Pediatric Pitfalls

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Pediatric care in ED is challenging

- Nonverbal
- Extremely anxious
- Vague history

Fever with convulsions

Febrile convulsion

- Case
  - 12 y/o
  - Fever, cough and rhinorrhea for 3 days
  - High fever and generalized seizure at home
  - Duration < 10 min
  - Mental status back to baseline at ED
- Imp: URI, febrile convulsion
- Plan: MBD with fever control

- 8 h later → status epilepticus
  - Final diagnosis → encephalitis
  - Outcome → neurologically impaired

Febrile convulsion

- Simple febrile convulsion
  - Generalized
  - Duration < 15 min
  - Not recur within a 24-h period
  - 6 m/o < age < 5 y/o
  - No evidence of meningitis on examination

- Need only age-appropriate fever work-up
  - Routine electrolytes, CT, EEG not necessary
  - Routine lumbar puncture not necessary if > 18 m/o and well appearing

Febrile convulsion

- Complex febrile seizure
  - Focal seizure
  - Duration > 15 min
  - More than 1 seizure within a 24-h period
  - Age < 6 m/o or > 5 y/o

- Should undergo lumbar puncture!

Febrile convulsion

- Lumbar puncture can be deferred if
  - Well appearing
  - Age > 18 m/o
- Lumbar puncture strongly considered if < 18 y/o and
  - Hx of irritability, decreased feeding, or lethargy
  - Toxic appearing or altered mental status following postictal period
  - Prolonged postictal period
  - PE: bulging fontanelle, photophobia, signs of meningismus
  - Complex febrile seizure features
  - Pretreatment with antibiotics

Over-reliance on WBC Count

Over-reliance on WBC count

- Bonsu et al: bacterial meningitis
  - 73% → WBC < 15,000/cmm
  - 96% → WBC < 20,000/cmm
- No leukocytosis ≠ no meningitis
- No leukocytosis ≠ no serious bacterial illness

Over-reliance on WBC count

- Indications of lumbar puncture (regardless of WBC count)
  - Extreme irritability or lethargy
  - Petechiae or purpura
  - Bulging fontanelle
  - Prolonged seizure activity
  - Headache, vomiting, meningismus (neck rigidity, Kernig or Brudzinski signs)

Misdosing

Misdosing medications

- About 10%
- Factors
  - Between 4-8 am
  - Patients with severe disease
  - Trainee – at the beginning of the academic year
  - Weekends
- 小心「夜班、假日、新手上路」

Misdosing medications

- Most common drugs
  - ACT
  - Antibiotics
  - Asthma medications
  - Antihistamines

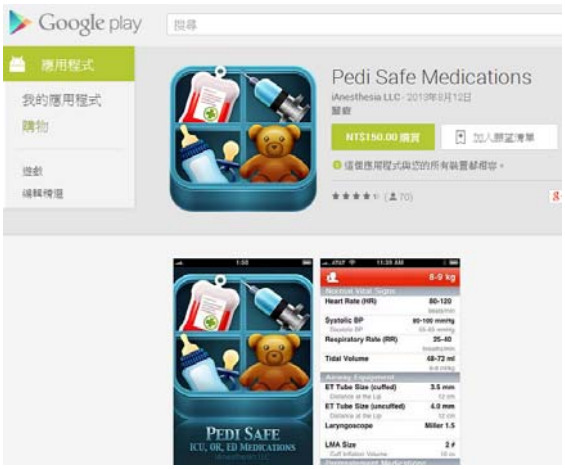
Misdosing medications

- Dosing errors
  - Ordered but not administered
  - The 10-fold errors:
    - E.g. Amoxicillin 80 mg/kg → 8 mg/kg or 800 mg/kg
  - Pounds misread as kg
  - Erroneous unit conversion
    - E.g. A case of AGE, BW = 6 pounds
    - Order: NS challenge 260 cc
    - Complication → lung edema → on endo!
    - Error → 6 pounds converted to 13 kg (instead of 2.7 kg)

快速評估小兒體重

Broselow tape

Simple rule



Misdosing medications

- Fact
  - BW should only be recorded in kg
  - Dosage calculations and concentrations must be checked prior to administration
  - 不恥下問！

Irritable Crying

Irritable crying

- Infantile colic → "rule of 3's" → cries for
  - 3 h / day
  - 3 days / week
  - for at least 3 weeks
  - resolves by age 3 m/o
- Pitfall → not colic

Irritable crying ≠ infantile colic

- PE → determine 41% other causes
- Systematic approach is important
  - Fully undress the infant
  - Examine digits, penis, clitoris of hair tourniquet
  - Examine cornea for abrasion (flourescein exam)
  - Examine eardrums
  - Examine inguinal areas and anus
  - ECG, x-rays, CT if indicated
  - Intussusception → "drawing up legs" during episodes of crying

Irritable crying ≠ infantile colic

- "It cries"
  - I - Infections: AOM, UTI, meningitis
  - T - Trauma: consider CT, x-rays
  - C - Cardiac: CHF, SVT
  - R - Rectal fissure, reaction to medications/immunizations, reflux
  - I - Intussusception
  - E - Eye: corneal abrasion, ocular FB
  - S - Surgical dz (hernia, testicular torsion), strangulation (hair/fiber tourniquet syndrome)

Hair Tourniquet Syndrome

The Febrile Child

The febrile infant

- Boston criteria (1-3 m/o)
  - Well appearing
  - No ear, soft tissue, joint or bone infections on PE
  - CSF < 10 WBC/HPF
  - Urine dipstick negative for leukocyte esterase
  - WBC count < 20,000/cmm
  - Normal chest radiograph (if ordered)
- Negative screen → MBD after ceftriaxone (50 mg/kg) im

The febrile infant

- Philadelphia criteria (29-56 days)
  - Looked well: Infant Observation Score </= 10
  - WBC count < 15,000/cmm
  - Band-to-neutrophil ratio of < 0.2
  - Urine < 10 WBC/HPF
  - CSF < 8 WBC/HPF and negative Gram stain
  - Stool negative for blood and few or no WBC (if watery diarrhea)
  - Normal chest radiograph (*all patients*)
- Negative screen → no antibiotics

The febrile infant

- Rochester criteria (</= 60 days)
  - Looked well
  - Previously healthy
  - No evidence of skin, soft tissue, bone, joint, or ear infection
  - Normal WBC count (5,000-15,000/cmm)
  - Absolute band count < 1500/cmm
  - Urine < 10 WBC/HPF
  - Stool < 5 WBC/HPF (if diarrhea)

TABLE 1. Yale Observation Scale[15,16]

Observation Item	1 Normal	3 Moderate Impairment	5 Severe Impairment
Quality of cry	Strong with normal tone or content and not crying	Whimpering or sobbing	Weak or moaning or high pitched
Reaction to parent stimulation	Cries briefly then stops or content and not crying	Cries off and on	Continual cry or hardly responds
State variation	If awake, stays awake or if asleep and stimulated, wakes up quickly	Eyes close briefly awake or awakes with prolonged stimulation	Falls to sleep or will not rouse
Color	Pink	Pale extremities or acrocyanosis	Pale or cyanotic or mottled or ashen
Hydration	Skin and eyes normal and mucous membranes moist	Skin and eyes normal and mouth slightly dry	Skin doughy or tented and dry mucous membrane and/or sunken eyes
Response (talk, smile) to social overtures	Smiles or alerts (≤2 mo)	Brief smile or alerts briefly (≤2 mo)	No smile or face anxious, dull, expressionless or no alerting (≤2 mo)

Appearance not reliable for NB sepsis

- Multiple criteria available BUT none as accurate for NB
- NB = high risk
- Virulent bacteria
  - *Gr.B streptococci* (meningitis, sepsis)
  - *E. coli*
  - *Listeria monocytogenes*
- Appearance not so reliable
  - ***Admit if T ≧38 ℃ and age < 28 d***

Work-up all febrile infant < 28 d/o

- T ≧38 ˚C and age < 28 d or toxic appearance
  - ***Hospital admission***
  - Blood culture
  - Rapid urine testing
  - Urine culture
  - CSF routine, Gram stain, and culture
  - CXR and stool studies if indicated
  - WBC count + D/C
  - Consider HSV studies
  - IV antibiotics

Fever >3d… 陷阱！

發燒 > 3天

- 如果是0.5 - 2 y/o，活動力很好，那麼驗U/A幾乎都是驗安心的
  - 沒有focus當然還是要驗
  - 只是你要先想好下一步，而不是藉由驗U/A丟給下一班
  - 心中要考慮嬰兒玫瑰疹，可以先跟家長衛教

發燒 > 3天

- 發燒四天（以上）的documentation
  - 一定要紀錄 “no signs of Kawasaki disease"（當然要評估過）
  - 因為Kawasaki是少數看起來不toxic，但可能後來被告到死的兒科疾病

發燒 > 3天

- 腸病毒發燒超過3天變成重症的機會會增加
  - 要紀錄到底目前目前像不像腸病毒感染
  - 有沒有 vesicle, rash?
  - 有沒有 jerks, jitter?

Vomiting

Vomiting ≠ AGE

- Should not automatically presumed to be caused by self-limited infection
  - R/O AGE
  - R/O viral infections

Case: Vomiting and fever

- 8 m/o girl: vomiting and low-grade fever
  - Non-toxic, mildly dehydrated, PR 160 bpm, RR 20, T 37.9˚C
  - Imp: AGE with dehydration
  - Plan: IV fluids, MBD (no work-up)
- Several hours later
  - Unresponsive, T 41˚C, PR 180, SBP 60 mmHg
  - Dx: Urosepsis
  - Hint:- UTI = common cause of vomiting
    Routinely check U/A (and U/C if < 2 y/o)

Vital Signs

Age	Awake	Sleep	SBP	DBP	RR
Neonate	100-180	80-160	70-100	50-65	30-60
6 months	120-160	80-180	87-105	53-66	25-50
2 years	80-150	70-120	90-106	55-67	18-35
5 years	80-110	60-90	94-109	56-69	17-27
10 years	70-110	60-90	102-117	62-75	15-23
>10 years	55-100	50-90	105-128	66-80	10-23

Hypotension (Systolic BP)

- Newborn:
  - Less than 60 mm Hg
- Infant:
  - Less than 70 mm Hg
- Child:
  - Less than 70 + 2 (Age)

Vital Signs: PR and RR

- PR (RR)
  - 0-6 months : < 160 (60)
  - 6-12 months : < 140 (40)
  - 1-6 years : < 120 (30)
  - 6-12 years : < 100 (20)

Case: Nonspecific vomiting

- 1 y/o boy: non-bilious vomiting, some lethargy
  - PR 170 bpm, no fever, sleeping(?)
  - Abd discomfort(?), no focal tenderness
  - Imp: AGE with dehydration
  - Plan: IV fluid, MBD
- Next day…
  - Bilious vomiting and bloody stools
  - Dx: Intussusception
  - Finally → surgery since enema reduction failed
  - Hint:- Episodic cries may be absent in intussusception
    Lethargy +/- vomiting → must D/D intussusception

Case: Vomiting and lethargy

- 9 m/o girl: vomiting, lethagy
  - PR 160 bpm, RR 30, BP 90/50 mmHg
  - Normal CBC, electrolytes, brain CT, and CSF
  - Abnormal: glucose 48, $HCO3^-$ 12 mEq
  - Impression? Check for?
- Impression: inborn error of metabolism
  - If suspicious, always check ***glucose*** and ***ABGs***
  - ***Ammonia*** level markedly elevated
  - Mx: hydration, glucose infusion, ***bicarbonate*** therapy

Vomiting ≠ AGE

- Should not automatically presumed to be caused by self-limited infection
  - R/O AGE
  - R/O viral infections
- May be…
  - Abdominal catastrophe: malrotation
  - Serious infections: meningitis, sepsis
  - DKA, adrenal insufficiency
  - Brain tumor, ICH, shaken baby

Vomiting ≠ AGE

- GI / surgical causes
  - *Appendicitis*, cholecystitis, pancreatitis
  - Food poisoning, AGE
  - GE reflux, PUD
  - Hepatitis
  - NEC (necrotizing enterocolitis)
  - IBD (inflammatory bowel disease)
  - Pyloric stenosis, Hirschprung disease, *malrotation*, intussusception, *incarcerated hernia*, SBO
  - *Testicular torsion*

Vomiting ≠ AGE

- Infectious causes
  - Otitis media
  - *Meningitis*
  - Respiratory disease – posttussive emesis (RSV, pertussis)
  - Strep throat
  - *UTI, APN*, PID
- Metabolic causes
  - Adrenal insufficiency
  - *DKA*
  - Inborn errors of metabolism

Vomiting ≠ AGE

- Neurologic causes
  - Head trauma
  - ICH
  - *Intracranial lesions*
  - Migraine
  - Seizures
  - Vertigo
- Other causes
  - *Pregnancy*
  - Drug ingestion (e.g. ACT)
  - HSP (Henoch Schonlein purpura)
  - Nephrolithiasis
  - Uremia

Vomiting ≠ AGE

- Caution!
  - ***No diarrhea***
  - Appeared toxic
  - Bilious vomitus

女童猝死案 疑腸扭轉內出血

2014年04月17日 04:10

493 點閱 | 2/10 | 我要評比

新竹縣8歲黃姓女童上周五與父親吃鐵板燒後，回家出現嘔吐、腹絞痛，陷入昏迷送醫不治，檢警16日會同法醫解剖，指女童患有腸扭轉不全症狀，疑造成內出血，可能是致死原因，已採集死者血液送驗，釐清是否中毒。

台大醫院新竹分院外科部主任黃元惠表示，女童若無發燒、拉肚子症狀，卻腹痛嘔吐，極可能是腸扭轉不全症的症狀，該症無法預防，與腸胃炎症狀雷同，。

檢警指出，黃姓女童的父母離異，由42歲的父親帶大；事發當晚，女童與父親到竹北某鐵板燒用餐，女童點了牛排與父親共享，不料回家後在隔日凌晨出現劇烈腹痛，送醫後急救不治。

US pediatric lawsuits

- Most common
  - Meningitis
  - Appendicitis
  - Arm fracture
  - Testicular torsion
- Potentially liability
  - Medication errors
  - Intussusception - delayed
  - Fever evaluation - inappropriate

Pearls for improving patient outcomes

- Use criteria to D/D simple from complex febrile seizures
- Children BW in kg not in pounds
- Do not rely on WBC count to decide for LP
- Diagnose colic by ruling out “it cries”
- Fully undress each child that you exam
- Do not diagnose AGE if vomiting without diarrhea