VIRTUAL CHILDREN'S HOSPITAL FOR LEARNING PEDIATRIC NURSING

Moodul 3

Theory material 2:

Medication administration to children

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Content

- Rights of Medication Administration in children
- Different forms and routes for giving medications for children
- Safety of preparing medications for children
- Medication calculations in pediatrics

  According to weight and BSA

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The Rights (7) of Medication Administration

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1. Right patient

Ask for at least 2 identifiers(Name Surname, ID,DOB etc) from a child or a parent

Use waist band or barcode scanning if applicable

Is the identification matching the prescribed order? Does the medication prescription match the child´s diagnosis?

2. Right Medication

Check the medication label. Does the medication label match the order prescribed ?

Be vigilant with look a-like and sound a-like medications

Is the correct medication form (syrup ,pill) according to the age of the child?

3. Right Dose

Does the strength and dosage match the order prescribed?

Calculate dosage accurately and use double checking

Are you sure this is the right amount of medicationfor a child

Check the dose prescribed according to children's BSA and/or weight.

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The Rights of Medication Administration (2)

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4.Right Route

Does the route of medication match the order?
Can medicine be cut, crushed or mixed with other substances?
Is the route of medication prescribed the correct route according to child's condition/ age?

5.Right Time

Does the administration time match the order?

Before administering prescribed medication,

ensure specified time interval has passed

The main purpose of the Rights of Medication Administration is to prevent medication errors!

6.Right Documentation

Document immediately after the medication is administered for patient ´s history and any other medication record if needed

7.Right Response

Assess the child ´s condition if the medication has the right response and document it

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Oral medications

Tablets, capsules, pills ,straws (solid forms)

- Small tablets or capsules are easier to swallow
- Sometimes tablets should be cut or crushed,

or capsules emptied in order to succeeding to give medication to children

- Pharmacies can prepare suitable doses for a child (as a powder)

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Oral medication ctd..

Mixtures, syrups (liquid forms)

- Easier to swallow
- Easier to apply exact dosing
- Flavered liquid medicine is more comfortable for a child
- Using oral syringes (right size)
- Older children can take medicine with syringe / spoon
- For smaller children oral liquid medicine can be applied by setting the tip of the syringe between a cheek and teeth when child is in up-right position
- Pipette can be used for small dosages /drops

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Oral medications ctd.

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New, more suitable forms of medications for children in the future (according to EU regulations)

Oro-dispersible tablet (flavered) as pain killer/ antibiotics

-a tablet dissolves in mouth and absorbs through mucous membranes

-can be dispersed with small amount of liquid

Straw (flavered) is full of pellets of medications

-a child draws the water in through the medication straw and gets medication subject

Lollipop (flavered) as pain killer

- a child sucks the medication from lollipop,
- absorbs through mucous membranes

"Lollipop medicine"

"Straw medicine"

Dispersible medicine

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Inhalations

Aerosols with a spacer and mask
Aeorchamber, Babyhaler) for smaller children

Aerosoles and other inhalers
for older children who are able to inhale

Nebulizer or steamer (Spira)
- inhalation medicine solution +
NaCl 0,9% 2-3 ml added

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Topical medications

- Lotions, ointments, creams, gels
- For skin diseases
- For atopic exzema/dermatitis:

Corticosteroids are use in short periods

Calcineurin inhibitors from 2 yr old

The absorption of topical steroids is much better through hydrated skin; thus, the ideal time for application is in the first 3 minutes after a bath or shower.

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Eye medications

- Mainly for applying antibiotic drops/ointments
- Good hand hygiene
- Child can sit or lie down
- Holding child´s head steady and open upper eye lid
- Drawing gently lower eyelid and apply (drop)medicine into lower eyelid
- Afterwards applying gentle pressure

5-10 secs to the inside corner of the eye, it prevents drops from entering the tear duct and enables them to be absorbed into the eye

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Intranasal medications

- For congestion of nose:

  Drops/sprays of saline

- For analgesia and sedation:

  midazolam, fentanyl, ketamine,dexmedetomidine

- For hypoglykemia:

  glucagon nasal powder

- For seizures

  midazolam nasal

- For vaccine:

  influenza vaccine

Administration:

- simple, rapid, painless
- Liquid form with a syringe and intranasal mucosal atomizing device

Intranasal mucosal atomizing device

https://unicat.msf.org/web/image/product.template/577793/image_1024?unique=6ab076a

https://www.researchgate.net/profile/Sophie-Tribolet-2/publication/358953747/figure/fig3/AS:11431281114725343@1674649925054/ntranasal-administration-in-neonates-summary-Pictures-left-IN-administration-with-the.png

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Ear medications

Topical medication for the ears used fornfection, inflammation and as a local anesthesia

Position the head so that the ear faces upward. when a child lies down on their side and tilts his head.

For children the ear lobe is gently pulled down and back, then applying drops into the ear canal

Keeping the head tilted for about two to five minutes so the drops can spread into the ear.

https://www.healthline.com/health/general-use/how-to-use-ear-drops#stepbystep-instructions

https://encrypted-tbn0.gstatic.com/images?q=tbn:ANd9GcRpvavfVsTYbC1cpcMe9zPuXfkFYtyNDA-tvak-3exaK4FyWSN8KFHm&usqp=CAE&s

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Injections: subcutaneous s.c.

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• For applying insulin, immunoglobulin, methotrexate, antigoaculants , vaccines

• Administered at a 45-degree angle

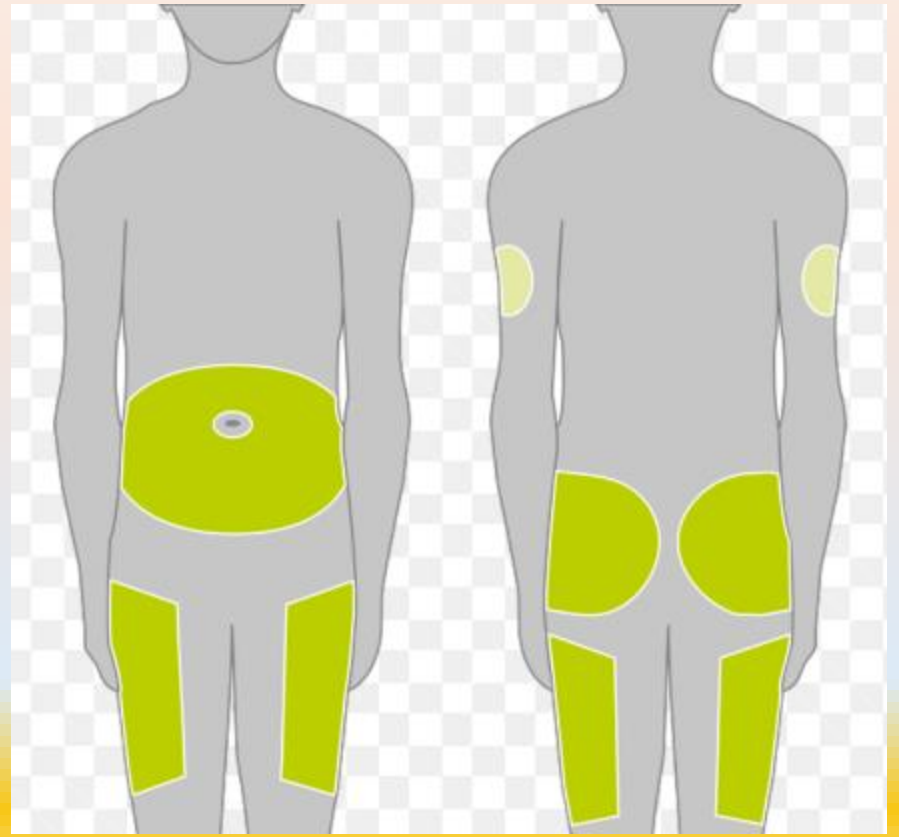
• Sites:

- usually thigh for infants aged <12 months and upper-outer triceps area of children aged ≥12 months. because there are more fatty tissue

-older children also used abdominal site

• Rotating sites is important

• Monitoring side effects: pain, bruices and fat deposits (lumpy area)



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Injections: intramuscular i.m.

- Only sometimes, avoided in children (causes pain)
- adrenaline, antibiotic, vaccines
- Topical anaesthetic cream (EMLA) before if possible
- Sites:

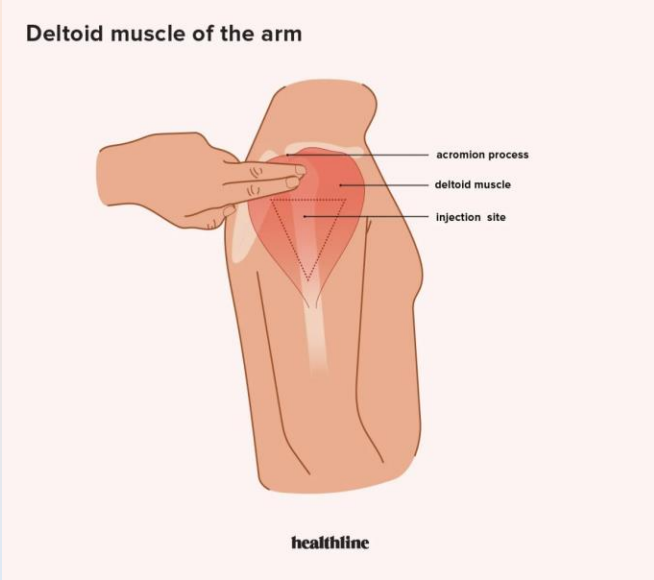
-Babies: front, upper tight muscle (m. vastus lateralis)

-Toddlers: top of upper arm muscle (m. deltoideus)

Babies: vastus lateralis muscle

https://thl.fi/documents/155392151/190385731/Lihaksensis%C3%A4inen-reisi-lapsi-pistopaikka_rajaus.jpg/a52a2385-e24e-7260-6ef0-8ae1ccd5b180?t=1595405976916

Toddlers: deltoid muscle



https://i0.wp.com/post.healthline.com/wp-content/uploads/2022/04/Deltoid-muscle-of-arm-What-Are-Intramuscular-Injections-1296x1103-Body-1.jpg?w=1155&h=2316

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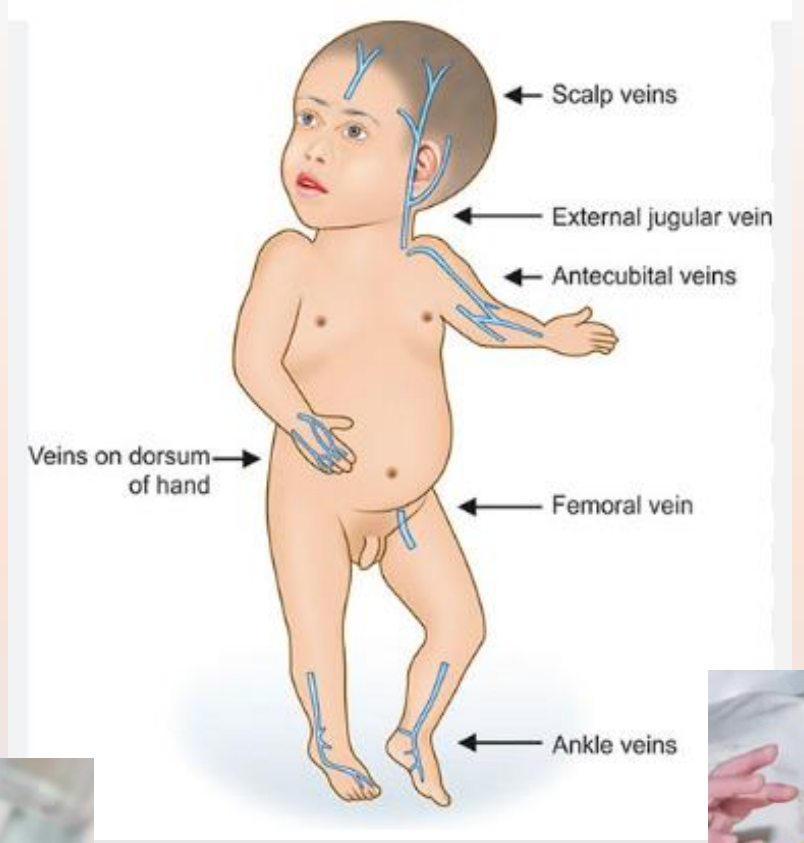
Injections: intravenous i.v.

- Sites of iv. cannulations
- Topical anaesthetic cream (EMLA) used before inserting iv. Lines (as a painkiller)
- Iv. medications used in severe cases
- Exact calculations and right dosages from vials/ampules

Often iv. medicines are diluted with small amount of solution e.g. saline

- Good fixing of cannulas
- Long iv.lines for child to move and play



I.V. Sites of children

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Safety of preparing medications for children

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Correct Dosage

- Accurately measured and current weight of the child
- Correct calculations
- Precisely prepared dosage of medication
- Double checking - practice

Proper Administration

- Right method for administering medication, right form and right route of medication
- Using right dosing device e.g right size of syringe, oral syringes
- Correct use of medical equipments (e.g.perfusor, insuline pump)

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Safety of preparing medication for children ctd..

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Storage

- Keeping all medications out of reach and sight of children

Education

- Teaching children about purpose of medication and how it is administrated
- Giving clear instructions to parents/caregivers about medications: name, dosage, timing and indication

Monitoring

- Effects of medications
- Adverse reactions or side effects
- Success of medication treatment (in hospital + at home)

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Medication calculation in paediatric population

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Universal formula

Weight –Base Dosing

Weight-based dosing is the most used method for calculating recommended medication doses in paediatric clinical practice.

E.g. of doctor prescription:
Cefotaxime 150mg/kg/day

Body Surface Area (BSA) Dosing

BSA is often used in clinical practise over body weight of medication calculation because is the most accurate indicator of metabolic mass.

E.g. of doctor prescription:
Vincristine 1,5mg/m2

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Body surface area (BSA) calculation

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- BSA is expressed in square meters (m2).
- To calculate the BSA, height and weight of the child should be measured.
- The BSA calculation is important to estimate the medication dose and to check if the prescribed daily dose of a medication is correct.

There are two ways to calculate a child's BSA manually:

1. A nomogram

2. Use of a calculation formula:
 There are many formulas used but DuBois Formula is the most used formula to calculate the BSA in clinical practise.

Nowadays, digital patient history programmes calculate the BSA automatically, when you give values of weight and height.

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Manual BSA calculation – Example using DuBois BSA Formula

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*A girl's **height is 110cm** and her **weight is 20 kg** .*

Using the DuBois BSA Formula. What is the child BSA?

$$\text{DuBois Formula: BSA } (m^2) = \sqrt{\frac{\text{Height (cm)} \times \text{Weight (kg)}}{3{,}600}}$$

BSA (m2)= √110 x 20 / √3600 = √2200/ √3600=0,78 m2

The girls BSA is 0,78m2

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BSA Medication Dosing Calculation -Example

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The medication dose of a 2-year-old child prescribed by the physician was 5mg/m2/day by mouth for 10 days.

The child weight is 11 kg and the height 85cm.

What is the daily dose of medication the patient will receive ?Use the DuBois Formula to calculate the child's BSA.

Steps:

1.Calculate the child's **BSA** using the formula.

√85cm x 11 kg / 3600 = √0,26 =**0,51**m2

DuBois Formula: $BSA\ (m^2) = \sqrt{\frac{Height\ (cm) \times Weight\ (kg)}{3,600}}$

2.Use the **prescribed dose** per unit BSA :**5mg/m2/day**

3.Multiply the dose per unit BSA by the child's BSA to get the total dose.

5 mg/m2 x0,51 m2=2,55 mg

Example: *If the prescribed dose is 5 mg/m2 and the child's BSA is 0.51m2 :*

Medication Dose = 5 mg/m2 ×0.51 m2=2.55 mg (based on BSA dose of the child)

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Universal formula
Weight –Base Dosing

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Calculation Formula:

Daily dose (mg/day) = Patient weight (kg) x Dosage for one day ((mg or ml)/kg)

Steps:

1. Determine the child's weight in kilograms (kg).
2. Use the prescribed dose per unit weight (e.g, mg/kg).
3. Multiply the dose per weight by the child's weight to get the total daily dose.

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SCENARIO 1: Example of Safely prepare medication using Universal formula:

Example: *A premature neonate female ,weights 1700gr.*

The physician prescribed CEFOTAXIME IV is 150 mg/kg TDS.

Universal formula

$$\frac{\text{D (desired amount)}}{H\ (amount\ on\ hand)} \times Q\ (quantity) = Dose$$

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1. ***Check the child's weight*** *. Weights 1700gr.*

Covered the weight to Kg. if 1000gr=1Kg then 1700gr =x kg Weight 1,7kg

2. ***The prescribed dose*** *per weight is 150 mg /kg TDS(3 times a day)*

3. ***Total dose calculation*** *: 1,7 x 150 mg/ = 255mg 3 TIMES A DAY or EVERY 8 HOURS*

4. After we checked that the prescribed amount on the medication administration form for the child was correct and signed by the physician ,we need to ***calculate the total amount of medication need in ml.***

5. To calculate the amount of medication to give based on the prescribed mg/kg we will use the universal formula .

6. We have received the following vials from the pharmacy .After we inject the water for injection 10 ml in the cefotaxime vial 1gr we have 1gr of the medicine in 10ml . 1gr =1000mg in10ml

7. The desire amount was (255 /1000) x 10ml =2550/1000=2,55ml

8. We need to take 2.55 ml from the vial to give the prescribed dose of 255 mg/ per dose 3 times a day(based on child kilos and the amount per kilo of medicine prescribed).

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TURKU AMK
TURKU UNIVERSITY OF APPLIED SCIENCES

Cyprus University of Technology

TARTU TERVISHOIU KÕRGKOOL
TARTU APPLIED HEALTH SCIENCES UNIVERSITY

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