BarCharts, Inc.® *WORLD'S #1* ACADEMIC OUTLINE



Essentials for students & professionals—calculations, formulas, measurements, dosages, rates, equivalents & more!

basics

Prefixes

Equivalents

mega-	1,000,000	micro-	1/1,000,000
kilo-	1,000	(one-millionth	0.000001)
hecto-	100		
deka-/deca-	10		
deci-	1/10		
(one-tenth	0.1)		
centi-	1/100		
(one-hundredth	0.01)		
milli-	1/1,000		
(one-thousandth	0.001)		

Abbreviations

M	mega-
k	kilo-
h	hecto-
da	deka-/deca-
d	deci-
c	centi-
m	milli-
mc	micro-

Length

Equivalents

1 mm	=	0.1 cm	1 m	=	1,000 mm
1 mm	=	0.039 in	1 m	=	100 cm
1 cm	=	10 mm	1 m	=	1.09 yards
1 cm	=	0.39 in	1 m	=	3.28 ft
10 mm	=	1 cm	1 dm	=	3.94 in
10 mm	=	0.39 in	1 dam	=	32.81 ft
2.54 cm	=	1 in	1 km	=	0.62 mile
2.5 cm	=	25.4 mm	1 km	=	3,280.08 ft
1 ft	=	12 in			
1 yard	=	3 ft			

Abbreviations

mm	millimeter
cm	centimeter
dm	decimeter
dam	dekameter
m	meter
in	inch
ft	foot/feet

Formulas

cm = in x 2.54
in = cm x 0.394

in	cm	in	cm
20	51	40	102
22	56	42	107
24	61	44	112
26	66	46	117
28	71	48	122
30	76	50	127
32	81	52	132
34	86	54	137
36	91	56	142
38	97	58	147

Area

1 square centimeter (cm^2)	=	100 square millimeters (mm^2)
1 cubic decimeter	=	1,000 cubic centimeters (cm^3)
1 cubic meter (m^3)	=	1,000 cubic decimeters

Abbreviations

cc	cubic centimeter

Weight

Equivalents

1 gr	=	64.79 mg
20 gr	=	1 scruple
60 gr	=	2.19 dr
16 dr	=	1 oz
1 g	=	15.432 gr
1 g	=	1,000 mg
1 g	=	0.035 oz
1 g	=	1 mL
10 g	=	1 dekagram
1 dekagram	=	0.35 oz
100 g	=	1 hectogram
1 hectogram	=	3.53 oz
1 mg	=	1,000 mcg
1 mg	=	0.001 g
1 centigram	=	0.15 gr
1 centigram	=	0.01 g
1 decigram	=	0.1 g
1 decigram	=	1.54 gr
1 kg	=	1 L
1 kg	=	2.2 lb
1 kg	=	1,000 g
1 oz	=	28.35 g/16 dr
1 Tbsp	=	15 g
1 Tbsp	=	4 dr
1 Tbsp	=	3 tsp
1 lb	=	16 oz
1 lb	=	0.45 kg

Abbreviations

dr	dram	lb	pound	Tbsp	tablespoon
g	gram	mcg	microgram	tsp	teaspoon
gr	grain	mg	milligram		
kg	kilogram	mL	milliliter		
L	liter	oz	ounce		

Formulas

kg = lb x 0.454
lb = kg x 2.205

Pounds (lb)	Kilograms (kg)	Pounds (lb)	Kilograms (kg)
10	4.5	100	45.4
25	11.4	125	56.8
50	22.7	150	68.1
75	34.1	175	79.5
95	43.1	200	90.8

Fluids

Equivalents

15 gtts = 1 mL
1 mL = 0.001 L
1,000 mL = 1 L
1 cL = 0.01 L
1 dL = 0.1 L
1 dL = 100 mL
1 daL = 10 L
1 hectoliter = 100 L
1 kiloliter = 1,000 L
1 cup = 8 oz
1 cup = 236.5 mL
1 pt = 16 oz
1 pt = 473 mL
1 pt = 2 cups
1 pt = 16 floz
1 qt = 32 oz
1 qt = 2 pints
1 qt = 0.946 L
1 qt = 4 cups
4 qt = 1 gal
4 qt = 16 cups
1 gal = 3,785 mL
1 gal = 3.785 L
1 gal = 4 qt
1 glass = 8 oz
1 teacup = 6 oz
1 gtt = 1 minim
1 gtt = 0.06 mL
1 fldr = 3.96 mL
1 fldr = 60 minims
1 floz = 8 fldr
1 floz = 6 tsp
1 floz = 2 Tbsp
1 floz = 29.57 mL
1 dr = $27^{11}/_{32}$ gr
1 oz = 16 dr
1 oz = 2 Tbsp
1 oz = 6 tsp
1 tsp = 60 gtt
1 tsp = $1^{1}/_{3}$ fldr
1 tsp = 5 mL
1 Tbsp = 3 tsp
1 Tbsp = 4 fldr
1 Tbsp = ½ oz
1 Tbsp = 15 mL
1 mL = 0.27 fldr
1 mL = 16.23 minims

Abbreviations

cL	centiliter	daL	dekaliter	kL	kiloliter	Tbsp	tablespoon
dL	deciliter	floz	fluidounce	pt	pint	tsp	teaspoon
		fldr	fluidram	qt	quart	gtt	drop
		hL	hectoliter	gal	gallon		

Temperature

Equivalents

0°C	=	32°F
35°C	=	95°F
37°C	=	98.6°F
100°C	=	212°F
(boiling water)		

Abbreviations

°C	degrees Celsius (centigrade)
°F	degrees Fahrenheit

Hot/Cold Application Temperatures

Description	°F	°C
Very hot	105–115	41–46
Hot	98–105	37–41
Warm	93–98	34–37
Tepid	80–93	26–34
Cool	65–80	18–26
Cold	50–65	10–18

(°F)	(°C)	(°F)	(°C)
97.0	36.1	103.0	39.4
98.0	36.7	104.0	40.0
98.6	37.0	105.0	40.6
99.0	37.2	106.0	41.1
100.0	37.8	107.0	41.7

Formulas

°C = °F – 32/1.8 [°F minus 32 divided by 1.8]
°F = °C × 1.8 + 32 [°C multiplied by 1.8 plus 32]

Normal Body Temperatures by Site

	Oral	Rectal	Axillary	Tympanic
°F	98.6	99.5	97.6	98.6
°C	37.0	37.5	36.4	37.0

calculations & formulas

Apothecary System

Equivalents

16.23 minims	=	1 mL
1 fldr	=	3.697 mL
1 floz	=	29.57 mL
1 pt	=	500 mL
1 qt	=	1.05 L
1 qt	=	1,000 mL
1 gr	=	64.79 mg
15.432 gr	=	1 g
1 drap	=	3.888 g
60 gr	=	1 drap
480 gr	=	1 ozap
31 g	=	1 ozap
12 ozap	=	1 lbap

Abbreviations

b.i.d., BID	twice a day
dr ap	dram apothecary
h.s., HS	at bedtime (or hour of sleep)
lb ap	pound apothecary
o.d.	once a day
oz ap	ounce apothecary
p.c.	after meals
po	by mouth
q	every
q.a.m.	every morning
q.d.	every day
q.h.	every hour
q.2.h.	every 2 hours
q.h.s.	every night
q.i.d.	four times a day
q.o.d.	every other day
ss	one-half
tab	tablet
Tbsp	tablespoon
t.i.d.	three times a day
tsp	teaspoon

Metric	Apothecary	Household
64.79 mg	1 gr	
1 g	15 gr	
1 kg		2.2 lb
0.45 kg		1 lb
5 mL		1 tsp
15 mL	½ oz	1 Tbsp
29.57 mL		1 floz
30 mL	1 oz	2 Tbsp
473.176 mL		1 pt
946.35 mL		1 qt
1,000 mL		33.8 oz
1 cm		0.4 in
2.5 cm		1 in

Laboratory Measures

Abbreviations

cm	=	centimeter	mm	=	millimeter
cm^3	=	cubic centimeter	mm Hg	=	millimeters of mercury
dL	=	deciliter	oz	=	ounce
floz	=	fluidounce	pt	=	pint
g	=	gram	QNS	=	quantity not sufficient
L	=	liter	qt	=	quart
lb	=	pound	U	=	unit
m	=	meter	wt	=	weight
mg	=	milligram			
mL	=	milliliter			

Reimbursement Calculators

Roman Numerals

I	1
V	5
X	10
L	50
C	100
D	500
M	1,000

Symbols

+	plus
–	minus
×	multiplied by (times)
/	divided by
<	less than
>	greater than (more than)
=	equals
≠	not equal to
±	plus or minus (approximately)
≤	less than or equal to
≥	greater than or equal to

Formulas

Resource-Based Relative Value System (RBRVS)

(PW + PE + MIC) × CF = Payment × GAF (Physician Work + Practice Expense + Malpractice Insurance Costs) MULTIPLIED BY Conversion Factor = Payment MULTIPLIED BY Geographic Adjustment Factor

Medicare Physician Fee Schedule

Formulas

PAR Physician Reimbursement
[Allowed Amount × 80%] – [Patient 20% co-pay] = Total Reimbursement

NonPAR Physician Reimbursement
([Allowed Amount × 80%] × 95%) – [Patient 20% co-pay] = Total Reimbursement from Medicare

NonPAR Limiting Charge
Allowed Amount × 115% = Limiting Charge

Ambulance Fee Schedule (Medicare)
(RF × AP) + (SR × PIP) = Medicare Payment (Reasonable Fee MULTIPLIED BY Allowed Percentage) PLUS (Schedule Rate MULTIPLIED BY Phase-In Percentage) = Medicare Payment Amount

Seven categories of ambulance services (land and water):

- Basic life support
- Basic life support – emergency
- Advanced life support, level 1
- Advanced life support, level 1 – emergency
- Advanced life support, level 2
- Specialty care transport
- Paramedic intercept

Air service ambulance services include:

- Fixed-wing air ambulance (airplane)
- Rotary-wing air ambulance (helicopter)

Health-Care Operating Indicators

Formulas

Average Length of Stay (ALOS)
Total # of patient days/Total # of discharges

Inpatient Occupancy Rate
Total # of inpatient days/Total # of inpatient beds

Outpatient Revenue as a Percentage of Total Patient Revenue
Total outpatient revenue $/ Total patient revenue $

Average Daily Inpatient Census
Total # of inpatient service days/Total number of days

Length of Stay (LOS)
Total length of stay/Total number of discharges (including deaths)

Death Rate (Gross Death Rate)
Total # of inpatient deaths/Total # of discharges

Net Death Rate
Total number of inpatient deaths minus deaths < 48 hours/Total number of discharges minus deaths < 48 hours

Newborn (NB) Death Rate
Total number of NB deaths/Total number of NB discharges (including deaths)

Maternal Death Rate (Hospital Inpatient)
Total number of direct maternal deaths/ Total number of maternal discharges (including deaths)

Gross Autopsy Rate
Total inpatient autopsies/Total number of inpatient deaths

Hospital Infection Rate
Total # of nosocomial infections/Total # of discharges (including deaths)

Postoperative Infection Rate
[# of infections in clean surgical cases/ Total number of surgical operations] × 100

Consultation Rate
Total number of patients receiving consultations/Total number of discharges and deaths

Community-Based Birth & Infant Death (Mortality) Rates
[# of live births for a given community/ Estimated population of that community] × 100

Incidences Rate of Disease
[Total # of new cases of a specific disease/ Total population at risk] × 10^n

Prevalence Rate of Disease
[All new & preexisting cases of a specific disease/Total population] × 10^n

Balance Sheet
Liabilities + Capital = Assets

[TIP] Burn Patient Fluid Retention (Parkland Formula)
2 – 4 mL/kg × % BSA burned = total fluid volume to be infused
(BSA = body surface area)

QuickStudy

coding *measurements*

Burns

To calculate the percentage of the body affected:

Adults – rule of nines

Head and neck	=	9%
Chest	=	9%
Arm, right	=	9%
Arm, left	=	9%
Abdomen	=	9%
Upper back	=	9%
Lower back, buttocks	=	9%
Leg, right, front	=	9%
Leg, right, back	=	9%
Leg, left, front	=	9%
Leg, left, back	=	9%
Genitals	=	1%

Children

Head	=	10%
Neck	=	2%
Torso	=	26%
Arm, upper, front, right	=	2%
Arm, upper, back, right	=	2%
Arm, lower, front, right	=	1.5%
Arm, lower, back, right	=	1.5%
Hand, front, right	=	1.25%
Hand, back, right	=	1.25%
Arm, upper, front, left	=	2%
Arm, upper, back, left	=	2%
Arm, lower, front, left	=	1.5%
Arm, lower, back, left	=	1.5%
Hand, front, left	=	1.25%
Hand, back, left	=	1.25%
Buttocks, right	=	2.5%
Buttocks, left	=	2.5%
Leg, upper, front, right	=	4%
Leg, upper, back, right	=	4%
Leg, lower, front, right	=	3.5%
Leg, lower, back, right	=	3.5%
Foot, front, right	=	1.75%
Foot, back, right	=	1.75%
Leg, upper, front, left	=	4%
Leg, upper, back, left	=	4%
Leg, lower, front, left	=	3.5%
Leg, lower, back, left	=	3.5%
Foot, front, left	=	1.75%
Foot, back, left	=	1.75%
Genitals	=	1%

[*NOTE: Variations occur because of the growth factor and percentages change as the child grows; therefore, these percentages are only averages, especially for legs*]

Infants

Head and neck	=	18%
Arm, right	=	9%
Arm, left	=	9%
Torso, front	=	18%
Torso, back	=	18%
Leg, right	=	13.5%
Leg, left	=	13.5%
Genitals	=	1%

Coding Excision of Lesions

Widest measurement of lesion + (margin × 2) = coded size

Coding Laceration Repair

Code the total of all lacerations on the same coded anatomical site

Coding Wound Repair

Add together length of all wounds in the same code grouping for one code

[TIPS] Degrees of Burns

First degree:
Redness of the epidermis (skin)

Second degree:
Blisters on the skin; involvement of the epidermis and the dermis layers

Third degree:
Destruction of all layers of the skin, with possible involvement of the subcutaneous fat, muscle, and bone

Necrosis:
The death of the tissue

Calculate Twice
Measure Twice

pediatric *definitions*

Perinatal

Full-term = Week 38 through 40 or 266 through 280 days

Prenatal Periods

Embryonic period = Weeks 2 through 8

Fetal period = Week 9 through delivery

Puerperium period = from the end of labor until the uterus returns to normal size (typically 3 to 6 weeks)

Postpartum period = First 6 weeks after childbirth

Newborns

Perinatal period = from before birth through day 28 after birth

Prematurity = Birth prior to completion of 37 weeks gestation

Low Birth Weight (LBW) = Baby born weighing less than 2,500 grams (5 lbs., 8 oz.)

Pediatric Dosage Calculators

Classifications of Young Patients

< 38 weeks gestation	Premature or preterm infant
< 1 month	Neonate or newborn infant
1 month to < 1 year	Infant
1 year to < 12 years	Child

Formulas

Clark's Rule
[Weight of child/150 lbs] x adult dose = child's dose

Fried's Rule
[Age of child in months/150 lbs] x average adult dose = child's dose

Young's Rule – Children (Up to 12)
[Age of child (in years)/Age of child (in years) + 12] x average adult dose = child's dose

West Nomogram
[BSA of child/BSA of adult] x adult dose = est. child's dose
BSA of child (m^2) x [dose/m^2] = est. child's dose

Expected Growth Rates for Infants & Children

Age	Expected Growth Rate per Year	Age	Expected Growth Rate per Year
1–6 months	18–22 cm	Third year	8 cm
6–12 months	14–18 cm	Fourth year	7 cm
Second year	11 cm	Fifth to tenth years	5–6 cm

APGAR Scoring for Newborns (Range 0–10)

Category	0 Points	1 Point	2 Points
A – Activity (Muscle tone)	Limp	Some flexion	Active motion
P – Pulse (Heart rate -bpm)	Absent	<100	≥100
G – Grimace (Reflex irritability)	No response	Grimace	Cough, sneeze, cry
A – Appearance (Color)	Blue or pale	Pink body with blue extremities	Completely pink
R – Respirations	Absent	Slow, irregular	Good, crying

[TIP] Timeline of Childhood Milestones

2 Months	Smiles at the sound of your voice
3 Months	Raises head and chest when lying on stomach Grasps objects Smiles at other people
4 Months	Babbles, laughs, tries to imitate sounds
6 Months	Rolls from back to stomach

clinical indicators

• Respiration

Normal Rates	Age
16–20/min	Age 16+
17–22/min	Age 10–16
18–24/min	Age 6–10
20–30/min	Age 1–6
30–50/min	Infant

• Blood Pressure

< 120/< 80	Normal
120–139/80–89	Prehypertension
140–159/90–99	Hypertension Stage 1
160–179/100–119	Hypertension Stage 2
180–209/110–119	Hypertension Stage 3
210/120 +	Hypertension Stage 4

• Cardiac Output (CO)

CO = HR × SV

Cardiac Output = Heart rate × stroke volume

• Stroke Symptoms: *sudden onset of*

- numbness/weakness
- confusion
- loss of vision
- loss of balance
- severe headache

• Hemodynamic Parameters

Afterload Normal Values:

Pulmonary Vascular Resistance (PVR) = 20 – 120 dyne/sec/cm^{-5}

Calculation:

{[mean pulmonary artery pressure (PAP) – pulmonary artery wedge pressure (PAWP)]/cardiac output (co)} × 80 = PVR (right ventricle)

Systemic Vascular Resistance (SVR) = 800 – 1,500 dyne/sec/cm^{-5}

Calculation:

{[mean arterial pressure – central venous pressure (CVP)]/CO} × 80 = SVR (left ventricle)

Contractility Normal Values:

Right ventricular stroke work index: 7 – 12 g/beat/m^2

Calculation:

{[pulmonary artery (PA) systolic pressure – CVP] × SV × 0.0136}/Body Surface Area (height and weight)

Left Ventricular Stroke Work Index:

35 – 85 g/beat/m^2

Calculation:

{(systolic BP – PAWP) × SV × 0.0136}/Body Surface Area (height and weight)

• Blood Flow Rate

$$\text{Flow rate} = \frac{\Delta P}{R}$$

• Mean Arterial Pressure (MAP)

Formula

$$\frac{[(\text{systolic}) + 2(\text{diastolic})]}{3} = \text{MAP}$$

• Body Mass Index (BMI)

Formulas

Weight (in kilograms)/Height (in meters) squared = Body Mass Index

kg/m^2 = BMI

Conversion

Weight in lbs/2.2 = weight in kg

Height in ins/39.37 = height in meters

BMI Values

< 17.5	Anorexic
17.6–20	Underweight
20–25	Normal weight
25–30	Overweight
30–40	Obese
> 40	Severe obesity

• Cardiac Assessment

Normal values (EKG/ECG)

PR:	0.12–0.20 sec
QRS:	0.06–0.12 sec
QT:	0.32–0.44 sec

Vital Signs

	Age 0–1	Age 1–6	Age 6–11	Age 11–16	Adult
Temperature (F = Fahrenheit)					
Oral	96°–99.5° F	98.5°–99.5° F	97.5°–99.6° F	97.6°–99.6° F	97.6°–99.6° F
Rectal	99°–100° F	99°–100° F	98.5°–99.6° F	98.6°–100.6° F	98.6°–100.6° F
Blood Pressure					
Systolic	74–100	80–112	80–120	88–120	90–120
Diastolic	50–70	50–80	50–80	58–80	60–80
Pulse (bpm)	80–160	75–130	70–115	55–110	60–100
Respirations	26–40	20–30	18–24	16–24	12–20

Pulse

Normal Rates	Age
60–100/min	Age 13+
75–110/min	Age 6–12
75–120/min	Age 2–6
80–130/min	Age 1–2
80–140/min	1 month–1 year
120–160/min	Newborn–1 month

Pulse Volume Variations

Number	Type	Description
0	Absent pulse	None felt
1+	Thready pulse	Difficult to feel; not palpable when only slight pressure applied
2+	Weak pulse	Somewhat stronger than a thready pulse but not palpable when light pressure applied
3+	Normal pulse	Easily felt but not palpable when moderate pressure applied
4+	Bounding pulse	Feels full and springlike even under moderate pressure

Pressure Ulcer Risk Assessment

Activity	
Ambulant without assistance	0
Ambulant with assistance	2
Chairfast	4
Bedfast	6
Mobility – Range of Motion	
Full range of motion	0
Moves with minimal assistance	2
Moves with moderate assistance	4
Immobile	6
Skin Condition	
Hydrated and intact	0
Rashes or abrasions	2
Decreased turgor, dry	4
Edema, erythema, pressure ulcers	6
Predisposing Disease Process	
No involvement	0
Chronic, stable	1
Acute or chronic, unstable	2
Terminal	3
Level of Consciousness	
Alert	0
Slow verbal response	1
Responds to verbal or painful stimuli	2
Absence of response to stimuli	3
Nutritional Status	
Good (eats 75% or more)	0
Fair (eats less than 75%)	1
Poor	2
Unable/refuses, emaciated	3
Incontinence – Bladder	
None	0
Occasional	1
Usually	2
Total	3
Incontinence – Bowel	
None	0
Occasional	1
Usually	2
Total	3

[TIP] PAIN SCALE

0	1	2	3	4	5	6	7	8	9	10
Pain-free	Occasional minor twinge	Minor annoyance; no meds	Distracting; mild meds needed	Mild meds partially effective	Pain can't be ignored	Stronger meds needed	Strong meds partially effective	Activity limited	Speech difficult	Unable to speak

QuickStudy

Aldrete Score/Postanesthetic Recovery Score

Activity	Able to move 4 extremities voluntarily or on command	2
	Able to move 2 extremities voluntarily or on command	1
	Able to move 0 extremities voluntarily or on command	0
Respiration	Able to breathe deeply and cough freely	2
	Dyspnea or limited breathing	1
	Apneic	0
Consciousness	Fully awake	2
	Arousable on calling	1
	Not responding	0
Circulation	B/P ± 20% of preanesthetic level	2
	B/P ± 20% to 50% of preanesthetic level	1
	B/P ± 50% of preanesthetic level	0
Color	Normal	2
	Pale, dusky, blotchy, jaundiced, other	1
	Cyanotic	0

Electrolyte Imbalance

Hypocalcemia	Ca< 4.5 mg/dL
Hypercalcemia	Ca> 5.6 mg/dL
Hypoglycemia	<60 mg/dL
Hyperglycemia	>250 mg/dL
Hypokalemia	K< 3.5 mEq/L
Hyperkalemia	K> 5.0 mEq/L
Hyponatremia	Na< 135 mEq/L
Hypernatremia	Na> 145 mEq/L

Electrolytes	MEQ/L
Extracellular Fluid (Plasma) – Cations	
Sodium (Na)	142
Potassium (K)	5
Calcium (Ca^{++})	5
Magnesium (Mg^{++})	2
Total Cations	154

Additional	Assessments	
Dressing	Dry and clean	2
	Wet but stationary or marked	1
	Growing area of wetness	0
Pain	Pain-free	2
	Mild pain handled by oral medication	1
	Severe pain requiring parenteral medication	0
Ambulation	Able to stand up and walk straight	2
	Vertigo when erect	1
	Dizziness when supine	0
Fasting/ Feeding	Able to drink fluids	2
	Nauseated	1
	Nausea and vomiting	0
Urine Output	Has voided	2
	Unable to void but comfortable	1
	Unable to void and uncomfortable	0

Electrolyte Imbalance

Extracellular Fluid (Plasma) – Anions	
Chloride (Cl-)	103
Bicarbonate (HCO_3^-)	26
Phosphate (HPO_4^{--})	2
Sulfate (SO_4^{--})	1
Organic acids	5
Proteinate	17
Total Anions	154
Intracellular Fluid – Cations	
Potassium (K^+)	150
Magnesium (Mg^{++})	40
Sodium (Na^{++})	40
Total Cations	230
Intracellular Fluid – Anions	
Phosphates & Sulfates	150
Bicarbonate (HCO_3^-)	10
Proteinate	40
Total Anions	200

Arterial Blood Gases: Normal Values

Acidity or alkalinity (pH)	7.3 to 7.45
Partial pressure of oxygen (PaO_2)	80 to 100 mm Hg
Partial pressure of carbon dioxide ($PaCO_2$)	35 to 45 mm Hg
Bicarbonate ion (HCO_3^-)	22 to 26 mm Hg
Arterial oxygen saturation (SaO_2)	95% (at sea level)

Edema Rating Scale

Press down for 5 seconds, then time how long indentation remains:

1+	Disappears rapidly
2+	Lasts 10 to 15 seconds
3+	Lasts more than 1 minute
4+	Lasts 2 to 5 minutes

Deep Tendon Reflexes Grading

4+	Hyperactive response (brisk, with intermittent or transient clonus)
3+	More than normal (brisk), slightly hyperactive
2+	Normal, active, expected response
1+	Sluggish or diminished
0	No response

Muscle Strength

5/5	Full power of contraction
4/5	Fair or moderate power of contraction
3/5	Just able to overcome force of gravity
2/5	Can move, but cannot overcome power of gravity
1/5	Minimal contractile power
0/5	No movement

Pain Intensity Scale

0	No pain
1	Mild pain
2	Discomforting pain
3	Distressing pain
4	Horrible pain
5	Excruciating pain

Body Surface Area (BSA)

$$BSA\ (m^2) = \text{Square root of } \frac{[h\ (cm) \times wt\ (kg)]}{3{,}600}$$

$$BSA\ (m^2) = \text{Square root of } \frac{[h\ (in) \times wt\ (lb)]}{3{,}131}$$

Levels & Calculations

Corrected Serum Calcium Level

Measured total serum Ca^{++} level (mg/dL) + 0.8 × (4.0 – measured albumin level [g/dL]) = corrected total calcium concentration (mg/dL)

Anion Gap Calculation

Anion gap = $(Na^+ + K^+) – (Cl^- + HCO_3^-)$
OR
Anion gap = $Na^+ – (Cl^- + HCO_3^-)$

Arterial & Venous Blood Normal Values

Parameter	Arterial Sample	Venous Sample
pH	7.35–7.45	7.33–7.41
$PaCo_2$	35–45 mm Hg	35–40 mm Hg
Oxygen Saturation	93–98%	65–75%
Base Excess or Deficit	+/- 2 mmol/L	+/- 4 mmol/L
HCO_3^-	22–26 mEq/L	24–28 Eq/L

Absolute Neutrophil Count (ANC) Calculation

[Total WBC count × (% segmented neutrophils + % bands)]/100 = ANC

Creatinine Clearance Calculation

[volume of urine (mL/min) × urine creatinine (mg/dL)]/serum creatinine (mg/dL)

Dosage Calculations

Formulas

$$\frac{\text{Dose ordered}}{\text{Dose on hand}} = \text{Amount to administer}$$

Solution Concentration

$$\frac{\text{Dosage in solution}}{\text{Volume of solution}} = \text{Solution concentration}$$

IV Dose Rate Calculation

$$\frac{\text{Dose ordered}}{\text{Solution concentration}} = \text{Volume/hour}$$

Intravenous Drip Rates

Amt × Drip/Minutes = # of drops per min.

Amt (Amount to be infused) × Drip (drip set) / min. (time of infusion – in min.) = # of drops per min. (the # of drops per min. to be infused)

Intravenous Flow Rate

[Volume (mL)/Time (min)] x C (gtt/mL) = R (gtt/min)

Solution Concentrations

3:100 MEANS 3 parts of drug or mineral are in 100 parts of liquid
15 mg/mL MEANS that 15 mg of the drug are in each mL of liquid

Length of Needle	Gauge
2"	15
1.5" (1.5" – 2")	18
1.5" (1" – 1.5")	20
⅜" (1" – 1.5")	22

Length of Needle	Gauge
1" (1" – 1.5")	23
⅝"	25
⅜" (½" – ⅝")	26
½" (½" – ⅝")	28

Lung Volumes & Capacities

	Symbol	Normal Value
Tidal Volume	V_T or TV	500 mL or 5–10 mL/kg
Inspiratory Reserve Volume	IRV	3,000 mL
Expiratory Reserve Volume	ERV	1,100 mL
Residual Volume	RV	1,200 mL
Vital Capacity	VC	4,600 mL
Inspiratory Capacity	IC	3,500 mL
Functional Residual Capacity	FRC	2,300 mL
Total Lung Capacity	TLC	5,800 mL

Respiratory Management

Device	Flow/Rate (L/min)	$\%O_2$ Delivered
Nasal Cannula	1	24%
	2	28%
	3	32%
	4	36%
	5	40%
	6	44%
Simple Mask	5–6	40%
	7–8	50%
	10	60%
Venturi Mask (with appropriate entrainment port)	4	24%
	4	28%
	6	31%
	8	35%
	8	40%
	10	50%
Partial Rebreathing Mask	6–10	Up to 80%
Non-Rebreathing Mask	10	80–100%

Price: U.S.$6.95

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Home Health Resource Group Severity Levels (HHRG)

Domain	Score	Points	Severity Level
Clinical	C0	0–7	Minimal severity
	C1	8–19	Low severity
	C2	20–40	Moderate severity
	C3	41+	High severity
Functional	F0	0–2	Minimal severity
	F1	3–15	Low severity
	F2	16–23	Moderate severity
	F3	24–29	High severity
	F4	30+	Maximum severity
Service Utilization	S0	0–2	Minimum utilization
	S1	3	Low utilization
	S2	4–6	Moderate utilization
	S3	7	High utilization

Heart Failure Classifications

Classification	Description	Prognosis
I	Ordinary physical activity does not cause undue fatigue, dyspnea, palpitations, or chest pain No pulmonary congestion or peripheral hypotension Patient is considered asymptomatic Usually no limitations of activities of daily living (ADL)	Good
II	Slight limitation on ADL Patient reports no symptoms at rest but increased physical activity will cause symptoms Basilar crackles and S_3 murmur may be detected	Good
III	Marked limitation on ADL Patient feels comfortable at rest but less-than-ordinary activity will cause symptoms	Fair
IV	Symptoms of cardiac insufficiency at rest	Poor

Glasgow Coma Scale

Eyes Open	Spontaneously	4
	To speech	3
	To pain	2
	None	1
Verbal	Oriented	5
	Confused	4
	Inappropriate words	3
	Incomprehensible sounds	2
	None	1
Motor Skills	Obeys commands	6
	Localized pain	5
	Flexion withdrawal	4
	Abnormal flexion	3
	Abnormal extension	2
	Flaccid	1
Total		15

Trauma Score

Glasgow Coma Scale	13–15	4
	9–12	3
	6–8	2
	4–5	1
	0–3	0
Systolic B/P	>89 mm Hg	4
	76–89	3
	50–75	2
	1–49	1
	0	0
Respiratory Rate (patient-initiated ventilations)	10–29/min	4
	>29*	3
	6–9	2
	1–5	1
	0	0

[* >29 is too fast, which is why that measure has a lower rank than 10–29/min., which is optimal; breathing too fast washes oxygen out of the lungs too quickly and can be dangerous]

Titration Table

Intravenous Rate (mL/hr)	30	37.5	45	52.5	60	67.5	75	82.5	90
Levophed Dose (mcg/min)	4	5	6	7	8	9	10	11	12 mcg/min (maximum)