Goals of assessment

- Assess/monitor physiologic parameters and systems: compare what you find against what you expect. Need to know what "normal" is for that patient.
- Recognize changes in patient condition
  - Note: kids are very strong...can maintain for a very long time until they run out of energy (then they crash fast). So, the signs are there for awhile, but the signs are *very subtle.*
- Evaluate responses to treatment and care
- Evaluate effectiveness of meds and interventions rather you gave them or not. Need to know what the drug is supposed to do, did it work and are they experiencing side effects?
- Physical Exam: It's all about the prep and the relationship you establish with the child.
  - Establish a rapport with the child and the family
  - Identify learning needs of child and family early on...we are always teaching.
  - It is always possible to assess, but just not in the way it's going to happen.
  - Get as much info as you can before you approach them (observe)

Practical tips for assessing children

- Talk to child/parent before hands-on
- School-age kids are pretty compliant
- Assess child younger than 2-3 years old while on parent's lap/being held
- Let parent hold the thermometer
- Do BP last...put cuff on arm, show mom where the button is and instruct parent to push button when they are calm.
- Have parent in view of the child.
- Incorporate parent into the assessment process
- Explain/describe what you find...but don't freak people out. Do it in a way that works to keep the family involved.
- Reinforce cooperative behavior
  - Want this to be a positive experience as much as possible...reward any element of positive experience.
- Don't lie...if something is going to hurt, say so.

The Process of Physical Assessment

- Initial assessment most complete, ongoing assessments based on findings and patient diagnosis
- Assessment q 4 hours
- Use a systematic approach, although head-to-toe may not be practical.
  - Start with most critical information first
- Perform least intrusive first (this will help you gain cooperation of child). They hate the BP, so do this last.
- Consider age/developmental differences
  - Infants: do assessment right before feeding, so get feeding stuff ready
  - Toddlers: may have to do focused assessment and have to be creative.
  - Pre-school: distract and play
  - School-age: they like to talk and also want to perform...they want to do well
  - Adolescents: kind of like toddlers with a bigger vocabulary, they like privacy, they don't like mornings, do want to be involved with their care, lots of these kids are chronic so they are used to hospital and have their own routine, get easier to deal with after 10am

Pediatric Assessment: Measures

- Size
  - To measure head go around largest part of head, usually above brow
  - Chest is around nipples
  - Abdomen is around umbilicus
- Weight (most meds are based on weight)
  - On admission, often daily while in hospital (depends on kid)
  - Infant scale: younger than 2 years (<20kg)
  - Cover and balance scale; keep hand on infant
  - Naked weight, dry diaper okay if scale zeroed with diaper
  - Standing scale: older than 2 years

- Without shoes
- If diapered, should be dry
- For child under 2, go to nearest 10 grams (4.32 kg)
- For child older than 2 you are going to 100 grams (4.3 kg)

Height
- Measured on admission
- ALERT! Looking for height and weight to be disparate, failure to maintain own growth curve, and any sudden changes (most likely d/t fluid)
- Children under 2 yrs: recumbent (lying down)
- Children over 2 yrs: standing measurement
- <5% or >95%: further assessment

Occipital Frontal Circumference (aka OFC or head circumference)
- On admission for all children <2 years
- On any child suspected of having hydrocephalus
- With neuro diagnosis, sometimes daily in infants
- Measure just above eyebrows
  - and around occipital prominence
  - at back of head
- If brain/head is growing out of proportion to the curve, then something else is probably in there (tumor or something)
- If it is an acute increase, this is probably fluid
- If it goes down, this is likely d/t brain atrophy
- If the OFC stops getting larger, maybe prematurely fused sutures (brain can't grow if head can't expand)

Temperature
- Fever = > 38.5C / 101.5F
- Recheck any reading < 35C / 95F
- Routes (try for consistent approach/label route)
- Oral: >5 years
- Axillary for most kids
- Rectal: they don't like this, invasive, infection risk
- Looking for trends, so be consistent with route
- Recheck if reading is high or low

Heart rate
- Heart rate: higher in younger children; but easier to hear
- Close eyes to make it easier to count heart rate, count in tens and use fingers to keep track.
- Extremely variable...will go up when excited, scared, in pain, dehydrated; lots of beat-to-beat variability as well
- Apical rate
- Radial pulse: >5 years
- Count for 1 minute in infants/young children if possible; 30 seconds in older children
- School age children have a *normal variant* called "sinus arrhythmia"...slows on inspiration, speeds up on expiration. If you suspect this is the case, have them hold their breath and it should even out.

Respiratory rate
- Respiratory rate: higher in younger children
- Varies with activity or excitement
- Younger children are abdominal breathers
- Count for 1 minute from a distance (they may get excited if you approach)
- Pediatric Assessment: Vital Signs

Blood pressure
- Lower in younger children
- As parents where child tolerates BP best
- Systolic BP can increase 40 - 50 mmHg *with excitement*
- "Normal" systolic BP = 90 + 2 x age in years
- 70 + 2x age in years = HYPOTENSION
- Diastolic = 2/3 systolic
- Techniques: palpation, auscultation, machine
- Make sure the cuff fits, child is calm
- Put extremity you are testing at the level of the heart

Oxygen saturation
- Expect > 95%
- Less than 90% = hypoxemia
- Often, oxygen administered for sats < 92%
- Probe location: finger, toe, foot
- Must have consistent tracing to trust reading; light will distort reading
- Pulse ox probe doesn't work so well with movement; make sure you have a good wave and that it matches the heart rate (not sure what she meant by this...I guess it will make more sense when I see it in the hospital)
- Kids generally tolerate the probe better on the foot, covered with a sock.
- Babies can get burnt from pulse ox probes (the light creates heat); change probe if signs of burning
- Congenital Heart Defects will have low O2 sats (Cyanotic Heart)

Assessment Red Flags (see notes to fill out on slide 16)
- Heart Rate (tachycardia)
- Infant, toddler, preschooler = HR > 180
- School age = HR > 160
- Adolescent = HR > 140
- Heart Rate (bradycardia)
- Infant = HR < 80
- Toddler, preschooler, school age = HR < 60
- Adolescent = HR < 55
- Kids will maintain SBP until they are ready to code. Frank hypotension is an EXTREMELY late sign of shock in a child.

Thermoregulation
- Large surface area/volume ratio
- Relatively small amount insulating fat
- Less than 6 months of age cannot shiver to generate heat, so they do nonshivering thermogenesis (burn brown fat...this takes oxygen and glucose, which leads to hypoglycemia...as they use up the oxygen they turn to anaerobic metabolism which makes them acidotic...the acidotic causes pulmonary vasoconstriciton which further contributes to hypoxia...you are on a downward spiral...this is "Cold Stress"
  - Tx: warm child, treat hypoG, hypoxia, acidosis
  - Better to prevent it from happening!
- Only undress part of the baby you are working with; be careful of surgeons spraying on betadine all over the chest.

Head/Neck: Fontanels
- Anterior: closes between 9 and 19 months
- Posterior : closes between 1 and 3 months
- Palpate sitting up
- Normal: soft and flat; pulsatile
- Abnormal: bulging and tense, sunken and depressed
  - Bulge d/t fluid, head-down position, crying (anything that increases pressure in SVC)
  - If bulging and tense is increased ICP

- Sunken = dehydration

Neuro Assessment
- Hardest assessment for a lot of people b/c not sure what is expected...look to parents for this information so you can determine baseline.
- Level of consciousness: cry, activity level, positioning, general appearance...basically looking for them to do what they are expected to do r/t developmental age
  - very shrill cry (like pulling cat's tail): that is a sign of increased ICP!
- Glasgow Coma Scale (has a variation for kids < 2)
- Pupils: size, shape, equality, light response; hard to shine light in their eyes...use best judgment here
- Sensory: response to touch, cold, pain
- Motor: symmetry of movements, equality of strength
  - should not have hand preference before 2 years of age
- Cerebellar: posture, balance, gait
  - Toddlers waddle and fall down a lot (normal)
- Glasgow Coma Scale for kids less than 2 years

Signs of Physiologic Distress: Neuro
- Irritability vs. lethargy
  - some kids are irritable when you mess with them, but calm otherwise
  - baby to the right is irritable (you can see from the posture), and in this kid is a sign of meningeal irritation
  - some kids are irritable when you mess with them and non-responsive otherwise
  - some kids are non-responsive all the time
- Recognition of parents
- Response to pain/intrusive procedures

Pediatric Assessment: Respiratory
- The vast majority of kids you'll see in hospital are respiratory cases. The respiratory system is one of the most different (when compared to adults).
- The system is smaller (than adults' systems) overall; the same amount of swelling in a child's airway will occlude it much, much more. As the child has to work extra hard to pull in the air, they will pull down harder with diaphragm and their nice, soft chest wall collapses in (retractions). This is a very inefficient way of breathing and it uses a ton of energy. This is ↑ WOB and they'll go go go go….STOP. This is no bueno.
- Tongue relatively large
- Larynx more anterior and cephalad (more prone to probs of aspiration)
- Narrowest point is cricoid cartilage
- Larynx is compliant/softer...you can close off infant airway by pushing head too far forward.
- Peripheral airways smaller and less supported (more prone to collapse)
- Fewer alveoli and incomplete development intra-alveolar & bronchoalveolar pathways
  - Children grow alveoli up until age of 8 (there is hope that they can grow out of a respiratory problem)
  - Kids don't have Pores of Kohn yet...so, if there is a plug in alveoli A, it's gone...there's no alternate pathway like there is in adults.
- Compliant chest wall → retractions when WOB is up
- Poorly developed intercostal muscles
- Horizontally inserted diaphragm
  - Anything that interferes with diaphragm movement, interferes with tidal volume (abdominal distention, abd pain,

Respiratory Assessment Parameters
- Color
- LOC
- Accessory muscle use (retractions), nasal flaring, see-saw respirations (chest goes down and abd goes up)

- Auscultation...very easy to hear breath sounds, but difficult to differentiate from each lobe. Will also hear upper airway noise (put steth outside their mouth and listen, then put on chest and listen..if same sound then it's upper airway noise)
- Listen for expiratory grunt: an effort to keep PEEP up by partially closing glottis. This is a VERY late sign of respiratory distress in the child.
- Pulse oximeter

Signs of Respiratory Distress
- RR, HR increases
- WOB increases
- Expiratory grunting
- Stridor, prolonged inspiratory phase
- Wheezing, prolonged expiratory phase
- LOC changes as they get hypoxemic...they get irritable
- Hypoxemia, hypercarbia, decrease O2 saturation
- Working hard to breathe
- Retractions and stridor
- Severe retractions

Pediatric Assessment: Cardiovascular
- Cardiac output is more rate dependent (CO = HR x SV)
  - the difference is babies have a small, thick myocardium...they have a limited ability to increase SV...so CO is more related to HR in a child.
  - they tolerate tachyC pretty well
  - but if you slow down HR and they can't increase SV, then CO drops.
- SNS innervation of myocardium incomplete
  - much more sensitive to vagal stimulation (suppositorries, suctioning, etc…)
- Circulating blood volume = 80cc/kg
- Kdis are very good at compensating for low CO...the SNS kicks in and they vasoconstrict to keep blood going toward central organs...this keeps BP stable, but then they do not perfuse out to extremities →
- Kids can lose 30% of blood volume before you see a change in BP
- Assessment parameters:
  - Vital signs
    - HR will go up very early on...but lots of things cause HR to go up, so can't rely on this alone
    - Delayed capillary refill (d/t shunting blood away from extremities)
    - Decrease in peripheral pulse as compared to central pulse (compare distal pulses to femoral pulse)...most important assessment!
    - Cool, mottled skin (make sure it's not d/t just being in a cool environment)
  - End organ perfusion
    - Decrease in LOC if not perfuses brain...can be hard to tell if this irritability is d/t pain, fear, etc...
  - Volume loss

- **Cardiovascular compromise: Signs and Symptoms**
- Signs of low cardiac output
  - Altered LOC
  - Metabolic acidosis...baby will attempt to compensate (Kussmaul's respirations)
- Signs of compensatory response
  - Increased heart rate
  - Decreased skin perfusion (in a warm environment); cap refill should be < 2-3 seconds
  - UO < 1cc/kg/hr
  - Decreased end organ perfusion...blood is shunted away from organs
    - GI → N/V
    - Brain → decreased LOC
- Hypotension is late sign

Nutrition & Gastrointestinal Function
- What's different:
  - Aerophagic (swallow a lot of air, so increased risk for vomiting and aspiration)
  - Difficulty localizing pain
  - Spleen/liver proportionately larger and less well-protected by the ribs
    - a normal finding in infant is for liver to be felt 2-3 cm below right costal margin
  - Higher BMR...need more calories and oxygen (also have limited stores of oxygen and glucose)
  - Gastro esophageal reflux d/t less-mature cardiac sphinctor...so, a certain amount of reflux is normal in infants. When it becomes abnormal is when they spit up so much that it affects growth or they are aspirating and having respiratory problems.

Fluid balance & Genitourinary tract
- Renal function immature for first couple years
- Less able to concentrate urine, so less able to conserve fluids or cope with large boluses of fluids
  - Calculate the maintenance fluid...muy importante!
- Kidneys are less protected by the ribs...more likely to have kidney injuries in traumas
- Larger proportion of body weight is water…much more at risk for fluid losses...get dehydrated quickly.

Musculoskeletal
- Overall tone: infant vs older child
- Posture
  - normal for toddlers to have the pot-belly swayback...should be "straighter" by 5 years
- Symmetry of musculoskeletal movement: watch them as they play
- Equality of muscle strength
- Gross motor and fine motor development
- Involuntary muscle movements

Summary
- The assessment could be considered the most important part of nursing care
- It is the nurse who is with the patient continually and who (in addition to parents) is most likely to pick up subtle changes in patient condition
- Assessment skills develop with time and experience; therefore, take every opportunity to touch, listen and observe
- Know normal – Recognize abnormal
- Changes in peds are subtle
- Involve the family in the care and assessment

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