Baby, you are HOT!

Febrile illnesses in the pediatric population

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Pediatric Patients

System CE in last 2 years reviewed:
general assessment
abuse, asthma
seizures
and cardiac arrest.

Assessment

A systematic approach is important, so throughout the encounter, a paramedic should be assessing for ***causative factors…***

Such as?

- Hypoxemia
- Acidosis
- Hypovolemia
- Hypoglycemia
- Hypothermia
- Trauma
- Infection

SOP p. 60

Goals

1. Create a greater awareness of childhood illnesses encountered pre-hospital with unusual presentations
2. Gain insight regarding modes of transmission and level of protection for disease specific illnesses
3. Prioritize prehospital care for individuals with a presentation of a febrile illness and/or rash

Class Outline

- Power Point presentation
- Case studies
- Handout outline:
  - Article, "Fever in the Neonate and young infant"
  - p. 8 Grid for note taking throughout lecture
  - p. 9-14 Case study rubrics

EMS is called to a single family house for the "sick child." Upon arrival further information reveals a 14 day premature infant who is now 4 days old in the care of a 19 year old mother who states he felt hot and had a fever. Grandmother also present.

Information received reveals that the neonate came home 2 days ago and due for follow up physician appt. tomorrow.

What should EMS be thinking about with this limited initial information?

Is this a concern that can wait until the doctors visit tomorrow morning or should they go back to the hospital now?

Fever in the neonate

- It is one of the most common chief complaints for peds pts presenting to the ED
- Approximately up to 20%
- Fever is clinically more important for those 0-3 months of age

Alpern ER, Henretig FM. Fever. In: Fleisher GR, Ludwg S, Henretig FM, eds, Textbook of Pediatric Emergency Medicine 5th ed. Philadelphia, PA: Lippincott Williams & Wilkins, pp. 295–306, 2006.

EMS has seen it all

Thoughts on this scenario can include:

- **young mom, not knowledgeable…**
- **is she just afraid?**
- **is the fever accurate?**

Next steps for EMS…

Next steps…general impression

PAT-**P**ediatric **A**ssessment **T**riangle *includes*:

- general appearance
- work of breathing
- circulation

(***SKIN*** *tells all*)

Bottom line…

Do they look sick or not?

And if they do, intervention follows quickly.
If they don't, what is next?

History is important

Because of this given situation in which the information may not come freely flowing, it is up to EMS to ask the right questions, in the right way, to appreciate the severity of illness

Children < 3 mos old have unique risks for serious bacterial infections (SBI)

Serious bacterial infections (SBI)

Neonates (less than 28 days old)

Young infants (28-90 days old)

Traditionally thought of as a subset of infants because of the potential for severity level with infections

Serious bacterial infections (SBI)

Most common:

UTI

Bacteremia (infection w/o a focused source)

Meningitis

**While the current practice of immunizing has ↓ the risk, the trend is changing and vaccination is not guaranteed.*

Back to that fever

- Often only indication for concern is a fever
  - Body temp is regulated by the thermosensitive neurons in the hypothalamus
- While an infants body temperature can vary based on age and even time of day, a fever is considered something of concern.

What then defines a fever?

Baby you are hot tonight!

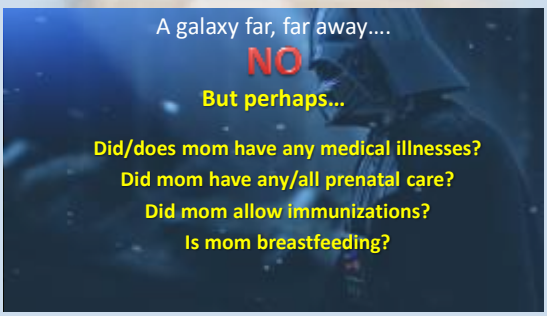
Physicians will generally agree that a fever is defined for the child appropriately dressed at rest is:

- Rectal temp of 38°C (100.4°F)
- Oral temp of 37.2°C (99°F) (used only when >5 yo)

American Academy of Pediatrics

Where does that fever come from and how can EMS discover the origin?

This adorable bundle of (sick) joy came from:



It's complicated

The maturing immune system is a work in progress

Immunity is either innate (within) or acquired

Acquired immunity is either active or passive

- How does one acquire passive immunity?
- Active immunity?

History and Physical

Important information to ask about:

- "is the child going to be immunized?"
  - If not, at greater risk for infection…
- "Is the child breastfeeding?"
  - In addition to Immunoglobulin G (IgG), mother's breast milk contains IgD, IgE, IgM.

So now that fever is not…"just a fever."

Bottom line….any child less than 3 months of age with a fever *should* be transported to the hospital for further evaluation or clear instruction to the parent of risk

Fever = Infection

(until proven otherwise)

- **First week of life**
  - **Maternal acquired pathogens**
- **Second week**
  - **Hospital acquired**

What should EMS recommend be done with the infant in the opening scenario?

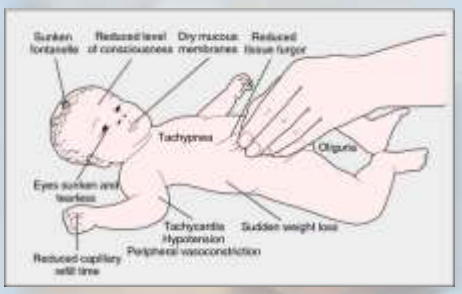
It is always prudent to encourage treatment

Transport is important due to nature of illness in a high risk population

Waiting is not recommended as the underlying problem is **NOT** able to be understood without further evaluation.

The very young infants that do not eat can become dehydrated, added to that a fever and they can deteriorate rapidly!

What else does EMS want to evaluate?



What questions should be asked to appreciate a child's hydration status?

Additional history components

Any hx of previous hospitalization or ICU stay?

Did child have any prior use of antibiotics?

Any prior use of antipyretics?

If so, what time?

↓ ***fever after Tylenol should not exclude a SBI.***

Fevers to be concerned about

When they look sick…
When they appear in pain
Difficulty breathing
Appear dehydrated

Airway and breathing

Increased WOB includes:

retractions
nasal flaring
grunting

Noises kids make

In addition to fever, kids make all sorts of noises
Noises heard while breathing include:
Hoarse or raspy cry (croup)
Muffled voice or ↄ talking (epiglottitis)
Snoring (upper airway obst.)
Wheezing on expiration (lower airway obst.)
Crackles (pneumonia/bronciolitis)
STRIDOR (croup ~ 90%; epiglottitis ~ 10%)

FEVER + Noise + AMS

This is never a good sign
One can assume pt distress
Supportive care
TRANSPORT

So many things

Flu
Chicken pox
Rubella
Abuse

Croup
Meningitis
Bronchiolitis
Epiglottitis
Asthma
RSV

What is highest priority?

Everything cannot be covered

Today:

Concentrated effort will be on communicable illnesses seen in children with fevers

Rashes, whoops and weird stuff!

Scenario 3

Arrive at a single family home for the child who parent states, “just had a seizure.”

EMS finds a 13 month old child in the care of parents.

Two older school aged children are also in the home and crying in concern for their sibling.

Child is limp, appears post-ictal lying on floor.

Child is on floor with blanket underneath body. Diaper wet. Mom states that the child has had a cold for the last 4 days & developed a fever last night to 38.7°C/ 101.6°F.

laying on floor, eyes closed, no movement of extremities

labored deep breathing

very pink, flushed & hot to touch. Also noted is a red petechial rash over chest, abdomen & extremities.

no FBAO

deep breathing noted with intermittent snoring respirations

as noted above; fast and regular distal pulse

bGL 96; pupils are slow but reactive

T: 40°C/104.0°F, HR: 120, R 22, Pox: 94%

Lungs clear, adequate air movement.

Parent states that the infant has been irritable and had difficulty taking in normal fluids by mouth or eating regular meals.

There is bulging at fontanel noted.

Treatment priorities?
EMS (self) protection/priorities?

Meningitis

"Meningococcal disease refers to an illness caused by type of bacteria known as meningococcus….

May develop in response to # of causes, bacteria or viruses, physical injury, cancer or certain drugs

Illnesses are often severe & include infections of the protective membranes covering the brain known as meninges, spinal cord (meningitis) & bloodstream infections (bacteremia or septicemia)."

CDC

Mode of transmission

Severity of illness & treatment for meningitis differ depending on cause

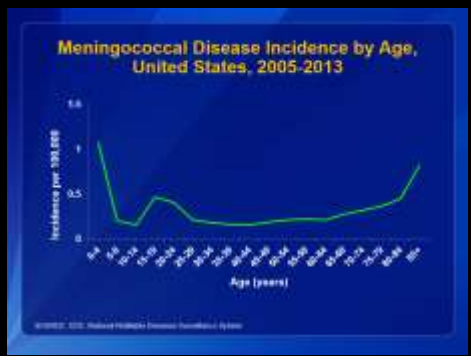
Thus, it is important to know the specific cause

"Spread through exchange of respiratory & throat secretions …

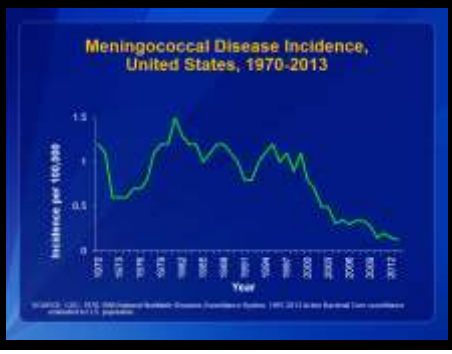
…can be treated w/ antibiotics, but quick medical attention is extremely important."

CDC

Susceptible at any age



Prevalence is declining



Signs and Symptoms

Symptoms are sudden onset of fever, headache, & stiff neck

Can start w/ S & S similar to influenza, and will often cause nausea, vomiting, ↑ sensitivity to light, rash, & confusion

Great, but what about this helps in children?

Fever we know, but…

Headache

How is this seen with children?

Stiff neck

…Completely unreliable w/ infants

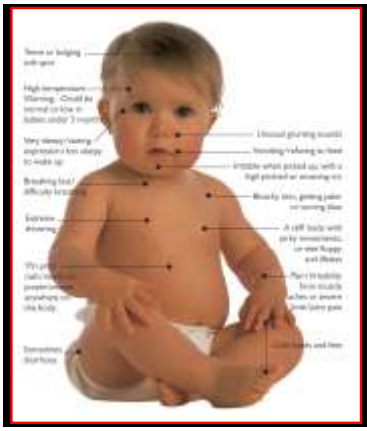
Confusion

What will be noticed?

No oral intake, irritable, crying all the time, hx. of infection or prolonged hospital stay.

The symptoms of meningococcal meningitis can appear quickly or over several days.

Sx. develop w/in 3-7 d after exposure.



Greatest concern is potential to rapidly deteriorate

Description, & Presentation

Viral more common, also called aseptic meningitis

Caused by enterovirus

Incubation period 3-7 d

In newborns, bacterial concern from maternal transmission - more severe; treatment with antibiotics

Sudden: less common but more likely to progress to shock, rash noted, poor prognosis (septicaemia)

Gradual: more common presents w/ fever & URI or GI

While most people recover, serious complications such as brain damage, hearing loss, or learning disabilities can occur.

There are several pathogens (types of germs) that can cause bacterial meningitis including haemophilus influenzae (most often caused by type b, Hib), & others

In the US, about 4,100 cases of bacterial meningitis, including 500 deaths from 2003–2007

Viral

Most common type

Often less severe and people usually get better on their own

EXCEPT for

Infants younger than 1 month & people with weakened immune systems are more likely to have severe illness

There is a fungal meningitis although rare

Usually spread of fungus through blood to the spinal cord~ people with weakened immune systems ; not contagious

Primary amebic meningoencephalitis (PAM) is a very rare form of parasitic meningitis that causes a brain infection that is usually fatal

Full blown non-blanching hemorrhagic rash

Tumbler Test

Bulging fontanel

May feel stiff or have jerky movements

"Fits" are common (pain)

Drowsiness or ↓ LOC (or fluctuating level) is important sign in all ages

Teenagers often present in an aggressive & combative manner

Drug and alcohol intoxication may be suspected

Complications

Teenagers are a vulnerable group

A secondary peak in incidence aged 15-20 yrs

S & S develop later into illness for teens than in younger children

Teenagers present to GPs & hospital later

Approximately 25% of teenagers carry meningococci in the nasopharynx

Scenario 1

EMS is called for an 8 month old infant that parent complains that they have had a runny nose and a bad cough.

The infant attends a day care facility that has recently had a "bad episode of multiple kids ill."

Symptoms started 2 wks ago, but sent child to day care anyway as parent had to work.

Parents called today since they noted that the infant was not breathing "normal" & seemed to stop every so often.

- Arrived at a 2 story building in which pt lives in basement w/ parents & additional 1 sibling. Child is resting currently in mother's arms.
- resting
- unlabored but as assessment continues the baby startles coughing violently w/ a high pitched sound-difficult to stop & catch breath.
- during coughing fit, baby's lips turn slightly blue, skin pale but moist from work of coughing.

open; no FBAO

breathing noted intermittent periods of apnea until coughing spell; otherwise resting between episodes

as noted above; also apical pulse at ~ 150BPM, no rash, cap refill 3 seconds with coughing; skin turgor w/ slight tenting

bGL 80; Pupils-PERRL

- T: 38°C/100.4°F, HR: 150, R 26, Pox: 90% with coughing.
- Lungs w/ crackles at bases that clears w/ cough.
- Parent states the infant has had difficulty taking in normal fluids due to coughing throughout feedings. 3-4 wet diapers a day.

Treatment priorities?
EMS (self) protection/priorities?

Pertussis (whooping cough)

Pertussis
Whooping Cough

A common (endemic) disease in US

Peaks reported every 3 to 5 years & frequent outbreaks

In 2012, the most recent peak year, 48,277 cases of pertussis were reported — and many more cases go unreported

Whoop…y!

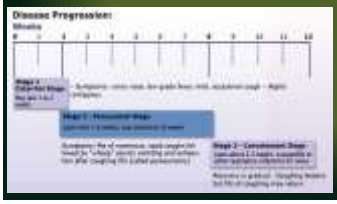
- Occurs in ALL age groups but is most severe in young infants
- While vaccines have been available since the '40s, outbreaks occur every year
- Number of cases has been ↑ steadily since the 1980s
- According to (CDC), >27,000 people were diagnosed with pertussis in 2010

Whoop…y!

- Infants too young to have received any or all doses of vaccine at greatest risk
- Transmitted in respiratory droplets by coughing & sneezing
- People can be contagious for up to 3 weeks after developing symptoms

Pertussis is a very contagious only found in humans

Bacterial spread treated with antibiotics



- **1 out of 4 (23%) get pneumonia**
- **1 out of 100 (1.1%) will have convulsions**
- **3 out of 5 (61%) will have apnea**
- **1 out of 300 (0.3%) will have encephalopathy**
- **1 out of 100 (1%) will die**

Chicken pox
Varicella Zoster (VZV)

Very contagious airborne disease caused by the varicella-zoster virus (VZV).

Causes a blister-like rash, itching, tiredness, & fever.

Chicken pox

10 to 21 days after exposure to develop VZV

1st S & S develop 14-16 d after contact w/ infected person

Contagious from 2-3 days before rash appears until all blisters crusted over

Fever, ↓appetite, H/A, cough, & sore throat

Generalized rash (itchy) appears about 1-2 days after first symptoms (progresses rapidly from macules to papules to vesicular lesions before crusting)

Temp to 102°F for 2-3 days

Those w/weakened immune system at greatest risk

Adults ***may have*** more difficult time

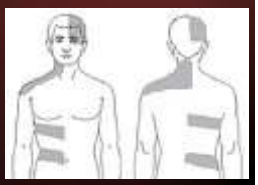
Transmission is airborne / contact

- sneezing, coughing

Shingles

Pain, itching, or tingling of the skin followed by a painful rash of blister-like sores, usually on one side of the body, often on the face or torso

- Fever
- Headache
- Chills
- Upset stomach



Scenario 5

EMS is called for the "sick child." Upon arrival to a single family home, father opens the door & leads EMS to the bedroom where a 3 yo w/ a fever, runny nose, cough, red eyes, & sore throat is found in the arms of his mother. "His fever is so high," she says. "And today this rash suddenly appeared all over his body. He is coughing & sneezing & won't eat."

Hx includes 10 days back from a family vacation to Disneyland. Hasn't been able to go back to pre-school since winter break ended. He has a scheduled MD appt in 2 days.

Lying in mother's arms, eyes closed w/ a grimace on face, arms wrapped around chest; appears to be in discomfort

breathing sl. faster than normal

pink, warm and dry

open; no FBAO

sl. fast breathing noted w/ grimace on face

as noted prior; regular & fast distal pulse; skin

w/ red flat red spots that appeared first on face

at the hairline & spread downward to neck,

trunk, arms, legs, & feet. Small raised bumps

also appear on top of the flat red spots.

bGL 72. Pupils equal and reactive

T: 39.8°C/103.6°F, HR: 104, R 16, Pox: 96%

Lungs clear to auscultation

Pt c/o sore throat pain w/ drinking or feeding. Oral mucosa red & appears dry.

Anytime individuals are in contact w/ large # of people or have a travel history, it should bring a heightened level of concern.

Maintaining hydration status & if the pt is not able to remain hydrated, IV w/ fluid bolus at 20cc/kg

Measles (Rubeola)

Measles

Measles is considered one of most contagious of all infectious diseases spread via the airborne route.

Symptoms include things normally seen from colds & flu

runny nose, fever, cough, sore throat, sneezing, loss of appetite, & red eyes.

Followed by a rash that spreads over the entire body

Measles

Rash begins 3-5 days after symptoms start

Begins as flat red spots appearing on face (hairline) & spread to neck, trunk, arms, legs, & feet

Small raised bumps may also appear on top of flat red spots

- The spots may become joined together as they spread from the head to the rest of the body.

When rash appears, fever may spike to ↑ 104°F.

*July 2, 2015, Washington State DoH confirmed a measles-related death.

Measles

Before measles vaccination program started ~ 1963, estimates about 3 - 4 M/yr got measles in the US.

Of those, 400-500 died, 48,000 were hospitalized, & 4,000 got encephalitis (brain swelling)

In 2013, national coverage for MMR vaccine among children aged 19—35 months was 91.9%.

Measles

In 2000, the United States declared that measles was eliminated from this country.

People who receive 2 vaccine doses are considered protected for life & do not need booster.

Koplik Spots

2-3 days after symptoms begin, tiny white spots with redness may appear inside mouth

FirstResponder.gov

- To ↓ risk, EMS transporting pts with S & S should wear masks
- U.S. experienced a record # of cases during 2014, 644 cases in 27 states — more than 3 X # of reported cases in 2013 & over 10 X # of cases reported in 2012 to CDC
- ↑est # of cases since elimination documented in 2000

Homeland Security

What now?

Scenario 2

EMS responds to a single family dwelling in which 1 adult worker is surrounded by multiple (~9) children varying in age, not appearing to be from the same family. Upon further questioning, the adult explains that this is a *day care facility,* not licensed & hosts approx. 15 children a day, depending on if families are here or traveling back to their homeland.

EMS is directed to a 3 yo child that is crouched in the corner whimpering, c/o of difficulty swallowing per caregiver (does not speak English). He has not been able to eat the last two days that he was at day care, just sits & rocks in the corner. He just arrived back from a visit w/ his family to Singapore.

unlabored but crying intermittently.

Skin, warm to touch, slightly dry in appearance w/ noted scratch marks. Additional findings note brown skin w/ blisters on ***palms of hands***. Long sleeve shirt on, occasionally scratching arms. Skin w/ tenting noted.

PAT

open; no FBAO; dry cracked lips

no respiratory distress noted; whimpering from pain

palpable, regular & strong radial pulse

c/o pain, especially in mouth and can't drink or eat. Pupils PERRL, normal mental status

T: 37.2°C/98.9°F, BP: 86/60, HR: 112, R 18, Pox: 97% with coughing. bGL: 80

Lungs clear, no adventitious sounds

Caregiver states the child has had difficulty with eating sack lunch & juice for last 2 days since arriving back from trip.

Upon assessing oral mucosa, you see multiple lesions along gums & teeth.

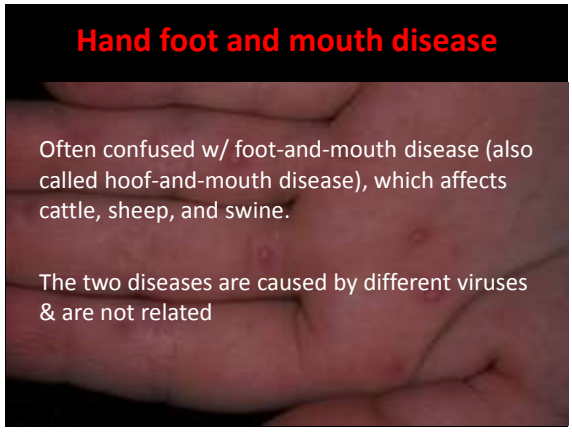
Transport for evaluation of skin rash & pain regimen for legions in mouth. If the pt cannot eat of drink, they can & will get severely dehydrated.

Respiratory precautions as well as contact precautions for skin rash.

Could be rash from a variety of illnesses, however w/rash on palms, working dx. is hand, foot & mouth disease.

Treatment priorities?
EMS (self) protection/priorities?

Hand foot and mouth disease



Often confused w/ foot-and-mouth disease (also called hoof-and-mouth disease), which affects cattle, sheep, and swine.

The two diseases are caused by different viruses & are not related

Hand foot and mouth disease

Outbreaks not common in United States; more so in Asia, with 1000's infected

Occurs particularly in young children, may be severe enough to require hospitalization

As of August 15, Singapore reported more than 18,000 cases of HFMD in 2015

Who cares?
Remember, people travel!

Hand foot & mouth disease

Viral illness

Affects infants & children younger than 5 years old but can occur in adults

Starts with a fever, ↓ appetite, sore throat, malaise

1-2 d after fever, painful sores develop in mouth, then on palms of hands & soles of feet

May also appear on knees, elbows, buttocks or genital area

Small red blisters / ulcers

Hand foot and mouth disease

Some people, especially young children, may get dehydrated if they are not able to swallow because of painful mouth sores

Hand foot and mouth disease

Caused by viruses that belong to the Enterovirus genus (group), including polioviruses, coxsackieviruses, echoviruses, and enteroviruses.

Same virus that causes meningitis so could cause it as well

Hand foot and mouth disease

Virus found in:

nose & throat secretions, blister fluid, & feces

Mode of transmission:

Respiratory and contact precautions

There is no specific treatment except over-the-counter medications to relieve pain

Scenario 6

EMS is called for abdominal pain. Upon arrival, a caregiver opens the door, explaining that the 4 year old child has had nausea, vomiting & explosive diarrhea for 2 days.

Every time an attempt is made to eat, it is met with resistance as it just keeps coming back up.

Found on the couch, an obviously fatigued, lethargic child wrapped in a blanket holding their stomach

breathing normal

pale, dry & cool to touch.

T: 37.1°C/98.8°F, BP: 70/54, HR: 130, R22, Pox: 99%

Lungs clear to auscultation

Oral mucosa dry, skin turgor poor; unable to maintain oral intake for 2 days.

Do you start an IV? When is it indicated in the dehydrated child?

Fluid bolus for rehydration?

Contact precautions; do not touch anything that may have come in contact with fecal matter! Gowns are needed….and Good luck ☺

Acute gastroenteritis **(AGE)**
Norovirus

Norovirus

Most common cause of **AGE** in the US

Each year, it causes 19-21 million illnesses & contributes to 56,000-71,000 hospitalizations & 570-800 deaths

Norovirus is also most common cause of foodborne-disease outbreaks in US

Norovirus

Very contagious & can infect anyone

Mode of transmission from infected person, contaminated food, water, or by touching contaminated surfaces

Contact precautions should be taken

Prevention: practice proper hand washing

A person usually develops symptoms 12 to 48 hours after being exposed

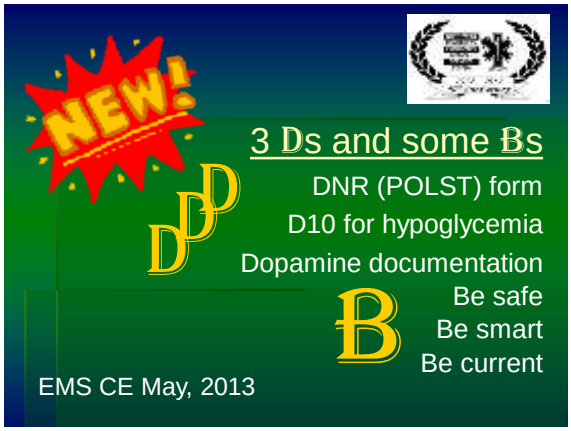
Most people get better within 1 - 3 days

Causes inflammation of stomach / intestines resulting in pain, N/V, diarrhea, low grade fever & generalized aching

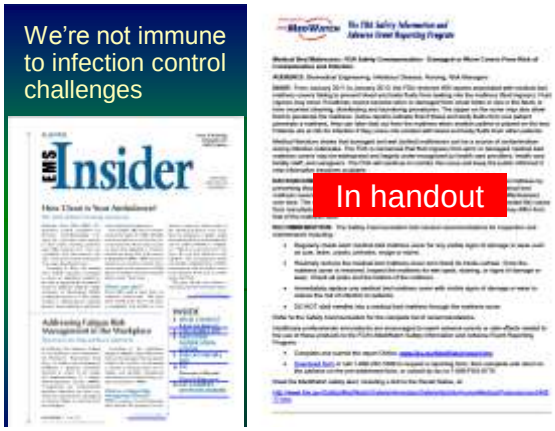
Risk for *dehydration especially in young children and older adults…*

As a reminder…

From CE 2013



We're not immune to infection control challenges



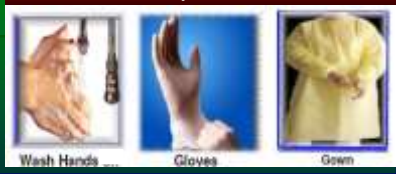
Norovirus gastroenteritis

Outbreaks in System areas

Norovirus gastroenteritis

It is extremely important that EMS use Contact and Standard precautions when responding to and transporting pts with vomiting and diarrhea

Contact precautions



Be safe

Hand Hygiene

During outbreaks, wash hands with soap and water immediately after removing gloves instead of only using the alcohol-based waterless sanitizer if suspected or confirmed norovirus gastroenteritis.

For all other hand hygiene indications refer to the 2002 HICPAC Guideline for Hand Hygiene in Health-Care Settings: http://www.cdc.gov/mmwr/PDF/rr/rr5116.pdf).

Increase frequency of cleaning and disinfection of pt care areas and frequently touched surfaces during outbreaks of norovirus

Cleaning and disinfecting of ambulance should be done before transporting another pt.

Procedures for cleaning:

Spray all surfaces with EPA-approved disinfectant; hold cleaning agent dispenser 10" from surface and atomize with quick short strokes, spraying evenly on (potentially) contaminated areas of equipment and affected interior pt compartment or other affected portions of vehicle until wet.
Wait 30 seconds and wipe dry with paper towel.

To kill staph, strep, and other virus and bacteria strains, repeat as above, wait 10 minutes, and wipe dry

Blood and other body fluids must be thoroughly cleaned from surfaces and objects before applying disinfectant

Use Standard Precautions for handling soiled pt-service items or linens, including appropriate use of PPE

The Pain Factor

As a reminder for pediatric patients, assessment should also include monitoring pain

Pain in Children

Using the FLACC Scale

FLACC

Face
Legs
Activity
Cry
Consolability

FLACC

Face
Legs
Activity
Cry
Consolability

FLACC

Face
Legs
Activity
Cry
Consolability

Face
Legs
Activity
Cry
Consolability

FLACC

If the story doesn't quite fit, remember to think outside of the box

Dispatched for the "sick child."

Information of a 5 yo unresponsive.

It's a warm, sunny summer day; EMS arrives at an apt complex, escorted to an apt in which 3 families live together. 5 adults & 6 children reside in a 2 br apt. There are 2 teens present, 2 school aged children & 2 babies in only diapers in a playpen crying. The teen explains that the 5 yo brother was sleeping on the bed when they heard a "thud."

"He must have fallen off the top bunk bed," he explained, "then started shaking all over."

Scenario 4

Found a small, underdeveloped child slow to respond on the couch.

Within 2 min of arrival, pt has a generalized complex seizure again.

laying on couch, eyes staring up and to the right, no movement of extremities

irregular deep breathing

pink, warm and dry.

snoring respirations; no FBAO

deep breathing noted with intermittent snoring after seizure

as noted above; regular distal pulse; skin w/ noted small round shaped marks (~2cm in diameter) & multiple bruises on body & back of legs

bGL 74; Pupils are dilated & slow to respond

T: 37.1°C / 98.8°F, BP: 130/86, HR: 90, R 15, Pox: 97%

Lungs clear to auscultation

*With no other history found, never let your guard down to the possibility **of abuse.***

*Transport necessary to a **L1 trauma center**; and report suspicions to DCFS per policy.*

Unknown origin; standard precautions

Any questions?

Great JOB