka O. Olutoye(^1), Timothy C. Lee(^1)</td>
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<td>58 P R 17:03 - 17:06</td>
<td>Altered neurotransmitter expression profile in the ganglionic bowel in Hirschsprung's disease. David Coyle(^1)(^2), Anne Marie O'Donnell(^1), John Gillick(^2), Prem Puri(^1)</td>
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<td>59 P R 17:06 - 17:09</td>
<td>Outcomes after peritoneal dialysis catheter placement. Jennifer L. Carpenter(^1)(^2), Sara C. Fallon(^1)(^2), Darrell L. Cass(^1), Paul K. Minifie(^1), Jed G. Nuchtern(^1), Sarah M. Swartz(^3), and Mary L. Brandt(^1)(^2)</td>
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**SATURDAY, SEPTEMBER 19, 2015**

**Oral Presentations**

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<th>Author(s)</th>
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<td>09:00 - 10:30</td>
<td>Scientific Session #5- Innovation/Best Practices Oral Presentations</td>
<td>Moderators: Erik Skarsgard, Jacob Langer</td>
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<td>09:00 - 09:12</td>
<td>A stitch in time saves nine: suture technique does not affect intestinal growth in a young, growing animal model.</td>
<td>Lori A. Gurien, Deidre L. Wyrick, R. Todd Maxson</td>
<td>Arkansas Children's Hospital, Little Rock, Arkansas</td>
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<td>09:24 - 09:36</td>
<td>Laparoscopy in pediatric surgery: implementation and supporting evidence.</td>
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<td>Victoria Sattarova¹, Simon Eaton², Nigel Hall³, Eveline Lapidus-Krol², Augusto Zani¹, Agostino Pierro¹</td>
<td>Prevalence of renal impairment in pediatric intestinal failure. Christina Kosar, Nicole De Silva, Yaron Avitzur, Karen Steinberg, Glenda Courtney-Martin, Kathryn Chambers, Kevin Fitzgerald, Elizabeth Harvey, Paul W Wales Hospital for Sick Children, Toronto, Ontario; ²UCL Institute of Child Health, London, United Kingdom.</td>
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<td>Natalia Dementieva</td>
<td>Our experience of treatment of problematic hemangiomas with propranolol and 940nm diode laser. Natalia Dementieva Dnipropetrovsk Regional Children’s Hospital, Ukraine</td>
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<tr>
<td>Christina Kosar, Karen Steinberg, Nicole De Silva, Yaron Avitzur, Paul W. Wales The Hospital for Sick Children, Toronto, Ontario</td>
<td>Cost of care for the intestinal failure patient: follow-up one year after primary discharge.</td>
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<td>Jessica Gonzalez-Hernandez¹, Yahya Daoud ¹, Jenny Styers ², Janna M. Journeycake ³, Nandini Channabasappa ⁴, Hannah G. Piper ²</td>
<td>Central venous thrombosis in children with intestinal failure on long-term parenteral nutrition.</td>
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<td>¹Department of Surgery, Baylor University Medical Center, Dallas, TX, USA; ²Division of Pediatric Surgery, University of Texas Southwestern/Children’s Health, Dallas, TX, USA; ³Division of Gastroenterology, University of Texas Southwestern/Children’s Health, Dallas, TX, USA; ⁴Division of Hematology-Oncology, University of Texas Southwestern/Children’s Health, Dallas, TX, USA</td>
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10:30 - 11:00  **Coffee break**

11:00 - 12:00  **Update from the CAPS Research Committee**

The CAPS Research Committee will provide the audience with updates on the EBR, CAPS research grant and clinical trials currently open for pediatric surgeon participation.

12:00 - 13:00  **JPS/MacLeod Lecture**

**Dr. Kevin Lally**

“Congenital Diaphragmatic Hernia – The past 25 (or so) years”

13:00 - 13:30  **President's Closing Remarks** Peter Fitzgerald

13:30  **Poster take down/clear poster hall**

18:30 - 24:00  **Presidential Reception and Dinner** Stratus Winery
A comparison of post-pyloromyotomy feeding regimens in infantile hypertrophic pyloric stenosis

Katrina Sullivan; Emily Chan; Mariam Iqbal; Jennifer Vincent; Ahmed Nasr

Department of Pediatric Surgery, Children's Hospital of Eastern Ontario, University of Ottawa, Ottawa, Ontario, Canada

**Background:** There exists no consensus on the most effective feeding regimen to decrease emesis and length of hospital stay following pyloromyotomy. Instead, feeding regimens are highly individualized and prescribed according surgeon preference.

**Objective:** To make recommendations on post-pyloromyotomy feeding by comparing the effect of early vs. late, ad libitum vs. structured, and rapid vs. gradual feeding regimens on patient outcomes.

**Method:** Systematic review and meta-analyses were conducted to assess the effect of different feeding regimens on length of hospital stay, number of patients with emesis, and frequency of emesis.

**Results:** 14 studies representing 2,124 patients were included. Ad libitum feeding was associated with significantly shorter length of hospital stay (LOS) when compared to structured feeding (MD -4.66 [-8.38, -0.95] P=0.01). While gradual feeding significantly decreased frequency of emesis episodes (OR 1.70 [-2.17, -1.23] P=<0.00001.

**Conclusions:** Ad libitum feeding is recommended following pyloromyotomy, as it leads to decreased LOS. If physicians prefer structured feeding regimens, we recommended early rapid feeds as this should lead to a shorter hospitalization. Although patients on an early rapid feeding schedule are likely to experience increased emesis, this appears to have no negative bearing on patient outcomes.

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**Formula feeding and hypertrophic pyloric stenosis: Is there an association? A case-control study**

Jui-Hsia Cleo Hung; Carolyn Wayne; Juan Bass; Ahmed Nasr

Department of Pediatric Surgery, Children's Hospital of Eastern Ontario, University of Ottawa, Ottawa, Ontario, Canada

**Objectives:** The etiology of infantile hypertrophic pyloric stenosis (HPS) has not been fully elucidated. The objective of this study was to identify HPS risk factors; specifically to determine whether formula-feeding, socio-economic status or seasons of birth were associated with increased incidence.

**Methods:** This is a case-control study including surgically treated HPS cases and matched controls admitted at our tertiary center between 1995 and 2012. Demographic and socio-economic data were collected from Statistics Canada for multivariate analysis of variance.

**Results:** We identified 882 surgically treated HPS cases and 955 matched controls. There was no difference in gestational age. The highest incidence of HPS was in infants born during the summer (p = 0.0028). In a univariate analysis, infants with HPS were more likely to be exclusively formula-fed compared to the control group (64% vs. 52%, p < 0.001). There was no difference between the HPS incidence in rural and urban regions. In a multivariate analysis, after adjusting for family history, socioeconomic status and season, exclusively breast-fed infants had a significantly lower risk of HPS compared with those who were formula-fed (OR: 0.57; 95% CI: 0.42-0.78). Formula-fed infants experienced a 1.36-times higher risk of HPS compared with exclusively breast-fed infants (RR: 1.36, 95% CI: 1.18-1.57).

**Conclusion:** Our data suggests that formula-feeding is associated with a significant increased risk of HPS. Further investigation may help to determine the components of formula that may be stimulating the hypertrophy, or alternately, the components of breast milk that might be protective, as well as other influencing factors.

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Biomarkers to predict outcome in congenital diaphragmatic hernia; Results obtained from an international multicenter study

Kitty G Snoek1; Ulrike Kraemer1; Irma Capolupo2; Arno van Heijst1; Anne Greenough4; Thomas Schaible3; Irwin Reiss6; Dick Tibboel1; René Wijnen1

1 Department of Intensive Care and Pediatric Surgery, Erasmus Medical Center- Sophia Children’s Hospital, Rotterdam, The Netherlands
2 Department of Medical and Surgical Neonatology, Bambino Gesu Children’s Hospital, Rome, Italy
3 Department of Pediatrics, Division of Neonatology, Radboud University Medical Centre, Nijmegen, The Netherlands
4 Division of Asthma, Allergy and Lung Biology, King's College London, London, United Kingdom
5 Department of Pediatrics, Universitätsmedizin Mannheim, Mannheim, Germany
6 Department of Neonatology, Erasmus Medical Center- Sophia Children’s Hospital, Rotterdam, The Netherlands

Background: In congenital diaphragmatic hernia (CDH) a high variability of severity of illness exists, mainly due to a different amount of pulmonary hypertension (PH). We hypothesized that higher levels of the serum biomarkers N-terminal pro-brain natriuretic peptide (NT-proBNP) and high-sensitivity Troponin-T (hs-TropT) would be found in patients with severe PH, non-survivors, patients with extracorporeal membrane oxygenation (ECMO) need and in survivors that developed bronchopulmonary dysplasia (BPD).

Methods: In an international, multicenter RCT (registered as NTR 1310), antenatally diagnosed CDH patients were randomized for initial ventilation strategy. At days 1, 3, 7 and 14 blood samples were collected and NT-proBNP and hs-TropT levels were measured.

Results: Of the 128 patients, 29 (22.7%) died, 27/81 (33.3%) patients born in an ECMO centre underwent ECMO and 31/99 (31.3%) of survivors developed BPD. NT-proBNP levels at day 1 were significantly higher in survivors with BPD than in survivors without BPD (p=0.01) and at day 3 we found the same trend and at day 3 (p=0.04). Median (interquartile range) are presented in the Table. Hs-TropT levels at day 1 were significantly elevated in patients with ECMO need compared to patients without ECMO need (p=0.01), and the hs-TropT levels at day 1 were also significantly higher in survivors with BPD than in survivors without BPD (p=0.02). Other results were not statistically significantly different (Table).

Conclusions: In CDH, NT-proBNP and hs-TropT may be useful in predicting BPD in survivors, and hs-TropT may also identify patients who need ECMO.

<table>
<thead>
<tr>
<th>Table</th>
<th>Results Mann-Whitney U test</th>
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<tbody>
<tr>
<td>Day</td>
<td>Outcome measure</td>
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<tr>
<td>Day 1</td>
<td><strong>Pulmonary hypertension (PH)</strong></td>
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<tr>
<td></td>
<td>No or mild PH</td>
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<tr>
<td></td>
<td>Moderate or severe PH</td>
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<td></td>
<td><strong>Mortality</strong></td>
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<td>Survivors</td>
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<td>Non-survivors</td>
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<td>ECMO need</td>
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<td>No need of ECMO</td>
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<td>p=0.09</td>
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<td>BPD in survivors</td>
<td>No presence of BPD</td>
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<td>BPD in survivors</td>
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<td>Presence of BPD</td>
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<td>p=0.04</td>
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<td>Day 3</td>
<td>Mortality</td>
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<td>Survivors</td>
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<td>Non-survivors</td>
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<td>p=0.10</td>
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<td>Day 7</td>
<td>Mortality</td>
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<td>Survivors</td>
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<td>p=0.62</td>
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<tr>
<td>Day 14</td>
<td>Mortality</td>
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<td>Survivors</td>
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<td>BPD in survivors</td>
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<td>Presence of BPD</td>
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<td>p=0.35</td>
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Data are presented as median (IQR). Abbreviations: PH: pulmonary hypertension; ECMO: extracorporeal membrane oxygenation; BPD: bronchopulmonary dysplasia.

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Increased C-Kit and stem cell factor expression in the pulmonary vasculature of nitrofen-induced congenital diaphragmatic hernia

Toshiaki Takahashi; Florian Friedmacher; Julia Zimmer; Prem Puri

National Children’s Research Centre, Our Lady’s Children’s Hospital, Crumlin, Dublin, Ireland

**Purpose:** Persistent pulmonary hypertension (PPH) remains a major challenge in newborns with congenital diaphragmatic hernia (CDH). PPH is caused by increased cell proliferation and endothelial dysfunction, which in turn leads to obstructive changes in the pulmonary vasculature. C-Kit and its ligand, stem cell factor (SCF) are expressed by endothelial cells (ECs) in developing lung mesenchyme, suggesting an important role in lung vascular formation. Conversely, absence of c-Kit expression has recently been demonstrated in ECs of dysplastic alveolar capillaries. We hypothesized that c-Kit and SCF expression is increased in pulmonary vasculature of nitrofen-induced CDH.

**Methods:** After obtaining ethical approval (REC668b), timed-pregnant rats received nitrofen or vehicle on gestational day 9(D9). Fetuses were sacrificed on D15, D18 and D21, and divided into control and nitrofen-exposed group (n=12 per time-point and group). Pulmonary gene expression levels of c-Kit and SCF were analyzed by qRT-PCR. Immunofluorescence-double-staining for c-Kit and SCF was combined with CD34 in order to evaluate protein expression in pulmonary vasculature.

**Results:** Relative mRNA levels of c-Kit and SCF were significantly increased in lungs of nitrofen-exposed fetuses on D15 (0.05±0.02 vs. 0.03±0.01)

**Conclusion:** Increased expression of c-Kit and SCF in pulmonary vasculature of nitrofen-induced CDH lungs suggests that enhanced c-Kit signaling during lung vascular development may lead to extensive vascular remodeling and thus to PPH.
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<tr>
<th>Control</th>
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Senior Author: Prem Puri

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Congenital diaphragmatic hernia: Observed/expected lung-to-head ratio as a predictor of long-term morbidity

Sebastian K King¹; Rose Gaiteiro²; Karel O’Brien³; Theo Moraes⁴; Tilman Humpl⁵; Margaret Marcon⁶; Monping Chiang⁴; Janette Reyes⁴; Beth Haliburton¹; Greg Ryan⁶; Peter Cox²; Priscilla P L Chiu¹

¹ Division of General and Thoracic Surgery, Hospital for Sick Children, Toronto, Ontario, Canada
² Division of Critical Care Medicine, Hospital for Sick Children, Toronto, Ontario, Canada
³ Division of Neonatology, Mount Sinai Hospital, University of Toronto, Toronto, Ontario, Canada
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⁶ Fetal Medicine Unit, Mount Sinai Hospital, University of Toronto, Toronto, Ontario, Canada

Aim: To investigate the association of observed/expected (O/E) lung-to-head ratio (LHR) by prenatal ultrasound with long-term morbidity for isolated fetal congenital diaphragmatic hernia (CDH) patients.

Methods: We performed a retrospective study of prenatally diagnosed CDH from 18-38 weeks of gestation between January 2002 and April 2010. Only currently surviving patients with at least 1 year of follow up for prospectively collected assessments of long-term morbidity were included.

Results: Seventy-two live-born neonates were identified and 48 survived (M:F = 20:28; left CDH = 45/48). O/E LHR was available in 43 survivors (mean 43.2%, median 40%, range 22.8 – 78.3%). Open diaphragmatic repair predominated (34/48, 12/48 thoracoscopic). Median length of follow-up was 6 years (range 0.3 – 11 years). Two cohorts of O/E LHR were defined, based upon previous studies from the authors (22.6 – 45%, 45.1 – 78.3%). Height and weight trajectories were similar between the two cohorts, with the majority of patients lying between the 3rd and 50th centiles for both measures. In those patients assessed with REEL-3 (language development) and/or Bayley scales (five developmental domains), there were no differences between the two cohorts by age 3 years. In addition, V/Q scans in the two cohorts demonstrated similar degrees of mismatch (mean delta V/Q = 35.4 versus 31.3).

Conclusions: In fetuses with isolated CDH, a reduction in O/E LHR is does not adversely affect heights and weights at long-term follow-up. There is no association between a lower O/E LHR and a reduction in REEL-3 or Bayley score, nor V/Q mismatch.

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microRNA miR-200b is essential for normal lung development in CDH

Naghmeh Khoshgoo1,2,3, Robin Visser1,2, Ramin Kholdebarin1,2, Patricia Terra1,7, Arzu Öztürk4,5,6, Sujata Basu1,7; Barbara Iwasiow1,2; Molly Pind4,5,6; Jorge Coreta-Pinto7; Geoff Hicks4,5,6; Andrew Halayko1,3; Vinaya Siragam1,2; Richard Keijzer1,2,3

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2 Department of Surgery, Faculty of Health Sciences, University of Manitoba, Winnipeg, Manitoba
3 Department of Physiology & Pathophysiology
4 Manitoba Institute of Cell Biology
5 Department of Biochemistry & Medical Genetics
6 Regenerative Medicine Program, University of Manitoba, Winnipeg, Canada
7 Department of Pediatric Surgery, Hospital de Braga, Braga, Portugal

Introduction: MicroRNAs are important epigenetic factors in development and disease. Recently, we showed that the expression of microRNA miR-200b is disrupted in abnormal lung development in human babies born with CDH. The aim of this study was to generate knockout mice for miR-200b and delineate the role of miR-200b in lung development. Additionally, we evaluated the effects of normalizing miR-200b expression in vivo in our nitrofen rat model of CDH.

Methods: We evaluated the expression of miR-200b in whole embryos using the lac-Z reporter inserted in the knockout mice. Lung branching and lung function analyses were performed on miR-200b +/-, +/- and -/- embryos and 8-week old mice, respectively. To evaluate the role of miR-200b in our nitrofen model of lung hypoplasia, we treated embryos with miR-200b indirectly via transplacental prenatal therapy. We compared the outcomes in the offspring of this dam with the offspring from the appropriate controls.

Results: LacZ expression in embryos with miR-200b showed a unique expression in lung, palate and inner ear. Lung function studies demonstrated that miR-200b -/- mice have significantly higher lung tissue resistance and elasticity compared to miR-200b +/- or +/- littermates. Lung branching ex vivo culture showed significantly lower branching in miR-200b +/- than +/-+. In our nitrofen model of hypoplastic lungs, morphometry and histology data demonstrate an impressive improvement in lung hypoplasia following treatment with miR-200b mimics.

Conclusion: These data indicate that miR-200b plays an essential role during lung development and can potentially be used as a prenatal therapy for lung hypoplasia.

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Laparoscopic Thal fundoplication: Is it worth the trouble?

Tamer Ashraf Wafa\textsuperscript{1} Tarek Barakat\textsuperscript{2} Nabil Dosouky\textsuperscript{3} Mohamed El-Ghazaly Waly\textsuperscript{1} Adham Wafaa Esaed\textsuperscript{1}

\textsuperscript{1} Mansoura University, Pediatric Surgery Unit, Mansoura, Egypt
\textsuperscript{2} Mansoura University, Pediatric Gastroenterology and Hepatology Unit, Mansoura, Egypt
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\textbf{Introduction:} Gastroesophageal reflux disease (GERD) is a common condition in pediatric age group. Many surgeons believe that complete fundoplication provides better reflux control, yet results in more dysphagia and gas-bloat symptoms. On the other hand, a partial wrap is reported to have fewer adverse effects, but a higher failure rate in controlling reflux. Till now, there is no agreement and little evidence as to whether complete or partial fundoplication is the optimal procedure in this age group.

\textbf{Patients and Methods:} This is a prospective single blinded randomized comparative study that included 30 patients that were randomly managed laparoscopically by either of Nissen or Thal fundoplication.

\textbf{Results:} Although the incidence of postoperative dysphagia was statistically insignificant, the duration of dysphagia did show statistically significant shorter duration in the Thal group (median 6 days), when compared to the Nissen group (median 17 days). Parents Satisfaction was higher in the Thal group. There were no recurrences in the Thal group versus one recurrence in the Nissen group, but this lead to no statistical significance.

\textbf{Conclusion:} This study suggests that Thal fundoplication offers an effective alternative to Nissen fundoplication with apparently shorter duration of dysphagia and so earlier return to the normal eating pattern.

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Fundoplication versus percutaneous gastrojejunostomy for gastroesophageal reflux in children with neurologic impairment: A survey of pediatric surgeons in Canada

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Background: Children with neurologic impairment are often treated with fundoplication or percutaneous gastrojejunostomy (GJ) for refractory gastroesophageal reflux. Guidelines do not recommend one procedure over the other and few comparative studies have been conducted.

Methods: We surveyed attendees of the Canadian Association of Pediatric Surgeons 2014 Annual Meeting using paper questionnaires. Response rate was increased by distributing an electronic version of the questionnaire via email.

Results: Thirty-four of 62 pediatric surgeons practicing in Canada completed the questionnaire (response rate=55%). Respondents have been practicing for a mean of 15 years (range 1 to 34 years) and train fellows (62%) and/or residents (100%). Pediatric surgeons in Canada reported performing fewer fundoplications last year (mean 3 cases/year) compared to 5 years ago (mean 7 cases/year) (p=0.001). There were no differences in ratings of safety or use of fundoplication versus GJ in children with neurologic impairment. Effectiveness was rated lower more frequently for fundoplication (8/34, 24%) compared to GJ (1/34, 3%) (p=0.03). Several respondents favored alternative approaches, including surgical jejunostomy with or without gastroesophageal disconnection (6/34, 18%) and thickening of gastrostomy feeds (1/34, 3%). Only half of respondents would support a randomized controlled trial.

Conclusions: There is significant variation in the management of refractory gastroesophageal reflux among pediatric surgeons in Canada. These clinicians are performing fewer fundoplications and some express concerns regarding its effectiveness in children with neurologic impairment. Prospective observational studies using validated measures of quality of life are needed to better understand clinical decision-making and long-term outcomes.

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**Weekday vs. weekend repair of esophageal atresia and tracheoesophageal fistula**

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**Purpose:** We hypothesize that weekend esophageal atresia and tracheoesophageal fistula (EA/TEF) repair has worse outcomes compared to procedures performed on weekdays.

**Methods:** Kids’ Inpatient Database (1997-2009) was searched for EA/TEF admitted at <8 days of life. Cases were limited to Type C EA/TEF. Risk-adjusted multivariate analysis (MVA) compared complications, mortality, and resource utilization (length of stay [LOS], total charges [TC]) between weekday and weekend procedures.

**Results:** Overall, 2913 EA/TEF cases were identified, with median (IQR) LOS 22 (31) days and TC 123794 (174317) USD. Overall survival was 96%. Patients were most commonly male (55%), Caucasian (62%), and underwent repair on weekdays (80%). Most common comorbidities included sepsis (12%), cardiac anomalies (4.8%), and intraventricular hemorrhage (1.7%). On risk-adjusted MVA, complication rates were higher among patients undergoing EA/TEF repair on a weekend (OR: 2.2) compared to a weekday, \( p=0.048 \). Additionally, complications (OR: 6.5) and LOS (OR: 9.3) were found to be higher among African American children compared to Caucasians \( p<0.001 \).

**Conclusion:** By risk-adjusted MVA, increased complication rates for EA/TEF are seen in patients undergoing repair on weekends compared to weekdays. Additionally, African American children experienced higher complication rates compared to Caucasians. LOS after repair varies according to race, payer status, and hospital characteristics.

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Long-term neurodevelopmental outcomes of patients with tracheoesophageal fistulas

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Introduction: Survival after tracheoesophageal fistula (TEF) repair has improved; however, there is little published on neurodevelopmental outcomes. The purpose of this study is to assess long-term neurodevelopmental outcomes in TEF patients to identify risk factors for poor outcomes.

Methods: We reviewed records of children who underwent TEF repair between August 2001 and June 2014. Upon discharge, children were referred to the Developmental Tracking Infant Progress Statewide (TIPS) program. We reviewed TIPS assessments (age<35 months), identifying neurodevelopmental delays by referral for early intervention services. Controls were case-matched nonsyndromic children of similar gestational age and birthweight. Fisher’s exact test was used for associations of categorical variables and Wilcoxon rank sum test was used to compare median values of continuous data between outcome groups. Logistic regression was used to perform multivariate analyses including risk factors significant in univariate analysis (p<0.10) for intervention services.

Results: Seventy-eight children underwent TEF repair; 38 followed up with TIPS. Survival was 93.6%. Predictors of hospital survival were Waterston classification (p=0.001), weight (p=0.027) and ventilator days (p=0.013). LOS was the only significant predictor of referral (p=0.0092) in multivariate analysis. There was a borderline significant difference in referral rate for early intervention: 52.6% of TEF patients were referred, while 34.2% of controls were referred (p=0.071).

Conclusion: Neurodevelopmental outcome of children with tracheoesophageal fistulas is excellent. These children may have slightly higher referral rates for intervention services than their peers. Both groups have a higher referral rate than healthy, term children (2-3%), suggesting prematurity may predict referral in many cases.
Extracorporeal shockwave lithotripsy (ESWL) for the treatment of bile duct stones in children

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Aim: To report our experience in the use of extracorporeal shockwave lithotripsy (ESWL) in children with bile duct stones.

Methods: Review of all children who underwent ESWL from July 2004 to May 2010. Piezoelectric ESWL was done for 40 minutes and was repeated, if necessary, after a minimum of 2 days. General anaesthesia was required only in one infant.

Results: There were 5 children: 3 had choledochal cyst excision (age 3, 4 and 10 y) and later developed intrahepatic bile duct stones (age 15, 14 and 12 y respectively) [Group A]; 2 had no other disease [Group B] and developed common bile duct stones (age 8 m and 9 y). In Group A, radiological investigations showed large stones (>15 mm) at the proximal end of the hepatico-jejunostomy and debris in the intrahepatic bile ducts. In group B, stones (< 6 mm) were near the papilla of Vater. In Group A, seven lithotripsy sessions were required to fragment stones and to eliminate debris completely. Two patients developed transitory fever and abdominal pain in between lithotripsy sessions. In Group B, common bile duct stones disappeared after single lithotripsy. At a median follow up of 6 years (range 4-10) all children are well and did not present recurrence of stones or cholangitis.

Conclusion: ESWL is a minimally invasive, safe and repeatable treatment for bile duct stone formation in children. Our small series indicate that after choledochal cyst excision children can develop large stones and can benefit from repeated lithotripsy.

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MicroRNA 200b is up-regulated in the fetal rabbit lung following the surgical creation of congenital diaphragmatic hernia

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Aim: We previously discovered that miR-200b expression is up-regulated in the human fetal hypoplastic congenital diaphragmatic hernia (CDH) lung. Our aim was to profile the expression of miR-200b and its downstream effectors (TGF-β2 and ZEB2) in the fetal rabbit lung following the surgical creation of CDH during the late pseudoglandular phase. The rabbit model has the advantage that its lung development is close to that of man. It is also suitable model for studying surgical and medical interventions that reverse pulmonary hypoplasia.

Methods: Three pregnant rabbits had CDH creation in 2-3 fetuses per doe on gestational day (GD 23). Fetuses were harvested either at GD28 (canalicular stage of lung development) or at term (GD 30=alveolar stage) with littermates taken as internal controls. Lungs were pressure fixed for 24 hours and sectioned either for in-situ hybridization (ISH) for miR-200b localization or immunohistochemistry for TGF-β2 or ZEB2.

Results: Three CDH lung and 3 control lungs were evaluated at either GD28 or GD30. Creation of CDH resulted in increased expression of miR-200b at both GD28 and GD30 in the alveoli compared to controls and this was coupled with reduced expression of TGF-b2 and ZEB2.

Conclusion: Hypoplastic fetal rabbit lung display up-regulation of miR-200b compared to controls. These results strengthen our previous results in human and nitrofen-induced hypoplastic lungs warranting future studies into the role of miR-200b as a promising therapeutic target.

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**miR-200 family expression during normal and abnormal lung development due to congenital diaphragmatic hernia**

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**Introduction:** Congenital Diaphragmatic Hernia (CDH) is a life-threatening disease associated with abnormal lung development. CDH occurs approximately 1 in every 2000-3000 live births and the pathogenesis is unknown. MicroRNAs (miRNAs) are short, non-coding RNAs that control protein expression through post-transcriptional regulation. Based on our previous work, we hypothesized that the miR-200 family is differentially expressed in normal and abnormal lung development. Accordingly, we aimed to determine and compare the expression of all miR-200 family members during normal and abnormal lung development due to CDH.

**Methods:** Abnormal lung development was induced using the nitrofen rat model for CDH. Digoxigenin-labelled probes were used to detect the miR-200 family through fluorescent in situ hybridization (FISH). Fluorescein-tyramide conjugation was used for tyramide signal amplification. FISH was performed on embryonic day 21 (E21) rat control and nitrofen-induced CDH lung tissues. MiRNA expression levels were analyzed using a Zeiss LSM 710 confocal microscope and Zeiss Efficient Navigation imaging software.

**Results:** Control vs nitrofen-induced CDH rat lungs showed contrasting expression of each member of the miR-200 family. MiR-200a, miR-200b and miR-429 showed higher expression in control rat lung tissues, especially in the epithelial cells lining the bronchioles. MiR-141 and miR-200c showed markedly higher expression in nitrofen lung tissues, also mainly in the epithelial cells of the bronchioles.

**Conclusion:** Our findings using FISH demonstrate that CDH lungs display dramatic changes in expression of miR-200 family members. This suggests that disruption of miR-200 family expression plays a role in pulmonary hypoplasia associated with CDH.

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A propensity-matched analysis of inhaled nitric oxide for congenital diaphragmatic hernia

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Background: Inhaled nitric oxide (iNO) administration for pulmonary hypertension in congenital diaphragmatic hernia (CDH) remains controversial since available evidence does not support its use. We evaluated determinants of iNO use and covariate matched outcomes using a national, disease specific database.

Methods: The CAPSNet database was queried for prenatal, peri-natal, post-natal and institutional covariates of iNO use for CDH patients. Mortality, ECMO and discharge on oxygen were compared between iNO and non-iNO groups. Odds ratios (95% confidence interval) were reported from univariate and multivariate logistic regression (MVR) analysis. Propensity score matched analysis of cases and controls (1:1 ratio) was built to compare outcomes.

Results: iNO use occurred in 224/517 CDH patients with complete records (43.3%). Unadjusted analysis demonstrated significantly increased mortality (36.2% vs. 10.9%), ECMO use (15.1% vs. 0.4%) and discharge on oxygen (30.8% vs. 16.7%) in iNO patients (p<0.01). After propensity matching for 13 covariates, iNO administration remained associated with increased mortality (28.1% vs. 17.2%) and ECMO use (14.3% vs. 0.8%), but not discharge on oxygen (29.7 v 23.4,p=0.28). MVR with adjustment for significant covariates (outborn status, pre-operative inotropes, APGAR at 5 minutes and hospital volume) demonstrated that iNO use was associated with increased mortality (OR: 2.81, 95%CI:1.64, 4.83) and discharge on oxygen: (OR:1.72 95%CI:1.06, 2.80).

Conclusion: iNO use for pulmonary hypertension management remains widespread in CDH infants. Despite controlling for covariates affecting the decision to administer iNO, no appreciable improvement in outcomes was demonstrated. Given the significant cost, liberal iNO use needs examination through further prospective efforts.

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**Space occupying lesions in the presence of congenital diaphragmatic hernia**

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**Introduction:** Previous reports describe lung malformations and other chest lesions in association with congenital diaphragmatic hernia (CDH), yet little is known how these lesions affect outcomes. We sought to evaluate the incidence and clinical outcomes of patients diagnosed with these chest lesions coupled with CDH at our institution.

**Methods:** The charts of all infants treated for CDH in a single pediatric fetal center from January 2004-October 2014 were reviewed. The outcomes of those with a space occupying lesions (SOL) in association with CDH were compared to those with isolated CDH. Patients with congenital heart defects and chromosomal abnormalities were excluded. Statistical analysis was performed using Student's t-test and Mann-Whitney U Test for continuous variables and Fischer's exact for categorical variables.

**Results:** 209 infants were treated during the study period, of which 93 were diagnosed with CDH and had no major associated structural or genetic anomalies, and 20 had an associated SOL (4 had >1 lesion). SOL included: bronchopulmonary sequestration (n=10; 4.8%), ectopic liver (n=8; 3.8%), foregut duplication cyst (n=3; 1.4%), and pleural cyst (n=2; 1%) confirmed by pathological examination. Table 1 illustrates characteristics and outcomes of patients with SOL in comparison to those with isolated CDH.

**Conclusion:** SOL, including ectopic liver, BPS and duplication cysts, are not uncommon in neonates with CDH. Despite theoretical concerns, there is no evidence that SOL are associated with worse outcomes; a finding which is helpful during prenatal counseling of families.

<table>
<thead>
<tr>
<th>Variable</th>
<th>CDH with SOL (n = 20)</th>
<th>Isolated CDH (n = 93)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gestational Age at diagnosis, weeks</td>
<td>25.0 ± 8.7</td>
<td>22.9 ± 6.8</td>
<td>0.27</td>
</tr>
<tr>
<td>Birth weight, kilograms</td>
<td>2.98 ± 0.56</td>
<td>2.95 ± 0.69</td>
<td>0.84</td>
</tr>
<tr>
<td>Length of intubation, days</td>
<td>25.1 ± 40.9</td>
<td>25.9 ± 49.0</td>
<td>0.95</td>
</tr>
<tr>
<td>Length of stay, days</td>
<td>49.1 ± 44.9</td>
<td>60.1 ± 62.1</td>
<td>0.48</td>
</tr>
<tr>
<td>Prenatal diagnosis</td>
<td>85%</td>
<td>65.2%</td>
<td>0.07</td>
</tr>
<tr>
<td>6-month mortality rate</td>
<td>10%</td>
<td>19.6%</td>
<td>0.28</td>
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<tr>
<td><strong>Supplemental O2 at</strong></td>
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<tr>
<td><strong>30 DOL</strong></td>
<td>30%</td>
<td>41.5%</td>
<td>0.30</td>
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<tr>
<td><strong>Supplemental O2 at</strong></td>
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<tr>
<td><strong>60 DOL</strong></td>
<td>26%</td>
<td>36%</td>
<td>0.31</td>
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</table>

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**3D printing to simulate laparoscopic choledochal surgery**

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**Aim:** Realistic simulators for complex laparoscopic reconstructive surgery are rare. We describe a hybrid model, harnessing 3D technology to simulate laparoscopic choledochal surgery.

**Methods:** Hepatic images and a 3D systems project 660pro with visijet pxl core powder produced a free standing liver mould (Figure 1) with portal slot for disposable hybrid components; hepatic and pancreatic ducts and choledochal cyst. The mould was used to create soft silicone replicas with T28 resin and T5 fast catalyst. The model was assessed in a regional hepato-biliary centre.

**Results:** Feasibility and reality for laparoscopic dissection were confirmed. Dissection of the choledochal cyst, disconnection at the levels of the hepatic hilum and pancreatic ducts were considered particularly well reproduced.

**Conclusion:** 1. 3D printing enables realistic simulation for entry level choledochal laparoscopic surgery
2. This novel simulation methodology may also be applicable to more complex choledochal as well as other reconstructive laparoscopic procedures

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Altered bile acid metabolism mediates the improvement of neonatal parenteral nutrition associated liver disease with glucagon-like peptide-2 therapy

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Background: Parenteral nutrition associated liver disease (PNALD) is a significant cause of morbidity and mortality for infants on long-term PN therapy. We previously reported that glucagon-like peptide-2 (GLP-2) treatment in a preclinical model of neonatal PNALD improves cholestasis.

Objective: Our aim is to delineate the mechanisms underlying the improved PNALD phenotype with GLP-2 therapy.

Methods: Neonatal piglets (2-5 days old) underwent jugular venous catheterization in order to receive total iso-caloric, iso-nitrogenous PN. Piglets were randomized to either GLP-2 treatment (11 nmol/kg/day) or saline control. After 17 days, piglets underwent terminal laparotomy and bile, liver and ileum specimens were collected. Semiquantitative RT-PCR was performed on liver and ileum to determine the relative expression of genes involved in bile acid metabolism. Tandem mass spectrometry was used to analyze bile acid composition. Data are analyzed via Kruskal-Wallis ANOVA.

Results: The hepatic expression of FXR (a key bile acid regulator, p<0.001) was upregulated with GLP-2 treatment compared to saline control. The hepatic expression of bile acid transporters MRP2 (p<0.01) and MRP3 (p<0.001) was also increased with GLP-2 treatment. There was no change in ileal FXR or FGF-19 expression but liver FGFR4 expression increased with GLP-2 treatment (p<0.001). GLP-2 treatment increased the biliary excretion of glycine-conjugated bile acids (p=0.03).

Conclusions: Alterations in bile acid metabolism may mediate the improvement of PNALD with GLP-2 therapy. At the transcriptional level, increased FXR and transporter expression reveal the mechanisms acting to regulate synthesis and increase bile acid export. The FGF19-FGFR4 pathway may link GLP-2 treatment and the liver.

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The role of ERCP in biliary atresia

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INTRODUCTION: Biliary atresia accounts for approximately 30 percent of neonatal cholestasis. Prompt diagnosis is essential as early intervention is required due to the rapid progression of the disease. Traditionally, a laparotomy was necessary to perform a cholangiogram to substantiate the diagnosis. ERCP, when available, is a less invasive alternative with a significant and valuable role in the evaluation of neonatal cholestasis. Its use, however, is restricted to a few specialized centers worldwide.

METHODS: We reviewed our early experience with ERCP in our institution to evaluate neonatal cholestasis suspected or indeterminate for biliary atresia after initial evaluation with ultrasound and nuclear medicine HIDA scan +/- liver biopsy.

RESULTS: In the last year 4 ERCP’s were performed in neonates under the age of 10 weeks with a mean weight of 4.48kg (range 4.1-4.86 kg). All patients had non-secreting HIDA scans. In one infant the diagnosis of biliary atresia was confirmed and the child subsequently went on a confirmatory open colangiogram and Kasai procedure. Biliary atresia was excluded in the other 3 patients. No complications were encountered as a result of the procedure.

CONCLUSIONS: Our early experience with ERCP suggests it as a safe alternative to open or laparoscopic cholangiogram and can assist by reducing the need for these more invasive cholangiogram techniques. Our preliminary data supports incorporating the use of ERCP in the diagnostic algorithm of neonatal cholestasis suspicious or indeterminate for biliary atresia.

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The role of ischemia in the pathogenesis of necrotizing enterocolitis

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Aim: Clear evidence of ischemia in the pathogenesis of necrotizing enterocolitis (NEC) is lacking. We investigated tissue ischaemia in NEC using immunohistochemical markers and correlated results with clinical data.

Methods: With ethical approval, we carried out immunohistochemical staining on bowel specimens of 24 NEC and 13 focal intestinal perforation (FIP) cases using 2 hypoxia markers, hypoxia induced factor 1α (HIF-1α) and glucose transporter 1 (GLUT1) and an inflammatory marker, leukocyte common antigen (LCA). An ischemic score (0-6) from the sum of the HIF-1α and GLUT1 staining grades was devised, where ≥3 is considered positive. Inflammation was graded 1-3 based on the LCA staining in the mucosa and submucosa. Relevant clinical information was obtained from hospital case records.

Results: 14 NEC specimens were ischemic-positive (ischemic score 4.6±1.2). The remaining 10 NEC (ischemic score 0.7±0.8) and all 13 FIP samples (ischemic score 0.5±0.5) were ischemic-negative. The ischemic-positive cases had classic NEC with multiple areas of bowel necrosis and were associated with later onset, enteral feeding, and pneumatosis. In contrast, all ischemic-negative NEC cases had focal NEC with perforation. Their clinical profile was similar to the FIP cases with younger gestational age at birth, early onset, association with ibuprofen/indomethacin usage but not with feeding and pneumatosis. There was no correlation between inflammation scores and ischemic scores on all the specimens.

Conclusions: Ischemia plays a primary role in pathogenesis of classic NEC only, not in FIP or focal NEC with perforation. Better categorization of the different types of NEC can direct appropriate prevention and treatment strategies.

<p>| Clinical profile of ischemic-positive, ischemic-negative NEC and FIP |
|---------------------------------|-----------------|-----------------|-----------------|
|                               | Ischemic(+) NEC | Ischemic(-) NEC | FIP              |
|                               | N=14            | N=10            | N=13            |
| Ischemic score*               | 4.6 ± 1.2       | 0.7 ± 0.8       | 0.5 ± 0.5       |
| Inflammation score in mucosa  | 1.6 ± 0.6       | 1.4 ± 0.5       | 1.2 ± 0.4       |
| Inflammation score in submucosa| 2.4 ± 0.6       | 2.4 ± 0.5       | 2.5 ± 0.5       |
| Gestation age at birth (weeks)* | 30.3 ± 3.3       | 26.1 ± 2.4       | 26.1 ± 1.8      |</p>
<table>
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<tr>
<th></th>
<th>Group 1</th>
<th>Group 2</th>
<th>Group 3</th>
</tr>
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<tbody>
<tr>
<td>Age at disease onset (days) *</td>
<td>18.8 ± 17.3</td>
<td>8.0 ± 3.7</td>
<td>7.6 ± 2.5</td>
</tr>
<tr>
<td>Feeding volume (ml/kg/day)*</td>
<td>116.7 ± 44.9</td>
<td>4.9 ± 8.3</td>
<td>7.6 ± 7.9</td>
</tr>
<tr>
<td>Length of bowel resection (cm)*</td>
<td>20.5 ± 15.5</td>
<td>7.7 ± 5.6</td>
<td>2.7 ± 2.6</td>
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<tr>
<td>Pneumatosis*</td>
<td>12 (85.7%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Bowel perforation*</td>
<td>6 (42.9%)</td>
<td>10 (100%)</td>
<td>13 (100%)</td>
</tr>
<tr>
<td>Previous ibuprofen/indomethacin usage*</td>
<td>3 (21.4%)</td>
<td>6 (60.0%)</td>
<td>9 (69.2%)</td>
</tr>
</tbody>
</table>

NEC: Necrotising Enterocolitis          
FIP: Focal Interstinal Perforation       
P < 0.05 with anova or chi-square test

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Role of pre-operative liver biopsy in the diagnosis of biliary atresia

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Background: Biliary atresia (BA) is a rare disease of unclear etiology, where obstruction of the biliary tree causes severe cholestasis leading to cirrhosis and ultimate death if left untreated in a timely manner. Neonates with cholestasis may undergo many tests before biliary atresia (BA) or another diagnosis is reached. The clinical role of using pre-operative liver biopsy as a part of the diagnostic workup for BA is still unclear.

Methods: We sought all publications describing the use of preoperative liver biopsy in neonates with cholestasis through MEDLINE, Embase, and CENTRAL. Accuracy, sensitivity, specificity, accuracy, positive predictive value (PPV) and negative predictive value (NPV) were extrapolated. In all studies, the final diagnosis of BA was confirmed based on surgical findings.

Results: A total of 16 articles were identified and included in this study (1959-2014). These studies included a total of 931 neonates. The accuracy of preoperative liver biopsy was 93.2%, with a sensitivity of 93.2%, specificity of 93.2%, PPV of 93.0% and a NPV of 93.4%. A trend of increasing diagnostic accuracy was noted over the years. There was no significant statistical differences in sensitivity (99% vs. 93%), specificity (90% vs. 93%) and accuracy (96% vs. 93%) in biopsies taken 8 weeks after birth.

Conclusion: Quantitative analysis demonstrated pre-operative biopsy to be both highly specific and sensitive in diagnosing BA pre-operatively. It is a highly reliable test that offers a means of arriving at an early definitive diagnosis of BA.

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Intestinal epithelial cell injury is rescued by administration of hydrogen sulfide donor

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**Purpose:** Oxidative stress has been implicated in the pathogenesis of several diseases in preterm babies, and may contribute to the disruption of intestinal epithelium leading to necrotizing enterocolitis (NEC). Hydrogensulfide (H2S) has been reported to have a protective function against oxidative stress in the gut. We hypothesize that administration of H2S can help decrease intestinal epithelial cell injury in vitro.

**Methods:** To establish an in vitro model of epithelial cell injury, intestinal epithelial cells (IEC-18) were treated with 100µM hydrogen peroxide (H2O2) for 24 hours. At 21 hours sodium hydrosulfide (NaHS), which is a H2S donor, was administered as a rescue treatment in two different concentrations: a) H2O2 + NaHS 0.1 mM; b) H2O2 + NaHS 0.2 mM. At 24 hours, cell viability was measured using a colorimetric assay (MTT). Data were presented as mean ± SD and compared using one-way ANOVA with Bonferroni post-test; p<0.05 was considered significant.

**Results:** IEC-18 cells treated with H2O2 had significantly lower viability than the control group (0.29±0.04 vs. 0.44±0.03, p<0.01). IEC-18 cell viability was not significantly improved by 0.1mM NaHS treatment (0.34±0.05, p=0.084), but was rescued by administration of 0.2mM NaHS (0.42±0.09; p<0.01 to H2O2; Figure).

**Conclusions:** Intestinal cell viability in vitro is impaired by exposure to H2O2 mimicking the oxidative stress on the epithelium occurring during NEC. This damage can be reversed by treatment with H2S donor. These findings indicate the potential for a pharmacological intervention to rescue the intestinal epithelium after oxidative stress.

Sponsoring CAPS Member: Agostino Pierro
Histologic inflammatory activity of the rectal margin as a predictor of post-operative complication in ileo-anal anastomosis (J-pouch) procedure in children with refractory ulcerative colitis

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Background: Post-operative complication from the ileoanal anastomosis (J-pouch) procedure for surgical management of refractory ulcerative colitis (UC) increases the risk of pouch dysfunction. The purpose of this study was to determine if histologic inflammatory activity of the rectal margin is an independent predictor of complication after controlling for other variables.

Methods: A retrospective chart review was performed to identify all pediatric patients with UC who underwent a J-pouch procedure between 1995 and 2014. Univariate and multivariate regression analysis were performed on the following variables: age at surgery, body mass index (BMI), comorbidities, time between colectomy and pouch, mucosectomy, protective ileostomy, length of pouch, and histologic inflammatory activity in the intestinal epithelium of the rectal margin.

Results: Forty-two patients (complicated = 19 vs. uncomplicated = 23) were included. Histologic inflammatory activity was significantly higher among the complicated group (9.3±3.1 vs. 4.1±3.1, p=0.02). No significant difference was found based on age at surgery in years (14.2±2.6 vs. 14.6±1, p=0.6), BMI (23.2±5 vs. 21.4±4, p=0.2), comorbidities (5 vs. 2 p=0.4), time between colectomy and pouch in months (20±15 vs. 15±12, p=0.8), mucosectomy (2 vs. 4, p=1.0), protective ileostomy (11 vs. 13, p=0.7), or length of pouch (16.8±4 vs. 15±2, p=0.1). In a multivariate regression, histologic inflammation of the rectal margin was significant (p=0.04) after adjusting for other variables.

Conclusion: After controlling for potential confounders, histologic inflammatory activity at the rectal margin was found to be a significant predictor of post-operative complication in the J-pouch procedure for refractory UC.

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Mortality trends in infants with necrotizing enterocolitis in Canada: A population based study

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Background: Our aim was to evaluate current trends in infant mortality and identify predictors of mortality associated with NEC across Canada.

Methods: Prospectively collected data from Canadian Neonatal Network™ (CNN) database were evaluated for patients with stage 2 or 3 NEC admitted between 2004 and 2013. Patient characteristics included data on pregnancy, antenatal treatments, delivery, perinatal physiology status, associated anomalies, postnatal interventions, NEC episodes and/or death. Comparison was made between survivors and non-survivors, and between medically and surgically treated infants; further analysis was performed for the subgroup of neonates without major congenital anomalies. Data were compared using Cochran–Armitage test for trend, chi-square and t-test.

Results: Of the 112,303 neonates registered on CNN during the study period, 2262 (2%) had stage 2 or 3 NEC. Of these, 546 (24%) infants died. Mortality rates over the ten-year period ranged between 19% and 28% (p=0.059; Figure). Factors significantly associated with mortality are reported in the Table. When NEC infants with major congenital anomalies (n= 264; 12%) were excluded, mortality was still significantly associated with the same factors. Higher mortality rates were associated with surgical treatment compared to medical treatment (39% vs. 17%, p<0.0001).

Conclusions: The mortality for stage 2 or 3 NEC across Canada remains high and there has been no change during the study period. Predictors of mortality include low birth weight, prematurity, low Apgar, early age at onset and patent ductus arteriosus. There is an urgent need to develop new strategies to improve outcomes of infants with NEC.
Table

<table>
<thead>
<tr>
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<th>Survivors (N= 1716)</th>
<th>Non-survivors (N= 546)</th>
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<td>Chorioamnionitis, N (%)</td>
<td>210 (15)</td>
<td>87 (21)</td>
<td>0.0048</td>
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<tr>
<td>Birth weight (g), mean±SD</td>
<td>1374 ± 739</td>
<td>1051 ±555</td>
<td>&lt;0.0001</td>
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<tr>
<td>Birth weight &lt;1kg, N (%)</td>
<td>647 (38)</td>
<td>324 (59)</td>
<td>&lt;0.0001</td>
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<tr>
<td>Gestational age (weeks), mean±SD</td>
<td>29.2 ± 4.0</td>
<td>27.3 ± 3.5</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Gestational age &lt;26weeks, N (%)</td>
<td>337 (20)</td>
<td>204 (37)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Apgar at 5 min, mean±SD</td>
<td>7.3 ± 1.9</td>
<td>6.7 ± 2.0</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Score for neonatal acute physiology (SNAP II), mean±SD</td>
<td>11.7 ± 12.7</td>
<td>19.5 ± 15.4</td>
<td>&lt;0.0001</td>
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<td>Days of life at NEC onset, mean±SD</td>
<td>21.9 ± 19.1</td>
<td>19.4 ± 15.3</td>
<td>0.0061</td>
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<tr>
<td>Corrected gestational age at NEC onset (weeks), mean±SD</td>
<td>32.4 ± 4.1</td>
<td>30.0 ± 3.8</td>
<td>&lt;0.0001</td>
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<tr>
<td>Patent ductus arteriosus, N (%)</td>
<td>686 (41)</td>
<td>287 (54)</td>
<td>&lt;0.0001</td>
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<tr>
<td>Patent ductus arteriosus treatment, N (%)</td>
<td>529 (40)</td>
<td>209 (49)</td>
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</table>

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The increasing incidence of gallbladder disease in children: A 20 year perspective

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Background/Purpose: The incidence of cholecystectomy in the pediatric population has been increasing over the last 20 years, but has not been described in a Canadian population. We conducted the first province wide study to describe the incidence of cholecystectomy in children in Ontario using the Institute for Clinical Evaluative Sciences (ICES).

Methods: A province wide retrospective cohort using ICES data over a 20 year period was performed. Patients < 18 years of age undergoing cholecystectomy from 1993-2012 were identified and age and sex-specific annual incidences were calculated.

Results: In the study period 527,434 cholecystectomies were performed in Ontario, Canada of which 6040 were in patients less than 18 years of age. The incidence of pediatric cholecystectomy increased from 8.8 per 100,000 to 13.0 per 100,000 (P < 0.001). The sex-specific incidence showed a larger increase in the incidence in the female population, 14.7 per 100,000 to 21.1 per 100,000 (P < 0.001). The vast majority (80%) of surgeries were performed in 13-18 year olds and were largely performed in the community setting (70%). Hereditary spherocytosis as an indication for surgery remained stable throughout the study period.

Conclusion: There has been a significant rise in the incidence of pediatric cholecystectomy in Ontario over the last 20 years. We hypothesize this increase is likely related to increasing levels of obesity, particularly in teenagers.

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Flap versus fascial closure for gastroschisis: A systematic review and meta-analysis

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Background: Umbilical flap closure represents an alternative to traditional fascial closure for gastroschisis. We performed a systematic review and meta-analysis of outcomes comparing these techniques.

Methods: Multiple databases were queried without language or date restrictions for comparative studies involving flap and fascial closure. Grey literature was sought. Outcomes of interest included: mortality, ventilation days, feeding parameters, length of stay (LOS), wound infection, markers of resource utilization and umbilical hernia incidence. Multiple reviewers independently assessed study eligibility and literature quality. Meta-analysis of outcomes was performed where appropriate (Revman 5.2). This study was prospectively registered.

Results: Twelve studies met inclusion criteria. Three were multi-institutional; one described flap closure for ‘complex’ gastroschisis. Quality assessment revealed unbiased patient selection and exposure, but group comparability was suboptimal in four studies. Overall, 1137 patients were evaluated of which 340 underwent flap closure (205 immediately; 135 post-silo). Meta-analysis revealed no significant differences in mortality, LOS, or feeding parameters between groups. Flap patients had less wound infections (OR 0.40 [95%CI 0.22-0.74], p<0.003). While flap patients had an increased risk of umbilical hernia, they were less likely to undergo repair (19% vs. 41%; P=0.01) (Figure 1).

Conclusions: Flap closure has equivalent or superior outcomes to fascial closure for patients with gastroschisis. Given potential advantages of bedside closure and minimal sedation, flap closure may represent the preferred closure strategy.

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The retrograde continence enema in children with spina bifida: Not as effective as first thought

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Aim: To investigate the effectiveness of the Peristeen retrograde continence enema (RCE) in the management of fecal incontinence in children with spina bifida.

Methods: We identified a homogenous group of spina bifida patients in whom RCE had been initiated (01/2006 – 07/2013). Confidential phone interviews were performed. Assessments included: (1) Fecal Incontinence Quality Of Life (FIQOL), (2) St Marks Faecal Incontinence score, (3) Cleveland Clinic Constipation score, and, (4) Neurogenic Bowel Dysfunction score. Pseudocontinence was defined as no involuntary stool loss in the preceding month.

Results: 11/20 patients (mean age 14.5 ± 5.3 years) were male. All patients had urinary incontinence. Only 9/20 patients were still using RCE (mean follow-up 4.1 years). Three patients ceased RCE within ten days, six after 4-12 months, and two after 36-48 months. Reasons for cessation included: difficulties with balloon (n = 4); procedure too difficult and invasive (n = 4); and pain (n =3). There were no differences between the successful and unsuccessful groups in length of training time for the technique, the instillate fluid and volume used, and the time taken to perform RCE. There were no differences between the two groups for quality of life, fecal incontinence or constipation scores. 8/9 patients using RCE achieved pseudocontinence.

Conclusions: We demonstrated a high rate of cessation with the RCE in patients with spina bifida. This could not be explained by associated conditions, or by enema-related parameters. One possible explanation is the lack of on-going outpatient support for the children and their families.

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Outcome of loop versus divided colostomy in the management of anorectal malformations

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Objectives: Colostomy is a common procedure as part of the management of anorectal malformation (ARM) in pediatric patients. We reviewed our experience with this procedure in this category of patients to evaluate if the type of colostomy (loop vs divided) are different in terms of outcome.

Methods: A retrospective chart review of the pediatric surgery Database at KFSHRC conducted for the period 2000–2014. Demographic, clinical and outcome data were collected and descriptive data were generated. Outcome relative to the type of the colostomy were compared using T-rest for continuous variables and Chi-square or Fisher-Exact tests were used for proportions where appropriate.

Results: There were 102 patients managed for ARM with colostomy as staged procedures, 61 males and 41 females. Patients had colostomy at a median age of 2 days and were closed at a median of 12 months. Definitive repair was at a median age of 9 months. Type of fistula was 8 perineal, 21 rectovestibular, 34 rectourethral, 11 rectovesical and there were 15 without fistulae and 13 cloacal anomalies. There were 55 loop and 47 divided colostomies with a mean operative time of 76 and 94 minutes consecutively (P=0.002). There were 89 descending/sigmoid and 13 transverse colostomies. Complications of creation and closure of loop and divided colostomies were compared and there was no difference except in occurrence of skin excoriation. There was more skin excoriation in divided colostomy compared to loop colostomy (17 vs10, P=0.04).

Conclusions: Loop colostomy has shorter operative time and relatively less complications compared to the divided colostomy. Our data suggests that loop colostomy may be more favorable to divided colostomy for ARM patients.

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Decreased expression of NEDL2 in Hirschsprung’s disease colon

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Aim: NEDL2 is a member of the Nedd4 family of E3 ubiquitin ligases, which play an important role in many physiological and pathological processes. A recent study showed that mice lacking the NEDL2 gene exhibited decreased numbers of enteric neurons, progressive bowel dysmotility and intestinal aganglionosis. We hypothesised that NEDL2 expression is decreased in Hirschsprung’s Disease (HD) and therefore designed this study to investigate the expression of NEDL2 in the normal human colon and in HD.

Methods: HD tissue specimens (n=5) were collected at the time of pull-through surgery, while colonic control samples were obtained at the time of colostomy closure in patients with imperforate anus (n=5). Immunolabelling of NEDL2 was visualised using confocal microscopy to assess protein distribution, while Western Blot analysis was undertaken to quantify NEDL2 protein expression.

Results: Confocal microscopy revealed NEDL2-positive cells within the submucosal and myenteric plexuses and smooth muscle layer in normal controls and the ganglionic region of HD, with a marked decrease in NEDL2-positive cells in aganglionic HD specimens. Double-labelling immunofluorescence confirmed that NEDL2 is expressed in interstitial cells of Cajal. Western blot revealed high levels of the NEDL2 protein in both normal controls and the ganglionic region of HD, while there was a marked decrease in NEDL2 protein expression in the aganglionic region of HD colon.

Conclusion: These findings suggest that the decreased NEDL2 expression in the aganglionic segment may contribute to motility dysfunction in HD.

<table>
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<tr>
<th>PROTEIN</th>
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<th>AGANGLIONIC</th>
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Altered expression of retinoblastoma 1 in the aganglionic colon

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Aim: The retinoblastoma 1 (RB1) tumor suppressor is a critical regulator of cell cycle progression and development, and has been widely demonstrated to be inactivated in human cancer. A recent study using RB1 knockout mice suggested a new role for RB1 in the regulation of the enteric nervous system (ENS), with knockout mice displaying ENS abnormalities. We hypothesized that RB1 expression is decreased in Hirschsprung’s Disease (HD) and therefore designed this study to investigate the expression of RB1 in the normal human colon and in HD.

Methods: HD tissue specimens (n=5) were collected at the time of pull-through surgery, while colonic control samples were obtained at the time of colostomy closure in patients with imperforate anus (n=5). Immunolabelling of RB1 was visualized using confocal microscopy to assess protein distribution, while Western Blot analysis was undertaken to quantify RB1 protein expression.

Results: Confocal microscopy revealed RB1-positive cells within the submucosal and myenteric plexuses and smooth muscle layer in normal controls and the ganglionic region of HD, with a marked decrease in RB1-positive cells in aganglionic HD specimens. Double-labeling immunofluorescence confirmed that RB1 is expressed in neurons and interstitial cells of Cajal. Western blot revealed high levels of the RB1 protein in both normal controls and the ganglionic region of HD, and a marked decrease in RB1 protein expression in the aganglionic region of HD colon.

Conclusion: These findings suggest that the decreased RB1 expression in the aganglionic segment may contribute to motility dysfunction in HD.

<table>
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<tr>
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<th>NC</th>
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Non-operative management of simple appendicitis is a safe and effective alternative to appendectomy

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Background: Recent literature suggests that many patients with non-perforated appendicitis can be managed non-operatively. The purpose of this study is to evaluate the results of a single group’s experience with a non-operative approach to children with simple appendicitis.

Methods: Parents of children with clinical or radiologic evidence of non-perforated appendicitis were given the choice of laparoscopic appendectomy (LA) versus medical management (MM). Patients in MM were admitted for observation and administration of intravenous antibiotics. The decision to transition to oral antibiotics and discharge versus proceeding with LA was made within 48 hours of admission based on the patient’s clinical status.

Results: 17 patients with a mean age of 9 years (range 5-15) underwent initial non-operative management. Average length of hospitalization was 1.6 days (range 1-3). Baseline characteristics are summarized in the table. 15 (88%) patients had resolution of symptoms with antibiotics alone, including 5 of the 7 (71%) with known fecalith. 2 patients did not respond and required LA. Both LA patients had a fecalith on imaging and non-perforated appendicitis at the time of operation.

Conclusion: Our results suggest that non-operative management of appendicitis is effective and definitive in a majority of children, including those with a fecalith, and support the need for larger randomized trials.

<table>
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<th>Imaging</th>
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Hospital preference of laparoscopic vs. open appendectomy: Effects on outcomes in simple and complicated appendicitis

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2 South Florida Pediatric Surgeons, P.A., Plantation, Florida, USA

Purpose: We hypothesize that laparoscopic (LA) or open appendectomy (OA) outcomes are associated with hospital procedure preference.

Methods: Queried Kids’ Inpatient Database (1997-2009) for simple (ICD-9-CM 540.9) and complicated (540.0, 540.1) appendicitis. Propensity score (PS) matched analyses and multivariate analyses (MVA) were utilized.

Results: Simple appendicitis (298,653) had LA (43%) or OA (57%). Complicated appendicitis (120,848) had LA (34%) or OA (66%). On PS-matched analysis of simple appendicitis (91,118 LA vs. 97,496 OA), LA had increased post-procedure hemorrhage (OR 7.0) and transfusion (1.7) rates, p<0.001; but lower wound infection (0.6), perforation/laceration (0.3), and acute gastrointestinal ulcer (0.7) rates, p<0.01. LA had shorter length of stay (LOS; 1.7 vs. 2.1 days), but higher total charges (TC; 19,501 vs. 13,089 USD), p<0.001. For complicated appendicitis (28,793 LA vs. 30,782 OA), LA had increased nausea/vomiting rate (1.9), p<0.001; but lower mortality (0.3), wound infection (0.5), transfusion (0.6), reoperation (0.2), and sepsis (0.7) rates, p<0.02. LA had shorter LOS (5.1 vs. 5.9), but higher TC (32,251 vs. 28,209), p<0.001. MVA demonstrated shorter LOS (0.9) for LA at laparoscopic-prefering hospitals vs. open-prefering hospitals for simple appendicitis, p<0.001. For complicated appendicitis, higher complication rates (1.1) were associated with OA at laparoscopic-prefering hospitals, p=0.006. Laparoscopic-prefering hospitals had higher TC for LA and OA for simple and complicated appendicitis, p<0.001.

Conclusion: Complications and resource utilization for appendicitis are associated with surgical technique and hospital procedure preference. Laparoscopic-prefering hospitals had higher complication rates with OA for complicated appendicitis and higher charges regardless of appendectomy technique or appendicitis type.
Propensity Score-Matched Analysis of Simple and Complicated Appendicitis by Appendectomy Technique, Kids’ Inpatient Database, 1997-2009

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Plots represent odds ratio (OR) values derived from propensity score-matched (demographics and hospital characteristics, 31 comorbidities) analyses of laparoscopic vs. open appendectomy for simple and complicated appendicitis; error bars represent 95% confidence intervals for ORs. OR plots not shown were not significant determinants at α=0.05.
Non-operative management vs immediate appendectomy for perforated appendicitis: A matched analysis

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Background: The role of non-operative management vs immediate appendectomy in the management of children with perforated appendicitis remains uncertain. The objective of this study was to compare these management options in groups of patients with matched clinical characteristics.

Methods: We retrospectively reviewed patients with confirmed perforated appendicitis from 2011 to 2014 at our institution. Patients in both groups were matched by age and duration of initial symptoms.

Results: We identified a total of 403 children with perforated appendicitis during the study period (101 cases were treated non-operatively and 302 cases were treated operatively). We were able to match 62 patients in each group by age and duration of the initial symptoms. There were no statistical differences in operative and postoperative complications between operative and non-operative groups (11.29 % vs. 16.13% p=0.6). The surgical group had a significantly shorter LOS (6.27 vs. 8.83 days; p=0.0006), smaller total admission number (1.08 vs. 1.81; p<0.0001), shorter duration of antibiotic therapy (13.5 vs. 17.79 days; p=0.0010), and less use of ultrasound survey (1.08 vs. 1.81, p < 0.0001).

Conclusions: When non-operative management vs immediate appendectomy for perforated appendicitis was studied using matched analysis, we found that immediate appendectomy resulted in a shorter LOS, smaller total admission number, shorter duration of antibiotic therapy and less use of ultrasounds. There was no difference in the complication rates.

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Audit of emergent and urgent surgery for acutely ill pediatric patients: Is access timely?

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Elective surgery wait times are frequently measured, however, there is a paucity of literature regarding emergent/urgent surgeries in Canada. Delays and performance of less urgent operations at night have been reported to increase morbidity and mortality. Our aims were to determine urgent/emergent operation wait times, timing and the impact on elective surgery.

Methods: With REB approval, a retrospective analysis (06/2011-12/2013) of emergent/urgent surgeries performed using a prospective operative and patient information database was performed. Emergent/urgent surgeries were classified: Class 1(1 hour), 2A(<6hours), 2B(<24h), and 3(<72h). In hours (IH= 07:45-15:30 M-F) was compared to Out-of hours (OOH).

Results: There were 4668 operations. Class 1, 2A, 2B, and 3 cases were within target in 56.6%, 82.6%, 81.1% and 73.6% and were performed OOH 74.7%, 72.1%, 56%, and 28.1% respectively. There were 63 Class 2B and 3 surgeries with in-room times ≥ 2300. Mean in-room time was 120 minutes (Class 1), 4.7 h (Class 2A), 15.4 h (class 2B), and 54 h (Class3). The most frequently bumped procedure was inguinal hernia repair.

Conclusion: During the audit period, the majority of urgent/emergent operations occurred OOH. Patients requiring emergent surgery were least likely to have their operation within target. Further research is needed to identify strategies which would mitigate delay and potential harm to children with emergent/urgent surgical conditions.

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A rare case of a supernumerary testis in a two year old boy

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Supernumerary testes (SNT) is a rare congenital abnormality described as the presence of three or more testicles. We report the case of a two year-old boy with intermittent left-sided scrotal swelling and an ipsilateral undescended testis. At OR a left cryptorchid testis was found at the external ring with further dissection revealing a second vas deferens attached to an additional intrascrotal testis. The cryptorchid testis was pexied in the left hemiscrotum with the second descended testis left in place. Review of the literature reveals less than 150 cases of SNT. Triorchidism is the most common form with the third testis typically located within the scrotal sac. SNT is frequently associated with undescended testis, testicular torsion, inguinal hernia, and hydrocele. Management is controversial with some advocating for orchidectomy due to concerns of malignancy. We recommend orchidopexy in an effort to preserve fertility while educating families about the remote risk of malignancy.

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Visceral basidiobolomycosis

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Gastrointestinal Basidiobolomycosis, an unusual fungal infection by saprophyte Basidiobolus ranarum, is very rare in children. We report the first case of gastrointestinal basidiobolomycosis from Qatar in a 4-year-old healthy girl who presented with a short history of abdominal pain, bleeding per rectum and weight loss. She required emergency laparotomy due to persistent bowel obstruction and sepsis. Histopathology of the mass revealed the Splendore-Hoeppli phenomenon consistent with basidiobolomycosis, a fungus belonging to the order Entomophthorales. After a six-month course of antifungal treatment, she underwent resection of the residual abdominal mass and reversal of the stoma. The presentation, diagnosis and management of rare visceral basidiobolomycosis are shared.

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Pneumomediastinum and cannabinoids consumption

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A 16-year-old male with a 36-hour history of non-bilious vomiting, facial swelling, difficulty swallowing, and painful chest pressure was transferred to our center with a presumptive diagnosis of Boerhaave’s syndrome. Examination upon arrival revealed subcutaneous crepitus from the maxillary region to the iliac crests. Neck, chest and abdominal radiographs showed pneumomediastinum and subcutaneous emphysema in the neck, chest and abdomen (Figure). An esophagogram excluded an esophageal perforation. The patient reported having smoked marijuana and drank alcohol prior to admission. Urinary tests were positive for cannabinoids. The patient was treated conservatively with rehydration, analgesia and nil-per-oral for 24 hours. On day four he was discharged home asymptomatic. At two months’ follow-up the patient remains symptom-free. Spontaneous pneumomediastinum is a benign condition, mainly reported in young adults, and associated with substance abuse, especially via inhalation, and persistent vomiting (cannabinoid hyperemesis syndrome). Once esophageal perforation has been excluded spontaneous pneumomediastinum may be managed conservatively.

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Use of 3D printing in pediatric surgery- A pectus model

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With the advent of affordable 3D printing technology for both biologic and non-biologic applications, the indications and uses of a local 3D printer at one's own institution for a variety of applications is now possible even for the pediatric surgeon. We present just one example of its usefulness in modelling a pectus bar to use in a pectus excavatum repair in a child. The benefits in terms of OR time, costs, accuracy of fit and potential future uses including printing an actual implantable bar are presented.

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Laser-assisted indocyanine-green dye angiography: A novel approach for real-time assessment of bowel perfusion

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Laser-assisted indocyanine-green dye angiography (LAICGDA) is a non-invasive technique used to evaluate tissue perfusion in adults. We report the first use of LAICGDA in neonates. An emergency C-section on a gastroschisis neonate resulted in a mesenteric tear. A preformed silo was placed. At 12h the bowel looked ischemic, prompting surgery. As the bowel showed signs of pan-necrosis it was placed within the abdomen without resection and a hand-sewn silo was formed, with a planned second look 48 hours later. LAICGDA was applied through the silo to monitor bowel viability in NICU. Poor illumination of bowel loops by LAICGDA indicated worsening ischemia, warranting a second-look laparotomy 24 hours earlier than planned. At surgery, LAICGDA guided appropriate resection of necrotic loops, confirmed on histology, leaving 12cm jejunum and 11cm ileum. At gastrostomy formation 4 months later, 35cm of viable small bowel was demonstrated. LAICGDA could be advantageous in guiding critical surgical decisions.

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Extreme short-bowel: A thirty-two year case follow-up

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This patient, now age 35 years, required extensive intestinal resections by nine weeks of age, leaving in continuity 8 cm of proximal jejunum, 5 cm of the most distal ileum and the ileo-cecal valve (J Pediatr Surg 18 264-268, 1983). He was weaned off home TPN at 21 months of age but had extreme cow’s-milk allergy. In adulthood he lost weight despite a high protein, low fat and low carbohydrate daily intake of 3000 calories. The pediatric surgeon was re-consulted at patient age 25 to advocate for intravenous nutritional supplementation. He now remains well providing he receives intermittent supplemental courses of home TPN 3-4 nights per week; target BMI 22.4. He graduated from university, is employed and will soon marry. This case demonstrates some of the difficulties of transitioning to full adult care and the lasting bond that can develop between patient and pediatric surgeon, even in retirement!

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Thoracoscopic aortopexy

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Background: Aortopexy is a well-established, effective treatment for tracheomalacia. Traditionally, this repair is performed by way of open surgery. With the increasing use of thoracoscopy in paediatric surgery, thoracoscopic aortopexy has emerged, which offers the well-described advantages of minimally invasive surgery, usually with similar, or better, clinical outcomes; however, numbers reported using this technique are limited.

Methods: Retrospective chart reviews were performed of patients who underwent thoracoscopic aortopexy at a tertiary paediatric hospital in Sydney, Australia, between 2012 and 2014. Patient factors, surgical details and clinical outcomes were evaluated.

Results: Eight patients with tracheomalacia were treated with thoracoscopic aortopexy. Indications for surgery were acute life-threatening events (ALTE) (6), ventilator-dependence (1), and recurrent pneumonia (1). Seven of the patients had previous oesophageal atresia/tracheo-oesophageal fistula. Mean age of patients at time of surgery was 8.4 months (±7.9 months) and mean operative time was 152 minutes (±39 minutes). Median length of stay was 7.5 days (3–128 days). There were no intraoperative complications. One patient suffered ischaemic seizures which manifested post-operatively; however, it is uncertain if these were related to the surgery or pre-operative ALTE. All patients have resolution of their presenting problems at follow up to date (mean 11 months, range 4 – 34 months).

Conclusions: This series adds to the growing body of evidence supporting the use of thoracoscopic aortopexy as a safe and effective alternative to open procedures. The authors recognize that this technique requires operators skilled in thoracoscopic surgery and should be performed at a tertiary paediatric institution.

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A modified laparoscopic PIRS technique for inguinal hernia and hydrocele repair in boys

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Background: Percutaneous inguinal ring suturing (PIRS) is an easy and scarless approach to ligate patent processus vaginalis (PPV) in children with inguinal hernia or communicating hydrocele, but it has been appointed as having a higher ipsilateral recurrence rate than open surgery. We hypothesized that introducing some modifications in PIRS technique we would reduce this recurrence rate.

Methods: We planned to use a modified PIRS technique (using a 16G needle, the peritoneum surrounding the internal inguinal ring was ligated leaving no gaps over the vas and vessels, additionally the upper external peritoneum of the proximal inguinal channel was cauterized). In the first series, we included 116 consecutive male patients submitted to laparoscopy with a preoperative diagnosis of PPV. Sixteen boys were excluded: 10 converted to open (7) or true laparoscopic herniotomy (3) due to technical difficulties and/or huge defect; in 6 we found either femoral hernia (2 cases) or no PPV (4 cases).

Results: Using this technique, we repaired 100 patients (54 right, 27 left, 19 bilateral PPV). Median operative time for unilateral and bilateral ligation was 35 and 54 minutes, respectively. We had intraoperative hematoma due to epigastric artery puncture. We registered one postoperative umbilical hernia and one suture-related inguinal granuloma. Surprisingly, using this approach we had no recurrences so far.

Conclusion: The laparoscopic view was useful to accurate the preoperative diagnosis. The PIRS technique was successful to repair either inguinal hernia or communicating hydroceles. The introduced modifications in PIRS technique resulted in a low rate of ipsilateral recurrence.

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Repair of esophageal atresia with endoscopic magnetic anastomosis after staged lengthening

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We describe the treatment of a patient with long-gap esophageal atresia with an upper pouch fistula, microgastria and minimal distal esophageal remnant. After 3 months of feeding via gastrostomy, a thoracoscopic modified Foker procedure was performed reducing the gap from approximately 7cm to 5 cm over 2 weeks of traction. A second stage to ligate the fistula and suture the proximal and distal esophagus toward each other resulted in a gap of 2 cm. IRB and FDA approval was then obtained for endoscopic placement of 10F catheter mounted magnets in the proximal and distal pouches promoting a magnetic compression anastomosis. Magnetic coupling occurred at 4 days, esophageal patency was confirmed at 10 days, and after magnet removal at 13 days an esophagram demonstrated a 10F channel without leak. Serial endoscopic balloon dilation of the channel has allowed drainage of swallowed secretions, as the baby learns bottling behavior at home.

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Laparoscopic repair of congenital paraesophageal hernia

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Most paraesophageal hernias in children present as complications of fundoplication or other procedures on the esophageal hiatus. Congenital paraesophageal hernias are exceedingly rare. The 5-minute video depicts the presentation, laparoscopic repair, and outcome of an 18-month old girl with congenital paraesophageal hernia. The five critical steps of the procedure are outlined clearly in this high-resolution video with commentary.

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The treatment of abdominoscrotal hydrocele: Is there a role for non-operative management?

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Background/Purpose: Abdominoscrotal hydrocele (ASH) is an uncommon entity. Until now, the recommended treatment has been surgical with only one successful case of non-operative management in literature. We report the largest single institution ASH case series to date, providing insights into outcomes of non-operative approach to ASH. In addition, we discuss use of Spring Back Sign and dynamic ultrasound in evaluation of scrotal swelling and relate our findings to pathophysiology of ASH.

Methods: Retrospective chart review of patients treated from 1994 to 2015 for ASH at British Columbia Children’s Hospital, Canada.

Results: Thirty patients were identified with ASH, 29 included in the analysis. Twenty-four (0.83) patients had the Spring Back Sign. In 9 patients (0.31) operative management was chosen with no observation period. Twenty out of 29 patients (0.69) were initially managed expectantly. Sixteen of the 20 patients (0.80) had at least resolution of their abdominal component. Twelve of these patients had complete resolution of ASH and four had the resolution of abdominal component with scrotal portion managed operatively; in 4 patients (0.20) ASH persisted despite observation, requiring operative management.

Conclusions: ASH should be included in the differential diagnosis of scrotal swelling when Spring Back Sign is present. We recommend dynamic ultrasound to look for an abdominal component. Observation is a reasonable first step in managing patients with uncomplicated ASH. It can result in complete resolution of ASH or its abdominal component leaving a scrotal portion that can be managed with less challenging dissection and high ligation of the processus vaginalis.

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A simplified laparoscopic technique for secure gastrostomy tube placement using guided transabdominal u-stitches gastropexy

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**Background:** Insecure gastropexy, gastric mucosa overgrowth, granulation tissue formation and non-healing gastrostomy are unwanted consequences encountered in the current minimally invasive gastrostomy tube (GT) placement techniques. Aiming to overcome these problems we have developed a simplified laparoscopic GT insertion (LAG) using guided transabdominal U-stitches gastropexy (GTU).

**Materials and Methods:** We retrospectively reviewed all LAG cases performed in our institute using the GTU technique. Briefly, a curved clamp is inserted intra-gastric through the laparoscopic port and guides a needle out-in-out to create multiple spaced transabdominal U-stitches that are tied over pledgets.

**Results:** Between March 2008 and January 2015, 31 cases had LAG attempts using GTU. Two cases were converted to open for non-LAPG related reasons. The median age of the remaining 29 cases was 37 (0.3-154.9) months, of those 20 had fundoplication (LAG-Fundo), while the remaining nine had LAG only. The mean operative times for LAG-Fundo and LAG were (148±57.5 min) and (41±12.4 min), respectively. During a median follow up of 21(4-81) months we did not encounter any procedure related mortality, intra-abdominal leaks or bowel injuries. One patient required redo-gastropexy due to unplanned early U-stitch removal and seven cases had transient external GT leak, granuloma formation and skin infection.

**Conclusion:** GTU can achieve a simple and secure LAG avoiding the catastrophic complications of intra-abdominal leak without the need of special instruments or enlarging the port’s wound. Using smaller wound and intra-abdominally placed mucosa helps in minimizing the risk of wound infection and external leak. Transient complications are expected during the earlier phase of the learning curve.

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A minimally invasive technique for ventriculocholecystic shunt placement

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Children with hydrocephalus requiring ventricular drainage undergo shunt placement into the peritoneal cavity. When the peritoneal cavity is not an option for multiple reasons, other drainage sites must be utilized. The gallbladder has been described as an alternative drainage site using an open technique. We present a novel minimally invasive technique for placement of a ventriculocholecystic shunt as an alternative site for cerebral spinal fluid drainage. Three 5 mm laparoscopic ports sites are used to guide a needle and guidewire transcutaneously into the lumen of the gallbladder. A dilator and sheath is then placed through the abdominal wall into the cholecystotomy site using the Seldinger technique. The shunt tubing is secured in place using an endoloop suture. A minimally invasive approach to placement of ventriculocholecystic shunts is a technically feasible option and can avoid laparotomy in the pediatric patient requiring an alternative site for drainage of cerebral spinal fluid.

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Validation of a dry-lab model for laparoscopic PIRS training

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Background: Percutaneous inguinal ring suturing (PIRS) is an attractive laparoscopic technique to repair inguinal hernia in children, but passing the suture under the peritoneum in the internal inguinal ring can be demanding. We imagined an easy-to-build dry-lab model for laparoscopic PIRS training.

Methods: The dry-lab model consists of two surgical gloves (being the smaller inside the larger). The entry of the glove is tied with a rubber letting a 5mm trocar within it (optic). CO2 is inflated through the trocar at 8 mmHg pressure. The 4 long fingers of the glove simulate 4 internal inguinal rings. 18 medical residents without laparoscopy experience were asked to visualize a video showing a laparoscopic PIRS performed in a 4-year old girl with a right inguinal hernia followed by a video showing the same technique performed in our dry-lab model. They were then asked to repeat the procedure in each of the 4 fingers and the procedures recorded. Two surgeons using the Task-specific Checklists (TSC), Global Rating Scale of Operative Performance (GRS) and time for the whole procedure evaluated performance blindly. Differences were assessed using Wilcoxon test.

Results: We found significant improvement in median TSC (p<0.05) and median GRS each time the procedure was repeated (p<0.05). There was significant shortening each time the procedure was repeated (p<0.05), except between the third and fourth finger (p=0.068).

Conclusion: Our Dry-lab model might be a good option for starting laparoscopic PIRS training.

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Fetal surgery for lung masses: Indications, operative details and outcomes

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Introduction: The purpose of this study was to review the indications, operative details and long-term outcome for fetuses treated with open fetal lung resection.

Methods: The records of all fetuses evaluated for a lung mass at a comprehensive fetal treatment center between July 2001 and March 2015 were reviewed to identify all treated with open fetal surgery. Data collected included surgical indications, operative treatment, pathologic findings, and outcome.

Results: Of 174 fetuses evaluated for a lung mass, 6 underwent open fetal resection at 22-25 weeks’ gestation. Five fetuses had large lobar masses (CVR 2.6-6.3), hydrops and signs of cardiac failure; 1 fetus had mainstem bronchial atresia (MBA). Four of 5 fetuses treated with lobectomy (4 CCAM; 1 extralobar sequestration) showed good recovery with resolution of hydrops, compensatory fetal lung growth and delivery 9-12 weeks later. One fetus with advanced hydrops, anasarca, associated placentomegaly, and maternal mirror syndrome died intraoperatively. The fetus treated with pneumonectomy for MBA at 21 weeks’ died shortly after preterm delivery at 24 weeks’ gestation. In follow-up at 1-13 years (median 7.7), all 4 surviving children are doing well, with no sign of lung disease, tracheal deviation, scoliosis, or chest wall deformity. All show normal development with no neurologic or physical delays.

Conclusion: Open fetal lobectomy for a large lung mass, hydrops and evolving heart failure permits compensatory fetal lung growth and excellent long-term pulmonary and developmental outcomes. Fetuses with anasarca, associated placentomegaly and maternal mirror syndrome are poor candidates for open fetal surgery.

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Rate of increase of lung-to-head ratio over the course of gestation is predictive of survival in left-sided congenital diaphragmatic hernia

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Purpose: Congenital diaphragmatic hernia (CDH) is associated with high postnatal mortality due to pulmonary hypoplasia. Ultrasonographic measurement of the fetal lung to head circumference ratio (LHR) represents the most accepted method for antenatal prediction of outcome. The prognostic utility of serial LHR measurements as a marker of lung growth has not been described. Our objective was to examine the relationship between the rate of interval increase of LHR and post-natal survival in left-sided CDH.

Methods: We retrospectively reviewed charts of all left-sided CDH patients enrolled in our pulmonary hypoplasia program from January 2004 to July 2014. All ultrasound studies performed at our institution (n=444) were pooled for final analysis according to gestational age. Regression analysis was used to assess the significance of the association between rate of LHR increase and post-natal survival.

Results: A total of 274 patients were studied, with 200 survivors and 74 non-survivors. Established markers of CDH severity including intrathoracic liver position, requirement for ECMO therapy and requirement for patch repair were all significantly increased in non-survivors (p<0.0001 respectively) while observed to expected lung ratios were significantly decreased in non-survivors (p<0.001). The rate of LHR increase as measured by linear regression and slope analysis was significantly increased in long-term survivors (p=0.0175).

Conclusions: Our findings indicate that the interval increase in LHR levels over the course of gestation correlate with survival in left-sided CDH patients. Regular ultrasonographic reevaluation of LHR throughout gestation following diagnosis of CDH may provide prognostic insight and help guide patient management.
**Figure 1:** The rate of LHR increase over the course of gestation is significantly associated with survival in left-sided CDH patients.

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Racial and ethnic disparities in children with malignant solid tumors
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Purpose: Racial and ethnic survival disparities have been reported for children with leukemia and lymphoma. We hypothesize that survival disparities exist for common pediatric malignant solid tumors (PMST).

Methods: We searched the Surveillance, Epidemiology, and End Results (1973-2011) cancer registry for patients <20 years old with neuroblastoma (NBL), rhabdomyosarcoma (RMS), Wilms’ tumor (WT), and renal cell carcinoma (RCC). Demographics, clinical characteristics, and survival outcomes were analyzed using standard statistical methods and multivariate analysis.

Results: Overall, 9459 patients with PMST were identified (NBL 41%, WT 32%, RMS 25%). Most patients were male (52%), white (61%), <5 years old (68%), and had surgery (77%). Total incidence remained stable at 1.93 per 100,000/year (NBL 0.82, WT 0.61, RMS 0.45). Blacks (2.2) and whites (2.1) had higher PMST incidence compared to Hispanics (1.4), Asians (1.2), and American Indians (1.6) per 100,000/year, p=0.005. Five-year survival was highest for WT (89%), followed by NBL (71%) and RMS (66%). Asians had the lowest 5-year survival (70%), while survival in blacks, whites, and Hispanics was similar (74-76%), p=0.016. Multivariate Cox regression analysis of all PMST identified age 12 months or older (OR: 4.32), male gender (1.15), distant disease (7.04), no operation (2.22), 1973-79 diagnosis (2.94), and Asian race (1.24) as independent prognostic indicators of mortality (all, p<0.03).

Conclusions: Racial/ethnic disparities exist in PMST incidence and survival in the US. Blacks and whites have the highest incidence of PMST, while Asians have the lowest overall survival. Outlining high-risk groups may inform potential screening practices and physician awareness for PMST.

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Induction of N-myc overexpression in neuroblastoma causes global changes in gene expression that correlate with differential virus replication and oncolytic effects of vesicular stomatitis virus

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Vesicular stomatitis virus (VSV), mutant ΔM51 (VSVΔM51) is a promising new treatment for several malignancies including high-risk neuroblastoma (NB). However, its utility is limited in tumors with functional type I interferon (IFN) signaling and/or expressing cellular factors with anti-viral functions. Ablation of anti-viral defenses in cancer cells is often determined by oncogene activation status. N-myc amplification is associated with high-risk NB. Using a non N-myc amplified NB cell line whose exogenous N-myc gene can be overexpressed by tetracycline removal, we studied the effects of N-myc expression on virus tropism, anti-viral innate immunity and global changes in gene expression upon infection. Induction of N-myc overexpression enhanced virus replication and virus-induced oncolysis and abrogated the anti-viral innate immunity induced by treatment with exogenous interferon beta (IFN-β) and polyinosinic-polycytidylic acid (poly I:C). Microarray analysis showed that virus infection caused differential changes in global gene expression that were N-myc-dependent. These changes involved IFN-stimulated genes (ISGs) and non-ISGs that play roles in apoptosis, transcription regulation and cellular stress, including the unfolded protein response (UPR). Interestingly, several ISGs with known anti-viral functions were downregulated in N-myc-overexpressing cells before and after infection suggesting that N-myc overexpression can sensitize cells to virus infection. This study suggests N-myc amplification sensitizes NB to virus-induced cell killing and thus can be a predictive biomarker of virotherapy response for high-risk NB.

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Serum metabolomic analysis may enhance risk group prediction in neuroblastoma

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Background: The current risk-group classification system does not clearly identify low risk NB patients who do not require surgery, nor the subset of high-risk patients who will not respond to therapy. Serum metabolomic analysis generates a metabolic “fingerprint” of a patient. It has proven utility in several types of cancer. We hypothesize that serum metabolomic analysis will enhance accuracy of risk-group classification for NB patients.

Methods: Human Data: A pilot study was done on COG tumour bank sera from 10 patients (5 high-risk, 5 low-risk). An institutional pilot study was carried out on 5 patients comparing same patient sera obtained during bulk disease to minimal disease (CR/VGPR). In Vitro: Supernatants from six NB cell lines (3 n-Myc amplified) were compared. In Vivo: Flank tumors were established in Nu/Nu mice by injection of NB cell lines (IMR-32, SH-EP, SK-N-AS, 3-4 mice/group, 1x10⁶ cells/mouse). Serum was drawn pre-injection, at 1 week after injection when there was no visible tumour, and again once tumours were grossly visible. Metabolomic analysis: Samples were analyzed by NMR and/or GC-MS. Multivariate data analysis was conducted using SIMCA-P (Umetrics).

Results: Serum metabolomic analysis differentiated high- and low risk patients as well as bulk disease or CR/VGPR. n-Myc amplified cells showed a characteristic metabolomic signature. Mouse sera developed an identifiable metabolomic pattern before tumors were grossly visible but could not detect differences in n-Myc status.

Conclusion: Serum metabolomic analysis can sensitively distinguish several aspects of NB. A larger analysis of COG banked sera is warranted.

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Are some children with empyema at risk for treatment failure with fibrinolytics? A multicenter cohort study

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Background: Guidelines from the American Pediatric Surgical Association recommend that children with empyema receive a trial of fibrinolytics. Some patients have poor outcomes with this approach and it is unclear which factors are associated with treatment failure.

Methods: Possible risk factors were identified through a review of the literature. Treatment failure was defined as the need for repeat pleural drainage and/or total length of stay greater than 2 weeks.

Results: We retrospectively identified 314 children with empyema treated with fibrinolytics at the Hospital for Sick Children (2000-2013, n=195), Children’s Hospital, London Health Sciences Centre (2009-2013, n=39), and McMaster Children’s Hospital (2005-2014, n=80). Median length of stay was 11 days (range 5-69 days). Thirteen percent of children required repeat drainage procedures and 34% experienced treatment failure. Platelet count, erythrocyte sedimentation rate, C-reactive protein, albumin, urea to creatinine ratio, and signs of necrosis on baseline imaging were not associated with treatment failure. Multivariable logistic regression demonstrated increased risk with immediate admission to intensive care (odds ratio=3.2), positive blood culture (odds ratio=2.3), and absence of complex septations on baseline ultrasound (odds ratio=2.0) (model R-squared=0.11). Male gender was associated with treatment failure in the univariate analysis but not in the multivariable model.

Conclusions: Predicting which children with empyema are at risk for treatment failure with fibrinolytics remains challenging. Risk factors include immediate admission to intensive care, positive blood culture, and absence of complex septations on ultrasound. Routine bloodwork and inflammatory markers have little prognostic value.

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Transfer impact on pediatric trauma outcomes

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Background: Evidence in the adult trauma population suggests that being transferred directly to a dedicated trauma center improves patients’ outcomes. Our aim was to assess whether transfer status had an impact on pediatric trauma outcomes.

Methods: Using a 1996-2014 pediatric trauma database, we tested the following outcomes: death, major complication, time to definitive treatment (TDT), hospital length of stay (LOS), and ICU length of stay (ICU LOS). Control variables included age, sex, injury severity score (ISS), and mode of transportation. Logistic, generalized linear, and Poisson regression models were used.

Results: Mortality and complication rates did not differ significantly between direct (mortality=52 per 1000, complications=54 per 1000) and transferred (mortality=59 per 1000; complications=67 per 1000) patients (mortality aRR: 1.17, 95%C1: 0.76-1.80, p=0.48; complication aRR: 1.13, 95%C1: 0.75-1.70, p=0.57). Transfer status was not a significant predictor of LOS (p=0.06), or ICU LOS (p=0.72), however LOS differed significantly among severely injured patients (transfer: 18.8 days vs. direct: 12.8 days, p=0.005). Transfer status was a significant predictor (p=0.0035) of time to definitive treatment (adjusted mean=17.4 hours (SD ± 81.5) for transfer and 2.6 hours (SD ±7.5) hours for direct patients). Lastly, the significant predictors of death were: ISS, transport mode, age, and TDT. Predictors of major complications were: ISS and TDT.

Conclusions: There were no significant differences in the mortality or complication rates between transferred and direct patients, and transfer status did not significantly predict LOS or ICU LOS. Other systemic issues may explain why transferred patients with severe injury have a longer LOS.

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Evaluating the impact of Infliximab use on surgical outcomes in pediatric Crohn Disease

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**Background:** The impact of Infliximab (IFX) on surgical outcomes is poorly defined in pediatric Crohn disease (CD). We evaluated our institution’s experience with IFX on postoperative complications and surgical recurrence.

**Methods:** A retrospective review of children who underwent intestinal resection for CD from 1/2002 to 10/2014 was performed. Data were collected on IFX use, which was provider dependent, and surgical outcomes. Preoperative IFX use was within a 3 month period.

**Results:** Seventy-three patients underwent intestinal resection with primary anastomosis for CD; 13 patients had enterostomies. Median age 15 years (range: 9-18). Indications for operation were obstruction (n=26), fistulizing disease (n=19), refractory disease (n=17), and multiple indications (n=11). The most frequent intervention was ileocecectomy (n=41). Nine patients (13%) required reoperation for recurrent disease at a median of 2.3 years (IQR 0.7-3.5). Twenty-two patients received preoperative IFX at median of 26 days (IQR 14-46). There were 7 postoperative complications: 2 bowel obstructions and 5 superficial wound infections (7%); there were no deep/organ surgical site infection or anastomotic leak. Characteristics and outcomes of patients stratified by IFX were not significantly different [Table1]. When stratified by indication, the presence of refractory disease was associated with higher preoperative IFX use (IFX use-55% vs. no IFX use 28%, p=0.027). No specific indication was associated with an increased reoperation rates.

**Conclusion:** Pediatric patients with CD treated preoperatively with IFX may undergo intestinal resection with primary anastomosis with acceptable morbidity. The heterogeneous approach to medical management underscores the need for guidelines to direct treatment and surveillance.

**Table 1.** Characteristics and outcomes in pediatric Crohn disease patients stratified by preoperative Infliximab use

<table>
<thead>
<tr>
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<th>Preoperative IFX (n=22)</th>
<th>No IFX (n=51)</th>
<th>p-value</th>
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<tbody>
<tr>
<td>Postoperative complications n (%)</td>
<td>2 (9)</td>
<td>5 (10)</td>
<td>0.92</td>
</tr>
<tr>
<td>Perioperative steroid use n (%)</td>
<td>11 (50)</td>
<td>29 (57)</td>
<td>0.59</td>
</tr>
<tr>
<td>Albumin at time of operation Median (IQR)</td>
<td>5.1 (3.0-4.5)</td>
<td>3.4 (3.0-3.8)</td>
<td>0.18</td>
</tr>
<tr>
<td>Prealbumin at time of operation Median (IQR)</td>
<td>16.6 (8.6-19)</td>
<td>19.8 (11-27)</td>
<td>0.60</td>
</tr>
<tr>
<td>Reoperation for recurrence at same location (%)</td>
<td>2 (9)</td>
<td>7 (14)</td>
<td>0.56</td>
</tr>
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<td>-----------------------------------------------</td>
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<tr>
<td>Time to reoperation (years)</td>
<td></td>
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<tr>
<td>Median (range)</td>
<td>1.3</td>
<td>2.9</td>
<td>0.33</td>
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<td></td>
<td>(0.6-2.1)</td>
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Early coagulopathy and metabolic acidosis predict transfusion requirements in pediatric trauma patients

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Background: Severely injured pediatric trauma patients often present to hospital with coagulopathy and metabolic acidosis. These derangements are associated with poor outcomes but it is unclear to what degree they predict packed red blood cell (pRBC) transfusion.

Methods: We retrospectively identified pediatric trauma patients from a level 1 trauma center from 2006 to 2013. Inclusion criteria were age less than 18 years, Injury Severity Score greater than 12, and pRBC transfusion within 24 hours of admission.

Results: We identified 96 pediatric trauma patients who underwent pRBC transfusion within 24 hours of presentation to hospital. On admission, 43% of these patients had one or more signs of coagulopathy and 81% had metabolic acidosis. Size of pRBC transfusion in the first 24 hours ranged from 3 to 177 mL/kg (mean 29 mL/kg) and nineteen patients (20%) underwent massive transfusion (>40 ml/kg in 24 hours). Univariate analysis indicated that size of pRBC transfusion was associated with low base excess (r=0.46), international normalized ratio (r=0.35), partial thromboplastin time (r=0.41), fibrinogen (r=0.46), and BIG score (Base deficit, INR, Glasgow Coma Scale (GCS), r=0.36), but not platelet count, age, GCS, or direct versus referred presentation. Multivariable linear regression confirmed that coagulopathy and metabolic acidosis remained predictive after adjusting for direct versus referred presentation (R-squared=0.30).

Conclusions: Early coagulopathy and metabolic acidosis predict size of pRBC transfusion among pediatric trauma patients. Further research is needed to develop massive transfusion protocols and guidelines for when they should be activated.

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Assessing quality of life in pediatric gastroschisis patients using the pediatric quality of life inventory survey: An institutional study

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Background: Quality of life (QOL) is a common concern among parents of gastroschisis patients in the prenatal counseling period. The purpose of this study was to quantify QOL outcomes in gastroschisis children using a validated QOL inventory survey.

Methods: A retrospective chart review and prospective survey (2012 Pediatric Quality of Life Inventory™ (PedsQL)) was performed for gastroschisis patients from 2005 to 2011. PedsQL is designed for patients >2 years of age. Average scores were compared between patients with simple versus complicated gastroschisis and patients with and without bowel resection.

Results: One-hundred nineteen patients >2 years of age with gastroschisis were identified. Twenty-eight families participated with an average patient age of 5.8 ± 2.3 years. There were 11 complicated and 17 simple cases. Compared to complicated gastroschisis, children with simple gastroschisis had significantly lower rates of re-operation (0.06% versus 90%, p<0.001) and bowel resection (12% and 64%, p=0.004). Average QOL scores for children with simple and complicated gastroschisis were 81.69 ± 19.50 and 78.75 ±20.14 (p=0.70), respectively. Average QOL scores were also similar in children with and without bowel resection (83.29±19.10 and 74.72±19.94, p=0.171). Cronbach’s alpha correlation was 0.912 for the overall survey; 0.921 for physical functioning, and 0.862 for psychosocial functioning questions.

Discussion: Despite increased need for re-operation and bowel resection in children with complicated gastroschisis, PedsQL scores were similar between those with simple and complicated disease. This study presents initial QOL data in gastroschisis patients but larger studies are needed from multi-institution consortia.

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Altered neurotransmitter expression profile in the ganglionic bowel in Hirschsprung’s disease

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Purpose: Children with persistent bowel symptoms after a pull-through operation, in whom no demonstrable pathology exists, may exhibit bowel dysmotility ranging from hypotonicity to hyperactivity. Altered expression of neuronal nitric oxide synthase (nNOS), vasoactive intestinal peptide (VIP) and choline acetyltransferase (ChAT) has been previously reported in the colon proximal to the aganglionic segment in EDNRB-null mice. We aimed to evaluate the expression pattern of these neurotransmitters in patients with HSCR.

Methods: Full-length pull-through specimens were collected from children with HSCR (n=10). Colonic controls were collected during colostomy closure in children with imperforate anus (n=8). The distribution of nNOS, ChAT, substance P (SP) and VIP expression was assessed using immunofluorescence and confocal microscopy. Protein expression in superficial and deep muscle layers was quantified using western blot analysis.

Results: Nitrergic ganglia were smaller and less cellular in the ganglionic bowel of 4 patients compared to controls. VIP expression was reduced in the ganglionic bowel in HSCR compared to healthy controls in 3 patients. Expression of SP was similar in ganglionic bowel in HSCR and controls. Expression of ChAT was reduced in the ganglionic bowel of 4 patients with HSCR compared to healthy controls.

Conclusion: Altered expression of key excitatory and inhibitory neurotransmitters in the ganglionic bowel of children with HSCR may explain the basis of bowel dysmotility after a properly performed pull-through operation in some patients.

Figure 1:
Confocal micrograph (a) and western blot imaging (b) demonstrating reduced expression of nNOS in the ganglionic bowel of a patient (H) with HSCR.

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Outcomes after peritoneal dialysis catheter placement

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Background: Peritoneal dialysis (PD) is the preferred method of dialysis in children with end stage renal disease. The purpose of this study was to review surgical outcomes after elective placement of PD catheters in children with chronic renal failure.

Methods: A retrospective review was performed on patients treated between February 2002 and July 2014. Primary outcomes were catheter life, late (>30 days post-op) complications (catheter malfunction, malpositioning, tunnel infection), and re-operation rate. Groups were stratified by technique and historic risk factors of age<2 and weight<10kg. Chi square tests were performed and significant variables were included in a multivariate regression.

Results: 116 patients had 173 catheters placed (121 open, 52 laparoscopic) with an average patient age of 9.7±6.3 years. Mean catheter life was similar in the laparoscopic and open groups (581±539 days versus 574±487 days, p=0.938); however the late complication rate was higher for open procedures (57% versus 37%, p=0.013). Children <2 or <10kg years had higher re-operation rates (64% versus 42%, p=0.014 and 73% versus 40%, p=0.001, respectively). When adjusted for age and weight, an open approach remained an independent risk factor for late complications (OR 2.44, 95% CI 1.20-4.95) but was no longer an independent predictor of re-operation. Fifty-nine (50.1%) patients were successfully bridged to transplant.

Discussion: Laparoscopic placement appears to reduce the rate of late complications in children who require PD dialysis catheters and may be the approach of choice. Children <2 years age or <10kg remain at risk for complications and re-operations, regardless of technique.

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Evaluating the effect of time process measures on appendectomy clinical outcomes

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Background: Literature reports varied results of time to appendectomy on clinical outcomes. We examined pre-operative delays on postoperative complications (POC) in acute pediatric appendicitis.

Methods: Children with acute appendicitis (January 2013 - June 2014) were identified from a prospective database. Univariate analyses compared time metrics (presentation to surgery, diagnosis to surgery, operative time), patient characteristics, and disease severity (complex or simple appendicitis) with POC and organ space surgical site infection (OSSI), as defined by NSQIP. Multivariate logistic regression was performed to determine predictors of POC.

Results: 1211 patients underwent appendectomy. Median age was 10.4 years (IQR 7.8 –13 years). 537 patients (45%) had complex appendicitis. Overall POC rate was 11% (n=133) and OSSI was 9% (n=105). Time from presentation or diagnosis to appendectomy did not increase risk of POC. Operative time (OT) was longer in patients with POC (57 min (IQR 49-75) vs. 46 min (IQR 36-57), p<0.001). After adjusting for confounding factors, significant predictors of POC were OT (OR 1.036, 95% CI 1.015-1.054) and disease severity (OR 6.5, 95% CI 2.75-15.35). Patients who developed OSSI had longer OT (60 min (IQR 51-80) vs. 46 min (IQR 27-57), p<0.001). In adjusted analyses, OT (OR 1.06, 95% CI 1.03-1.09), duration of symptoms (OR 1.153, 95% CI 1.04-1.29) and disease severity (OR 73.1, 95% CI 7.3-713) were significant predictors of OSSI.

Conclusion: Pre-operative delays were not associated with increased incidence of POC. The strongest predictor of POC in appendectomy is disease severity, which may correlate with increased operative time in our cohort.

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Surgical intervention of ulcerated hemangiomas treated with steroids versus propranolol

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Hemangiomas are the most common tumor of infancy and medical treatment is undertaken during the proliferative phase to avoid long term complications. Until recently corticosteroids were the treatment of choice, however there has been a recent shift to propranolol. Surgical intervention is considered for problematic hemangiomas in the proliferative phase and involuted fibrofatty residual. This study compares the indications and frequency of surgical intervention in patients treated with propranolol or corticosteroids. A single center IRB approved retrospective chart review of all medically treated ulcerated hemangioma patients between 2005-2014. Demographic data and indications for surgical intervention were obtained for all patients. Both univariate and multivariate analyses were performed. 152 patients were treated with medications for ulcerated hemangiomas during this time period. Patients treated with a combination of propranolol and corticosteroids were eliminated. 36 patients completed a corticosteroid treatment course and 30 patients were treated with propranolol only. There were no significant differences between treatment groups in terms of gender, age at diagnosis, race, number, and location of hemangioma. Average treatment time was 6 months for the corticosteroid group and 7 months for propranolol treatment group. 17/36 (47%) of corticosteroid patients underwent surgical intervention, 5/30 (16.6%) of propranolol patients required surgical resection (p=0.008). There was no significant difference in laser treatment between groups (p=0.5). Patients treated with propranolol required significantly fewer surgical interventions than those treated with corticosteroids implying a more efficacious treatment paradigm. This was unrelated to differences in race, gender, age or length of treatment.

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Public health consequences of central venous catheter composition

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Introduction: Most complications of implantable central venous access devices (CVAD) are well described. However, the complication of catheter fracture has either been unrecognized or underreported. After changing to polycarbonate-based thermoplastic urethane (TPU) catheters, we observed a marked increase in catheter fracture at the time of removal. Our aim was to identify the incidence of this complication and any predisposing characteristics.

Methods: A single-center retrospective review of patients under 18 years undergoing CVAD removal from January 2008 to March 2014 was performed. Demographics, placement/removal indications, catheter characteristics, number of catheter days, and complications were analyzed. Catheters were independently reviewed by biomedical engineering. Chi Square and Fischer Exact tests were used.

Results: One-hundred eighty-one patients underwent CVAD insertion and 88 underwent removal. Patients were grouped based on timing of catheter insertion: Group 1 (n=41, 2008-2011) and Group 2 (n=47, 2012-2014). Both groups had similar indications for placement and removal, and catheter complications (infection, thrombosis, and dislodgement) were not significantly different. However, cases of difficult removal and catheter fracture were significantly increased in Group 2 (1 vs. 10, p<0.01 and 0 vs. 7, p<0.01, respectively) (Figure 1A). Strikingly, catheter fracture only occurred after 720 catheter days (Figure 1B).

Conclusions: Catheter removal is not thought to be associated with serious complications. However, we identified that catheter fracture and difficult removal occurred with TPU catheters exceeding 720 catheter days. We recommend TPU catheters for short-term use only. Additionally, concerns should be addressed with the family when removing TPU catheters with a prolonged duration.
Figure 1: A) Catheter demographic data and description of catheter complications. Demographic data was similar between the two groups. Of the complications, infection, thrombosis and dislodgment were not significantly different. Difficult removal and catheter fracture were significantly different though. B) Kaplan-meier curve showing that all of the catheter fractures occurred in group 2, and of those that fractured, the probability of them fracturing went up after 720 catheter days.

Sponsoring CAPS Member: Priscilla P L Chiu
Predicting the outcome of pediatric acute pancreatitis

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Our knowledge on risk stratifying pediatric acute pancreatitis is poorly understood and extrapolated from adult literature, predicting severe outcomes, based on scores like pediatric acute pancreatitis score (DeBanto et al), CTSI (computed tomography severity index or Balthazar) or even serum lipase levels. We aimed to assess the predictive value of CTSI and serum lipase in the pediatric acute pancreatitis. Children admitted to our institution with acute pancreatitis over 9 years were reviewed. Contrast-enhanced computed tomographic (CT) images at presentation were done and assessed for peripancreatic fluid and the extent of necrosis. Serum lipase levels were sent within first 24 hours. Of 115 children with acute pancreatitis, 105 underwent contrast-enhanced CT at presentation. The majority were more than 10 years of age. Etiology was idiopathic (52.4%) in most, followed by traumatic (16.2%), medication-induced (11.4%), gallstone (6.7%), choledochal cyst (3.8%), and others (9.6%). The sensitivity, specificity, positive predictive value, and negative predictive value of the CTSI were 45.6%, 95.8%, 92.9%, and 59.7%, respectively, which compared favorably to the results of the serum lipase levels (84.2%, 25%, 57.1% and 57.1%) and both combined (40.35%, 95.83%, 92%, 57.5%). Our review demonstrates that the CTSI is a useful tool for predicting patients that will develop major complications, against those who will not. The serum lipase at presentation, alone, may have a better sensitivity than CTSI, but does not translate into a better positive predictive value, or a good risk stratification tool. Combining the two improved neither the sensitivity nor the specificity of CTSI alone.

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A Markov decision analysis model of adolescent bariatric surgery: Why weight?

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**Purpose:** Bariatric surgery is performed with increasing frequency in North American adolescents. We developed a Markov decision analysis model to evaluate optimal timing for gastric bypass in obese adolescents, and to estimate changes in quantity and quality of life.

**Methods:** A Markov state-transition model was used to determine the optimal surgical management strategy for obese adolescents. In a Markov model, patients’ transition over time among health states based on the probabilities associated with different interventions. Each health state is assigned an associated utility, using quality-adjusted life-years (QALYs). Our model patient is a 16-year-old female with body mass index (BMI) 45 kg/m\textsuperscript{2} undergoing immediate gastric bypass compared to delaying surgery into adulthood (Figure 1). Surgical and BMI-based outcome probabilities and utilities were obtained from the existing literature.

**Results:** Our model demonstrates that early gastric bypass surgery was favored by 2.02 QALYs compared to delaying surgery until age 35 (48.91 vs. 46.89 QALYs). The benefit was even greater for males, where early surgery was favored by 2.9 QALYs (48.30 vs 45.40 QALYs). In a sensitivity analysis for surgical weight loss, over 30\% of adolescents need to fail to lose weight following surgery before adult surgery is favored. We found that the absolute benefit of surgery at age 16 increased the later surgery was delayed into adulthood.

**Conclusions:** Our model suggests that early gastric bypass improves both quality and quantity of life in severely obese adolescents. These findings are useful for surgeons and referring physicians when counseling adolescents considering weight loss surgery.
Figure 1. Conceptual Markov model for the surgical treatment of adolescent obesity.

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**A stitch in time saves nine: Suture technique does not affect intestinal growth in a young, growing animal model**

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**Background:** Thought to improve intestinal growth postoperatively, many pediatric surgeons advocate using interrupted suture techniques over continuous running methods for bowel anastomosis. However, this method results in longer operative time while differences in long-term outcomes remain unclear. We compared intestinal growth during the postoperative period using different anastomotic techniques in young rats.

**Methods:** Young, growing rats underwent laparotomy and small bowel transection. Bowel anastomosis was performed using either a simple interrupted or continuous running technique with the same suture. At 7-weeks postoperatively after complete growth of the intestines, a 5-cm segment of bowel containing the anastomotic site was resected and the diameter measured. The distal portion was occluded and a manometer inserted into the proximal portion with saline infused and burst pressure recorded.

**Results:** 13 rats underwent anastomosis with simple interrupted technique and 16 with continuous running method. No significant differences were found in body weight at first or second operations. Neither the diameters (0.69 vs 0.79 cm; p=.11) nor burst pressures (298.00 vs 282.94 mm Hg; p=.30) were statistically different, although the calculated circumference was smaller in the simple interrupted group (2.18 vs 2.59 cm; p=.032). No burst pressure ruptures occurred at the anastomotic line.

**Conclusion:** In a young, growing animal, different suturing techniques were not ultimately associated with differences in anastomotic diameters or burst pressures after complete intestinal growth, although the continuous running group had a statistically larger circumference. Continuous running technique for small bowel anastomosis in young rats does not limit intestinal growth at the anastomotic site.

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Effect of surgical safety checklist implementation in pediatric surgery: A retrospective review and meta-analysis

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Background: The use of safety checklists in the operating room has been shown to improve surgical outcomes; however their effect in pediatric surgery has not been thoroughly evaluated. Our objective was to study the impact of a surgical checklist in a pediatric hospital and to compare these results to existing publications via meta-analysis.

Methods: We performed a retrospective review of pediatric procedures for one year before and one year after implementation of a surgical safety checklist at a pediatric tertiary hospital. Patients from the two time periods were matched by age, wound class, procedure class and procedure type. Data were extracted on complications, mortality, and length of hospital stay. A systematic review and meta-analysis was performed to compare and combine our data with the published literature.

Results: We included 1050 pediatric patients. The complication and mortality rates increased non-significantly after implementation of the checklist (from 5.5% to 7.2% (P = 0.312) and from 0.2% to 0.4% (P = 1.000), respectively). There was, however, a significant reduction in length of hospital stay from 4.67 to 3.99 days (P = 0.027). Our systematic review included 11 studies. Meta-analysis results indicated a significant decrease in the rate of complications following checklist implementation (OR 0.60 [0.44, 0.81] P = 0.001).

Conclusions: Implementation of a surgical safety checklist was not associated with reductions in complication and mortality rates in pediatric surgery, although analysis of the literature indicates that checklists do improve pediatric surgical outcomes.

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Laparoscopy in pediatric surgery: Implementation and supporting evidence

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Background: To assess: (i) the diffusion curve of laparoscopy usage in Canadian pediatric hospitals and determine if a plateau was reached; (ii) the relationship between uptake of laparoscopic surgery and the level of evidence supporting its use.

Methods: National data on four pediatric laparoscopic operations (appendectomy, pyloromyotomy, cholecystectomy, splenectomy; REB:100045867) were analyzed using the Canadian Institute for Health Information Discharge Abstract Database (2002-2013). Highest level of evidence (Oxford Centre for Evidence-Based Medicine) was reviewed using Cochrane, Embase, Pubmed databases. Chi-square test for trend was used to determine significance and time to plateau.

Results: There were 28,843 operations (open: 12,048; laparoscopic: 16,795). Use of all 4 laparoscopic procedures significant increased (p<0.0001, Figure). A plateau was reached for cholecystectomy (2006), splenectomy (2007) and appendectomy (2012), whereas there was no plateau for pyloromyotomy. The use of laparoscopic pyloromyotomy in 2013 remains lower than the other 3 procedures (p<0.01). Laparoscopic appendectomy and pyloromyotomy are supported by level 1a evidence in children whereas cholecystectomy and splenectomy are supported by level 1a evidence in adults but level 1b in children.

Conclusions: In Canada there has been a long delay (>15 years) in reaching high-level implementation of laparoscopy in children. Laparoscopic cholecystectomy first reached plateau, whereas laparoscopic pyloromyotomy continues to increase but remains low despite high level of evidence in support of its usage compared to open surgery. This is the first study to provide nationwide data on the diffusion of pediatric laparoscopy and highlights the need for the implementation of evidence-based practice in pediatric surgery.
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Prevalence of renal impairment in pediatric intestinal failure

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Background: Outcomes of children with intestinal failure have continued to improve; however, with improved survival, other co-morbidities have become evident. The goal of our study was to evaluate the presence of renal impairment in a cohort of patients with pediatric intestinal failure (PIF).

Methods: A cross-sectional prevalence design was performed in PIF patients followed by our intestinal rehabilitation program between 2013-2014. Renal function was evaluated using serum creatinine and urea, urine oxalate, creatinine, calcium and calcium/creatinine ratios. Renal ultrasounds were performed to assess for echogenicity. Data was collected on IF related factors. Data was analyzed using medians and Mann-Whitney U or proportions and Chi square.

Results: Fifty-six patients (median age 48 months; 35 males (57%) were studied. Twenty-four patients (43%) had increased echogenicity/nephrocalcinosis on ultrasound. There were no differences in serum creatinine or urea, but patients with nephrocalcinosis had statistically different calcium:creatinine ratio (1.47 vs 0.71; p=0.014), urine oxalate (108 vs 228; p=0.044) and serum phosphate (1.56 vs 1.74; p=0.035). Patients with echogenicity had a shorter colonic remnant (25cm vs 33cm; p=0.001), a history of longer PN exposure (928 vs 500 days; p=0.05), percent PN calories (37 vs 0; p=0.05), and higher total fluid intake (103 vs 21; p=0.05) but no difference in PN calcium/phosphate/magnesium content (mmol/kg).

Conclusion: A large proportion of PIF patients have abnormal echogenicity/nephrocalcinosis associated with prolonged PN exposure. This has implications for long-term management since serum urea and creatinine are typically normal. Regular surveillance is required and further study is warranted to determine specific risk factors.

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Our experience of treatment of problematic hemangiomas with Propranolol and 940nm diode laser

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Introduction: Hemangiomas are diagnosed in 10 – 12% of one year-old children. About 10% of them impair the quality of life, lead to disability and social maladjustment.

Aim: to study the efficacy and safety of systemic propranolol-therapy in combination with 940nm diode laser in the treatment of severe hemangiomas.

Methods: Initial examination was intended for detection of contraindications. Phase 1 was systemic oral propranolol-therapy at a dose of 2-2.5 mg/kg/day divided in three portions for 6 - 8 months. Start of therapy was in hospital (4 - 7 days) and was continued as an outpatient. Removal of the drug was carried out by a dose reduction for ¼ a week. Phase 2 was photothermolysis of residual elements with a diode 940 nm laser. The total number of patients was 123 (11 with vascular malformations and 112 with hemangiomas).

Results: Malformations: no effect. Hemangiomas: the changes in color, size and softening were noticeable in the first 1-3 days. Effect depended on the child's age at the start of therapy: the younger the child was, the better the result of treatment. Regression of size was larger and faster than color. Laser correction of residual telangiectasias performed to 61 children. Subtotal reduction of volume was obtained in 94.9%, color in 66.7%, normalization of skin relief in 88.0% of patients.

Conclusions: This study shows the possibility of complete removal of severe hemangiomas in children with excellent anatomical, functional and cosmetical result in comfortable conditions for both baby and parents without significant side effects.
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Cost of care for the intestinal failure patient: Follow-up one year after primary discharge

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Background: Survival of children with intestinal failure has improved over the last decade, resulting in increased health care expenditures. Our objective was to determine outpatient costs for the first year after primary discharge.

Methods: A retrospective analysis was performed in pediatric intestinal failure (PIF) patients between 2009-2012. Patients were stratified into 3 groups (1 = enteral support with no devices [7 patients], 2 = enteral support with devices (gastrostomy and/or ostomy) [19 patients], 3 = home parenteral nutrition (HPN) [22 patients]). Data abstraction included clinical characteristics and costs related to medication, enteral/parenteral nutrition, and supplies were calculated. Data was analyzed using one way ANOVA.

Results: 48 Patients (mean age 7.6 months; 31 males [65%]) were studied. See attached table for results. HPN patients had significantly more ambulatory visits (p<0.0001).

Conclusion: The outpatient expenditures to care for PIF patients in the first year post primary discharge are significant. Our single payer healthcare system supports the majority of costs, but families are also incurring expenses related to travel and lost productivity. Children on HPN have more visits to hospital, but have access to more funding options. Children solely on gastrostomy or stoma therapy however, have a significantly greater personal financial burden.

<table>
<thead>
<tr>
<th></th>
<th>Enteral - No Medical Device (n=7)</th>
<th>Enteral – Medical Device (n=19)</th>
<th>Home PN (n=22)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length of Primary Admission (days)</td>
<td>98 (36.5)</td>
<td>157 (63.7)</td>
<td>140 (78.0)</td>
<td>0.162</td>
</tr>
<tr>
<td>Ambulatory visits</td>
<td>6.7 (1.3)</td>
<td>11.9 (6.4)</td>
<td>20.4 (8.7)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Number of re-admissions</td>
<td>0.29 (0.5)</td>
<td>1.2 (1.4)</td>
<td>3.2 (2.4)</td>
<td>0.001</td>
</tr>
<tr>
<td>Number of re-admitted days</td>
<td>4.7 (8.3)</td>
<td>10.1 (17.0)</td>
<td>27.7 (26.1)</td>
<td>0.010</td>
</tr>
<tr>
<td>Productive days lost</td>
<td>11.4 (9.1)</td>
<td>22.4 (21.4)</td>
<td>49.6 (30.2)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Ambulatory costs</td>
<td>313.14 (199.77)</td>
<td>594.32 (432.48)</td>
<td>1184.98 (850.49)</td>
<td>0.003</td>
</tr>
<tr>
<td>Global cost of Gtube</td>
<td>0</td>
<td>2144.34 (1313.19)</td>
<td>1570.33 (1334.56)</td>
<td>0.020</td>
</tr>
<tr>
<td>Family cost of Gtube</td>
<td>0</td>
<td>957.65 (426.09)</td>
<td>824.97 (517.12)</td>
<td>0.002</td>
</tr>
<tr>
<td>Global cost of ostomy</td>
<td>0</td>
<td>555.16 (1317.21)</td>
<td>1917.82 (1791.92)</td>
<td>0.003</td>
</tr>
<tr>
<td>Family cost of ostomy</td>
<td>0</td>
<td>460.42 (1092.43)</td>
<td>1590.55 (1486.13)</td>
<td>0.003</td>
</tr>
<tr>
<td>Global cost of medications</td>
<td>397.53 (214.37)</td>
<td>872.61 (588.89)</td>
<td>4673.79 (3371.97)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Family cost of medications</td>
<td>397.53 (214.37)</td>
<td>799.50 (564.07)</td>
<td>478.79 (621.66)</td>
<td>0.119</td>
</tr>
<tr>
<td>Global cost of enteral nutrition</td>
<td>2575.58 (2205.42)</td>
<td>4802.66 (3189.07)</td>
<td>2895.98 (3229.18)</td>
<td>0.104</td>
</tr>
<tr>
<td>Family cost of enteral nutrition</td>
<td>2575.58 (2205.42)</td>
<td>4302.67 (2888.34)</td>
<td>187.65 (447.92)</td>
<td>&lt;0.0001</td>
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<tr>
<td>Global cost of parenteral nutrition</td>
<td>0</td>
<td>0</td>
<td>304034.68</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Total cost of care</td>
<td>3742.21 (2335.88)</td>
<td>8969.09 (3988.61)</td>
<td>320368.50 (10472.43)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Cost to family</td>
<td>3438.17 (2255.12)</td>
<td>7114.56 (3210.53)</td>
<td>4266.93 (2108.73)</td>
<td>0.001</td>
</tr>
<tr>
<td>Cost to system</td>
<td>0</td>
<td>1854.54 (1141.23)</td>
<td>316101.56 (10228.07)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>----------------</td>
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<tr>
<td>Distance to hospital</td>
<td>62.6 (65.9)</td>
<td>121.0 (174.2)</td>
<td>109.3 (151.1)</td>
<td>0.688</td>
</tr>
</tbody>
</table>

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Central venous thrombosis in children with intestinal failure on long-term parenteral nutrition

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Purpose: Children with intestinal failure (IF) often require prolonged central venous access for parenteral nutrition (PN). Despite improved nutritional management and hepatic protection, central venous thrombosis (CVT) remains a significant morbidity. We reviewed the incidence of CVT and possible risk factors in children with IF.

Methods: Children with IF on home PN (2010-2014) with central venous imaging were retrospectively reviewed. Patient demographics, catheter characteristics, catheter-related complications and markers of liver function were compared between children with and without CVT. Prothrombotic markers were reviewed for patients with CVT.

Results: 30 children with IF on long-term PN had central venous imaging. 17 patients (57%) had thrombosis of ≥ 1 central vein, of which 12 (40%) had ≥ 2 thrombosed central veins. Patients with and without CVT did not differ significantly with regard to: small bowel length, days on PN, mean number or diameter of central venous catheters, number of catheter-related bloodstream infections or number of catheter occlusions. Patients with CVT had a significantly lower albumin level (2.76±0.38g/dL vs. 3.12±0.41g/dL, p=0.0223). 71% of children with CVT underwent evaluation for thrombophilia. The most common findings were antithrombin, protein S and C deficiencies and elevated Factor VIII (Table 1). There was a statistically significant correlation between a combined protein S and C deficiency and having > 1 CVT.

Conclusions: Children with IF on long-term PN are at high risk for CVT secondary to low levels of natural anticoagulant proteins and elevated factor FVIII activity which is likely a reflection of liver insufficiency and chronic inflammation.

<table>
<thead>
<tr>
<th>Thrombophilia Marker</th>
<th>Number of Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antithrombin Deficiency (n = 12)</td>
<td>7 (58%)</td>
</tr>
<tr>
<td>Elevated Factor VIII (n = 8)</td>
<td>4 (50%)</td>
</tr>
<tr>
<td>Protein S Deficiency (n = 12)</td>
<td>6 (50%)</td>
</tr>
<tr>
<td>Protein C Deficiency (n = 12)</td>
<td>5 (42%)</td>
</tr>
<tr>
<td>Combined Protein Deficiency (n = 12)</td>
<td>4 (33%)</td>
</tr>
<tr>
<td>Prothrombin Mutation (n = 8)</td>
<td>1 (12%)</td>
</tr>
<tr>
<td>Factor V Leiden Mutation (n = 10)</td>
<td>0 (0%)</td>
</tr>
</tbody>
</table>

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POSTERS/ABSTRACTS FOR VIEWING- CAPS 2015

1

Effect of gestational age at birth on neonatal outcomes in gastroschisis

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Introduction: Some surgeons suggest routine delivery of gastroschisis at 34 weeks gestational age (GA) would reduce bowel exposure to amniotic fluid improving gut function and decrease exposure/risks of parenteral nutrition (PN) and hospitalisation. We aimed to determine the effect of timing of delivery on time to full enteral feeds (ENT), length of hospital stay (LOS) and developing sepsis.

Methods: An REB-approved retrospective analysis (2000-2013) of gastroschisis born ≥34 weeks GA was performed. Data (ENT, LOS, birth GA, sepsis and complexity [concomitant necrosis/ataresia/stenosis/perforation] were analysed by T-test, Cox regression and Fisher’s exact test.

Results: 217 gastroschisis patients were included, 30 were complex. Corrected GA at ENT and LOS was similar between those born 34-37 weeks (ENT 43.8±1.0 weeks, LOS 45.3±0.9), and those born ≥37 weeks (ENT 43.0±0.6, LOS 44.4±0.7), p=0.4 and 0.5 respectively, although proportion of complex gastroschisis was similar. ENT and LOS were significantly longer in those born 34-37 weeks (ENT 56±7, LOS 67±6), and those born ≥37 weeks (ENT 38±4, LOS 48±5), p=0.037 and 0.021 respectively. Cox regression, adjusting for complexity, showed that lower birth GA significantly prolonged ENT (odds ratio 1.2 [95%CI:1.1-1.3], p=0.001) and LOS (odds ratio 1.3 [95%CI:1.1-1.4], Figure). Infants born 34-37 weeks were significantly more likely to become septic (36/114, 32%) than those born ≥37 weeks (18/103, 17%, p=0.019).

Conclusions: Although delivery at 34 weeks has been advocated, delivery <37 weeks leads to a prolonged period of PN and hospitalization with increased risk of sepsis.
**Effect of associated anomalies on the outcomes of fetuses with congenital diaphragmatic hernia**

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**Purpose:** Outcomes of congenital diaphragmatic hernia (CDH) are often evaluated based on whether it is “isolated” or associated with other anomalies. The purpose of this study was to evaluate the impact of various types of associated anomalies on CDH outcomes.

**Methods:** We reviewed records of all CDH patients at a tertiary care center from January 2004 to January 2014. Isolated CDH was defined as CDH without cardiac, genetic or structural anomalies. Cardiac anomalies other than atrial or ventricular septal defects and structural anomalies requiring intervention in the perinatal period were classified as major. The primary outcome of interest was 6-month mortality.

**Results:** Of 189 CDH patients, 93(49.2%) had isolated CDH. Others had: genetic anomalies (n=28; 14.8%), cardiac anomalies alone (n=46; 24.3%) (13 major; 33 minor) and structural anomalies alone (n=18; 9.5%) (8 major; 10 minor). Fifty (26.5%) patients died within the first six months of life. Non-survivors had smaller prenatal lung volumes (24.3±8.3%vs.36.5±14.9% of expected; p<0.001), were younger (36.4±3.1vs.37.8±2.1 weeks; p=0.008) and weighed less (2611±811vs. 2932±589grams; p=0.016) at birth compared to survivors. Mortality at 6 months was higher in patients with genetic and major cardiac anomalies (Table 1). A major cardiac anomaly was independently associated with a 21-fold increased risk of mortality at 6 months (95%CI: 1.8-242).

**Conclusion:** Major cardiac and genetic anomalies were associated with increased 6-month mortality in CDH patients. However, associated minor cardiac anomalies and/or structural anomalies did not affect mortality. Therefore, the presence of these conditions should not adversely impact their perinatal management.
Catheter salvage following central line associated blood stream infections in pediatric home parenteral nutrition patients

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**Background:** Central line associated blood stream infection (CLABSI) is a common complication of home parenteral nutrition (HPN). While catheter removal was historically the mainstay of treatment, line salvage is increasingly being used to preserve vascular access. This study aimed to evaluate the efficacy of catheter salvage following CLABSI in selected pediatric HPN patients.

**Methods:** After IRB approval, a single center review of pediatric HPN patients with CLABSI between January 2012 and December 2013 was performed. Criteria for catheter removal included: hemodynamic instability, fungemia, tract infection, and persistently positive blood cultures at 48 hours of therapy. The primary outcome was recurrence of CLABSI within 30 days of antibiotic completion.

**Results:** 146 CLABSIs were reviewed in 64 HPN patients [age 7 years (IQR 2-7.4)]. No deaths were observed. Catheter salvage was attempted in 79/146 (53%) of episodes. Greater CLASBI re-infection at 30 days was seen in this cohort as compared to the line removal group though it did not attain statistical significance (19% vs. 10%, p=0.17). Comparison of re-infection with the same organism showed a reduced difference (5.1% vs. 4.5%, p=0.87). In 47 episodes with line salvage, test of cure (TOC) blood cultures were obtained after antibiotic completion. 97.8% were negative and did not correlate significantly with 30-day re-infection (κ=0.26).

**Conclusions:** Catheter salvage in selected pediatric HPN patients with CLABSI appears to be a generally efficacious strategy though line re-infections at 30 days are evident in approximately one in five episodes. Negative TOC cultures do not reliably predict CLABSI recurrences.
Trauma in Ethiopian children: Factors affecting severity of injury

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Purpose: Trauma is the leading cause of death in children over 5 years old. This study aims to identify main causes and risk factors of severity for pediatric trauma in Ethiopia.

Methods: A prospective database collection of all pediatric admissions for trauma at a district-level hospital in Ethiopia over a period of 3 years. Data collected includes demographics, injury mechanism, diagnoses, hospital stay with procedures, and discharge outcome.

Results: Between 2011 - 2014, 349 pediatric (age under 19 years) patients presented with traumatic injuries at our institution. Girls represented 29.5%, mean age was 11.2 years, and injuries were equally distributed between rural and urban settings. The most frequent mechanism of injury was pedestrian injured on the road (31%), and the commonest injury was lower limb fracture (32%). Death occurred in 4.3%. Risk of death was associated with type of injury (p=.035), mechanism of injury (p=.016), loss of consciousness (LOC) (p=.026), Glasgow Coma Score (GCS) <15 (p<.000), and systolic hypotension (p=.032) and hypoxia on presentation (p=.048). Prolonged length of stay (over 1 week) was associated with age over 10 years (p=.01), rural setting (p=.001), LOC (p=.034), and hypotension on presentation (p=.026). Conditional forward stepwise logistic regression analysis identified GCS, mechanism of injury, older age, and tachycardia as predictors of fatality.

Conclusion: The study highlights mechanisms and patterns of pediatric injury in Ethiopia, and risk factors for adverse outcomes. This can guide public health policies and future educational efforts.
Challenges in the management of conjoined twins in a poor resource setting: A report of 3 cases

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Background: Despite the advances in transport, intensive care unit and new treatment modalities, conjoined twins continue to pose a significant challenge for paediatric surgeons. This study was undertaken to highlight the peculiarities of the management of conjoined twins in a poor resource setting.

Methods: All confirmed cases of conjoined twins were prospectively documented from 2001 to 2014 at Charles De Gaulle Paediatric Teaching Hospital in Ouagadougou (Burkina Faso).

Results: Three cases were recorded: one case of thoraco-omphalopagus conjoined twins, born prematurely by elective caesarean surgery, one case of pygomelus conjoined twins with two phallus, and one last case of epigastric heteropagus conjoined twins. All our patients were male. Antenatal diagnosis was made in one case. Associated malformations were found in two patients. Thoraco-omphalopagus twins who shared the breastbone, liver, heart, and transverse colon died at day 38 of life from heart failure before any treatment. The two others were successfully operated by surgical resection separation of the parasitic twin at 30 days of life for the epigastric heteropagus conjoined twins and four and a half months for pygomelus conjoined twins.

Conclusion: The management of conjoined twins is difficult in the context of Sub-Saharan African developing countries. Their survival depends on an early detection by prenatal diagnosis, the creation of intensive care units, the integrated care of mother and child diseases and the development of partnership between hospitals in the South and those in the North. Key-words: conjoined twin – management-poor resource setting.
Is a chest tube needed post-surgical repair of esophageal atresia and tracheoesophageal fistula?

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**Background:** After definitive repair of esophageal atresia (EA) and tracheoesophageal fistula (TEF), a chest tube (CT) may be left in place to diagnose and/or conservatively treat a post-operative anastomotic leak. Its necessity is controversial, and thus its use amongst surgeons is variable. The purpose of this study was to determine if the use of a chest tube decreases early post-operative complications after EA and TEF repair.

**Methods:** A retrospective chart review was performed to identify all patients with EA and TEF who underwent repair between 2003 and 2012. Patients were divided into two groups: with and without chest tube. Univariate analysis was performed to determine differences with respect to birth weight, gap length, type of TEF, comorbidities, length of stay, and early post-operative complications. Complications were defined as anastomotic leak or respiratory complications including pneumothorax, chylothorax, and pneumonia.

**Results:** One hundred and twenty patients were included. Sixty-nine neonates had a CT inserted intraoperatively, while 51 did not. In a univariate analysis, there were no significant differences between the two groups with respect to birth weight (2622±795 vs. 2699±805 g, p=0.2), long gap length (24.6% vs. 15.7%, p=0.3), Type C TEF (84.1% vs. 84.3%, p=0.8), comorbidities (13.0% vs. 11.8% p=0.8), or length of stay (31±12 vs. 36±16 days, p=0.5). The incidence of complications in the chest tube group was 13%, while the incidence of complications in the group without chest tube was 12% (p=0.9).

**Conclusion:** The use of a chest tube does not decrease early post-operative complications after EA and TEF repair.
Evaluating the management strategies for malrotation in cardiac heterotaxy patients

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**Background:** The appropriate surgical management of malrotation in children with heterotaxy and congenital heart disease (CHD) is unknown. Some perform a Ladd’s procedure to prevent midgut volvulus; others observe asymptomatic patients. We routinely perform a prophylactic Ladd’s procedure after cardiac stabilization. We evaluated the outcomes of this strategy.

**Methods:** We performed a retrospective chart review of all children with CHD and heterotaxy and malrotation identified on contrast radiographs treated from August 2002 until April 2014. We defined any readmission for small bowel obstructions (SBO) or suspected or confirmed volvulus as a complication.

**Results:** We identified 95 patients (68%) with cardiac heterotaxy and malrotation. Seventy-one (75%) had a Ladd’s procedure; only 15 (16%) had abdominal symptoms at the time of surgery. Only one symptomatic patient had an underlying volvulus without ischemia, the other 14 symptomatic patients did not have a volvulus. Twenty-two (23%) died from cardiopulmonary complications during follow-up, 10 before and 12 after the Ladd’s procedure. Seventy-three patients survived long term (median: 4.8 years). Six of the 59 (10%) surviving Ladd’s patients returned with a SBO; 2 required adhesiolysis of which one needed a small bowel resection. None of the 14 patients who did not have a Ladd’s developed a volvulus [Figure].

**Conclusion:** Ten percent of our patients developed a SBO after a Ladd’s. Conversely, none of the patients who were observed without a Ladd’s developed a volvulus. This suggests that complications from a Ladd’s procedure occur with greater frequency than complications from observing a heterotaxy patient with malrotation.
Laparoscopic-assisted trans-anal pullthrough (LATP) versus complete trans-anal pullthrough (CTP) in the surgical management of Hirschsprung’s disease

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Background: It is unclear whether optimal results are accomplished in the surgical management of Hirschsprung’s disease via laparoscopic-assisted trans-anal pullthrough (LATP) or the complete trans-anal pullthrough (CTP). The purpose of this study was to compare outcomes between both approaches.

Methods: We retrospectively reviewed all patients with Hirschsprung’s disease at our centre that either had LATP or CTP between 1995 and 2014. Cases were matched by age, birth weight and level of aganglionosis. We also performed a systematic literature review and meta-analysis.

Results: Twenty-four patients who underwent LATP were matched to 12 patients who underwent CTP. The LATP group had a significantly longer operative time (3.9± 1.1 vs 2.6± 0.6 hours, p=0.001). There was no difference in length of stay (p=0.3) or post-operative complications (p=0.7, for leak, stricture, enterocolitis and post-obstructive symptoms). A literature search identified a total of 19 published studies, 13 of which reported LATP (252 patients), 4 reported CTP (151 patients), and 2 that were comparative. Our pooled analysis of comparative studies including our results, showed operative time was significantly longer for the LATP group (MD=0.89, 95% CI 0.73-1.06 hours, p<0.001). There was no significant difference in major complications (OR=0.54, 95% CI 0.26-1.33, p=0.23) or in length of stay (MD= 0.15, 95% CI 0.79-5.03, p=0.15).

Conclusion: Clinical outcomes are comparable between laparoscopic-assisted trans-anal pullthrough and complete trans-anal pullthrough. The complete trans-anal approach has the advantage of shorter operative time without the need for laparoscopic instruments.