Methods for Success in Pediatric Imaging

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Objectives

- Understand the principles of pediatric imaging
- Optimize performance of nuclear medicine studies in children
- Discuss special considerations for care of the pediatric patient
- List simple means of ensuring non-sedated infant’s and children’s comfort and cooperation during an imaging study

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Welcome to Nuclear Medicine
Different Age Groups to Consider

- Neonate/infant (birth-2 years)
- Toddler (2-3 years)
- Preschooler/ early school age (4-7 yrs)
- School age (8-12 years)
- Adolescent (13-18 years)
- Young adult/adult (18+)

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Neonate/Infant

- Provide information to family
- Sensitive to family while performing the study
- Bed selection
- Patient uses senses and motor abilities
- Sensitive to light and loud noises

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Toddler

- Explain directly preceding procedure
- Use simple concrete explanations <5 min
- Utilize family without interference
- Distraction technique
- Understanding of self

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Preschooler/Early School Age

- Encourage parental participation
- Utilize appropriate communication with sensory aspects
- Encourage questions
- Distraction techniques
School Age

- Encourage parental participation
- Explain procedures using simple and familiar terminology
- Include patient in care
- Encourage questions and discussions
- Distraction techniques

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Adolescent

- Utilize patient as main source of information
- Provide information to patient and family
- Explore interests as distraction technique
- Encourage questions and concerns
- Respect privacy
- Ask if pregnant
Young Adult/Adult

- Provide information to patient/family at the level they can understand
- Utilize patient as main source of information
- Ask if Pregnant
- Sensitive to patient’s privacy
- Lots of questions and concerns

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Always Consider

- Patient safety
- Mobility
- Age-specific communication
- Age-specific distraction techniques
- Needle gauge
- Privacy
- Family

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Prior to Patients Arrival

- Call day prior to confirm appointment
- Welcome questions and concerns
- It is important to inform the parents/patient approximately how long the examination will take and if it is necessary to return the next day
- If necessary, child life specialist can assist
Prior to Patients Arrival

- Patient can bring:
  - their own video
  - CD player
  - Favorite stuffed animal or toy
  - Blanket
When the Patient Arrives to Nuclear Medicine

- Friendly and warm department
  - Reception
  - Staff
- Inviting imaging rooms
- Kid friendly rooms
- Keep waiting time to a minimal
- Parents and family are happy

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Waiting Room

- Spacious
- Attractively decorated
- Sufficient seating

- Toys
- Reading material
- Blackboard & chalk
- Paper and crayons for appropriate kids
- Television

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Examining Room

- Quiet and attractive
- Sufficient light and dimmer
- Ceiling-mounted spotlight
- Ceiling-mounted hangers to hold iv bags
- Adjustable imaging table
- Mounted television
- VCR
- Sphygmomanometer for all ages
- Scale in the dept.

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Helpful Supplies

- Pacifiers
- Baby bottles
- Diapers
- Children's books
- Adhesive tape
- Child size sphygmomanometers
When working with children

Communication is everything

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If possible, arrange for an interpreter prior to scan

Explanations and words should be chosen accordingly

Children who are prepared can be more cooperative

Important to keep in mind the child’s developmental level when giving information about the exam

Children have highly developed imaginations
Terminology

- Needle stick = Pinch-like a mosquito bite
- Dose = Magic wand
- Numbing medicine = Foot falling asleep
- Tape = Seat belts
- Tourniquet = Tight bracelet
- Catheter = Little tube
- Oxygen mask = Mask like Darth Vader
- Hospital gown = Ball gown (for girls)
- Sedation = Sleepy medicine
“Nuclear” in Nuclear Medicine

- Creates concern in the parents
- Explain the low radiation exposures
  - Parents
  - Children
    - Glowing in the dark
    - Super power heroes
- If a mother is pregnant
How Do You Help Your Child Cope With a Difficult Situation in the Hospital?
Things Parents Can Do

- Tell your child what to expect
- Use a calm, soothing voice
- Reassure your child
- Coach your child
- Give encouragement
- Hold your child’s hand
- Stroke your child’s face or arm
Things Children Can Do

- Breathe deeply
- Blow bubbles
- Pretend to blow the candles out on a birthday cake for deep breathing
- Think about a happy or fun time, and pretend to be there
- Tell stories or sing aloud
Things Children Can Do (con’t)

- Count backwards
- Squeeze your hand
- Listen to music
- Look at picture or toy
- Count pennies or change
- Puppets
- Peek-a-boo
Professionals on Your Child’s Team

- Child Life Specialist
- Social worker
- Resource specialist
- Psychiatrist or psychologist
- Interpreter
- Clowns who nurture laughter and smiles
- Chaplain
- Patient Care Coordinator
- Pediatric nurse
Child Life Specialist

- Contacts family prior to visit
  - Answers all questions
  - Eases concern and anxiety for families

- Arranges a meeting upon arrival to hospital
Child Life Specialist

- Offers developmental play as a way for children to express fears or concerns and understand the hospital environment
- Goes over entire procedure with patient
  - Works with technologist performing the examination
  - Shows patient medical equipment that will be used
- Uses techniques
  - Anatomical correct dolls
  - Books/videos
  - Prizes
<table>
<thead>
<tr>
<th>Procedure</th>
<th>Radiopharm.</th>
<th>Dose/ kg</th>
<th>Minimal dose</th>
<th>Maximum dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skeletal</td>
<td>99mTc-MDP</td>
<td>.2mCi</td>
<td>1mCi</td>
<td>20mCi</td>
</tr>
<tr>
<td>Renal cortical</td>
<td>99mTc-DMSA</td>
<td>.05mCi</td>
<td>.2mCi</td>
<td>3mCi</td>
</tr>
<tr>
<td>Gastric emptying</td>
<td>99mTc-SC</td>
<td>.0015mCi</td>
<td>.2mCi</td>
<td>1mCi</td>
</tr>
<tr>
<td>Myocardial perfusion</td>
<td>99mTc-MIBI</td>
<td>.4mCi</td>
<td>2mCi</td>
<td>10-30mCi</td>
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<tr>
<td>Hepatobiliary</td>
<td>99mTc-disothenin</td>
<td>.05mCi</td>
<td>.5mCi</td>
<td>2.5mCi</td>
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<tr>
<td>Dynamic renal</td>
<td>99mTc-mag3</td>
<td>.2mCi</td>
<td>1mCi</td>
<td>10mCi</td>
</tr>
<tr>
<td>RNC</td>
<td>Tco4-</td>
<td></td>
<td>1mCi</td>
<td>2mCi</td>
</tr>
</tbody>
</table>
Injections

- Properly id patient
- Patients weight
- Explain the procedure
- Two or more people for proper holding technique
- Can use towel to help immobilize patients arm
- Proper hand positioning
- Wash
- Have everything ready to be quick
- Butterfly needle
  - 25g or 27g
Injecting a Pediatric Patient

- Anticipate their next move
- Have parents “hug” the child
- Place forefinger and thumb over patient’s hand
- Co-worker holds until needle is in place and can connect syringes for you
- If iv, use wrapping to help hide
Try to give the patient as many choices as possible
Imaging

- Patients should be examined for metallic objects
- Diapers, clothing, or gauze contaminated with radionuclides should be removed
- Contaminated skin should be thoroughly washed and monitored
motion
Non motion
How Do You Distract a Patient?

- Neonates/infants
  - usually fall asleep if well fed and held

- For the ones that don’t:
  - Dim lights
  - Papoose wrap
  - Sandbags and tape
  - Bubbles
  - Appropriate television for the color and noise
  - Singing or soft music
  - Peek-a-boo
  - Anything with color
    - Pinwheel
How Do You Distract a Patient? (Con’t)

- Toddler and school age more difficult
  - Gain their trust
  - Parents near by
  - Television
  - Books
  - Music
  - Mirror
  - Interests
  - Prizes in the toy chest

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Nuclear Medicine Procedures

- **Radionuclide Cystography (RNC)**
  - Difficult procedure for patient and parents
  - Sterile catheterization
  - Filling of bladder can be uncomfortable
  - Sensitive to patients and privacy
    - Potty trained patients use upright procedure
    - Technologists can step out of room while voiding

- **Urodynamics**
  - Cuts down anxiety
  - Avoid patient having to be catheterized twice
Motion rnc

263s  285s  307s  329s  350s  372s

394s  416s  438s  460s  482s  504s

526s  548s  569s  591s  613s  635s

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For the patients that need to be catheterized

- **mag3**
  - Place IV first
  - Let parents hold patient for a minute
  - Catheter
    - If age appropriate, cut hole in diaper
    - Urinal with a hole in the cover
    - Place the end of catheter in the urinal for proper and constant drainage
    - Sandbags and tape
Immobilization Techniques

- Papoose wrap
- Blanket
- Tape
- Sandbags
- Holding a patient
  - Potential artifacts resulting from holding patients by hand should be kept in mind and avoided

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Papoose

- Fold a sheet ¾ in half
- Lie baby/toddler supine
- Fold one side of sheet over one arm and tuck under body
- Fold other side of sheet over other arm and tuck under body
- Fold remaining sheet over entire body and tuck under patient
- Tape and sandbags (for non-spect)
Fold sheet ¾
Wrap ¾ side of sheet over patient’s arm and under body
Wrap other arm and tuck under patient’s body leaving the bottom layer from the ¾ side of sheet.
Fold remaining sheet over the patient and tuck under patient’s body
Don’t forget the 3” adhesive tape
Turn on Barny and begin imaging

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The parents are usually more than willing to help out
What If the Immobilization and Distraction Techniques Don’t Work?

- Injection sites
- You get motion
- Sedation is then required
Incentives for a Job Well Done

- Stickers
- Cartoon bandages
- Treasure chest:
  - Bubbles
  - Plastic Bracelets
  - Bouncing balls
  - Toy Cars
  - Stamps
  - Tattoos
  - Pencils/erasers

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Helpful Resources

- www.childrenshospital.org
  - 617-355-6000
  - Child life services at children’s 617-355-6551
- www.aap.org
- www.brightfutures.org
- www.kidshealth.org/parent/growth/
Conclusion

What leads to a cooperative patient?

- Communication
- Trust
- Understanding of what is expected of them

Clean and friendly environment
Well trained, informative and friendly staff

- Always remember radiation safety
- Always remember your age competencies