Lessons Learned in Paediatric Emergency Medicine
Has anything changed?

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Disclaimer

I have no actual or potential conflict of interest to declare.

Photographs, images, charts and information were selected from The Hospital for Sick Children teaching file, my personal collection or downloaded from the internet.

I was a member of the Canadian Association of Emergency Physicians Task Force which developed and implemented Canadian Triage Guidelines, and co-author of the Paediatric Triage Guidelines.

Dr. D. Anna Jarvis

Learning Objectives:

1. To review illustrative cases which highlight major changes in clinical treatment protocols.
2. To consider major changes in Emergency Department organization, systems and work environment.
3. To challenge participants to answer the questions:
   Has patient care improved?
   Are patient outcomes better?
   Is the Emergency Department a more or less positive work environment?

The Hospital for Sick Children - Toronto The Way We Were - 1972

- almost 900 beds
- 25 junior and 25 senior residents
- "Emergency Room" staffed by interns and residents
- "Triage" → Eddie the doorman
  Mrs. R. & Mrs. B - Clerks
  Ruth – Registration and Poison calls

The Hospital for Sick Children - Toronto The Way We Were - 1972

- Supervision: next day chart reviewed by a senior surgeon
- Shifts:
  3 days (0800-1800 hrs)
  3 nights (1800-0800 hrs)
  3 off

Overnight there was often time for a nap!

Illustrative Cases

- Asthma
- Croup
- Gastroenteritis
- Head Injuries
- Pain Management

Asthma

- 8 year old presents from soccer practice with difficulty breathing

Past history: Known asthmatic on daily Salbutamol and steroid puffers, no previous admissions

On examination: unable to lie flat or speak in sentences, audible wheezing, marked indrawing and reduced air entry in all lung fields. No hives or signs of anaphylaxis

What is the "best" immediate treatment ?

Asthma: "State of the Art Management

- 1964: subcutaneous Epinephrine
  intravenous Aminophylline +/- inhaled "Bromide"
- 1972: nebulised Orciprenaline (Alupent)
  intravenous Aminophylline
- 1984: nebulised Salbutamol (Ventolin)
  intravenous Aminophylline + steroids
- 2011: MDI Salbutamol + Ipratropium bromide
  + steroids +/- intravenous Magnesium sulphate
  +/- intravenous Salbutamol

Future: ? inhaled Magnesium sulphate
? Aminophylline infusions ?
something new

Croup

- An 18 month old arrives by ambulance. "Well" at bedtime other than a running nose. Awoke at 2 a.m. with barking cough and difficulty breathing.
- A premature NICU graduate (28 weeks gestation, ventilated for 1 week, developmentally "catching up").
- On examination marked respiratory distress sitting up, impressive sternal indrawing, inspiratory and expiratory stridor at rest, poor air entry over all lung fields, pale, tired, pulse 160/minute.

What is the best immediate treatment?

Croup: "Best" Management

- 1972: Croup tent or "mist room"
  5% Canadian Croup cases intubated,
  many children needed permanent tracheostomies
- 1980: Croup tent or "mist room"
  Racemic Epinephrine nebulised inhalations
  0.5% Canadian Croup cases intubated
- 2011: Nebulised Epinephrine inhalations
  oral steroids (Dexamethasone)
  almost no children intubated
  few admitted to hospital

New questions: How long to observe in Emergency?
Correct dose of oral steroid?

Gastroenteritis

- 3 year old presents at 7pm with worried parents.

History: recently started Day Care, vomited after supper tonight, has had 6 watery stools since morning, tired and cranky. Previously healthy.

Examination: carried by dad, alert, quiet and not interested in playing, dry skin and mouth, soft non tender abdomen
Respiratory rate 20/min Pulse 110/min BP 80/60

What is your assessment and "best" management?

Gastroenteritis

- 1964: chicken noodle soup, ginger ale, dilute juice, teas, boiled rice (kongee)
  Kaolin et morph + antiemetics
- 1980: BRAT diet (banana, rice cereal, apple sauce and juice, toast), no milk until "Diarrhoea settled"
  definitely no medications
  many children admitted for intravenous fluids
- 2011: Absolutely no juices, never stop breast feeding
  oral rehydration fluids +/- Ondansetron
  intravenous fluids and admission if vomiting persists
  early reintroduction of solid foods

Are subcutaneous or naso gastric fluids "prefered" routes?
What of lactobacilli, zinc, Peptobismol and antibiotics?

Head Injuries

- A 10 year old comes in with the coach after "hitting the boards" while playing hockey. He was "stunned" for at least 10 minutes, needed help off the ice, and has vomited x 2. He has on regulation gear.
- On examination he is pale, pulse 100/min RR 16/min BP 100/80. Fully alert and oriented, no visible signs of trauma and wants to return to the game "I'm OK now".
- The coach and parents want a CT head "to rule out any head injury" so he can participate in the Play offs next week.

What is Best Management for a Head Injury in 2011?

Head Injuries: then and now

- 1972: Full examination, offer a drink of clear fluid, if tolerated home and return to play quickly.
  Any vomiting or abnormal findings skull x-ray + admit to hospital for "observation"+ intravenous fluids.
- 1999: CT head + observe in emergency or admit, and return to play quickly
- 2011: Caution re CTs apply CT Head Guidelines graduated return to play over time + close observation re psycho-educational progress.

Caution: Far too many CTs done in children
There is an increased risk of future cancer

Birmingham Children's Hospital (BCH) Head Injury Guidelines 2005

Request immediate CT head imaging if:

1. GCS < 13 on hospital assessment
2. GCS 13 or 14 at 2 hours following adequate resuscitation
3. vomiting – discuss with consultant if > 3 vomits or if vomit(s) 2 hours post injury

Birmingham Children's Hospital (BCH)

- large regional centre
- over 45, 000 emergency visits annually
- all head injury patients studied x 6 months after introduction of BCH – Head Injury Guidelines

Results:

- 1428 head injured children (65% boys)
- median age 4 years (6 days to 15 years)
- 57 (4%) had CT head (within 1 hour of request)
- 20 (35%) of CTs abnormal (intracranial bleeds, fractures, 1 cerebral edema, 7 cases with combinations of findings)

Birmingham Children's Hospital (BCH)

- 108 children (8%) would have also have had CT head if NICE Guidelines were followed
- 78 vomited > 1
- 25 had loss of consciousness at the scene
- 4 had GCS 14 at 2 hours post injury
- all 108 children observed in Observation Unit or hospital ward, reviewed by a senior clinician prior to discharge
- *All children well 1 year post head injury*

Epidemiology of Post Concussive Syndrome in Pediatric Mild Traumatic Brain Injury (mTBI)

Barlow et al ***Pediatrics 2010***

- prospective, consecutive controlled-cohort study
- tertiary care pediatric centre – population 1.3 million
- 670 children 0 to 18 years with mTBI
- 197 children with extra cranial injuries (ECI)
- parent telephone interview 7 to 10 days post injury and monthly until symptom resolution
- Post Concussion Symptom Inventry, Rivermead Postconcussion Symptom Questionnaire, Brief Symptom Inventory and Family Assessment Device

Epidemiology of Post Concussive Syndrome
Barlow **RESULTS:**

Symptom Persistence following injury	mTBI	ECI
3 months – all ages	11%	0.5%
6 years and older	13.7%	0.5%
1 year – all ages	2.3%	0.01%

NOTE: Family Functioning and maternal adjustment did not differ between groups

mTBI = mild traumatic brain Injury ECI = extra cranial injury

Pain Control

- 1972: Routine operative closure of Patent Ductus Arteriosus in premature infants without anaesthetic.
  "Babies do not feel pain, and anyway they will not remember anything"
  "children do not tolerate opiates and strong analgesics"
- 2011: Babies do feel pain!!!!!
  Boys circumcised without analgesia scream longer and louder, and display more signs of distress during routine immunisations.

When last did you audit your practice to evaluate how you really manage pain in children?

Underuse of Analgesia in Very Young Pediatric Patients with Isolated Painful Injuries

Alexander & Manno
Annals of Emerg Med 2003;41(5):617-22

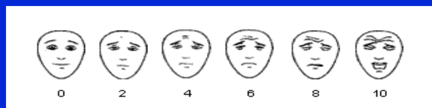
"Children younger than 2 years of age receive disproportionally less analgesia than school age children, despite having obviously painful conditions"

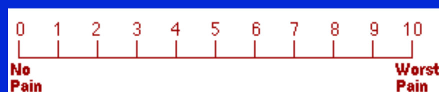
Which children receive adequate pain relief?

Alexander & Manno Annals of Emerg Med 2003

	6 to 12 months	6 to 10 years
all injuries	47.6%	64.6%
all fractures	48.8%	70.6%
displaced fractures	22.0%	55.0%
all burns	25.0%	50.0%

Pain Scales





Pain Scales

Canadian Medical Protection Association (CMPA) Report – 14 year old girl

- girl put arm through glass window
- arm sutured with BP cuff tourniquet and portable lamp illumination
- patient complained of “burning” pain nurse adjusted lamp x 2 (at least)
- doctor and nurse concluded pain due to tourniquet

What would you do if patient continued to complain ?

CMPA Case – 14 year old girl

- 2 days later during routine dressing change
- significant necrosis due to third degree burn
- lamp was defective, no heat shield

Who was found responsible for injury?

The lamp had been defective for “some time”

CMPA Case – 14 year old girl

- family complained to Professional Colleges and launched litigation
- no expert support could be identified
- legal action settled against both physician and nurse
- Colleges critical of both MD & RN “duty of care”

Never ignore patient’s pain/discomfort if you use defective equipment you may be held responsible!

What system do you have in place for routine reporting of unsafe equipment, working conditions and concerns?

Harm to patient

Combination of Events

Harm resulting from underlying condition

- natural progression

Harm resulting from care or services provided to patient

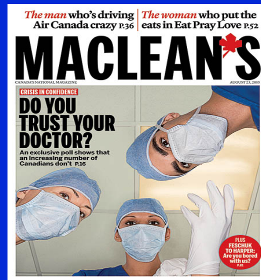
- inherent risks
- system failure(s)
- provider performance
- combinations

Note: informed consent and excellent communication essential to patient satisfaction

MacLean’s – August 23, 2010

CRISIS IN CONFIDENCE

“Do You Trust Your Doctor?”



Staying out of Trouble

- LISTEN when parents express concerns
- more than 1 pathological process may be present simultaneously
- childhood illnesses may progress
- Canada is the world! Remember imported infectious diseases and ethno-cultural aspects of each case
- NEVER punish a child because of parent's attitude or behaviour
- Mother (patient) is always right!

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