



ThinkAskLearn  
Health Professional Education

Sick Kids – Common Paeds  
Presentations

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ThinkAskLearn  
Health Professional Education

KIDS that COOK: Fever in ED

David Corkill  
Emergency Nurse Educator

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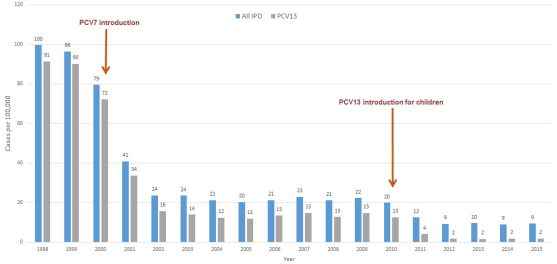
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Trends in invasive pneumococcal disease among children aged <5 years old, 1998–2015




Year	All IPD (per 100,000)	PCV13 (per 100,000)
1998	100	81
1999	99	80
2000	79	72
2001	45	34
2002	24	18
2003	24	14
2004	21	12
2005	20	12
2006	21	13
2007	23	12
2008	21	13
2009	22	15
2010	20	13
2011	12	4
2012	9	2
2013	10	2
2014	9	2
2015	9	2

\*PCV13 serotype: 1, 3, 4, 5, 6A, 6B, 7F, 9V, 14, 18C, 19A, 19F, and 23F

Active Bacterial Core surveillance data, 1998–2015, unpublished

CDC Sept 2017



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## Sepsis in Children

- 70% pneumococcal and 20% Haemophilus influenzae B - pre Hib immunisation
- 90% pneumococcal post Hib immunisation
- Salmonella - 6%
- N.meningitidis - 1%



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## Pneumococcal Vaccine

- Pneumococcal pneumonia begins with a high fever, cough, and stabbing chest pains,
- Pneumococcal vaccine is 60% to 70% effective in preventing bacteraemic pneumococcal infections
- Now on immunisation schedule
- 1980/90's Occult bacteraemia 5% in under 2 yrs
- 21c Rates declined to 0.5-1% for under 2 yrs



Not what is the WCC but has the child been vaccinated?



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## Myths of Fever

- My child feels warm, so she has a fever
- All fevers are bad for children
- Fevers cause brain damage or fevers above 40° C are dangerous
- Anyone can have a febrile seizure
- Febrile seizures are harmful



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### Myths of Fever

- All fevers need to be treated with fever medicine
- Without treatment, fevers will keep going higher
- With treatment, fevers should come down to normal
- If the fever doesn't come down (if you can't "break the fever"), the cause is serious



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### Myths of Fever

- Once the fever comes down with medicines, it should stay down
- If the fever is high, the cause is serious
- The exact number of the temperature is very important



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### Fever



- No 1 presentation to ED
- Major cause of anxiety in parents
- 20-40% of parents report fever every year
- Poor diagnostic sign
- Fever  $>39.4^{\circ}\text{C}$  : increased risk of bacteraemia



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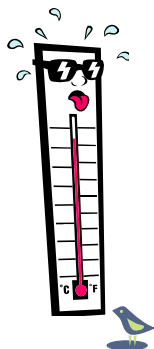
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## Thermometers

- Rectal
- Tympanic
- Axillary
- Oral
- Invasive



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### Accuracy of Infrared Tympanic Thermometry Used in the Diagnosis of Fever in Children A Systematic Review and Meta-Analysis

Chen Zhen, MM1,2  
Zhang Xia, BS2  
Zhou Ya Jun, MD3  
Li Long, MM2  
Shuai Jian, MM4  
Cai Gui Ju, MM5  
Li Long, MD1

CLIN PEDIATR February 2015 vol. 54 no. 2 114-126

- When you study them, tympanic thermometers are accurate!!!
- Authors 'Cautiously recommend'



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Downloaded from <http://emj.bmj.com/> on July 27, 2016 - Published by group.bmj.com  
EMJ Online First, published on June 22, 2016 as 10.1136/emmed-2015-205122

Original article

### Temperature measurement in the adult emergency department: oral, tympanic membrane and temporal artery temperatures versus rectal temperature

Polly E Bijur, Purvi D Shah, David Esses

- Not really accurate compared to rectal
- Only studied on adults in research conditions
- Tympanic temps most accurate
- Consider dropping temp from 38°C to 37.5°C



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## Benefits of Fever

- Increases metabolic rate
- Destroy invading micro-organisms
- Increases removal of micro-organisms



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## Source of Fevers

- Viral
  - Croup
  - Broncholitis/URTI
  - Varicella
  - Gastroenteritis - Rotovirus
- Bacterial
  - Otitis media
  - Cellulitis
  - Septic arthritis



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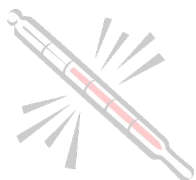
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## Sources of Fever

- Serious
  - UTI's
  - Pneumonia
  - Bacteraemia's
  - Meningitis
- Fever without source



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### Assessment of Child with Fever

- History
  - Immunisations
  - Recent travel
  - Exposure to sick contacts
  - Previous illness/hospitalisation
  - Change in behaviour, eating drinking patterns, sleep pattern
- How was the temperature taken at home?
- When did you last give panadol?



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### Assessment of Child with Fever

- Raised Temperature may not occur in the unwell child
- The Neonate History
  - evidence of poor feeding
  - vomiting
  - poor social interaction
  - changes in the quality of crying
  - possible apneic episodes



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### Recognition of the Unwell Child

- Primary Survey Approach/Focused assessment
- Airway
  - Stridor, Drooling
- Breathing
  - Rate, Recession, grunting, nasal flaring, WOB
- Circulation
  - Pulse, CRT, BP
- Disability
  - AVPU, BSL Lethargy, Tone



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## Urinary Tract Infection

- UTI common source of sepsis
- Potential for Renal disease at later in life
  - Age younger than 12 months
  - Temperature above 39°C
  - Illness for 2 days or more
  - Absence of any other source for fever



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## Urinary Tract Infection

- Ban the BAG
- A negative WTU in Bag – OK
- Mid Stream Sample
- Clean Catch
- In/Out catheter
- Supra Pubic Aspirate for neonates



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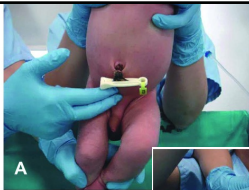


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86% success rate  
Kids less than 30 days

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### Febrile Convulsion

- Anxiety for Parents
- Concerned re leading to choking, brain death, develop a learning disability or seizure disorder
- Usually self limiting
- Often benign caused by viral infection
- 2-4% of all children least one febrile seizure
- 1/3 will have a repeat febrile seizure



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### Febrile Convulsion

- Uncertain etiology
- Related to
  - Rapidity of fever
  - Height of fever
- Young children have a low seizure threshold.
- Peak between 3 months and 5 years
- Mostly generalised seizures but may also be focal
- Sepsis must be excluded

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Conclusion

- Fever poor diagnostic sign
- Paracetamol for pain - not fever
- Temperature measurement devices are important
- Need to exclude sepsis
- Febrile convulsion require supporting parents



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The Kid that gave me the s....!  
Gastroenteritis in the ED

David Corkill  
Emergency Nurse Educator  
MEmergN, MAdvPrac (Hth Prof Edu), BN, Dip App Sc

[www.thinkasklearn.com.au](http://www.thinkasklearn.com.au)



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Simple Gastroenteritis

- Nausea
- Vomiting
- Watery diarrhea
- Abdominal cramping
- Fever
- Headache
- Loss of appetite
- Weight loss
- Dehydration



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<ul style="list-style-type: none"><li>• <b>Gastroenteritis</b> Gastroenteritis is inflammation of the</li><li>• <b>Food poisoning</b> Food poisoning can cause abdominal</li><li>• <b>Medication reaction or side-effect</b> Medication side effects include nausea</li><li>• <b>Acute sinusitis</b> Acute sinusitis, an inflammation of the</li><li>• <b>Drug overdose</b> A drug overdose</li><li>• <b>Aspirin</b> Aspirin</li><li>• <b>Asplenic meningitis (child)</b> Asplenic meningitis, or viral meningitis</li><li>• <b>Scrub</b> Scrub causes a reddened, irritated</li><li>• <b>Murder</b> Murder</li><li>• <b>Sickle cell disease symptoms include</b></li><li>• <b>Tension headache</b> Tension headaches, caused by muscle</li><li>• <b>Traveler's diarrhea</b> Traveler's diarrhea causes watery diarrhea</li><li>• <b>Intestinal bowel syndrome</b> Intestinal bowel syndrome is a common</li><li>• <b>Lactose intolerance</b> Lactose intolerance, or the inability to</li><li>• <b>Coxsackie virus infection</b> Coxsackie virus infection can cause fever</li><li>• <b>Inflammatory bowel disease</b> Inflammatory bowel disease causes</li></ul>	<ul style="list-style-type: none"><li>• <b>Constipation (child)</b> Constipation is having less than</li><li>• <b>Constipation (adult)</b> Constipation is having less than</li><li>• <b>Viral pharyngitis</b> Viral pharyngitis is a sore throat</li><li>• <b>Viral gastroenteritis</b> Gastroenteritis (stomach flu) is</li><li>• <b>Mononucleosis</b> Mononucleosis is a viral infection</li><li>• <b>Crohn's disease</b> Crohn's disease is a digestive</li><li>• <b>Lyme disease</b></li><li>• <b>Heat exhaustion</b> Heat exhaustion causes intense</li><li>• <b>Hepatitis A</b> Hepatitis A is an inflammation of</li><li>• <b>Hepatitis B</b> Hepatitis B is an inflammation of</li><li>• <b>Giardiasis</b> Giardiasis is an infection of the</li><li>• <b>Iron poisoning</b> Iron poisoning causes abdominal</li><li>• <b>Lupus (systemic lupus erythem)</b> Lupus is a chronic autoimmune</li><li>• <b>Carbon monoxide poisoning</b> Carbon monoxide poisoning can</li></ul>	<ul style="list-style-type: none"><li>• <b>Chronic kidney disease</b> Chronic kidney disease is a condition of the kidneys that can cause high blood pressure, fatigue</li><li>• <b>Cryptosporidiosis</b> Cryptosporidiosis is a lung disease causing a wide range of digestive, respiratory and cardiovascular</li><li>• <b>Thalassemia</b> Thalassemia is a rare group of genetic blood disorders affecting red blood cells and leading</li><li>• <b>Botulinum toxin (Botox) injection</b> Botulinum toxin side effects may include pain and tenderness at the injection site, headache,</li><li>• <b>Influenza (flu) child</b> The seasonal flu is a common viral infection that causes fever, body ache, headache, and</li><li>• <b>Influenza (flu) adults</b> The flu is a respiratory tract infection and causes fever, sore throat, runny nose, headache, c</li><li>• <b>Generalized anxiety disorder</b> Generalized anxiety disorder is a condition in which a person has nearly constant anxiety.</li><li>• <b>Bacterial pneumonia</b> Bacterial pneumonia is a lung infection caused by bacteria, and causes a cough, fever, weak</li><li>• <b>Gastritis</b> Gastritis is an inflammation of the stomach lining, causes stomach upset, irritation, and pain.</li><li>• <b>Middle ear infection</b> A middle ear infection puts pressure on the eardrum, causing pain and, sometimes, hearing</li><li>• <b>Migraine headache (adult)</b> Migraines are a common type of headache that can cause severe pain, aura or flashes in vis</li><li>• <b>Diabetes, type 2</b> Diabetes can make you feel hungry, tired, or thirsty; you may urinate more than normal and</li><li>• <b>Roseola</b> Roseola is a very common childhood infection and causes a very high fever followed by a</li></ul>
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Diarrhoea, vomiting, headache symptoms

Over 170 conditions - WEBMD

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Gastroenteritis

- Leading childhood mortality worldwide
- Rotavirus causes half the diarrhoea admissions in Australia
- 20,000 admissions per year of children under 5
- Acute Diarrhoea
- Fever
- Vomiting last 12-24 hours
- Watery diarrhoea last about 5 days



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## Does it work?

### Changes in the epidemiology of gastroenteritis in a paediatric short stay unit following the introduction of rotavirus immunisation

Jonathan D Aikusa,<sup>1,2</sup> Sandy M Hopper,<sup>2,3</sup> Julian J Kelly,<sup>1,3</sup> Carl D Kirkwood<sup>4,5</sup> and Jim P Buttery<sup>1,5,6</sup>  
 Journal of Paediatrics and Child Health 49 [2013] 120-124

- Australian Study – RCH Melbourne 2005-2009
- 58% reduction in AGE admitted to SSU
- ED attendances with AGE – 53 to 34 per 1000
- AGE Admission rate 23% down to 13%
- Known Rotavirus Median age 1.3yr to 3.8yrs
- Resource planning implications



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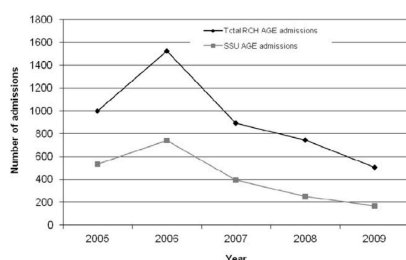


Fig. 1 Number of admissions for acute gastroenteritis (AGE) to the Royal Children's Hospital (RCH) short stay unit (SSU) and to the RCH as a whole between 2005 and 2009.

Journal of Paediatrics and Child Health 49 [2013] 120-124



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## Diarrhoea and Vomiting

- Essentially 2 aspects of assessment
  - Diagnosis
    - Is there a cause other than infective gastroenteritis?
  - Degree of dehydration
    - Does the patient need admission to hospital?
    - Is there any reason why oral rehydration is not appropriate?



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## Diagnosis?

- Viral gastroenteritis
- Invasive bacterial disease
- Food poisoning
- Appendicitis
- Urinary infections
- Intussusception
- Abdo pain is not a feature of uncomplicated gastroenteritis



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## Assessment Criteria

- ABC's
- Duration of illness
- Presence of blood or mucus in the stool
- Intake of fluids
- Activity of the patient
- Number of diarrhoea and vomiting episodes
- Fever
- Moisture of the mucous membranes
- Urine frequency



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**BEWARE THE  
VOMITING CHILD  
WITHOUT MUCH IN  
THE WAY OF  
DIARRHOEA**



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### Causes of Gastro

- Virus
  - rotavirus, enteric adenovirus, astrovirus, calicivirus, norovirus, coronavirus and cytomegalovirus.
- Bacterial
  - Campylobacter jejuni , Staphylococcus aureus , Bacillus cereus , Escherichia coli , Vibrio cholerae , Shigella dysenteriae , Salmonella enteritidis , Yersinia enterocolitica , Clostridium perfringens and C. difficile
- Protozoa
  - Giardia lamblia , Cryptosporidium parvum and Entamoeba histolytica



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### Dehydration Assessment

Weight loss	Up to 5%	6-10%	More than 10%
Appearance	Active, alert	Irritable, alert, thirsty	Lethargic, looks sick
Capillary filling	Normal	Slightly delayed	Delayed
Pulse	Normal	Fast, low volume	Very fast, thready
Respiration	Normal	Fast	Fast and deep
Blood pressure	Normal	Normal or low	Very low
Mucous memb.	Moist	Dry	Parched
Tears	Present	Less than expected	Absent
Eyes	Normal	Normal	Sunken
Skin Turgor	Springs back	Tents briefly	Prolonged tenting
Fontanel (infant sitting)	Normal	Sunken slightly	Sunken significantly
Urine flow	Normal	Reduced	Severely reduced

Based on Duggan et al 1992



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## Meta analysis of data

ARTICLE

### Enteral vs Intravenous Rehydration Therapy for Children With Gastroenteritis

A Meta-analysis of Randomized Controlled Trials

Bob K. Fonseca, FRACP, MMed; Anna Holdgate, FACEM, MMed; Jonathan C. Craig, FRACP, PhD

Arch Pediatr Adolesc Med. 2004;158:483-490

### Oral versus intravenous rehydration for treating dehydration due to gastroenteritis in children (Review)

Hartling L, Balamore S, Wibe N, Russell KF, Klassen TP, Craig WR

The Cochrane Library 2010, Issue 1



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## Cochrane review

- Hartling et al 2010
- 1811 participants over 17 trials
- Failure rate ORT - 4% (1 in 25 kids)
- 6 deaths in IVT, 2 in ORT
- No clinical significant difference in outcomes
  - Wt gain, duration, total fluid intake
- Shorter LOS with ORT
  - -1.2 Days
- Increased risk of paralytic ileus with ORT



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## ORT for Dummies

- Reverse technology transfer
- Kids with mild/no dehydration can be discharged without a trial of fluids
- Aim 10/20ml/kg in first hour
  - 50/100mls in 3-4hrs
- Small aliquots 5ml every 1-2 mins
- Add 10ml/kg for every watery diarrhoea
- 2ml/kg for every vomit



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## Original Investigation

# Effect of Dilute Apple Juice and Preferred Fluids vs Electrolyte Maintenance Solution on Treatment Failure Among Children With Mild Gastroenteritis A Randomized Clinical Trial

Stephen B. Freedman, MDCM, MSc; Andrew R. Willan, PhD; Kathy Boutis, MD; Suzanne Schuh, MD

**JAMA** Published online April 30, 2016

- 647 kids aged 6months-60months with mild /moderate dehydration\*
- Outcomes – IV rehydration, hospitalisation, ED/GP revisit, ongoing weight loss, other secondary outcomes



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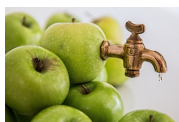
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## Dilute Apple Juice and preferred fluids vs Commercial ORT

- Treatment failure rate  
– ORT 25% vs Apple 16.7%
- Needed IV rehydration  
– ORT 9% vs Apple 2.5%
- No other outcome difference
- Benefit of apple juice/preferred fluids over electrolyte maintenance solution was most notable in children aged 24 months or older



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## Antiemetic Use for Nausea and Vomiting in Adult Emergency Department Patients: Randomized Controlled Trial Comparing Ondansetron, Metoclopramide, and Placebo

Diana Egerton-Warburton, MBBS, FACEM; Robert Meek, MBBS, FACEM\*; Michaela J. Mee, MBBS, FACEM; George Breitberg, MBBS, FACEM

Volume 64, No. 5 : November 2014 Annals of Emergency Medicine

- Undiagnosed nausea and vomiting
- 258 patient randomised into 3 groups
- 87 receiving ondansetron, 88 receiving metoclopramide 83 receiving placebo
- All had NS 4/24 started as well



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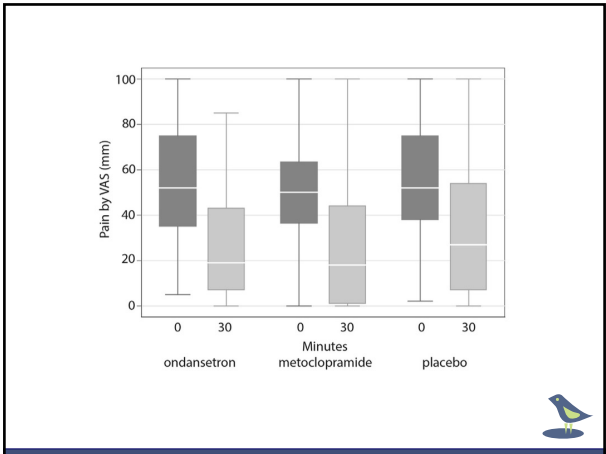
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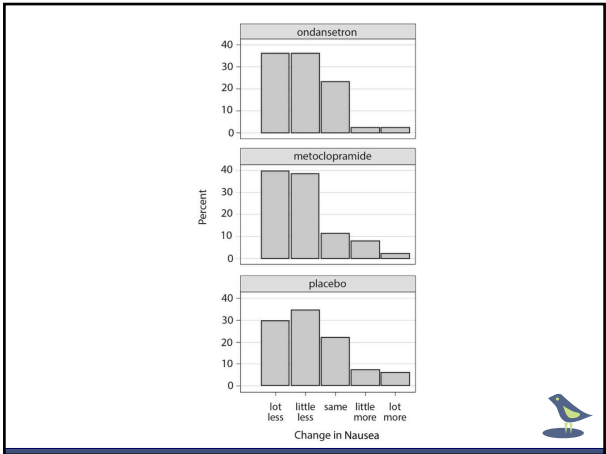
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"In the early ED care of nausea unrelated to chemotherapy or radiotherapy, routine antiemetic therapy may not be warranted."

Egerton-Warburton et al 2014

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## Management of Vomiting

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

### Oral Ondansetron for Gastroenteritis in a Pediatric Emergency Department

Stephen B. Freedman, M.D.C.M., Mark Adler, M.D., Roopa Seshadri, Ph.D.,  
and Elizabeth C. Powell, M.D., M.P.H.



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## Management of Vomiting

THE NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

### Oral Ondansetron for Gastroenteritis in a Pediatric Emergency Department

Stephen B. Freedman, M.D.C.M., Mark Adler, M.D., Roopa Seshadri, Ph.D.,  
and Elizabeth C. Powell, M.D., M.P.H.

- 215 kids 6mth-10 yrs
- Randomised to Ondansetron or placebo for mild to moderate gastroenteritis
- All had vomited within 4 hrs prior to enrolment
- 2mg – 8-15kg; 4mg 16-30kg, 8mg for over 30kg
- Oral rehydration as per department protocol 30ml every 5 minutes
- Vomiting - 14% vs 35%, Need IVT – 14% vs 31%
- Increased rates of diarrhoea in Ondansetron group



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## In Conclusion

- Decision – Is it gastro?
- Red flags
- Assess dehydration
- Use Oral Rehydration Therapy
- Antiemetic use is worth considering?



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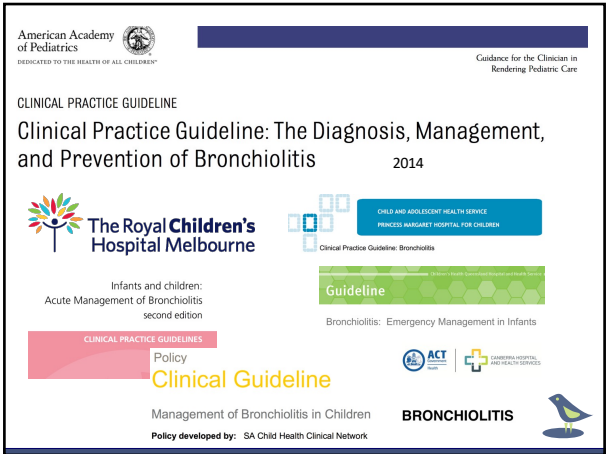
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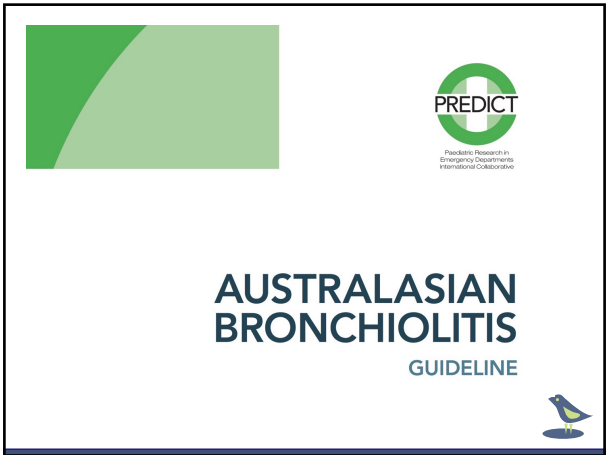
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# AUSTRALASIAN BRONCHIOLITIS

BEDSIDE CLINICAL GUIDELINE



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INITIAL ASSESSMENT			
This table is meant to provide guidance in order to stratify severity. The more symptoms the infant has in the mod-severe categories, the more likely they are to develop severe disease.			
	MILD	MODERATE	SEVERE
Behaviour	Normal	Some/intermittent irritability	Increasing irritability and/or lethargy Fatigue
Respiratory rate	Normal – mild tachypnoea	Increased respiratory rate	Marked increase or decrease in respiratory rate
Use of accessory muscles	Nil to mild chest wall retraction	Moderate chest wall retractions Tracheal tug Nasal flaring	Marked chest wall retractions Marked tracheal tug Marked nasal flaring
Oxygen saturation/ oxygen requirement	O <sub>2</sub> saturations greater than 92% (in room air)	O <sub>2</sub> saturations 90–92% (in room air)	O <sub>2</sub> saturations less than 90% (in room air) Hypoxemia, may not be corrected by O <sub>2</sub>
Apnoeic episodes	None	May have brief apnoea	May have increasingly frequent or prolonged apnoea
Feeding	Normal	May have difficulty with feeding or reduced feeding	Reluctant or unable to feed

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## Do not test the child!

- Chest X-ray (CXR)
- Blood tests (including full blood count (FBC), blood cultures)
- Virological testing (nasopharyngeal swab or aspirate)
- Urine microscopy and culture



Predict 2016



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## Do not treat patient

- No medication including:
  - Salbutamol – even in wheezing family
    - No longer trial of Ventolin
- Steroids
- Adrenaline – except in Peri-Arrest
- Hypertonic Saline Nebs
- Antibiotics
- Antivirals
- No Chest Physio
- No nasal suctioning



Predict 2016



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## Supportive Treatment

- Oxygen
  - Only if they need it
  - **Persistently** less than 92% room air
  - ‘brief desaturations are not a reason to commence oxygen therapy’
  - Try normal NP first

Predict 2016



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## High Flow Nasal Cannula



- “HFNC can be considered in the presence of hypoxia (oxygen saturation less than 92%) **and** moderate to severe recessions
- Its use in infants without hypoxia should be limited to the randomised controlled trial (RCT) setting only “

Predict 2016



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Supportive Treatment

- Monitoring
  - Use CEWT tools
- “Continuous oximetry should not be routinely used to dictate medical management unless disease is severe”



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Supportive Hydration

Unknown volume- 60 -100% maintenance volume, watch for overload



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