



THE COMPLETE

Nursing School BUNDLE

BROUGHT TO YOU BY

NURSE
in the making

TABLE OF CONTENTS

Head To Toe Assessment	4
Dosage Calculation	6
Lab Value Cheat Sheet.....	18
Lab Value Memory Tricks	19
Blood Types	20
Fundamentals.....	21
Pharmacology: Suffixes, Prefixes, & Antidotes.....	41
Mental Health Disorders	49
Mental Health Pharmacology	59
Mother Baby	65
Pediatric Milestones.....	82
Med-Surg	
Renal / Urinary System	87
Cardiac System	97
Endocrine System	118
Respiratory Disorders	128
Hematology Disorders.....	133
Gastrointestinal Disorders	136
Neurological Disorders.....	140
Burns.....	145
ABG's	149

HEAD-TO-TOE ASSESSMENT

→
INSPECT
PALPATE
PERCUSS
AUSCULTATE

Introduction

- Knock
- Introduce yourself
- Wash hands
- Provide privacy
- Verify patient ID and DOB
- Explain what you are doing (using non-medical language)

Orientation

- What is your name?
- Do you know where you are?
- Do you know what month it is?
- Who is the current U.S. president?
- What are you doing here?
- A&O X4 = Oriented to Person, Place, Time, and Situation

"Normal" Vital Signs

PULSE: 60-100 bpm

BLOOD PRESSURE: 120/80 mmHg

O2 SATURATION: 95-100%

TEMPERATURE: 97.8-99.1° F

RESPIRATIONS: 12-20 breaths per min

Head & Face

HEAD

- Inspect head/scalp/hair
- Palpate head/scalp/hair

FACE

- Inspect
- Check for symmetry
 - To assess Cranial Nerve 7, check the following:
 - Raise eyebrows
 - Smile
 - Frown
 - Show teeth
 - Puff out cheeks
 - Tightly close eyes

EYES

- Inspects external eye structures
- Inspect color of conjunctiva and sclera
- PERRLA
 - **P**upils **E**qual, **R**ound, **R**eactive to **L**ight, & **A**ccommodation

Neck, (Chest (Lungs) & Heart

NECK

- Inspect and palpate
- Palpate carotid pulse
- Check skin turgor (under clavicle)

POSTERIOR CHEST

- Inspect
- Auscultate lung sounds in posterior and lateral chest
 - Note any crackles or diminished breath sounds

ANTERIOR CHEST

- Inspect:
 - Use of accessory muscles
 - AP to transverse diameter
 - Sternum configuration
- Palpate: symmetric expansion
- Auscultate lung sounds – anterior and lateral
 - Note any crackles or diminished breath sounds

HEART

- Auscultate heart sounds (A, P, E, T, M) with diaphragm and bell
 - Note any murmurs, whooshing, bruits, or muffled heart sounds

Peripherals

PERIPHERALS

Upper extremities

- Inspect and palpate.
- Note any texture, lesions, temperature, moisture, tenderness, & swelling
- Palpate radial pulses bilaterally (+1, +2, +3, +4)

SHOULDER

- Inspect, palpate, and assess

ELBOWS

- Inspect, palpate, and assess

HANDS AND FINGERS

- Inspect hands/fingers/nails
- Palpate hands and finger joints
- Check muscle strength of hands bilaterally
 - Does each hand grip evenly?

+1 = Diminished
+2 = "Normal"

+3 = Full
+4 = Bounding, strong

Spine

- Have the patient stand up (if able)
- Inspect the skin on the back
- Inspect: spinal curvature (cervical/thoracic/lumbar)
- Palpate spine
- Note any lesions, lumps, or abnormalities

Lower Extremities (hips, knees, ankles)

LOWER EXTREMITIES

- Inspect:
 - Overall skin coloration
 - Lesions
 - Hair distribution
 - Varicosities
 - Edema
- Palpate: Check for edema (pitting or non-pitting)
- Check capillary refill bilaterally

HIPS

- Inspect and palpate

KNEES

- Inspect and palpate

ANKLES

- Inspect and palpate
- Post tibial pulse (+1, +2, +3, +4)
- Dorsal pedis pulse bilaterally (+1, +2, +3, +4)
 - Check strength bilaterally
 - Dorsiflexion flexion against resistance

Abdomen

- Inspect:
 - Skin color
 - Contour
 - Scars
 - Aortic pulsations
- Auscultate bowel sounds: all 4 quadrants (start in RLQ and go clockwise)
- Light palpation: all 4 quadrants

ABSENT: Must listen for at least 5 minutes to chart absent bowel sounds

HYPOACTIVE: One bowel sound every 3-5 minutes

NORMOACTIVE: Gurgles 5-30 time per minute

HYPERACTIVE: Can sometimes be heard without a stethoscope constant bowel sounds, > 30 sounds per minute

OVERALL

- Positions and drapes patient appropriately during exam (gave patient privacy)
- Gave patient feedback/instructions
- Exhibits professional manner during exam, treated patient with respect and dignity
- Organized: exam followed a logical sequence (order of exam "made sense")

DOSAGE CALCULATION

ABBREVIATIONS

TIMES OF MEDICATIONS

ac	before meals
pc	after meals
daily	every day
bid	two times a day
tid	three times a day
qid	four times a day
qh	every hour
ad lib	as desired
stat	immediately
q2h	every 2 hours
q4h	every 4 hours
q6h	every 6 hours
prn	as needed
hs	at bedtime

EXAMPLE

A patient is receiving 1 mg **tid**.
How many mg will they receive in one day?

Remember: **tid** = 3X a day

Answer: if they are receiving 1 mg for 3X a day,
that's $1 \text{ mg} \times 3 = 3 \text{ mg}$ per day

ROUTES OF ADMINISTRATION

PO	by mouth
IM	intramuscularly
PR	per rectum
SubQ	subcutaneously
SL	sublingual
ID	intradermal
GT	gastrostomy tube
IV	intravenous
IVP	intravenous push
IVPB	intravenous piggyback
NG	nasogastric tube

DRUG PREPARATION

tab, tabs	tablet
cap, caps	capsule
gtt	drop
EC	enteric coated
CR	controlled release
susp	suspension
el, elix	elixir
sup, supp	suppository
SR	sustained release

METRIC

g (gm, Gm)	gram
mg	milligram
mcg	microgram
kg (Kg)	kilogram
L	liter
mL	milliliter
mEq	milliequivalent

APOTHECARY AND HOUSEHOLD

gtt	drop
min, m, mx	minim
tsp	teaspoon
pt	pint
gal	gallon
dr	dram
oz	ounce
T, tbs, tbsp	tablespoon
qt	quart

CONVERSIONS

BASED ON VOLUME

$$1 \text{ mg} = 1,000 \text{ mcg}$$

$$1 \text{ g} = 1,000 \text{ mg}$$

$$1 \text{ oz} = 30 \text{ mL}$$

$$8 \text{ oz} = 1 \text{ cup}$$

$$1 \text{ tsp} = 5 \text{ mL}$$

$$1 \text{ dram} = 5 \text{ mL}$$

$$1 \text{ tbsp} = 15 \text{ mL}$$

$$1 \text{ tbsp} = 3 \text{ tsp}$$

$$1 \text{ L} = 1,000 \text{ mL}$$

$$1 \text{ mL} = 15 \text{ gtts (drops)}$$

THE METRIC SYSTEM

Large unit to small unit → move decimal to the right

Small unit to large unit → move decimal to the left



Moving to a larger unit? Move the decimal place to the Left
(Ex: mcg → mg) (Larger unit think Left)

EXAMPLE

$$1500 \text{ mcg} = \underline{\hspace{1cm}} \text{ mg}$$

A “mg” is **larger** (Larger unit think Left) than a “mcg”
Therefore you move decimal 3 places to the Left

$$1500. \text{ mcg} = \underline{1.500} \text{ mg (1.5 mg)}$$

BASED ON WEIGHT

$$1 \text{ kg} = 2.2 \text{ lbs}$$

$$1 \text{ lb} = 16 \text{ oz}$$

$$\text{lb} \rightarrow \text{kg} \quad \text{DIVIDE by 2.2}$$

Example:

$$120 \text{ lbs} = \underline{\hspace{1cm}} \text{ kg}$$

$$120 \text{ lbs} / 2.2 = 54.545 \text{ kg}$$

$$\text{kg} \rightarrow \text{lb} \quad \text{MULTIPLY by 2.2}$$

Example:

$$45.6 \text{ kg} = \underline{\hspace{1cm}} \text{ lb}$$

$$45.6 \text{ kg} \times 2.2 = 100.32 \text{ lb}$$

DOSAGE CALC RULES

KEY

Medication errors kill,
PREVENTION is crucial!

1

Show ALL your work.

2

Leading zeros must be placed before any decimal point.

The decimal point may be missed without the zero

EXAMPLE

.2 mg should be **0.2** mg

WHY? .2 could appear to be 2

(0.2 mg of morphine is VERY different than 2 mg of morphine!)

3

No trailing zeros.

0.7 mL NOT 0.70 mL

1 mg NOT 1.0 mg

WHY? 1.0 could appear to be 10!

4

DO NOT round until you have the final answer!

HOW TO ROUND YOUR FINAL ANSWER

If the number
in the thousands place
is 5 or greater → The # in the hundredth place is rounded up

EXAMPLES: 1.995 mg is rounded to 2 mg
1.985 mg is rounded to 1.99 mg

If the number
in the thousands place
is 4 or less → The # is dropped

EXAMPLE: 0.992 mg is rounded to 0.99 mg

DECIMAL REFERENCE GUIDE

34.732

tens
ones
tenths
hundredths
thousandths

5

Most nursing schools, if not all, do not give partial credit.

(THIS MEANS EVERY STEP MUST BE DONE CORRECTLY!)

FORMULA METHOD

(FOR VOLUME-RELATED DOSAGE ORDERS)

$$\frac{D}{H} \times V = A$$

D = DESIRED

Example: "The physician orders **120 mg**..."

NOTE:

Some medications like Heparin and Insulin are prescribed in units/hour

H = DOSAGE OF MEDICATION AVAILABLE

Example: "The medication is supplied as **100 mg**/5 mL"

V = VOLUME THE MEDICATION IS AVAILABLE IN

Example: "The medication is supplied as 100 mg/**5 mL**"

A = AMOUNT OF MEDICATION REQUIRED FOR ADMINISTRATION

Your answer

KEY

You should assume that all questions are asked "per dose" unless the question gives a timeframe (example: "how many tablets will you give in 24 hours?")

EXAMPLE 1

Ordered: **Drug C 150 mg**

Available: **Drug C 300 mg/tab**

How many tablets should be given?

$$\frac{D}{H} \times V = A$$

What's our desired? **Drug C 150mg PO**

What do we have? **Drug C 300mg/tab**

What's our quantity/volume? **tablets**

$$\cancel{150 \text{ mg}} \div \cancel{300 \text{ mg}} \times 1 \text{ tab} = 0.5 \text{ tabs}$$
$$150 \div 300 = 0.5 \times 1 = 0.5 \text{ tabs}$$

FINAL ANSWER: **0.5 tabs**

EXAMPLE 2

Ordered: **Drug C 10,000 units SubQ**

Available: **Drug C 5,000 units/mL**

How many mL should be given?

$$\frac{D}{H} \times V = A$$

What's our desired? **Drug C 10,000 SubQ**

What do we have? **Drug C 5,000 units**

What's our quantity/volume? **1 mL**

$$\cancel{10,000 \text{ units}} \div \cancel{5,000 \text{ units}} \times 1 \text{ mL} = 2 \text{ mL}$$
$$10,000 \div 5,000 = 2 \times 1 = 2 \text{ mL}$$

FINAL ANSWER: **2 mL**

IV FLOW RATES

mL / hour

$$\frac{\text{mL of solution}}{\text{total hours}} = \text{mL/hr}$$

NOTE:

If the question is asking for flow rate and you're given units of mL, you need to write the answers in **mL/hr!**

NOTE:

mL/hr is always rounded to the nearest whole number!

What if the question is given in minutes?

Since there are 60 minutes in one hour, use this formula:

$$\frac{\text{mL of solution}}{\text{min}} \times 60 = \text{mL/hr}$$

(minutes)

EXAMPLE #1

Ordered: 1000 mL D5W to infuse over 3 hours. What will the flow rate be?

$$\frac{1000 \text{ mL}}{3 \text{ hr}} = 333.333 \text{ mL/hr}$$

ANSWER: **333 mL/hr**
(rounded to the nearest whole number)

EXAMPLE #2

Ordered: Infuse 3 grams of Penicillin in 50 mL normal saline over 30 minutes.

$$\frac{50 \text{ mL}}{30 \text{ min}} \times 60 = 100 \text{ mL/hr}$$

ANSWER: **100 mL/hr**

gtt / min

$$\frac{\text{mL of solution}}{\text{total minutes}} \times \text{drop factor} = \text{gtt/min}$$

NOTE:

If a drop factor is included, the question is asking for flow rate in gtt/min.

You need to write the answers in **gtt/minute!**

Remember our abbreviations:
gtt means "drop"!

What if the question is given in hours?

Convert hours to minutes!

For example: 1 hours = 60 minutes
2.5 hours = 150 minutes

EXAMPLE #1

Ordered: 1000 mL of Lactated Ringer's to infuse at 50 mL/hour. Drop factor for tubing is a 5 gtt/mL. (Convert: 1 hour = 60 min)

$$\frac{50 \text{ mL}}{60 \text{ min}} \times 5 \text{ gtt/mL} = 4 \text{ gtt/min}$$

$50 \div 60 = 0.833 \times 5 = 4.166$
Round to the nearest whole number → **4**

FINAL ANSWER: **4 gtt/min**

NOTE:

Remember Rule #4
Don't round till the end!

EXAMPLE #2

Ordered: 100 mL of Metronidazole to infuse over 45 minutes. The tubing you are using has a drop factor of 10 gtt/mL.

$$\frac{100 \text{ mL}}{45 \text{ min}} \times 10 \text{ gtt/mL} = 22 \text{ gtt/min}$$

$100 \div 45 = 2.222 \times 10 = 22.222$
Round to the nearest whole number → **22**

FINAL ANSWER: **22 gtt/min**

NOTE:

Remember Rule #4
Don't round till the end!

PRACTICE QUESTIONS

Do all 10 questions without looking at the correct answers on the following pages. Don't forget to show all your work. After you are done, walk through each question...even the questions you got correct!

1 ORDERED: Rosuvastatin 3000 mcg PO ac
AVAILABLE: Rosuvastatin 2 mg tablet (scored)
How many tabs will you administer in 24 hours?

2 ORDERED: Tylenol supp 2 g PR q6h
AVAILABLE: Tylenol supp 700 mg
**How many supp will you administer?
Round to nearest tenth.**

3 ORDERED: Potassium chloride 0.525 mEq/lb PO
dissolved in 6 oz of juice at 0930
AVAILABLE: Potassium chloride 12 mEq/mL
**How many mL of potassium chloride
will you add to the juice for a 66.75 kg
patient? Round to nearest tenth.**

4 1000 mL D5W to infuse over 4 hours.

5 150 mL Cipro 250 mcg
to infuse over 45 minutes.

6 250 mL normal saline over 5 hours.
Tubing drop factor of 10 gtt/mL.

7 Humulin R 200 units in 100 mL of normal
saline to infuse at 4 units/hr.

8 Dopamine 600 mg in 200 mL of normal saline to
infuse at 10mcg/kg/min. Pt weight = 190 lbs.

9 2.5 L normal saline to infuse over 48 hours.

10 ORDERED: Morphine 100 mg IM q12h prn pain
AVAILABLE: Morphine 150 mg/2.6 mL
**How many mL will you administer?
Round to nearest hundredth.**

COMPREHENSIVE REVIEW

1

ORDERED: Rosuvastatin 3000 mcg PO ac
AVAILABLE: Rosuvastatin 2 mg tablet (scored)

How many tabs will you administer in 24 hours?

STEP 1: CONVERT DATA

mcg → mg

$$3000 \text{ mcg} = 3 \text{ mg}$$

Remember: small to big, move the decimal point
3 to the left (unit is getting Larger think Left)

STEP 2: READY TO USE DATA

Ordered: 3 mg

Available: 2 mg

Volume: 1 tab

Administered ac: before each meal

Question is asking: dosage in 24 hours

STEP 3: IRRELEVANT DATA

N/A

STEP 4: FORMULA USED

$$\frac{D}{H} \times V = A$$

SHOW YOUR WORK

$$\frac{3 \cancel{\text{mg}}}{2 \cancel{\text{mg}}} = 1.5$$

$$1.5 \times 1 \text{ tab} = 1.5$$

$$1.5 \times 3 = 4.5 \text{ tabs per day}$$

ROUND: No rounding necessary

FINAL ANSWER: 4.5 tabs

NOTE:

Don't forget to check times of medication! The medication is ordered to be given AC, which means before each meal. Since there are 3 meals in a day (24 hours), the answer must be multiplied by 3.

2

ORDERED: Tylenol supp 2 g PR q6h
AVAILABLE: Tylenol supp 700 mg

How many supp will you administer? Round to nearest tenth.

STEP 1: CONVERT DATA

g → mg

$$2 \text{ g} = 2000 \text{ mg}$$

Remember: big to small, move the decimal point
3 to the right

STEP 2: READY TO USE DATA

Ordered: 2000 mg

Available: 700 mg

Volume: 1 supp

STEP 3: IRRELEVANT DATA

N/A

STEP 4: FORMULA USED

$$\frac{D}{H} \times V = A$$

SHOW YOUR WORK

$$\frac{2000 \cancel{\text{mg}}}{700 \cancel{\text{mg}}} = 2.857$$

$$2.857 \times 1 \text{ supp} = 2.857 \text{ supp}$$

ROUND: Nearest tenth

$$2.857 \text{ supp} \rightarrow 2.9 \text{ supp}$$

FINAL ANSWER: 2.9 supp

NOTE:

Remember Rule #4
Don't round till the end!

COMPREHENSIVE REVIEW

3

ORDERED: Potassium chloride 0.525 mEq/lb PO dissolved in 6 oz of juice at 0930
AVAILABLE: Potassium chloride 12 mEq/mL
How many mL of potassium chloride will you add to the juice for a 66.75 kg patient? Round to nearest tenth.

STEP 1: CONVERT DATA

kg → lb

$$66.75 \text{ kg} \times 2.2 \text{ (lb/kg)} = 146.85 \text{ lb}$$

mEq/lb → mEq

$$(0.525 \text{ mEq/lb} \times 146.85 \text{ lb}) = 77.096 \text{ mEq}$$

NOTE:

In this case, ordered amount depends on patient weight

STEP 2: READY TO USE DATA

Ordered: 77.096 mEq

Available: 12 mEq

Volume: 1 mL

STEP 3: IRRELEVANT DATA

Dissolved in 12 oz of juice at 0930

KEY

Question asked for "per dose" because no timeframe was given

STEP 4: FORMULA USED

$$\frac{D}{H} \times V = A$$

SHOW YOUR WORK

$$\frac{77.096 \text{ mEq}}{12 \text{ mEq}} = 6.424$$

$$6.424 \times 1 \text{ mL} = 6.424 \text{ mL}$$

ROUND: Nearest tenth

$$6.424 \text{ mL} \rightarrow 6.4 \text{ mL}$$

FINAL ANSWER: 6.4 mL

4

1000 mL D5W to infuse over 4 hours.

STEP 1: CONVERT DATA

N/A

STEP 2: READY TO USE DATA

1000 mL

4 hr

STEP 3: IRRELEVANT DATA

N/A

STEP 4: FORMULA USED

$$\frac{\text{mL of solution}}{\text{total hours}} = \text{mL/hr}$$

SHOW YOUR WORK

$$\frac{1000 \text{ mL}}{4 \text{ hr}} = 250 \text{ mL/hr}$$

NOTE:

mL/hr is always rounded to nearest whole number!

ROUND: No rounding necessary

FINAL ANSWER: 250 mL/hr

COMPREHENSIVE REVIEW

5

150 mL Cipro 250 mcg to infuse over **45 minutes**.

Remember:

If the question is asking for flow rate ("to infuse") and you're given mL of solution, you need to write the answer in **mL/hours!**

STEP 1: CONVERT DATA

N/A

STEP 2: READY TO USE DATA

mL of solution: 150 mL
total hours: 45 min

STEP 3: IRRELEVANT DATA

Cipro 250 mcg

Important: don't let this information lead you to use the wrong formula. In this example, we're asked for a flow rate which requires mL of solution and total time.

STEP 4: FORMULA USED

$$\frac{\text{mL of solution}}{\text{total minutes}} \times 60 = \text{mL/hr}$$

SHOW YOUR WORK

$$\frac{150 \text{ mL}}{45 \text{ min}} = 3.333 \times 60 = 200 \text{ mL/hr}$$

NOTE:

Remember rule #4
Don't round till the end!

NOTE:

mL/hr is always rounded to nearest whole number!

ROUND: No rounding necessary

FINAL ANSWER: 200mL/hr

6

250 mL normal saline over **5 hours**.
Tubing drop factor of **10 gtt/mL**.

STEP 1: CONVERT DATA

hr → min

1 hour = 60 minutes

$$5 \text{ hr} \times \frac{60 \text{ min}}{1 \text{ hr}} = 300 \text{ min}$$

STEP 2: READY TO USE DATA

mL of solution: 250 mL
total minutes: 300 min
Drop factor: 10 gtt/mL

STEP 3: IRRELEVANT DATA

N/A

STEP 4: FORMULA USED

$$\frac{\text{mL of IV solution}}{\text{time in minutes}} \times \text{drop factor} = \text{gtt/min}$$

SHOW YOUR WORK

$$\frac{250 \text{ mL}}{300 \text{ min}} = 0.8333 \text{ mL/min}$$

$$0.8333 \text{ mL/min} \times 10 \text{ gtt/mL} = 8.3333 \text{ gtt/min}$$

ROUND: gtt/mL is always rounded to the nearest whole number!

$$8.3333 \text{ gtt/min} \rightarrow 8 \text{ gtt/min}$$

NOTE:

Don't round till the end!

NOTE:

The question may not specify to round the final answer to a whole number; you are expected to know this with gtt/min units.

FINAL ANSWER: 8 gtt/min

COMPREHENSIVE REVIEW

7

Humulin R **200 units** in **100 mL** of normal saline to infuse at **4 units/hr**.

STEP 1: CONVERT DATA

N/A

STEP 2: READY TO USE DATA

Desired: 4 units/hr
Available: 200 units
Volume: 100 mL

STEP 3: IRRELEVANT DATA

N/A

STEP 4: FORMULA USED

$$\frac{D}{H} \times V = A$$

SHOW YOUR WORK

$$\frac{4 \text{ units/hr}}{200 \text{ units}} = 0.02 \text{ /hr}$$

$$0.02 \text{ /hr} \times 100 \text{ mL} = 2 \text{ mL/hr}$$

ROUND: No rounding necessary

FINAL ANSWER: 2 mL/hr

NOTE:
mL/hr is always rounded to nearest whole number!

8

Dopamine **600 mg** in **200 mL** of normal saline to infuse at **10 mcg/kg/min**.
Pt weight = 190 lbs.

Remember:

If the question is asking for flow rate ("to infuse") and you're given mL of solution, you need to write the answer in mL/hr!

STEP 1: CONVERT DATA

$$\text{mcg} \rightarrow \text{mg}$$

$$10 \text{ mcg} = 0.010 \text{ mg}$$

$$\text{lb} \rightarrow \text{kg}$$

$$190 \text{ lb} / 2.2 = 86.363 \text{ kg}$$

$$\frac{\text{mg/kg}}{\text{min}} \rightarrow \frac{\text{mg}}{\text{min}}$$

$$0.010 \text{ mg/kg/min} \times 86.363 \text{ kg} = 0.863 \text{ mg/min}$$

Remember:

Small to big: move the decimal point 3 to the left (unit is getting Larger think Left)

KEY

In this case, ordered amount depends on patient weight

STEP 2: READY TO USE DATA

Desired: 0.863 mg/min
Available: 600 mg
Volume: 200 mL

STEP 3: IRRELEVANT DATA

N/A

STEP 4: FORMULA USED

$$\frac{D}{H} \times V = A$$

SHOW YOUR WORK

$$\frac{0.863 \text{ mg/min}}{600 \text{ mg}} = 0.00143 \text{ /min}$$

$$0.00143 \text{ /min} \times 200 \text{ mL} = 0.2878 \text{ mL/min}$$

$$0.2878 \text{ mL/min} \times 60 \text{ min} = 17.2727 \text{ mL/hr}$$

ROUND: mL/hr is always rounded to nearest whole number!

$$17.2727 \text{ mL/hr} \rightarrow 17 \text{ mL/hr}$$

FINAL ANSWER: 17 mL/hr

WAIT!

This is mL/min... we need units of mL/hr!

COMPREHENSIVE REVIEW

9

2.5 L normal saline to infuse over 48 hours.

Remember:

If the question is asking for flow rate ("to infuse") and you're given mL of solution, you need to write the answer in **mL/hours!**

STEP 1: CONVERT DATA

L → mL

Remember: big to small, move the decimal point 3 to the right

2.5 L = **2500 mL**

STEP 2: READY TO USE DATA

mL of solution: **2500 mL**

total hours: **48 hr**

STEP 3: IRRELEVANT DATA

N/A

STEP 4: FORMULA USED

$$\frac{\text{mL of solution}}{\text{total hours}} = \text{mL/hr}$$

SHOW YOUR WORK

$$\frac{2500 \text{ mL}}{48 \text{ hours}} = 52.0833 \text{ mL/hr}$$

ROUND: mL/hr is always rounded to nearest whole number!

52.0833 mL/hr → **52 mL/hr**

FINAL ANSWER: 52 mL/hr

10

ORDERED: Morphine **100 mg** IM q12h prn pain

AVAILABLE: Morphine **150 mg/2.6 mL**

How many mL will you administer?

Round to nearest hundredth.

STEP 1: CONVERT DATA

N/A

STEP 2: READY TO USE DATA

Ordered: **100 mg**

Available: **150 mg**

Volume: **2.6 mL**

STEP 3: IRRELEVANT DATA

IM q12h prn pain

KEY

Question asked for "per dose" because no timeframe was given

STEP 4: FORMULA USED

$$\frac{D}{H} \times V = A$$

SHOW YOUR WORK

$$\frac{100 \text{ mg}}{150 \text{ mg}} = 0.6666$$

$$0.6666 \times 2.6 \text{ mL} = 1.7333 \text{ mL}$$

ROUND: nearest hundredth

1.7333 mL → **1.73 mL**

FINAL ANSWER: 1.73 mL

LAB VALUE CHEAT SHEET

VITAL SIGNS

- Blood pressure
 - Systolic: 120 mmHg
 - Diastolic: 80 mmHg
- Heart Rate: 60 - 100 BPM
- Respirations: 12 - 20 Breaths per min
- Oxygen: 95% - 100%
- Temperature: 97.8 °F - 99 °F

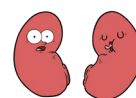


BASAL METABOLIC PANEL (BMP)

- Sodium: 135 - 145 mEq/L
- Potassium: 3.5 - 5.0 mEq/L
- Chloride: 95 - 105 mEq/L
- Calcium: 9 - 11 mg/dL
- BUN: 7 - 20 mg/dL
- Creatinine: 0.6 - 1.2 mg/dL
- Albumin: 3.4 - 5.4 g/dL
- Total protein: 6.2 - 8.2 g/dL

RENAL

- Calcium: 9 - 11 mg/dL
- Magnesium: 1.5 - 2.5 mg/dL
- Phosphorus: 2.5 - 4.5 mg/dL
- Specific gravity: 1.010 - 1.030
- GFR: 90 - 120 mL/min/1.73 m²
- BUN: 7 - 20 mg/dL
- Creatinine: 0.6 - 1.2 mg/dL



LIVER FUNCTION TEST (LFT)

- ALT: 7 - 56 U/L
- AST: 5 - 40 U/L
- ALP: 40 - 120 U/L
- Bilirubin: 0.1 - 1.2 mg/dL



LIPID PANEL

- Total cholesterol: <200 mg/dL
- Triglyceride: <150 mg/dL
- LDL: <100 mg/dL → Bad cholesterol
- HDL: >60/dL → Happy cholesterol

HbA1c

- Non-diabetic: 4 - 5.6%
- Pre-diabetic: 5.7 - 6.4%
- Diabetic: > 6.5% (GOAL for diabetic: < 6.5%)



PANCREAS

- Amylase: 30 - 110 U/L
- Lipase: 0 - 150 U/L



ABG'S

- PH: 7.35 - 7.45
- PaCO₂: 35 - 45 mmHg
- PaO₂: 80 - 100 mmHg
- HCO₃: 22 - 26 mEq/L



REMEMBER
ROME

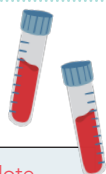
Respiratory
Opposite
Metabolic
Equal

COAGs

- PT: 10 - 13 sec
- PTT: 25 - 35 sec
- aPTT: 30 - 40 sec (heparin)
- INR
 - NOT ON Warfarin < 1 sec
 - ON Warfarin 2 - 3 sec

COMPLETE BLOOD COUNT (CBC)

- WBC: 4,500 - 11,000
- RBC's: 4.5 - 5.5
- PLT: 150,000 - 450,000
- Hemoglobin (Hgb)
 - Female: 12 - 16 g/dL
 - Male: 13 - 18 g/dL
- Hematocrit (HCT)
 - Female: 36% - 48%
 - Male: 39% - 54%



OTHER

- MAP: 70 - 100 mmHg
- ICP (intracranial pressure): 5 - 15 mmHg
- BMI: 18.5 - 24.9
- Glasgow coma scale: Best = 15
 - Mild: 13-15
 - Moderate: 9-12
 - Severe: 3-8

	Measured with	Therapeutic Range	Antidote
HEPARIN	aPTT	1.5 - 2.0 x normal "control" value	Protamine Sulfate
WARFARIN	PT/INR	1.5 - 2.0 x normal "control" value	Vitamin K

*The higher these numbers = higher chance of bleeding

LAB VALUE MEMORY TRICKS

ELECTROLYTES

SODIUM: 135 - 145

*Commit to memory!



POTASSIUM: 3.5 - 5

BANANAS:

There are about 3-5 in every bunch & you want them half ripe ($\frac{1}{2}$)

So, think 3.5 - 5.0



PHOSPHORUS: 2.5 - 4.5

PHOR: 4

US: 2 (me + you = 2)



*don't forget the .5

CALCIUM: 9 - 11

CALL 911



MAGNESIUM: 1.5 - 2.5

MAGnifying glass you see 1.5 - 2.5 bigger than normal



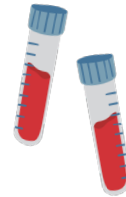
CHLORIDE: 95 - 105

Think of a chlorinated pool that you want to go in when it's **SUPER HOT:** 95 - 105 °F



COMPLETE BLOOD COUNT (CBC)

- Hemoglobin (Hgb)
 - Female:** 12 - 16 g/dL
 - Male:** 13 - 18 g/dL
- Hematocrit (HCT)
 - Female:** 36% - 48%
 - Male:** 39% - 54%



To remember HCT, multiply Hgb by 3

$12 \times 3 = 36$ (Female)
 $16 \times 3 = 48$
 $13 \times 3 = 39$ (Male)
 $18 \times 3 = 54$

BASAL METABOLIC PANEL (BMP)

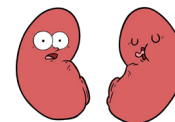
BUN: 7 - 20 mg/dL

Think hamburger **BUN**s...
Hamburgers can cost anywhere from \$7 - \$20 dollars

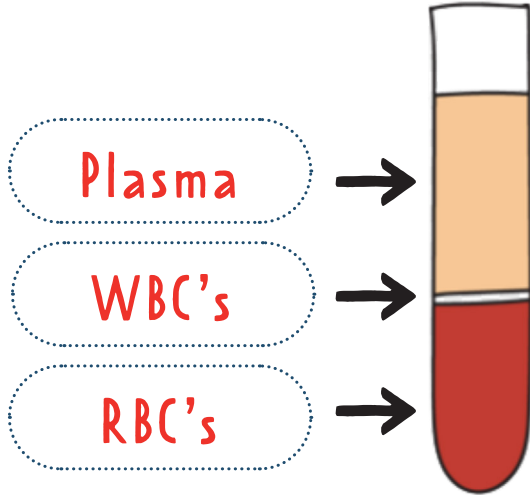


CREATININE: 0.6 - 1.2 mg/dL

This is the same value as **LITHIUM's** therapeutic range (0.6 - 1.2 mmol/L)
Lithium is excreted almost solely by the kidneys...
And creatinine is a value that tests how well your kidneys filter



BLOOD TYPES



ANTIGENS:

Proteins that elicit immune response

Identifies the cell

PLASMA ANTIBODIES

Protects body from "invaders" (think ANTI)

Opposite of the type of antigen that is found on the RBC

A

Antigen: A

Antibodies: B

Recipient: A, O

Donor: A, AB

B

Antigen: B

Antibodies: A

Recipient: B, O

Donor: B, AB

AB

Universal
RECIPIENT

Antigen: A & B

Antibodies: NONE

Recipient: ALL

Donor: AB

O

Universal
DONOR

Antigen: NONE

Antibodies: A & B

Recipient: O

Donor: ALL

Rh FACTOR



Has Rh on surface



Does not have Rh on surface

Can receive



Can receive



FUNDAMENTALS

ABBREVIATIONS

AbdAbdomen	ICUIntensive care unit
A.B.G.Arterial blood gas	I&OIntake & output
ADLActivities of daily living	IMIntramuscular
a.c.Before meals	IVIntravenous
A&OAlert & oriented	NGTNasogastric tube
BPBlood Pressure	NPONothing by mouth
d/cDiscontinue	CPRCardiopulmonary resuscitation
H&HHemoglobin & hematocrit	PPEPersonal protective equipment
DNRDo not resuscitate	POBy mouth
DXDiagnosis	p.r.n.As needed
ECGElectrocardiogram	ROMRange of motion
FxFracture	S&SSigns & symptoms
h.s.At bedtime	StatImmediately
HOBHead of bed	U/AUrinalysis
HOHHard of hearing	VSVital signs
H&PHistory & physical	PERRLAPupils equal, round, & reactive to light & accommodation
HRHeart rate	

DO NOT USE	POTENTIAL PROBLEM	INSTEAD WRITE
U	Mistaken for "0" (zero) or "cc"	"unit"
IU	Mistaken for IV (intravenous) or the number 10 (ten)	"International Unit"
Q.D., QD, q.d., qd, Q.O.D., QOD, q.o.d, qod	Mistaken for each other	"daily" or "every other day"
Trailing zero (X.0 mg) Lack of leading zero (.X mg)	Decimal point is missed	"X mg" "0.X mg"
MS, MSO4, MgSO4	Can mean morphine sulfate or magnesium sulfate	"morphine sulfate" "magnesium sulfate"
@	Mistaken for the number "2" (two)	"at"
cc	Mistaken for U (units) when poorly written	"mL" or "milliliters"

THE NURSING PROCESS

"ADPIE"

A ssessment

- Gather information & review
- Verify the information collected is clear & accurate

SUBJECTIVE DATA:

What the pt. tells the nurse

OBJECTIVE DATA:

Data the nurse obtains through their assessment & observation

D iagnosis

- Interpret the information collected
- Identify & prioritize the **problem** through a nursing diagnosis (be sure it's NANDA approved)

P lanning

- Set **goals** to solve the problem
- Prioritize the outcomes of care

Set SMART goals

- **S**pecific
- **M**easurable
- **A**chievable
- **R**elevant
- **T**ime frame

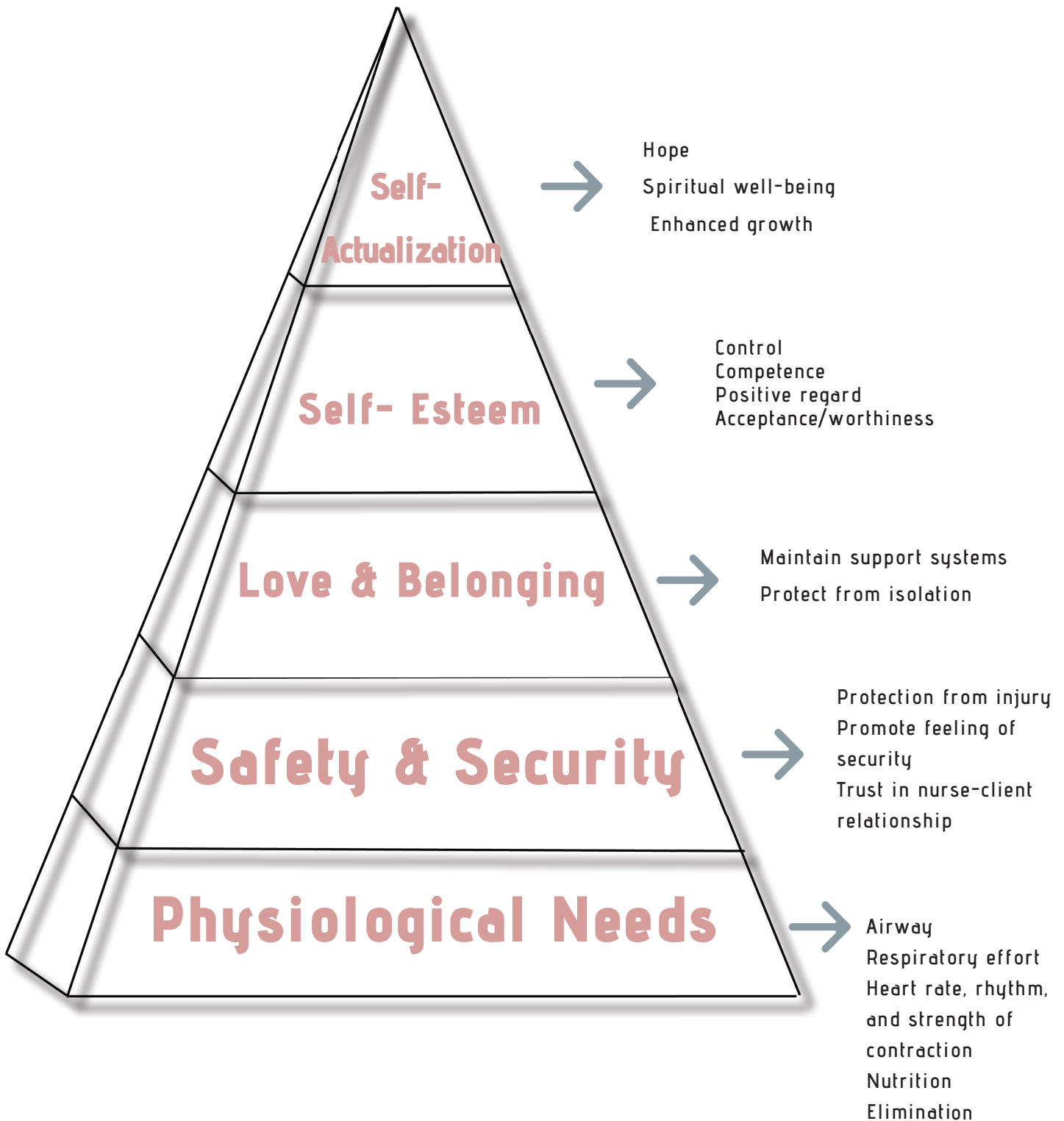
I mplementation

- Reaching those goals through **performing** the nursing actions
- "Implementing" the goals set above in the planning stage

E valuation

- **Determine** the outcome of goals
- Evaluate pt. compliance
- Document client's response to pain
- Modify & assess for needed changes

Maslow's Hierarchy of Basic Needs



NURSING ETHICS & LAW

Ethical Principles

Autonomy

→ Respect for an individual's right to make their own decisions

Nonmaleficence

→ Obligation to do & cause no harm to others

Beneficence

→ Duty to do good to others

Justice

→ Distribution of benefits & services fairly

Veracity

→ Obligation to tell the truth

Fidelity

→ Following through with a promise

HIPAA

The Health Insurance Portability & Accountability Act

- Patient's records are private & they have the right to ensure the medical information is not shared without permission
- All health care professionals must inform the pt. how their health information is used
- The pt. has the right to obtain a copy of their personal health information

Patient Rights

Right to.....

- PRIVACY
- CONSIDERATE & RESPECTFUL CARE
- BE INFORMED
- KNOW THE NAMES & ROLES OF THE PERSONS WHO ARE INVOLVED IN CARE
- CONSENT OR REFUSE A TREATMENT
- HAVE AN ADVANCE DIRECTIVE
- OBTAIN THEIR OWN MEDICAL RECORDS & RESULTS

Consent

TYPES OF CONSENT:

Admission Agreement, Immunization Consent, Blood Transfusion Consent, Surgical Consent, Research Consent, & Special Consents

- Treatment can not be done without pt. consent
- In the case of an emergency when a pt. can not give consent, consent is implied through emergency laws
- Minors (under 18), consent must be obtained from a parent or legal guardian

Before signing the consent, the pt. must be informed of the following: risks & benefits of surgery, treatments, procedures, & plan of care in layman's terms so the pt. understands clearly what is being done

MAINTAIN SAFETY

TRANSMISSION BASED PRECAUTIONS

AIRBORNE

Think "MTV"

Measles

Tuberculosis

Varicella (Chickenpox) & Disseminated varicella-zoster

- Single room under negative pressure, door remains closed
- Health care workers wear a respiratory mask (N95 or higher level)

DROPLET

- Adenovirus
- Diphtheria (pharyngeal)
- Epiglottitis
- Influenza (flu)
- Meningitis
- Mumps
- Parvovirus B19
- Pertussis
- Pneumonia
- Rubella
- Scarlet fever
- Sepsis
- Streptococcal pharyngitis

- Private room or a pt. whose body cultures contain the same organism
- Wear a surgical mask
- Place a mask on the pt. whenever they leave the room.

CONTACT

- Colonization or infection with a multidrug-resistant organism
- Enteric infections (Clostridium difficile)
- Respiratory infections (RSV, Influenza)
- Wound & skin infections (cutaneous diphtheria, herpes simplex, impetigo, pediculosis, scabies, staphylococci, & varicella-zoster)
- Eye infections (conjunctivitis)

- Private room or cohort client
- Use gloves & a gown whenever entering the pt's room

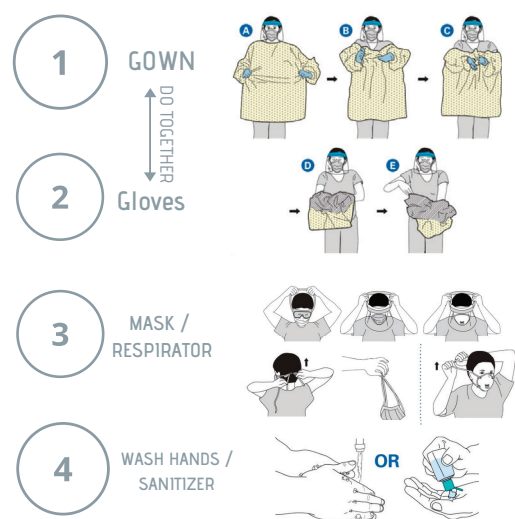
PPE

PERSONAL PROTECTIVE EQUIPMENT

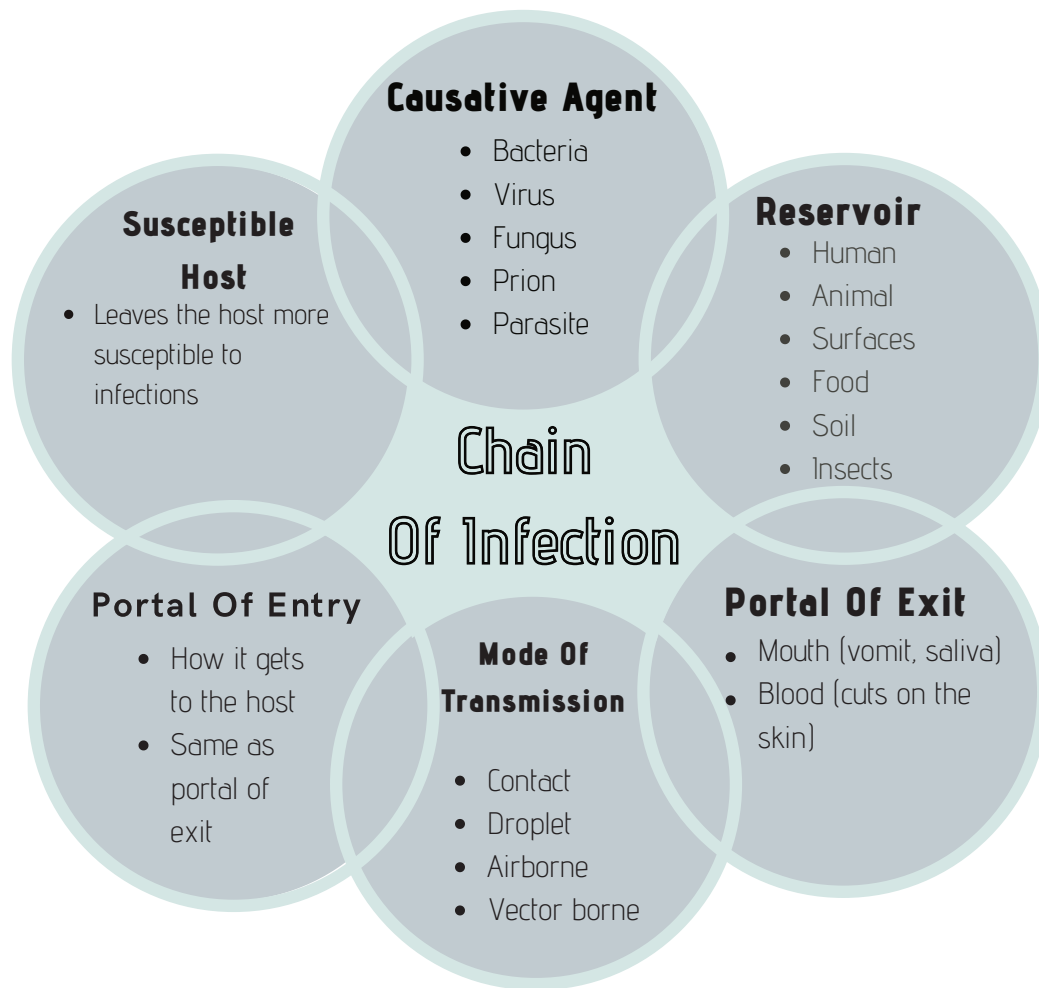
Donning PPE



Removing PPE



INFECTION CONTROL



STAGES OF INFECTION

Incubation

→ Interval between the pathogen entering the body & the presentation of the first symptom

Prodromal Stage

→ Onset of general symptoms to more distant symptoms; the pathogen is multiplying

Illness Stage

→ Symptoms specific to the infection appear

Convalescence

→ Acute symptoms disappear and total recovery could take days to months

SODIUM IMBALANCE

MAJOR ELECTROLYTE FOUND IN ECF. ESSENTIAL FOR ACID-BASE, FLUID BALANCE, ACTIVE & PASSIVE TRANSPORT MECHANISM, IRRITABILITY & CONDUCTION OF NERVE-MUSCLE TISSUE

135 - 145
mEq/L

HYPERNATREMIA

>145 mEq/L

HYPONATREMIA

<135 mEq/L

Signs & Symptoms

Flushed skin
Restless, anxious, confused, irritable
Increase BP & fluid retention
Edema (pitting)
Decreased urine output

Skin flushed & dry
Agitation
Low-grade fever
Thirst (dry mucous membranes)

Stupor / coma
Anorexia (nausea / vomiting)
Lethargy
Tachycardia (thready pulse)

Limp muscles (muscle weakness)
Orthostatic hypotension
Seizures/ Headache
Stomach cramping (Hyperactive bowels)

Risk Factors

- Increased sodium intake
 - Excess oral sodium ingestion
 - Excess administration of IV fluids w/ sodium
 - Hypertonic IV fluids
- Increased water loss
 - Fever
 - Watery diarrhea
 - Diabetes Insipidus
 - Excessive diaphoresis
- Decreased sodium excretion

- Increased sodium excretion
 - Excessive diaphoresis
 - Diuretics
 - Vomiting & diarrhea
- Inadequate sodium intake
 - Fasting, NPO, low-salt diet
- Kidney disease
- Syndrome of inappropriate antidiuretic hormone secretion
- Heart failure

Management

- If due to fluid loss:
 - Administer IV infusions
- If the cause is inadequate renal excretion of sodium:
 - Give diuretics that promote sodium loss
- Restrict sodium & fluid intake as prescribed

- Instruct the client to increase oral sodium intake
- If due to hypovolemia:
 - Give IV sodium chloride infusions
- If due to hypervolemia:
 - Give osmotic diuretics

POTASSIUM IMBALANCE

PLAYS A VITAL ROLE IN CELL METABOLISM, TRANSITION OF NERVE IMPULSES, THE FUNCTIONING OF CARDIAC, LUNG, & MUSCLE TISSUES, & ACID-BASE BALANCE.
POTASSIUM & SODIUM ARE ALWAYS OPPOSITES; WHEN ONES RISES, THE OTHER FALLS.

3.5 – 5
mEq/L

HYPERKALEMIA

>5 mEq/L

HYPOKALEMIA

<3.5 mEq/L

Signs & Symptoms

Muscle cramps

Urine abnormalities

Respiratory distress

Decreased cardiac contractility

ECG changes →

Reflexes

- Tall peaked T waves
- Flat P waves
- Widened QRS complexes
- Prolonged PR intervals

- Thready, weak, irregular pulse
- Orthostatic hypotension
- Shallow respirations
- Anxiety, lethargy, confusion, coma
- Paresthesias
- Hyporeflexia
- Hypoactive bowel sounds, constipation
- Nausea, vomiting, abdominal distention
- ECG changes →

- ST depression
- Shallow or inverted T wave
- Prominent U wave

Risk Factors

- Excessive potassium intake
- Rapid infusion of potassium-containing IV solutions
- Decreased potassium excretion
- Potassium-retaining diuretics
- Kidney disease
- Adrenal insufficiency (Addison's disease)
- Tissue damage
- Acidosis
- Hyperuricemia
- Hypercatabolism

Potassium imbalance can cause cardiac dysrhythmias that can be life-threatening!

- Actual total body potassium loss
- Inadequate potassium intake
 - Fasting, NPO
- Movement of potassium from the extracellular fluid to the intracellular fluid
 - Alkalosis
 - Hyperinsulinism
- Dilution of serum potassium
 - Water intoxication
 - IV therapy with potassium-deficient solutions

Management

- Discontinue IV & PO potassium
- Initiate a potassium-restricted diet
- Potassium-excreting diuretics
- Prepare the client for dialysis (if sodium is critically high)
- Prepare for administration:
 - IV calcium & IV hypertonic glucose
- Avoid the use of salt substitutes or other potassium-containing substance

- Oral potassium supplements
- Liquid potassium chloride
- Potassium-retaining diuretic
- **Potassium is never administered by IV push, IM, or subcut routes.**
 - **IV potassium is always diluted & administered using an infusion device!**



CALCIUM IMBALANCE

FOUND IN THE BODY'S CELLS, BONES, AND TEETH.
NEEDED FOR PROPER FUNCTIONING OF THE CARDIOVASCULAR,
NEUROMUSCULAR, ENDOCRINE SYSTEMS, BLOOD CLOTTING &
TEETH FORMATION

9 – 10.5
mg/dL

HYPERCALCEMIA
>10.5 mg/dL

HYPOCALCEMIA
<9 mg/dL

Signs & Symptoms

Bone pain
Arrhythmias
Cardiac arrest (bounding pulses)
Kidney stones
Muscle weakness ↓ deep tendon reflexes
Excessive urination

Convulsions
Arrhythmias (diminished pulses)
Tetany
Spasms & stridor
Go Numbness in the fingers, face, & limbs
Positive Trousseau's: Carpal spasm caused by inflating a blood pressure cuff
Chvostek's signs: Contraction of facial muscles w/ light tap over the facial nerve

Risk Factors

- Increased calcium absorption
- Decreased calcium excretion
- Kidney disease
- Thiazide diuretics
- Increased bone resorption of calcium
 - Hyperparathyroidism / Hyperthyroidism
 - Malignancy (bone destruction from metastatic tumors)
- Hemoconcentration

- Inhibition of calcium absorption from the GI tract
- Increased calcium excretion
 - Kidney disease, polyuric phase
 - Diarrhea & Steatorrhea
 - Wound drainage
- Conditions that decrease the ionized fraction of calcium

Management

- D/C IV or PO calcium
- D/C Thiazide diuretics
- Administer phosphorus, calcitonin, bisphosphonates, & prostaglandin synthesis inhibitors (NSAIDS)
- Avoid foods high in calcium

- Adm. calcium PO or IV
 - For IV warm before & adm. slowly
- Adm. aluminum hydroxide & vitamin D
- Initiate seizure precautions
- 10% calcium (acute calcium deficit)
- Consume foods high in calcium

A client with a calcium imbalance is at risk for pathological fracture. Move the client carefully and slowly.

MAGNESIUM IMBALANCE

MOST OF THE MAGNESIUM FOUND IN
THE BODY IS FOUND IN THE BONES.

1.3 - 2.1
mEq/L

HYPERMAGNESEMIA

>2.1 mEq/L

HYPOMAGNESEMIA

<1.3 mEq/L

Signs & Symptoms

LOW Everything

- Low Energy (drowsiness / coma)
- Low HR (bradycardia)
- Low BP (hypotension)
- Low RR (bradypnea)
- Decreased deep tendon reflex

HIGH Everything

- High HR (tachycardia)
- High BP (hypertension)
- Increased deep tendon reflex (hyperreflexia)
- Shallow respirations
- Twitches, paresthesias
- Tetany & seizures
- Irritability & Confusion

Positive Trousseau's: Carpal spasm caused by inflating a blood pressure cuff

Chvostek's signs: Contraction of facial muscles w/ light tap over the facial nerve

Risk Factors

- Increased magnesium intake
 - Magnesium-containing antacids & laxatives
 - Excessive adm. of magnesium IV
- Renal insufficiency = decreased renal excretion of magnesium

- Insufficient magnesium intake
 - Malnutrition/vomiting/diarrhea
 - Malabsorption syndrome
 - Celiac & Crohn's disease
- Increased magnesium excretion
 - diuretics or chronic alcoholism
- Intracellular movement of magnesium
 - Hyperglycemia & insulin adm.
 - Sepsis

Management

- Diuretics
- IV adm. calcium chloride or calcium gluconate
- Restrict dietary intake of magnesium-containing foods
- Avoid the use of laxatives & antacids containing magnesium

- Magnesium sulfate IV or PO
- Seizure precautions
- Instruct the client to increase magnesium-containing foods

IV THERAPY

TYPES OF IV SOLUTIONS



HYPERTONIC

D5NS

Used when low levels of sodium or chloride & for metabolic alkalosis

5% dextrose in 0.45% saline

Commonly used as maintenance fluid

5% dextrose in LR

Replaces fluids
For burns, bleeding, dehydration

"Enter the vessel"

More concentrated & increased osmolality

ISOTONIC

0.9% saline (NS)

Helpful for sodium or chloride replacement
Used with **blood products**

Ringer's lactate (LR)

Replaces fluids
For burns, bleeding, dehydration

5% dextrose (D5W)

Replaces deficits of total body water
Not used alone: dilution of electrolytes can occur

"Stays where I Put it"

Same osmolality as body fluids

HYPOTONIC

0.45% NS

Helps kidneys excrete excess fluids

2.5% Dextrose

Treats intracellular dehydration such as DKA

0.33% NS

Never give to pts. w/ burns or liver disease

"Go Out of the vessel"

More diluted & decreased osmolality

IV THERAPY

COMPLICATIONS

Air Embolism

Symptoms

- Tachycardia
- Chest pain
- Hypotension
- ↓ LOC
- Cyanotic

*Air enters the vein
through the IV tubing*

Treatment

- Clamp the tubing
- Turn pt. on the left side & place in Trendelenburg position
- Notify the HCP

Infiltration

Symptoms

- At the site...
 - Pain
 - Swelling
 - Coolness
 - Numbness
- No blood return

*IV fluid leaks into
surrounding tissue*

Treatment

- Remove the IV
- Elevate the extremity
- Apply a warm or cool compress
- Do not rub the area

Infection

Symptoms

- Tachycardia
- Redness
- Swelling
- Chills & fever
- Malaise
- Nausea & vomiting

*Entry of microorganism
into the body via IV*

Treatment

- Remove the IV
- Obtain cultures
- Possible antibiotics administration

IV THERAPY

COMPLICATIONS

Circulatory Overload

Symptoms

- ↑ blood pressure
- Distended neck veins
- Dyspnea
- Wet cough & crackles

*Administration of fluids too rapidly
(Fluid Volume Overload)*

Treatment

- ↓ flow rate (keep-vein-open rate)
- Elevate the head of the bed
- Keep the pt. warm
- Notify the HCP

Phlebitis

Symptoms

- At the site
 - Heat
 - Redness
 - Tenderness
- ↓ Flow of IV

*Inflammation of the vein
Can lead to a clot
(thrombophlebitis)*

Treatment

- Remove the IV
- Notify the HCP
- Restart the IV on the opposite side

Hematoma

Symptoms

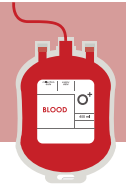
- Ecchymosis
- At the site
 - Blood
 - Hard & painful lump

*Collection of blood
in the tissues*

Treatment

- Elevate the extremity
- Apply pressure & ice

BLOOD TRANSFUSIONS



Blood Types

A	→	Antigen: A Antibodies: B	Recipient: A, O Donor: A, AB	
B	→	Antigen: B Antibodies: A	Recipient: B, O Donor: B, AB	
AB	→	Antigen: A&B Antibodies: NONE	Recipient: ALL Donor: AB	Universal RECIPIENT
O	→	Antigen: NONE Antibodies: A&B	Recipient: O Donor: ALL	Universal DONOR

Rh+ can receive from (+) (-)
Rh- can receive from (-)

Administration of the Transfusion

1. Insert an IV line using an 18- or 19-gauge IV needle
2. Run it with normal saline (keep-vein-open-rate)
3. Use the largest catheter port available
4. Begin the transfusion slowly
 - a. The first 15 min ***MOST CRITICAL*** monitor the pt for S/S of any transfusion reaction
 - b. Vital signs are monitored every 30 minutes - 1 hour
 - c. After 15 minutes the flow can be increased (unless a transfusion reaction has occurred)
5. Document the client's tolerance to the administration of the blood product

TRANSFUSION REACTION

A TRANSFUSION REACTION IS AN ADVERSE REACTION THAT HAPPENS AS A RESULT OF RECEIVING BLOOD TRANSFUSIONS

Immediate transfusion reaction

Chills, diaphoresis, aches, chest pain, rash, hives, itching, swelling, rapid, thready pulse, dyspnea, cough, or wheezing

Circulatory overload

Infusion of blood too rapid for the pt. to tolerate

Cough, dyspnea, chest pain, headache, hypertension, tachycardia, bounding pulse, distended neck vein, wheezing

Septicemia

Blood that is contaminated with microorganisms

Rapid onset of chills, high fever, vomiting, diarrhea, hypotension & shock

Iron overload

Complication that occurs in pt's who receive multiple blood transfusions

Vomiting, diarrhea, hypotension, altered hematological values

Nursing Actions to a Transfusion Reaction

1. Stop the transfusion
2. Change the IV tubing down to the IV site
3. Keep the IV open w/ normal saline
4. Notify the HCP & blood bank
5. Do not leave the client alone (monitor pt. vital signs & continue to assess the pt.)

PHARMACOKINETICS

ABSORPTION

Medication going from
the location of
administration to the
bloodstream

ORAL

Takes the
longest to
absorb

Subcut & IM

Depends on the site
of blood perfusion.
More blood
perfusion = rapid
absorption

IV

Quickest
absorption
time

DISTRIBUTION

Transportation by
bodily fluids of the
medication to where it
needs to go

Influencing factors:

- Circulation
- Permeability of the cell membrane
- Plasma protein binding

METABOLISM

How is the medication
going to be broke down?
Most common site: LIVER

Influencing factors:

- Age (Infants & elderly have a limited med-metabolizing capacity)
- Medication type
- First-pass effect
 - Liver may inactive some medication (may need nonenteral route)
- Nutritional status

EXCRETION

How is the medication going to be
eliminated from the body?
Most commonly done by KIDNEYS

Influencing factors:

- Kidney dysfunction
 - Leads to an increase in the duration and intensity of a medication response

MEDICATION ADMINISTRATION

6 Rights of Med Admin

Right....PATIENT



Right....MED



Right....TIME



Right....ROUTE



Right....DOSE



Right..DOCUMENTATION



Types of Orders

ROUTINE



Given on a regular schedule with or without a termination date

Single
"One-time"



For administration once at a specific time, common pre-opt

STAT



Only for administration once and given immediately

PRN



"As needed" must have an indication for use such as pain, nausea & vomiting.

Common Medication Errors

Medication error kills, prevention is crucial!

- Wrong medication
- Incorrect dose
- Wrong...
 - Client
 - Route
 - Time
- Administering a medication the pt. is allergic to
- Incorrect D/C of medication
- Inaccurate prescribing

NONPARENTERAL ADMINISTRATION

Oral or enteral

- Contradictions: vomiting, aspiration precautions/absence of a gag reflex, decreased LOC, difficulty swallowing
- Have pt. sit at a 90 angle to help with swallowing
- **NEVER** crush enteric-coated or time-release medications
- Break or cut scored tablets only!

Transdermal

- Place the patch on a dry and clean area of skin (free of hair)
- Rotate the sites of the patch to prevent skin irritation
- Always take off the old patch before placing a new one

Inhalation

- Rinse mouth after the use of steroids
- 20 - 30 seconds between puffs
- 2 - 5 minutes between different medications
- Use a spacer if possible to prevent thrush

Sublingual & Buccal

Sublingual under the Tongue

Buccal: Between the cheek & the gum

- Keep the tablet in place until it has completely absorbed
- DO NOT eat or drink until the tablet has completely dissolved

Suppositories

Rectal

- Lateral or Sims' position
- Use lubrication
- Insert beyond the internal sphincter
- Leave it in for 5 minutes

Vaginal

- Supine with knees bent & feet flat on the bed, close to hips
- Insert the suppository along the posterior wall of the vagina (3 - 4 inches deep)
- Stay supine for at least 5 minutes

Installation

(Drops, ointments, sprays)

EYES

- Have pt. tilt their head back slightly
- Hold the dropper 1 - 2 cm above the conjunctiva sac & drop medication directly into the sac
- Apply gentle pressure on the nasolacrimal duct for 30 - 60 seconds

EAR

- Have pt. tilt their head
- Warm the solution before adm. to prevent vertigo & dizziness
- Adults: pull ear upward & outward
- <3 years of age: pull ear down & back

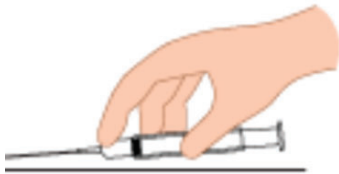
NOSE

- Have pt. lay supine
- Do not blow nose for 5 min after drop instillation

PARENTERAL ADMINISTRATION

ANY ROUTE OF ADMINISTRATION THAT DOES NOT INVOLVE DRUG ABSORPTION THROUGH THE GI TRACT

Intradermal



10 - 15° Degree Angle

- Uses: TB testing, allergy sensitivities & checking for medications
- Needle size: 26 - 27 gauge
- Should form a "bleb"

Subcutaneous



45° Degree Angle

- Uses: non-irritating, water-soluble medication (insulin & heparin)
- Needle size: 25 - 18 gauge
- Do not inject more than 1.5 ml of solution

Intramuscular



90° Degree Angle

- Uses: irritating, solutions in oils, and aqueous suspensions
- Needle size: 18 - 27 gauge
- Do not inject more than 3 mL (2 mL for the deltoid)
 - Divide larger volumes into two syringes & use two different sites
- Use the Z-track method

Intravenous



25° Degree Angle

- Uses: administering medications, fluids, & blood products
- Needle size:
 - 16-gauge: patients who have trauma
 - 18-gauge: surgery & blood administration
 - 22 - 24-gauge: children, older adults, & clients who have medical issues or are stable post-op

The smaller the gauge, the larger the IV bore.
Example: 16 gauge is the largest needle size

SCOPE OF PRACTICE



RN

- Post-op assessment
- Initial client teaching
- Starting blood products
- Sterile procedures
- IV's & IV medications 
- Discharge education
- Clinical assessment

ADPIE

NOTE:

When a registered nurse delegates tasks to others, responsibility is transferred but accountability for patient care is not transferred. The RN is still responsible!

LPN/LVN

- Stable client
- Monitor RN's findings & gather data
- Specific assessments
- Reinforce teaching
- Routine procedures (catheterization, ostomy care, wound care)
- Monitors IVF's & blood products
- Administer injections & narcotics (not IV's meds & 1st IV bag) 
- Tube potency & enteral feedings
- Sterile procedures

SPECIFIC ASSESSMENTS

Lung sounds, bowel sounds, & neurovascular checks

UAP

- Routine, stable vital signs
- Documenting input and output
- Can get blood from the blood bank
- Activities of daily living (ADL's) 

ADL'S

- Feeding (**not** with aspiration risk) 
- Positioning
- Ambulation
- Cleaning
- Linen change
- Hygiene care

RN = Registered Nurse, LPN = Licensed Practical Nurse, LVN = Licensed Vocational Nurse, UAP = Unlicensed Assistive Personnel

PHARMACOLOGY

Suffixes, Prefixes, & Antidotes

ANTIBIOTICS / ANTIBACTERIALS

Broad spectrum antibiotics

-oxacin

Tetracyclines

-cycline

Sulfonamides

sulf-

Cephalosporins

-cef ceph-

Penicillins

-cillin

Aminoglycosides & macrolides

-mycin

Fluoroquinolones

-floxacin

ANTIVIRALS

Antiviral (disrupts viral maturation)

-virimat

Antiviral (undefined group)

vir- -vir- -vir

Antiviral (neuraminidase inhibitors)

-amivir

Antiviral (acyclovir)

-cyclovir

HIV protease inhibitors

-navir

HIV / AIDS

-vudine

ANTIFUNGAL

Antifungal

-azole

CARDIAC

ANTIHYPERTENSIVES

ACE inhibitors	-pril
Beta-blockers	-olol
Angiotensin II receptor antagonists	-sartan
Calcium channel blockers	-pine -amil
Vasopressin receptor antagonists	-vaptan
Alpha-1 blockers	-osin
Loop diuretics	-ide -semide
Thiazide diuretics	-thiazide
Potassium sparing diuretics	-actone

ANTIHYPERLIPIDEMICS

HMG-CoA reductase inhibitor	-statin
-----------------------------	----------------

OTHER

Anticoagulants (Factor Xa inhibitors)	-xaban
Anticoagulants (Dicumarol type)	-arol
Anticoagulants (Hirudin type)	-irudin
Low-molecular-weight heparin (LMWH)	-parin
Thrombolytics (clot-buster)	-teplase -ase
Antiarrhythmics	-arone

RESPIRATORY

UPPER RESPIRATORY

Second-gen antihistamines (H1 antagonist)	-adine
Second-gen antihistamines (H1 antagonist)	-tirizine
Second-gen antihistamines (H1 antagonist)	-ticine
Nasal decongestants	-ephrine -zoline

LOWER RESPIRATORY

Beta2-agonists (Bronchodilator)	-terol
Xanthine derivatives	-phylline
Cholinergic blockers	-tropium
Cholinergic blockers	-clididun
Immunomodulators & leukotriene modifiers	-zumab -lukast

ANESTHETICS / ANTIANXIETY

Local anesthetics

-caine

Barbiturates (CNS depressant)

-barbital

Benzodiazepines (for anxiety/sedation)

-zolam

Benzodiazepines (for anxiety/sedation)

-zepam

ANTIDEPRESSANTS

Selective serotonin
reuptake inhibitors (SSRIs)

-oxetine -talopram -zodone

Serotonin-norepinephrine
reuptake inhibitors
(SNRI/DNRI)

-faxine -zodone -nacipram

Tricyclic antidepressants (TCAs)

-triptyline -pramine

ANALGESICS / OPIOIDS

Opioids

-done

Opioids

-one

NSAID's (anti-inflammatory)

-olac -profen

Salicylates

Asprin (ASA)

Nonsalicylates

Acetaminophen

GASTROINTESTINAL

Histamine H2 antagonists (H2-blockers)

-tidine -dine

Proton pump inhibitors (PPIs)

-prazole

Laxatives

-lax

ANTIDIABETIC

Oral hypoglycemics

-ide -tide -linide

Inhibitor of the DPP-4 enzyme

-gliptin

Thiazolidinedione

-glitazone

MISCELLANEOUS

Corticosteroids

-asone -olone -inide

Triptans (anti-migraine)

-triptan

Ergotamines (anti-migraine)

-ergot-

Antiseptics

-chloro

Antituberculars (TB)

rifa-

Bisphosphonates

-dronate

Neuromuscular blockers

-nuim

Retinoids (anti-acne)

tretin-

Phosphodiesterase 5 inhibitors

-afil

Carbonic anhydrase inhibitors

-lamide

Progestin (female hormone)

-trel

Atypical antipsychotics

-ridone

ANTIDOTES

Opioids / narcotics

Warfarin

Heparin

Digoxin

Anticholinergics

Benzodiazepines

Cholinergic crisis

Acetaminophen (Tylenol)

Magnesium sulfate

Iron

Lead

Lead

Alcohol withdrawal

Beta blockers

Calcium channel blockers

Aspirin

Insulin

Pyridoxine

Tricyclic antidepressants

Cyanide

Naloxone (Narcan)

Vitamin K

Protamine sulfate

Digibind

Physostigmine

Flumazenil (Romazicon)

Atropine (Atropen)

Acetylcysteine

Calcium gluconate

Deferoxamine

Chelation agents

Dimercaprol & disodium

chlordiazepoxide (Librium)

Glucagon

Glucagon, insulin, or calcium

Sodium bicarbonate

Glucose

Deferoxamine

Sodium bicarbonate

Hydroxocobalamin

MENTAL HEALTH

DISORDERS

THERAPEUTIC COMMUNICATION TECHNIQUES

Client-centered type of communication to build and help relationships with clients, families, and all relationships.



DO

- Allow client to control the discussion
- Give recognition/validation
- Active listening!
- Use open-ended questions

Don't be a **LOSER**, be an active listener!

- L** Lean forward toward the client
- O** Open posture
- S** Sit squarely facing the client
- E** Establish eye contact
- R** Relax & listen

EXAMPLES

"Is there something you would like to talk about?"

"Tell me more about that"

"So you are saying you haven't been sleeping well?"

"Tell me more about ____"



DON'T

- Ask "why"
- Ask too many questions
- Give advice
- Give false reassurance
- Change the conversation topic
- Give approval or disapproval
- Use close-ended questions/statements

EXAMPLES

"Don't worry!"

"I think you should ____"

"Don't be silly"

"That's great!"

THERAPEUTIC COMMUNICATION CAN BE BOTH...

VERBAL COMMUNICATIONS



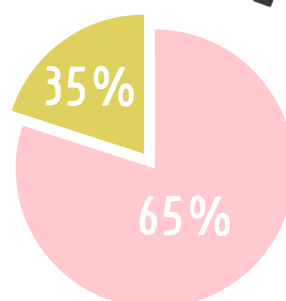
Words a person speaks



NON-VERBAL COMMUNICATIONS



You may say all the "right" things but deliver it poorly.



Facial expressions

Eye contact

Posture

Movement

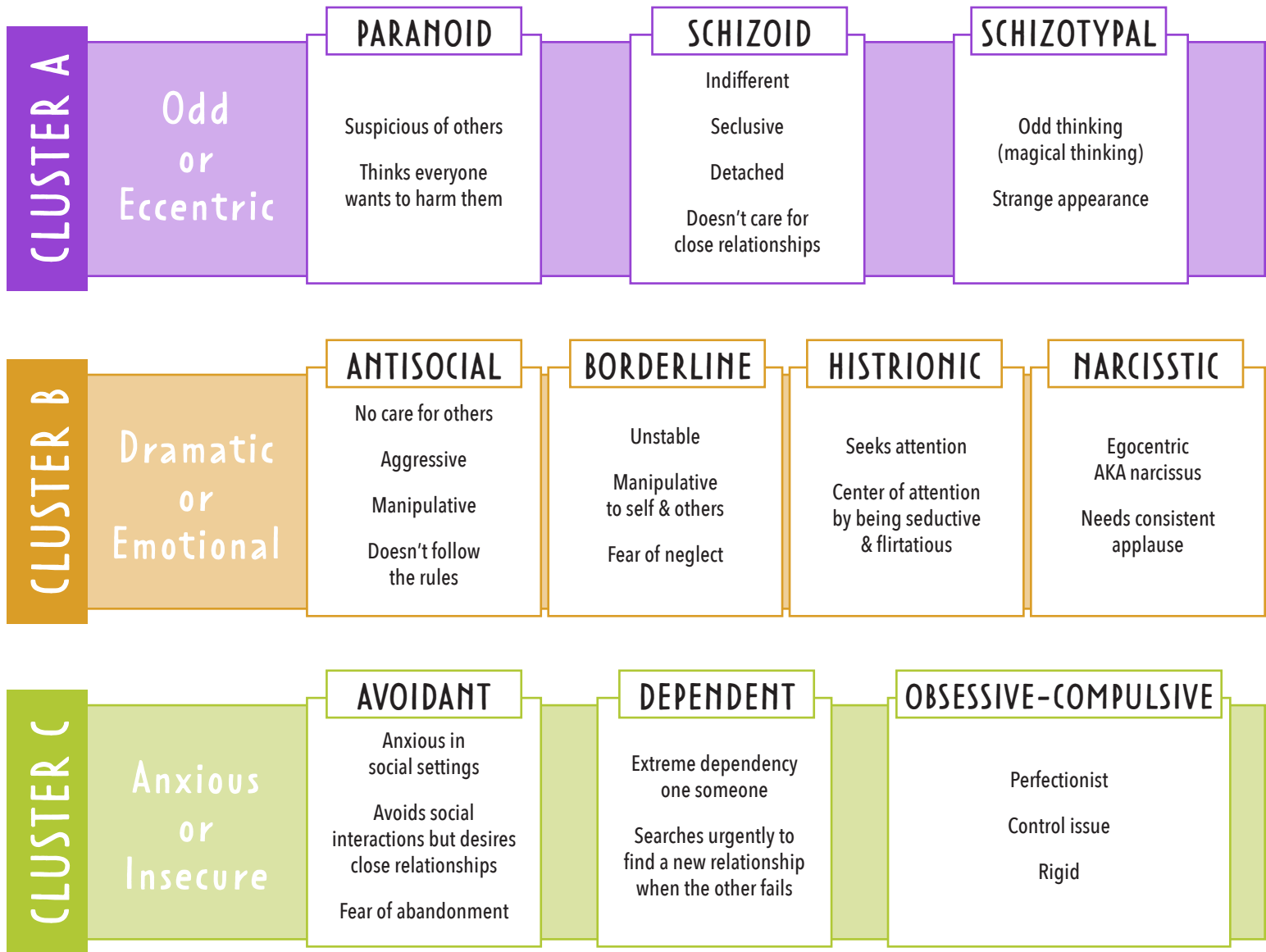
Appearance

Body language

Vocal cues

(yawning, tone of voice, pitch of voice)

PERSONALITY DISORDERS



NURSING CARE

- **Safety** is a priority
- Develop a therapeutic relationship
- Respect the patient's needs while still setting limits and consistency
- Give the client choices to improve their feeling of control

Clients with a personality disorder are at a ↑ risk for violence & self-harm

TREATMENT

Medications such as



- Antidepressants
- Anxiolytics
- Antipsychotics
- Mood stabilizers

Therapies such as

- Psycho
- Group
- Cognitive
- Behavioral

EATING DISORDERS



ANOREXIA NERVOSA

- ↓ Weight (BMI <18.5)
- ↓ Blood pressure
- ↓ Heart rate *from dehydration & electrolyte imbalance*
- ↓ Sexual development
- ↓ Subcutaneous tissue = Hypothermia
- ↓ Period regularity
- Amenorrhea (*period may stop*)
- Refuses to eat
- Lanugo (*thin hair to keep the body warm*)
- Typically does not purge
- Restricts self from eating
- Fear of gaining weight
- Constipation (*from dehydration*)

TREATMENT

- ↑ Weight slowly (2 -3 lbs a week)
- Monitor exercise

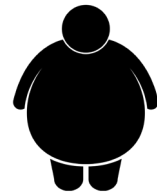


BULIMIA NERVOSA

- Binge eating followed by purging
- Normal weight to overweight (BMI 18.5 - 30)
- Teeth erosion
- Bad breath
- May use laxatives and/or diuretics

TREATMENT

- Monitor client during and after meals for acts of purging



BINGE EATING

- Binge eating not followed by purging
- Tend to be overweight
- Binging causes:
 - Depression
 - Hatred
 - Shame



REFEEDING SYNDROME

Potential complications when fluids, electrolytes, and carbohydrates are introduced too quickly to a malnourished client. Treatment should be done **slowly** to avoid this syndrome.

TREATMENT FOR ALL EATING DISORDERS

Teach coping skills

Maintain trust

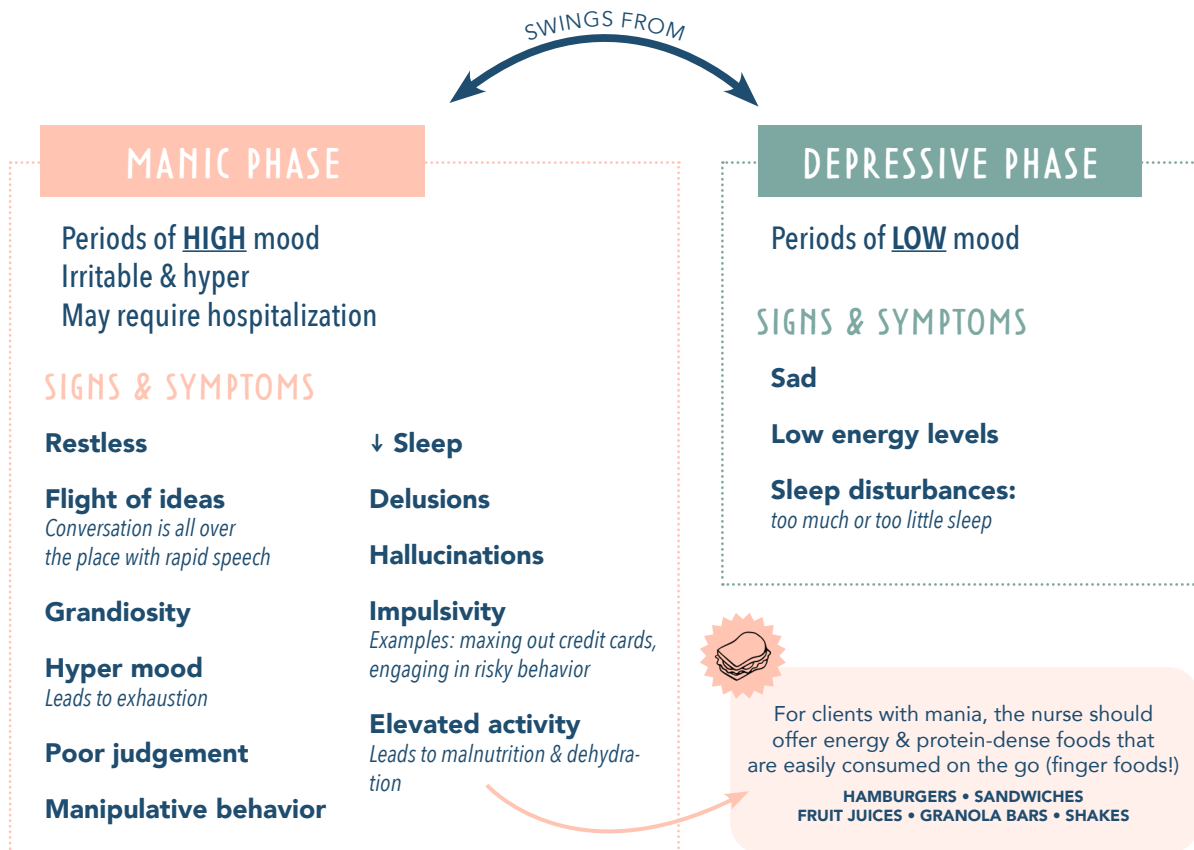
Have the client be a part of the decision making & the plan of care!

Therapy group, individual or family

BIPOLAR DISORDER

MOOD SWINGS:

Depression to mania with periods of normalcy



TREATMENT	
 NURSING CONSIDERATIONS FOR THE ACUTE PHASE	• Provide a safe environment <i>Remove harmful objects from the room</i> • Set limits on manipulative behavior • Provide finger foods & fluids • Re-channel energy for physical activity • ↓ Stimuli - Turn off or turn down the TV & music - Keep away from other clients if they are bothersome
PHARMACOLOGY	• Lithium carbonate • Anticonvulsants • Antidepressants • Antipsychotics • Antianxiety <i>See pharmacology section for more details</i>

SCHIZOPHRENIA SPECTRUM DISORDER OVERVIEW

PHASES

1	PRE-MORBID	Normal functioning. Symptoms have not become apparent yet.
2	PRODROMAL	More tempered form of the disorder. Can be months to years for the disorder to become obvious.
3	SCHIZOPHRENIA	Positive symptoms are noticeable and apparent.
4	RESIDUAL	Periods of remission. Negative symptoms may remain, but S&S of the acute stage (positive symptoms) are gone.

POSSIBLE CAUSES (not fully known)



↑ in the neurotransmitter
DOPAMINE



Illicit substance
(LDS & Marijuana)



Environmental
(malnutrition, toxins, viruses during pregnancy)



Genetics
(family history)

SIGNS & SYMPTOMS

POSITIVE

Delusions
Anxiety/agitation
Hallucinations
Auditory *most common
Jumbled speech
Disorganized behavior

NEGATIVE

Flattened/bland effect
Lack of energy
Reduced speech
Avolition
Lack of motivation
Anhedonia
Not capable of feeling joy or pleasure
Lack of social interaction

TREATMENT

- **Medication**
 - Antipsychotic medications
 - Antidepressants
 - Mood stabilizers (lithium)
 - Benzodiazepines
- **Therapy**
- **Exercise**



NURSING CONSIDERATIONS

- Try to establish trust with the patient
- Encourage compliance with the medications
- Promote self-care
- Encourage group activities
- Offer therapeutic communication

HOW TO ADDRESS HALLUCINATIONS?

- Don't address the hallucinations
Example: "I don't see spiders on the wall but I see you are scared"
- Be compassionate
- Bring the conversation back to reality
- Do not argue with the client
- Provide safety for the client & the staff!

TYPES OF DEPRESSION

MAJOR DEPRESSIVE DISORDER (MDD)

Has at least 5 of these symptoms every day for at least 2 weeks:

- Depressed mood
- Too much or too little sleep
- Indecisiveness
- Thoughts of death (suicide)
- ↓ ability to think/concentrate
- Not able to feel pleasure
- ↑ or ↓ motor activity
- Weight fluctuations
(5% change within a month)

FACTS

- MDD impairs the client's normal functioning
- MDD is not the same depression seen in bipolar disorder
- MDD is not a mood swing, it's constant

TREATMENT PHASES FOR MDD

ACUTE: 6 - 12 weeks

Hospitalization & medications may be prescribed

GOALS:

- ↓ Depressive symptoms
- ↑ Functionality

CONTINUATION: 4 - 9 months-

Medication is continued

GOALS:

- Prevent relapse

MAINTENANCE: 1+ year

Medication may be continued or be phased out

GOALS:

- Prevent relapse & further depressive episodes

Treatment for the client will reflect what phase they are in!

PREMENSTRUAL DYSPHORIC DISORDER (PMDD)

Depression that occurs during the luteal phase of the menstrual cycle.

SYMPTOMS

- Emotional
- ↑ Eating
- ↓ Energy
- ↓ Concentration

SUBSTANCE INDUCED DEPRESSIVE DISORDER

Depression associated with withdrawal or the use of alcohol and drugs.

POSTPARTUM

Depression that happens after a woman goes through childbirth.

The woman may feel disconnected from the world. She may have a fear of harming her newborn.

PERSISTENT DEPRESSIVE DISORDER (DYSTHYMIA)

A more mild form of depression compared to MDD, although it can turn into MDD later in life.

NURSING CONSIDERATIONS

- Safety is a priority. Those struggling with depression have a higher suicide risk.

Initiate suicide precautions:

- Remove sharp things
- Keep medications out of reach
- Remove objects that may be used for strangulation (wires)

- Help the client identify coping methods & teach alternatives if needed

- Provide local resources such as churches, local programs, community resources, etc.

- Encourage:

- Physical activity
- Self-care
- Supportive relationships
Individual therapy, support groups, & peer support

SEASONAL AFFECTIVE DISORDER (SAD)

Depression that occurs seasonally.

Often occurs during the winter months when there is less sunshine.

TREATMENT: Light therapy

TREATMENT

MEDICATIONS

- SSRI's
- SNRI's
- TCA's
- MAOI's

NON-PHARMACOLOGICAL THERAPIES

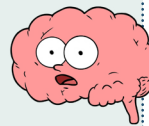
- Light therapy
- St. John's wort

ELECTROCONVULSIVE THERAPY (ECT)

Used for clients who are unresponsive to other treatments. Transmits a brief electrical stimulation to the patient's brain.

THE PROCEDURE

- The patient is asleep under anesthesia
- The client will not remember and is unaware of the procedure
- Muscle relaxants may be given to ↓ seizure activity & ↓ risk for injury
- Client may have memory loss, confusion, & headache post-procedure



DIFFERENT TYPES OF ANXIETY DISORDERS

NORMAL

WORST

	MILD	MODERATE	SEVERE	PANIC
LEVELS OF ANXIETY	Normal/healthy amount of anxiety. Allows one to have sharp focus & problem solve.	Thinking ability is impaired. Sharp focus & problem-solving can still happen just at a lower level.	Focus & problem solving are not possible. Feelings of doom may be felt.	Most extreme anxiety. Unstable & not in touch with reality.
SYMPTOMS	Nail-biting Tapping Foot jitters	GI upset Headache Voice is shaky	Dizziness Headache Nausea Sleeplessness Hyperventilation	Pacing Yelling Running Hallucinations

ANXIETY DISORDERS	Separation Anxiety Disorder	Experiences extreme fear of anxiety when separated from someone they are emotionally connected to. This is a normal part of infancy, but not a normal part of adulthood.
	Specific Phobia	Irrational fear of a particular object or situation. SOME EXAMPLES: • Monophobia - Fear of being alone • Zoophobia - Fear of animals • Acrophobia - Fear of heights
	Social Anxiety Disorder (Social Phobia)	Fear of social situations or presenting in front of groups. They fear embarrassment. They may have symptoms (real or fake) to escape the situation.
	Panic Disorder	Reoccurring panic attacks that last 15 - 30 minutes with physical manifestations.
	Agoraphobia	Extreme fear of certain places where the client feels unsafe or defenseless. May even be too fearful of places to maintain employment.
	Generalized Anxiety Disorder (GAD)	Uncontrolled extreme worry for at least 6 months that causes impairment of functionality.

Agora means "open space"

OBSESSIVE COMPULSIVE DISORDERS	Obsessive Compulsive Disorder (OCD)	OBSESSION: Recurrent thoughts COMPULSION: Recurrent acts or behaviors This obsessiveness is usually because it decreases stress & helps deal with anxiety.
	Hoarding Disorder	Compulsive desire to save items even if they have no value to the person. It may even lead to unsafe living environments.
	Body Dysmorphic Disorder	Preoccupied with perceived flaws or imperfections in physical appearance that the client thinks they have.

SOMATIC SYMPTOM & RELATED DISORDERS (SOMATOFORM DISORDERS)

SOMATIC SYMPTOM DISORDER

Somatization is psychological stress that presents through physical symptoms that can not be explained by any pathology or diagnosis.

NURSING CONSIDERATIONS

- SAFETY is a priority Asses for symptoms or thoughts of self-harm or suicide
- Understand the somatic symptoms are real to the client even though they are not real
- Help the client verbalize their feelings while limiting the amount of time talking about their somatic symptoms
- Asses coping mechanism & educate on alternative ways of coping

MANIFESTATIONS

- Consumed by physical manifestations to the point it disrupts daily life
- Seeks medical help from multiple places
- Remission & exacerbations
- Overmedicates with analgesic and antianxiety medications
- ↑ Stress = ↑ somatic symptoms



PHQ-15:

PATIENT HEALTH QUESTIONNAIRE 15

An assessment tool used to identify 15 of the most common somatic symptoms

CONVERSION DISORDER

Sudden onset of neurological manifestations & physical symptoms without a known neurological diagnosis. It can be related to a psychological conflict/need beyond their conscious control.

NURSING CONSIDERATIONS

- Ensure SAFETY
- Gain trust & rapport with the client
- Asses coping mechanism & educate on alternative ways of coping
- Asses stress management methods
- Encourage therapy such as:
 - Individual therapies
 - Group therapies
 - Support groups

MANIFESTATIONS

MOTOR

Paralysis pseudoseizures

Pseudocyesis:

Signs & symptoms of pregnancy without the presence of a fetus AKA false pregnancy. This may be present in a client who desires to become pregnant

SENSORY

Blindness

Deafness

Sensations (burning/tingling)

Inability to smell/speak



MEDICATIONS

The client may be prescribed **antidepressants** or **anxiolytics**

POSTTRAUMATIC STRESS DISORDER (PTSD)

Mental health condition where exposure to a traumatic event has occurred.

NURSING CONSIDERATIONS

- Teach relaxation techniques
- Teach ways to ↓ anxiety
- Support groups

MANIFESTATIONS

Lasting longer than 1 month:

- Anxiety
- Detachment
- Nightmares of the event



MEDICATIONS

Antidepressants may be prescribed

NEUROCOGNITIVE DISORDERS



Dementia & Alzheimer's are NOT the same.

Dementia is a general term that refers to a group of symptoms, not a specific disease.
Dementia may advance to a major neurocognitive disorder such as Alzheimer's disease.

DELIRIUM

SHORT TERM / SUDDEN CHANGE

Impairment (hours - days)

There is always an underlying cause... something is causing the delirium!

- Hospitalization
- ICU delirium
- Polypharmacy
- Old age
- Stroke
- Surgery
- Restraints
- Secondary to a medical condition (infection, electrolyte imbalance, substance abuse...etc)

Delirium is a medical emergency and requires prompt diagnosis & treatment

- Disorganization
 - Most common to time & place
 - Happens mostly at night
- ↓ Memory
- Anxiety & agitation
- Delusional thinking
- Ranges from lethargic to hypervigilance!

- Safety: prevent physical harm
- Avoid restrains when possible
- Remember physical needs (Hygiene, food, water, sleep, etc)
- May be prescribed anti-anxiety/antipsychotic medications

ONSET

RISK FACTORS

MANIFESTATIONS

INTERVENTIONS

CURE?

ALZHEIMER'S

CONTINUOUS

Decline of function (months - years)

Genetics

Family history (immediate family)

Head Injury

Traumatic brain injuries (TBI) & head trauma

Advanced Age

>65 have the highest risk

Cardiovascular Disease & Lifestyle Factors

Inactivity, unhealthy diet, high cholesterol, obesity, & diabetes

STAGES OF ALZHEIMERS DISEASE

SEVERE MODERATE MILD	Early stage <i>not noticeable to others</i>	• Memory lapse • Misplacing things • Short term memory	• Difficulty focusing • Can still accomplish own ADL's
	Middle Stage <i>noticeable to others</i>	• Forgets own history • Difficulty completing tasks • Personality changes • Unable to do some ADL's & self-care (may be incontinent)	• Gets lost & wanders often • Gets angry & frustrated
	Late Stage <i>Requires full assistance</i>	• Needs assistant with all ADL's • Losing the capability to have discussions • Losing physical skills (walking, sitting, swallowing) • May result in death or coma	

Caring for a pt. with Alzheimer's is very complex!

- Help families in planning for extended care
- Monitor nutrition, weight, & fluids status
- Maintain a quiet environment to ↓ stimuli
- **Cholinesterase inhibitor** may be prescribed to improve quality of life but does NOT cure the disease.

Communication

- Speak slowly
- Give one direction at a time
- Don't ask complex or open-ended questions
- Ask simple, direct questions
- Face the client directly when speaking

RX
Used in early & moderate stages of dementia & Alzheimer's disease. May also be used for Parkinson's dementia.



GENERIC	TRADE NAME
donepezil	Aricept
galantamine	Razadyne
Rivastigmine	Exelon

Reversible if prompt treatment is initiated

Irreversible

MENTAL HEALTH

PHARMACOLOGY

LITHIUM CARBONATE

MOOD STABILIZER:

Known for its side effects and narrow therapeutic range

THERAPEUTIC RANGE:

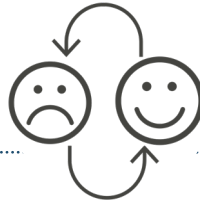
0.6 - 1.2 mEq/L



USES

Bipolar disorder

Helps regulate the "mood swings"
(depression & mania)



ADVERSE REACTIONS

- Nausea
- Vomiting
- Thirst
- Polyuria
- Tremors
- Weight gain

TOXICITY!

- Confusion
- Blurred vision
- Diarrhea
- Tinnitus
Ringing in ears
- Slurred speech
- Coma
- Convulsions

TOXICITY LEVELS

Mild: 1.5 - 2 mEq/L

Moderate: 2 - 3 mEq/L

Severe: > 3 mEq/L

HOW DOES TOXICITY HAPPEN?

- Dehydration
causes ↑ lithium levels in blood
- Hyponatremia
- Old age
↓ kidney function...this means lithium builds up in the blood

CONTRADICTIONS

- Pregnancy category D:
Contradicted in pregnancy & breastfeeding
- Renal / cardiovascular disease
- Dehydrated patients
Excessive diarrhea or vomiting
- Receiving diuretics
- Sodium depletion
- Hypersensitivity to tartrazine

EDUCATION

- Carry ID that shows you are taking lithium
- Educate on signs & symptoms of **toxicity**
- Educate and stress importance of taking medication regularly
- Serum lithium levels should be checked every 1-2 months
- Do not operate heavy machinery or drive
- Educate on drinking plenty of water to avoid dehydration (therefore avoiding toxicity)
- Avoid starting a low salt diet
Sudden ↓ in salt = ↑ in lithium

ANTIDEPRESSANT DRUGS

SSRI's

Selective serotonin reuptake inhibitor

Inhibits uptake of serotonin = ↑ serotonin

Think
Smiley
Serotonin

- Depression
- Anxiety
- OCD
- Eating disorders

SNRI's/DNRI's

Serotonin / Norepinephrine &
Dopamine / Norepinephrine reuptake inhibitor

Affects serotonin, norepinephrine & dopamine

- Depressive episodes
- Anxiety disorders
- Fibromyalgia
- Diabetic neuropathy pain

ACTION

USES

SIDE EFFECTS

NURSING CONSIDERATIONS

DRUG TABLE



NEURO

- Headache
- Tremors
- Difficulty sleeping

3 S's of SSRI's

- Serotonin syndrome
- Sexual dysfunction
- Stomach issues



GI

- Nausea
- Dry mouth / thirst
- Constipation
- Urinary retention
- Sexual dysfunction

SEROTONIN SYNDROME

- Too much serotonin in the brain
- Mental changes
- Tachycardia
- Tightness in muscles
- Difficulty walking
- ↑ BP & temp



NEURO

- Headache
- Dizziness
- Vertigo
- Photosensitivity
- Agitation/tremors
- Insomnia



GI

- Dry mouth/thirst
- Dehydration
- Constipation
- Nausea/diarrhea

- May take 4 -6 weeks to take effect
Educate on the importance of compliance
- Take medication in the morning
- **First line** drug for depression/anxiety



A client who had suicidal plans may now have the **energy** due to the medication to carry out the plans!

- May take 4-6 weeks to take effect
Educate on the importance of compliance
- Do not mix with TCA's or MAOI's
- **Zyban** is used for smoking cessation. Do not use it while taking bupropion for depression – it could cause **overdose**.

GENERIC	TRADE NAME
sertraline	Zoloft
citalopram	Celexa
escitalopram	Lexapro
fluoxetine	Prozac
vilazodone	Viibryd

SUFFIXES

-talopram, -oxetine, -zodone

GENERIC	TRADE NAME
bupropion	Zyban & Wellbutrin
duloxetine	Cymbalta
venlafaxine	Effexor XR
milnacipran	Savella
nefazodon	–

SUFFIXES

-faxine, -zodone, -nacipran

ANTIDEPRESSANT DRUGS

TCA's Tricyclic antidepressants		MAOI's Monoamine oxidase inhibitor																						
Blocks reuptake of serotonin & norepinephrine in the brain		Blocks monoamine oxidase which causes ↑ in epinephrine, norepinephrine, dopamine, & serotonin, which causes stimulation of the CNS!		ACTION																				
• Depressive episodes • Bipolar disorder • OCD • Neuropathy • Enuresis		Depression		USES																				
• Constipation • Dry mouth • Drowsiness • Blurred vision • Orthostatic hypotension • Urine retention • Cardiotoxic Causes heart problems in patients with pre-existing cardiac conditions or elderly clients...give with caution!		NEURO • Orthostatic hypotension • Dizziness • Blurred vision GI • Constipation • Dry mouth • Nausea/ vomiting HYPERTENSIVE CRISIS • Headache • Stiff neck • Nausea / vomiting • Fever • Dialated pupils Seek medical help to ↓ blood pressure		SIDE EFFECTS																				
• May take 2- 3 weeks to take effect <i>Educate on the importance of compliance</i> • WAIT 14 days after being off MAOI's to start taking TCA's • Amoxapine is not an antipsychotic drug but similar to these drugs, it may cause TD & NMS (D/C the drug immediately if these symptoms occur)		• Can take up to 4 weeks to reach therapeutic levels <i>Educate on the importance of compliance</i> • Educate on the signs & symptoms of HTN crisis • Avoid foods with Tyramine • Aged cheese • Fermented meats • Chocolate • Caffeinated beverages • Sour cream & yogurt		NURSING CONSIDERATIONS																				
<table><thead><tr><th>GENERIC</th><th>TRADE NAME</th></tr></thead><tbody><tr><td>amitriptyline</td><td>-</td></tr><tr><td>amoxapine</td><td>-</td></tr><tr><td>clomipramine</td><td>Anafranil</td></tr><tr><td>protriptyline</td><td>Vivactil</td></tr><tr><td>nortriptyline</td><td>Pamelor</td></tr></tbody></table> SUFFIXES -triptyline, -pramine		GENERIC	TRADE NAME	amitriptyline	-	amoxapine	-	clomipramine	Anafranil	protriptyline	Vivactil	nortriptyline	Pamelor	<table><thead><tr><th>GENERIC</th><th>TRADE NAME</th></tr></thead><tbody><tr><td>phenelzine</td><td>Nardil</td></tr><tr><td>tranylcypromine</td><td>Parnate</td></tr><tr><td>isocarboxazid</td><td>Marplan</td></tr></tbody></table>		GENERIC	TRADE NAME	phenelzine	Nardil	tranylcypromine	Parnate	isocarboxazid	Marplan	DRUG TABLE
GENERIC	TRADE NAME																							
amitriptyline	-																							
amoxapine	-																							
clomipramine	Anafranil																							
protriptyline	Vivactil																							
nortriptyline	Pamelor																							
GENERIC	TRADE NAME																							
phenelzine	Nardil																							
tranylcypromine	Parnate																							
isocarboxazid	Marplan																							

ANTI-ANXIETY DRUGS (ANXIOLYTICS)

BENZODIAZEPINES



RX

Bipolar disorder

Benzo's are mainly prescribed for acute anxiety, sedation/muscle relaxant, seizures, & alcohol withdrawal

Not a first-line drug for treating long-term psychiatric anxiety conditions

ACTION

Binds to cell receptors enhancing the effects of GABA

GABA (inhibitory neurotransmitter)
slows/calms the activity of the nerves in the brain



GENERIC	TRADE NAME
alprazolam	Xanax
lorazepam	Ativan
diazepam	Valium
clonazepam	Klonopin
chlordiazepoxide	Librium
SUFFIXES	
-zolam & -epam	

Antidote: FLUMAZENIL

ADVERSE DRUG REACTIONS (ADR'S)

- Mild drowsiness, sedation
- Lightheadedness, dizziness, ataxia
- Visual disturbances
- Anger, restlessness
- Nausea, constipation, diarrhea
- Lethargy, apathy, fatigue
- Dry mouth

NURSING CONSIDERATIONS TO HELP WITH ADR'S

Take at night if it makes you dizzy/drowsy
Rise slowly from sitting or lying
Do not drive or operate heavy machinery

Fluids, fiber, & exercise!
Give with food to ↓ GI upset

Sips of water, suck on hard candy,
chewing sugar-free gum

SYMPTOMS OF WITHDRAWAL

Withdrawals typically happen when the medication is stopped abruptly or taken for >3 months

- ↑ Anxiety
- ↑ HR
- ↑ BP
- ↑ Temp/sweating
- ↓ Memory
- Agitation
- Seizures/tremors
- Insomnia
- Vomiting
- Muscle aches

NURSING CONSIDERATIONS

- Not meant for long term therapy because ↑ risk for physical & psychological **DEPENDENCE**
- Use of long term therapy leads to **TOLERANCE**
Larger doses of the drug are required to achieve the desired outcome
- Must be **TAPERED**
↓ the dosage gradually.
NEVER stop the medication abruptly!

CONTRAINDICATIONS & PRECAUTIONS

- Pregnant, laboring & lactating women (Preg Category D)
- Elderly (↑ chance of dementia)
- Impaired liver or kidney function
- Debilitation

NONBENZODIAZEPINES

ACTION

Depends on the drug

buspirone (Buspar)
acts on serotonin receptors

hydroxyzine (Vistaril)
acts on the hypothalamus & brainstem reticular formation

GENERIC	TRADE NAME
buspirone	Buspar
doxepin	Silenor
hydroxyzine	Vistaril
meprobamate	—

ANTIPSYCHOTICS

Most commonly used for psychosis (schizophrenia)



REVIEW: Why are SGA's better than FGA's?

SGA's work on both positive & negative symptoms, and have a lower risk of developing tardive dyskinesia (TD).

FIRST GENERATION ANTIPSYCHOTICS (FGA's)

Also called **typical/conventional**

GENERIC	TRADE NAME
chlorpromazine	–
haloperidol	Haldol
loxapine	Adasuve

ACTIONS OF FGA's

- Blocks/inhibits dopamine from being released in the brain
- Helps diminish positive symptoms of schizophrenia

SIDE EFFECTS OF FGA's

- Higher risk of TD, EPS, & NMS
- Orthostatic hypotension

SECOND GENERATION ANTIPSYCHOTICS (SGA's)

Also called **atypical**

GENERIC	TRADE NAME
risperidone	Risperdal
clozapine	Clozaril
quetiapine	Seroquel
ziprasidone	Geodon
aripiprazole	Abilify

ACTIONS OF SGA's

- Acts on both serotonin & dopamine in the brain
- Helps diminish positive symptoms of schizophrenia & helps negative symptoms as well!

SIDE EFFECTS OF BOTH

- Anticholinergic effects
- Photophobia
- Photosensitivity
- Sedation/lethargy

SIDE EFFECTS OF SGA's

- Lower risk of TD, EPS & NMS
- ↑ Weight
- ↑ Cholesterol
- ↑ Triglyceride
- ↑ Blood sugar

TARDIVE DYSKINESIA (TD)

- Involuntary movements of the face, tongue, or limbs that may be irreversible.

EXTRAPYRAMIDAL SYNDROME (EPS)

- Parkinson's like symptoms • Akathisia (restlessness) • Dystonia (muscle twitching)

NEUROLEPTIC MALIGNANT SYNDROME (NMS)

- Combination of symptoms: EPS, high fever, & autonomic disturbance
- One can recover 7-10 days after DC of medication, but it can be fatal if not treated in time

CONTRAINDICATIONS

- Hypersensitivity
- Parkinson's disease
- Comatose pt.
- Liver problems
- Depressed
- Coronary artery disease
- Bone marrow depression
- Hyper or hypotension
- Blood dyscrasias

NURSING CONSIDERATIONS

- Educate that it may take 6 - 10 weeks to take effect
- Tell patient about adverse reactions and emphasize that adherence is very important

FGA's

- Teach S&S of TD, EPDS, & NMS!
- Advise the client to get up slowly

SGA's

- Check labs (blood sugar, LDL, triglycerides)
- To decrease the risk of gaining weight, advise the patient about exercise, low-calorie diet, & monitor their weight.

MOTHER BABY

ABBREVIATIONS

IUP/IUFD	Intrauterine pregnancy / intrauterine fetal demise
SAB	Spontaneous abortion
TAB	Therapeutic abortion
LMP	Last menstrual period
ROM	Rupture of membranes
SROM	Spontaneous rupture of membranes
AROM	Artificial rupture of membranes
PROM	Prolonged rupture of membranes (>24 hours)
PPROM	Preterm premature rupture of membranes
SVD	Spontaneous vaginal delivery
FHR	Fetal heart rate
EFM	Electronic fetal monitoring
US	Ultrasound transducer (detects FHR)
FSE	Fetal scalp electrode (precise reading of FHR)
IUPC	Intrauterine pressure catheter (strength of contractions)
LTV	Long term variability
SVE	Sterile vaginal exam
MLE	Midline episiotomy

NST	Non-stress test
CST	Contraction stress test
BPP	Biophysical profile
VBAC	Vaginal birth after cesarean
AFI	Amniotic fluid index
BUFA	Baby up for adoption
NPNC	No prenatal care
PTL	Preterm labor
BOA	Born on arrival
BTL	Bilateral tubal ligation
D&C / D&E	Dilation & curettage / dilation & evacuation
LPNC	Late prenatal care
TIUP	Term intrauterine pregnancy
VMI / VFI	Viable male infant / viable female infant
EDB	Estimated date of birth
EDC	Estimated date of confinement
EDD	Estimated date of delivery

PREGNANCY DURATION

40 weeks gestational age

The number of completed weeks counting from the 1st day of the last normal menstrual cycle (LMP).

38 weeks fetal age

This refers to the age of the developing baby, counting from the estimated date of conception. The fetal age is usually 2 weeks less than the gestational age.

TRIMESTERS

First Trimester

0 – 13 WEEKS

Second Trimester

14 – 26 WEEKS

Third Trimester

27 – 40 WEEKS

PRENATAL TERMS

Gravida / Gravity

A woman who is pregnant / the number of pregnancies

Nulligravida

Never been pregnant

Primigravida

Pregnant for the first time

Multigravida

A woman who has had 2+ pregnancies

Parity

The number of pregnancies that have reach viability (20 weeks of gestation) whether the fetus was born alive or not

Nullipara

0

Zero pregnancies beyond viability (20 weeks)

Primipara

1

One pregnancy that has reached viability (20 weeks)

Multipara

2+

Two or more pregnancies that have reached viability (20 weeks)

Preterm

Pregnancies that have reached 20 weeks but ended before 37 weeks

Term

Pregnancies that have lasted between week 37 and week 42

Early Term: 37 – 38 6/7

Full Term: 39 – 40 6/7

Late Term: 41 – 41 6/7

Postdate/Postterm

A pregnancy that goes beyond 42 weeks

GTPAL

An acronym used to assess pregnancy outcomes

G

GRAVITY



The number of pregnancies

- Includes the present pregnancy
- Includes miscarriages / abortions
- Twins / triplets count as one

T

TERM BIRTHS



The number born at term

- > 37th week of gestation
- Includes alive or stillborn
- Twins / triplets count as one

P

PRE-TERM BIRTHS



The number of pregnancies delivered beginning with the 20th - 36 ⁶/₇th weeks of gestation

- Includes alive or stillborn
- Twins / triplets count as one

A

ABORTIONS / MISCARRIAGES



The number of pregnancies delivered before 20 weeks gestation

- Counts with gravity
- Twins / triplets count as one

L

LIVING CHILDREN



The number of current living children

- Twin / triplets count individually

ANSWER KEY

Q#1 1 1 1 2
Q#2 1 1 1 2
Q#3 1 1 1 2

PRACTICE QUESTION 1

You are admitting a patient to the mother-baby unit. Two hours ago she delivered a boy on her due date. She gives her obstetric history as follows: she has a three-year-old daughter who was delivered a week past her due date and last year she had a miscarriage at 8 weeks gestation. How would you note this history using the GTPAL system?

- A. 2-2-1-0-2
- B. 3-2-1-0-1
- C. 3-2-1-0-2
- D. 3-2-0-1-2

PRACTICE QUESTION 2

A prenatal client's obstetric history indicates that she has been pregnant 3 times previously and that all her children from previous pregnancies are living. One was born at 39 weeks gestation, twins were born at 34 weeks gestation, & another child was born at 38 weeks gestation. She is currently 38 weeks pregnant. What is her gravidity & parity using the GTPAL system?

- A. 4-1-3-0-4
- B. 4-1-2-0-3
- C. 4-2-1-0-4
- D. 4-2-2-0-4

PREGNANCY SIGNS & SYMPTOMS

PRESUMPTIVE

SUBJECTIVE

Think
"Mom"

These are changes felt by the women that are subjective.
Can be associated with other things.

NOT a definite diagnosis for pregnancy!

- P** Period Absent (Amenorrhea)
- R** Really tired
- E** Enlarged breasts
- S** Sore breasts
- U** Urination increased (urinary frequency)
- M** Movement perceived (quickening)
- E** Emesis & nausea

Why is quickening not a positive sign?

Quickening can be difficult to distinguish from peristalsis or gas so it can not be a positive sign.

PROBABLE

OBJECTIVE

Think
"Doctor"

Pregnancy signs that the nurse or doctor can observe

- P** Positive (+) pregnancy test (high levels of the hormone: hCG)
- R** Returning of the fetus when uterus is pushed w/ fingers (ballottement)
- O** Objective
- B** Braxton hicks contractions
- A** A softened cervix (Goodell's sign)
- B** Bluish color of the vulva, vagina, or cervix (Chadwick's sign)
- L** Lower uterine segment soft (Hegar's sign)
- E** Enlarged uterus

Why is a positive pregnancy test not a positive sign?

High levels of hCG can be associate with other conditions such as certain medications or hydatidiform mole (molar pregnancy).

POSITIVE

OBJECTIVE

Think
"Baby"

Can only be attributed to a fetus

Definite diagnosis for pregnancy!

- F** Fetal movement palpated by a doctor or nurse
- E** Electronic device detects heart tones ♥
- T** The delivery of the baby
- U** Ultrasound detects baby
- S** Seeing visible movements

PREGNANCY PHYSIOLOGY

HORMONES

Prolactin: Allows for breast milk production

Estrogen: Growth of fetal organs & maternal tissues

Progesterone & Relaxin: Relaxes smooth muscles

hCG: Produced by placenta, prevents menstruation

Oxytocin: Stimulates contractions at the start of labor

RESPIRATORY

- ↑ Basal metabolic rate (BMR)
- ↑ O₂ needs
- Respiratory alkalosis (MILD)

CARDIOVASCULAR

- ↑ Cardiac output
(↑ Heart rate + ↑ stroke volume)
- Blood pressure stays the same or a slight decrease
- ↑ in plasma volume
- ♥ Enlarges
(May develop systolic murmurs)

RENAL

- ↑ GFR from ↑ plasma volume
- Smooth muscle relaxation of the uterus = ↑ risk of UTI's!
- ↑ Urgency, frequency & nocturia
- EDEMA!!

SKIN

- **Striae**
Stretch marks (abdomen, breasts, hips, etc)
- **Chloasma**
Mask of pregnancy
Brownish hyperpigmentation of the skin
- **Linea Nigra**
"Pregnancy line" dark line that develops across your belly during pregnancy
- **Montgomery glands / Tubercles**
Small rough / nodular / pimple-like appearance of the areola (nipple)

MUSCULOSKELETAL

- **Lordosis:** center of gravity shifts forward leading to inward curve of spine
- Low back pain
- Carpal tunnel syndrome
- Calf cramps

PITUITARY

- ↓ FSH/LH due to ↑ Progesterone
- ↑ Prolactin
- ↑ Oxytocin

THYROID

- ↑ Thyroxine
- May have moderate enlargement of the thyroid gland (goiter)
- ↑ Metabolism & ↑ appetite

GASTROINTESTINAL

- **Pyrosis**
↑ Progesterone = LOS to relax = ↑ heartburn
- **Constipation & hemorrhoids**
↑ Progesterone = ↓ gut motility
- **Pica**
Non-food cravings such as ice, clay, and laundry starch

HEMATOLOGICAL

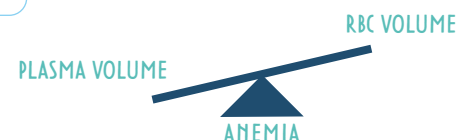
FIBRINOGEN < Non-pregnant levels: 200-400 mg/dL
Pregnant levels: up to 600 mg/dL

Pregnant women are **HYPERCOAGULABLE**
(increased risk for DVT's)

- ↑ White blood cells
- ↓ Platelets

ANEMIA

Plasma volume is greater than the amount of red blood cell (RBC) = hemodilution = **physiological anemia**



NAEGELE'S RULE

➔ Used for estimating the expected date of delivery (EDD) based on LMP (last menstrual period)

DATE OF LAST MENSTRUAL PERIOD — 3 CALENDAR MONTHS + 7 DAYS + 1 YEAR



REMEMBER:

How many days
are in each month?



30 days hath
September, April,
June & November.
All the rest have 31,
except February alone
(28 days)

EXAMPLE

1st day of last period:	September 2, 2015
Minus 3 calendar months:	June 2, 2015
Plus 7 days:	June 9, 2015
Plus 1 year:	June 9, 2016 (EDD)

FACTS ABOUT NAEGELE'S RULE

- ♥ Bases calculation on a woman who has a 28-day cycle (most women vary)
- ♥ The typical gestation period is 280 days (40 weeks)
- ♥ First-time mothers usually have a slightly longer gestation period

WHAT TO AVOID DURING PREGNANCY

TERATOGENIC DRUGS



REMEMBER
THE
MNEMONIC!

TERA-TOWAS

- T** Thalidomide
- E** Epileptic medications (valproic acid, phenytoin)
- R** Retinoid (vit A)
- A** Ace inhibitors, ARBS
- T** Third element (lithium)
- O** Oral contraceptives
- W** Warfarin (coumadin)
- A** Alcohol
- S** Sulfonamides & sulfones

TORCH INFECTIONS

TORCH infections are a group of infections that cause fetal abnormalities. Pregnant women should avoid these infections!

REMEMBER
THE
MNEMONIC!

TORCH



- T** Toxoplasmosis
- Parv **O** Virus-B19 (fifth disease)
- R** Rubella
- C** Cytomegalovirus
- H** Herpes simplex virus

STAGES OF LABOR

STAGE 1

CERVIX DILATES FROM 0-10 CM

Longest Stage

LATENT (EARLY)

- ♥ Cervix dilates: 1 - 3 cm
- ♥ Intensity: Mild
- ♥ Contractions: 15 - 30 mins

ACTIVE

- ♥ Cervix dilates: 4 - 7 cm
- ♥ Intensity: Moderate
- ♥ Contractions: 3 - 5 min (30-60 sec in duration)

TRANSITION

- ♥ Cervix dilates: 8 - 10 cm
- ♥ Intensity: Strong
- ♥ Contractions: Every 2-3 min (60-90 sec in duration)

INTERVENTIONS

- ♥ Promote comfort
 - Warm shower, massage, or epidural
- ♥ Offer fluids & ice chips
- ♥ Provide a quiet environment
- ♥ Encourage voiding every 1 - 2 hours
- ♥ Encourage participation in care & keep informed
- ♥ Instruct partner in **effleurage** (light stroking of the abdomen)
- ♥ Encourage effective breathing patterns & rest between contractions

REMEMBER THE MNEMONIC!

Labor
Actively
Transitioning

>30 MIN = RETAINED PLACENTA

STAGE 2

THE BABY IS DELIVERED

- Starts when cervix is fully dilated & effaced
- Ends after the baby is delivered

PUSHING!!!

INTERVENTIONS

- ♥ Provide ice chips & ointment for dry lips
- ♥ Provide praise & encouragement to the mother
- ♥ Monitor uterine contractions & mother's vital signs
- ♥ Maintain privacy & encourage rest between contractions
- ♥ Encourage effective breathing patterns & rest between contractions
- ♥ Monitor for signs of birth (perineal bulging or visualization of fetal head)

STAGE 3

THE PLACENTA IS DELIVERED

The PLACENTA is expelled (5 - 30 min after birth)

SIGNS OF A PLACENTA DELIVERY

- ♥ Lengthening umbilical cord
- ♥ Gush of blood
- ♥ Uterus changes from oval to globular shape

DELIVERY MECHANICS

"Shiny Schultz"

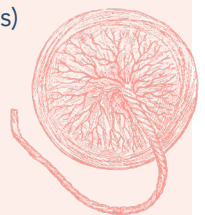
Side of baby delivered 1st

"Dirty Duncan"

Side of mother delivered 1st

INTERVENTIONS

- ♥ Assessing mother's vital signs
- ♥ Uterine status (fundal rubs every 15 minutes)
- ♥ Provide warmth to the mother
- ♥ Promote parental-neonatal attachment
- ♥ Examine placenta & verify it's intact
 - Should have 2 arteries & 1 vein



STAGE 4

RECOVERY!

RECOVERY: first 1-4 hours after delivery of the placenta

- ♥ Assessing the fundus
- ♥ Continue to monitor vital signs & temperature for infection
- ♥ Administer IV fluids
- ♥ Monitor lochia discharge (lochia may be moderate in amount & red).
- ♥ Monitor for respiratory depression, vomiting, & aspiration if general anesthesia was used
- ♥ Great time to watch for complications such as bleeding (postpartum hemorrhage)



- ♥ FIRM
- ♥ Midline



- ♥ Soft
- ♥ Boggy
- ♥ Displaced



TIP

Looks like smiley face!

2 "A" for Arteries
1 "V" for Vein

TRUE VS. FALSE LABOR

	FALSE LABOR	TRUE LABOR
CONTRACTIONS	• Irregular • Stops with walking / position change • Felt in the back or the abdomen above the umbilicus • Often stops with comfort measures	• Occur regularly - Stronger - Longer - Closer together • More intense with walking • Felt in lower back -> radiating to the lower portion of the abdomen • Continue despite the use of comfort measures
CERVIX	• May be soft • NO significant change in.... - Effacement - Dilation • No bloody show • In posterior position (baby's head facing mom's front of belly) 	• Progressive change - Softening - Effacement - Dilation signaled by the appearance of bloody show - Moves to an increasingly anterior position (baby's head facing mom's back) 
FETUS	• Presenting part is usually not engaged in the pelvis	• Presenting parts become engaged in the pelvis • Increased ease of breathing (more room to breathe) • Presenting part presses downward & compresses the bladder = urinary frequency

SIGNS OF LABOR

LABOR

Moving the fetus, placenta, & the membranes out of the uterus through the birth canal

Signs of Preceding Labor

- Lightening
- Increased vaginal discharge (bloody show)
- Return of urinary frequency
- Cervical ripening
- Rupture of membranes "water breaking"
- Persistent backache
- Stronger Braxton Hicks contractions
- Days preceding labor
 - Surge of energy
 - Weight loss (1- 3.5 pounds) from a fluid shift

FETAL HEART TONES

EARLY DECELERATIONS

"Mirror" image of mom's contractions
(They don't technically come early)

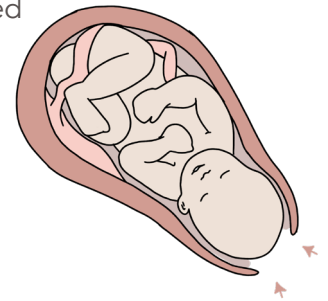
Normal
fetal heart rate
120 - 160 BPM

Cause:

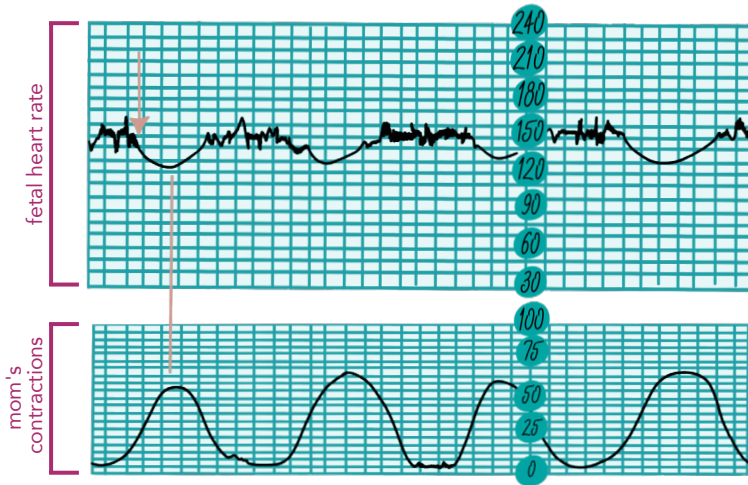
- ♥ From head compression

Intervention:

- ♥ Continue to monitor
- ♥ No intervention needed



NORMAL! ✓



LATE DECELERATIONS

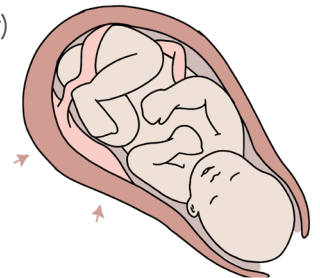
Literally comes late after mom's contraction

Cause:

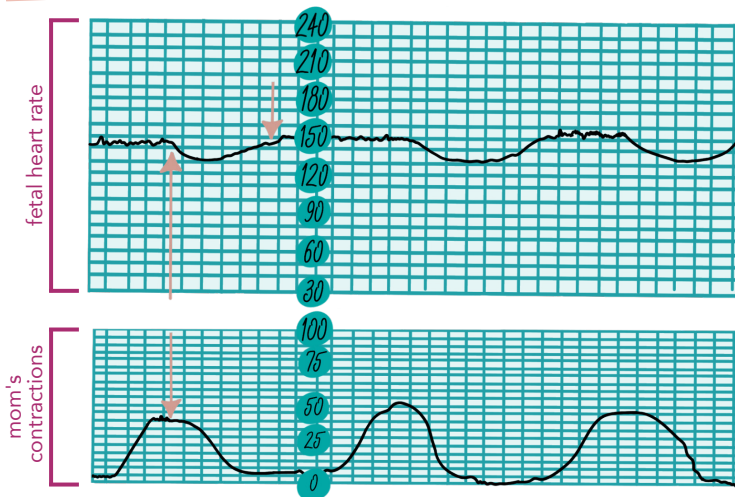
- ♥ Uteroplacental insufficiency

Intervention:

- ♥ D/C oxytocin
- ♥ Position change
- ♥ Oxygen (nonrebreather)
- ♥ Hydration (IV fluids)
- ♥ Elevate legs to correct the hypotension



NON-REASSURING ✗



VARIABLE DECELERATIONS

*Variable: Looks "V" shaped

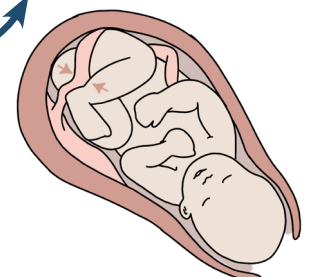
Cause:

- ♥ Cord compression

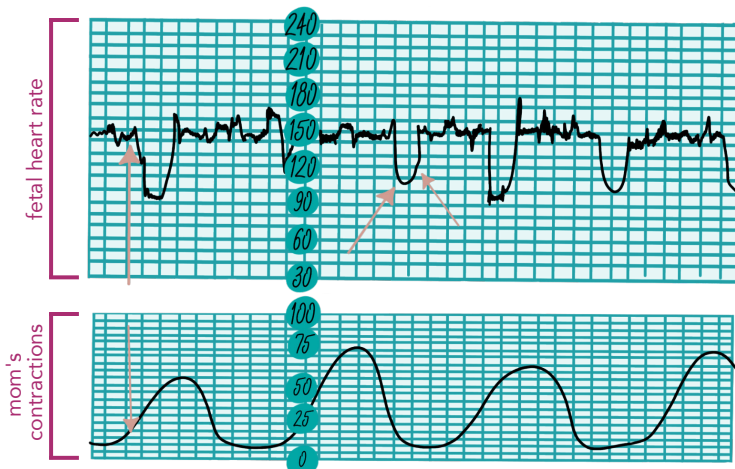
Intervention:

- ♥ D/C Oxytocin
- ♥ Amnioinfusion
- ♥ Position change
- ♥ Breathing techniques
- ♥ Oxygen (nonrebreather)

Side-lying or knee chest will relieve pressure on cord



NON-REASSURING ✗



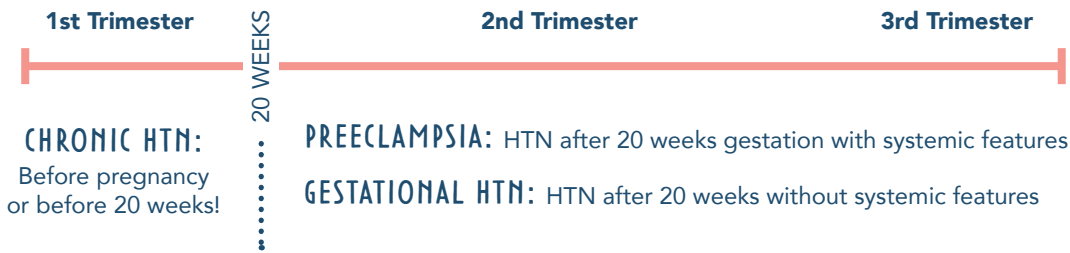
PREECLAMPSIA OVERVIEW

Overview of Hypertensive disorders during pregnancy

WHAT IS HYPERTENSION?

SYSTOLIC >140
OR
DIASTOLIC > 90

Hypertension may be abbreviated "HTN"



SIGNS & SYMPTOMS

"PRE" eclampsia

- P** Proteinuria
 - R** Rising BP
 - E** Edema
- Triad Signs

- ♥ Severe headache
- ♥ RUQ or epigastric pain
- ♥ Visual disturbances
- ♥ ↓ Urine output
- ♥ Hyperreflexia
- ♥ Rapid weight gain

PATHOLOGY

Pathology isn't completely known

PLACENTA is the root cause

- ♥ Defective spiral artery remodeling
- ♥ Systemic vasoconstriction & endothelial dysfunction

RISK FACTORS

- ♥ HX of preeclampsia in previous pregnancies
 - ♥ Family history of preeclampsia
 - ♥ 1st pregnancy
 - ♥ Obesity
 - ♥ Very young (<18) or very old (>35)
 - ♥ Medical conditions (Chronic HTN, renal disease, diabetes, autoimmune disease)
- AMA (advanced maternal age) ↑

HELLP SYNDROME

Variant of preeclampsia
Life-threatening complication

- H** Hemolysis
- EL** Elevated liver enzymes
- LP** Low platelet count

ECLAMPSIA

(seizures activity or a coma)

Immediate care:

- Side-lying
- Padded side rails with pillows/blankets
- O₂
- Suction if needed
- Do not restrain
- Do not leave



MAGNESIUM SULFATE

RX given to prevent seizures during & after labor.

***Remember:** magnesium acts like a depressant

THERAPEUTIC RANGE: 4 – 7 mg/dL

TOXICITY!

- RR <12
- ↓ DTR's
- UOP <30 mL/hr
- EKG Changes

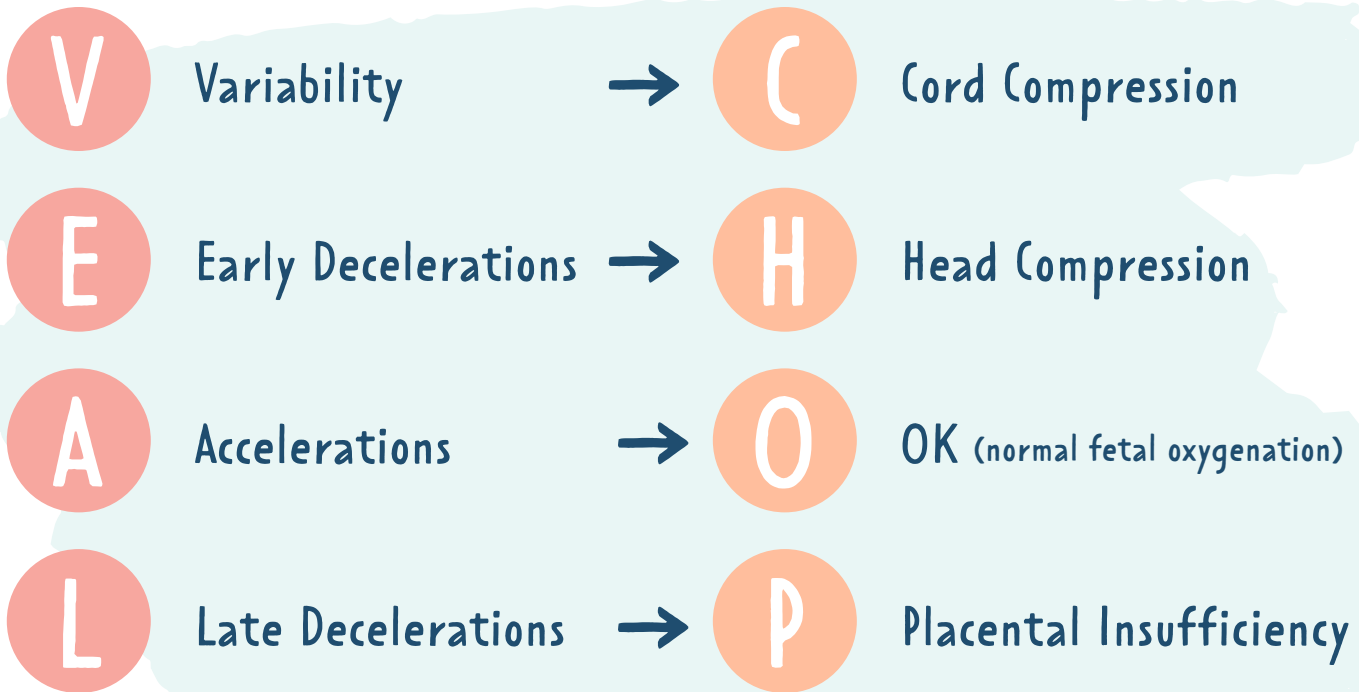
*Mag is excreted in urine
↓UOP → ↑Mag levels

ANTIDOTE: calcium gluconate

*because magnesium sulfate can cause respiratory depression

VEAL CHOP

A tool to help interpret fetal strips



ASSESSMENT OF UTERINE CONTRACTIONS

Duration	BEGINNING of the contraction to the END of that same contraction	• Lasts 45 - 80 seconds • Should not exceed 90 seconds <i>Only measured through external monitoring</i>
Frequency	Number of contractions from the BEGINNING of one contraction to the BEGINNING of the next	• 2 - 5 contractions every 20 minutes • Should not be more FREQUENT than every 2 minutes <i>Only measured through external monitoring</i>
Intensity	Strength of a contraction at its PEAK	• 25 - 50 mm Hg • Should not exceed 80 mm HG <i>Can be palpated</i> <i>Mild - nose</i> <i>Moderate - chin</i> <i>Strong - forehead</i>
Resting Tone	TENSION in the uterine muscle between contractions (relaxation of the uterus = fetal oxygenation between contractions)	• Average: 10 mm HG • Should not exceed 20 mm HG <i>Can be palpated</i> Soft = good Firm = not resting enough

LABOR & BIRTH PROCESSES

5 P's

5 factors that affect the process of labor & birth

PASSENGER

Fetus & Placenta

PASSAGEWAY

The Birth Canal

POSITION

Position of the Mother

POWERS

Contractions

PSYCHOLOGY

Emotional Response

PASSENGER

FETUS & PLACENTA

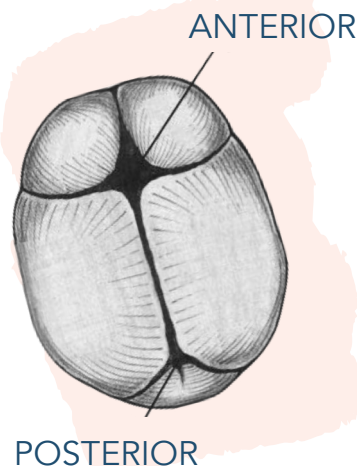
SIZE OF THE FETAL HEAD

FONTANELS

- Space between the bones of the skull allows for molding
- Anterior (larger)
 - Diamond-shaped
 - Ossifies in 12-18 months
- Posterior
 - Triangle shaped
 - Closes 8 - 12 weeks

MOLDING

- Change in the shape of the fetal skull to "mold" & fit through the birth canal



FETAL PRESENTATION

Refers to the part of the fetus that enters the pelvic inlet first through the birth canal during labor

CEPHALIC

- Head first
- Presenting part: Occipital (back of head/skull)



BREECH

- Buttocks, feet, or both first
- Presenting part: Sacrum

SHOULDER

- Shoulders first
- Presenting part: Scapula

FETAL LIE

Relation of the long axis (spine) of the fetus to the long axis (spine) of the mother

LONGITUDINAL OR VERTICAL

- The long axis of the fetus is parallel with the long axis of the mother
- Longitudinal: cephalic or breech

TRANSVERSE, HORIZONTAL, OR OBLIQUE

- Long axis of the fetus is at a right angle to the long axis of the mother
- Transverse: vaginal birth **CANNOT** occur in this position
- Oblique: usually converts to a longitudinal or transverse lie during labor

CONTINUED →

LABOR & BIRTH PROCESSES

PASSENGER

CONTINUED

FETAL ATTITUDE

GENERAL FLEXION

- Back of the fetus is rounded so that the chin is flexed on the chest, thighs are flexed on the abdomen, legs are flexed at the knees

BIPARIETAL DIAMETER

- 9.25 cm at term, the largest transverse diameter and an important indicator of fetal head size

SUBOCCIPITOBREGMATIC DIAMETER

- Most critical & smallest of the anteroposterior diameters

LIGHTENING
What is this?
When the baby "drops"
into the mother's
pelvis

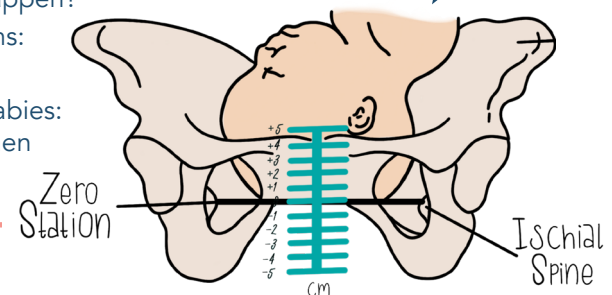
FETAL POSITION

FETAL STATION

- Where the baby's **presenting part** is located in the pelvis
- **Presenting part?**
 - Head, foot, butt (closest to exit of uterus)
- Measured in centimeters (cm)
 - Find the ischial **spine = zero**
 - **Above the ischial spine is (-)**
 - **Below the ischial spine is (+)**
 - +4 / +5 = Birth is about to happen
 - Documented
 - 5, -4, -3, -2, -1, 0, +1, +2, +3, +4, +5

ENGAGEMENT

- Fetal station zero = baby is "**engaged**"
- Presenting parts have entered down into the pelvis inlet & is at the ischial spine line (0)
- When does this happen?
 - First-time moms: 38 weeks
 - Already had babies: can happen when labor starts



PASSAGEWAY

THE BIRTH CANAL: Rigid bony pelvis, soft tissue of cervix, pelvic floor, vagina & introitus

TYPES OF PELVIS

GYNECOID

- Classic female type
- Most common

ANDROID

- Resembling the male pelvis

ANTHROPOID

- Oval-shaped
- Wider anteroposterior diameter

PLATYPELLOID

- The flat pelvis
- Least common

SOFT TISSUE

LOWER UTERINE SEGMENT

- Stretchy

CERVIX

- Effaces (thins) & dilates (opens)
- After fetus descends into the vagina, the cervix is drawn upward and over the first portion

PELVIC FLOOR MUSCLES

- Helps the fetus rotate anteriorly

VAGINA

INTROITUS

- External opening of the vagina

LABOR & BIRTH PROCESSES

POSITION

POSITION OF THE MOTHER DURING

UPRIGHT POSITION

Sitting on a birthing stool or cushion

"ALL FOURS" POSITION

On all fours: putting your weight on your hands & feet

LITHOTOMY POSITION

Supine position with buttocks on the table

LATERAL POSITION

Laying on a side



Frequent changes in position helps with:

- Relieving fatigue
- Increasing comfort
- Improving circulation

POWERS

CONTRACTIONS: PRIMARY & SECONDARY

PRIMARY POWERS

Involuntary uterine contractions
Signals the beginning of labor

DILATION

- Dilation of the cervix is the enlargement or widening of the cervical opening & canal once labor has begun
- Cervix: closed → full dilation (10 cm)
- Pressure from amniotic fluid can also apply force to dilate

EFFACEMENT

- Shortening & thinning of the cervix during the first stage of labor
- Cervix normally:
 - 2 -3 cm long
 - 1 cm thick
- The cervix is "pulled back / thinned out" by a shortening of the uterine muscles

Degree of
EFFACEMENT
is EXPRESSED in %
(0-100%)

FERGUSON REFLEX

- When the stretch receptors release oxytocin, it triggers the maternal urge to bear down

SECONDARY POWERS

Does not affect cervical dilation but helps with expulsion of infant once the cervix is fully dilated

- Voluntary bearing-down efforts by the women once the cervix has dilated
- When the presenting part reaches the pelvic floor, the contractions change in character & become expulsive.
- Laboring women start to feel an involuntary urge to push & she uses secondary powers to aid in the expulsion of the fetus

PSYCHOLOGY

EMOTIONAL RESPONSE

Anxiety can increase pain perception & the need for more medications (analgesia & anesthesia)

THINGS TO CONSIDER:

SOCIAL SUPPORT

PAST EXPERIENCE

KNOWLEDGE

NEWBORN ASSESSMENT

APGAR

7 - 10 supportive care
4 - 6 moderate depression
< 4 aggressive resuscitation

	SCORE	0 POINTS	1 POINT	2 POINTS
A	Activity (Muscle tone)	Absent	Flexed arms & legs	Active
P	Pulse	0	< 100	> 100
G	Grimace (Reflex irritability)	Floppy	Minimal response to stimulation	Prompt response to stimulation
A	Appearance (Skin color)	Blue / pale all over	Pink body, Blue extremities (acrocyanosis)	Pink all over
R	Respiration (Effort)	No Breathing	Slow & irregular	Vigorous cry

INITIAL GOALS:

1ST PRIORITY = AIRWAY

Suction with bulb syringe / deep suction
*Newborns are obligatory nose breathers

2ND PRIORITY = WARMTH

Dry with a blanket or place in warmer

CIRCULATORY SYSTEM

- Blood flow from umbilical vessels & placenta stop at birth
- Acrocyanosis:**
 - Blueness of hands & feet (normal during the first 24 hours of life)
- Closure of
 - ♥ Ductus arteriosus
 - ♥ Foramen ovale
 - ♥ Ductus venosus
- Transient murmurs are normal

VITAL SIGNS

Respiratory Rate:

30 - 60 breaths/min

Heart Rate: 110 - 160 BPM

Can be 180 if crying
Can be 100 if sleeping
Take apical pulse for 1 full min

Temperature (auxillary):

97.7° - 99.5° F
36.5° - 37.5° C

Blood Pressure:

Not done routinely
Systolic 60 - 80 mm Hg
Diastolic 40 - 50 mm Hg

MAP

Equal to the # of weeks gestation or higher

Breathing pattern is **IRREGULAR**.
Newborns are **abdominal** breathers.
To count breaths, place your hand on their abdomen  Count for a full minute!

Signs of Respiratory Distress
Retractions
Nasal flaring
Grunting

HEAD

Caput Succedaneum:

- Edema (collection of fluid)
- Crosses the suture lines
- (Like a baseball **cap**)

- Molding:** abnormal head shape that results from pressure (normal)

Fontanelles:

Bulging = increase ICP or hydrocephalus
Sunken = dehydration

Cephalhematoma:

- Birth trauma (collection of blood)
- Does not cross the suture lines

Fontanelles may be bulging when the newborn cries, vomits, or is lying down. This is normal.

GENERAL CHARACTERISTICS

Head & Chest Circumference

Head circumference

32 - 39 cm
14 - 15 inches
*measure above eyebrows

Chest circumference

30 - 36 cm
12 - 14 inches
*measure above nipple line

Length & Weight

Expected Length

44 - 55 cm
17 - 22 in

Expected Weight

2,500 - 400 g
5 lb, 8 oz - 8 lb, 14 oz



UMBILICAL CORD

Should have
2 arteries
& **1 vein**



Should be dry,
no odor, & no drainage

↓ TEMP → HEAT LOSS DUE TO:

Evaporation: Moisture from skin & lungs

Convection: Body heat to cooler air

Conduction: Body heat to a cooler surface in direct contact

Radiation: Body heat to a cooler object nearby

POSTPARTUM ASSESSMENT: "BUBBLES"

B

BREASTS

- May be sore after breastfeeding
- Breastfeed every 2 - 3 hours (15 - 20 minutes each breast)
- Position newborn "tummy to mummy"
- Latch should be completely around the areola

MASTITIS

Infection & inflammation of breast tissue

- Continue breastfeeding
- Warm compress
- Hydration
- Rest
- Analgesics
- Wash hands!

U

UTERUS

UTERINE ATONY

RISK FACTORS

- Retained placenta
- Chorioamnionitis (infection)
- Uterine fatigue
- Full bladder

SYMPTOMS

- Enlarged
- Soft
- Boggy
- Not midline
- Poorly contracted uterus

INTERVENTIONS

- Fundal massage
- Assist to void or use in-and-out catheter

B

BOWELS

Constipation is common after birth. Increasing **FLUIDS & FIBER** may help!

HEMORRHOIDS

- May see blood in the stool
- Should begin to shrink following birth

INTERVENTIONS

- Tucks / witch hazel
- Ice pack
- Squeeze bottle
- Sitz Bath

B

BLADDER

- Postpartum urinary retention is common
 - In-and-out catheterization may be needed
 - Bladder distention can cause a displaced & boggy uterus!

SIGNS OF INFECTION



- Foul smelling or purulent lochia
- Fever ($>100.4^{\circ}\text{F}$)
- Abdominal tenderness
- Tachycardia

L

LOCHIA

"Really Sore After"

RUBRA

bright red
1 - 3 days

SEROSA

pinkish/brown
4 - 10 days

ALBA

whitish-yellow
10 - 14 days *Can last up to 6 weeks

E

EMOTIONAL STATUS

- Postpartum depression (PPD) is common for women following childbirth
- As the nurse ask about feelings of...
depression • hopelessness • self-harm • harm to the newborn
- Crying
- Irritable
- Sleep disturbances
- Anxiety
- Feelings of guilt

S

SECTION (c-section incisions) / Episiotomy

- Promote proper wound healing
- Report to the health care provider: *pain • inflammation • surrounding skin is warm to touch*

POSTPARTUM HEMORRHAGE

Postpartum Hemorrhage is defined as:

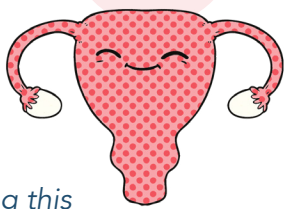
VAGINAL BIRTH: loss of >500 ml of blood
CESAREAN BIRTH: loss of >1,000 ml of blood
A CHANGE IN HEMATOCRIT BY 10%

PATHOLOGY

The uterus is like a **BASKET WEAVE OF MUSCLE FIBERS** that crimps off vessels **protecting mom from hemorrhage.**

If the uterus is not doing this crimping off, it causes bleeding!

The uterus is often called the **LIVING LIGATURE**



SIGNS & SYMPTOMS

- ♥ Hypotonia of the uterus
- ♥ Atony / boggy uterus
- ♥ Deviated to the right
- ♥ Uncontrolled bleeding

#1 cause of uterine atony is A FULL BADDER

RISK FACTORS

- ♥ Multiple gestations
- ♥ Polyhydramnios
- ♥ Macrosomic fetus (> 8 lbs)
- ♥ Multifetal gestation

overdistended uterus

DRUGS

"OH MY HEMORRHAGE"

→ This is a way to remember the order in which the drugs are used

#1

OXYTOCIN

"Pitocin"

ACTION

Stimulates contraction of the uterine smooth muscle

#2

METHERGINE

"Methylergonovine"

ACTION

Vasoconstriction

CONTRAINDICATIONS

Contraindicated in people with hypertension

**Remember vasoconstriction causes blood pressure to rise*

#3

HEMABATE

ACTION

Hemabate is a prostaglandin! Hemabate helps control blood pressure and muscle contractions (uterine contractions).

CONTRAINDICATIONS

Contraindicated in people with asthma

ANOTHER MEDICATION THAT CAN BE USED:

MISPROSTOL

given rectally

ACTION

Stimulates contraction of the uterine smooth muscle

PEDIATRIC

MILESTONES

PEDIATRIC MILESTONES

INFANT

BIRTH - 12 MONTHS

GROSS MOTOR

FINE MOTOR

LANGUAGE

1
MONTH

- Head lag
- Rounded back while sitting
- Lifts and turns head to the side in prone position

- Fists mostly clenched
- Involuntary hand movements

2
MONTHS

- Raises head & chest
- Head control improving

- Makes verbal noise (coos)

3
MONTHS

- Raises head 45 degrees in prone
- Tiny head lag in pull-to-sit

- Holds hand in front of face with hands open

4
MONTHS

- Lifts head & looks around
- Rolls from prone to supine
- Head leads body when pulled to sit

FUN TIP!
Rolls on the floor
rhymes with four!

- Bats at objects

- Babbling (copies noises)

5
MONTHS

- Rolls from supine to prone & back again
- Sits with back upright when supported

- Grasps rattle

FUN TIP!
You grasp something with five fingers

6
MONTHS

- Tripod sit



- Releases objects in hand to take another

- Babbles (nonspecific)

7
MONTHS

- Sits alone with some use of hands for support

- Transfers objects from one hand to the other

8
MONTHS

- Sits unsupported



- Gross pincer grasp (rakes)

9
MONTHS

- Crawls with abdomen off the floor



- Bangs objects together

10
MONTHS

- Pull to stand
- Able to cruise on objects (furniture)

- Fine pincer grasp
- Puts objects into containers & takes them out

11
MONTHS

- Offers objects to others & releases them

12
MONTHS

- **Walks independently**
- Sits down from standing position without assistance

- Feeds self finger-foods
- Draws simple marks on paper
- Turns pages in a book

- **RECEPTIVE LANGUAGE**
- **EXPRESSIVE LANGUAGE**
- **SIGNS OF DELAY**

RECEPTIVE LANGUAGE

- Understands common words independent of context
- Follows a one-step gestured command

EXPRESSIVE LANGUAGE

- First word (example: "mama")
- Uses a finger to point to things
- Imitates: gestures & vocal



SIGNS OF DELAY



- After independent walking for several months
 - Persistent tiptoe walking
 - Failure to develop a mature walking

PEDIATRIC MILESTONES

TODDLER 1-3 YEARS

15
MONTHS

18
MONTHS

24
MONTHS

30
MONTHS

GROSS MOTOR

- Walks independently



- Climbs stairs
- Pulls toys

- Kicks a ball
- Able to stand on tiptoes
- Climbs on & off furniture

FUN TIP!
Think: terrible twos!

FINE MOTOR

- Feeds self finger foods
- Uses index finger to point
- Full pincer grasp developed

- Uses their hands a lot for: reaching, grabbing, releasing, stacking blocks
- Turns book pages
- Removes shoes and socks
- Stacks four cubes

- Builds tower of 6-7 cubes
- Right/left-handed
- Scribbles, paints, & imitates strokes
- Turns doorknobs
- Puts round pegs into holes

RECEPTIVE LANGUAGE

- Understands 100-150 words
- Follows commands without gestures
- Looks at adults when communicating

- Understands "no"
- Understands 200 words
- Says: "what's this?"

- Points to named body parts/pictures in books
- Listens to simple stories
- Says: "my" & "mine"

- Follows a series of 2 independent commands

EXPRESSIVE LANGUAGE

- Repeats words
- Babbles sentences

- Vocab: 15-20 words
- Uses names of familiar objects

- Vocab: 40-50 words
- Sentences of 2-3 words (ex. "want cookie")
- Use descriptive words: hungry, hot, cold

- Vocab: 150-300 words

SIGNS OF DELAY

- Persistent tiptoe walking
- Does not develop a mature walking pattern

- Not walking
- Not speaking 15 words
- Does not understand the function of common household items

- Does not: use two-word sentences, imitate actions, or follow basic instructions
- Cannot push a toy with wheels

PEDIATRIC MILESTONES

PRESCHOOL

3-6 YEARS

3
YEARS

GROSS MOTOR

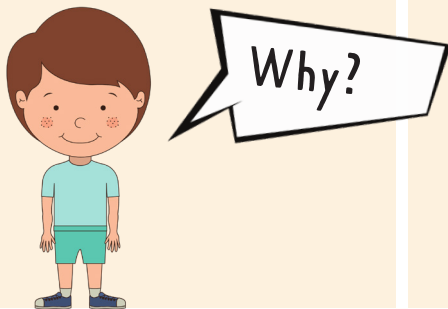
- Climbs well and runs easily
- Pedals tricycle
- Walks up & down stairs with alternating feet
- Bends over without falling

FINE MOTOR

- Undresses self
- Copies circles
- Tower of 9-10
- Holds a pencil
- Screws and unscrews lids
- Turns book pages one at a time

COMMUNICATION

- Understands most sentences
- Understands physical relation (in, on, under)
- Follows a 3-part command
- Half of the conversation understood by outside family
- Says: "why?"
- 3 or 4-word sentences
- Talks about past
- Vocab: 1,000 words
- Says their name, age, & gender
- Uses pronouns and plurals



4
YEARS

- Throws ball overhead
- Kicks ball forward
- Can bounce a ball back
- Hops on one foot
- Alternating feet going up & down steps

- Uses scissors
- Copies capital letter
- Draws circles, squares, & traces a cross or diamond
- Draws a person with 2-4 body parts
- Laces shoes

- Speaks in complete sentences
- Tells a story
- 75% of speech understood by outside observers
- Stays on topic in conversation
- Knows the name of familiar animals
- Knows at least one color
- Uses language to engage in make-believe
- Can count a few numbers
- Vocab: 1,500 words

5
YEARS

- May be able to:
 - Skip
 - Swim
 - Skate
 - Climb
 - Swing

- Can draw a person and some letters
- May dress/undress themselves
- Can use a fork, spoon, & knife
- Mostly cares for own toileting needs

- Most of the child's speech can be understood
- Explains how an item is used
- Participates in long & detailed conversations
- Talks about past, future, and imaginary events
- Answers questions that use "why" and "when"
- Can count to 10
- Says name & address
- Recalls part of a story
- Speech should be completely intelligible, even if the child has articulation difficulties
- Speech is generally grammatical correct
- Vocab: 2,000 words



SIGNS OF DELAY

- Difficulty with stairs
- Falls a lot while walking
- Can't build a 4+ block tower
- Extreme difficulty separating from parents
- No make-believe play
- Can't copy a circle
- No short paragraphs
- Doesn't understand simple instructions
- Unclear speech & drooling
- Little interest in other kids



- Can't jump in place or ride a tricycle
- Can't stack 4 blocks
- Can't throw a ball overhead
- Does not grasp crayon with thumb and fingers
- Difficulty with scribbling
- Can't copy a circle
- Doesn't say 3+ word sentences
- Can't use the words "me" & "you"
- Ignores other children or doesn't show interest in interactive games
- Still clings or cries if parents leave

- Sad often
- Little interest in playing with other kids
- Unable to separate from their parents
- Is extremely aggressive, fearful, passive, or timid.
- Easy distracted (can't concentrate for 5 minutes)
- Can not do ADL's by themselves (brush teeth, undress, wash & dry hands, etc)
- Rarely engages in fantasy play

PEDIATRIC MILESTONES

PHYSIOLOGICAL CHANGES

EARLY ADOLESCENCE

10-13
YEARS

MIDDLE ADOLESCENCE

14-16
YEARS

LATE ADOLESCENCE

17-20
YEARS

MALE

- Pubic hair spread laterally, begins to curl, pigmentation increases
- Growth & enlargement of testes & lengthening of the penis
- Lengthy look due to extremities growing faster than the trunk

- Pubic hair becomes more coarse in texture & takes on adult distribution
- Testes, scrotum, & penis continue to grow
- The skin around the scrotum darkens
- Glands penis develops
- May experience breast enlargement

- Mature pubic hair distribution & coarseness
- Breast enlargement disappears
- Adult size & shape of testes, scrotum, and penis
- Scrotum skin darkening

FEMALE

- First menstrual period (average age is 12 years)
- Breasts bud and areola continue to enlarge (no separation of the breasts)
- Pubic hair begins to curl & spread over the mons pubis

- Pubic hair becomes coarse in texture
- Amount of hair increases
- Areola & papilla separate from the contour of the breasts to form a secondary mound

- Mature pubic hair distribution and coarseness

MED-SURG

RENAL/URINARY SYSTEM

Overview Of The Kidneys

Functions

Acid-base balance

Water balance

Electrolyte balance

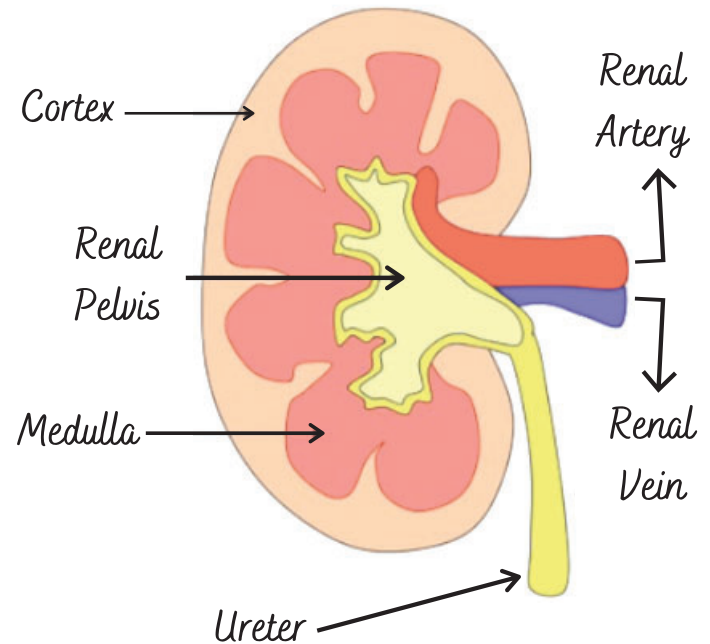
Toxin removal

Blood pressure control

Erythropoietin

Vitamin **D** metabolism

Structure



Urine Formation

1

Glomerular Filtration

- Blood flows into the kidneys: 1,200 mL/min
- Filters water, electrolytes, & small molecules into the glomerulus (Large molecules stay in the bloodstream)

2

Tubular Reabsorption

Fluid moves from renal tubules into the capillaries. They reabsorb fluid into the venous circulation

3

Tubular Secretion

Fluid moves from the capillaries into the renal tubules to get eliminated/excreted

4

Urine Excretion



TERMS TO KNOW

Dysuria.....	Painful while urinating
Nocturia.....	Excessive urination at night
Hematuria.....	Bloody urine
Frequency.....	Voiding more than every 3 hours
Urgency.....	Strong desire to void
Incontinence.....	Involuntary voiding
Enuresis.....	Involuntary voiding during sleep
Proteinuria.....	Abnormal amounts of protein in the urine
Oliguria.....	Urine output: <400 mL/day
Anuria.....	Urine output: <50 mL/day
Micturition.....	Voiding

Lab Values Related to The Kidneys

GFR



Glomerular Filtration: blood flow through the kidneys & filtration occurs

90 - 120 mL/min

BUN



Blood Urea Nitrogen: Normal waste product resulting from the breakdown of proteins. ↑ Levels can indicate a problem & be toxic in the body.

7 - 20 mg/dL

Creatinine



End product of muscle metabolism. **A better indicator of kidney function than BUN!**

0.6 - 1.2 mg/dL

Urine Specific Gravity



Measures the kidney's ability to excrete or conserve water

1.010 - 1.030

Acute Glomerulonephritis

SIGNS & SYMPTOMS

- Hematuria
- Azotemia →
- Malaise
- Headache
- Proteinuria
- Hypoalbuminemia
- Oliguria
- Edema
- ↓ GFR
- ↑ Blood Pressure
- ↑ Urine specific gravity

Excessive nitrogenous waste in the blood
↑ BUN & Creatine

PATHOLOGY

An acute inflammatory reaction in the glomerular capillaries

Antibodies get "*lodged*" in the glomeruli

=
Scarring
↓ GFR

Main cause: Recent group A beta-hemolytic streptococcal infection

INTERVENTIONS

- Diet Modifications
 - Fluid restriction
 - Sodium restriction
 - ↓ Protein
 - Provide a lot of carbohydrates →
- Monitor
 - Daily intake & output
 - Daily weight →
- Fix the cause! (strep)
- Bed rest
- Diuretics
- Antihypertensive medications

Carbohydrates provide energy & stop the breakdown of protein

A weight gain of 1 kg is equal to 1,000 mL of retained fluid

Nephrotic Syndrome

PATHOLOGY

Inflammatory response in the glomerulus

↓
Damage to membrane

↓
Loss of protein (**Albumin**)

↓
Causes synthesis of lipoprotein

↓
Hyperlipidemia

↓
Possible blood clots (thrombosis)

↓
Hypoalbuminemia

↓
Fluid shift

↓
Generalized **edema**

SIGNS & SYMPTOMS

- Edema
- Hyperlipidemia
- Proteinuria

Classic Symptoms

↓
> 3.5 g/day
= severe proteinuria

INTERVENTIONS

• Diet Modifications

- ↓ Cholesterol & saturated fats
- ↓ Sodium diet
- Moderate protein intake →

↑ High biologic value (HBV)

- Meat
- Fish
- Poultry
- Milk
- Eggs
- Soy

• Medications

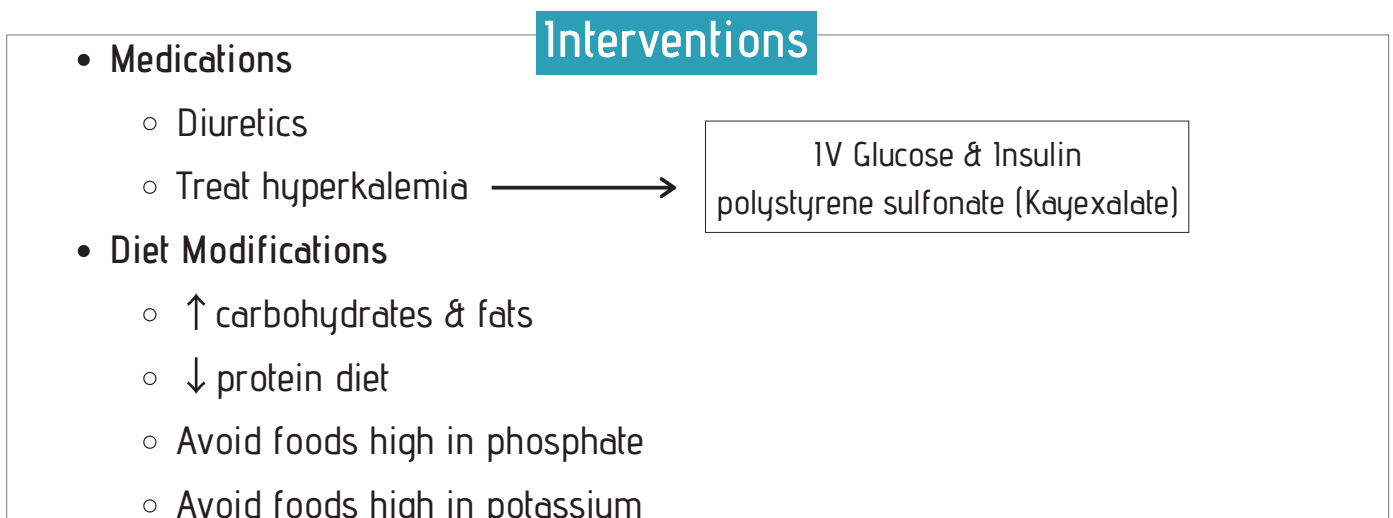
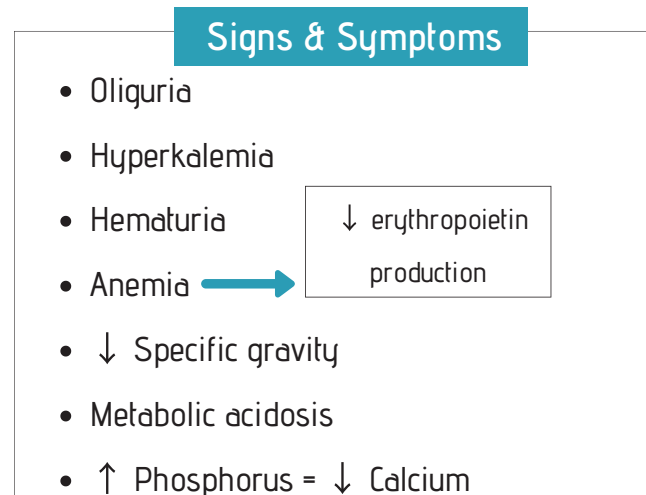
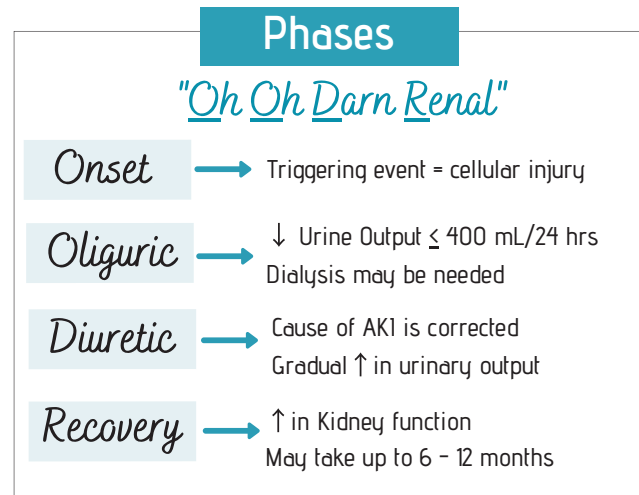
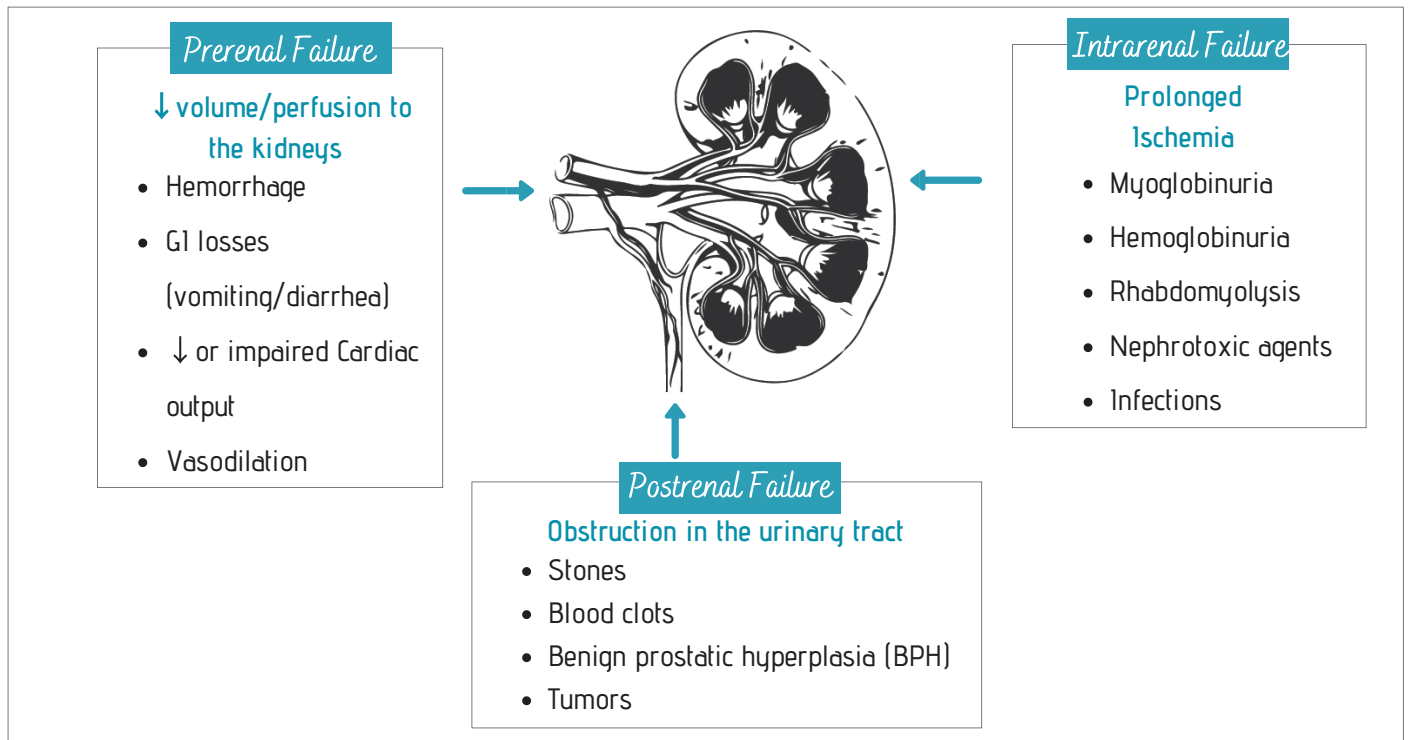
- Diuretics
- Statins
- Prednisone to ↓ inflammation
- Antineoplastic agent
- Immunosuppressant

• Report any signs of infection →

Infection is a major concern for this pt.
Report things such as respiratory infections!

Acute Kidney Injury (AKI)

Sudden renal damage!



Chronic Kidney Disease (CKD)

Progressive & irreversible
loss of kidney function

STAGES

Stages are based on the
GFR rate
As CKD worsens, GFR ↓

Stage 1

90+

Stage 2

60-89

Stage 3

A: 45 - 59
B: 30-44

Stage 4

15 - 29

Stage 5

0 - 15

TREATMENT

Dialysis

Kidney transplant

SIGNS & SYMPTOMS

In the end stages of CKD, almost **every**
body system is negatively affected



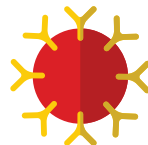
Lethargy
Alter LOC
Confusion
Seizures



Hypertension
Fluid volume **excess**
Heart failure



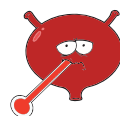
Anorexia
Nausea / vomiting
Uremic fetor (ammonia breath)
Metallic taste



Impaired immune &
inflammatory response



Anemia (↓ erythropoietin)
↑ Risk for bleeding
Prolonged bleeding time



Amenorrhea
Erectile dysfunction
↓ Libido



Uremic frost
Pruritus

Dialysis

Hemodialysis

Most common method
3X a week (3 -5 hours per treatment)



Outside
the body

The **dialyzer** (artificial kidney)

Brings blood to the dialyzer

Filters out toxins/waste products

Brings clean blood back to the body

Vascular Access

FISTULA

Joining an artery to a vein
Can take up to 4-6 weeks to heal

GRAFT

Inserting synthetic graft material between an artery and vein
Can take 2-3 months before it can mature

Both require surgery

- X Compression
- X Blood draws
- X Blood pressure readings
- X Tight clothing
- X Carrying bags
- X Sleeping on that arm

Evaluation of Patency
Feel the thrill...
Hear the bruit....

Peritoneal Dialysis

Inside
the body



Dialysate is infused into the peritoneal cavity by gravity

Close the clamp on the infusion line

Dialysate dwells for a set amount of time (dwell time)

The drainage tube is unclamped

Fluid drains from the peritoneal cavity by gravity

A new container of Dialysate is infused as soon as drainage is complete

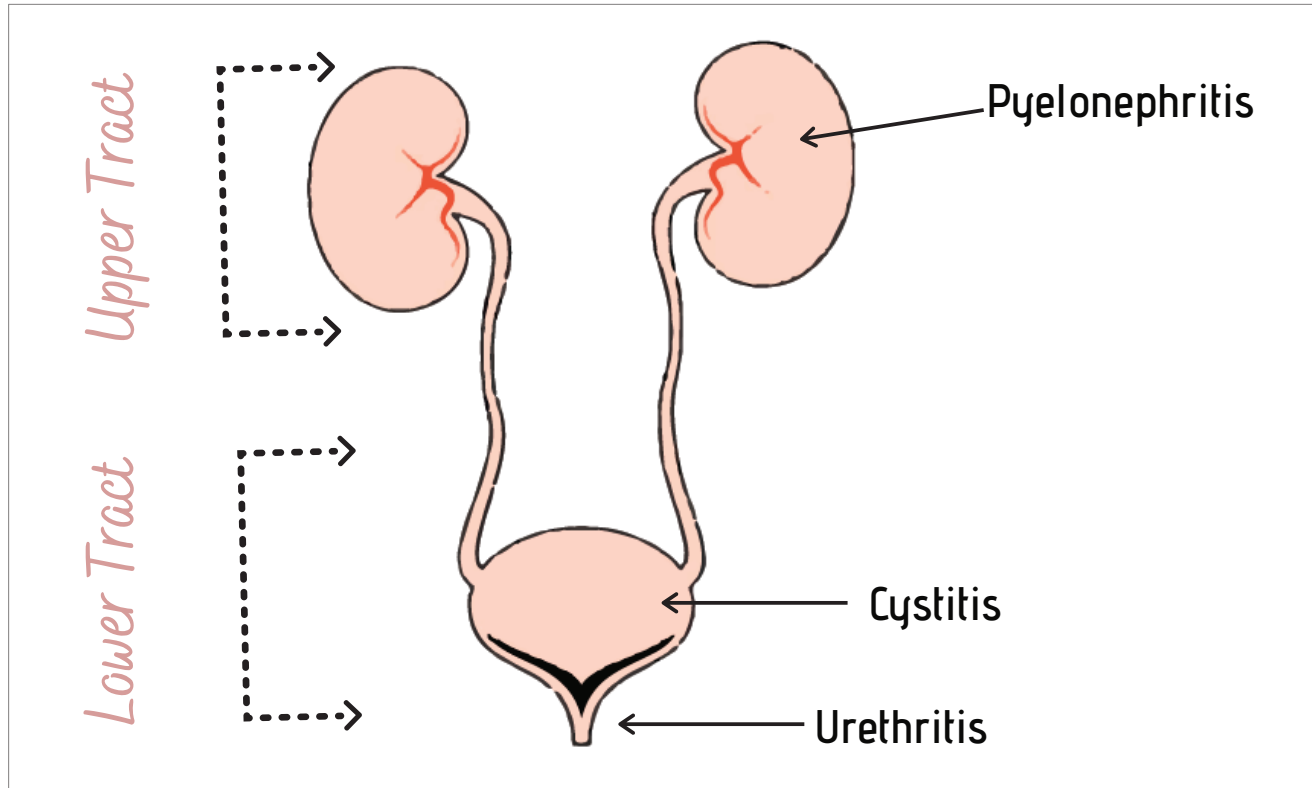
REPEAT!

PERITONEAL CATHETER

Performed at the bedside or in the operating room

Cloudy drainage may indicate infection

Urinary Tract Infection



Signs & Symptoms

Pyelonephritis

Chills & fever
Leukocytosis
Bacteriuria
Pyuria
Flank pain
Nausea & vomiting
Headache
Malaise
Painful urination

Lower UTI's

Dysuria
Burning on urination
Frequency & urgency
Nocturia
Incontinence
Hematuria

Elderly pt's
may show
different
symptoms

- Confusion
- Lethargy
- New Incontinence

Treatment

- Hydration → "flushing" out the urinary tract
- Antibiotics
- Phenazopyridine → Analgesic to ↓ pain
May turn urine orange

Renal Calculi

Nephrolithiasis: stones in the Kidneys
Ureterolithiasis: stones in the Ureter

PATHOLOGY

Stones can be made up of:

Calcium oxalate → Most Common
Calcium phosphate
Uric acid

RISK FACTORS

Males
Urinary stasis
Hyperparathyroidism
Hyperuricemia (gout)
Dehydration

SIGNS & SYMPTOMS

- Pain in the costovertebral region
- Discomfort
- Hematuria
- Pyuria
- Nausea & vomiting

INTERVENTIONS

- Medications
 - NSAIDs
 - Opioids analgesics
- Hot baths
- Moist heat on the inflamed area

- Diet

- ↑ FLUIDS! →

Aids in flushing out the stone

- Procedures

- Extracorporeal shock wave lithotripsy (ESWL) →
 - Endourologic (percutaneous) stone removal

Crushes the stone
Strain the urine after & send stones for analysis

Eradicate The Stone!

MED-SURG

CARDIAC SYSTEM

CARDIAC TERMS

CARDIAC OUTPUT (CO)

Total volume pumped per minute

Normal 4 - 8 L/min

Less volume = ↓ CO

More volume = ↑ CO

CO = HR x Stroke Volume

Cardiac Output = Heart Rate



↓ CO = ↓ perfusion to the body

- ↓ LOC
- Lungs sound wet due to backflow
- Shortness of breath
- Skin will be cold & clammy
- ↓ UOP
- Weak peripheral pulses

STROKE VOLUME

Amount of blood pumped out of the ventricle with each beat or contraction

CONTRACTILITY

Force / strength of contraction of the heart muscle

EJECTION FRACTION (EF)

% of blood expelled from the left ventricle with every contraction

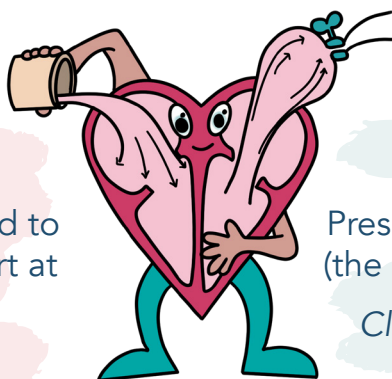
Normal EF: 50 - 70%

EXAMPLE:

If the EF is 55%, the heart is pumping out 55% of what's inside of the left ventricle

PRELOAD

Amount of blood returned to the right side of the heart at the end of diastole



AFTERLOAD

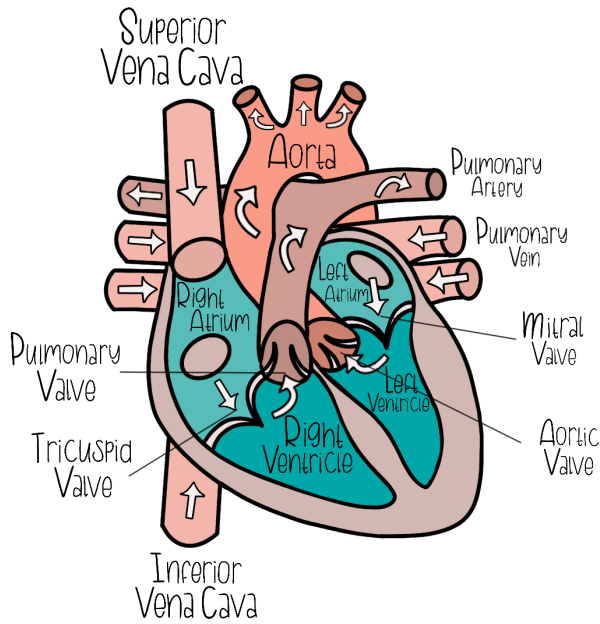
Pressure that the left ventricle has to pump against (the resistance it must overcome to circulate blood)

Clinically measured by systolic blood pressure!

HEMODYNAMIC PARAMETERS

Cardiac output (CO)	Total volume pumped per minute	Normal 4 - 8 L/min
Cardiac Index (CI)	Cardiac output per body surface area $CI = \frac{CO}{\text{surface area}}$	2.5 - 4.0 L/min/m²
Central Venous Pressure (CVP)	Pressure in the superior vena cava. Shows how much pressure from the blood is returned to the right atrium from the superior vena cava.	2 - 8 mmHg
Mean Arterial Pressure (MAP)	Average pressure in the systemic circulation (your body) through the cardiac cycle	70 - 100 mmHg
Systemic Vascular resistance (SVR)	The resistance it takes to push blood through the circulatory system to create blood flow	800 - 1200 dynes/sec/cm

FLOW OF BLOOD THROUGH THE HEART



RIGHT SIDE

Deoxygenated Blood

Carries oxygen poor blood **from the body** back to the right side of the heart

1. Superior / Inferior Vena Cava
2. Right Atrium
3. Tricuspid Valve
4. Right Ventricle
5. Pulmonic Valve
6. Pulmonary Artery

**DEOXYGENATED BLOOD
TO THE LUNGS**

LEFT SIDE

Oxygenated Blood

Oxygenated blood **from the lungs**

7. Pulmonary Vein
8. Left Atrium
9. Bicuspid / Mitral Valve
10. Left Ventricle
11. Aortic Valve
12. Aorta

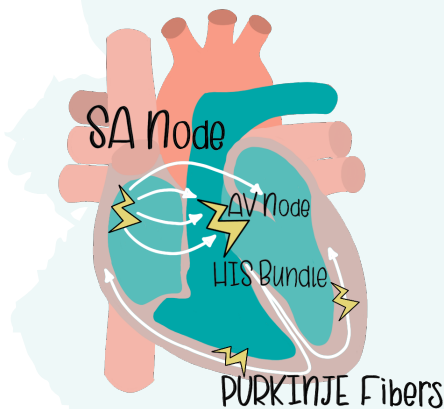
**OXYGENATED BLOOD
TO THE BODY**

VASCULAR SYSTEM FACTS

ARTERIES - Carry oxygenated blood to tissues → (think **A**way from the heart)

VEINS - Carry deoxygenated blood back to the heart

Electrical Conduction of the Heart



NMEMONIC

Send

A

Big

Bounding

Pulse

SA Node

↓
AV Node

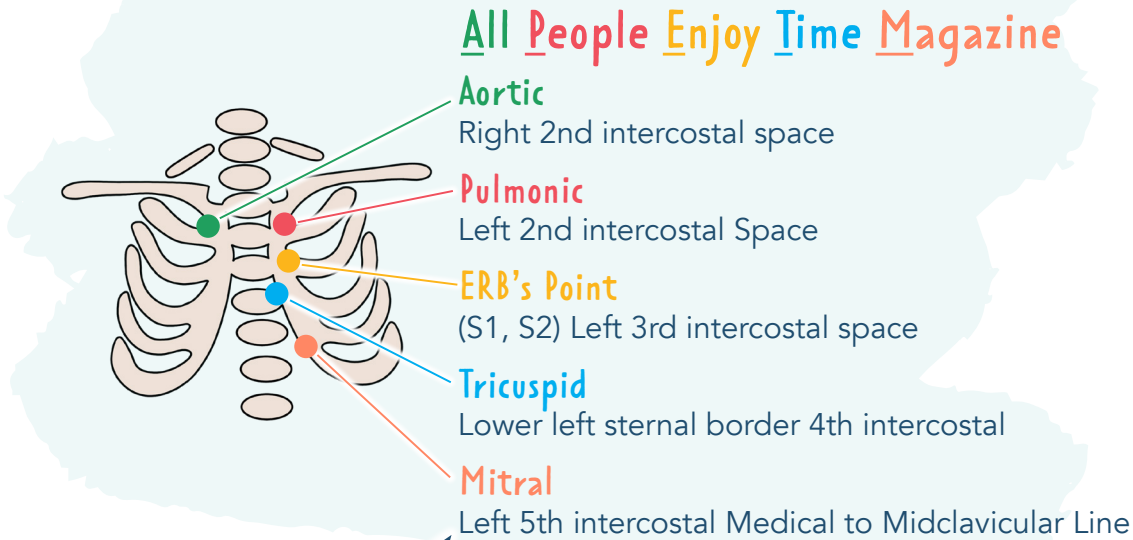
↓
Bundle of His

↓
Bundle Branches

↓
Purkinje Fibers

AUSCULTATING HEART SOUNDS

5 Areas for Listening to the Heart



TIP

Think **M** for **M**idclavicular & **M**itral has 5 letters for "5th intercostal space"

NORMAL

S1
LUB Tricuspid & mitral valve closure

S2
DUB Aortic & pulmonic valve closure

Closing of the valves

Valve opening does not normally produce a sound

ABNORMAL

S3 **EARLY DIASTOLE** in rapid ventricle filling

S4 **LATE DIASTOLE** & high atrial pressure (forcing blood into a stiff ventricle)

Abnormal ventricular filling

Extra ♥ sounds

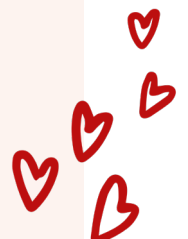
SYSTOLE: Ventricle pump / ejection = LUB (S1)

DIASTOLE: Ventricle relax / filling = DUB (S2)

Memory Trick

"COZY RED"

CO (contract) **ZY** (systole)
RE (relax) **D** (diastole)

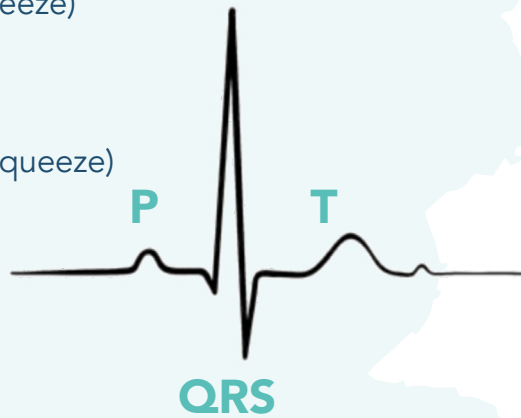


EKG WAVEFORMS

SIGNS & SYMPTOMS

PQRST

- P** Atrial contraction (squeeze)
DE-polarization
DE-compressing
- QRS COMPLEX** Ventricular contraction (squeeze)
DE-polarization
DE-compressing
- T** Ventricles
RE-laxing
RE-polarizing
RE-filling with blood



PR INTERVAL

Movement of electrical activity from atria to ventricles

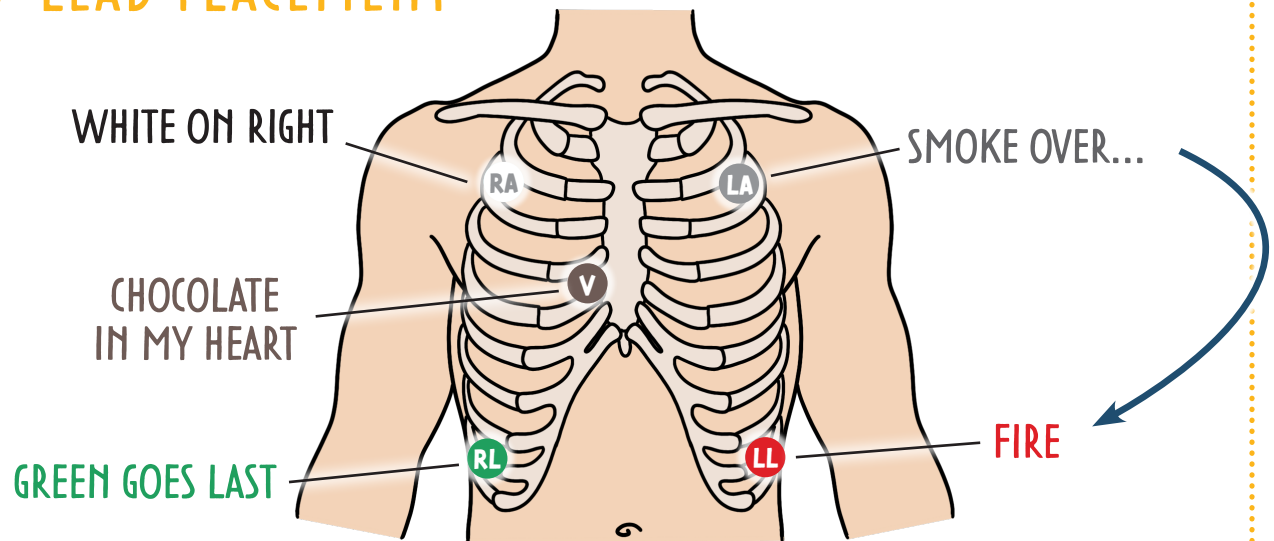
ST SEGMENT

Time between ventricular depolarization and repolarization (ventricular contraction)

QT INTERVAL

Time taken from ventricles to depolarize, contract, and repolarize

5-LEAD PLACEMENT



6 STEPS TO INTERPRETING EKG'S

#1 P WAVE

Identify & examine the P waves

- Should be present & upright
- Comes before QRS complex
- One P wave for every QRS complex

#2 PR INTERVAL

Measure PR interval

Normal PR interval:
0.12 - 0.2 seconds

#3 QRS WAVE

Is every P wave followed by a QRS complex?

- Should not be widened or shortened – this may indicate problems!

Normal QRS complex:
0.06 - 0.12

Widen is often seen in PVC's, Electrolyte imbalances & drug toxicity!

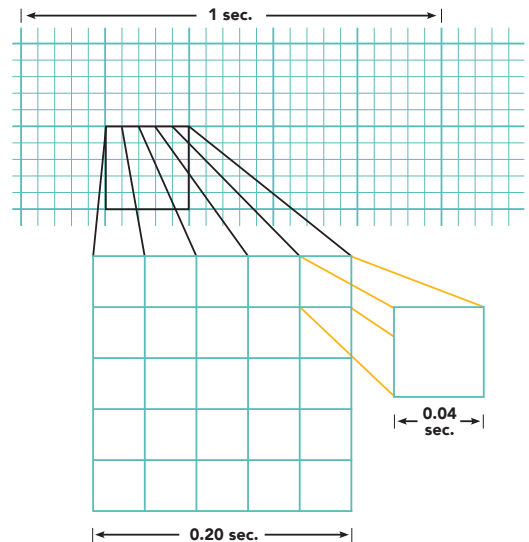
#4 R-R

Are the R to R intervals consistent

- Regular or irregular?

BASIC RHYTHMS

NORMAL SINUS 60 - 100 bpm
SINUS TACHYCARDIAC > 100 bpm
SINUS BRADYCARDIAC < 60 bpm



1 large box = 0.20 seconds

5 large boxes = 1 second

1 small box = 0.04 seconds

#5 DETERMINE THE HEART RATE

6 SECOND METHOD

Count the number of R's in between the 6 second strips & multiply by 10



6 R's X 10 = 60 beats per minutes

Be sure and check that the strip is 6 seconds! Count the boxes

BIG BOX METHOD

300 divided by the number of big boxes between 2 R's



300 / 5 = 60 BPM

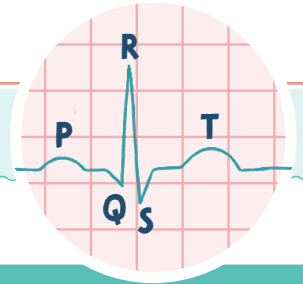
#6 IDENTIFY THE EKG FINDING!

EKG'S

NORMAL SINUS RHYTHM



RATE	60 - 100 bpm
RYTHM	Regular
P WAVE	Upright & uniform before each QRS
PR INTERVAL	Normal
QRS COMPLEX	Normal



SINUS BRADY



KEY

The sinus node creates an impulse at a **slower**-than-normal rate

RATE	< 60 bpm
RYTHM	Regular
P WAVE	Upright & uniform before each QRS
PR INTERVAL	Normal
QRS COMPLEX	Normal

CAUSES

- ♥ Lower metabolic needs
 - Sleep, athletic training, hypothyroidism
- ♥ Vagal stimulation
- ♥ Medications
 - Calcium channel blockers, beta blockers, Amiodarone

TREATMENT

- ♥ Correct the underlying cause!
- ♥ ↑ the heart rate to normal

SINUS TACHY



KEY

The sinus node creates an impulse at a **faster**-than-normal rate

RATE	> 100 bpm
RYTHM	Regular
P WAVE	Upright & uniform before each QRS
PR INTERVAL	Normal
QRS COMPLEX	Normal

CAUSES

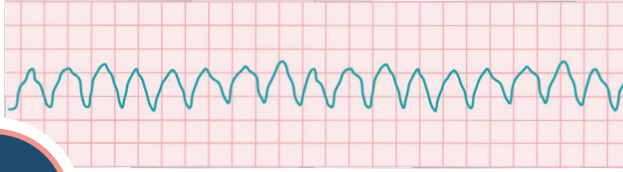
- ♥ Physiologic or psychological stress
 - Blood loss, fever, exercise, dehydration
- ♥ Certain medications
 - Stimulants - caffeine, nicotine
 - Illicit drugs - cocaine, amphetamines
 - Stimulate sympathetic response - epinephrine
- ♥ Heart failure
- ♥ Cardiac tamponade
- ♥ Hyperthyroidism

TREATMENT

- ♥ Identify the underlying cause!
- ♥ ↓ the heart rate to normal

EKG'S

VENTRICULAR TACHYCARDIA (VT)



Memory trick:
looks like
tombstones

Irregular, coarse waveforms of different shapes. The ventricles are quivering and there is **no contractions or cardiac output** which may be **fatal!**

RATE	100 - 250 bpm
RYTHM	Regular
P WAVE	Not visible
PR INTERVAL	None
QRS COMPLEX	Wide (like tomb stomps) > 0.12 seconds

CAUSES

- ♥ Myocardial ischemia / infarction
- ♥ Electrolyte imbalances
- ♥ Digoxin toxicity
- ♥ Stimulants: caffeine & methamphetamines

MANIFESTATIONS

- ♥ Patient is usually awake unlike V fib
- ♥ Chest pain
- ♥ Lethargy
- ♥ Anxiety
- ♥ Syncope
- ♥ Palpitations



TREATMENT

STABLE CLIENT WITH A PULSE

- ♥ Oxygen
- ♥ Antidysrhythmics (ex. Amiodarone...stabilizes the rhythm)
- ♥ Synchronized Cardioversion

- Synchronized administration of shock (delivery in synch with the QRS wave).
- Cardioversion is NOT defibrillation! (which is only given with deadly rhythms!)

UNSTABLE CLIENTS WITHOUT A PULSE

Also called **PULSELESS V-TACH**

- ♥ CPR
- ♥ Follow ACLS protocol for defibrillation
- ♥ Possible Intubation
- ♥ Drug Therapy
 - Epinephrine, vasopressin, amiodarone

SHOCK!

UNTREATED VT CAN LEAD TO



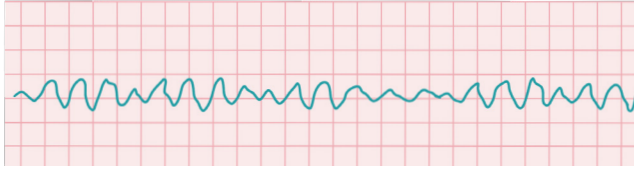
VENTRIVCULAR FIBRILIATTION



DEATH

EKG'S

VENTRICULAR FIBRILLATION (V-FIB)



Rapid, disorganizes pattern of electrical activity in the ventricle in which electrical impulses arise from many different foci!

RATE	Unknown
RYTHM	Chaotic & irregular
P WAVE	Not visible
PR INTERVAL	Not visible
QRS COMPLEX	Not visible

CAUSES

- ♥ Cardiac injury
- ♥ Medication toxicity
- ♥ Electrical imbalances
- ♥ Untreated ventricular tachycardia

MANIFESTATIONS

- ♥ Loss of consciousness
- ♥ May not have a pulse or blood pressure
- ♥ Respirations have stopped
- ♥ **Cardiac arrest & death!**

**NO CARDIAC
OUTPUT
=
NO OXYGEN
TO THE BODY**

TREATMENT

- ♥ CPR
- ♥ Oxygen
- ♥ Defib (follow ACLS protocol for defibrillation) ⚡
- ♥ Possible Intubation

- ♥ Drug Therapy
 - Vasoconstriction: Epinephrine
 - Antiarrhythmic: Amiodarone, lidocaine
 - Possibly magnesium

TIP

"DEFIB THE VFIB"

CARDIOVERSION VS. DEFIBRILATION

CARDIOVERSION

- ♥ Synchronized shock
- ♥ Lower amount of energy
- ♥ Not done with CPR
- ♥ Stable clients
 - ♥ Ex. A-fib

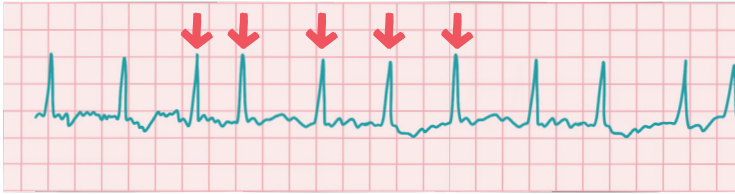
DEFIBRILATION

- ♥ Asynchronous
- ♥ Higher amount of energy
- ♥ Resume CPR after shock
- ♥ Unstable clients
 - ♥ Example: pulseless VT or VF

EKG'S

ATRIAL FIBRILLATION (A-FIB)

IRREGULAR R-R INTERVALS



Uncoordinated electrical activity in the atria that causes rapid & disorganized "fibbing" of the muscles in the atrium.

RATE	Usually over 100 BPM
RHYTHM	Irregular
P WAVE	None. They are irregular (fibrillatory waves)
PR INTERVAL	Visible
QRS COMPLEX	Normal

**THE ATRIA IS
QUIVERING!**

CAUSES

- ♥ Open heart surgery
- ♥ Heart failure
- ♥ COPD
- ♥ Hypertension
- ♥ Ischemic heart disease

MANIFESTATIONS

- ♥ Most commonly asymptomatic
- ♥ Fatigue
- ♥ Malaise
- ♥ Dizziness
- ♥ Shortness of breath
- ♥ Tachycardia
- ♥ Anxiety
- ♥ Palpitations

**ALL DUE
TO
LOW O2**

TREATMENT

STABLE PT.

- ♥ Oxygen
- ♥ Drug Therapy!
 - Beta Blockers
 - Calcium channel blockers
 - Digoxin
 - Amiodarone
 - Anticoagulants therapy to prevent emboli

UNSTABLE PT.

- ♥ Oxygen
- ♥ Electro Cardioversion
 - Synchronized administration of shock (delivery in synch with the QRS wave).
 - Cardioversion is NOT defibrillation! which is only given with deadly rhythms!

RISK FOR CLOTS!

The atria quiver causes pooling of blood in the heart which increases the risk for clots = increased risk for MI, PE, CVA's, & DVTs!

EKG'S

PREMATURE VENTRICULAR CONTRACTIONS (PVCs)



Early "premature" conduction of a QRS complex

RATE	Depends on the underlying rhythm
RHYTHM	Regular but interrupted due to early P waves
P WAVE	Visible but depends on timing of PVC (may be hidden)
PR INTERVAL	Slower than normal but still 0.12 - 0.20 seconds
QRS COMPLEX	Sharp, bizarre, and abnormal during the PVC

CAUSES

- ♥ Heart failure
- ♥ Myocardial ischemia / infarction
- ♥ Drug toxicity
- ♥ Caffeine, tobacco, alcohol
- ♥ Stress or Pain
- ♥ Increased workload on the heart

EXERCISE
FEVER
HYPERVOLEMIA
HEART FAILURE
TACHYCARDIA

BIGEMINY: every **other** beat

TRIGEMINY: every **3rd** beat

QUADRAGEMINY: every **4th** beat

R-ON-T PHENOMENON: PVC arises spontaneously from the repolarization gradient (T-wave) may precipitate V-fib

TREATMENT

TX based on underlying cause

- ♥ May not be harmful if the client has a healthy heart
- ♥ Oxygen
- ♥ Decrease caffeine intake
- ♥ Correct the electrolyte imbalances
- ♥ D/C or adjust the drug causing toxicity
- ♥ Decrease stress or pain

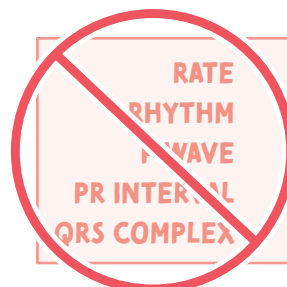
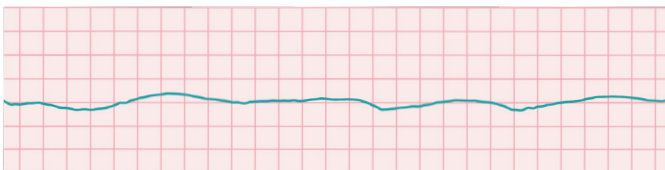
MANIFESTATIONS

- ♥ May be asymptomatic
- ♥ Feels like your heart...
 - "Skipped a beat"
 - "Heart is pounding"
- ♥ Chest pain

CHEST PAIN

Notify the healthcare provider if the client complains of chest pain, if the PVC's increase in frequency or if the PVC's occur on the T wave (R-on-T phenomenon).

ASTOLE



FLATLINE

CAUSES

- ♥ Myocardial ischemia/infarction
- ♥ Heart failure
- ♥ Electrolyte imbalances (common: hypo/hyperkalemia)
- ♥ Severe acidosis
- ♥ Cardiac tamponade
- ♥ Cocaine overdose

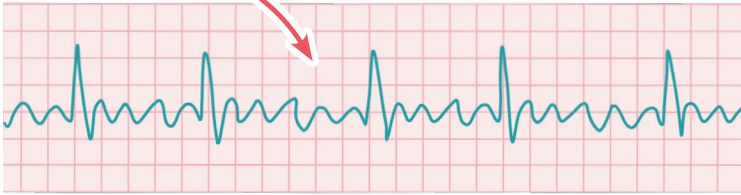
TREATMENT

- ♥ **High quality CPR**
 - Heel of hand on the center of the chest
 - Arms straight
 - Shoulders aligned over hands
 - Compress at 2 - 2.4 inches at a rate of 100 - 120 min
 - 30 compressions to 2 rescue breaths
 - Minimal interruptions

EKG'S

ATRIAL FLUTTER

SAWTOOTH



Similar to A-fib, but the heart's electrical signals spread through the atria. The heart's upper chambers (atria) beat too quickly but at a regular rhythm.

RATE	75-150 BPM
RHYTHM	Usually regular
P WAVE	"Sawtooth" P wave configuration shaped flutter waves
PR INTERVAL	Unable to measure
QRS COMPLEX	Usually normal & upright

CAUSES

- ♥ Coronary artery disease (CAD)
- ♥ Hypertension
- ♥ Heart failure
- ♥ Valvular disease
- ♥ Hyperthyroidism
- ♥ Chronic lung disease
- ♥ Pulmonary embolism
- ♥ Cardiomyopathy

MANIFESTATIONS

- ♥ May be asymptomatic
- ♥ Fatigue / syncope
- ♥ Chest pain
- ♥ Shortness of breath
- ♥ Low blood pressure

TREATMENT

STABLE PT.

- ♥ Drug therapy!
 - Calcium channel blockers
 - Antiarrhythmics
 - Anticoagulants

RISK FOR CLOTS!

Atrial flutter causes pooling of blood in the atria = risk for clots

UNSTABLE PT.

- ♥ Cardioversion
 - Synchronized administration of shock (delivery in sync with the QRS wave).
 - Cardioversion is NOT defibrillation!

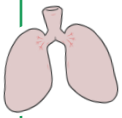
DEFIBRILLATION

Defibrillation is only given with deadly rhythms!

HEART FAILURE

SIGNS & SYMPTOMS

LEFT SIDED HF



LEFT SIDE THINK LUNGS

Fluid is backing up into the lungs = pulmonary symptoms

- D**yspnea
- R**ales (crackles)
- O**rthopnea
- W**eakness / fatigue
- N**octurnal paroxysmal dyspnea
- I**ncreased HR
- N**agging cough (*frothy, blood tinged sputum*)
- G**aining weight (2 -3 lb's a day)

OTHER S&S
↑ UOP
Hypotension
S3 Gallop

RIGHT SIDED HF

Fluid is backing up into the venous system

- S**welling of the legs & hands
- W**eight gain
- E**dema (pitting)
- L**arge neck veins (JVD)
- L**ethargy / fatigue
- I**rregular heart rate
- N**octuria
- G**irth (Ascites)

OTHER S&S
Hepatomegaly
Splenomegaly
Anorexia

SYSTOLIC HF VS. DIASTOLIC HF

SYSTOLIC HF

Weakened heart muscle

The ventricle does not **EJECT** properly

DIASTOLIC HF

Stiff & non-compliant heart muscle

The ventricle does not **FILL** properly

EJECTION FRACTION (EF)

Amount of blood **PUMPED OUT**

Amount of blood **IN THE CHAMBER**

% EF

EF REDUCED



NORMAL EF



**NORMAL EJECTION FRACTION
50% - 70%**

HEART FAILURE: DIAGNOSIS & INTERVENTIONS

DIAGNOSIS

BNP

B-TYPE NATRIURETIC PEPTIDE

Secreted when there is ↑ pressure in the ventricle

BNP ↑ in HF

CHEST X-RAY

Enlarged heart & pulmonary infiltrates

ECHOCARDIOGRAM

Looks at ejection fraction, back flow, & valve problems

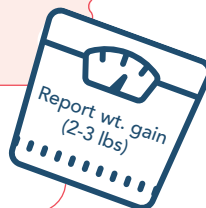
EF is ↓ in most types of HF

INTERVENTIONS

MONITOR

Strict I&O's
Daily weights
Edema

Same time
Same scale
Same clothes



DIET MODIFICATIONS

Fluid restrictions
↓ Sodium
↓ Fat
↓ Cholesterol

Spread fluids out during the day
Suck on hard candy to ↓ thirst

REPORT S&S OF FLUID RETENTION

Edema
Weight gain

ELEVATE HOB

(Semi-Fowler's position)

BALANCE PERIODS OF ACTIVITY & REST

CORONARY ARTERY DISORDERS (CAD)

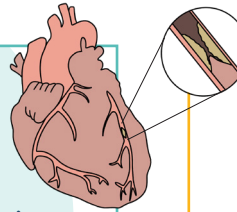
RISK FACTORS

NON-MODIFIABLE

Age
Gender
Race
Family history

MODIFIABLE

Diabetes
Hypertension
Smoking
Metabolic Syndrome
Obesity
Physical inactivity
High cholesterol



PATHO

Fatty plaques develop



Called **ARTHEROSCLEROSIS**



Restriction of blood flow to the heart

SIGNS & SYMPTOMS

ISCHEMIA

Inadequate blood supply to the heart = ↓ O₂ to the heart.

ISCHEMIA: ↓ O₂

INFARCTION: Death

ANGINA PECTORIS

Chest pain that is caused by **myocardial ischemia**

- Chest pain w/ activity
- Shortness of breath
- Fatigued

PREVENTION

- Management of hypertension
- Management of diabetes
- Smoking cessation
- Diet
- Exercise

DIAGNOSIS

BLOOD TEST - Lipoprotein profile

- LDL
- HDL
- Total Cholesterol
- Triglycerides

ECG

- Assess for changes in ST segments or T waves!

TREATMENT

- Lipid-lowering medications "Statins"
- Heart-healthy diet
- Physical activity
- Smoking cessation
- Stress management
- Hypertension management
- Diabetes management
- Coronary stent / angioplasty
- Coronary Artery Bypass Graft (CABG)

WEEKLY EXERCISE GOALS
Moderate: 75 min
Vigorous: 150 min

Cholesterol

LDL

Low Density Lipoprotein

→ Want **LOW** Levels (<100 mg/dL)
BAD CHOLESTEROL

HDL

High Density Lipoprotein

→ Want **HIGH** Levels (>60 mg/dL)
HAPPY CHOLESTEROL

PERIPHERAL DISEASES

PERIPHERAL VASCULAR DISEASE (PVD)

Deoxygenated blood can't get back to the heart. Pooling of oxygenated blood in the extremities.

"VEINY"

- V**ery big pulses = warm legs
- E**dema (blood pooling)
- I**rrregular shaped sores (ulcerations)
- N**o intense pain (dull, achy pain)
- Y**ellow & brown ankles

GANGRENE?

NO! PVD is not an oxygen problem

PERIPHERAL ARTERIAL DISEASE (PAD)

Think
"BAD"

Narrow artery (atherosclerosis) where oxygenated blood can't get to the distal extremities (hands & feet).

Ischemia & necrosis of the extremities

"ARTS"

- A**bsent pulses (cool, shiny, no hair)
- R**ound, red sores
- T**oes & feet pale or black "eschar"
- S**harp calf pain (intermittent claudication)

GANGRENE?

YES! This may develop because oxygenated blood is not getting to the extremities

CAUSES OF BOTH

Smoking • Diabetes • High cholesterol • Hypertension

DX: Doppler Ultrasound or Ankle Brachial Index (ABI)

TREATMENT — KEEP VEIN OPEN!

- **Elevate Veins**
- **Medications**
 - Aspirin or Clopidogrel
 - Cholesterol lowering drugs "statin"
- **Surgery**
 - Angioplasty
 - Bypass (CABG)
 - Endarterectomy

TREATMENT — GET BLOOD MOVING!

- **DAngle Arteries**
(Dependent position)
- **Perform daily skin care with moisturizer**
- **Stop smoking**
- **Avoid tight clothing** (vasoconstriction)
- **No heating pads!**
- **Medications**
 - Vasodilators
 - Antiplatelets

ANGINA PECTORIS

Chest pain that is caused by myocardial ischemia

TYPES OF ANGINA

STABLE

"Predictable"

Occurs with

EXERTION

↑ myocardial
demand for oxygen

UNSTABLE

"Preinfarction"

Occurs at

REST

& more frequently

PRINZMETAL'S / VARIANT

"Coronary artery vasospasm"

Pain at rest with reversible

ST-ELEVATION

MANIFESTATIONS

- Chest pain (heavy sensation) may radiate to neck, jaw, or shoulders
- Unusual fatigue
- Weakness
- Shortness of breath
- Pallor
- Diaphoresis

INTERVENTIONS

GOAL: ↓ OXYGEN DEMAND

REPERFUSION PROCEDURES

PCI

Percutaneous
Coronary
Interventions

CABG

Coronary Artery
Bypass Graft

DRUG THERAPY

NITRATES

- Vasodilators
- ↓ ischemia = ↓ pain
- Usually administered sublingually

CALCIUM CHANNEL BLOCKERS

- Relaxes blood vessels
- ↑ oxygen supply to the heart
- ↓ workload of heart

BETA BLOCKERS

- ↓ myocardial oxygen consumption

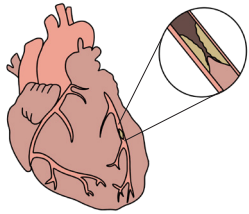
ANTIPLATELET / ANTICOAGULANT

- Prevents platelet aggregation & thrombosis

MYOCARDIAL INFARCTION (MI)

PATHO

Complete blockage in one or more arteries of the heart



ARTHEROSCLEROSIS

Coronary arteries become narrow due to plaque

ANGINA

Due to ischemia (low O₂)

MYOCARDIAL INFARCTION (MI)

Plaque rupture become a blood clot that blocks arteries of the heart

SIGNS & SYMPTOMS

SUDDEN, CRUSHING, RADIATING CHEST PAIN THAT CONTINUES DESPITE REST & MEDICATIONS

- Shortness of breath
- Nausea & vomiting
- Sweating
- Pale & dusty skin

PAIN FELT IN THE...

- Left arm
- Mid back/shoulder
- Heartburn

WOMEN PRESENT WITH DIFFERENT SYMPTOMS

- Fatigue
- Shoulder blade discomfort
- Shortness of breath

DIAGNOSIS

- ECG

- ST-Elevation (no O₂)
- ST-Depression (low O₂)
- T-wave inversion

- TROPONIN

- STRESS TEST

- Chemical & exercise

TREATMENT

IMMEDIATE

- M** MORPHINE
↓ workload of the heart & ↓ pain
- O** OXYGEN
↑ O₂ to the heart
- N** NITROGLYCERIN
opens up the vessels
- A** ASPIRIN
Prevents platelets from sticking together

CATH LAB OR CLOT BUSTER

MEDICATIONS

- Thrombolytics (clot busters)
- Example: Streptokinase

SURGERY

- PCI "Percutaneous Coronary Intervention"
- CABG
- Endarterectomy
- Cut out the blockage

Suffixes:
-teplase
-ase

PREVENTION & REST

PREVENT / STABILIZE CLOT

- Heparin IV

REST THE HEART WITH...

- Nitro
- Beta-Blockers
- Calcium channel blockers

ANY TIME YOU GIVE A THROMBOLYTIC, WATCH FOR SIGNS OF BLEEDING!

CARDIAC BIOMARKERS

TROPONIN

troponin I <0.5 ng/mL

*Cardiac specific enzymes
BEST indicator of an acute MI*

*> 1.5 ng/mL
=CRITICAL*

INCREASE

Few hours

PEAK

Can remain elevated for as long as 3 weeks

CK-MB

0 - 3 ng/mL

*Cardiac-specific isoenzyme
BUT less reliable than Troponin*

INCREASE

Few hours

PEAK

24 Hours

MYOGLOBIN

5 - 70 ng/mL

*Myoglobin is found in cardiac & skeletal muscle
NOT a specific indicator of an acute MI, but a (-) sign is
good for ruling out an acute MI*

INCREASE

1 -3 Hours

PEAK

12 Hours

*MYOGLOBIN
THINK MUSCLE*

DIURETICS

LOOP Diuretic

LOOP Diuretic			
furosemide (Lasix)	bumetanide (Bumex)	torsemide (Demadex)	
<u>Action</u> Inhibit reabsorption of Na^+ & Cl^- Acts on 3 sites = $\uparrow$ reabsorption	<u>Purpose</u> • Hypertension • Heart failure • Renal disease • Edema • Pulmonary edema	<u>Side Effects</u> $\downarrow$ Hypokalemia $\downarrow$ Hypotension $\downarrow$ Hyponatremia $\uparrow$ Hyperglycemia $\uparrow$ Photosensitivity Dehydration	<u>Nursing Considerations</u> • Obtain baseline vital signs • Adm. furosemide SLOWLY (rapid adm. can cause permanent hearing loss) • Replace K^+ if <3.5 mEq/L

THIAZIDE Diuretic

THIAZIDE Diuretic			
hydrochlorothiazide (Microzide)	chlorothiazide (Diuril)	methyclothiazide	
<u>Action</u> Inhibit reabsorption of Na^+ & Cl^- Excretion of Na^+ , Cl^- , & H_2O	<u>Purpose</u> • Hypertension • Heart failure • Renal disease • Cirrhosis • Edema • Corticosteroids • Estrogen Therapy	<u>Side Effects</u> $\downarrow$ Hypokalemia $\downarrow$ Hypotension $\downarrow$ Hyponatremia $\downarrow$ Libido $\uparrow$ Hyperglycemia $\uparrow$ Photosensitivity Dehydration Azotemia	<u>Nursing Considerations</u> • Obtain baseline vital signs • Give w/ meals to $\downarrow$ GI upset • Replace K^+ if <3.5 mEq/L • Avoid giving to pt.'s with gout • Monitor renal function

DIURETICS

OSMOTIC Diuretic

mannitol
(Osmitol)

<u>Action</u>	<u>Purpose</u>	<u>Side Effects</u>	<u>Nursing Considerations</u>
↑ the thickness of the filtrate so water can't be reabsorbed Excretion of Na⁺ & Cl⁻	• Tx of cerebral edema • ↓ Intraocular Pressure (IOP)	Edema Blurred vision Nausea, vomiting, & diarrhea Urinary retention	• Only administered IV • May crystalize (check solution before adm.) • Perform neuro assessment & LOC (if using for cerebral edema)

K⁺ Sparing Diuretic

spironolactone
(Aldactone)

Spirolactone
THINK Sparing (K⁺)

<u>Action</u>	<u>Purpose</u>	<u>Side Effects</u>	<u>Nursing Considerations</u>
Antagonizes aldosterone (which ↑ reabsorption of Na⁺) Excretion of Na⁺ & H₂O NOT K⁺	• Hypertension • Edema • Hypokalemia • Hyperaldosteronism • Cross-sex hormonal therapy ↓ Spironolactone inhibits testosterone	Hyperkalemia Diarrhea Gastritis Drowsiness Erectile dysfunction Gynecomastia	• Avoid eating foods high in potassium • Avoid salt substitutes & potassium supplements • Monitor K⁺ levels Educate: gynecomastia is usually reversible after therapy has stopped

MED-SURG

ENDOCRINE SYSTEM

ENDOCRINE SYSTEM

FUNCTIONS

Maintenance &
regulation

Energy metabolism

Response to
stress & injury

Reproduction

Growth &
development

Fluid, electrolyte, &
acid-base balance

Endocrine Glands

HYPOTHALAMUS



PANCREAS



PITUITARY



ADRENAL



THYROID



OVARIES



PARATHYROID



TESTES



DIABETES

TYPE 1 & 2



Blood Glucose goal:
70 - 110 mg/dL

Type 1 Diabetes

No insulin production

- Usually diagnosed in childhood
- Caused by an autoimmune response
- The cells are starved of glucose since there is no insulin to bring it into the cells
- The cells break down protein and fat into energy causing ketones to build up = **acidosis!**

Type 2 Diabetes

Does not produce enough insulin or produces "bad" insulin that does not work properly

- Onset usually as an adult

Pathology

Signs & Symptoms

3 P's

Onset: **ABRUPT**

- Polyuria - Excessive peeing
- Polydipsia - Excessive thirst
- Polyphagia - Excessive hunger

Onset: **GRADUAL**

Treatment

Insulin only! oral hypoglycemic agents will not work for this pt.

- Diet & exercise
- Oral hypoglycemia agents
 - Example: Metformin
- Possibly Insulin

Complications

Diabetic Ketoacidosis (DKA)

Onset: **ABRUPT**

Patho:

1. Not enough insulin
2. Blood sugar becomes VERY high
3. Cells break down protein & fat into energy
4. Ketones build up = Acidosis!

Signs & Symptoms:

- Ketosis & acidosis
- Hyperglycemia
- Dehydration
- Kussmaul respiration (trying to blow off CO₂)
- Acid breath "fruity breath"

Treatment:

- **IV INSULIN**
- Fluid replacement
- Correction of electrolyte imbalances

Hyperosmolar hyperglycemic state (HHS)

Onset: **GRADUAL**

Patho:

- NO acidosis present!
- Simply high amounts of glucose in the blood

Signs & Symptoms:

- Hyperglycemia

Treatment:

- Fluid replacement
- Correction of electrolyte imbalances
- Possible Insulin administration

DIABETES NURSING CARE

Hyperglycemia

↑ Blood Sugar

>200 mg/dL

Gradual (hours to days)

- Polyuria
- Polydipsia
- Polyphagia
- Hot & dry skin
- Dry mouth (dehydration)
- Fruity breath
- Deep, rapid breaths (air hunger)
- Numbness & tingling
- Slow wound healing
- Vision changes

- Administer Insulin as needed
- Restrict exercise when blood glucose is >250 mg/dL
- Test urine for ketones

Diabetic Diet



Complex carbohydrates

Fiber-rich foods

Heart-healthy fish

"Good fats"

Sugar-free fluids



Saturated fats

Trans fats

Cholesterol

Sodium



Blood Glucose Goal:
70 - 110 mg/dL

Hypoglycemia

↓ Blood Sugar

<60 mg/dL

Sudden

- Cool & clammy skin
- Diaphoresis
- Palpitations
- Fatigue & weakness
- Confusion
- Headache
- Shakiness
- Inability to arouse from sleep

15 X 15 X 15

Oral intake of
15 grams
of carbohydrates

Recheck blood
glucose in 15 min

Give another 15
grams of
carbohydrates if
needed

Unconscious patients

Do not put anything in an unconscious patient's mouth, they can *aspirate*!

Administer glucagon
(subcut or IM)

Repeat in 10
min if still
unconscious

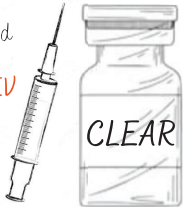
Place client in a
lateral position

Notify health
care provider

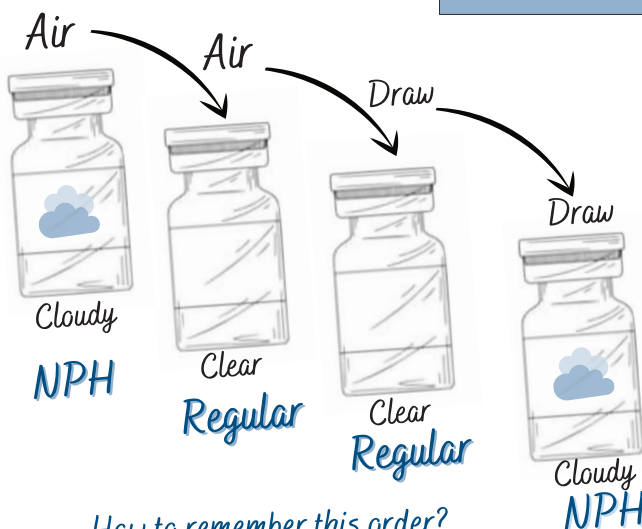
Acute Care Setting

Administer 50% dextrose if IV
access is available

INSULIN TYPES

RAPID	LISPRO HUMANLOG ASPART NOVOLOG GLULISINE APIDRA	ONSET: 5 - 30 min PEAK: 30 min - 3 hrs DURATION: 3 - 5 hrs	
SHORT	REGULAR	ONSET: 30- 60 min PEAK: 2 - 4 hrs DURATION: 5 - 7 hrs	<i>Standard Insulin Given IV</i> 
INTER-MEDIATE	NPH NPH HUMULIN N NOVOLIN NPH	ONSET: 1 - 2 hrs PEAK: 4 - 12 hrs DURATION: 18 - 24 hrs	
LONG	GLARGINE LANTUS DETEMIR LEVEMIR	ONSET: 1 - 2 hours PEAK: None DURATION: 24 hrs	<i>Do not mix with any other insulin</i> 

Administration



How to remember this order?

You are Not → Retired you are an R → N

- Must be given SubCut or IV
- Remove all air bubbles
- Rotate site 1 inch from previous site
- Common sites: back of arms, thighs & abdomen (at least 2 inch away from the belly button)

Complications

- Hypoglycemia
- Weight gain
 - Insulin is a growth hormone
- Lipatrophy (loss of subcut fat)

THYROID DISORDERS

Hint: Thyroid hormone give you ENERGY



HYPERTHYROIDISM

"Too much ENERGY!"

- Nervous
- Irritable
- Attention span
- Increased appetite
- Weight loss
- Hot
- **Exophthalmos** 
- Enlarged thyroid
- Increased:
 - Blood pressure
 - Pulse

HYPOTHYROIDISM

"Not enough ENERGY!"

- No energy
- Fatigue
- No expressions
- Weight gain
- Cold
- Amenorrhea
- Slurred

Thyroid Medications

- *Levothyroxine (Pt. will be on this forever)*

Anti-Thyroid Medications

- *Methimazole or PTU*

Iodine Compounds

Radioactive Iodine Therapy

Thyroidectomy

THYROID STORM



Acute / life threatening emergency with uncontrollable hyperthyroidism

Signs & Symptoms

- ↑ Temp
- Tachycardia
- Hypertension
- Nausea/vomiting /diarrhea
- Agitation/anxiety
- Delirium, seizures or coma

Interventions

- Patent airway
- Non Salicylate antipyretics
- Antithyroid medications
- Cooling blanket

SIGNS & SYMPTOMS

TREATMENT

PARATHYROID GLAND DISORDERS

Produces the hormone parathyroid hormone (PTH) which controls the levels of calcium in the blood



↑ PTH

HYPERPARATHYROIDISM

↓ PTH

HYPOPARATHYROIDISM

Can occur after a **thyroidectomy** due to accidental removal of the parathyroid

SIGNS & SYMPTOMS

- ↑ Calcium ↓ Phosphorus
- Fatigue & muscle weakness
- Skeletal pain
- Pathological fractures from bone deformities
- Kidney stones (↑ calcium)
- Weight loss / anorexia
- Constipation
- Hypertension
- Cardiac dysrhythmias

- ↓ Calcium ↑ Phosphorus
- Numbness & tingling
- Muscle cramps
- Tetany
- Hypotension
- Anxiety, irritability, & depression

Same S&S of hypocalcemia!

Positive Trousseau's: Carpal spasm caused by inflating a blood pressure cuff

Chvostek's signs: Contraction of facial muscles w/ light tap over the facial nerve

TREATMENT

- Parathyroidectomy
 - Removal of more than one gland
- Administer
 - Phosphates, Calcitonin, & IV or oral bisphosphonates
- DIET: ↑ fiber & moderate calcium

- IV Calcium
- Phosphorus binding drugs
- DIET: ↑ Calcium ↓ Phosphorus

ADRENAL CORTEX DISORDERS

One on the top of each kidney

Adrenal cortex hormones:

- Glucocorticoids
- Mineralocorticoids
- Sex hormones

Retains: Na^+ & H_2O
Loses: K^+



CUSHINGS

Disorder of the adrenal cortex

Too many steroids

They "have a cushion"

- Muscle wasting
- Moon face
- Buffalo hump
- Truncal obesity w/ thin extremities
- Supraclavicular fat pads
- Weight gain
- Hirsutism (masculine characteristics)
- $\uparrow$ Glucose $\uparrow$ NA^+
- $\downarrow$ K^+ $\downarrow$ CA^+
- Hypertension

- Adrenalectomy
 - Requires lifelong glucocorticoid replacement
- Avoid infection
- Adm. chemotherapeutic agents if adrenal tumor is present

ADDISONS

Disorder of the adrenal cortex

Not enough steroids

We need to "ADD" some

- Fatigue
- Nausea / vomiting / diarrhea
- Anorexia
- Hypotension
- Confusion
- $\downarrow$ NA & H_2O $\uparrow$ K^+
- Hyperpigmentation of the skin
- **Vitiligo:** white areas of depigmentation

Addisonian Crisis !

Signs & Symptoms

- Profound fatigue
- Dehydration.....shock!
- Renal failure
- Vascular collapse
- Hyponatremia
- Hyperkalemia

Give them steroids!

- Adm. glucocorticoid and/or mineralocorticoid
- Diet: high in protein & carbs

SIGNS & SYMPTOMS

TREATMENT

ADRENAL MEDULLA DISORDER

One on the top of each kidney

Adrenal medulla hormones:

- Epinephrine
 - Norepinephrine
- "Fight or flight response"



PHEOCHROMOCYTOMA

Excessive amounts of epinephrine & norepinephrine are secreted

SIGNS & SYMPTOMS

- ↑ Blood pressure
- ↑ Heart rate
- Palpitations
- Tremors
- Flushing / diaphoretic
- Headache
- Pain in the chest or abdomen
- Hyperglycemia

*Avoid stimuli!
It may cause a
hypertensive crisis*



TREATMENT

- Adrenalectomy (if a tumor is present)
- Tell the pt. not to smoke, drink caffeine or change position suddenly
- Adm. anti-hypertensives
- Promote rest & calm environment
- Diet: high in calories, vitamins, & minerals

PITUITARY GLAND DISORDERS

Antidiuretic Hormone (ADH) regulates & balances the amount of water in your blood



SIADH

Retains Water

- Low urinary output of concentrated urine
- Fluid volume overload!
- Weight gain without edema
- Hypertension
- Tachycardia
- Nausea & vomiting
- Hyponatremia

DIABETES INSIPIDUS

Loses Water

- Excretes large amounts of diluted urine
- Polydipsia
- Dehydration
- Decreased skin turgor
- Dry mucous membranes
- Muscle pain & weakness
- Headache
- Postural hypotension
- Tachycardia
- Low urinary specific gravity

*Normal specific gravity
1.005–1.030*

SIGNS & SYMPTOMS

TREATMENT

- Implement seizure precautions
- Elevate HOB to promote venous return
- Restrict fluid intake
- Adm. loop diuretics
- Adm. vasopressin antagonists

- Adequate fluids
- IV hypotonic saline
- Vasopressin or desmopressin acetate
- Monitor
 - Intake & output
 - Weight

MED-SURG

RESPIRATORY DISORDERS

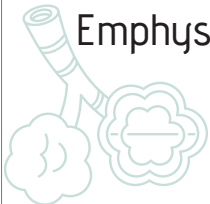
Chronic Obstructive Pulmonary Disease (COPD)

PATHOLOGY

Chronic airflow limitation

Umbrella term:

Emphysema or Chronic Bronchitis



RISK FACTORS

- Smoking
- Occupation exposure
- Infection
- Air pollution
- Genetic abnormalities
 - Deficiency of alpha1- antitrypsin
(Protects the lining of the lungs)

SIGNS & SYMPTOMS

Emphysema

"Pink Puffers"

- Thin
- Quiet chest
- Severe dyspnea
- Hyperinflation of the lungs
(barrel chest)

Distension & destruction of airspaces &
walls of the alveoli

Chronic bronchitis

"Blue Bloaters"

- Overweight
- Cyanotic (blue)
- Peripheral edema
- Rhonchi & wheezing
- Chronic cough

Distension & destruction of airspaces &
walls of the alveoli

DIAGNOSTIC

Arterial blood gases (ABGs)

Chest X-ray

Pulmonary Function Test: Spirometry

Obstructive lung disease

FEV1/FVC ratio of less than 70%

FEV1 =
Forced expiratory
volume

FVC =
Forced vital
capacity

Chronic Obstructive Pulmonary Disease (COPD)

MANAGEMENT

- Lifestyle Modifications

- Smoking cessation →

- Determine readiness
- Develop a plan
- Discuss nicotine replacement

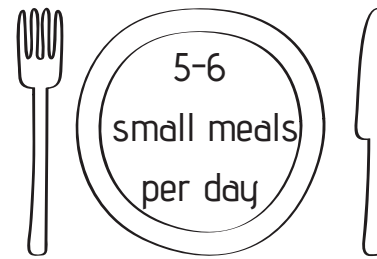
- Diet Modifications

- Promote nutrition
- Increase calories →
- Small frequent meals

Pt's with COPD are using ALL their energy to breathe, burning a lot of calories

- Pharmacologic Therapy

- Bronchodilators
- Corticosteroids
- Nicotine replacement
- Bupropion (anti-depressant)
- Vaccinations →



- Oxygen Therapy

- Adm. during exacerbations
- Adm. when O₂ saturation is <90% or showing signs of respiratory distress →

Influenza & pneumococcal vaccine
↓ the incidence of pneumonia

Adm. oxygen with caution to pt.s with chronic hypercapnia (elevated PaCO₂ levels)

- Surgery

- Bullectomy
- LVRS- Lung Volume Reduction Surgery
- Lung transplant

ASTHMA

Inflamed, narrow, & swollen airway

CLASSIFICATIONS

Based on Symptoms

MILD INTERMITTENT

<2 a week

MILD PERSISTENT

>2 a week
Not Daily

MODERATE PERSISTENT

Daily &
exacerbations
2X a week

SEVERE PERSISTENT

Continually
frequent
exacerbations

SIGNS & SYMPTOMS

- Dyspnea (shortness of breath)
- Chest tightness
- Anxiety
- Wheezing
- Mucus production
- Use of accessory muscles

DIAGNOSTIC

- Pulmonary function test (PFTs)
 - FVC
 - FEV1 (↓ 15% - 20%)
- Chest X-ray

NURSING CARE

- Assess pt's airway
- High Fowler's position
- Provide frequent rest periods
- Adm. oxygen therapy
- Maintain a calm environment to ↓ stress

STATUS ASTHMATICUS

Life-threatening asthma episode
Medical emergency!
Oxygen
Hydration
Nebulization
Systemic corticosteroid

MEDICATIONS

- B2 -Agonists

- Short-acting (Albuterol)
- Long-acting (Salmeterol)

RAPID RELIEF

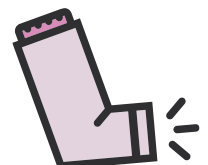
PREVENT ASTHMA
ATTACKS

- Corticosteroids

- Anticholinergics

- Methylxanthines (Theophylline)

↓ Pulmonary secretions &
bronchodilation



PNEUMONIA

PATHOLOGY

Inflammation of the lungs

Mucus production & lung infection
causes airway obstruction!

Inadequate gas exchange

RISK FACTORS

- Postoperative
- Aspiration
- Immobility

SYMPTOMS

- Chills
- ↑ Temperature
- Chest pain
- Difficulty breathing
- Productive cough
- Rhonchi & wheezes

DIAGNOSTIC

- Chest X-ray →

Shows pulmonary infiltrates
or pleural effusions

- ↑ White blood cells
- ↑ Erythrocyte sedimentation rate

- Sputum culture →

Can be bacterial,
viral, or fungal

INTERVENTIONS

- Diet
 - ↑ Calorie
 - ↑ Protein
 - ↑ Fluids →
 - Small frequent meals
- Medications
 - Antibiotics (only for bacteria)
 - Bronchodilators
 - Cough suppressants
 - Mucolytic agents

Thins secretions

- Semi Fowler's position →

Helps lung
expansions

Monitor

- Respiratory status
- Pulse oximetry
- Color, consistency & amount of sputum

MED-SURG

HEMATOLOGY DISORDERS

IRON DEFICIENCY ANEMIA

PATHOLOGY

↓ *Iron stores*

Iron is essential to hemoglobin in red blood cells. Hemoglobin carries oxygen to the cells!

SYMPTOMS

- Pallor
- Weakness & fatigue
- Microcytic (small) red blood cells



↓ hemoglobin

↓ hematocrit

CAUSES

- Blood loss / hemorrhage
- Malabsorption
- Inadequate dietary intake of iron



IRON-RICH FOODS

Egg yolks
Apricots
Tofu

Potatoes
Fish

Legumes
Oysters
Tuna
Seeds

Iron-fortified cereals
Red meats
Poultry
Nuts

INTERVENTIONS

- ↑ Iron
- Administer iron
 - Oral , IM, or IV

SIDE EFFECTS OF IRON SUPPLEMENTS

Black stool
Constipation
Foul aftertaste

Administering Iron Supplements

- Give between meals

↓ **Absorption**
Calcium:
Milk & antacids

↑ **Absorption**
Vitamin C:
Fruit juice & multivitamin

Liquid iron stains the teeth

1. Take with a straw
2. Brush teeth after

THROMBOCYTOPENIA

PATHOLOGY

↓ *platelets*

- Platelets help clot the blood
- They help the blood clump
- Forming a plug at the site of the injury
- ↓ platelets = THINK **BLEEDING**

*Normal
Platelet Count*

150,000 -
400,000

Thrombocytopenia

< 150,000

SYMPTOMS

- Prolonged bleeding time from cuts
- **Petechiae** (pinpoint bleeding)
- **Purpura** (bruising)
- Bleeding from the gums & nose
- Heavy menstrual cycles
- Blood in stool / urine
- ↑ INR & ↑ PT/PTT

CAUSES

Platelet disorders
Leukemia
Anemia
Trauma
Enlarged spleen
Liver disease
Ethanol (alcohol-induced)
Toxins (drug-induced)
Sepsis

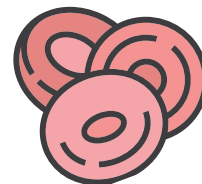
INTERVENTIONS

- Platelet transfusion
- Bone marrow transplant

→ *Platelets are made in
the bone marrow*

BLEEDING PRECAUTIONS

- Use electric razors
- NO Aspirin
- Use small needle gauges
- Decrease needle sticks
- Protect from injury



MED-SURG

GASTROINTESTINAL DISORDERS

ACUTE PANCREATITIS

PATHOLOGY



The islets of Langerhans secrete **Insulin & Glucagon**

Pancreatic tissue: secrete digestive enzymes that break down **carbohydrates, proteins & fats**

Pancreatitis is an **AUTO-DIGESTION** of the pancreas by its digestive enzymes released too early in the pancreas

RISK FACTORS

- Gallstones
- Alcohol use
- Hyperlipidemia
- Hyperparathyroidism
- Hypercalcemia
- Cigarette smoking
- Trauma
- Viral infections
- Penetrating ulcers
- Kidney failure
- Drugs / toxicity

SIGNS & SYMPTOMS

- Nausea & vomiting → **Bile-stained**
- Fever
- Jaundice
- Mental confusion & agitation
- Grey-Turner's Sign → **Bruising in the flank**
- Cullen's Sign → **Bruising around the umbilicus**
- Abdominal guarding
- Rigid/board-like abdomen

LABS

- ↑ Amylase
- ↑ Lipase
- ↑ WBC's
- ↑ Bilirubin
- ↑ Glucose
- ↓ Platelets
- ↓ Ca & Mg

INTERVENTIONS

- Rest the pancreas! → **NPO**
 - Pain management
 - IV fluids → **Risk for hypovolemic shock! BUT...prevent fluid volume overload!**
- Monitor**
Glucose
Blood pressure
Intake & output
Laboratory values

MEDICATIONS

- Opioid analgesics
- Antibiotics
- Proton Pump Inhibitors (PPI's)
- Pancreatic enzymes

- Hypovolemia
 - Pancreatic infection
 - Type 1 Diabetes Mellitus
- Complications**

INFLAMMATORY BOWEL DISEASE

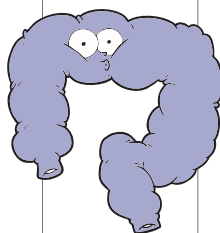
CROHN'S DISEASE

Inflammation that occurs anywhere
in the GI tract (mouth - anus)

remissions & exacerbations

SIGNS & SYMPTOMS

- Anorexia & weight loss
- Anemia
- Fever
- Cramping after meals
- Mucus like diarrhea (semisolid)
- Abdominal distention
- Nausea & vomiting



ULCERATIVE COLITIS

Inflammation & ulceration of the
colon & rectum

SIGNS & SYMPTOMS

- Anorexia & weight loss
- Anemia
- Malnutrition
- Malaise
- Abdominal cramping
- Bloody diarrhea
- Dehydration
- Vitamin K deficiency

INTERVENTIONS

For the acute phase

- NPO →
- Diet
 - Clear liquids to ↓ fiber
 - ↑ Protein
 - Vitamins & iron supplements
 - Avoid gas-forming foods →
- Avoid smoking
- Medications

Adm. fluids,
electrolytes or
parenteral nutrition

- Dairy
- Whole-wheat grains
- Nuts
- Fruits & vegetables
- Alcohol
- Caffeine

Monitor

- Bowel sounds
- Bowel perforation
- Peritonitis
- Hemorrhage
- Stool
 - Color
 - Consistency
 - Presence of blood

Corticosteroids
Immunosuppressants
Antidiarrheals
Salicylate compounds

TYPES OF HEPATITIS

Inflammation of the liver

*Can be caused by viral, bacteria,
or hepatotoxic medications*

Hints to remember
the viral types of
hepatitis (ABCDE)

	Transmission	Serological Markers	Vaccine 
H A v	Fecal - Oral Food & water	anti-HAV - infectious IgG - Immune	
H B v	B think Body Fluids Childbirth & sex	Anti - HBc - Infectious Anti-HBs- Immune / recovery	
H C v	Same as HBV IV drug users	Anti - HCV	
H D v	<u>D</u> epends on B Hep D occurs with Hep B	HDAg Anti - HDV	
H E v	Waterborne Food & water	Anti- HEV	

Signs & Symptoms

- Jaundice
- Dark-colored urine
- Clay-colored stool
- Vomiting
- Flu-like symptoms

Fever
Fatigue
↓ Appetite
Abdominal pain

Nursing Care

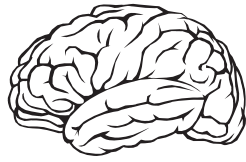
- Rest
- Diet 
- Proper hand hygiene
- Avoid sex until hepatitis
antibodies are negative

Small frequent meals
↑ Carbohydrates
↑ Calories
↓ Protein & fat

MED-SURG

NEUROLOGICAL DISORDERS

GLASGOW COMA SCALE



Tool for assessing a patient's response to stimuli

<i>Eye opening response</i>	Spontaneous	4
	To speech	3
	To pain	2
	No response	1
<i>Verbal response</i>	Oriented	5
	Confused	4
	Inappropriate words	3
	Unclear sounds	2
	None	1
<i>Motor response</i>	Obeys command	6
	Localizes pain	5
	Withdraws	4
	Flexion	3
	Extension	2
	None	1
<i>Total</i>	3 - 15	

Interpretation

3

Severe impairment of neurologic function, coma, or brain death *Worst*

≤8

Unconscious patient

15

Fully alert & oriented *Best*

SEIZURES

Abnormal & sudden electrical activity of the brain

Epilepsy: chronic seizure activity

Status Epilepticus: a seizure that lasts >30 minutes

GENERALIZED SEIZURES



*The entire
brain is
affected*

TONIC-CLONIC

May begin with an aura. Stiffening (tonic) and/or rigidity (clonic) of the muscles.

ABSENCE

Usually looks like a blank stare that lasts seconds.

MYOCLONIC

Sudden jerking or stiffening of the extremities (arms or legs).

ATONIC

Sudden loss of muscle tone. May lead to sudden falls or dropping things.

PARTIAL SEIZURES



*One area of
the brain is
affected*

SIMPLE PARTIAL

Sensory symptoms with motor symptoms and stays aware. They may report an aura.

COMPLEX PARTIAL

Altered behavior/awareness and loses consciousness for a few seconds.

INTERVENTIONS

DO's

- Maintain a patent airway
- Note the time & duration of the seizure
- Turn patient on the side
- Place patient laying down (protect the head)
- Administer oxygen
- Prepare to suction secretions
- Loosen restrictive clothing

DON'T's

- Restrain the patient
- Force the jaw open
- Place anything in their mouths
- Leave the patient

STROKE

"Cerebrovascular Accident"

Disturbance in the cerebral blood flow

ISCHEMIC STROKE

"Thrombotic or embolic"
Thrombosis (blood clot).
Embolism (blocking of an artery). Blood flow is cut off which leads to **Ischemia**.

Transient Ischemic Attacks: "TIA's"

"Mini strokes"

The same pathology as a stroke but no cerebral infarction occurs

HEMORRHAGIC STROKE

Ruptured artery or aneurysm

The collection of blood in the brain leads to **ischemia & increased ICP**

TREATMENT

Fibrinolytic Therapy

Tissue plasminogen activator
alteplase (tPA)

breaks down the blood clot!



Given 3 - 4.5 hours
after initial symptoms

**Do not give if active
bleeding is suspected**

Stop the bleeding

Prevent Increased ICP

Poor prognosis

Needs careful monitoring in an
intensive care unit

Blood may need to be removed to
↓ pressure on the brain

RISK FACTORS

Modifiable

- Hypertension
- Atherosclerosis
- Anticoagulation therapy
- Diabetes Mellitus
- Obesity
- Stress
- Oral contraceptives

Non-Modifiable

- Family history of strokes
- Older age
- Male gender
- Blacks
- Hispanics

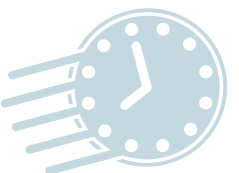
SIGNS & SYMPTOMS

Face drooping

Arm weakness

Speech difficulty

Time to call 911



STROKE

NURSING MANAGEMENT

- Assist with **safe feeding**

- Do not feed until gag reflex has come back
- ↓ chances of aspiration

LIQUID

1. Thin
2. Nectar-like
3. Honey-like
4. Spoon-thick

FOOD

1. Pureed
2. Mechanically altered
3. Mechanically soft
4. Regular

- Positioning of the client

- Elevate head of the bed to ↓ ICP
- Place a pillow under the affected arm in a **neutral** position

Remember

If the stroke occurs on the left side of the brain, the right side of the body will be affected

- Assist with communication skills

- Encourage passive range of motion

every 2 hours

- Preventative DVT measures

- Compression stockings
- Frequent position change
- Mobilization

- Assist with Activities of Daily Living (ADL's)

- Frequent rest periods
- Dress the affected side first
- Support affected side

MED-SURG

BURNS

BURNS



WHAT IS A BURN?
Damage to skin integrity

TYPES OF BURNS

THERMAL

most common

Superficial heat
Examples: liquid, steam, fire

CHEMICAL

Burn caused by a toxic substance
Can be Alkali or Acidic
Examples: bleach, gasoline, paint thinner

RADIATION

Sunburns (UV radiation)
& cancer treatment (radiation therapy)

INHALATION

Caused by inhaling smoke which can cause flame injury or carbon monoxide poisoning

FRICTION

Burn caused when an object rubs off the skin
Examples: road rash, scrapes, carpet burn

COLD

Skin has been overexposed to cold
Example: frostbite

ELECTRIC

Electrical current that passes through the body causing damage within

POTENTIAL COMPLICATIONS

Dysrhythmias, Fracture of bones.
Release of **myoglobin & hemoglobin** into the blood which can clog the kidneys.

BURNS INJURY DEPTH

1st Degree

SUPERFICIAL

- Epidermis
- Pink & painful (still has nerves)
- No scarring
- Blanching: present
- Heals: few days

2nd Degree

SUPERFICIAL PARTIAL THICKNESS

- Epidermis & dermis
- Blisters, shiny, & moist
- Painful
- Blanching: present
- Heals: 2 - 6 weeks

3rd Degree

FULL THICKNESS

- Epidermis, dermis, & hypodermis
- May look black, yellow, red & wet
- No pain/limited pain (nerve fibers are destroyed)
- Skin will not heal (need skin grafting)
- **Eschar**: dead tissue, leathery; must be removed!

LAYERS OF THE SKIN

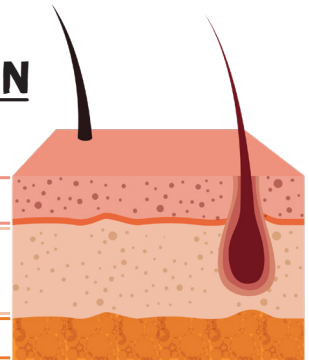


EPIDERMIS

DERMIS

HYPODERMIS

subcut/fatty tissue



BURN LOCATION

RESPIRATORY

- Face
- Neck
- Chest
- Torso

DISABILITY

- Hands
- Feet
- Joints
- Eyes

TROUBLE HEALING

- Poor blood supply
- Diabetes
- Infection

INFECTION

Any open area where bacteria can easily enter

- Perineum
- Ears
- Eyes

COMPARTMENT SYNDROME

- In the extremities
- Tight skin such as eschar acting like a band around the skin cutting off blood circulation

INHALATION INJURY

Damage to the respiratory system!
Happens mostly in a **closed area**

SIGNS OF INHALATION INJURY

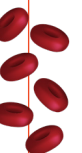
- Hair singed around the face, neck or torso
- Trouble talking
- Soot in the nose or mouth
- Confusion or anxiety

CARBON MONOXIDE (CO) POISONING

Carbon monoxide travels faster than oxygen, making it bind to hgb first.

Now oxygen cannot bind to hgb = **HYPOXIC**

Classic symptom: **cherry red skin**
Treatment: **100% O2**



NOTE:

Oxygen saturation may appear normal

PHASES OF BURN MANAGEMENT



EMERGENT PHASE

Onset of Injury to the restoration of capillary permeability



24 - 48 HOURS
after burn

PATHO

↑ Capillary permeability (leaky vessels) causing:

- Plasma leaves the intravascular space
 - Albumin & sodium follows
- Fluids shift to the interstitial tissue

LEADS TO EDEMA

LEADS TO FLUIDS VOLUME DEFICIT (FVD) IN THE INTRAVASCULAR SPACE

VITAL SIGNS

- ↑ Pulse
- ↓ Blood pressure
- ↓ Cardiac output
- ↓ Urine output
(from ↓ perfusion to the kidneys)

THINK: HYPOVOLEMIC SHOCK!

LABS

- ↑ Potassium (K+)
- ↑ Hematocrit (HCT)
- ↓ White Blood Cells (WBC's)
- ↑ BUN/Creatine

NURSING CONSIDERATIONS

- Establish IV access (preferably 2)
- Fluids (Lactated Ringer's, crystalloids)
- Parkland formula
- Foley catheter to monitor urinary output (UOP)
 - Goal: > 30 mL/hr of UOP
- Decrease edema
 - Elevate extremities above heart level

THINK: ABC's



ACUTE PHASE

Capillary permeability stabilized - to wound closure



48 - 72 HOURS

after burn & until wounds have healed

PATHO

Capillary permeability is restored which leads to the body diuresing (increased urine production). All the excess fluid that shifted from the interstitial tissue shifts back into the intravascular space.

GOALS

- Prevent infection
 - Systemic antibiotic therapy
- Ensure proper nutrition
 - Needs ↑ calories
 - Protein & Vit C to promote healing
- Alleviate pain
- Wound care
 - Always premedicate before wound care!
 - Debridement or grafting

NURSING CONSIDERATIONS

- Renal
 - Diuresis is happening
 - Foley catheter to monitor UOP
- Respiratory
 - Possible intubation if respiratory complications occurred
- Gastrointestinal
 - Since the client is in FVD, there is ↓ perfusion to the stomach
 - Paralytic ileus
 - Curlings ulcer
 - Medication to decrease chance of ulcers
 - H2 histamine blocking agent (↓HCl)
 - Monitor bowel sounds
 - May need NG tube for suctioning



REHABILITATIVE PHASE

Burn healed and the patient is functioning mentally & physically

GOALS

- Psychosocial
- Activities of daily living (ADL's)
- Physical therapy (PT)
- Occupational therapy (OT)
- Cosmetic corrections



FLUID RESUSCITATION FOR BURNS

THE PARKLAND FORMULA

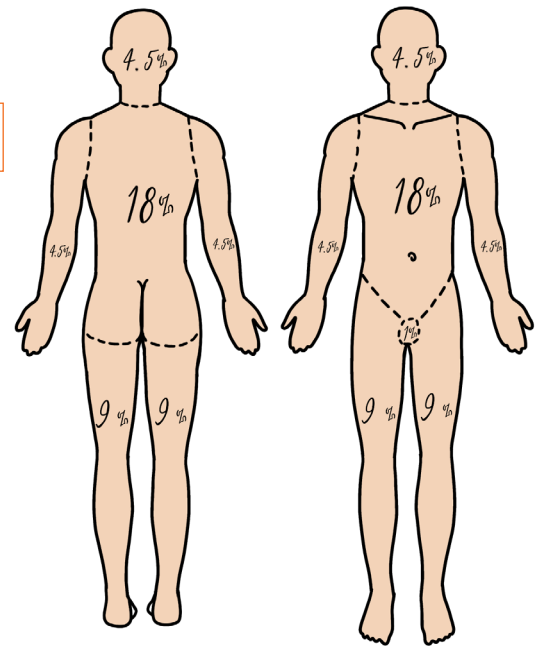
Used to calculate the total volume of fluids (mL) that a patient needs **24 hours** after experiencing a burn
Apply only in 2nd & 3rd degree burns.

$$4 \text{ mL} \times \text{TBSA (\%)} \times \text{Body Weight (kg)} = \text{total mL of fluid needed}$$

Give half of the solution for the **FIRST 8 HOURS**

Give half of the solution for the **NEXT 16 HOURS**

RULE OF NINES



RULE OF NINES

Quick estimate of the % of the **total body surface area (TBSA)** has been effected by a partial & full-thickness burn in an adult client.

PRACTICE QUESTION

PART 1

A 25 year old male patient who weighs **79 kg** has sustained burns to the back of the right arm, posterior trunk, front of the left leg, and their anterior head and neck. Using the **Rule of Nines**, calculate the total body surface area percentage that is burned.

Back of right arm - 4.5%
Posterior trunk - 18%
Front of left leg - 9%
Anterior head & neck - 4.5%

ANSWER:
36%

NOTE:

The formula uses TBSA (%). However, you must calculate using 36. Not 0.36 (also written as 36%).

PART 2

Use the Parkland formula to calculate the total amount of Lactated Ringer's solution that will be given over the next 24 hours.

ANSWER:
11,376 mL

$$4 \text{ mL} \times 36\% \times 79 \text{ kg} = 11,376 \text{ mL}$$

$$11,376 / 2 = 5,688 \text{ mL}$$

FIRST 8 HOURS

$$11,376 / 2 = 5,688 \text{ mL}$$

NEXT 16 HOURS

Keep in mind: the question could ask you for mL given in the first 24 hours, the first 8 hours, etc., so read the question carefully.

ARTERIAL

BLOOD GASES (ABG's)

ABG INTERPRETATION

1

KNOW YOUR
LAB VALUES!

	Acidosis	Normal	Alkalosis
pH	<7.35	7.35 - 7.45	>7.45
CO ₂	>45	35 - 45	<35
HCO ₃	<22	22 - 26	>26

2

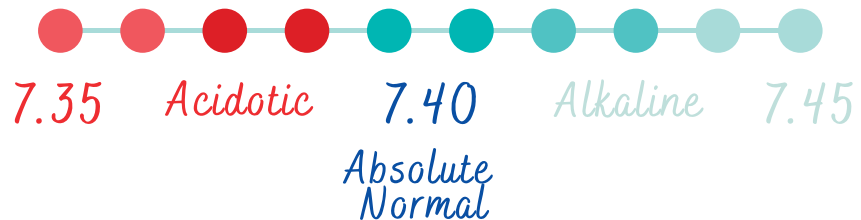
RESPIRATORY OR A
METABOLIC PROBLEM?

Respiratory Opposite	pH ↑	CO ₂ ↓	Alkalosis
	pH ↓	CO ₂ ↑	Acidosis
Metabolic Equal	pH ↑	HCO ₃ ↑	Alkalosis
	pH ↓	HCO ₃ ↓	Acidosis

3

UNCOMPENSATED, PARTIALLY
COMPENSATED, OR FULLY
COMPENSATED?

LOOK AT THE PH



- 1.If the pH is out of range & CO₂ or HCO₃ is in range = Uncompensated
- 2.If CO₂ & HCO₃ are BOTH out of range & the PH is out of range = Partially Compensated
- 3.If PH is in range (7.35 - 7.45) = Fully Compensated

HOW DO THE ORGANS COMPENSATE?



Excreting excess acid & bicarb (HCO₃)
OR
Retaining hydrogen & bicarb (HCO₃)

Bicarb
Hydrogen → B think
"Base"

Hours - days
to compensate



Hyperventilating = ↓ CO₂ = Alkalosis
Hypoventilating = ↑ CO₂ = Acidosis



Compensates
FAST!

CO₂ think
"acid" → CO₂

RESPIRATORY ACIDOSIS

Pathophysiology



Lung
problem

The lungs are retaining too much **CO₂**



Kidneys
compensate

The kidneys excrete **hydrogen** & retain **bicarb (HCO₃)**

PH	CO ₂
<7.35	>45

Causes

Retaining **CO₂**
"DEPRESS" breathing

- D**rugs (Opioids & Sedatives)
- E**dema (Fluid in the lungs)
- P**neumonia (Excess mucus in the lungs)
- R**espiratory center of the brain is damaged
- E**mboli (Pulmonary emboli)
- S**pasms of the bronchial (Asthma)
- S**ac elasticity damage (COPD & Emphysema)

All these things cause impaired gas exchange

Signs & Symptoms

Hypoxic

- ↓ Blood pressure
- ↓ Respiration rate
- ↑ Heart rate
- Restlessness
- Confusion
- Headache
- Sleepy / coma

Interventions

- Administer O₂
- Semi-Fowler's position
- Turn, cough, & deep-breathe (TCDB)
- **Pneumonia**: ↑ fluids to thin secretions & administer antibiotics
- Monitor potassium levels (normal 3.5 - 5.0 mmol/L)
- If **CO₂** >50, they may need an endotracheal tube

RESPIRATORY ALKALOSIS

Pathophysiology



Lung
problem

The lungs are losing too much **CO₂**



Kidneys
compensate

The kidneys excrete **bicarb (HCO₃)** & retain **hydrogen**

PH	CO ₂
>7.45	<35

Causes

Losing **CO₂**
"TACHYPNEA"

- ↑ Temperature
- Aspirin toxicity
- Hyperventilation

Signs & Symptoms

- Respiratory rate >20
- ↑ Heart rate
- Confused & tired
- Tetany
- EKG changes
- (+) Chvostek sign

Twitching of the facial muscles when tapping the facial nerve in response to hypocalcemia

Interventions

- Provide emotional support
- Fix the breathing problem!
 - Encourage good breathing patterns
 - **Rebreathing into a paper bag**
 - Give anti-anxiety medications or sedatives to ↓ breathing rate
- Monitor K⁺ & Ca²⁺ levels

METABOLIC ACIDOSIS

Pathophysiology



Kidney
problem



Lungs
compensate

Too much **Hydrogen**
Too little **Bicarb (HCO₃)**

The lungs will
blow off **CO₂**

PH	HCO ₃
<7.35	<22

Causes

- Diabetic ketoacidosis →
- Acute/chronic kidney injury
- Malnutrition →
- Severe diarrhea →

Not enough insulin =
↑ fat metabolism =
excess **ketones (acid)**

Breaking down of fats =
excess **ketones (acid)**

Excessive loss of base
from your "base"

Signs & Symptoms

- Kussmaul's breathing
- Hyperkalemia
 - Muscle twitching
 - Weakness
 - Arrhythmias
- ↓ Blood pressure
- Confusion

Deep rapid
breathing
>20 breaths
per minute

Metabolic **Acidosis** = ↑ serum potassium
Metabolic **Alkalosis** = ↓ serum potassium

Interventions

- Monitor intake & output
- Administer IV solution to ↑ bases & ↓ acids
- Initiate seizure precaution
- Monitor K⁺ levels

Diabetic Ketoacidosis (DKA)

- Give Insulin (this stops the breakdown of fats which stops **ketones** from being produced)
- Monitor for hypovolemia due to polyuria

Kidney disease

- Dialysis to remove toxins
- Diet
 - ↑ Calories
 - ↓ Protein

METABOLIC ALKALOSIS

Pathophysiology



Kidney
problem



Lungs
compensate

Too much **Bicarb (HCO₃)**
Too little **Hydrogen**

The lungs will
retain **CO₂**

PH	HCO ₃
>7.45	>26

Causes

- Too many antacids →
- Diuretics
- Excess vomiting →
- Hyperaldosteronism

Too much
sodium bicarbonate (BASE)

Excess loss of **hydrochloric acid (HCL)** from the stomach

Signs & Symptoms

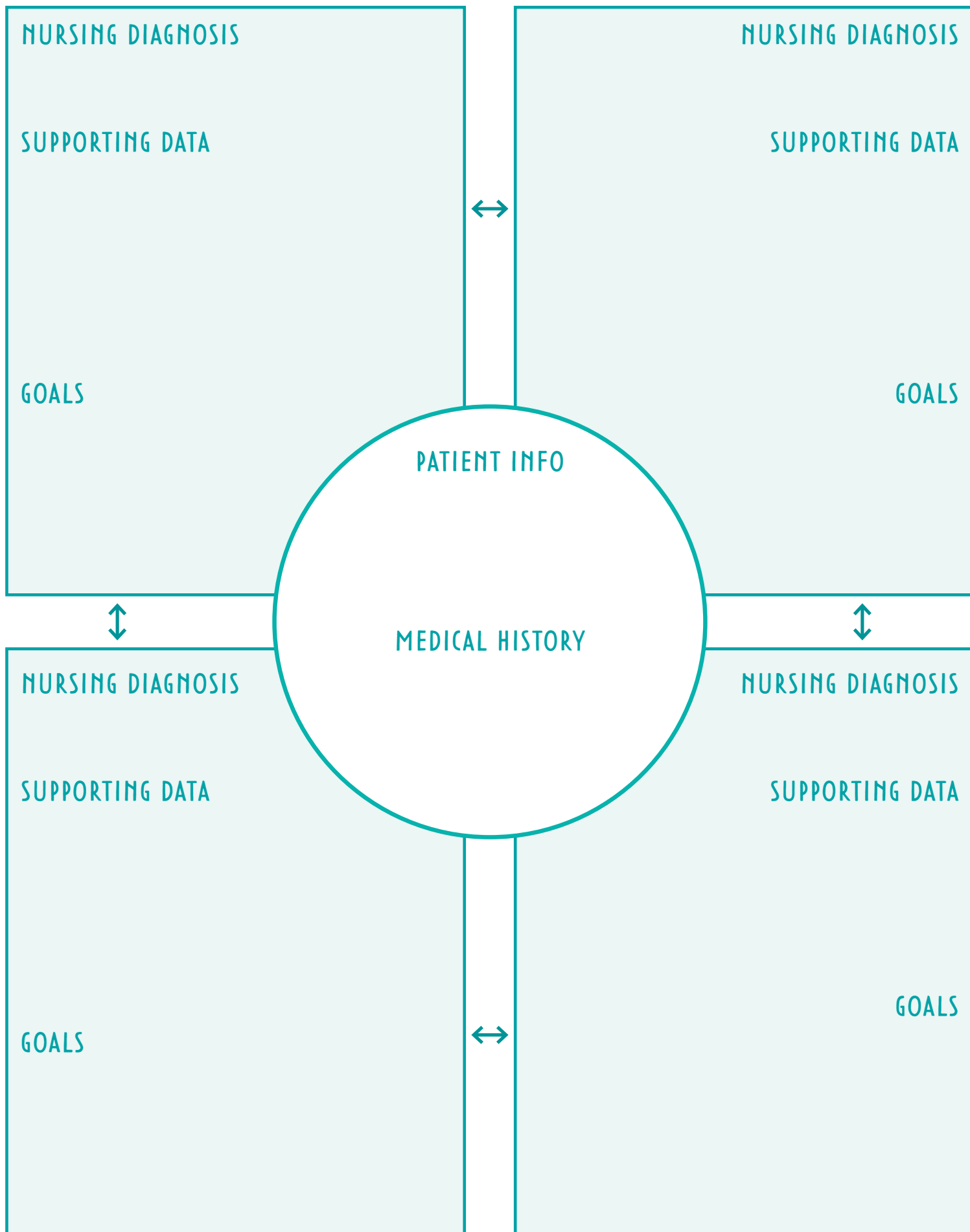
- Hypoventilation <12 breaths per minute
- Low Potassium (K⁺)
 - Dysrhythmias
 - Muscle cramps/weakness
 - Vomiting
 - Tetany
 - Tremors
 - EKG changes

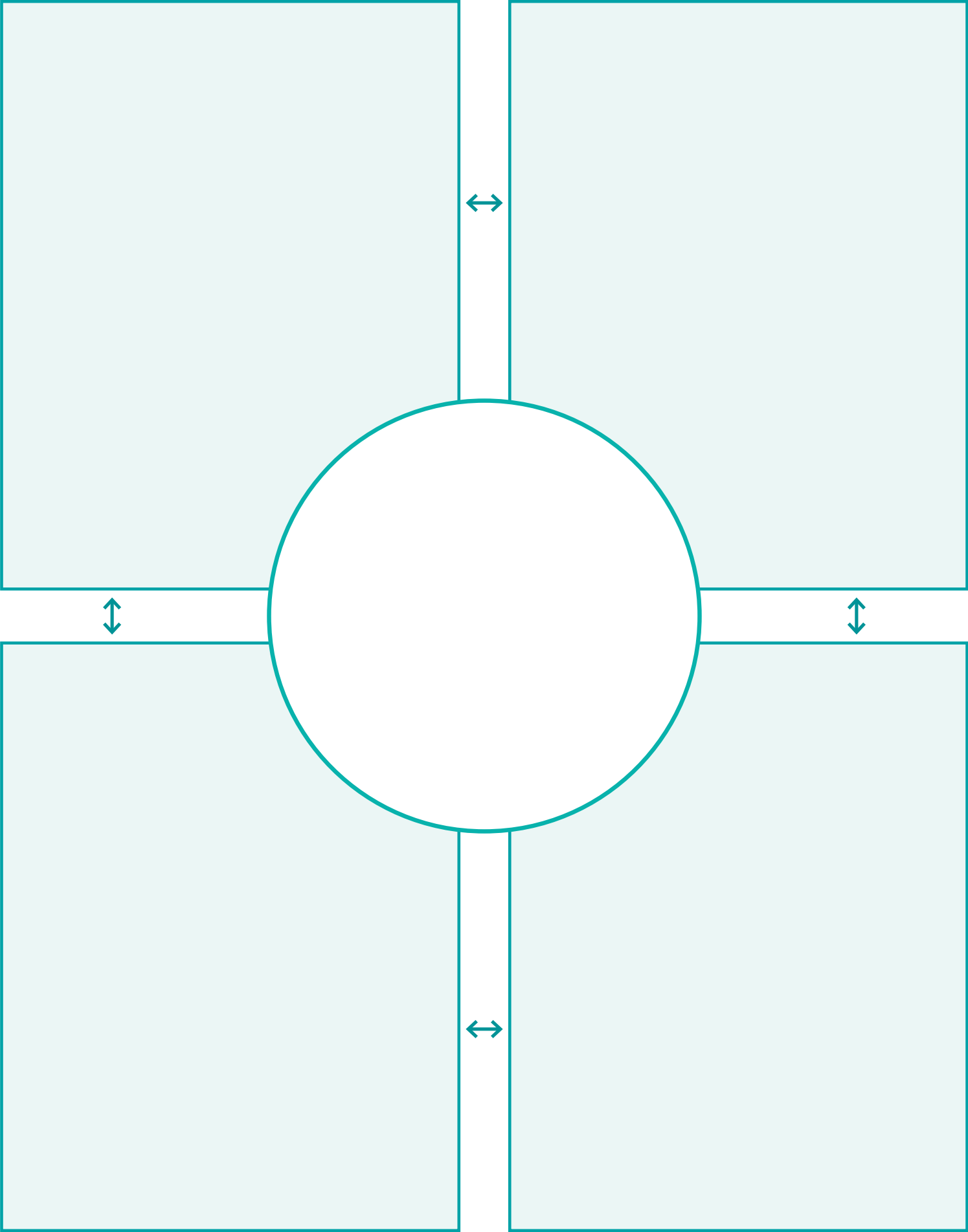
Interventions

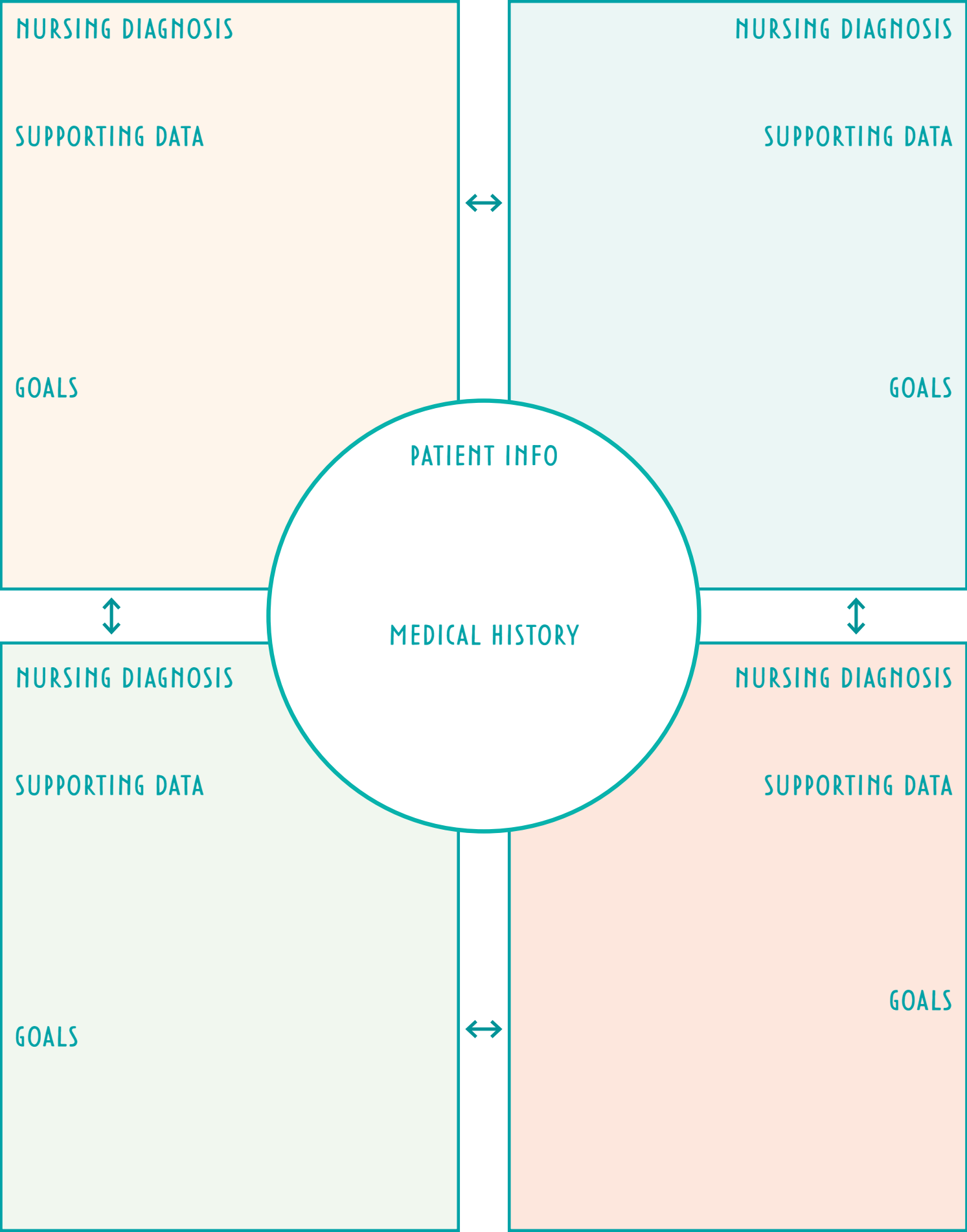
- Monitor Potassium & Calcium levels
- Administer IV fluids to help the kidneys get rid of **bicarbonate**
- Replace K⁺
- Give antiemetics for vomiting (Zofran or Phenergan)
- Watch for signs of respiratory distress

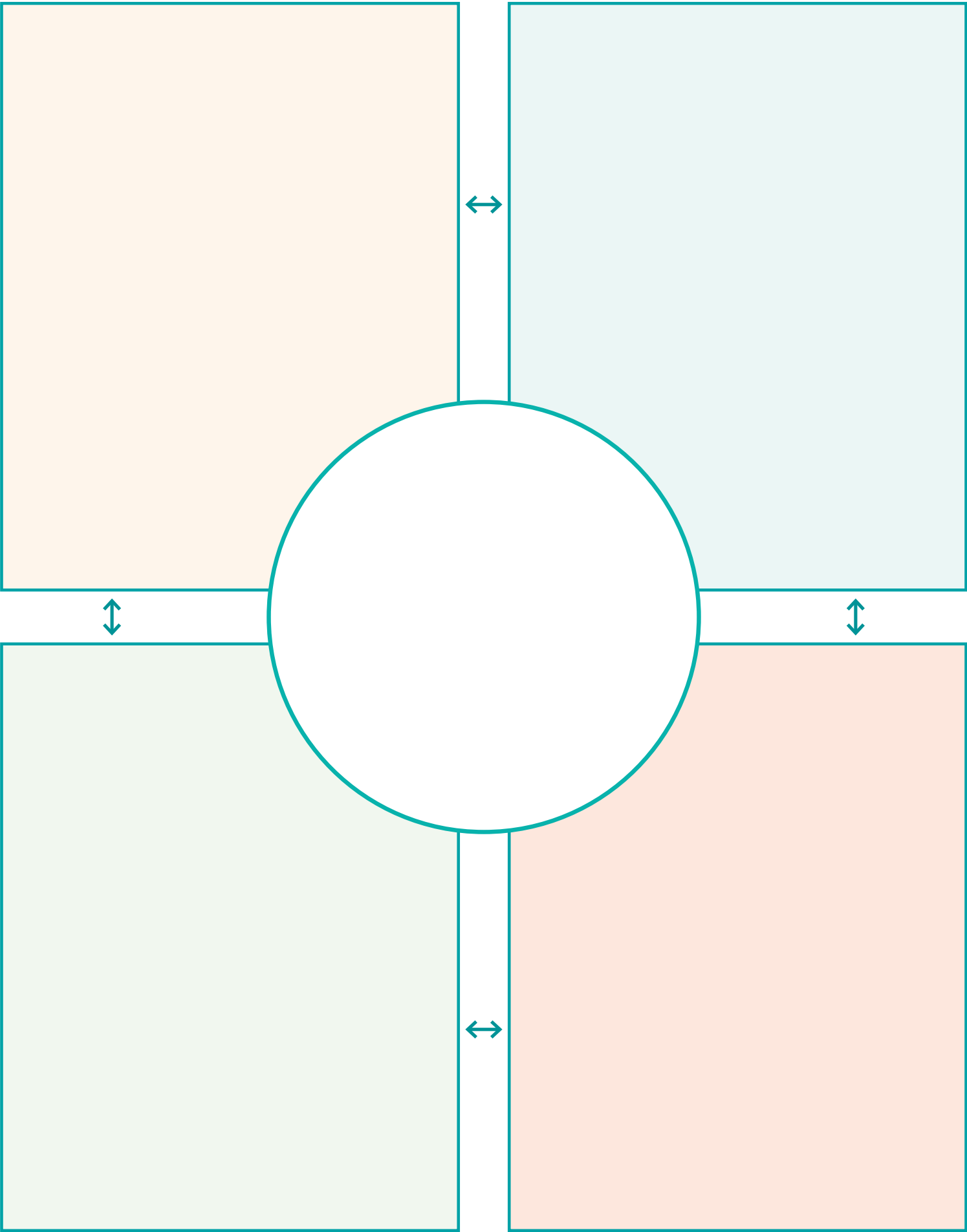
TEMPLATES

& PLANNERS









Course Tracker

COURSE:

[illegible]

Test / Quiz Tracker

COURSE:

TEST DATE	CHAPTERS/TOPICS COVERED	GRADE	PASSED?
			YES NO ☐ ☐
			YES NO ☐ ☐
			YES NO ☐ ☐
			YES NO ☐ ☐
			YES NO ☐ ☐
			YES NO ☐ ☐
			YES NO ☐ ☐
			YES NO ☐ ☐
			YES NO ☐ ☐
			YES NO ☐ ☐
			YES NO ☐ ☐
			YES NO ☐ ☐
			YES NO ☐ ☐
			YES NO ☐ ☐
			YES NO ☐ ☐
			YES NO ☐ ☐
			YES NO ☐ ☐
			YES NO ☐ ☐
			YES NO ☐ ☐
			YES NO ☐ ☐
			YES NO ☐ ☐

Course Tracker

COURSE:

[illegible]

Test / Quiz Tracker

COURSE:

TEST DATE	CHAPTERS/TOPICS COVERED	GRADE	PASSED?	
			YES ☐	NO ☐
			YES ☐	NO ☐
			YES ☐	NO ☐
			YES ☐	NO ☐
			YES ☐	NO ☐
			YES ☐	NO ☐
			YES ☐	NO ☐
			YES ☐	NO ☐
			YES ☐	NO ☐
			YES ☐	NO ☐
			YES ☐	NO ☐
			YES ☐	NO ☐
			YES ☐	NO ☐
			YES ☐	NO ☐
			YES ☐	NO ☐
			YES ☐	NO ☐
			YES ☐	NO ☐
			YES ☐	NO ☐
			YES ☐	NO ☐
			YES ☐	NO ☐

Course Tracker

COURSE:

Test / Quiz Tracker

COURSE:

TEST DATE	CHAPTERS/TOPICS COVERED	GRADE	PASSED?	
			YES ☐	NO ☐
			YES ☐	NO ☐
			YES ☐	NO ☐
			YES ☐	NO ☐
			YES ☐	NO ☐
			YES ☐	NO ☐
			YES ☐	NO ☐
			YES ☐	NO ☐
			YES ☐	NO ☐
			YES ☐	NO ☐
			YES ☐	NO ☐
			YES ☐	NO ☐
			YES ☐	NO ☐
			YES ☐	NO ☐
			YES ☐	NO ☐
			YES ☐	NO ☐
			YES ☐	NO ☐
			YES ☐	NO ☐
			YES ☐	NO ☐
			YES ☐	NO ☐

Course Tracker

COURSE:

[illegible]

Test / Quiz Tracker

COURSE:

[illegible]

Course Tracker

COURSE:

[illegible]

Test / Quiz Tracker

COURSE:

[illegible]

WEEKLY Planner

MONDAY:

TUESDAY:

WEDNESDAY:

THURSDAY:

FRIDAY:

SATURDAY:

SUNDAY:

TO DO LIST

- ☐ _____
- ☐ _____
- ☐ _____
- ☐ _____
- ☐ _____
- ☐ _____
- ☐ _____
- ☐ _____
- ☐ _____
- ☐ _____
- ☐ _____
- ☐ _____
- ☐ _____
- ☐ _____

NOTES

TESTS / EXAMS

PROJETS / ASSIGNMENTS

SELF-CARE ♥

MONTHLY *Planner*

MONTH: _____

YEAR: _____

MONTH: _____

☐ SUNDAY

MONDAY

TUESDAY

WEDNESDAY

THURSDAY

FRIDAY

☐ SATURDAY

PRIORITIES

PRIORITIES

PRIORITIES

PRIORITIES

PRIORITIES

PRIORITIES

PRIORITIES

6 AM	6 AM	6 AM	6 AM	6 AM	6 AM	6 AM
7 AM	7 AM	7 AM	7 AM	7 AM	7 AM	7 AM
8 AM	8 AM	8 AM	8 AM	8 AM	8 AM	8 AM
9 AM	9 AM	9 AM	9 AM	9 AM	9 AM	9 AM
10 AM	10 AM	10 AM	10 AM	10 AM	10 AM	10 AM
11 AM	11 AM	11 AM	11 AM	11 AM	11 AM	11 AM
12 PM	12 PM	12 PM	12 PM	12 PM	12 PM	12 PM
1 PM	1 PM	1 PM	1 PM	1 PM	1 PM	1 PM
2 PM	2 PM	2 PM	2 PM	2 PM	2 PM	2 PM
3 PM	3 PM	3 PM	3 PM	3 PM	3 PM	3 PM
4 PM	4 PM	4 PM	4 PM	4 PM	4 PM	4 PM
5 PM	5 PM	5 PM	5 PM	5 PM	5 PM	5 PM
6 PM	6 PM	6 PM	6 PM	6 PM	6 PM	6 PM
7 PM	7 PM	7 PM	7 PM	7 PM	7 PM	7 PM
8 PM	8 PM	8 PM	8 PM	8 PM	8 PM	8 PM
9 PM	9 PM	9 PM	9 PM	9 PM	9 PM	9 PM

PRODUCTIVITY METER

BAD GOOD GREAT!

A vertical productivity meter with a teal background. It features a scale from 1 to 20. The word "BAD" is at the bottom, "GOOD" is in the middle, and "GREAT!" is at the top. The meter is currently at level 10.

PATHOLOGY

DISEASE

SIGNS & SYMPTOMS

RISK FACTORS

COMPLICATIONS

DIAGNOSIS

TREATMENT



WWW.ANURSEINTHEMAKING.COM