“ALPHABET SOUP”
R U A TREKKY?

BY
BRIAN RAMRATTAN
TREKK (TRANSLATING EMERGENCY KNOWLEDGE FOR KIDS)
OVERVIEW OF THE MANAGEMENT OF COMMON PEDIATRIC PROBLEMS

1. BRONCHIOLITIS
2. CROUP
3. GASTROENTERITIS
Bronchiolitis is a viral lower respiratory tract infection characterized by obstruction of small airways caused by acute inflammation, edema and necrosis of the epithelial cells lining the small airways as well as increased mucus production.

- Respiratory syncytial virus (RSV) is responsible for most cases.
- Primary infection does not confer protective immunity and reinfections continue to occur into adulthood.
- In Canada, RSV season usually begins between November and January, and persists for four to five months.
• Bronchiolitis affects more than one-third of children in the first two years of life and is the most common cause for admission to hospital in their first year.

• Over the past 30 years, hospitalization rates have increased from 1% to 3% of all infants.

• Rising admissions have been costly for the health care system, and reflect significant morbidity and impact on families.
DIAGNOSIS:

• Bronchiolitis is a clinical diagnosis based on a directed history and physical examination

• Bronchiolitis may present with a wide range of symptoms and severity, from a mild upper respiratory tract infection (URTI) to impending respiratory failure

• Bronchiolitis typically presents with a first episode of wheezing before the age of 12 months

• The course begins with a two-to-three-day viral prodrome of fever, cough and rhinorrhea progressing to tachypnea, wheeze, crackles and a variable degree of respiratory distress

• Signs of respiratory distress may include grunting, nasal flaring, in drawing, retractions or abdominal breathing
History, symptoms and signs of viral bronchiolitis

Preceding viral upper respiratory tract infection, cough and/or rhinorrhea

Exposure to an individual with viral upper respiratory tract infection

Signs of respiratory illness may also include:

• Tachypnea
• Intercostal and/or subcostal retractions
• Accessory muscle use
• Nasal flaring
• Grunting
• Colour change or apnea
• Wheezing or crackles
• Lower $O_2$ saturations
**Differential diagnosis for wheezing in young children**

- Viral bronchiolitis
- Asthma
- Other pulmonary infections (eg, pneumonia)
- Laryngotracheomalacia
- Foreign body aspiration
- Gastroesophageal reflux
- Congestive heart failure
- Vascular ring
- Allergic reaction
- Cystic fibrosis
- Mediastinal mass
- Tracheoesophageal fistula
• Physical examination findings of importance include increased respiratory rate, signs of respiratory distress, and crackles and wheezing on auscultation

• Measurement of oxygen saturation often shows decreased saturation levels

• Signs of dehydration may be present if respiratory distress has been sufficient to interfere with feeding
INVESTIGATIONS:

• Diagnostic studies are not indicated for most children with bronchiolitis

• Tests are often unhelpful and can lead to unnecessary admissions, further testing and ineffective therapies

• Evidence-based reviews have not supported the use of diagnostic testing in typical cases of bronchiolitis.

• **Chest Radiograph (CXR)** of infants with bronchiolitis often reveals nonspecific, patchy hyperinflation and areas of atelectasis, which may be misinterpreted as consolidation

• This can lead to increased and inappropriate use of antibiotics

• A recent prospective study found CXR findings inconsistent with bronchiolitis in only two of 265 infants, and in no case did the results change acute management
• While routine CXR is not supported by current evidence, it should be considered when the diagnosis of bronchiolitis is unclear, the rate of improvement is not as expected or the severity of disease raises other diagnostic possibilities such as bacterial pneumonia.

• **Nasopharyngeal swabs for respiratory viruses** generally are not helpful from a diagnostic perspective and do not alter management in most cases.

• They are not routinely recommended unless required for infection control (ie, the cohorting of hospitalized patients).

• **Complete Blood Count** has not been found to be useful in predicting serious bacterial infections (SBI).
• **Bacterial Cultures:** the incidence of concomitant SBI is believed to be very low, but not insignificant, in febrile infants with bronchiolitis

• Infants in their first two months of life have the greatest risk of SBI, especially urinary tract infection

• Rates vary from 0% to 6.1%

• Bacteremia is rare (<1%) in most studies

• Meningitis complicating bronchiolitis is also extremely rare

• A study in the office setting of febrile infants with bronchiolitis found no cases of SBI out of 125 patients with bronchiolitis, compared with 212 of 1933 (11%) in a febrile group of similar age without bronchiolitis.
### Role of diagnostic studies in typical cases of bronchiolitis

<table>
<thead>
<tr>
<th>Type</th>
<th>Specific indications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chest radiograph</td>
<td>Only if severity or course suggests alternate diagnosis</td>
</tr>
<tr>
<td>Nasopharyngeal swabs</td>
<td>Only if required for cohorting admitted patients</td>
</tr>
<tr>
<td>Complete blood count</td>
<td>Generally not helpful in diagnosis or monitoring of routine cases</td>
</tr>
<tr>
<td>Blood gas</td>
<td>Only if concerned about potential respiratory failure</td>
</tr>
<tr>
<td>Bacterial cultures</td>
<td>Not recommended routinely; may be required based on clinical findings and a child’s age</td>
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Groups at higher risk for severe disease

Infants born prematurely (<35 weeks’ gestation)

<3 months of age at presentation

Hemodynamically significant cardiopulmonary disease

Immunodeficiency
**MANAGEMENT:**

- Bronchiolitis is a self-limiting disease
- Most children have mild disease and can be managed with supportive care at home
- For those requiring admission, supportive care with assisted feeding, minimal handling, gentle nasal suctioning and oxygen therapy still forms the mainstay of treatment
EVIDENCE SUMMARY:

The purpose of this is to describe the effectiveness of five treatment options, based on a 2011 Overview of Reviews. Some children with serious illness may be admitted to the hospital. However, this summary describes treatment outcomes in outpatients. These are children who are cared for at a clinic or at the emergency department, but who are not admitted to the hospital.

The treatments were compared using four outcomes to examine which treatment was the most effective overall. These areas were:

» Did treatment reduce hospitalization rates?
» Did treatment reduce the length of stay in the emergency department (ED)?
» Did treatment reduce the clinical severity of the infection?
» Is the treatment associated with any adverse effects
TREATMENT SCENARIO 1

Glucocorticoids vs Placebo

HOSPITALIZATION RATE
There was no difference in hospitalization rates on day 1 or within 7 days for children given glucocorticoids compared with those given placebo.

LENGTH OF STAY (IN THE ED)
There was no difference in the length of stay in the ED for children given glucocorticoids compared to those given placebo.

CLINICAL SEVERITY SCORES
There was no difference in clinical severity scores at 60 minutes or 120 minutes for children given glucocorticoids compared with those given placebo.

ADVERSE EFFECTS
There were no adverse effects (vomiting, hypertension, bleeding, pallor or flushing, and tremor) for glucocorticoids compared with placebo.
TREATMENT SCENARIO 2

Epinephrine vs Placebo

HOSPITALIZATION RATE
Epinephrine provided a decrease in hospitalization on day 1. However, there was no difference in hospitalization within 7 days compared to the placebo.

LENGTH OF STAY (IN THE ED)
There were no data comparing epinephrine with placebo.

CLINICAL SEVERITY SCORES
There was a decrease in score at 60 minutes and at 120 minutes for epinephrine compared with placebo.

ADVERSE EFFECTS
There were no data comparing epinephrine with placebo. There is no evidence of increased return to the ED in patients who received epinephrine compared to placebo.
TREATMENT SCENARIO 3

All bronchodilators vs Placebo

The evidence available shows that when all bronchodilators are combined (ie. pure beta-agonists or medications with alpha and beta-agonist effects such as epinephrine or salbutamol etc.), they are not effective in children with bronchiolitis.
TREATMENT SCENARIO 4

Glucocorticoids + Epinephrine vs Placebo

HOSPITALIZATION RATE
There was a significant decrease in hospitalization rates up to 7 days for children treated with glucocorticoids and epinephrine combined compared with placebo.

LENGTH OF STAY (IN THE ED)
There were no data comparing glucocorticoids and epinephrine with placebo.

CLINICAL SEVERITY SCORES
There was a decrease in score at 60 minutes for glucocorticoids and epinephrine combined. No data were available for clinical scores at 120 minutes.

ADVERSE EFFECTS
There were no differences in adverse effects (vomiting, bleeding, pallor or flushing, and tremor) for glucocorticoids and epinephrine compared with placebo.
Hypertonic Saline vs Placebo

There were not enough data to determine if hypertonic saline is effective
THE FINDINGS

TREATMENT SCENARIO 1

There is little compelling evidence or data to recommend glucocorticoids as a treatment for bronchiolitis, unless paired with epinephrine which shows a reduction in hospitalization within 7 days.

TREATMENT SCENARIO 2

There is evidence that treatment with epinephrine can reduce the need for hospitalization. Observation is needed after giving epinephrine to continue to monitor the child's symptoms for 2-3 hours.

TREATMENT SCENARIO 3

There was no compelling evidence to recommend bronchodilators (other than epinephrine) as a treatment for bronchiolitis.
TREATMENT SCENARIO 4

There is some evidence that combining epinephrine with glucocorticoids may improve the longer-term outcome of admission to hospital within 7 days.

TREATMENT SCENARIO 5

There was no compelling evidence or data to recommend hypertonic saline as a treatment for bronchiolitis.
<table>
<thead>
<tr>
<th>Treating bronchiolitis</th>
<th>Recommended</th>
<th>Evidence equivocal</th>
<th>Not recommended</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Oxygen</strong></td>
<td>Epinephrine nebulization</td>
<td>Salbutamol</td>
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<td></td>
<td>Nasal suctioning</td>
<td>Corticosteroids</td>
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<tr>
<td><strong>Hydration</strong></td>
<td>3% hypertonic saline nebulization</td>
<td>Antibiotics</td>
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<td></td>
<td>Combined epinephrine and dexamethasone</td>
<td>Antivirals</td>
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<td></td>
<td></td>
<td>Cool mist therapies or therapy with saline aerosol</td>
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**DECISION TO ADMIT:**

- The decision to admit should be based on clinical judgment and consider the infant’s respiratory status, ability to maintain adequate hydration, risk for progression to severe disease and the family’s ability to cope.
- Physicians should keep in mind that the disease tends to worsen over the first 72 h when deciding whether to hospitalize.
- Severity scoring systems exist; however, none are widely used and few have demonstrated predictive validity.
- Respiratory rate, subcostal retractions and oxygen need may be the most helpful parameters used in the various bronchiolitis severity scores.
Guidelines for admission may include

- Signs of severe respiratory distress (eg, indrawing, grunting, RR >70/min)
- Supplemental O₂ required to keep saturations >90%
- Dehydration or history of poor fluid intake
- Cyanosis or history of apnea
- Infant at high risk for severe disease
- Family unable to cope
Discharge from hospital

Tachypnea and work of breathing improved

Maintain $O_2$ saturations $>90\%$ without supplemental oxygen OR stable for home oxygen therapy

Adequate oral feeding

Education provided and appropriate follow-up arranged
References:

CROUP

• Croup (laryngotracheobronchitis) is a very common cause of upper airway obstruction in children and has an annual incidence in Alberta of 6% in children under the age of 6 years.

• Viral invasion of the laryngeal mucosa leads to inflammation, hyperemia, edema, epithelial necrosis, and shedding of this region.

• Croup is usually caused by the virus parainfluenza and is most prevalent in the late fall to early winter months.

• Influenza A and B, adenovirus, respiratory syncytial virus (RSV), echovirus, and mycoplasma have also been isolated.
• Croup occurs most commonly in children between 6 months and 3 years of age, but can also occur in children as young as 3 months and as old as 15 years.

• It has been reported rarely in adults.

• Boys are affected more often than girls.

• In Alberta, more than 60% of children diagnosed to have croup have mild symptoms, about 4 percent are hospitalised, and approximately one in 4,500 children are intubated (approximately one in 170 hospitalized children).
DIAGNOSIS

• Croup symptoms may occur either with or without antecedent upper respiratory symptoms of cough, rhinorrhea, and fever.

• Croup symptoms most commonly occur in the late evening and at night and have an abrupt onset. They include:
  • Seal-like barky cough
  • Inspiratory stridor
  • Hoarseness
  • No to moderately high fever
• Croup symptoms frequently improve en route to medical care, and fluctuate significantly depending on whether the child is calm or agitated.

• Croup symptoms usually improve during the day, and often recur again the following night.

• The majority of children resolve their croup symptoms within 48 hours, but a small proportion of children have symptoms that persist for up to one week.

• Following the resolution of croup symptoms, children usually have typical ‘URT I’- like symptoms and occasionally a secondary bacterial-induced otitis media.
• KEY FEATURES TO FOCUS ON INCLUDE:
  • ♦ AUDIBLE SEAL-LIKE BARKY COUGH
  • ♦ VOICE IS OFTEN HOARSE
  • ♦ VARYING DEGREES OF STRIDOR, PREDOMINANTLY INSPIRATORY
  • ♦ VARYING DEGREES OF RETRACTIONS OF THE CHEST WALL
  • ♦ OFTEN AGITATED
  • ♦ ABSENCE OF DROOLING
  • ♦ APPEARS NON-TOXIC
• OTHER ASSOCIATED FEATURES THAT CAN BE FOUND ON PHYSICAL EXAMINATION INCLUDE:
  • ♦ FEBRILE (UP TO 40° C)
  • ♦ TACHYCARDIA (WITH MORE SEVERE OBSTRUCTIVE SYMPTOMS)
  • ♦ MODERATE TACHYPNEA (USUALLY LESS THAN 50 BREATHS PER MINUTE)
  • ♦ IF THE SUPRAGLOTTIC REGION IS VISUALIZED, IT APPEARS NORMAL
  • NOTE THIS SHOULD NOT BE ROUTINELY ATTEMPTED IN ANY CHILD WITH RESPIRATORY DISTRESS
• The vast majority of children who present with acute onset of upper airway obstruction characterized by stridor and indrawing have croup

• The most common alternative diagnosis is bacterial tracheitis

• Bacterial tracheitis is thought to be a super-infection of croup, and can be most readily distinguished from croup by the presence of high fever, toxic appearance, and poor response to epinephrine

• Management of bacterial tracheitis includes intravenous antibiotics and these patients frequently require intubation and respiratory support.
• The second most likely alternative diagnosis is epiglottitis.

• This disease, primarily caused by haemophilus influenzae, was once relatively common in children; however, with the advent of the HIB vaccine, is now relatively rare

• A young child with epiglottitis most commonly presents with sudden onset of high fever, dysphagia, drooling, toxic appearance, and is anxious and sitting forward in a “sniffing position”

• There is an absence of a barky cough

• The most crucial aspect of management is to secure the airway, and should only be attempted by physicians extremely experienced in airway management
• **THE MODIFIED WESTLEY CLINICAL SCORING SYSTEM FOR CROUP**

• **INSPIRATORY STRIDOR:**
  - NOT PRESENT - 0 POINTS.
  - WHEN AGITATED/ACTIVE - 1 POINT.
  - AT REST - 2 POINTS.

• **INTERCOSTAL RECESSION:**
  - MILD - 1 POINT.
  - MODERATE - 2 POINTS.
  - SEVERE - 3 POINTS.

• **AIR ENTRY:**
  - NORMAL - 0 POINTS.
  - MILDLY DECREASED - 1 POINT.
  - SEVERELY DECREASED - 2 POINTS.

• **CYANOSIS:**
  - NONE - 0 POINTS.
  - WITH AGITATION/ACTIVITY - 4 POINTS.
  - AT REST - 5 POINTS.

• **LEVEL OF CONSCIOUSNESS:**
  - NORMAL - 0 POINTS.
  - ALTERED - 5 POINTS.

• **POSSIBLE SCORE 0-17: <4 = MILD CROUP, 4-6 = MODERATE CROUP, >6 = SEVERE CROUP**
INVESTIGATIONS

• Laboratory and radiological assessments are not necessary to make the diagnosis of croup.

• The diagnosis can be reliably made based on the clinical presentation in combination with a careful history and physical examination.

• If laboratory tests are obtained they should be well justified and should be deferred while the patient is in respiratory distress.

• Imaging studies are not required in patients with a typical history that respond appropriately to treatment however, lateral and anteroposterior (AP) soft tissue neck film may be helpful in clarifying the diagnosis in children with croup-like symptoms.
• A ragged edge or a membrane spanning the trachea suggests **Bacterial Tracheitis**
• Thickening of epiglottis and aryepiglottic folds suggests **Epiglottitis**
• Bulging posterior pharynx soft tissues suggests Retropharyngeal Abscess
THE TREATMENTS WERE COMPARED USING FOUR OUTCOMES TO EXAMINE WHICH TREATMENT WAS THE MOST EFFECTIVE. THE OUTCOMES WERE:

• Did treatment reduce respiratory distress?
• Did treatment reduce hospital admissions or re-admissions?
• Did treatment reduce the risk of needing intubation?
• Is the treatment associated with any adverse effects?
TREATMENT SCENARIO 1

GLUCOCORTICOIDS VS PLACEBO

RESPIRATORY DISTRESS (CROUP SCORE) Glucocorticoids provided an improvement in croup scores at 6 hours and 12 hours after first dosage. At 24 hours, there was no difference in the croup score compared to the placebo.

HOSPITAL ADMISSIONS / RE-ADMISSIONS Glucocorticoids reduced the need for hospital admission and length of stay. They reduced the number of patients who needed to return for medical care.

NEED FOR INTUBATION There was no difference in need for intubation between patients treated with glucocorticoids or placebo.

ADVERSE EFFECTS There were no data collected in the studies on adverse effects due to glucocorticoid administration.
TREATMENT SCENARIO 2

Epinephrine vs Placebo

RESPIRATORY DISTRESS (CROUP SCORE) Epinephrine provided an improvement in croup scores at 30 minutes after first dosage. At 2 hours and 6 hours, there was no difference in croup score compared to placebo.

HOSPITAL ADMISSIONS / RE-ADMISSIONS There was no difference in the number of patients who needed to return for medical care compared to placebo.

NEED FOR INTUBATION There was no difference in the number of patients needing intubation.

ADVERSE EFFECTS There were no adverse effects due to epinephrine reported in the studies.
TREATMENT SCENARIO 3

Heliox vs Placebo

There was not enough data to determine if heliox is effective

TREATMENT SCENARIO 4

Humidified Air vs Placebo

The evidence available shows that humidified air is not effective in children with croup
THE FINDINGS

TREATMENT SCENARIO 1 Glucocorticoids were effective at reducing the length of stay for patients who had to be hospitalized.

TREATMENT SCENARIO 2 Epinephrine was determined to be the best treatment for fast and short term relief. However, due to variations and difficulties of administering its different forms to children, and its risk of side effects, epinephrine is not the most effective treatment for croup.

TREATMENT SCENARIO 3 Studies on heliox have come up short on determining whether it could be an effective treatment for croup. More studies are needed to determine its true effectiveness as a treatment.

TREATMENT SCENARIO 4 The available evidence does not support humidified air for the treatment of croup.
SUMMARY of Treatment

Treatment with glucocorticoids is the most effective overall. Compared to placebo, they were the treatment that resulted in the best croup score between 6 hours and 12 hours. They also resulted in fewer return visits for medical care and shorter length of stay in the emergency department.

Epinephrine is effective to quickly reduce respiratory symptoms
INDICATIONS FOR ADMISSION

• Though the vast majority of children can be managed as outpatients, relatively little evidence has been published that addresses exactly which children should be admitted.

• ABSOLUTE

• Significant respiratory compromise persisting four or more hours after treatment with corticosteroids (IF POSSIBLE PHYSICIANS SHOULD WAIT AT LEAST 4 HOURS AFTER TREATMENT WITH DEXAMETHASONE BEFORE DECIDING TO ADMIT A CHILD TO HOSPITAL)

• Sternal wall indrawing

• Easily audible stridor at rest
• **RELATIVE**

  • Patient living a long distance from hospital or having inadequate transportation
  
  • Inadequate observation or follow-up is likely
  
  • Significant parental anxiety exists
  
  • Recurrent ED visits within 24 hours
DISCHARGE FROM ED

- The presence of mild symptoms either on initial evaluation or after a period of observation.
- Children should not be discharged earlier than two hours after administration of epinephrine.
- Parents (caretakers) should be able to return for care if respiratory distress recurs at home*
REFERENCES

GASTROENTERITIS

- GASTROENTERITIS is a common disease, usually of viral origin that inflames both the stomach and small intestine. It is characterized by fever, diarrhea, and vomiting.

- Dehydration assessment is the cornerstone of management and is measured through estimating the degree of dehydration.
• **NO DEHYDRATION** » First signs of dehydration might not be evident until 3% dehydration. Usually no signs of dehydration are present and urine output, while dark, is only slightly reduced.

• **SOME (MILD - MODERATE) DEHYDRATION** » **MORE NUMEROUS CLINICAL SIGNS ARE EVIDENT AT 5% DEHYDRATION.** These may include less frequent urination, mild tachycardia and tachypnea, sunken eyes, dry oral mucosa and decreased activity.

• **SEVERE DEHYDRATION** » **SIGNS NOT EVIDENT UNTIL FLUID LOSS REACHES 9%.** These include lethargy, significantly reduced urine output, sunken eyes, tachypnea, tachycardia and dry oral mucosa. The above are more significant than is seen in children with “some” dehydration.
THE TREATMENTS WERE COMPARED USING FOUR OUTCOMES TO EXAMINE WHICH TREATMENT WAS THE MOST EFFECTIVE OVERALL. THESE AREAS WERE:

- Did treatment reduce rate of hospital admission or re-admission?
- Did treatment reduce the length of hospital stay?
- Was intravenous therapy needed due to failure of other treatment?
- Is the treatment associated with any side effects
TREATMENT SCENARIO 1

**ORAL REHYDRATION THERAPY (ORT) VS INTRAVENOUS THERAPY (IV)**

**HOSPITAL ADMISSIONS / RE-ADMISSIONS**

- There was no data available indicating whether there was a difference in hospital admissions or re-admissions between patients treated with ORT or iv therapy.

**LENGTH OF STAY**

- Patients receiving ORT had a similar length of hospital stay compared to those treated with iv therapy.

**NEED FOR INTRAVENOUS THERAPY**

- There was no important difference in the number of children who failed treatment with ORT compared to iv therapy.

**ADVERSE EFFECTS**

- There were fewer cases of phlebitis with ORT. There were more cases of paralytic ileus with ORT.
TREATMENT SCENARIO 2

ANTI-VOMITING DRUGS VS PLACEBO

HOSPITAL ADMISSIONS / RE-ADMISSIONS

• Anti-vomiting drugs lowered the rate of admission to the hospital. There was no difference in the need for re-admission 72 hours after discharge, compared with placebo.

LENGTH OF STAY

• There was no data available on the length of hospital stay between patients treated with anti-vomiting drugs or placebo.

NEED FOR INTRAVENOUS THERAPY

• Anti-vomiting drugs lowered the need for iv therapy (even up to 72 hours after discharge) compared with placebo.

ADVERSE EFFECTS

• There was some evidence that anti-vomiting drugs cause an increase in diarrhea.
TREATMENT SCENARIO 3

PROBIOTICS VS PLACEBO

HOSPITAL ADMISSIONS / RE-ADMISSIONS

• There was no data available indicating whether there was a difference in hospital admissions or re-admissions between patients treated with probiotics or placebo.

LENGTH OF STAY

• Patients receiving a probiotic had a reduced hospital stay of 24 hours compared to those treated with placebo.

NEED FOR INTRAVENOUS THERAPY

• There was no data available indicating whether there was a difference in need for iv therapy between patients treated with probiotics or placebo.

ADVERSE EFFECTS

• There were no adverse effects reported due to probiotics.
THE FINDINGS

TREATMENT SCENARIO 1

• ORAL REHYDRATION THERAPY IS RECOMMENDED AS THE FIRST CHOICE FOR PREVENTING THE DEVELOPMENT OF DEHYDRATION AND FOR THE TREATMENT OF CHILDREN WITH MILD OR MODERATE DEHYDRATION ASSOCIATED WITH ACUTE GASTROENTERITIS. The length of stay in hospital is similar to iv therapy but it is less invasive and avoids the possible complications associated with receiving intravenous therapy.

TREATMENT SCENARIO 2

• Most children with acute gastroenteritis do not need intravenous rehydration. ANTI-VOMITING DRUGS SHOULD BE CONSIDERED THE FIRST LINE ADJUNCT TO PROMOTE THE SUCCESS OF ORT, especially in children with significant vomiting. Anti-vomiting drugs reduce the need for iv rehydration and the need for hospitalization. Drug of choice is ondansetron. The use of dimenhydrinate should be discouraged.

TREATMENT SCENARIO 3

• Probiotics appear to reduce the length of stay in children who are hospitalized with gastroenteritis. However, THERE IS NOT ENOUGH INFORMATION ON THE TYPE OF PROBIOTICS THAT WORK BEST, as well as how much and for how long the probiotics should be given to support routine use in outpatients.
SUMMARY

• ORAL REHYDRATION SHOULD BE THE FIRST CHOICE TO REHYDRATE CHILDREN WITH MILD TO MODERATE DEHYDRATION.

• IN MOST CASES INTRAVENOUS REHYDRATION IS NOT NECESSARY AND ANTI-VOMITING DRUGS CAN BE USED TO REDUCE ITS USE. Drug of choice is ondansetron. The use of dimenhydrinate should be discouraged.

• NOT ENOUGH IS KNOWN ABOUT PROBIOTICS TO MAKE FIRM RECOMMENDATIONS IN OUTPATIENTS.
TREATMENT DEPENDS ON HYDRATION STATUS:

NO DEHYDRATION – CAN BE MANAGED AT HOME

• » PROVIDE ADEQUATE FLUIDS & CONTINUE AGE-APPROPRIATE DIET

• » USE OF ORAL REHYDRATION SOLUTIONS (ORS) SUCH AS PEDIALYTE® OR PEDIATRIC ELECTROLYTE® SHOULD BE ENCOURAGED TO REPLACE LOSSES
SOME DEHYDRATION

• » FLUID DEFICIT SHOULD RAPIDLY BE REPLACED

• » 50 – 100 ML OF ORS/KG BODY WEIGHT WITHIN 2 - 4 HOURS OF PRESENTATION

• » ADDITIONAL ORS ADMINISTERED TO REPLACE ONGOING LOSSES

• » SMALL AMOUNTS FREQUENTLY IF THE CHILD IS VOMITING

• » AIM TO ADMINISTER CHILD’S WEIGHT (IN KG) EVERY 5 MINUTES (E.G. 20 ML/5 MIN FOR 20 KG CHILD)

• » INTRAVENOUS HYDRATION IS RARELY NEEDED
SEVERE DEHYDRATION

• Requires immediate intravenous (or intraosseous) rehydration with isotonic (0.9% normal saline or lactated Ringers) solutions administered as rapidly as possible to restore hemodynamic stability (often requires 60 or more ml/kg over the initial hour).
ONDANSETRON

• Selective serotonin receptor antagonist
• Single oral dose administration is extremely safe and cost-effective
• Suggested dosing regimen:
  • 8 - 15 KG: 2 MG
  • 15 - 30 KG: 4 MG
  • >30 KG: 8 MG
• Enhances the success of oral rehydration in children with "some" dehydration
• No evidence to support use of multiple doses (e.g. following discharge)
• Clinical trial evidence does not support the use of dimenhydrinate
IF DEHYDRATION IS DEEMED SUFFICIENT TO REQUIRE REHYDRATION AND FAIL ORAL REHYDRATION AND IV ACCESS UNOBTAINABLE OR DEEMED TOO DIFFICULT

• Administer nasogastric rehydration with oral rehydration solution 50 ML/KG OVER 3 HOURS
CRITERIA FOR HOSPITAL ADMISSION

• Caregivers cannot provide adequate care at home
• “Some” dehydration and intractable vomiting, ORS refusal, or inadequate ORS intake
• Concern exists for other possible illnesses complicating the clinical course
• Worsening diarrhea or dehydration despite adequate volumes of fluids
• Severe dehydration
• Social or logistical concerns exist that might prevent return to emergency department if needed
• Young age, unusual irritability or drowsiness, progressive symptoms
Step 1 - Should the child be placed into the Pathway?

**Inclusion:**
- Children < 3 months and < 10 years with vomiting and/or diarrhea with or without accompanying nausea, fever or abdominal pain.

**Exclusion:**
- Chronic medical conditions such as diabetes, PKU, immunodeficiency or those affecting major organ systems.
- Signs suggesting GI obstruction such as abdominal distention, tachypnea or absent bowel sounds.
- Abnormal blood or stool results.

Step 2 - Assessment at Triage

**Consider need for intubation:**
- Capillary refill < 2 seconds.
- Absent breath sounds.
- Poor general appearance.

**Glasgow Score:** (3 points for each sign listed below):
- Coma (1 point).
- Altered level of consciousness (2 points).
- Unresponsive (3 points).

**Access for shock:**
- Vital signs - RT, HR, BP, CRF, LOC.
- Look for signs taken for age.

Step 3 - Staff Nurse Assessment

**Weigh child**
Nursing Directive for Ondansetron Use

1. Does the patient meet inclusion/exclusion criteria for prophylaxis?
   - YES → Needs Oral Rehydration (5-10%)
   - NO → Do not give Ondansetron

2. Signs and symptoms on a 0-10 scale:
   - YES → Start Oral Rehydration
   - NO → Start Oral Rehydration 15 minutes after Ondansetron given

3. Glu Ondansetron
   - YES → Start/Restart Oral Rehydration 15 minutes after Ondansetron given
   - NO → Do not give Ondansetron

* If patient vomiting within 15 minutes, repeat dose

Ondansetron Dosing

- Oral Solution:
  - 0.2 mg/kg if child < 4 kg
  - 4 mg if child > 4 kg
  - 8 mg if child > 15 kg
  - 16 mg if child > 30 kg

* A single dose is sufficient. Repeat dosing may increase risk of side effects.
Abbreviations

BD = Blood Drawing
BP = Blood Pressure
BMI = Body Mass Index
CPT = Capillary Perfusion Time
DNTS = Drug Name, Time, and Dosage
ED = Emergency Department
ECG = Electrocardiogram
ECG = Electrocardiogram
EGD = Gastrointestinal Bleeding
FLU = Fluoride
GCS = Glasgow Coma Score
Hb = Hemoglobin
HR = Heart Rate
IOL = Insertion Rate
LDR = Level of Consciousness
NUR = Nursing Notes
NRT = Nasogastric Tube
NS = Normal Saline
NSH = Oral Rehydration Solution
PPL = Phenytoin
PNU = Prognosis
RT = Room Temperature
T = Temperature

Vital Signs Tables

<table>
<thead>
<tr>
<th>Definition of Repetitivity to</th>
<th>Normal Heart Rate</th>
<th>Normal Mean</th>
<th>Normal Systolic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>Lower Limit</td>
<td>Upper Limit</td>
<td>Lower Limit</td>
</tr>
<tr>
<td>Infant (0-12 mos)</td>
<td>&lt; 75</td>
<td>120</td>
<td>70</td>
</tr>
<tr>
<td>Children (1-10 yrs)</td>
<td>75 + (age in yrs)</td>
<td>110</td>
<td>60</td>
</tr>
<tr>
<td>Children (11-15 yrs)</td>
<td>&gt; 15</td>
<td>120</td>
<td>70</td>
</tr>
</tbody>
</table>

Premature Cephalic Index = 2 sec with

Dichotic: L/D = GCS x 1

Major Teaching Points

- Provide all patients with video teaching & standard teaching pamphlets
- Emphasize:
  - Use regular and preferred diet
  - May use a range of fluids (see pamphlet for list); do not use Pedialyte®, Oralade®, or standard ORS at home
  - Use replacement fluids if frequent vomiting or diarrhea
  - If child does not tolerate fluids, emphasize need to give frequent small sips of fluid using syringe, without stopping for vomiting
  - Signs or symptoms of dehydration and aches to return to care
  - Treatment with antiemetics, other anti-vomiting, iron supplements, and anti-diarrheal discharge are not recommended

Oral Rehydration Table

<table>
<thead>
<tr>
<th>Weight (kg)</th>
<th>Oral Solution per 5 mL*</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 10</td>
<td>20 ml</td>
</tr>
<tr>
<td>10 - 15</td>
<td>25 ml</td>
</tr>
<tr>
<td>15 - 20</td>
<td>30 ml</td>
</tr>
<tr>
<td>20 - 25</td>
<td>35 ml</td>
</tr>
<tr>
<td>25 - 30</td>
<td>40 ml</td>
</tr>
<tr>
<td>30 - 35</td>
<td>45 ml</td>
</tr>
</tbody>
</table>

* Calculated based on 10 mL/kg body weight
** Using 1:2 or 1:3 ratio of water to Pedialyte® (1 oz) or another oral rehydration solution

Pedialyte® Inequalities: 0-6 hr each
REFERENCES:

• 1) Gorelick MH, Shaw KN, Murphy KO. Validity And Reliability Of Clinical Signs In The Diagnosis Of Dehydration In Children. Pediatric. 1997;99:e6.


QUESTIONS????