Introduction to Anesthesia Booklet

Topics:

Medical Abbreviations

Machine Check

Table Top Setup

Anesthesia Consent

Advanced Directive

Power of Attorney

Living Will

Pre-op Evaluation

Pre-op Medications

Anesthesia Record

History and Physical

Common Lab Values
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>A2</td>
<td>Aortic second sound</td>
</tr>
<tr>
<td>AA</td>
<td>Anesthesiologist assistant</td>
</tr>
<tr>
<td>AAA</td>
<td>Abdominal aortic aneurysm</td>
</tr>
<tr>
<td>AAAA</td>
<td>American Academy of Anesthesiologist Assistants</td>
</tr>
<tr>
<td>AAF</td>
<td>African-American female</td>
</tr>
<tr>
<td>AAM</td>
<td>African-American male</td>
</tr>
<tr>
<td>AAPA</td>
<td>American Association of Physician Assistants</td>
</tr>
<tr>
<td>Ab; ab</td>
<td>Abortion; antibiotics</td>
</tr>
<tr>
<td>abd</td>
<td>Abdomen, abdominal</td>
</tr>
<tr>
<td>ABD</td>
<td>Army battle dressing</td>
</tr>
<tr>
<td>ABG</td>
<td>Arterial blood gas</td>
</tr>
<tr>
<td>ABL</td>
<td>Allowable blood loss</td>
</tr>
<tr>
<td>abn</td>
<td>Abnormal</td>
</tr>
<tr>
<td>a.c.</td>
<td>Before meals (ante cibos, L)</td>
</tr>
<tr>
<td>ACL</td>
<td>Anterior cruciate ligament</td>
</tr>
<tr>
<td>ACLS</td>
<td>Advanced cardiac life support</td>
</tr>
<tr>
<td>ACS</td>
<td>Acute coronary syndrome</td>
</tr>
<tr>
<td>ACT</td>
<td>Activated clotting time</td>
</tr>
<tr>
<td>A.C.T.H., ACTH</td>
<td>Adrenocorticotrophic hormone</td>
</tr>
<tr>
<td>ad</td>
<td>To, up to</td>
</tr>
<tr>
<td>ADD</td>
<td>Attention deficit disorder</td>
</tr>
<tr>
<td>ADHD</td>
<td>Attention deficit and hyperactivity disorder</td>
</tr>
<tr>
<td>ad lib</td>
<td>As desired</td>
</tr>
<tr>
<td>adm.</td>
<td>Admission, administer(ed)</td>
</tr>
<tr>
<td>AF</td>
<td>Atrial fibrillation (or A fib); atrial flutter</td>
</tr>
<tr>
<td>A.F.B.</td>
<td>Acid-fast bacilli</td>
</tr>
<tr>
<td>AFP</td>
<td>Alpha fetal protein</td>
</tr>
<tr>
<td>A/G</td>
<td>Albumin-globulin ratio (blood)</td>
</tr>
<tr>
<td>AI</td>
<td>Aortic insufficiency</td>
</tr>
<tr>
<td>AICD</td>
<td>Automated intra-coronary defibrillator device</td>
</tr>
<tr>
<td>AIDS</td>
<td>Acquired immuno-deficiency syndrome</td>
</tr>
<tr>
<td>AKA</td>
<td>Above the knee amputation</td>
</tr>
<tr>
<td>AK</td>
<td>Above knee</td>
</tr>
<tr>
<td>alb.</td>
<td>Albumin</td>
</tr>
<tr>
<td>ALI</td>
<td>Acute lung injury</td>
</tr>
<tr>
<td>alk. phos.</td>
<td>Alkaline phosphatase</td>
</tr>
<tr>
<td>ALS</td>
<td>Amyotrophic lateral sclerosis (Lou Gehrig’s Disease)</td>
</tr>
<tr>
<td>alt. die</td>
<td>Alternate days</td>
</tr>
<tr>
<td>alt. hor</td>
<td>Every other hour</td>
</tr>
<tr>
<td>alt. noc</td>
<td>Every other night</td>
</tr>
<tr>
<td>AMA</td>
<td>Against medical advice, American Medical Association</td>
</tr>
<tr>
<td>AMI</td>
<td>Acute myocardial infarction</td>
</tr>
<tr>
<td>amt</td>
<td>Amount</td>
</tr>
<tr>
<td>amp</td>
<td>Ampule</td>
</tr>
<tr>
<td>ant</td>
<td>Anterior</td>
</tr>
</tbody>
</table>
A&O x 3  Alert and oriented to person, place, and time
AODM  Adult onset diabetes mellitus
A₂, P₂  Aortic second sound greater than pulmonic second sound
A-P  Auscultation and percussion
AP  Anterior-posterior, anteroposterior
aPTT  Activated partial thromboplastin time
Aq.  Water
Aq. dist.  Water distilled
AR  Aortic regurgitation
ARC  Acquired immune deficiency syndrome related complex
ARDS  Adult respiratory distress syndrome
AROM  Artificial rupture of membranes
A.S.  Left ear
AS  Aortic stenosis
ASA  Aspirin, American Society of Anesthesiologist
ASAP  As soon as possible
ASC  Ambulatory surgery center
ASCAD  Arteriosclerotic coronary artery disease
ASCVD  Arteriosclerotic cardiovascular disease
ASD  Atrial septal defect
ASHD  Arteriosclerotic heart disease
AST  Aspartate aminotransferase (formerly SGOT)
ATN  Acute tubular necrosis
AV  Atrioventricular; assisted ventilation
A/V  Arterio-venous
AVF  Arteriovenous fistula
AVG  Arteriovenous graft
AVM  Arteriovenous malformation
AVR  Aortic valve replacement

B

bilateral
Bilateral
Ba  barium
B.b.  drink
BCLS  Basic cardiac life support
BCP  Birth control pills
BE  Barium enema
BF  Black female
BH  Bair Hugger
b.i.d./B.I.D.  Twice a day
B.I.N.  Twice a night
BK  Below knee
BLBS=  Bilateral breath sounds and equal
BKA  Below the knee amputation
BM  Black male, bowel movement
<table>
<thead>
<tr>
<th>Acronym</th>
<th>Definition</th>
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<tbody>
<tr>
<td>BMI</td>
<td>body mass index</td>
</tr>
<tr>
<td>BMR</td>
<td>basal metabolic rate</td>
</tr>
<tr>
<td>BMT</td>
<td>bilateral myringotomy tubes</td>
</tr>
<tr>
<td>BP</td>
<td>blood pressure</td>
</tr>
<tr>
<td>BPH</td>
<td>benign prostatic hyperplasia</td>
</tr>
<tr>
<td>bpm</td>
<td>beats per minute</td>
</tr>
<tr>
<td>BRBPR</td>
<td>bright red blood per rectum</td>
</tr>
<tr>
<td>BS</td>
<td>breath sounds; bowel sounds; blood sugar</td>
</tr>
<tr>
<td>BSA</td>
<td>body surface area</td>
</tr>
<tr>
<td>BSO</td>
<td>bilateral salpingo-oophorectomy</td>
</tr>
<tr>
<td>B.S.P.</td>
<td>bromsulphalein test</td>
</tr>
<tr>
<td>B/U</td>
<td>back-up</td>
</tr>
<tr>
<td>BUN</td>
<td>blood urea nitrogen</td>
</tr>
<tr>
<td>BW</td>
<td>birth weight</td>
</tr>
<tr>
<td>bx</td>
<td>biopsy</td>
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</tbody>
</table>

**C**

<table>
<thead>
<tr>
<th>Letter</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>c</td>
<td>with</td>
</tr>
<tr>
<td>°C</td>
<td>degrees Celsius</td>
</tr>
<tr>
<td>C-1, C-2, etc</td>
<td>first cervical vertebra, etc.</td>
</tr>
<tr>
<td>CA</td>
<td>cancer, carcinoma</td>
</tr>
<tr>
<td>Ca</td>
<td>calcium</td>
</tr>
<tr>
<td>CABG</td>
<td>coronary artery bypass graft</td>
</tr>
<tr>
<td>CaCl</td>
<td>calcium chloride</td>
</tr>
<tr>
<td>CAD</td>
<td>coronary artery disease</td>
</tr>
<tr>
<td>CaGl</td>
<td>calcium gluconate</td>
</tr>
<tr>
<td>CASHD</td>
<td>coronary artery symptomatic heart disease</td>
</tr>
<tr>
<td>Cal.</td>
<td>caloric</td>
</tr>
<tr>
<td>cap.</td>
<td>capsule</td>
</tr>
<tr>
<td>CAPD</td>
<td>continuous ambulatory peritoneal dialysis</td>
</tr>
<tr>
<td>CAT</td>
<td>computerized axial tomography</td>
</tr>
<tr>
<td>cauc.</td>
<td>caucasian</td>
</tr>
<tr>
<td>CBC</td>
<td>complete blood count</td>
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<tr>
<td>CBF</td>
<td>cerebral blood flow</td>
</tr>
<tr>
<td>cc</td>
<td>cubic centimeter</td>
</tr>
<tr>
<td>Ccr</td>
<td>creatinine clearance</td>
</tr>
<tr>
<td>CCU</td>
<td>coronary care unit</td>
</tr>
<tr>
<td>CEA</td>
<td>carotid endarterectomy</td>
</tr>
<tr>
<td>CF</td>
<td>cystic fibrosis</td>
</tr>
<tr>
<td>CFX</td>
<td>circumflex coronary artery</td>
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<tr>
<td>CHD</td>
<td>congenital heart disease</td>
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<tr>
<td>CHEM-6</td>
<td>Na⁺, K⁺, Cl⁻, CO₂, glucose, BUN</td>
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<tr>
<td>CHEM-7</td>
<td>Chem-6 + creatinine</td>
</tr>
<tr>
<td>CHEM-14</td>
<td>total bilirubin, total protein, albumin, calcium, phosphorus, alkaline phosphatase, lactic dehydrogenase, SGOT, creatinine, uric acid,</td>
</tr>
</tbody>
</table>
cholesterol, MSI, GGT, SGPT
CHEM-23 CHEM-6 + CHEM-14 + CPK, direct bilirubin, triglycerides
CHF congestive heart failure
CHI closed head injury
Chol. cholesterol
Cl cardiac index
CICU cardiac intensive care unit
CK creatinine kinase
Cl chloride
cm. centimeter
CMRO$_2$ cerebral metabolic requirement of O$_2$
CMV cytomegalovirus
CNS central nervous system
c/o complained of
CO cardiac output
CO$_2$ carbon dioxide, bicarbonate
cong. congested
COPD chronic obstructed pulmonary disease
CP cerebral palsy; chest pain
CPAP continuous positive airway pressure
CPB cardio-pulmonary bypass
CPK creatinine phosphokinase
CPK-MB creatinine kinase - MB band
CPR cardiopulmonary resuscitation
Cryo cryoprecipitate
CRNA certified registered nurse anesthetist
C & S culture and sensitivity
C/S Cesarean section delivery
CSF cerebral spinal fluid
CT; C/T computed tomography (see CAT), chest tube
CTA clear to auscultation
CTR carpal tunnel release
CTS carpal tunnel syndrome
Cu copper
CV controlled ventilation / cardiovascular
CVA cerebral vascular accident
CVICU cardiovascular intensive care unit
CVP central venous pressure
c/w consistent with
CXR chest X-ray

D
D5W dextrose 5% in water
D5 1/2NS dextrose 5% in 0.45% normal saline
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>D5LR</td>
<td>dextrose 5% in Lactated Ringers</td>
</tr>
<tr>
<td>D10W</td>
<td>dextrose 10% in water</td>
</tr>
<tr>
<td>D50</td>
<td>dextrose 50%</td>
</tr>
<tr>
<td>D&amp;C</td>
<td>dilatation and curettage</td>
</tr>
<tr>
<td>D/C</td>
<td>discontinue</td>
</tr>
<tr>
<td>DDD</td>
<td>degenerative disc disease</td>
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<tr>
<td>D.D.S.</td>
<td>doctor of dental science</td>
</tr>
<tr>
<td>def</td>
<td>defecation</td>
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<tr>
<td>DHEAS</td>
<td>dehydroepiandrosterone sulfate</td>
</tr>
<tr>
<td>DI</td>
<td>diabetes insipidus</td>
</tr>
<tr>
<td>DIC</td>
<td>disseminated idiopathic coagulopathy</td>
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<tr>
<td>DIFF.</td>
<td>differential (blood count)</td>
</tr>
<tr>
<td>dil.</td>
<td>dilatation</td>
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<tr>
<td>disc.</td>
<td>discharge</td>
</tr>
<tr>
<td>DJD</td>
<td>degenerative joint disease</td>
</tr>
<tr>
<td>DKA</td>
<td>diabetic ketoacidosis</td>
</tr>
<tr>
<td>dl</td>
<td>deciliter</td>
</tr>
<tr>
<td>DL</td>
<td>direct laryngoscopy</td>
</tr>
<tr>
<td>DLCO</td>
<td>diffusion capacity of lung-carbon monoxide test</td>
</tr>
<tr>
<td>DLT</td>
<td>double-lumen tube</td>
</tr>
<tr>
<td>DMD</td>
<td>Doctor of Medical Dentistry</td>
</tr>
<tr>
<td>DMV</td>
<td>daily multi-vitamin</td>
</tr>
<tr>
<td>DNR</td>
<td>do not resuscitate</td>
</tr>
<tr>
<td>D.O.</td>
<td>Doctor of Osteopathy</td>
</tr>
<tr>
<td>DOA</td>
<td>dead on arrival</td>
</tr>
<tr>
<td>DOB</td>
<td>date of birth</td>
</tr>
<tr>
<td>DOE</td>
<td>dyspnea on exertion</td>
</tr>
<tr>
<td>DPL</td>
<td>diagnostic peritoneal lavage</td>
</tr>
<tr>
<td>DPT</td>
<td>diptheria-pertussis-tetanus</td>
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<tr>
<td>dr.</td>
<td>dram</td>
</tr>
<tr>
<td>DT</td>
<td>delirium tremens</td>
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<tr>
<td>DTRs</td>
<td>deep tendon reflexes</td>
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<td>DVT</td>
<td>deep vein thrombosis</td>
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<tr>
<td>dx; Dx</td>
<td>diagnosis</td>
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<tr>
<td>Dz</td>
<td>disease</td>
</tr>
<tr>
<td>EBL</td>
<td>estimated blood loss</td>
</tr>
<tr>
<td>EBT</td>
<td>endobronchial tube</td>
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<tr>
<td>EBV</td>
<td>estimated blood volume; Epstein-Barr virus</td>
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<td>ECCE</td>
<td>extracapsular cataract extraction</td>
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<tr>
<td>ECG</td>
<td>electrocardiogram</td>
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<tr>
<td>ECMO</td>
<td>extracorporeal membrane oxygenation/oxygenator</td>
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<tr>
<td>ECT</td>
<td>electroconvulsive therapy</td>
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<tr>
<td>Abbreviation</td>
<td>Full Form</td>
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<td>--------------</td>
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</tr>
<tr>
<td>ED</td>
<td>emergency department</td>
</tr>
<tr>
<td>EDC</td>
<td>estimated date of confinement</td>
</tr>
<tr>
<td>EEG</td>
<td>electroencephalogram</td>
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<tr>
<td>EENT</td>
<td>eye, ear, nose, and throat</td>
</tr>
<tr>
<td>EEY</td>
<td>erythromycin</td>
</tr>
<tr>
<td>EF</td>
<td>ejection fraction</td>
</tr>
<tr>
<td>EGA</td>
<td>estimated gestational age</td>
</tr>
<tr>
<td>EGD</td>
<td>esophagogastroduodenoscopy</td>
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<tr>
<td>EJ</td>
<td>external juglar vein</td>
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<tr>
<td>elix.</td>
<td>elixir</td>
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<tr>
<td>EMG</td>
<td>electromyogram</td>
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<tr>
<td>ENT</td>
<td>ear, nose, throat</td>
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<tr>
<td>EOM</td>
<td>extra-ocular muscles</td>
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<tr>
<td>ER</td>
<td>emergency room</td>
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<tr>
<td>ESR</td>
<td>erythrocyte sedimentation rate</td>
</tr>
<tr>
<td>ESRD</td>
<td>end stage renal disease</td>
</tr>
<tr>
<td>ESRF</td>
<td>end stage renal failure</td>
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<tr>
<td>EST</td>
<td>electroshock therapy</td>
</tr>
<tr>
<td>ESWL</td>
<td>external sound wave therapy</td>
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<tr>
<td>ETCO₂</td>
<td>end-tidal carbon dioxide</td>
</tr>
<tr>
<td>EtOH</td>
<td>alcohol</td>
</tr>
<tr>
<td>ETT</td>
<td>endotracheal tube</td>
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<tr>
<td>EUA</td>
<td>examination under anesthesia</td>
</tr>
<tr>
<td>Ex lap</td>
<td>exploratory laparotomy</td>
</tr>
<tr>
<td>ext</td>
<td>extract</td>
</tr>
<tr>
<td>expir</td>
<td>expired</td>
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<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
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<tbody>
<tr>
<td>F.A.C.P.</td>
<td>Fellow, American College of Physicians</td>
</tr>
<tr>
<td>F.A.C.S.</td>
<td>Fellow, American College of Surgeons</td>
</tr>
<tr>
<td>FANA</td>
<td>Florida Association of Nurse Anesthetists</td>
</tr>
<tr>
<td>F.B.</td>
<td>foreign body</td>
</tr>
<tr>
<td>FBS</td>
<td>fasting blood sugar</td>
</tr>
<tr>
<td>FeSO₄</td>
<td>ferrous sulfate (iron)</td>
</tr>
<tr>
<td>FEV₁</td>
<td>forced expiratory volume at 1 second</td>
</tr>
<tr>
<td>FFP</td>
<td>fresh frozen plasma</td>
</tr>
<tr>
<td>FHx</td>
<td>family history</td>
</tr>
<tr>
<td>FHR</td>
<td>fetal heart rate</td>
</tr>
<tr>
<td>FHT</td>
<td>fetal heart tone</td>
</tr>
<tr>
<td>FIO₂</td>
<td>fraction inspired oxygen</td>
</tr>
<tr>
<td>fld.</td>
<td>fluids</td>
</tr>
<tr>
<td>fl. dr.</td>
<td>fluid dram</td>
</tr>
<tr>
<td>FRC</td>
<td>functional residual capacity</td>
</tr>
<tr>
<td>FROM</td>
<td>full range of motion</td>
</tr>
</tbody>
</table>
FSA  Florida Society of Anesthesiologists
FSH  follicle stimulating hormone
FTA  fluorescent treponemal/titer antibody
FTI  free triiodothyronine index
FTI  free thyroxine index
FTLB  full term living birth
FTNB  full term normal birth
FTT  failure to thrive
F/U  follow up
FUO  fever of unknown origin
Fx  fracture

G
GBS  gall bladder series
GC  gonococcus
GCS  Glasgow Coma Scale
g/dL  grams per deciliter
GDM  gestational diabetes mellitus
GE  gastroesophageal
GERD  gastric esophageal reflux disorder
GGT  gamma glutamyl transpeptidase
GH  growth hormone
GI  gastrointestinal
gm  gram
gm%  grams per one hundred milliliters of blood
G/P  gravida/para
GPI  general paresis
G6PD  glucose 6 phosphate dehydrogenase
gr  groin
grav.  gravida (pregnancy)
gh.  drops
GSW  gun shot wound
gtt  drops
GTT  glucose tolerance test
GU  genitourinary
GYN  gynecology

H
h, H  hour
H/A  headache
HAV  hepatitis A virus
<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
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<tr>
<td>HBsAb</td>
<td>hepatitis B surface antibody</td>
</tr>
<tr>
<td>HBsAg</td>
<td>hepatitis B surface antigen</td>
</tr>
<tr>
<td>HBV</td>
<td>hepatitis B virus</td>
</tr>
<tr>
<td>HCG, hCG</td>
<td>human chorionic gonadotropin</td>
</tr>
<tr>
<td>Hct</td>
<td>hematocrit</td>
</tr>
<tr>
<td>HCTZ</td>
<td>hydrochlorothiazide</td>
</tr>
<tr>
<td>HCVD</td>
<td>hypertensive cardiovascular disease</td>
</tr>
<tr>
<td>HD</td>
<td>hemodialysis</td>
</tr>
<tr>
<td>HDL</td>
<td>high density lipoprotein</td>
</tr>
<tr>
<td>H &amp; E</td>
<td>hemorrhage and exudate (eye)</td>
</tr>
<tr>
<td>HEENT</td>
<td>head, eye, ear, nose, and throat</td>
</tr>
<tr>
<td>HELLP</td>
<td>hemolysis, elevated liver enzymes, low platelets (a syndrome)</td>
</tr>
<tr>
<td>Hg</td>
<td>mercury</td>
</tr>
<tr>
<td>Hgb</td>
<td>hemoglobin</td>
</tr>
<tr>
<td>HGH</td>
<td>human growth hormone</td>
</tr>
<tr>
<td>HIV</td>
<td>human immunodeficiency virus</td>
</tr>
<tr>
<td>HME</td>
<td>heat-moisture exchanger</td>
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<tr>
<td>hn.</td>
<td>tonight</td>
</tr>
<tr>
<td>H/O</td>
<td>history of</td>
</tr>
<tr>
<td>HOH</td>
<td>history of headache</td>
</tr>
<tr>
<td>H &amp; P</td>
<td>history and physical</td>
</tr>
<tr>
<td>HPI</td>
<td>history of present illness</td>
</tr>
<tr>
<td>HPV</td>
<td>human papilloma virus</td>
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<tr>
<td>h.s.; H.S.</td>
<td>at bed time</td>
</tr>
<tr>
<td>HSV</td>
<td>herpes simplex virus</td>
</tr>
<tr>
<td>HTN</td>
<td>hypertension</td>
</tr>
<tr>
<td>HTLV</td>
<td>human T-cell lymphotrophic virus</td>
</tr>
<tr>
<td>HVA</td>
<td>homovanillic acid</td>
</tr>
<tr>
<td>HVD</td>
<td>hypertensive vascular disease</td>
</tr>
<tr>
<td>Hx; hx</td>
<td>history</td>
</tr>
<tr>
<td>IABP</td>
<td>intra-arterial balloon pump</td>
</tr>
<tr>
<td>IBW</td>
<td>ideal body weight</td>
</tr>
<tr>
<td>ICP</td>
<td>intracranial pressure</td>
</tr>
<tr>
<td>ICU</td>
<td>intensive care unit</td>
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<tr>
<td>I &amp; D</td>
<td>incision and drainage</td>
</tr>
<tr>
<td>IDDM</td>
<td>insulin dependent diabetes mellitus</td>
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<tr>
<td>I/E</td>
<td>inspiratory-to-expiratory time ratio</td>
</tr>
<tr>
<td>Ig A,D,E,G,M</td>
<td>immunoglobulin- types A,D,E,G,M</td>
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<tr>
<td>IGP</td>
<td>intragastric pressure</td>
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<tr>
<td>IHHS</td>
<td>idiopathic hypertrophic subaortic stenosis</td>
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<tr>
<td>IHR</td>
<td>inguinal hernia repair</td>
</tr>
<tr>
<td>IJ</td>
<td>internal juglar vein</td>
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</table>
IM  intramuscular
IMA  internal mammary artery
IMP, imp.  impression
IMV  intermittent mandatory ventilation
inf.  infusion
inj.  Injection
INR  internal normalization ratio
I & O  intake and output
IOP  intraocular pressure
IPN  intern progress notes
IPPB  intermittent positive pressure breathing
IRV  inverse ratio ventilation
ITP  idiopathic thrombocytopenia purpura
IU  intrauterine
I.U.; IU  international unit
IUD  intrauterine device; intrauterine death
IUFD  intrauterine fetal death
IUP  intrauterine pregnancy
IV  intravenous
IVC  inferior vena cava
IVDA  intravenous drug abuse
IVF  in vitro fertilization
IVH  intraventricular hemorrhage
IVP  intravenous pyelogram

J

JODM  juvenile onset diabetes mellitus

K

K  potassium
Kcal, KCAL  kilocalorie
KCl  potassium chloride
kg  kilogram
KUB  kidney, ureter, bladder (used when taking an X-ray)
KVO  keep vein open

L
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
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<tbody>
<tr>
<td>L</td>
<td>left; liter</td>
</tr>
<tr>
<td>L-1, L-2, etc.</td>
<td>first lumbar vertebra, etc.</td>
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<tr>
<td>LAD</td>
<td>left anterior descending (coronary artery)</td>
</tr>
<tr>
<td>lap.</td>
<td>laparotomy</td>
</tr>
<tr>
<td>lat</td>
<td>lateral</td>
</tr>
<tr>
<td>LAVH</td>
<td>laparoscopic assisted vaginal hysterectomy</td>
</tr>
<tr>
<td>LBBB</td>
<td>left bundle branch block</td>
</tr>
<tr>
<td>LBCD</td>
<td>left border cardiac dullness</td>
</tr>
<tr>
<td>LBP</td>
<td>low back pain</td>
</tr>
<tr>
<td>lbs</td>
<td>pounds</td>
</tr>
<tr>
<td>LBW</td>
<td>low birth weight</td>
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<tr>
<td>LCM</td>
<td>left costal margin</td>
</tr>
<tr>
<td>L &amp; D</td>
<td>labor and delivery</td>
</tr>
<tr>
<td>LDH</td>
<td>lactic dehydrogenase</td>
</tr>
<tr>
<td>LDL</td>
<td>low density lipoprotein</td>
</tr>
<tr>
<td>LE</td>
<td>lower extremity</td>
</tr>
<tr>
<td>LE prep</td>
<td>lupus erythematosus cell preparation</td>
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<tr>
<td>LFT</td>
<td>liver function test(s)</td>
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<td>LHF</td>
<td>left heart failure</td>
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<td>LHRH</td>
<td>luteinizing hormone releasing hormone</td>
</tr>
<tr>
<td>Li</td>
<td>lithium</td>
</tr>
<tr>
<td>LIH</td>
<td>left inguinal hernia</td>
</tr>
<tr>
<td>LIMA</td>
<td>left internal mammary artery</td>
</tr>
<tr>
<td>LLD</td>
<td>left lateral decubitus (position)</td>
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<td>LLE</td>
<td>left lower extremity</td>
</tr>
<tr>
<td>LLL</td>
<td>left lower lobe</td>
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<tr>
<td>LLQ</td>
<td>left lower quadrant</td>
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<tr>
<td>LM</td>
<td>left main coronary artery</td>
</tr>
<tr>
<td>LMA</td>
<td>laryngeal mask airway</td>
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<tr>
<td>LMP</td>
<td>last menstrual period</td>
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<td>LOA</td>
<td>left occipital anterior</td>
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<tr>
<td>LOC</td>
<td>loss/level of consciousness</td>
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<td>LP</td>
<td>lumbar puncture</td>
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<td>LPN</td>
<td>licensed practical nurse</td>
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<td>LPV</td>
<td>lymphophathia venereum</td>
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<tr>
<td>LR</td>
<td>lactated Ringer's solution</td>
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<td>LSK</td>
<td>liver, spleen, kidneys</td>
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<td>LSO</td>
<td>left salpingo oopherectomy</td>
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<td>LTL</td>
<td>laparoscopic tubal ligation</td>
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<td>LUE</td>
<td>left upper extremity</td>
</tr>
<tr>
<td>LUL</td>
<td>left upper lobe</td>
</tr>
<tr>
<td>LUQ</td>
<td>left upper quadrant</td>
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<td>LV</td>
<td>left ventricle</td>
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<td>LVAD</td>
<td>left ventricular assist device</td>
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<tr>
<td>LVE</td>
<td>left ventricular enlargement</td>
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<tr>
<td>LVEDP</td>
<td>left ventricular end diastolic pressure</td>
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<td>LVH</td>
<td>left ventricular hypertrophy</td>
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<td>LVS</td>
<td>left ventricular strain</td>
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</table>
LWMA  left wall motion abnormality

M

m  minimum
μg  microgram
μl  microliter
μM  micromole
M1  mitral first sound
MAC  minimum alveolar concentration; monitored anesthesia care
MAP  mean arterial pressure
MAST  military anti-shock trousers
MBC  maximal breathing capacity
MCA  motorcycle accident
mcg  microgram
MCH  mean corpuscular hemoglobin
MCHC  mean corpuscular hemoglobin concentration
MCL  mid clavicular line
MCV  mean corpuscular volume
MD  Medical Doctor
MDI  metered dose inhaler
mEq  milliequivalent
mEq/L  milliequivalent per liter
mg  milligram
mg/dL  milligrams per deciliter
MgSO4  magnesium sulphate
MH  malignant hyperthermia
MID-CAB  minimally invasive coronary artery bypass
MICU  medical intensive care unit
min  minute
ml  milliliter
mm  millimeter
mmHg  millimeter of mercury
Mn  manganese
MOSF  multi-organ system failure
mOsm  milliosmole
MR  mental retardation; mitral valve regurgitation
MRI  magnetic resonance imaging
MRSA  methicillin resistant staph aureus
MS  multiple sclerosis; mitral stenosis
MSO4  morphine sulfate
MSL  mid sternal line
MVA  motor vehicle accident
MV  multivitamins
MVP  mitral valve prolapse
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<tr>
<th>Term</th>
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<tr>
<td>MVR</td>
<td>心脏瓣膜手术</td>
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<tr>
<td>N; N₂</td>
<td>氮气</td>
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<tr>
<td>Na</td>
<td>氯化钠</td>
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<tr>
<td>N/A</td>
<td>不适用；不可用</td>
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<tr>
<td>NAD</td>
<td>无明显不适</td>
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<td>NaP</td>
<td>氯化钠pentothal</td>
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<td>n.b.</td>
<td>注释</td>
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<td>NB</td>
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<td>NEC</td>
<td>恶性肠炎</td>
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<tr>
<td>ng</td>
<td>纳克</td>
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<td>NG</td>
<td>鼻胃管</td>
</tr>
<tr>
<td>NH₃</td>
<td>氨气</td>
</tr>
<tr>
<td>NI</td>
<td>不适用</td>
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<td>NICU</td>
<td>新生儿重症监护单位</td>
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<td>NIDDM</td>
<td>非胰岛素依赖性糖尿病</td>
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<td>NKA</td>
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<td>NKDA</td>
<td>无已知药物过敏反应</td>
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<td>nM</td>
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<td>NMR</td>
<td>核磁共振成像</td>
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<td>N₂O</td>
<td>二氧化氮</td>
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<td>noct</td>
<td>夜间</td>
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<td>NP</td>
<td>护士</td>
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<td>中性蛋白酶Hagedorn（胰岛素）</td>
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<td>NPN</td>
<td>非蛋白质氮</td>
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<td>NPO</td>
<td>无入口药（nil per os）</td>
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<td>NR</td>
<td>不重复</td>
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<td>NS</td>
<td>正常生理盐水</td>
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<td>NSAID</td>
<td>非甾体抗炎药</td>
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<td>NSR</td>
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<td>佛罗里达南东部大学</td>
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<td>NTG</td>
<td>硝酸甘油</td>
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<td>NTT</td>
<td>鼻鼻饲管</td>
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<tr>
<td>N/V</td>
<td>恶心、呕吐</td>
</tr>
<tr>
<td>N/V/D</td>
<td>恶心、呕吐、腹泻</td>
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<tr>
<td>O₂</td>
<td>氧气</td>
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<tr>
<td>OB</td>
<td>妇产科</td>
</tr>
<tr>
<td>OB/GYN</td>
<td>妇科/产科医生</td>
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</table>
Occ  occasional
OD  overdose
O.D.  right eye (oculus dexter)
OETT  oral endotracheal tube
OH  occupational history
OHD  organic heart disease
Oint.  ointment
OLA  occiput left anterior
OLP  occiput left posterior
OP CAB  off-pump coronary artery bypass
OPS  out patient surgery
OR  operating room
ORIF  open reduction internal fixation
os  mouth
O.S.  left eye (oculus sinister)
O.2S  oxygen saturation
OSA  obstructive sleep apnea
O.T.  occupational therapy
OTC  over the counter
O.U.; o.u.  each eye
o/w  otherwise
oz.  ounce

P
p  after
P  phosphorous
P\textsubscript{2}  pulmonic second sound
P & A  percussion and auscultation
PaCO\textsubscript{2}  partial pressure of CO\textsubscript{2} in arterial blood
PA  pulmonary artery
PAC  premature atrial contraction; pulmonary artery catheter
PA-C  physician assistant-certified
PACU  post anesthesia care unit
PALS  pediatric advanced life support
PaO\textsubscript{2}  partial pressure of O\textsubscript{2} in arterial blood
PAOP  pulmonary artery occluded pressure
Pap  Papanicolaou smear (Pap smear)
para  parity
PAT  paroxysmal atrial tachycardia; preadmission testing
Pb  lead
PBI  protein bound iodine
P.C.  after meals
PCA  patient controlled analgesia
PCN  penicillin
<table>
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<th>Abbreviation</th>
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<tr>
<td>PCWP</td>
<td>pulmonary capillary wedge pressure</td>
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<tr>
<td>PD</td>
<td>peritoneal dialysis</td>
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<td>PDA</td>
<td>patent ductus arteriosus</td>
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<tr>
<td>PD&amp;C</td>
<td>postural drainage and clapping</td>
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<td>PE</td>
<td>pulmonary embolism</td>
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<td>P.E.</td>
<td>physical exam</td>
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<td>PEA</td>
<td>pulseless electrical activity</td>
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<tr>
<td>PEEP</td>
<td>positive end expiratory pressure</td>
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<tr>
<td>PEG</td>
<td>percutaneous endoscopic gastrostomy</td>
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<tr>
<td>per</td>
<td>by</td>
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<tr>
<td>PERRLA</td>
<td>pupils, equal, round, reactive to light and accommodation</td>
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<tr>
<td>P&lt;sub&gt;e&lt;/sub&gt;T&lt;sub&gt;CO₂&lt;/sub&gt;</td>
<td>partial pressure of CO₂ in end-tidal gas</td>
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<tr>
<td>PFO</td>
<td>patent foramen ovale</td>
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<td>PFT</td>
<td>pulmonary function test</td>
</tr>
<tr>
<td>Pg</td>
<td>picogram</td>
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<tr>
<td>pH</td>
<td>hydrogen ion concentration</td>
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<tr>
<td>PH</td>
<td>past history</td>
</tr>
<tr>
<td>PI</td>
<td>present/previous illness</td>
</tr>
<tr>
<td>PICC</td>
<td>percutaneously inserted central catheter</td>
</tr>
<tr>
<td>PICU</td>
<td>pediatric intensive care unit</td>
</tr>
<tr>
<td>PID</td>
<td>pelvic inflammatory disease</td>
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<td>PIH</td>
<td>pregnancy induced hypertension</td>
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<td>PIP</td>
<td>peak inspiratory pressure</td>
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<tr>
<td>PKU</td>
<td>phenylketonuria</td>
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<td>PLT/plt.</td>
<td>platelets</td>
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<td>PMHx</td>
<td>past medical history</td>
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<td>PMR</td>
<td>physical medicine and rehabilitation</td>
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<td>PMS</td>
<td>premenstrual syndrome</td>
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<tr>
<td>PND</td>
<td>paroxysmal nocturnal dyspnea, post nasal drip</td>
</tr>
<tr>
<td>PNV</td>
<td>prenatal vitamins</td>
</tr>
<tr>
<td>PO</td>
<td>by mouth</td>
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<tr>
<td>PO&lt;sub&gt;₂&lt;/sub&gt;</td>
<td>phosphate</td>
</tr>
<tr>
<td>POD</td>
<td>post operative day</td>
</tr>
<tr>
<td>PONV</td>
<td>post-op nausea and vomiting</td>
</tr>
<tr>
<td>post-op</td>
<td>after operative</td>
</tr>
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<td>p.p.</td>
<td>postprandial</td>
</tr>
<tr>
<td>PP</td>
<td>post partum</td>
</tr>
<tr>
<td>PPP</td>
<td>pressure points padded</td>
</tr>
<tr>
<td>PPD</td>
<td>purified protein derivative(TB test)</td>
</tr>
<tr>
<td>PPL</td>
<td>pleuropneumonia like</td>
</tr>
<tr>
<td>PR</td>
<td>per rectum</td>
</tr>
<tr>
<td>PRBC</td>
<td>packed red blood cells</td>
</tr>
<tr>
<td>preop</td>
<td>before surgery</td>
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<tr>
<td>p.r.n./prn</td>
<td>whenever necessary</td>
</tr>
<tr>
<td>PROM</td>
<td>premature rupture of membranes</td>
</tr>
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<td>PSHx</td>
<td>past surgical history</td>
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<td>PSP</td>
<td>phenolsulfonphthalein test</td>
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</table>
PSV  pressure support ventilation
PSVT paroxysmal supraventricular tachycardia
PT prothrombin time (a.k.a. protime); physical therapy
PTA prior to admission
PTCA percutaneous transluminal coronary angioplasty
PTH parathyroid hormone
PTT partial thromboplastin time
PUD peptic ulcer disease
PUO pyrexia of undetermined origin
PVC premature ventricular contraction
PVD peripheral vascular disease
PVR pulmonary vascular resistance

Q

q every
qd every day
qh every hour
q2h every 2 hours
q4h every 4 hours
qHS every night
qid four times a day
qn every night
qod every other day
qqh every four hours
QRS ventricular wave EKG
q.s. sufficient quantity
QV as much
qwk every week

R

R right
RA rheumatoid arthritis; right atrium
rad unit of measurement of the absorbed dose of ionizing radiation
RAD reactive airway disease
RAH right atrial hypertrophy
RAI radioactive iodine
RAP retrograde autologous prime
RAST radioallergosorbent test
RBBB right bundle branch block
RBC red blood cell
RCA right coronary artery
<table>
<thead>
<tr>
<th>Abbreviation</th>
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<td>RCM</td>
<td>right costal margin</td>
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<tr>
<td>RCR</td>
<td>rotator cuff repair</td>
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<tr>
<td>RDS</td>
<td>respiratory distress syndrome</td>
</tr>
<tr>
<td>RF</td>
<td>rheumatic fever</td>
</tr>
<tr>
<td>Rh</td>
<td>Rhesus factor</td>
</tr>
<tr>
<td>RHD</td>
<td>rheumatic heart disease</td>
</tr>
<tr>
<td>RHF</td>
<td>right heart failure</td>
</tr>
<tr>
<td>RLE</td>
<td>right lower extremity</td>
</tr>
<tr>
<td>RLL</td>
<td>right lower lobe</td>
</tr>
<tr>
<td>RLQ</td>
<td>right lower quadrant</td>
</tr>
<tr>
<td>RML</td>
<td>right middle lobe</td>
</tr>
<tr>
<td>RN</td>
<td>registered nurse</td>
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<tr>
<td>R/O</td>
<td>rule out</td>
</tr>
<tr>
<td>ROA</td>
<td>occiput right anterior</td>
</tr>
<tr>
<td>ROM</td>
<td>range of motion</td>
</tr>
<tr>
<td>ROP</td>
<td>occiput right posterior</td>
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<tr>
<td>ROS</td>
<td>review of systems</td>
</tr>
<tr>
<td>ROT</td>
<td>occiput right transverse</td>
</tr>
<tr>
<td>RQ</td>
<td>respiratory quotient</td>
</tr>
<tr>
<td>RR</td>
<td>respiratory rate</td>
</tr>
<tr>
<td>RRE</td>
<td>round, regular, equal</td>
</tr>
<tr>
<td>RRR</td>
<td>regular rate and rhythm</td>
</tr>
<tr>
<td>RSO</td>
<td>right salpingo oopherectomy</td>
</tr>
<tr>
<td>RSR</td>
<td>regular sinus rhythm</td>
</tr>
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<td>RSD</td>
<td>reflex sympathetic dystrophy</td>
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<td>RSV</td>
<td>respiratory syncytial virus</td>
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<td>RT</td>
<td>respiratory therapy</td>
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<td>related to</td>
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<td>RTC</td>
<td>return to clinic</td>
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<td>RT3U</td>
<td>resin triiodothyronine uptake</td>
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<td>RUL</td>
<td>right upper lobe</td>
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<td>RUQ</td>
<td>right upper quadrant</td>
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<td>RVAD</td>
<td>right ventricular assist device</td>
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<td>right ventricular hypertrophy</td>
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<td>RWMA</td>
<td>right wall motion abnormality</td>
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<td>Rx</td>
<td>therapy; prescription</td>
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<table>
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<td>s</td>
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<tr>
<td>SA</td>
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<td>subarachnoid hemorrhage</td>
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<td>SaO₂</td>
<td>oxygen saturation of hemoglobin in arterial blood</td>
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<td>SBE</td>
<td>subacute bacterial endocarditis</td>
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<tr>
<td>SCD</td>
<td>sequential compression device</td>
</tr>
<tr>
<td>SD</td>
<td>septal defect</td>
</tr>
<tr>
<td>SDH</td>
<td>subdural hematoma</td>
</tr>
<tr>
<td>sed rate</td>
<td>sedimentation rate</td>
</tr>
<tr>
<td>SGC</td>
<td>Swan-Ganz catheter</td>
</tr>
<tr>
<td>SGOT</td>
<td>serum glutamic oxaloacetic transaminase (AST)</td>
</tr>
<tr>
<td>SGPT</td>
<td>serum glutamic pyruvic transaminase (ALT)</td>
</tr>
<tr>
<td>SHx</td>
<td>social history</td>
</tr>
<tr>
<td>SIADH</td>
<td>syndrome of inappropriate anti-diuretic hormone</td>
</tr>
<tr>
<td>SICU</td>
<td>surgical intensive care unit</td>
</tr>
<tr>
<td>SIDS</td>
<td>sudden infant death syndrome</td>
</tr>
<tr>
<td>SIMV</td>
<td>synchronized intermittent mandatory ventilation</td>
</tr>
<tr>
<td>SIRS</td>
<td>systemic inflammatory response syndrome</td>
</tr>
<tr>
<td>SL</td>
<td>sublingual</td>
</tr>
<tr>
<td>SLE</td>
<td>systemic lupus erythmatosus</td>
</tr>
<tr>
<td>SNP</td>
<td>sodium nitroprusside</td>
</tr>
<tr>
<td>SOB</td>
<td>shortness of breath</td>
</tr>
<tr>
<td>s.o.s.</td>
<td>if occasion arises</td>
</tr>
<tr>
<td>S/P</td>
<td>status post</td>
</tr>
<tr>
<td>sp. gr.</td>
<td>specific gravity</td>
</tr>
<tr>
<td>spec.</td>
<td>specimen</td>
</tr>
<tr>
<td>SpO₂</td>
<td>saturation of hemoglobin in arterial blood from pulse oximetry</td>
</tr>
<tr>
<td>SQ</td>
<td>subcutaneous</td>
</tr>
<tr>
<td>SR</td>
<td>spontaneous respiration</td>
</tr>
<tr>
<td>SROM</td>
<td>spontaneous rupture of membranes</td>
</tr>
<tr>
<td>ss</td>
<td>half; sliding scale</td>
</tr>
<tr>
<td>s/s</td>
<td>signs and symptoms</td>
</tr>
<tr>
<td>SSS</td>
<td>sick sinus syndrome</td>
</tr>
<tr>
<td>STAT</td>
<td>supercedes tasks of all types (i.e. immediately)</td>
</tr>
<tr>
<td>STD</td>
<td>sexually transmitted disease</td>
</tr>
<tr>
<td>STS</td>
<td>serological test for syphilis</td>
</tr>
<tr>
<td>SV</td>
<td>stroke volume; supraventricular</td>
</tr>
<tr>
<td>SVC</td>
<td>superior vena cava</td>
</tr>
<tr>
<td>SvO₂</td>
<td>oxygen saturation of hemoglobin in mixed-venous blood</td>
</tr>
<tr>
<td>sup.</td>
<td>suppository</td>
</tr>
<tr>
<td>SVR</td>
<td>systemic vascular resistance</td>
</tr>
<tr>
<td>SVT</td>
<td>supraventricular tachycardia</td>
</tr>
<tr>
<td>sx</td>
<td>symptoms; surgery</td>
</tr>
<tr>
<td>T</td>
<td>temperature; thoracic</td>
</tr>
<tr>
<td>T₃</td>
<td>iodothyronine</td>
</tr>
<tr>
<td>T₄</td>
<td>thyroxine</td>
</tr>
<tr>
<td>T &amp; A</td>
<td>tonsillectomy and adenoidectomy</td>
</tr>
</tbody>
</table>
tab  tablet
TAH  total abdominal hysterectomy
TB  tuberculosis
TBSA  total body surface area
TEE  transeosophageal echocardiography
TEF  transeosophageal fistula
TENS  transcutaneous electrical nerve stimulation
THA  total hip arthroplasty
THR  total hip replacement
TIA  transient ischemic attack
TIBC  total iron binding capacity
tid  three times a day
tin  three times a night	
tinct  tincture
TKA  total knee arthroplasty
TKR  total knee replacement
TMJ  temporomandibular joint
TOF  train of four; Tetrology of Fallot
TP  total protein
TPN  total parenteral nutrition
TPR  temperature, pulse, respiration
TR  tricuspid (valve) regurgitation
TSH  thyroid stimulating hormone
TUNA  transurethral needle ablation
TURB  transurethral resection of the bladder
TURP  transurethral resection of prostate
TVH  total vaginal hysterectomy
Tx  treatment
T & X  type and crossmatch

U

U  unit
UA  urinalysis
UCG  urinary chorionic gonadotropins
UE  upper extremity
UGI  upper gastrointestinal
ung  ointment
UO  urine output
URI  upper respiratory infection
U/S  ultrasound
UTI  urinary tract infection
UUN  urine, urea, nitrogen
V

v volt
V_T tidal volume
VAE venous air embolism
VATS video assisted thoracoscopic surgery
VC vital capacity
VCU voiding cystourethrogram
VD venereal disease
V_D volume of distribution
V_D/V_T dead space-to-tidal volume ratio
VDRL venereal disease research lab (lab report)
VHD valvular heart disease
VLBW very low birth weight
VLDL very low density lipoprotein
VMA vanillylmandelic acid
vol. volume
Vol% volumes percent
V.O. verbal order
V-P ventricular-peritoneal
V/Q ventilation-perfusion ratio
VS vital signs
VSD ventricular septal defect
VSS vital signs stable
V-Tach ventricular tachycardia

W

WBC white blood cells
w.d./WD well developed
WF white female
wk week
WM white male
WMA wall motion abnormality
W.N. well nourished
WNL within normal limits
WPW Wolff-Parkinson-White (syndrome)
wt. weight
w/u work up

X, Y, & Z

x times
<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>X-match</td>
<td>cross match</td>
</tr>
<tr>
<td>XR</td>
<td>X-ray</td>
</tr>
<tr>
<td>yo</td>
<td>year(s) old</td>
</tr>
<tr>
<td>Zn</td>
<td>zinc</td>
</tr>
</tbody>
</table>
SYMBOLS

≈  approximately
@  at
Δ  change
√  check
↓  decrease, deficiency, depressed, diminished, inferior (position), degree
°  divided by; per
equals
↑  increase, elevated, enlarged, rising, superior (position), upper
-  negative
#  number or pounds
Ø  none, nothing
1°  primary
2°  secondary
3°  tertiary
c  with
s  without
p  after
.  decimal [Never use trailing zero (1.0mg) or leading decimal (.1mg)]
Medical Jargon

A-line (n.)
Refers to the words “arterial line” which is a catheter inserted into an artery usually to monitor pressure and waveforms.

Ex. "He has an a-line in his right radial artery."

Amnio (n.)
This is a shortening of the word “amniocentesis” where the obstetrician samples the amniotic fluid though the abdominal wall with a biopsy needle.

Ex. “her amnio was negative.”

Bili (n.)
A shortening of the word “bilirubin” which is a yellow bile pigment resulting from the breakdown of hemoglobin.

Ex. “This patient’s total bili is up.”

Blue 100 (n.) (variants; Code Blue, Dr. Blue)
Ex. “Blue 100, emergency room, Blue 100, emergency room, Blue 100, emergency room”

A general hospital announcement to all medical staff that there is a life threatening medical emergency and usually involves cardiac resuscitation. The hospital operator repeats the phrase three times and location of the emergency. Every hospital has its own term for this situation.

bleeder (n.)
Usually refers to an arteriole that has been severed and is pumping blood into the surgical site.

Ex. “Nurse, can you hand me a stitch, I have a small bleeder here.”

blower (n.)
Refers to a ventilator.

Ex. “After we intubate the patient let’s put him on the blower.”

Can also refer to a carbon dioxide blowing instrument used in cardiac surgery.

Ex. “Turn the blower on so I can get rid of some of this blood.”
bovie (n.)
Refers to any electrocautery device used in the operating room to cauterize wounds to staunch bleeding or oozing from capillaries or arterioles. The Bovie machines were the first widely available commercial electrocautery devices.

Ex. “Nurse can you hand me the bovie, I have some bleeding here.”

break (v.)
The process of relieving an acute symptom that is continuous.

Ex. “The patient has a laryngospasm, so I’m applying some positive pressure to break the spasm.”

bug juice (n.)
Refers to antibiotic solution.

Ex. “I need some bug juice to rinse out this wound.”

cabbage (n.)

Ex. “This patient had a cabbage done 4 years ago.”
A play on phonetic structure of “CABG” which is the abbreviation for coronary artery bypass graft.

cat scan (n.)
Refers to the radiologic technique known as Computerized Axial Tomography.

Ex. “The patient has to go for a CAT scan first before they come down to the operating room.”

clamp (n., v.)
Refers to a surgical instrument shaped like scissors, however used to compress a blood vessel or other anatomic structure. Common example of such an instrument is a “hemostat”

Ex. (n.) “Nurse give me a clamp, I have a bleeder.” (v.) “I’m going to clamp the aorta.”

close (v.)
The act of closing the wound with suture or staples.

Ex. “We’re almost done. We’ll close in about 10 min.”

code (n., v.)

Ex. (n.) “There is a code in progress down the hall. (v.) If this patient’s blood pressure goes down he may code.” (adj.)
Refers to a medical emergency in which a designated team responds. Usually involves a cardiac resuscitation for cardiac arrest or irregular rhythm.

**Code Blue (n.)**

See “Blue 100”

**crit (n.)**

Refers to percentage of red blood cells per 100cc of whole blood sampled from the patient. The term is a shortening of the term hematocrit.

Ex. “The patient has lost 500cc of blood. Let’s get a crit.”

**Echo (n.)**

A shortened term for the word “echocardiogram” which is an ultrasonic evaluation of heart function.

Ex. “The patient’s echo showed damage to the left ventricle.”

**epi (n.)**

The term is a shortening of the term epinephrine.

Ex. The patient’s pressure is down. Give them 100 micrograms of epi.”

**foley (n.)**

A shortened phrase for Foley catheter. A tube that is inserted through the urethra to drain the bladder.

Ex. “The patient had a foley placed last night.”

**flouro (n. or v.)**

A shortened form of fluoroscope or flouroscopy. A form of continuous x-ray for diagnostic and procedural assistance.

Ex. “they are bringing in a flouro (n.) to see where the fracture is. They will flouro (v.) the leg in two places.”

**gas (n.)**

Refers to an arterial blood gas test.

Ex. “The patient’s lungs sound bad. Let’s get a gas and see what the oxygen level is in his blood.”
**glue (n.,v.)**

Refers to an adhesive, methylmethacrylate that is used primarily by orthopedic surgeons to fix artificial joints to the supporting bones. This bone(s) is usually the femur and/or tibia. Placement of this substance sometimes has vasoactive effects on the circulation.

   Ex. (n.) “We are putting the glue into the femoral shaft now.”
   Ex. (v.) “We are going to glue the artificial hip to the femur now.”

**K (n.)**

Refers to the serum electrolyte potassium whose chemical symbol is K.

   Ex. “The EKG waveform looks odd. Let’s draw some blood and see what the K is.”

**lido (n.)**

A shortening of the drug name lidocaine.

   Ex. “The patient has premature ventricular contractions. Give 100 mg. of lido.”

**lines (n.)**

Refers to tubing used in intravenous administration and monitoring sets or cables used with physiologic monitors.

   Ex. “Watch how you transfer the patient onto the bed. You may get her lines tangled.”

**lytes (n.)**

A shortening of the term electrolytes referring to compounds found in the blood serum.

   Ex. “This patient has renal disease. Make sure we get lytes on him before we induce anesthesia.”

**mayo (n.)**

Refers to an equipment stand used by scrub nurses to hold instruments that can be positioned over the patient.

   Ex. “I’m raising the OR table. Watch your mayo!”

**mics (n.)**

The word is pronounced “mikes.” This is a shortening of the word micrograms.

   Ex. “Give the patient 100 mics of neosynephrine.”
neo (n.)

Is a shortened form of neosynephrine.

   Ex. “Give the patient a 100 mics of neo.”

neuro (n.)

A shortening of the term neurosurgery and refers to that surgical specialty.

   Ex. “The neuro docs haven’t evaluated the spine yet.”

orthopods (n.)

Refers to orthopedic surgeons.

   Ex. “The orthopods want this patient positioned on his left side up.”

on/off the pump

Refers to a patient being place or taken off of an extracorporeal bypass machine that is used to bypass the heart and lungs during cardiac surgery.

   Ex. “We’ll be going on the pump in just a couple of minutes.”

penrose (n.)

Refers to a surgical item that is placed in wounds to drain them postoperatively. It is a tubelike device that is very pliable and usually made of latex. It is also used as a tourniquet when starting intravenous lines.

   Ex. “Is there a penrose on the cart? I need to start an i.v.”

plege solution (n.) pronounced “pleeg”

A solution used in cardiac bypass procedures, which is infused into the coronary arteries to disrupt the electrical activity of the heart and induce cardiac arrest. Administered by the perfusionist operating the bypass apparatus.

   Ex. “I have infused 200cc of plege solution and myocardial temperature is 32.1 °.”

relax (v., adv.)

Term that usually refers to paralyzing a patient temporarily by using drugs during an operation.

   Ex.(v.) “The surgeon is probably going to want us to relax the patient for this appendectomy.”
   Ex (adv.) “Use the twitch monitor to see if the patient is relaxed.”
road trip (n.)

Used to define anesthetic procedures done outside the operating room.

   Ex. “We’re going on a road trip to cardiac cath lab for an AICD evaluation.”

roc (n.)

Shortening of the drug rocuronium.

   Ex. “I just gave the patient 10 mg. of roc because the patient moved.”

rod (n., v.)

Used to describe any number of orthopedic devices that primarily are inserted into the shaft of the damaged bone.

   Ex. (n.) “We will use a rod to repair that fractured femur.”
   Ex. (v.) “We’ll be rodding this femur fracture.”

sat (n.)

Shortening of the term saturation used in blood gas analysis. Saturation refers to the percent of hemoglobin that has oxygen bound to the molecule.

   Ex. “The patient’s sat is only 91%. Let’s increase the oxygen going to the patient.”

scope (n.,v.)

This term has several meanings. It is a shortening of the drug name scopolamine. It also refers to any instrument that is used to visualize internal anatomy, such as, a laryngoscope. It is also used as a verb in defining an action that uses an instrument to visualize internal anatomy.

   Ex. (n.) “Give the patient .2 mg. of scope.”
   Ex. (n.) “Hand me the scope so I can intubate this patient.”
   Ex. (v) “I’m going to scope this patient first and see if we can intubate.”

squirt (v., n.)

Used by surgeons and other physicians that use vascular catheters. Typically a dye solution that is

   Ex. (v.) “I’m going to squirt the aorta now.”
   Ex. (n.) “The patient had a squirt that showed a cerebral aneurysm.”

squirter (n.)

A word used to indicate a laceration of a large arterial blood vessel that sends a pulsating stream of blood into the surgical field.

   Ex. (n.) “Nurse hand me a clamp. I have a squirter here.”
**stat (v.)**

An expression that means to do something immediately. Usually follows a request or order.

Ex. (v.) “Give the patient 100 mg. of succinylcholine. STAT!”

**stitch (n.,v.)**

Used to denote a surgical suture or the act of suturing.

Ex. (n.) “Don’t tie the stitch too tight or it will break.”
Ex. (v.) “Let’s get this wound stitched.”

**Sux (n.)**

A shortened form of a drug name succinylcholine.

Ex. (n.) “Give the patient 100 mg. of Sux.”

**Swan (n.,v.)**

A shortened form of the name of a monitoring cardiac catheter called a Swan-Ganz catheter. Also used as a verb to describe the insertion of the Swan-Ganz catheter.

Ex. (n.) “The patient came from the intensive care unit and has a Swan in place.”
Ex. (v.) “The surgeons are going to Swan the patient before they bring him to the OR.”

**wedge (n.,v.)**

A term used for the reading acquired from Swan-Ganz catheter after it is properly positioned in the pulmonary artery. It is a term used to describe the positioning of the Swan-Ganz catheter to obtain a reading.

Ex. (n.) “The patient’s wedge was 15.”
Ex. (v.) “The waveform indicates that we have a wedged catheter.”
## Dangerous Abbreviations

### Dangerous Abbreviations Or Dose Designations – Not Recommended

<table>
<thead>
<tr>
<th>Abbreviation /Dose Expression</th>
<th>Intended Meaning</th>
<th>Misinterpretation</th>
<th>Correction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apothecary symbols</td>
<td>dram minim</td>
<td>Misunderstood or misread (symbol for dram misread for “3” and minim misread as “mL”).</td>
<td>Use the metric system.</td>
</tr>
<tr>
<td>AU</td>
<td>aurio uterque (each ear)</td>
<td>Mistaken for OU (oculo uterque—each eye).</td>
<td>Don’t use this abbreviation.</td>
</tr>
<tr>
<td>D/C</td>
<td>discharge discontinue</td>
<td>Premature discontinuation of medications when D/C (intended to mean “discharge”) has been misinterpreted as “discontinued” when followed by a list of drugs.</td>
<td>Use “discharge” and “discontinue.”</td>
</tr>
<tr>
<td>Drug names</td>
<td></td>
<td></td>
<td>Use the complete spelling for drug names.</td>
</tr>
<tr>
<td>ARAºA</td>
<td>vidarabine</td>
<td>cytarabineARAºC</td>
<td></td>
</tr>
<tr>
<td>AZT</td>
<td>zidovudine (RETROVIR)</td>
<td>azathioprine</td>
<td></td>
</tr>
<tr>
<td>CPZ</td>
<td>COMPAZINE (prochlorperazine)</td>
<td>chlorpromazine</td>
<td></td>
</tr>
<tr>
<td>DPT</td>
<td>DEMEROL-PHENERGANTHORAZINE</td>
<td>diphtheria-pertussis-tetanus (vaccine)</td>
<td></td>
</tr>
<tr>
<td>HCl</td>
<td>hydrochloric acid</td>
<td>potassium chloride (The “H” is misinterpreted as “K.”)</td>
<td></td>
</tr>
<tr>
<td>HCT</td>
<td>hydrocortisone</td>
<td>hydrochlorothiazide</td>
<td></td>
</tr>
<tr>
<td>HCTZ</td>
<td>hydrochlorothiazide</td>
<td>hydrocortisone (seen as HCT250 mg)</td>
<td></td>
</tr>
<tr>
<td>MgSO4</td>
<td>magnesium sulfate</td>
<td>morphine sulfate</td>
<td></td>
</tr>
<tr>
<td>MSO4</td>
<td>morphine sulfate</td>
<td>magnesium sulfate</td>
<td></td>
</tr>
<tr>
<td>MTX</td>
<td>methotrexate</td>
<td>mitoxantrone</td>
<td></td>
</tr>
<tr>
<td>TAC</td>
<td>triamcinolone</td>
<td>tetracaine, ADRENALIN, cocaine</td>
<td></td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Correct Interpretation</td>
<td>Common Misinterpretation</td>
<td>Correct Advice</td>
</tr>
<tr>
<td>--------------</td>
<td>------------------------</td>
<td>--------------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>ZnSO₄</td>
<td>zinc sulfate</td>
<td>morphine sulfate</td>
<td></td>
</tr>
<tr>
<td>Stemmed names</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>“Nitro” drip</td>
<td>nitroglycerin infusion</td>
<td>sodium nitroprusside infusion</td>
<td></td>
</tr>
<tr>
<td>“Norflox”</td>
<td>norfloxacin</td>
<td>NORFLEX</td>
<td></td>
</tr>
<tr>
<td>m g</td>
<td>microgram</td>
<td>Mistaken for “mg” when handwritten.</td>
<td>Use “mcg.”</td>
</tr>
<tr>
<td>o.d. or OD</td>
<td>once daily</td>
<td>Misinterpreted as “right eye” (OD—oculus dexter) and administration of oral medications in the eye.</td>
<td>Use “daily.”</td>
</tr>
<tr>
<td>TIW or tiw</td>
<td>three times a week.</td>
<td>Mistaken as “three times a day.”</td>
<td>Don’t use this abbreviation.</td>
</tr>
<tr>
<td>per os</td>
<td>orally</td>
<td>The “os” can be mistaken for “left eye.”</td>
<td>Use “PO,” “by mouth,” or “orally.”</td>
</tr>
<tr>
<td>q.d. or QD</td>
<td>every day</td>
<td>Misinterpreted as q.i.d., especially if the period after the “q” or the tail of the “q” is misunderstood as an “i.”</td>
<td>Use “daily” or “every day.”</td>
</tr>
<tr>
<td>qn</td>
<td>nightly or at bedtime</td>
<td>Misinterpreted as “qh” (every hour).</td>
<td>Use “nightly.”</td>
</tr>
<tr>
<td>qhs</td>
<td>nightly at bedtime</td>
<td>Misread as every hour.</td>
<td>Use “nightly.”</td>
</tr>
<tr>
<td>q6PM, etc.</td>
<td>every evening at 6 PM</td>
<td>Misread as every six hours.</td>
<td>Use 6 PM “nightly.”</td>
</tr>
<tr>
<td>q.o.d. or QOD</td>
<td>every other day</td>
<td>Misinterpreted as “q.d.” (daily) or “q.i.d. (four times daily) if the “o” is poorly written.</td>
<td>Use “every other day.”</td>
</tr>
<tr>
<td>sub q</td>
<td>subcutaneous</td>
<td>The “q” has been mistaken for “every” (e.g., one heparin dose ordered “sub q 2 hours before surgery” misunderstood as every 2 hours before surgery).</td>
<td>Use “subcut.” or write “subcutaneous.”</td>
</tr>
<tr>
<td>SC</td>
<td>subcutaneous</td>
<td>Misinterpreted for SL (sublingual).</td>
<td>Use “subcut.” or write “subcutaneous.”</td>
</tr>
<tr>
<td>U or u</td>
<td>unit</td>
<td>Read as a zero (0) or a four (4), causing a 10-fold overdose or greater (4U seen as “40” or 4u seen as 44”).</td>
<td>“Unit” has no acceptable abbreviation. Use “unit.”</td>
</tr>
<tr>
<td>IU</td>
<td>international unit</td>
<td>Misread as IV (intravenous).</td>
<td>Use “units.”</td>
</tr>
<tr>
<td>cc</td>
<td>cubic centimeters</td>
<td>Misread as “U” (units).</td>
<td>Use “mL.”</td>
</tr>
<tr>
<td>x3d</td>
<td>for three days</td>
<td>Mistaken for “three doses.”</td>
<td>Use “for three days.”</td>
</tr>
<tr>
<td>BT</td>
<td>bedtime</td>
<td>Mistaken as “BID” (twice daily).</td>
<td>Use “hs.”</td>
</tr>
<tr>
<td>ss</td>
<td>sliding scale</td>
<td>Mistaken for “55.”</td>
<td>Spell out “sliding”</td>
</tr>
<tr>
<td><strong>Insulin or ½ (apothecary)</strong></td>
<td><strong>&gt; and &lt;</strong> greater than and less than</td>
<td><strong>/ (slash mark)</strong> separates two doses or indicates “per”</td>
<td></td>
</tr>
<tr>
<td>--------------------------------</td>
<td>------------------------------------------</td>
<td>-------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Mistakenly used opposite of intended.</td>
<td>Use “greater than” or “less than.”</td>
<td>Do not use a slash mark to separate doses. Use “per.”</td>
<td></td>
</tr>
<tr>
<td><strong>Name letters and dose numbers run together</strong> (e.g., Inderal 40 mg)</td>
<td>Inderal 40 mg</td>
<td>Misread as Inderal 140 mg.</td>
<td></td>
</tr>
<tr>
<td>Misread as Inderal 140 mg.</td>
<td>Always use space between drug name, dose and unit of measure.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Zero after decimal point</strong> (1.0)</td>
<td>1 mg</td>
<td>Misread as 10 mg if the decimal point is not seen.</td>
<td></td>
</tr>
<tr>
<td>Misread as 10 mg if the decimal point is not seen.</td>
<td>Do not use terminal zeros for doses expressed in whole numbers.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>No zero before decimal dose</strong> (.5 mg)</td>
<td>0.5 mg</td>
<td>Misread as 5 mg.</td>
<td></td>
</tr>
<tr>
<td>Misread as 5 mg.</td>
<td>Always use zero before a decimal when the dose is less than a whole unit.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Anesthesia Apparatus Checkout Recommendations, 1993

This checkout, or a reasonable equivalent, should be conducted before administration of anesthesia. These recommendations are only valid for an anesthesia system that conforms to current and relevant standards and includes an ascending bellows ventilator and at least the following monitors: capnograph, pulse oximeter, oxygen analyzer, respiratory volume monitor (spirometer) and breathing system pressure monitor with high and low pressure alarms. This is a guideline which users are encouraged to modify to accommodate differences in equipment design and variations in local clinical practice. Such local modifications should have appropriate peer review. Users should refer to the operator’s manual for the manufacturer’s specific procedures and precautions, especially the manufacturer’s low pressure leak test (step #5).

Emergency Ventilation Equipment

*1. Verify Backup Ventilation Equipment Is Available & Functioning

High Pressure System

*2. Check Oxygen Cylinder Supply
   a. Open cylinder and verify at least half full (about 1000 psi).
   b. Close cylinder.

*3. Check Central Pipeline Supplies
   a. Check that hoses are connected and pipeline gauges read about 50 psi.

Low Pressure System

*4. Check Initial Status of Low Pressure System
   a. Close flow control valves and turn vaporizers off.
   b. Check fill level and tighten vaporizers’ filler caps.

*5. Perform Leak Check of Machine Low Pressure System
   a. Verify that the machine master switch and flow control valves are OFF.
   b. Attach "Suction Bulb" to common Fresh) gas outlet.
   c. Squeeze bulb repeatedly until fully collapsed.
   d. Verify bulb stays fully collapsed for at least 10 seconds.
   e. Open one vaporizer at a time and repeat ‘c’ and ‘d’ as above.
   f. Remove suction bulb, and reconnect fresh gas hose.

*6. Turn On Machine Master Switch
   and all other necessary electrical equipment.

*7. Test Flowmeters
   a. Adjust flow of all gases through their full range, checking for smooth operation of
      floats and undamaged flowtubes.
   b. Attempt to create a hypoxic O2/N2:0 mixture and verify correct changes in flow
      and/or alarm.

Scavenging System

*8. Adjust and Check Scavenging System
   a. Ensure proper connections between the scavenging system and both APL (pop-off)
      valve and ventilator relief valve.
   b. Adjust waste gas vacuum (if possible).
   c. Open APL valve and occlude Y-piece.
   d. Verify that absorber pressure gauge reads about zero.
   e. With the O2 flush activated allow the scavenger reservoir bag to distend fully, and
      then verify that absorber pressure gauge reads < 10 cm H2O.

Breathing System

*9. Calibrate O2 Monitor
   a. Ensure monitor reads 21% in room air.
   b. Verify low O2 alarm is enabled and functioning.
   c. Reinstall sensor in circuit and flush breathing system with O2.
   d. Verify that monitor now reads greater than 90%.

10. Check Initial Status of Breathing System
   a. Set selector switch to "Bag" mode.
   b. Check that breathing circuit is complete, undamaged and unobstructed.
   c. Verify that C02 absorbent is adequate.
   d. Install breathing circuit accessory equipment (e.g. humidifier, PEEP valve) to be used
      during the case.

11. Perform Leak Check of the Breathing System
   a. Set all gas flows to zero (or minimum).
   b. Close APL (pop-off) valve and occlude Y-piece.
   c. Pressurize breathing system to about 30 cm H2O with 02 flush.
   d. Ensure that pressure remains fixed for at least 10 seconds.
   e. Open APL (Pop-off) valve and ensure that pressure decreases.

12. Test Ventilation Systems and Unidirectional Valves
   a. Place a second breathing bag on Y-piece.
   b. Set appropriate ventilator parameters for next patient.
   c. Switch to automatic ventilation (Ventilator) mode.
   d. Fill bellows and breathing bag with O2 flush and then turn ventilator ON.
   e. Set O2 flow to minimum, other gas flows to zero.
   f. Verify that during inspiration bellows delivers appropriate tidal volume and that during
      expiration bellows fills completely.
   g. Set fresh gas flow to about 5 L/min.
   h. Verify that the ventilator bellows and simulated lungs fill and empty appropriately
      without sustained pressure at end expiration.
   i. Check for proper action of unidirectional valves.
   j. Exercise breathing circuit accessories to ensure proper function.
   k. Turn ventilator OFF and switch to manual ventilation (Bag/APL) mode.
   l. Ventilate manually and assure inflation and deflation of artificial lungs and appropriate
      feel of system resistance and compliance.
   m. Remove second breathing bag from Y-piece.

Monitors

13. Check, Calibrate and/or Set Alarm Limits of all Monitors
   Capnometer    Pulse Oximeter
   Oxygen Analyzer    Respiratory Volume Monitor (Spirometer)
   Pressure Monitor with High and Low Airway Alarms

Final Position

14. Check Final Status of Machine
   a. Vaporizers OFF    d. All flowmeters to zero
   b. APL valve open    e. Patient suction level adequate
   c. Selector switch to "Bag"    f. Breathing system ready to use

* If an anesthesia provider uses the same machine in successive cases, these steps need not be
  repeated or may be abbreviated after the initial checkout.
Anesthesia care providers must follow an OR setup protocol which is consistent for all clinical cases. Consistent setups minimize the potential for errors in practice. Every hospital follows a protocol which is unique to that institution. However, there are standards for setup which this program requires its students to uphold. The following protocol is consistent with the accepted standard of care for the majority of the hospitals that you will be rotating with. This protocol WILL be followed by ALL students at ALL rotations and may only be altered if the deviation is discussed with the anesthesia team members prior to actual room setup.

I. Tabletop - The following items should be present on the anesthesia machine tabletop for ALL cases (general anesthesia or MAC) unless specified otherwise.

A. Airway Equipment

1. an appropriately sized and functional laryngoscope blade and handle
2. one (1) appropriately sized endotracheal (ETT) tube with cuff checked for patency
   a. a stylet inserted into the ETT
   b. two (2) ETTs (one size below and one size above the chosen size) in the top drawer of the anesthesia machine (formula for pediatric OETT sizes==>[age(y) + 16]/4)
3. a tongue depressor
4. two (2) appropriately sized oral airways

B. Pharmaceuticals

1. Emergency Drugs
   a. syringe labeled atropine, with drug drawn up
      i. 1cc syringe for a patient under 1 year of age
      ii. 3 cc syringe for a patient over 1 year of age
   b. syringe labeled succinylcholine, with drug drawn up
      i. 1cc syringe for a patient under 1 year of age
      ii. 3 cc syringe for a patient over 1 year of age but under 12 years of age
      iii. 10 cc syringe for a patient over 12 years of age
   c. one type of vasopressor drawn up (i.e. Phenylephrine, ephedrine)
   d. one 5cc syringe of 2% lidocaine

2. Induction Agents
   a. one (1) syringe of 1% propofol on table top
      i. one (20) cc syringe for patients over age 5 years
      ii. five (5) cc syringe for patients under age 5 years
3. Maintenance Agents
   a. a vial of a **non-depolarizing muscle relaxant** (i.e. rocuronium, vecuronium, cis-atracurium, etc.) with labeled syringe **on tabletop but not drawn up** unless confirmed by staff
   b. a labeled syringe for **midazolam**
   c. a labeled syringe for a **narcotic** (fentanyl, sufentanil, etc.)

II. The Anesthesia Machine - The following items on the machine should be checked prior to the first case of the day and prior to each subsequent case when appropriate.

   A. The availability and integrity of patient suction must be verified.
   B. Check **O_2 cylinder** supply.
   C. Check **O_2 pipeline** supply.
   D. Check **vaporizer** fill level.
   E. Calibrate **O_2 monitor** sensor to room air.
   F. Check **flowmeters**.
   G. Install and check the integrity of an appropriately sized **breathing circuit**.
   H. Place an appropriately sized **mask** on the circuit.
   I. Verify that the **CO_2 absorber** (Baralime) is adequate.
   J. Verify the integrity of the **APL (pop-off) valve** and the **scavenging system**.
   K. Test the integrity of the **ventilator**.
   L. Test the integrity of **monitors** (capnograph, pulse oximeter, ECG, temperature probe, etc.) and position probes and leads for quick placement on the patient.
   
   1. The use of a **precordial stethoscope** is an accepted standard of care and it should be used at all times for **intraoperative monitoring and transport to PACU** unless specifically directed otherwise by a member of the team.

III. Intravenous Therapy - The following items should be setup in the OR prior to the start of each case.

   A. Intravenous Fluid
      1. **Lactated Ringers** for most healthy patients
      2. **0.9% saline** (normal saline) or **5% dextrose in water** (D5W) for renal failure patients
      3. fluid choice for neonates as per attending anesthesiologist's request
B. Tubing Setup
1. 60 drop/cc (minidrip) setup for patients under ten (10) years of age
2. 10 drop/cc (maxidrip) setup for patients over ten (10) years of age
3. stopcock in-line if a moderate chance of blood transfusion exists
4. anesthesia extension set if using stopcock or if IV site is not easily accessible
5. the fluid should be completely flushed through the tubing

C. Supply Bin
1. A bin containing the following items should be stocked and in the room prior to the start of each case:
   a. at least two (2) of each appropriately sized IV catheters
   b. 1% lidocaine in a one (1) or a three (3) cc syringe and a 26 g or smaller needle for local infiltration
   c. 4" x 4" gauze sponges for clean up
   d. tape
   e. alcohol wipes
   f. 18 g needles for skin hole
   g. tourniquet

   The above list is considered standard and it should be followed exactly unless a change has been discussed with the anesthesia team members. Unauthorized deviation from this protocol will be considered unacceptable and will be managed accordingly.
CONSENT FOR ANESTHESIA SERVICES

I, __________________________, acknowledge that my doctor has explained to me that I will have an operation, diagnostic or treatment procedure. My doctor has explained the risks of the procedure, advised me of alternative treatments and told me about the expected outcome and what could happen if my condition remains untreated. I also understand that anesthesia services are needed so that my doctor can perform the operation or procedure.

It has been explained to me that all forms of anesthesia involve some risks and no guarantees or promises can be made concerning the results of my procedure or treatment. Although rare, unexpected severe complications with anesthesia can occur and include the remote possibility of infection, bleeding, drug reactions, blood clots, loss of sensation, loss of limb function, paralysis, stroke, brain damage, heart attack or death. I understand that these risks apply to all forms of anesthesia and that additional or specific risks have been identified below as they may apply to a specific type of anesthesia. I understand that the type(s) of anesthesia service checked below will be used for my procedure and that the anesthetic technique to be used is determined by many factors including my physical condition, the type of procedure my doctor is to do, his/her preference, as well as my own desire. It has been explained to me that sometimes an anesthesia technique which involves the use of local anesthetics, with or without sedation, may not succeed completely and therefore another technique may have to be used including general anesthesia.

<table>
<thead>
<tr>
<th>Anesthesia Type</th>
<th>Expected Result</th>
<th>Technique</th>
<th>Risks</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Anesthesia</td>
<td>Total unconscious state, possible placement of a tube into the windpipe.</td>
<td>Drug injected into the bloodstream, breathed into the lungs, or by other routes.</td>
<td>Mouth or throat pain, hoarseness, injury to mouth or teeth, awareness under anesthesia, injury to blood vessels, aspiration, pneumonia.</td>
</tr>
<tr>
<td>Spinal or Epidural Analgesia/Anesthesia</td>
<td>Temporary decreased or loss of feeling and/or movement to lower part of the body.</td>
<td>Drug injected through a needle/catheter placed either directly into the spinal canal or immediately outside the spinal canal.</td>
<td>Headache, backache, buzzing in the ears, convulsions, infection, persistent weakness, numbness, residual pain, injury to blood vessels, &quot;total spinal&quot;.</td>
</tr>
<tr>
<td>Major / Minor Nerve Block</td>
<td>Temporary loss of feeling and/or movement of a specific limb or area.</td>
<td>Drug injected near nerves providing loss of sensation to the area of the operation.</td>
<td>Infection, convulsions, weakness, persistent numbness, residual pain, injury to blood vessels.</td>
</tr>
<tr>
<td>Intravenous Regional Anesthesia</td>
<td>Temporary loss of feeling and/or movement of a limb.</td>
<td>Drug injected into veins of arm or leg while using a tourniquet.</td>
<td>Infection, convulsions, persistent numbness, residual pain, injury to blood vessels.</td>
</tr>
<tr>
<td>Monitored Anesthesia Care (with sedation)</td>
<td>Reduced anxiety and pain, partial or total amnesia.</td>
<td>Drug injected into the bloodstream, breathed into the lungs, or by other routes producing a semi-conscious state.</td>
<td>An unconscious state, depressed breathing, injury to blood vessels.</td>
</tr>
<tr>
<td>Monitored Anesthesia Care (without sedation)</td>
<td>Measurement of vital signs, availability of anesthesia provider for further intervention.</td>
<td>None.</td>
<td>Increased awareness, anxiety and/or discomfort.</td>
</tr>
</tbody>
</table>

I hereby consent to the anesthesia service checked above and authorize that it be administered by __________________________ or his/her associates, all of whom are credentialed to provide anesthesia services at this health facility. I also consent to an alternative type of anesthesia, if necessary, as deemed appropriate by them. I expressly desire the following considerations be observed (or write "none"):

I certify and acknowledge that I have read this form or had it read to me, that I understand the risks, alternatives and expected results of the anesthesia service and that I had ample time to ask questions and to consider my decision.

Patient Identification

Patient's Signature: __________________________

Date and Time: __________________________

Relationship to Patient: __________________________

Witness: __________________________

Developed by the American Association of Nurse Anesthetists - 1991
INSTRUCTIONS

Part 1 of this form lets you name another individual as agent to make health care decisions for you if you become incapable of making your own decisions, or if you want someone else to make those decisions for you now even though you are still capable. You may also name an alternate agent to act for you if your first choice is not willing, able, or reasonably available to make decisions for you.

Your agent may not be an operator or employee of a community care facility or a residential care facility where you are receiving care, or your supervising health care provider or an employee of the health care institution where you are receiving care, unless your agent is related to you or is a coworker.

Unless you state otherwise in this form, your agent will have the right to:

1. Consent or refuse consent to any care, treatment, service, or procedure to maintain, diagnose, or otherwise affect a physical or mental condition.
2. Select or discharge health care providers and institutions.
3. Approve or disapprove diagnostic tests, surgical procedures, and programs of medication.
4. Direct the provision, withholding, or withdrawal of artificial nutrition and hydration and all other forms of health care, including cardiopulmonary resuscitation.
5. Donate organs or tissues, authorize an autopsy, and direct disposition of remains.

However, your agent will not be able to commit you to a mental health facility, or consent to convulsive treatment, psychosurgery, sterilization or abortion for you.

Part 2 of this form lets you give specific instructions about any aspect of your health care, whether or not you appoint an agent. Choices are provided for you to express your wishes regarding the provision, withholding, or withdrawal of treatment to keep you alive, as well as the provision of pain relief. You also can add to the choices you have made or write down any additional wishes. If you are satisfied to allow your agent to determine what is best for you in making end-of-life decisions, you need not fill out Part 2 of this form.

Give a copy of the signed and completed form to your physician, to any other health care providers you may have, to any health care institution at which you are receiving care, and to any health care agents you have named. You should talk to the person you have named as agent to make sure that he or she understands your wishes and is willing to take the responsibility.

>You have the right to revoke this advance health care directive or replace this form at any time.
**PART 1 – POWER OF ATTORNEY FOR HEALTH CARE**

**DESIGNATION OF AGENT:** I designate the following individual as my agent to make health care decisions for me:

Name of individual you choose as agent: ________________________________

Address: ____________________________________________________________

Telephone: __________________________________________________________

( home phone ) ( work phone ) ( cell/pager )

OPTIONAL: If I revoke my agent’s authority or if my agent is not willing, able, or reasonably available to make a health care decision for me, I designate as my first alternate agent:

Name of individual you choose as first alternate agent: __________________

Address: ____________________________________________________________

Telephone: __________________________________________________________

( home phone ) ( work phone ) ( cell/pager )

OPTIONAL: If I revoke the authority of my agent and first alternate agent or if neither is willing, able, or reasonably available to make a health care decision for me, I designate as my second alternate agent:

Name of individual you choose as second alternate agent: __________________

Address: ____________________________________________________________

Telephone: __________________________________________________________

( home phone ) ( work phone ) ( cell/pager )

**AGENT’S AUTHORITY:** My agent is authorized to make all health care decisions for me, including decisions to provide, withhold, or withdraw artificial nutrition and hydration and all other forms of health care to keep me alive, except as I state here:

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________

(Add additional sheets if needed.)
WHEN AGENT’S AUTHORITY BECOMES EFFECTIVE: My agent’s authority becomes effective when my primary physician determines that I am unable to make my own health care decisions. 

(Initial here) 

OR

My agent’s authority to make health care decisions for me takes effect immediately. 

(Initial here) 

AGENT’S OBLIGATION: My agent shall make health care decisions for me in accordance with this power of attorney for health care, any instructions I give in Part 2 of this form, and my other wishes to the extent known to my agent. To the extent my wishes are unknown, my agent shall make health care decisions for me in accordance with what my agent determines to be in my best interest. In determining my best interest, my agent shall consider my personal values to the extent known to my agent.

AGENT’S POSTDEATH AUTHORITY: My agent is authorized to make anatomical gifts, authorize an autopsy and direct disposition of my remains, except as I state here or in Part 3 of this form:

(Add additional sheets if needed.)

NOMINATION OF CONSERVATOR: If a conservator of my person needs to be appointed for me by a court, I nominate the agent designated in this form. If that agent is not willing, able or reasonably available to act as conservator, I nominate the alternate agents whom I have named, in the order designated.

PART 2 – INSTRUCTIONS FOR HEALTH CARE

If you fill out this part of the form, you may strike any wording you do not want.

END-OF-LIFE DECISIONS: I direct that my health care providers and others involved in my care provide, withhold, or withdraw treatment in accordance with the choice I have marked below:

Choice Not To Prolong Life:

I do not want my life to be prolonged if (1) I have an incurable and irreversible condition that will result in my death within a relatively short time, (2) I become unconscious and, to a reasonable degree of medical certainty, I will not regain consciousness, or (3) the likely risks and burdens of treatment would outweigh the expected benefits,

(Initial here)

OR

Choice To Prolong Life:

I want my life to be prolonged as long as possible within the limits of generally accepted health care standards.

(Initial here)
RELIEF FROM PAIN: Except as I state in the following space, I direct that treatment for alleviation of pain or discomfort be provided at all times, even if it hastens my death:

(Add additional sheets if needed.)

OTHER WISHES: (If you do not agree with any of the optional choices above and wish to write your own, or if you wish to add to the instructions you have given above, you may do so here.) I direct that:

(Add additional sheets if needed.)

PART 3 – DONATION OF ORGANS AT DEATH (OPTIONAL)

I. Upon my death:

I give any needed organs, tissues, or parts  

(Initial here)  

OR

I give the following organs, tissues, or parts only:  

(Initial here)

II. If you wish to donate organs, tissues, or parts, you must complete II and III.

My gift is for the following purposes:

Transplant  

(Initial here)  

Research  

(Initial here)

Therapy  

(Initial here)  

Education  

(Initial here)

III. I understand that tissue banks work with both nonprofit and for-profit tissue processors and distributors. It is possible that donated skin may be used for cosmetic or reconstructive surgery purposes. It is possible that donated tissue may be used for transplants outside of the United States.

1. My donated skin may be used for cosmetic surgery purposes.

Yes  

(Initial here)  

No  

(Initial here)

2. My donated tissue may be used for applications outside of the United States.

Yes  

(Initial here)  

No  

(Initial here)
3. My donated tissue may be used by for-profit tissue processors and distributors:

Yes __________ No __________

(Initial here)  (Initial here)

(Health and Safety Code Section 7158.3)

PART 4 – PRIMARY PHYSICIAN (OPTIONAL)

I designate the following physician as my primary physician:

Name of Physician: __________________________ Telephone: __________________________

Address: ________________________________________________________________

OPTIONAL: If the physician I have designated above is not willing, able, or reasonably available to act as my primary physician, I designate the following physician as my primary physician:

Name of Physician: __________________________ Telephone: __________________________

Address: ________________________________________________________________

PART 5 – SIGNATURE

The form must be signed by you and by two qualified witnesses, or acknowledged before a notary public.

SIGNATURE: Sign and date the form here:

Date: __________________________

Name: __________________________

(sign your name) (print your name)

Address: ________________________________________________________________

STATEMENT OF WITNESSES: I declare under penalty of perjury under the laws of California (1) that the individual who signed or acknowledged this advance health care directive is personally known to me, or that the individual’s identity was proven to me by convincing evidence (2) that the individual signed or acknowledged this advance directive in my presence, 3) that the individual appears to be of sound mind and under no duress, fraud, or undue influence, (4) that I am not a person appointed as agent by this advance directive, and (5) that I am not the individual’s health care provider, an employee of the individual's health care provider, the operator of a community care facility, an employee of an operator of a community care facility,
the operator of a residential care facility for the elderly, nor an employee of an operator of a residential care facility for the elderly.

**FIRST WITNESS**

Name: __________________________ Telephone: __________________________

Address: __________________________________________________________

_______________________________________________________________

Signature of Witness: __________________________ Date: __________________________

**SECOND WITNESS**

Name: __________________________ Telephone: __________________________

Address: __________________________________________________________

_______________________________________________________________

Signature of Witness: __________________________ Date: __________________________

**ADDITIONAL STATEMENT OF WITNESSES:** At least one of the above witnesses must also sign the following declaration:

I further declare under penalty of perjury under the laws of California that I am not related to the individual executing this advance health care directive by blood, marriage, or adoption, and to the best of my knowledge, I am not entitled to any part of the individual's estate upon his or her death under a will now existing or by operation of law.

Signature of Witness: __________________________
YOU MAY USE THIS CERTIFICATE OF ACKNOWLEDGMENT BEFORE A NOTARY PUBLIC INSTEAD OF THE STATEMENT OF WITNESSES.

State of California

County of ____________________________________________

On (date) ______________________ before me, (here insert name and title of the officer) __________

____________________________________________________________________________

personally appeared (name(s) of signer(s)) ____________________________________________,

personally known to me (or proved to me on the basis of satisfactory evidence) to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

WITNESS my hand and official seal. [Civil Code Section 1189]

Signature of Notary: ________________________________ (Seal)

PART 6—SPECIAL WITNESS REQUIREMENT

If you are a patient in a skilled nursing facility, the patient advocate or ombudsman must sign the following statement:

STATEMENT OF PATIENT ADVOCATE OR OMBUDSMAN

I declare under penalty of perjury under the laws of California that I am a patient advocate or ombudsman as designated by the State Department of Aging and that I am serving as a witness as required by Section 4675 of the Probate Code.

Date: ____________________________________________

Name: ____________________________________________

(sign your name) ________________________________

(print your name) ________________________________

Address: _________________________________________

________________________________________________
DIRECTIVA POR ANTICIPADO DE LA ATENCIÓN DE LA SALUD

INSTRUCCIONES

La Sección 1 de este formulario le permite nombrar a otro individuo como representante para que tome las decisiones de atención de la salud por usted en caso que llegue a ser incapaz de tomar sus propias decisiones o si usted quiere que alguien más tome esas decisiones por usted ahora aunque todavía siga siendo capaz. También puede nombrar a un representante suplente que actúe por usted si su primera elección no está dispuesta, no es capaz o no está razonablemente accesible para tomar decisiones por usted.

Su representante no puede ser un operador o empleado de un establecimiento de atención comunitaria y un establecimiento de atención residencial donde lo estén atendiendo, ni su proveedor de atención de la salud encargado de la supervisión o un empleado de la institución de atención de la salud donde usted esté recibiendo la misma, a menos que su representante esté emparentado con usted o sea compañero de trabajo.

A menos que indique lo contrario en este formulario, su representante tendrá el derecho de:

1. Prestar o negar el consentimiento a cualquier atención, tratamiento, servicio o procedimiento para mantener, diagnosticar o afectar de otro modo una enfermedad física o mental.
2. Seleccionar o rechazar proveedores e instituciones de atención de la salud.
3. Aprobar o desaprobar pruebas diagnósticas, procedimientos quirúrgicos y programas de medicamentos.
4. Dirigir el proveimiento, la negación o la retirada de nutrición e hidratación artificial y todas las demás formas de atención de la salud, incluyendo resucitación cardiopulmonar.
5. Donar órganos o tejidos, autorizar una autopsia y ordenar la disposición final de los restos.

Sin embargo, su representante no podrá internarlo en un establecimiento psiquiátrico ni dar su consentimiento para que usted sea sometido a tratamiento convulsivo, psicocirugía, esterilización o aborto.

La Sección 2 de este formulario le permite dar instrucciones específicas acerca de cualquier aspecto de su atención de la salud, ya sea que usted nombre un representante o no. Se proporcionan opciones para que usted exprese sus deseos acerca del proveimiento, la negación o la retirada del tratamiento para mantenerlo vivo, así como el proveimiento de alivio del dolor. También se proporciona espacio para que usted aumente las opciones que haya hecho o que anote cualesquier deseos adicionales. Si está conforme con dejar que su representante determine lo que sea mejor para usted al tomar decisiones relacionadas con el final de la vida, no es necesario que llene la Parte 2 de este formulario.

Entréguelas copias del formulario firmado y debidamente llenado a su médico, a cualesquier otros proveedores de atención de la salud que pueda tener, a cualquier institución de atención de la salud en la que lo estén atendiendo y a todos los representantes de atención de la salud que haya nombrado. Deberá hablar con la persona que haya nombrado como representante para asegurar que él o ella entienda sus deseos y esté dispuesta a asumir la responsabilidad.
Usted tiene derecho a revocar esta directiva por anticipado de la atención de la salud o a reemplazar este formulario en cualquier momento.

**PARTE 1 – PODER NOTARIAL PARA ATENCIÓN DE LA SALUD**

**DESIGNACIÓN DEL REPRESENTANTE:** Designo al siguiente individuo como mi representante para que tome las decisiones de atención de la salud por mí:

Nombre del individuo que usted elija como representante ____________________________

Dirección: ______________________________________________________________________

Teléfono: ______________________________________________________________________

( en casa) (teléfono en el trabajo) teléfono celular / localizador

OPCIONAL: Si revoco la autoridad de mi representante o si mi representante no está dispuesto, no es capaz o no está razonablemente accesible para tomar una decisión de atención de la salud por mí, designo como mi primer representante suplente a:

Nombre de la persona que usted elige como primera alternativa: ____________________________

Dirección: ______________________________________________________________________

Teléfono: ______________________________________________________________________

( en casa) (teléfono en el trabajo) teléfono celular / localizador

OPCIONAL: Si revoco la autoridad de mi representante y mi primer representante suplente o si ninguno de los dos está dispuesto, es capaz o está razonablemente accesible para tomar una decisión de atención de la salud por mí, designo como mi segundo representante suplente a:

Nombre del individuo que usted elija como su segundo representante suplente ____________________________

Dirección: ______________________________________________________________________

Teléfono: ______________________________________________________________________

( en casa) (teléfono en el trabajo) teléfono celular / localizador

**AUTORIDAD DEL REPRESENTANTE:** Mi representante está autorizado para tomar todas las decisiones de atención de la salud por mí, incluyendo las decisiones para proveer, negar o retirar la nutrición e hidratación artificial y todas las demás formas de atención de la salud para mantenerme vivo, excepto como lo consigno aquí:

______________________________________________________________________________

______________________________________________________________________________

(Si es necesario, agregue hojas adicionales.)
CUÁNDO ENTRA EN VIGENCIA LA AUTORIDAD DEL REPRESENTANTE: La autoridad de mi representante entra en vigencia cuando mi médico de atención primaria determine que soy incapaz de tomar mis propias decisiones de atención de la salud.

(Escriba sus iniciales aquí)

La autoridad de mi representante para tomar las decisiones de atención de la salud por mí entra en vigor inmediatamente.

(Obrigación del representante)

OBLIGACIÓN DEL REPRESENTANTE: Mi representante tomará decisiones de atención de la salud por mí de acuerdo con este poder notarial para atención de la salud, todas las instrucciones que yo proporcione en la Parte 2 de este formulario y mis demás deseos en la medida conocida para mi representante. En la medida que mis deseos sean desconocidos, mi representante tomará decisiones de atención de la salud por mí de acuerdo con lo que mi representante determine que es en mi mejor interés. Para determinar mi mejor interés, mi representante deberá considerar mis valores personales en la medida conocida por el mismo.

AUTORIDAD DEL REPRESENTANTE DESPUÉS DE LA MUERTE: Mi representante está autorizado para hacer donaciones anatómicas, autorizar una autopsia y ordenar la disposición final de mis restos, excepto como yo lo consigno aquí o en la Parte 3 de este formulario:

(Si es necesario, agregue hojas adicionales.)

NOMBRAMIENTO DE CURADOR: Si algún tribunal necesita nombrar a un curador de mi persona, propongo al representante designado en este formulario. Si dicho representante no está dispuesto, no es capaz o no está razonablemente disponible para actuar como curador, propongo a los representantes suplentes que he nombrado, en el orden designado.

PARTE 2 – INSTRUCCIONES PARA LA ATENCIÓN DE LA SALUD

Si usted llena esta parte del formulario, podrá tachar cualquier texto que no quiera.

DECISIONES DEL FINAL DE LA VIDA: Ordeno que mis proveedores de atención de la salud y otros que participen en mi atención provean, nieguen o retiren el tratamiento de acuerdo con la elección que yo haya marcado abajo:

Elección de no prolongar la vida

(Inicial aquí) No quiero que mi vida sea prolongada si (1) tengo una enfermedad incurable e irreversible que resulte en mi muerte dentro de un periodo relativamente corto, (2) pierdo el conocimiento y, con un grado razonable de certidumbre médica, no lo recuperaré o (3) los riesgos y cargas probables del tratamiento serían más mayores que los beneficios previstos,

O

Elección de prolongar la vida

(Inicial aquí) Quiero que mi vida sea prolongada tanto como sea posible dentro de los límites de las normas de atención de la salud generalmente aceptadas.
ALIVIO DEL DOLOR: Excepto como lo consigno en el siguiente espacio, ordeno que se me proporcione en todo momento tratamiento para el alivio del dolor o las molestias, aunque acelere mi muerte:

(Si es necesario, agregue hojas adicionales).

OTROS DESEOS: (Si usted no está de acuerdo con alguna de las elecciones opcionales que aparecen arriba y desea anotar las suyas propias, o si desea aumentar las instrucciones que ha proporcionado arriba, puede hacerlo aquí). Ordeno que:

(Si es necesario, agregue hojas adicionales.)

PARTE 3 – DONACIÓN DE ÓRGANOS DESPUÉS DE LA MUERTE (OPCIONAL)

I. Después de mi muerte

Dono todos los órganos, tejidos o partes necesarios, 

(Escriba sus iniciales aquí)

O

Dono solamente los siguientes órganos, tejidos o partes. 

(Escriba sus iniciales aquí)

II. Si usted desea donar a órganos, tejidos o partes, usted debe completar II y III

Mi donación es para los siguientes propósitos (tache cualquiera de los siguientes que usted no desee):

<table>
<thead>
<tr>
<th>Trasplante</th>
<th>Investigación</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Escriba sus iniciales aquí)</td>
<td>(Escriba sus iniciales aquí)</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Terapia</th>
<th>Educación</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Escriba sus iniciales aquí)</td>
<td>(Escriba sus iniciales aquí)</td>
</tr>
</tbody>
</table>

III. Entiendo que los bancos de tejidos trabajan con procesadores y distribuidores de tejidos tanto con fines de lucro como sin fines de lucro. Es posible que la donación de piel se use para fines cosméticos o de cirugía reconstructiva. Es posible que la donación de tejido se use para trasplantes fuera de los Estados Unidos.

1. Mi donación de piel puede usarse con fines de cirugía cosmética.

   Sí
   No

   (Inicial aquí)  (Inicial aquí)

2. Mi donación de tejido puede usarse para aplicaciones fuera de los Estados Unidos.

   Sí
   No

   (Inicial aquí)  (Inicial aquí)
3. Mi donación de tejido puede ser usada por procesadores y distribuidores de tejidos con fines lucrativos:

<table>
<thead>
<tr>
<th>Sí</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Inicial aquí)</td>
<td>(Inicial aquí)</td>
</tr>
</tbody>
</table>

(Código de Salud y Seguridad, Sección 7158.3)

**PARTE 4 – MÉDICO DE ATENCIÓN PRIMARIA (OPCIONAL)**

Designo al siguiente como mi médico de atención primaria:

Nombre del Médico: __________________________ Teléfono: __________________________

Dirección: __________________________________

_______________________________

OPCIONAL: Si el médico que he designado no está dispuesto, no es capaz o no está razonablemente accesible para actuar como mi médico de atención primaria, designo al siguiente para que desempeñe este papel:

Nombre del Médico: __________________________ Teléfono: __________________________

Dirección: __________________________________

_______________________________

**PARTE 5 – FIRMA**

El formulario debe ser firmado por usted y dos testigos calificados o certificado ante un notario público.

**FIRMA:** Firme y ponga aquí la fecha en el formulario:

Fecha: __________________________

Nombre: __________________________

(ponga su firma) (escriba su nombre con letra de molde)

Dirección: __________________________________

_______________________________

**DECLARACIÓN DE LOS TESTIGOS:** Declaro bajo pena de perjurio conforme a las leyes de California (1) que el individuo que firmó o certificó esta directiva por anticipado de la atención de la salud es conocido personalmente para mí, o que la identidad del individuo me fue demostrada con evidencia convincente, (2) que el individuo firmó o certificó esta directiva por anticipado en mi presencia, (3) que el individuo parece encontrarse en buen estado mental y bajo ninguna presión, fraude o influencia indebida, (4) que no soy la persona designada como representante en esta directiva por anticipado y (5) que no soy el proveedor de atención de la salud del individuo,
un empleado del proveedor de atención de la salud del individuo, el operador de un establecimiento de atención comunitaria, un empleado de un operador de un establecimiento de atención comunitaria, el operador de un establecimiento de atención residencial para ancianos, ni un empleado de un operador de un establecimiento de atención residencial para personas de edad avanzada.

Nombre: ___________________________ Teléfono: ___________________________

Dirección:  __________________________________________________________________

Firma del testigo: ___________________________ Fecha: ______________

SEGUNDO TESTIGO

Nombre: ___________________________ Teléfono: ___________________________

Dirección:  __________________________________________________________________

Firma del testigo: ___________________________ Fecha: ______________

DECLARACIÓN ADICIONAL DE LOS TESTIGOS: Por lo menos uno de los testigos mencionados arriba también debe firmar la siguiente declaración:

Declaro además bajo pena de perjurio conforme a las leyes de California que no estoy emparentado por lazos sanguíneos, matrimonio o adopción con el individuo que formaliza esta directiva por anticipado de la atención de la salud, y que a mi leal saber y entender, no tengo derecho a parte alguna del caudal hereditario del individuo después de su muerte bajo un testamento actualmente existente o por ministerio de ley.

Firma del testigo: ___________________________
Usted puede usar este certificado de confirmación ante notario público en vez de la declaración de testigos.

State of California

County of ________________________________

On (date) __________________________ before me, (here insert name and title of the officer) ________

personally appeared (name(s) of signer(s)) ____________________________,

personally known to me (or proved to me on the basis of satisfactory evidence) to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

WITNESS my hand and official seal. [Civil Code Section 1189]

Signature of Notary: ____________________________ (Seal)

PARTE 6 – REQUERIMIENTO DE TESTIGO ESPECIAL

Si usted es paciente en un establecimiento con servicio de enfermería especializada, el abogado o defensor cívico del paciente debe firmar la siguiente declaración:

DECLARACIÓN DEL ABOGADO O DEFENSOR CÍVICO DEL PACIENTE

Declaro bajo pena de perjurio conforme a las leyes de California que soy abogado o defensor cívico del paciente designado por el Departamento de la Senectud del Estado y que estoy sirviendo como testigo como lo estipula la Sección 4675 del Código Testamentario.

Fecha: ______________________________

Nombre: ______________________________

(ponga su firma) (escriba su nombre con letra de molde)

Dirección: __________________________________________________________

_____________________________________________________________________
This declaration is made this __________ day of_______________________________________(month, year).

I, ____________________________________________________________________________, being of sound mind, willfully and voluntarily make known my desires that my moment of death shall not be artificially postponed.

If at any time I should have an incurable and irreversible injury, disease, or illness judged to be a terminal condition by my attending physician who has personally examined me and has determined that my death is imminent except for death delaying procedures, I direct that such procedures which would only prolong the dying process be withheld or withdrawn, and that I be permitted to die naturally with only the administration of medication, sustenance, or the performance of any medical procedure deemed necessary by my attending physician to provide me with comfort care.

In the absence of my ability to give directions regarding the use of such death delaying procedures, it is my intention that this declaration shall be honored by my family and physician as the final expression of my legal right to refuse medical or surgical treatment and accept the consequences from such refusal.

Signed __________________________________________________________________________________________

City, County and State of Residence ___________________________________________________________________

The declarant is personally known to me and I believe him or her to be of sound mind. I saw the declarant sign the declaration in my presence (or the declarant acknowledged in my presence that he or she had signed the declaration) and I signed the declaration as a witness in the presence of the declarant. I did not sign the declarant’s signature above for or at the direction of the declarant. At the date of this instrument, I am not entitled to any portion of the estate of the declarant according to the laws of intestate succession or, to the best of my knowledge and belief, under any will of declarant or other instrument taking effect at declarant’s death, or directly financially responsible for declarant’s medical care.

Witness __________________________________________________________________________________________

Witness __________________________________________________________________________________________
Disclosure Statement for Medical Power of Attorney
Advance Directives Act (see §166.163, Health and Safety Code)

This is an important legal document. Before signing this document, you should know these important facts:

Except to the extent you state otherwise, this document gives the person you name as your agent the authority to make any and all health care decisions for you in accordance with your wishes, including your religious and moral beliefs, when you are no longer capable of making them yourself. Because "health care" means any treatment, service or procedure to maintain, diagnose, or treat your physical or mental condition, your agent has the power to make a broad range of health care decisions for you. Your agent may consent, refuse to consent, or withdraw consent to medical treatment and may make decisions about withdrawing or withholding life-sustaining treatment. Your agent may not consent to voluntary inpatient mental health services, convulsive treatment, psychosurgery, or abortion. A physician must comply with your agent's instructions or allow you to be transferred to another physician.

Your agent's authority begins when your doctor certifies that you lack the competence to make health care decisions.

Your agent is obligated to follow your instructions when making decisions on your behalf. Unless you state otherwise, your agent has the same authority to make decisions about your health care as you would have had.

It is important that you discuss this document with your physician or other health care provider before you sign it to make sure that you understand the nature and range of decisions that may be made on your behalf. If you do not have a physician, you should talk with someone else who is knowledgeable about these issues and can answer your questions. You do not need a lawyer's assistance to complete this document, but if there is anything in this document that you do not understand, you should ask a lawyer to explain it to you.

The person you appoint as agent should be someone you know and trust. The person must be 18 years of age or older or a person under 18 years of age who has had the disabilities of minority removed. If you appoint your health or residential care provider (e.g., your physician or an employee of a home health agency, hospital, nursing home, or residential care home, other than a relative), that person has to choose between acting as your agent or as your health or residential care provider; the law does not permit a person to do both at the same time.

You should inform the person you appoint that you want the person to be your health care agent. You should discuss this document with your agent and your physician and give each a signed copy. You should indicate on the document itself the people and institutions who have signed copies. Your agent is not liable for health care decisions made in good faith on your behalf.
Even after you have signed this document, you have the right to make health care decisions for yourself as long as you are able to do so and treatment cannot be given to you or stopped over your objection. You have the right to revoke the authority granted to your agent by informing your agent or your health or residential care provider orally or in writing, by your execution of a subsequent medical power of attorney. Unless you state otherwise, your appointment of a spouse dissolves on divorce.

This document may not be changed or modified. If you want to make changes in the document, you must make an entirely new one.

You may wish to designate an alternate agent in the event that your agent is unwilling, unable, or ineligible to act as your agent. Any alternate agent you designate has the same authority to make health care decisions for you.

This Power of Attorney is not valid unless it is signed in the presence of two competent adult witnesses. The following persons may not act as ONE of the witnesses:

- the person you have designated as your agent.
- a person related to you by blood or marriage;
- a person entitled to any part of your estate after your death under a will or codicil executed by you or by operation of law;
- your attending physician;
- an employee of your attending physician;
- an employee of a health care facility in which you are a patient if the employee is providing direct patient care to you or is an officer, director, partner, or business office employee of a health care facility or of any parent organization of the health care facility; or
- a person who, at the time this power of attorney is executed, has a claim against any part of your estate after your death.
Medical Power Of Attorney
Advance Directives Act (see §166.164, Health and Safety Code)

Designation of Health Care Agent:

I, _______________________________ (insert your name) appoint:
Name: _______________________________
Address: __________________________________________ Phone: __________

______________________________ as my agent to make any and all health care decisions for me, except to the extent I state otherwise in this document. This medical power of attorney takes effect if I become unable to make my own health care decisions and this fact is certified in writing by my physician.

Limitations On The Decision Making Authority Of My Agent Are As Follows:

________________________________________________________________________

________________________________________________________________________

Designation of an Alternate Agent:
(You are not required to designate an alternate agent but you may do so. An alternate agent may make the same health care decisions as the designated agent if the designated agent is unable or unwilling to act as your agent. If the agent designated is your spouse, the designation is automatically revoked by law if your marriage is dissolved.)

If the person designated as my agent is unable or unwilling to make health care decisions for me, I designate the following person(s), to serve as my agent to make health care decisions for me as authorized by this document, who serve in the following order:

First Alternate Agent
Name: _______________________________
Address: __________________________________________ Phone: __________

Second Alternate Agent
Name: _______________________________
Address: __________________________________________ Phone: __________

The original of the document is kept at ____________________________

The following individuals or institutions have signed copies:

Name: _______________________________
Address: _______________________________

Name: _______________________________
Address: _______________________________

(continued on reverse)
Duration
I understand that this power of attorney exists indefinitely from the date I execute this document unless I establish a shorter time or revoke the power of attorney. If I am unable to make health care decisions for myself when this power of attorney expires, the authority I have granted my agent continues to exist until the time I become able to make health care decisions for myself.

(If Applicable) This power of attorney ends on the following date: ______________________

Prior Designations Revoked
I revoke any prior medical power of attorney.

Acknowledgement of Disclosure Statement
I have been provided with a disclosure statement explaining the effect of this document. I have read and understand the information contained in this disclosure statement.

(You Must Date and Sign This Power of Attorney)

I sign my name to this medical power of attorney on _____ day of _____________ (month, year) at ____________________________

(City and State)

___________________________________________
(Signature)

___________________________________________
(Print Name)

Statement of First Witness
I am not the person appointed as agent by this document. I am not related to the principal by blood or marriage. I would not be entitled to any portion of the principal's estate on the principal's death. I am not the attending physician of the principal or an employee of the attending physician. I have no claim against any portion of the principal's estate on the principal's death. Furthermore, if I am an employee of a health care facility in which the principal is a patient, I am not involved in providing direct patient care to the principal and am not an officer, director, partner, or business office employee of the health care facility or of any parent organization of the health care facility.

Signature: ______________________________________
Print Name: ______________________________________ Date: _______________
Address: _______________________________________

______________________________
Signature of Second Witness

Signature: ______________________________________
Print Name: ______________________________________ Date: _______________
Address: _______________________________________

version 10/25/99
### Allergies/Anesthesia

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<th>Allergies/Anesthesia</th>
<th>Status</th>
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### Meds/OTC/Herbal

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### Problem List

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### Problem List (Continued)

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### Problem List (Continued)

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</table>

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Medicine History & Physical

Developed by S.A. Irwin, Ph.D., 2001
**Patient Name:** ________________________________  
**History Number:** ____________________________

### Anesthesia / Surgical History
- **Have you donated your own blood for THIS operation?**
  - [ ] No  
  - [ ] Yes
- **Date of Last Menstrual Period:** __________________________ (date)
- **Previous back surgery**
- **May or Iodine or Seafood?**
  - [ ] Yes  
  - [ ] No
- **Have you ever had a spinal or epidural before?**
  - [ ] No  
  - [ ] Yes
- **Any other illness (specify):** ____________________________
- **Have you or the patient need help with either of the following:**
  - (Provide or bring a copy with you)
- **Where will you be staying the night before your operation/procedure?**
  - (name of person completing form) ______________________________________________________

### Medical History (continued)
- **Liver disease**
- **Hepatitis (yellow jaundice) When?**
  - ____________________________
- **Other joint diseases**

### Other Medical Conditions (continued from previous page)
- **Back Problems**
  - [ ] Neck  
  - [ ] Thoracic  
  - [ ] Low back
- **Neuromuscular Disease**
  - [ ] + HIV
- **Arthritis:**
  - [ ] Jaw  
  - [ ] Neck  
  - [ ] Other joints
- **Liver disease**
- **Hepatitis (yellow jaundice) When?**
  - ____________________________
- **Other disease?**

### Admissions Information
- **Are you allergic to any medicines?**
  - [ ] Yes  
  - [ ] No
- **Do you have an Advance Directive?**
  - [ ] Yes  
  - [ ] No
- **Do you have any ongoing pain problems?**
  - [ ] No  
  - [ ] Yes

### Allergies
- **Are you allergic to any medicines?**
  - [ ] Yes  
  - [ ] No
  - [ ] What drugs? __________________________
- **Are you allergic to any foods?**
  - [ ] Yes  
  - [ ] No
  - [ ] What foods? __________________________
- **Are you allergic to latex or rubber products (for example: balloons, condoms, paint) or foods linked to latex allergies (for example: kiwi, bananas, passion fruit, or avocados)?**
  - [ ] Yes  
  - [ ] No
  - [ ] Describe
- **Are you allergic to dyes used for x-rays?**
  - [ ] Yes  
  - [ ] No
- **Any other allergies?**
  - [ ] Yes  
  - [ ] No

### Other
- **Back Problems**
  - [ ] Neck  
  - [ ] Thoracic  
  - [ ] Low back
- **Neuromuscular Disease**
  - [ ] + HIV
- **Arthritis:**
  - [ ] Jaw  
  - [ ] Neck  
  - [ ] Other joints
- **Liver disease**
- **Hepatitis (yellow jaundice) When?**
  - ____________________________
- **Other disease?**

---

**Completed by:**  
[ ] Patient  
[ ] Other  
[ ] [Relationship to Patient]

**Fold**

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**FORM #JHH 03-755-00193 (05/05) Page 1 of 4**
Patient Name: ___________________________ History Number: ________________

Please list all medications you are currently taking (include any vitamins, herbs, or other supplements)

<table>
<thead>
<tr>
<th>Medication</th>
<th>How Much</th>
<th>How Often</th>
<th>Medication</th>
<th>How Much</th>
<th>How Often</th>
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</table>

Medications brought to hospital: No ☐ Yes ☑ Sent home ☑ Secured on unit: __________________________

Wants to continue supplements during hospitalization? No ☐ Yes ☑ (Notify MD)

We routinely screen all patients for abuse or violence in their lives.

Is this a problem for you? No ☐ Yes ☑ Would you like help with this today? No ☐ Yes ☑

Do you use any drugs not listed above? No ☐ Yes ☑ What drugs? ________________

Do you smoke? No ☐ Have you smoked in the past? Yes ☑ No ☐ Year you quit? ________________

Yes ☑ What do you smoke and how much? ________________

Do you drink alcohol? No ☐ Yes ☑ What kind and how much each day? ________________

For Hospital Staff Only:

For validation by the Inpatient/ICU RN. If information is added to this form after the initial completion, initial the entry and indicate signature, title, and the date and time of the entry in the signature box below.

For the above lung problems, have you ____________ (Check all that apply)

☐ been on steroids (prednisone, medrol, or cortisone) within past 2 years? When? ________________

☐ been admitted to the hospital within past 2 years? When? ________________

☐ been seen in an Emergency Room within past 2 years? When? ________________

☐ had a chest-x-ray within the last 6 months? When? ________________

☐ undergone breathing tests? (Bring all NON-JOHNS HOPKINS reports with you)

☐ undergone breathing tests? (Bring all NON-JOHNS HOPKINS reports with you)

Where? ________________ When? ________________

Other Medical Conditions

☐ Kidney disease

☐ Dialysis ☐ Transplant

☐ Bladder/Urinary disorder (infections)

☐ Adrenal disease

☐ Stomach ulcers

☐ Diabetes

☐ Insulin ☐ Pills ☐ Diet Controlled

☐ Thyroid ☐ on Thyroid medication

☐ Fainting spells

☐ Neurologic disease

☐ Parkinson's Disease

☐ Seizures ☐ on medication for seizures

☐ Stroke ☐ When?

☐ Hiatal Hernia

☐ Unable to lie flat without heartburn

(Continue to the next page)
### Medical History

**Patient Name:** _________________________________  **History Number:** ___________________________

**For Hospital Staff Only:**

<table>
<thead>
<tr>
<th>Initials</th>
<th>Signature/Title</th>
<th>Date/Time</th>
<th>Initials</th>
<th>Signature/Title</th>
<th>Date/Time</th>
</tr>
</thead>
</table>

We routinely screen all patients for abuse or violence in their lives. Is this a problem for you? No □ Yes □ Would you like help with this today? No □ Yes □

Do you use any drugs not listed above? No □ Yes □ What drugs? __________

Do you smoke? No □ Have you smoked in the past? No □ Yes □ Year you quit? Yes □ What do you smoke and how much? __________

Do you drink alcohol? No □ Yes □ What kind and how much each day? __________

Do you use or wear any of the following: No □ Yes □
- Removable Dentures □ Full □ Partial □ Upper □ Lower
- Hearing Aid □ Right □ Left □ Both
- Glasses □ Contact Lenses □
- False Eye □ Right □ Left
- Prosthesis or adaptive equipment? What type __________

Check all that remain with patient: □

Please continue to the next page

---

**Special Heart Testing:** (Please bring all NON-JOHNS HOPKINS medical reports with you.)

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Date:</th>
<th>Hospital/Dr:</th>
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<tbody>
<tr>
<td>Exercise stress test</td>
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<tr>
<td>Echocardiogram</td>
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<td>Thallium</td>
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<tr>
<td>Cardiac catheterization</td>
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<tr>
<td>Electrocardiogram (EKG)</td>
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</table>

**Lung Disease**

<table>
<thead>
<tr>
<th>Condition</th>
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<td>Asthma/Wheezing</td>
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<td>Bronchitis</td>
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<td>Emphysema</td>
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<td>Cystic Fibrosis</td>
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<tr>
<td>Sleep Apnea</td>
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</tbody>
</table>

**Heart Disease**

- High Blood Pressure—— □
- On medication for high blood pressure
- Chest Pain—— □ With activity
- Chest Pain combined with: □ difficulty breathing □ sweating □ nauseated feeling
- Heart attack Date: __________
- Give name of hospital where treated:
- History of heart attacks in your immediate family (parents, brothers, or sisters)
- Heart surgery or angioplasty Date: __________
- Give name of hospital where treated:
- Heart rhythm problem or palpitations □ Pacemaker Last Checked: __________
- Heart valve problem or congenital abnormality. Describe: __________

**Medication**

<table>
<thead>
<tr>
<th>Medication</th>
<th>How Much</th>
<th>How Often</th>
</tr>
</thead>
</table>

Please list all medications you are currently taking (include any vitamins, herbs, or other supplements)

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Medications brought to hospital: No □ Yes □ Sent home □ Secured on unit: __________

Wants to continue supplements during hospitalization? No □ Yes □ (Notify MD)

For the above lung problems, have you ____________ (Check all that apply)

- been on steroids (prednisone, medrol, or cortisone) within past 2 years? When? __________
- been admitted to the hospital within past 2 years? When? __________
- been on antibiotics within past 6 months? Where? __________
- had a chest x-ray within the last 6 months? (Bring all NON-JOHNS HOPKINS reports with you) When? __________
- undergone breathing tests? (Bring all NON-JOHNS HOPKINS reports with you) Where? __________ When? __________

**Other Medical Conditions**

- Kidney disease
- Dialysis □ Transplant □
- Bladder/Urinary disorder (infections) □
- Adrenal disease □
- Stomach ulcers □
- Diabetes □
- Insulin □ Pills □ Diet Controlled
- Thyroid □ on Thyroid medication □
- Fainting spells □
- Neurologic disease □
- Parkinson's Disease □
- Seizures □ on medication for seizures □
- Stroke □ When? __________
- Hiatal Hernia □
- Unable to lie flat without heartburn (Please continue to the next page)

---
**Patient Name:** ________________________________________

**History Number:** ________________________________________

### Medical History (continued)

- **Liver disease:**
  - [ ] No
  - [ ] Yes

- **Hepatitis (yellow jaundice):** When: __________________

- **Other medical conditions:**
  - Back Problems
  - Neck
  - Thoracic
  - Low back
  - Previous back injury
  - Previous back surgery

- **Blood transfusion within last 3 months:**

- **Chemotherapy:**
  - [ ] Check here if you were treated for cancer

- **Transplantation:**
  - [ ] Check here if you were treated for organ failure related to an illness

### Anesthesia / Surgical History

- **Have you donated your own blood for THIS operation?**
  - [ ] No
  - [ ] Yes

- **Have you ever had general anesthesia (put to sleep) for an operation before?**
  - [ ] No
  - [ ] Yes

- **Date of Last Menstrual Period:** ________________ (date)

### Other Medical Conditions (continued from previous page)

- **Arthritis:**
  - Jaw
  - Neck
  - Other joints

- **Liver disease:**
  - [ ] No
  - [ ] Yes

- **Hepatitis (yellow jaundice):** When: __________________

- **Back Problems:**
  - [ ] Check here if you were treated for back pain

- **Neuromuscular Disease:**

- **Blood Transfusion within last 3 months:**

- **Chemotherapy:**
  - [ ] Check here if you were treated for cancer

- **Transplantation:**
  - [ ] Check here if you were treated for organ failure related to an illness

### Allergies

- **Are you allergic to any medications?**
  - [ ] No
  - [ ] Yes

- **What drugs?**

- **Are you allergic to any foods?**
  - [ ] No
  - [ ] Yes

- **What foods?**

- **Are you allergic to latex or rubber products?**
  - [ ] No
  - [ ] Yes

- **For example: balloons, condoms, paint**

- **Are you allergic to latex or rubber products?**
  - [ ] No
  - [ ] Yes

- **For example: kiwi, bananas, passion fruit, or avocados**

### Pain

- **Do you have any ongoing pain problems?**
  - [ ] No
  - [ ] Yes

- **If yes, specify:**

### Admission Information

- **Planned operation or procedure:** _____________________________________________________________________

- **Where will you be staying the night before your operation/procedure?**

- **Name/location:** _________________________________________________ Phone/Cell Phone: ___________________

- **Have you had an unplanned stay in the hospital or been seen in the Emergency Department more than once in the last six months?**
  - [ ] No
  - [ ] Yes (describe when and why)

- **Occupation:**

- **Primary MD:**
  - Name ___________________________________________________
  - Phone: ______________________

- **Do you have an Advance Directive?**
  - [ ] No
  - [ ] Yes (Provide or bring a copy with you)

- **(for example: Durable Power of Attorney for Health Care or Living Will)**

- **Who would you like to designate as your spokesperson?**
  - Name: ____________________________ Phone: ______________________

- **Contact person in case of an emergency:**
  - Name: ____________________________ Phone: ______________________

- **Are you allergic to latex or rubber products?**
  - [ ] No
  - [ ] Yes

- **Describe _____________________________________________**

- **Are you allergic to any foods?**
  - [ ] No
  - [ ] Yes

- **Describe _____________________________________________**

- **Any other allergies?**
  - [ ] No
  - [ ] Yes

- **Describe _____________________________________________**

- **Are you allergic to latex or rubber products?**
  - [ ] No
  - [ ] Yes

- **Describe _____________________________________________**

- **Are you allergic to any foods?**
  - [ ] No
  - [ ] Yes

- **Describe _____________________________________________**

### Completion

- **Completed by:**
  - [ ] Patient
  - [ ] Other

- **Date/Time:** ____________________________

- **(Relationship to Patient):** ____________________________

- **Reviewer Signature/Title:** ____________________________

- **Date:** ____________________________

---

**THE JOHNS HOPKINS HOSPITAL**

**PRE-OPERATIVE EVALUATION CENTER**

**Adult Screening Tool and History Form**

**Patient Instructions:**

This form helps the doctors and nurses plan your care. Please answer all the questions using a PEN. Indicate with a check mark or write your answer in the space provided. Bring the form with you and/or complete on the day of your admission. The staff will complete shaded areas, after you are admitted.

**Will you or the patient need help with either of the following:**

- [ ] Foreign Language: Specify _____________ [ ] Hearing Impaired

**Date:** ____________ **Patient Name:** ____________________________

**Planned operation or procedure**

**Data Source:** (name of person completing form)

**Where will you be staying the night before your operation/procedure?**

**Name/location:** _________________________________________________ Phone/Cell Phone: ___________________

**Have you had an unplanned stay in the hospital or been seen in the Emergency Department more than once in the last six months?**
  - [ ] No
  - [ ] Yes (describe when and why)

**Occupation:**

**Primary MD:**
  - Name: ____________________________ Phone: ______________________

**Do you have an Advance Directive?**
  - [ ] No
  - [ ] Yes (Provide or bring a copy with you)

**Who would you like to designate as your spokesperson?**
  - Name: ____________________________ Phone: ______________________

**Contact person in case of an emergency:**
  - Name: ____________________________ Phone: ______________________

**Are you allergic to latex or rubber products?**
  - [ ] No
  - [ ] Yes

**Describe _____________________________________________**

**Are you allergic to any foods?**
  - [ ] No
  - [ ] Yes

**Describe _____________________________________________**

**Any other allergies?**
  - [ ] No
  - [ ] Yes

**Describe _____________________________________________**

---

**Please continue to the next page.**
Directions: List medications used by the patient prior to admission. * - “Home” means the location of the patient just prior to admission. Patients may complete the gray area, which will be reviewed on admission.

### Allergies:

#### "HOME" MEDICATION LIST (CURRENT MEDS USED PRIOR TO ADMISSION)

(prescriptions, over-the-counter medications, herbals, vitamins, inhalers, eye drops, creams, ointments, parenteral nutrition etc.)

<table>
<thead>
<tr>
<th>MEDICATION NAME</th>
<th>DOSE</th>
<th>ROUTE (e.g., by mouth or injection)</th>
<th>FREQUENCY (how often is it taken)</th>
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</table>

**USE ADDITIONAL FORM(S) AS NEEDED TO LIST ALL “HOME” MEDICATIONS.**

<table>
<thead>
<tr>
<th>Source of Medication History (check all that apply)</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐ Direct observation of patient’s medications</td>
</tr>
<tr>
<td>☐ Clinic note: date: ____</td>
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<tr>
<td>☐ Obtaining history was not feasible (e.g., patient not conscious)</td>
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<tr>
<td>☐ Patient provided list</td>
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<tr>
<td>☐ Family provided list</td>
</tr>
<tr>
<td>☐ Patient verbal recall</td>
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<tr>
<td>☐ Family verbal recall</td>
</tr>
<tr>
<td>☐ Pharmacy (name/phone number) ___</td>
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<tr>
<td>☐ Primary physician (name/phone number) ___</td>
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<tr>
<td>☐ Previous discharge paperwork (date: ___)</td>
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<tr>
<td>☐ Other ___</td>
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</table>

Signature of person reviewing above medication list: __________________________________________________________________________________________

“Home” medication list reconciled with admission orders. (Authorized prescriber signature)

ID #: ____________  Date: ____________  Time: ____________

RECORD "HOME" MEDICATION INFORMATION OBTAINED AFTER INITIAL RECONCILIATION ON REVERSE SIDE.

PLACE AS THE FIRST SHEET BEHIND THE "MEDICATION" MEDICAL RECORD TAB

DO NOT THIN FROM CHART
MODIFICATIONS TO INITIAL “HOME” MEDICATION LIST

**DIRECTIONS:** Record additional “home” medication information obtained after initial reconciliation has occurred and notify prescriber. Include over-the-counter (OTC) and herbal medications.

**Source of Additional Medication History (check all that apply):**
- Directly observed patient medications
- Clinic note (date: _______________)
- Patient provided list
- Family provided list
- Patient verbal recall
- Family verbal recall
- Pharmacy (name/phone number) ____________________________
- Primary physician (name/phone number) _____________________
- Previous discharge paperwork (date: _____________________)
- Other ___________________________________________________

<table>
<thead>
<tr>
<th>MEDICATION NAME</th>
<th>DOSE (do not use volume, e.g., mL)</th>
<th>ROUTE</th>
<th>FREQUENCY</th>
<th>Prescriber notified (check)</th>
<th>Recorder (date/time, initials)</th>
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**Name of recorder** | **Initials** | **Name of recorder** | **Initials** | **Name of recorder** | **Initials**
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Form Number: 11/05
NSU ANESTHESIA RECORD

PRE-PROCEDURE

Date

OR # Page of

Surgeon(s)

Pre-Anesthetic state:

Awake
Anxious
Uncooperative

Chart reviewed
Permit signed

Non-I Nvasive B/P
Non-Invasive B/P

Oxygen / FiO2 monitor
Oxygen / FiO2 monitor

Steth: Esophageal
Steth: Esophageal

Room Time IN: OUT:

Pt Identified: ID Band

GA Induction:

Inhalation

OCR Induction:

Inhalation

Chart reviewed

Non-Intubated

Premedication:

Permit signed

Patient reassessed prior to anesthesia & surgery; surgical site verified - Ready to proceed

Peri-operative pain management discussed with patient/guardian, plan of care completed

Regional:

Arm(s) secured on armboards: L R

Peripheral:

Arms < 90°

Monitoring:

Airway humidifier: Simple O2 mask

Temperature

Body warmer

Ventilation

CPB

Spontaneous

Artificial

Controlled

Respiratory Rate (bpm)

Peak Pressure (cm H20)

Tidal Volume (ml)

PET CO2

SpO2

Nebulizer - See Remarks

Pre-procedure Vital Signs

Blood Pressure

Pulse

Temp

Tidal Volume (ml)

Respiratory Rate (bpm)

Peak Pressure (cm H20)

Symbols for Remarks

Position

TOTALS

TOTAL TIME:

REMARKS

Patient Identification (Addressograph Card)
HISTORY

Chief Complaint: In patient’s own words, the patients’ main complaint or why they are having surgery.

- Indicate patient’s understanding of medical condition and potential outcomes from surgery
- Question: What brought you to the hospital today?

History of Illness: Brief description of the course of the medical pathology for which the patient is presenting to the operating room

- Pertinent related history
  - Timing and duration of illness
  - Signs and symptoms
  - Severity
  - Associated and modifying factors
  - Course of disease
  - Treatments protocols thus far
- Question: What are you having surgery for?

Adult Illnesses: Concurrent medical illnesses that may or may not be related to the indication for surgery

- Examples:
  - Hypertension and CAD
  - Diabetes mellitus (DM)
  - Hepatitis or cirrhosis
  - Asthma or recent URI
  - Communicable diseases
  - Renal or thyroid disease
  - Pregnancy
- Question: What major medical problems do you have?

Surgical History: Indicates patient’s tolerance of anesthesia and associated risks of surgery. This also gives the anesthetist an indication a base level of patient knowledge of what to except during the operative course, and the patient’s understanding of what will be occurring in the operative suite

- Important component of surgical history:
  - Year
  - Surgical procedure
  - Type of anesthesia and any problems with anesthesia
    - Post-op sore throat or hoarseness
    - Post-op hemoptysis or hematemesis
    - PONV
• Difficult or prolonged intubation
• Unexpected intensive care admissions
• Adverse reactions to anesthesia drugs
  o Complications from surgery

* Question: Have you ever been put to sleep for surgery before?

Family History: Indicates any potential underlying (or 'silent') hereditary complications that may preexist in the surgical patient

• Important points to note:
  o Parents or young siblings who have died prematurely of CAD
  o FHx of trouble with anesthesia
    • Particularly a history of pseudocholinesterase deficiency or malignant hyperthermia
  • Question: Has anyone in your family ever had any problems with anesthesia?

Drug Allergies: It is critical to decipher from the patient history whether the patient has a true allergy to a given agent, or merely an adverse side effect

• Important aspects to note:
  o Specific drug or food that caused reaction
  o Type of reaction
  o Severity of reaction
  o Known alternatives to agent
  • Of particular interest are patients that report an allergy to adhesive tape or latex
  • Question: Are you allergic to any medications that you know of?

Social History: Indicates daily activity, stress level, religious preferences, exposure to toxic agents, or language barriers to communication

• Important aspects to note:
  o Occupation, are there any toxic exposures
  o Smoking history
    • Note daily consumption and duration of exposure
    • ‘Pack year’: # of packs/day x # of years smoking
      • Ex: 1 PPD x 20 years = 20 pack years
    • Question: Do you smoke? How much?
  o Alcohol consumption
    • Note daily consumption and duration of exposure
    • Question: Do you drink? How much?
  o Illicit drug use
    • Note exact type, frequency of use, and last intake
    • Admission by patient may require explanation of risks of anesthesia with unknown drug use
• Question: Do you use any [illegal] drugs?
  o Physical activity level
  • Question: Are you able to walk up a flight of stairs or a block down the street without getting short of breath?

**Current Medications:** Medication list gives a generalized indication of concurrent pathologies and treatment modalities. This should include all physician-prescribed medications, OTC drugs, vitamins, and/or herbal remedies

• Important aspects to note:
  o Names of drug
  o Indication for prescription
  o Frequency and dose
• Question: Do you take any medicines or drugs on a regular basis?

**REVIEW OF SYSTEMS:**

The initial review of symptoms should begin with observation of the patient. By simply looking at and interacting with the patient, several important characteristics vital to your assessment will become realized:

• General appearance
• Weight
• Age
• Relative socioeconomic status
• Sex
• Race
• Education level
• Level of consciousness

**HEENT:**

Head: H/O headaches, dizziness, lightheadedness
Eyes: Corrective lenses (glasses or contacts)
Ears: Difficulty hearing, hearing aids
Nose: Nosebleeds, sinus trouble, previous surgery or trauma
Dentition: General dental problems
  o Poor dentition or use of prostheses
Throat: Sore throats, history of hoarseness or change in voice quality, snoring, difficulty swallowing, any prior treatment for TMJ problems

**Neck:**

• History of any surgeries or trauma to head, neck, mouth, throat,
  o Note any stabilization methods in place (ie: collar, traction, halo, or c-spine radiology)
• History of tracheostomy
• History of laryngectomy
• Neck stiffness or pain
• Goiter
• Radiation to the neck
• Any pathology related to decreased cervical ROM

Respiratory:

• History of asthma or other breathing problems
  o Age of onset
  o Medications (esp. steroid administration)
  o Hospitalization or intubations in past
  o Time since last exacerbation and ER visits
• Emphysema, chronic bronchitis
  o Including medications and disease progression
• Recent pneumonia, acute bronchitis, or URI
• Tuberculosis (TB)
• Cough (acute, or chronic and if so, any changes)
• Sputum production (color, quantity, and any recent changes)

Cardiovascular:

• Chest pain, palpitations, shortness of breath, exercise tolerance, irregular heart arrhythmias, or valvular disorders
• Orthopnea, paroxysmal nocturnal dyspnea
• Edema, leg pain with walking
• Hypertension
  o Including medications and any changes in past 6 months
• History of Rheumatic fever or heart murmurs
• Myocardial Infarction (when, treatments, outcomes)
• History of cardiac surgery (ie: CABG, valve replacements, etc.)
• Last ECG
  o Patients over 50 years old should get an ECG prior to any anesthetic, and the ECG should be less than 30 days old

Gastrointestinal:

• History of gastroesophageal reflux (GERD)
  o Including severity, medications daily and prn, current interval between episodes
  o Regurgiation after meals upon recumbency, what position do you sleep in or number of pillows used
• History of hiatal hernia
• Abdominal pain in relation to ingestion of fatty foods
• Liver disease
  o Jaundice
  o Any recent travel to endemic areas
  o Occupational exposure to toxins
• History of hepatitis exposures and hospitalizations
• Abdominal surgeries such as gastric bypass
• Nausea, vomiting, diarrhea

Urinary:
• Kidney disease and/or dialysis
  o Last dialysis treatment
  o Note location of any AV fistulas or shunts, medications, daily urine production
• Possibility of UTI
  o Frequency, pain or burning with urination, urgency
• Kidney stones, incontinence

Female GU:
• Last menstrual period
• Possibility of being pregnant
  o A serum $\beta$-human chorionic gonadatropin (HCG) level should be obtained on any female of child-bearing age prior to receiving anesthesia

Hematologic:
• Bleeding problems (ie: hemophilia, von Willebrand’s disease)
• Anemias (type or cause)
• Sickle cell anemia (disease or trait)
• History of blood transfusions, reactions to transfusions

Musculoskeletal:
• Muscular dystrophies or myotonic muscular disease
• Arthritis, rheumatoid and osteoarthritis
  o Think of both neck and other joints for positioning issues
• Other neuromuscular diseases (ie. myasthenia gravis)

Neurologic:
• Seizures, paralysis, numbness or loss of sensation
  o With seizure disorder, note last episode and any inciting agents
• Tremors or other involuntary movements
• Stroke, TIA
  o When, treatment or meds, timing of event

Endocrine:
• Thyroid disease
  o Hyper- or hypothyroid
  o Medications
  o Goiter
- Treatment with radiation therapy
- Diabetes mellitus
  - Oral medications
  - Insulin use
  - Obtain preoperative blood sugar
  - Note medication regimen

**Psychiatric:**
- Medications, tension, stress, mood, memory
PHYSICAL EXAM

General Survey: Emotional status (confusion, depression, anxiety, lability)
Posture, involuntary movements, immobility or paralysis
Peripheral cyanosis, audible wheeze, pallor
Accessory muscle use, general respiratory pattern, stridor
Diaphoresis, jaundice, signs of distress, clubbing
Voice quality

Vital Signs:

Pulse, rate and rhythm
- Normal: 60-100 bpm
- Bradycardia: <60 bpm
- Tachycardia: >100 bpm

Respirations, rate and character
- Normal: 14-20 bpm
- Hyperpnea: deep breathing
- Bradypnea: <14 bpm
- Tachypnea: >20 bpm
- Apnea: lack of respirations
Blood pressure

- Normal: < 130/85 mmHg
- High normal: 130/85 – 139/89 mmHg
- Mild hypertension: 140/90 – 159/99 mmHg
- Moderate hypertension: 160/100 – 179/109 mmHg
- Severe hypertension: 180/110 – 209/119 mmHg
- Critical hypertension: >210/120 mmHg
Height and weight
- Weight and height conversions
  - Kilograms (kg) = lbs / 2.2 kg/lbs.
  - Centimeters (cm) = height (inches) x 2.5 cm/in.
- Ideal body weight

<table>
<thead>
<tr>
<th>Gender</th>
<th>Ideal BMI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Men</td>
<td>[0.5 \times \frac{kg}{m^2} + 11.5]</td>
</tr>
<tr>
<td>Women</td>
<td>[0.4 \times \frac{kg}{m^2} + 0.03 \times \text{Age} + 11]</td>
</tr>
</tbody>
</table>

- Body Mass Index (BMI)
  - BMI = \frac{kg}{m^2}
Temperature

- Conversion of fahrenheit (°F) to celsius (°C)
  - °C = \( \frac{9}{5} (\text{°F}) + 32 \)

<table>
<thead>
<tr>
<th>C</th>
<th>F</th>
<th>C</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>-40</td>
<td>-40</td>
<td>-40</td>
<td>-40</td>
</tr>
<tr>
<td>-23.3</td>
<td>-10</td>
<td>14</td>
<td>18.3</td>
</tr>
<tr>
<td>20.6</td>
<td>-5</td>
<td>23</td>
<td>21.1</td>
</tr>
<tr>
<td>-17.8</td>
<td>0</td>
<td>32</td>
<td>23.9</td>
</tr>
<tr>
<td>-15</td>
<td>5</td>
<td>41</td>
<td>26.7</td>
</tr>
<tr>
<td>-12.2</td>
<td>10</td>
<td>50</td>
<td>29.4</td>
</tr>
<tr>
<td>-9.4</td>
<td>15</td>
<td>59</td>
<td>32.2</td>
</tr>
<tr>
<td>-6.7</td>
<td>20</td>
<td>68</td>
<td>35</td>
</tr>
<tr>
<td>-3.9</td>
<td>25</td>
<td>77</td>
<td>37</td>
</tr>
<tr>
<td>-1.1</td>
<td>30</td>
<td>86</td>
<td>37.2</td>
</tr>
<tr>
<td>1.7</td>
<td>35</td>
<td>95</td>
<td>37.8</td>
</tr>
<tr>
<td>4.4</td>
<td>40</td>
<td>104</td>
<td>38.3</td>
</tr>
<tr>
<td>7.2</td>
<td>45</td>
<td>113</td>
<td>38.9</td>
</tr>
<tr>
<td>10</td>
<td>50</td>
<td>122</td>
<td>39.4</td>
</tr>
<tr>
<td>12.8</td>
<td>55</td>
<td>131</td>
<td>40</td>
</tr>
</tbody>
</table>

Skin:
- Inspect: Color, petechiae, ecchymosis

Head:
- Inspect: Frontal and profile view to assess mandibular and maxillary size
- Palpate: Maxillary and frontal sinuses for tenderness
**Eyes:**

*Inspect:* Look for scleral icterus
Pupils for size, if they are equal and react to light
P.E.R.R.L.A.
* Pupils Equal, Round and Reactive to Light & Accommodation

**Nose:**

*Inspect:* External profile for symmetry and deformities
Nares for size and location
Evidence of epistaxis

*Palpate:* Patency of nares

> Which naris is larger?

Nares' Examination
Mouth:
Inspect:
- Oversized teeth, prostheses, poor dentition (i.e., carious, cracked, broken, or missing teeth, especially #’s 7, 8, 9, 10, 23, 24, 25, 26)

Dentition:

Tongue:
- Size, location, disease, midline with protrusion

Soft palate
- Uvula, faucial pillars, palatine tonsils
- First attempt with patient actively opening mouth, then saying “Ahhh,” then use tongue depressor and light
- Mallampati Classification system

Oropharyngeal Examination (OPE)

- Uvula viz
- Hard palate viz
- Tonsils viz
- Soft palate viz
Joint mobility

- TMJ – joint movement and mobility (ie. rotation, sliding, other)
Mouth opening
- Estimate number of cm.

Maxilla/Mandible
- Over-jet, overbite, prognathism, retrognathism

Palpate:
* TMJ movement for cracking or crepitus,
* Establish if decreased range of motion is from pain or mechanical etiology
Neck:
Inspect: Cervical spine mobility and alignment
- Symmetry of cervical spine
- ROM – flexion, extension, rotation right and left, side-to-side right and left, any pain, parasthesias, motor weakness, mechanical limitation, no movement
- Atlanto-occipital joint – (patient sits straight and extends head while keeping cervical spine in neutral position)

• Thyromental distance – (head fully extended and measure between bony point of mentum of the mandible and the thyroid notch)
- Position of trachea and larynx, scars from previous tracheostomy, deformities, erythema, edema, or induration
- JVD, visualize jugular venous pulsation

**Palpate:**
Trachea and larynx
- Fixed with swallowing
- Hyoid bone including greater horns
- Thyroid notch and thyroid for consistency, size, masses, nodules, tenderness, manual movement of thyroid
- Cryothyroid membrane
- Cricoid cartilage

**Larynx**

![Diagram of the larynx and related structures]
Respiratory:

Inspect: Thorax, neck, and abdomen
- Position, pattern, symmetry, synchrony of patient's breathing
- Look for – barrel-shaped thorax, kyphoscoliosis, obesity, pectus excavation, pervious mastectomy, burn scars, scars from previous chest tube placement or thoracotomy
- Ability of patient to take deep breath and cough vigorously
- Suprasternal or intercostal retractions

Palpate: Tactile fremitus
Symmetry of chest excursion

Percuss: Diaphragmatic excursion

Auscultate: Lung fields, both anterior and posterior
Cardiovascular:

Inspect: Anterior chest for lifts, heaves, PMI

Palpate: Precordium for thrill at sternal borders (first with fingertips and then with ball of hand)

Auscultate: With both bell and diaphragm in supine position
With diaphragm sitting up and leaning forward and patient holding breath
**Abdominal:**

**Inspect:** Surface for condition of skin, visible masses, scars
Contour and fullness
Aortic pulsation

**Auscultate:** Bruits over aorta, renal arteries, iliac arteries
Femoral pulse

**Percuss:** Lightly over 4 quadrants (looking for distention)
Over 11-12 interspaces in LMAL for splenomegaly

**Palpate:** For liver edge, texture, tenderness
For spleen (along left costal margin)
Abdominal aorta, estimate size
Flank or suprapubic tenderness
Kidneys bilaterally
Femoral pulses (after auscultation)

**Musculoskeletal:**

**Inspect:** Extremity alignment, joint deformity, atrophy

**Palpate:** Strength testing
Neurologic:

Mental status
Discrimination (ie. pinprick or temperature)
Lower and upper extremity weakness or sensory deficit
Sensory by dermatomes
# Common Laboratory Values

## CBC

<table>
<thead>
<tr>
<th>Test</th>
<th>Normal value</th>
<th>Function</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hemoglobin</td>
<td>12-18 g/100 mL</td>
<td>Measures oxygen carrying capacity of blood</td>
<td>Low: hemorrhage, anemia</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>High: polycythemia</td>
</tr>
<tr>
<td>Hematocrit</td>
<td>35%-50%</td>
<td>Measures relative volume of cells and plasma in blood</td>
<td>Low: hemorrhage, anemia</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>High: polycythemia, dehydration</td>
</tr>
<tr>
<td>Red blood cell</td>
<td>4-6 million/mm³</td>
<td>Measures oxygen-carrying capacity of blood</td>
<td>Low: hemorrhage, anemia</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>High: polycythemia, heart disease, pulmonary disease</td>
</tr>
<tr>
<td>White blood cell</td>
<td></td>
<td>Measures host defense against inflammatory agents</td>
<td>Low: aplastic anemia, drug toxicity, specific infections</td>
</tr>
<tr>
<td>Infant</td>
<td>8,000-15,000/mm³</td>
<td></td>
<td>High: inflammation, trauma, toxicity, leukemia</td>
</tr>
<tr>
<td>4-7 y</td>
<td>6,000-15,000/mm³</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8-18 y</td>
<td>4,500-13,500/mm³</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Differential Count

<table>
<thead>
<tr>
<th>Test</th>
<th>Normal value</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neutrophils</td>
<td>54%-62%</td>
<td>Increase in bacterial infections, hemorrhage, diabetic acidosis</td>
</tr>
<tr>
<td>Lymphocytes</td>
<td>25%-30%</td>
<td>Viral and bacterial infection, acute and chronic lymphocytic leukemia, antigen reaction</td>
</tr>
<tr>
<td>Eosinophils</td>
<td>1%-3%</td>
<td>Increase in parasitic and allergic conditions, blood dyscrasias, pernicious anemia</td>
</tr>
<tr>
<td>Basophils</td>
<td>1%</td>
<td>Increase in types of blood dyscrasias</td>
</tr>
<tr>
<td>Monocytes</td>
<td>0%-9%</td>
<td>Hodgkin's disease, lipid storage disease, recovery from severe infections, monocytic leukemia</td>
</tr>
</tbody>
</table>

## Absolute Neutrophil Count (ANC)

<table>
<thead>
<tr>
<th>Calculation</th>
<th>Normal value</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>(% Polymorphonuclear Leukocytes + % Bands) x Total White Cell Count / 100</td>
<td>&gt;1500</td>
<td>&lt;1000 Patient at increased risk for infection; defer elective dental care</td>
</tr>
</tbody>
</table>

## Bleeding Screen

<table>
<thead>
<tr>
<th>Test</th>
<th>Normal value</th>
<th>Function</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prothrombin time</td>
<td>1-18 sec</td>
<td>Measures extrinsic clotting factors</td>
<td>Prolonged in liver disease, impaired Vitamin K production, surgical trauma with blood loss</td>
</tr>
<tr>
<td>Partial thromboplastin time</td>
<td>By laboratory control</td>
<td>Measures intrinsic clotting of blood, congenital clotting disorders</td>
<td>Prolonged in hemophilia A,B, and C and Von Willebrand's disease</td>
</tr>
<tr>
<td>Platelets</td>
<td>140,000-340,000/mL</td>
<td>Measures clotting potential</td>
<td>Increased in polycythemia, leukemia, severe hemorrhage, decreased in thrombocytopenia purpura</td>
</tr>
<tr>
<td>Bleeding time</td>
<td>1-6 min</td>
<td>Measures quality of platelets</td>
<td>Prolonged in thrombocytopenia</td>
</tr>
<tr>
<td>International Normalized Ratio (INR)</td>
<td>Without anticoagulant therapy</td>
<td>Measures extrinsic clotting function</td>
<td>Increased with anticoagulant therapy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Anticoagulant therapy target range: 2-3</td>
<td></td>
</tr>
</tbody>
</table>

## Urinalysis

<table>
<thead>
<tr>
<th>Test</th>
<th>Normal value</th>
<th>Function</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volume</td>
<td>1,000-2,000 mL/d</td>
<td>Measures the degree of tubular reabsorption and dehydration</td>
<td>Increase in diabetes mellitus, chronic nephritis</td>
</tr>
<tr>
<td>Specific gravity</td>
<td>1.015-1.025</td>
<td>reflects acidosis and alkalosis</td>
<td>Increase in diabetes mellitus; decrease in acute nephritis, diabetes insipidus, aldosteronism</td>
</tr>
<tr>
<td>pH</td>
<td>6-8</td>
<td>Reflects acidosis and alkalosis</td>
<td>Acidic: diabetes, acidosis, prolonged fever Alkaline: urinary tract infection, alkalosis</td>
</tr>
<tr>
<td>Casts</td>
<td>1-2 per high power field</td>
<td></td>
<td>Renal tubule degeneration occurring in cardiac failure, pregnancy, and hemoglobinuric-nephrosis</td>
</tr>
</tbody>
</table>

## Electrolytes

<table>
<thead>
<tr>
<th>Test</th>
<th>Normal value</th>
<th>Function</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium (Na)</td>
<td>135-147 mEq</td>
<td>Reflects acid-base balance</td>
<td>Increase in Cushing's syndrome</td>
</tr>
<tr>
<td>Potassium (K)</td>
<td>3.5-5 mEq</td>
<td></td>
<td>Increase in tissue breakdown</td>
</tr>
<tr>
<td>Bicarbonate (HCO₃)</td>
<td>24-30 mEq</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chloride (Cl)</td>
<td>100-106 mEq</td>
<td></td>
<td>Increase in renal disease and hypertension</td>
</tr>
</tbody>
</table>
**Introduction to Clinical Anesthesia**

**Normal Lab Values**

* Reference values only; normal ranges will vary between labs and facilities *

**Hematology**

Hgb  ♂ 13.5-17.5  ♀ 12.0-16.0 g/dl

Hct  ♂ 39-49%  ♀ 35-45%

RBC’s  ♂ 4.3-5.7  ♀ 3.8-5.1 ·10⁸/μl

Plt 150-450·10³ /μl

WBC 4.5-11.0 ·10³ /μl

- Neutrophils 57-67%
  Segs 54-62%
  Bands 3-5%
- Lymphocytes 23-33%
- Monocytes 3-7%
- Eosinophils 1-3%
- Basophils 0-1%

ESR ♂ < 15  ♀ < 20 mm/hr

Fe  ♂ 65-175  ♀ 50-170 μ g/dl

Fe Sat ♂ 20-50  ♀ 15-50%

FDP <10 μ g/ml

Ferritin  ♂ 20-250  ♀ 10-120 ng/ml

**Fibrinogen 150-350 mg/dl**

Haptoglobin 26-185 mg/dl

Hgb A₁C 5.0-7.5%

MCH 26-34 pg
MCHC 33-37%
MCV 80-100 fl
PT 10-14 sec
aPTT 20-40 sec
INR 0.9-1.2 sec
ACT 80-120 sec
Retics 0.5-1.5%
TIBC 250-400 μ g/dl
Transferrin 200-400 mg/dl
TT 13-20 sec

Chemistries
Na+ 135-145 mEq/l
K+ 3.5-5.3 mEq/l
Cl- 95-105 mEq/l
HCO3- 22-29 mEq/l
BUN 10-26 mg/dl
Creat 0.6-1.3 mg/dl
Glucose 70-115 mg/dl
Anion Gap 7-16 mEq/l
Osmolality 275-300 mOsm/kg
Ca++ total: 8.5-10.5 mg/dl
Ionized: 4.65-5.28 mg/dl
Mg+ 1.3-2.4 mEq/l

Phosphate 2.5-4.5 mg/dl

α FP <10 ng/mol

**Albumin 3.5-5.5 g/dl**

Immunoglobulin: IgA 70-312 mg/dl
IgG 640-1350 mg/dl

IgM 56-350 mg/dl

Lactate 0.5-1.3 mEq/l

Protein (total) 6.0-8.0 g/dl

Uric Acid ♂ 3.0 - 7.4 ♀ 2.1 - 6.3 mg/dl

Zn 55-135 μg/dl

**Liver/Pancreas**

ALT 0-40 IU/l

Alk Phos ♂ 38-126 ♀ 70-230 U/l

Ammonia 10-50 μmol/l

AST 7-40 IU/l

Bilirubin(total) 0.2 – 1.0 mg/dl

Bilirubin(conj) 0 – 0.2 mg/dl

GGT 0-50 U/l

LDH 90-190 U/l

Amylase 25-125 U/l

C peptide 0.70 – 1.89 ng/ml
- Lipase 10-140
  >60yo 18-180
**Lipids**

Tot. Cholest. <200 mg/dl

LDL <130 mg/dl

HDL ♂ >29 ♀ > 35 mg/dl

Triglyc. ♂ 40-160 ♀ 35-135 mg/dl

**Other**

CPK ♂ 38-174 ♀ 26-140 U/l

CPK MB <5%

Acid Phosphatase <0.8 IU/ml

B₁₂ 100-700 pg/ml

CA-125 <35 U/ml

Cu⁺ ♂ 70-140 ♀ 80-155 μ g/dl

Folate 3-15 ng/ml

Pb <10 μ g/dl

PSA <4.0 ng/ml

Zn²⁺ 70-150 μ g/dl
Blood Gasses

<table>
<thead>
<tr>
<th></th>
<th>Arterial</th>
<th>Venous</th>
</tr>
</thead>
<tbody>
<tr>
<td>PH</td>
<td>7.35-7.45</td>
<td>7.32-7.42</td>
</tr>
<tr>
<td>pCO₂</td>
<td>35-45</td>
<td>41-51</td>
</tr>
<tr>
<td>pO₂</td>
<td>80-100</td>
<td>25-40</td>
</tr>
<tr>
<td>HCO₃</td>
<td>21-27 mEq/l</td>
<td>24-28 mEq/l</td>
</tr>
<tr>
<td>O₂ sat</td>
<td>95-99%</td>
<td>-</td>
</tr>
</tbody>
</table>

Urine

Min Vol. 0.5-1.0 ml/kg/hr

Spec Gravity 1.015-1.030

Osmol. 600-1400 mOsm/kg

Creatinine ♂ 14-26 ♂ 11-20 mg/kg/day

• Cr Clearance ♂ 100-150 ♂ 90-140 ml/min
  * rough estimate only, varies with BMI

Urea Nitrogen 12-20 g/day

Ca++ 100-300 mg/day

K+ 25-125 mEq/day

Na+ 40-220 mEq/day

PO₄ 0.4-1.3 g/day

Uric acid 250-750 mg/day

Albumin 10-100 mg/day
Amylase 1-17 U/hr
Glucose <0.5 g/day
Protein 10-100 mg/day

**CSF**

- Pressure 60-180 mmH2O
- WBC 0-5 /μ l
- Protein 15-45 mg/dl
- Glucose 40-80 mg/dl
Alkaline Phosphatase – ALP

**Norms:**
- Adult – 30-85 ImU/ml or 42-128 U/L (SI units)
- 2 years – 85-235 ImU/ml
- 2-8 yrs – 65-210 ImU/ml
- 9-15 yrs – 60-300 ImU/ml
- 16-21 yrs – 30-200 ImU/ml
- Elderly – slightly higher than adult

ALP is used to detect and monitor disease of the liver or bone.

**Explanation:**

While ALP is an enzyme found in many tissues, the highest concentrations are found in the liver, biliary tract epithelium, and bone. Normally ALP is excreted in the bile. Enzyme levels of ALP are greatly increased with extrahepatic and intrahepatic obstructive biliary disease and cirrhosis. Lower levels of elevation are seen in hepatic tumors, hepatotoxic drugs, and hepatitis.

There are a couple of ways to distinguish whether the elevation of the total ALP is from bone or liver disease. The first is to look at isoenzymes. ALP1 would be high when the source of the elevated ALP is from the liver. ALP2 would be higher if bone was the source of total ALP elevation. Another way would be to simultaneously test for 5’-nucleotidase. If total ALP and 5’nucleotidase are both elevated, the disease is in the liver. If 5’-nucleotidase is normal, the disease is in the bone.

**Clinical Significance: (Liver causes)**

**Increased levels**
- Primary cirrhosis
- Intrahepatic or extrahepatic biliary obstruction
- Primary or metastatic liver tumor
- Intestinal ischemia or infarction

**Decreased levels**
- Hypophosphatemia
- Malnutrition
- Pernicious anemia
- Scurvy (Vit C deficiency)
Amylase

**Norms:**
- Adult – 56-190 IU/L, 80-150 Somogyi units/dl, or 25-125 U/L (SI units)
- Newborn – 6-65 U/L
- Values may be slightly increased during normal pregnancy and in elderly

This test is used to detect and monitor the clinical course of pancreatitis.

**Explanation:**

Amylase is normally secreted by acinar cells in the pancreas and then moves through the pancreatic duct and into the duodenum. Amylase aids in the catabolism of carbohydrates to their component simple sugars. If there is damage to the acinar cells or obstruction of pancreatic duct flow, amylase is poured into the intrapancreatic lymph system and into the free peritoneum. There, amylase is picked up by the blood vessels draining the free peritoneum and lymph system. Amylase is rapidly cleared by the kidney and serum levels can return to normal in 48 to 72 hours if the insult does not persist.

Amylase is not specific for the pancreas. Other reasons amylase may be elevated include bowel perforation, penetrating peptic ulcer into the pancreas, duodenal obstruction, ectopic pregnancy, diabetic ketoacidosis and parotiditis (mumps) because of amylase in the salivary glands.

Patients with chronic pancreatic disorders that have resulted in destruction of pancreatic cells may not have elevated amylase because it is not being secreted as it normally would.

**Clinical Significance:**

Increased levels
- Acute pancreatitis
- Chronic relapsing pancreatitis
- Penetrating peptic ulcer into the pancreas
- GI disease
- Acute cholecystitis
Aspartate Aminotransferase – AST (formerly SGOT)
Alanine Aminotransferase – ALT (formerly SGPT)

AST Norms: 0-5 days – 35-140
< 3 yrs – 15-60
3-6 yrs – 15-50
6-12 yrs – 10-50
12-18 yrs – 10-40
Adult – 5-40 IU/L
Adult – 8-20 U/L (SI units)
Females – slightly higher than males
Elderly – slightly higher than adults

ALT Norms: Adult/Child – 5-35 IU/L or 8-20 U/L (SI units)
Values may be higher in men and in African Americans.
Elderly – slightly higher than adult
Infant – may be twice as high as adult

Explanation:

Both are enzymes found in many tissues of the body such as heart, liver, and skeletal muscle. Increases in these enzymes indicate cellular injury because as cells are injured these enzymes are released into the bloodstream. AST levels can rise to 10 or 20 times the normal level in extrahepatic obstruction (e.g., gallstones) or acute hepatitis, respectively. In cirrhotic patients the level of AST elevation will depend on the amount of active inflammation. Most ALT elevations are due to hepatocellular dysfunction. The AST/ALT ratio is usually greater than 1 in patients with alcoholic cirrhosis, liver congestion, and metastatic tumor of the liver. Ratios of less than 1 may be seen in acute hepatitis, viral hepatitis, or infectious mononucleosis. Ratio is less accurate if AST exceeds 10 times normal.

Clinical Significance: (these are just liver considerations – there are others)

Increased AST when evaluating for liver disease
  Hepatitis
  Hepatic cirrhosis
  Drug-induced liver injury
  Hepatic mets
  Hepatic necrosis
  Hepatic surgery
  Infectious mononucleosis with hepatitis
  Hepatic infiltrative process

Increase ALT – Significant increase
  Hepatitis
  Hepatic necrosis
Hepatic ischemia

Increased ALT – Moderate increase
  Cirrhosis
  Cholestasis
  Hepatic tumor
  Hepatotoxic drugs
  Obstructive jaundice

Increase ALT – Mild increase
  Pancreatitis
  Infectious mononucleosis
Bilirubin

**Norms:** Total Bilirubin 0.1-1.0 mg/dl or 5.1-17.0 mmol/L (SI units)  
Indirect – 0.2-0.8 mg/dl or 3.4-12.0 mmol/L (SI units)  
Direct – 0.1-0.3 mg/dl or 1.7-5.1 mmol/L (SI units)  
Newborn total bilirubin – 1-12 mg/dl or 17.1-20.5 mmol/L (SI units)

This test evaluates liver function.

**Explanation:**

Bilirubin metabolism begins when RBCs are broken down, mostly in the spleen. Hemoglobin is broken down to heme and globin. The heme is then catabolized into biliverdin. This is then transformed into unconjugated bilirubin. The unconjugated bilirubin then goes to the liver and is conjugated with glucuronide to form conjugated bilirubin. The conjugated bilirubin is excreted from the liver cells and eventually through the common bile duct into the bowel. Some conjugated bilirubin is also excreted through the kidneys, in the urine.

Jaundice is the yellowish skin color change that accompanies abnormally high levels of serum bilirubin. It results from a dysfunction in either the metabolism or excretion of
bilirubin. If you know whether it is the unconjugated or conjugated bilirubin that is elevated, you can begin to clue in on the cause. Elevated unconjugated or indirect bilirubin generally indicates hepatocellular dysfunction. Elevated conjugated or direct bilirubin indicates something extrahepatic such as gallstones or tumors obstructing the bile ducts.

**Clinical Significance:**

Increased Conjugated Bilirubin
- Gallstones
- Extrahepatic duct obstruction
- Extensive liver mets
- Cholestasis
- Dubin-Johnson syndrome
- Roto’s syndrome

Increased Unconjugated Bilirubin
- Transfusion reaction
- Sickle cell anemia
- Hemolytic anemia
- Pernicious anemia
- Hepatitis
- Cirrhosis
- Sepsis
- Neonatal hyperbilirubinemia
**Blood Alcohol Levels**

**Norms:** None

**Critical Values:** >300 mg/dl

This test measures alcohol levels in the blood. It is used to detect alcohol intoxication and overdose.

**Explanation:**

Blood alcohol levels of 50 to 100 mg/dl, or 0.05% to 0.10% weight/volume, may cause flushing, slowing of reflexes, and impaired visual activity. People with levels lower than 0.05% are not considered under the influence of alcohol. Levels over 0.10% are considered over the legal limit in most states and evidence of intoxication. Depression of the CNS occurs with levels over 100 mg/dl, or 0.10%, and fatalities can occur with levels over 400 mg/dl, or 0.40%.

Alcohol is rapidly absorbed from the stomach in about 1 hour. If the stomach is empty, absorption is faster. Alcohol is metabolized in the liver. A 70-kg person with normal liver function can metabolize about 15 mg of alcohol per hour.
**Blood Urea Nitrogen – BUN**

**Norms:**
- Adult – 10-20 mg/dl or 3.6-7.1 mmol/L (SI units)
- Elderly – may be slightly higher than adult
- Child – 5-18 mg/dl
- Infant – 5-18 mg/dl
- Newborn – 3-12 mg/dl
- Cord – 21-40 mg/dl

**Critical Values:**
> 100 mg/dl (indicates serious impairment of renal function)

BUN serves as an index of the function of the liver, where urea is formed, and the kidneys, where the urea is excreted.

**Explanation:**

BUN measures the amount of urea nitrogen there is in the blood. Urea is formed in the liver as an end product of protein metabolism. It is then deposited into the bloodstream and excreted through the kidneys. If normal liver function exists, BUN is a measure of renal function and glomerular filtration rate.

BUN may not become elevated if renal disease is unilateral because the unaffected kidney can compensate for the diseased kidney. There are other causes of BUN elevation other than primary renal disease. Some of these include shock, dehydration, CHF, and excessive protein catabolism.

BUN is interpreted in conjunction with the creatinine test. Creatinine is actually a better indicator of renal disease.

**Clinical Significance:**

Increased levels
- Prerenal causes
  - Hypovolemia
  - Shock
  - Burns
  - Dehydration
  - CHF
  - MI
  - GI bleeding
  - Excessive protein catabolism
  - Starvation
  - Sepsis

- Renal causes
  - Renal disease
Renal failure
Nephrotoxic drugs

Postrenal causes
  Ureteral obstruction from stones, tumor, or congenital anomalies
  Bladder outlet obstruction from prostatic hypertrophy or cancer or bladder/urethral anomalies
Calcium (Total/Ionized Calcium)

Norms: 

<table>
<thead>
<tr>
<th>Age</th>
<th>mg/dl</th>
<th>mmol/L (SI Units)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL CALCIUM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;10 days</td>
<td>7.6-10.4</td>
<td>1.9-2.6</td>
</tr>
<tr>
<td>Umbilical</td>
<td>9.0-11.5</td>
<td>2.25-2.88</td>
</tr>
<tr>
<td>10 days-2 yrs</td>
<td>9.0-10.6</td>
<td>2.3-2.65</td>
</tr>
<tr>
<td>Child</td>
<td>8.8-10.8</td>
<td>2.2-2.7</td>
</tr>
<tr>
<td>Adult</td>
<td>9.0-10.5</td>
<td>2.25-2.75</td>
</tr>
</tbody>
</table>

| IONIZED CALCIUM|       |                |
| Newborn        | 4.2-5.58 | 1.05-1.37    |
| 2 mons-18 yrs  | 4.80-5.52 | 1.20-1.38   |
| Adult          | 4.5-5.6  | 1.05-1.30    |

Critical Values: Total Calcium - <6.0 or >13 mg/dl; or <1.5 or >3.25 mmol/L
Ionized Calcium - <2.2 or >7.0 mg/dl; or <0.78 or >1.58 mmol/L

Serum calcium levels are used to evaluate parathyroid function and calcium metabolism by directly measuring the total amount of calcium in the blood. They are also used to monitor patients with renal failure, renal transplantation, hyperparathyroidism, and various malignancies. Serum calcium testing is also used to monitor calcium levels during and after large-volume blood transfusions.

Explanation:

Serum calcium is vital for muscle contractility, cardiac function, neural transmission, and blood clotting. When calcium blood levels decrease, parathyroid hormone (PTH) release is stimulated. This hormone acts on the reservoirs of calcium, bones and teeth, to release calcium into the blood. About half of the serum calcium exists in the blood in its free (ionized) form and then about half exists in its protein-bound form (mostly with albumin). The serum calcium level measures both. Therefore, as albumin levels decrease, so will be the serum calcium level and vice versa. Generally it is remembered that the total serum calcium level decreases by approximately 0.8 mg for every 1-g decrease in the serum albumin level.

For the diagnosis of hypercalcemia, the patient must have elevated serum calcium levels at least three times. Symptoms of hypercalcemia include anorexia, nausea, vomiting, somnolence, and coma. Hyperparathyroidism is the number one cause of hypercalcemia. Parathyroid hormone acts to increase serum calcium by increasing GI absorption, decreasing urinary excretion, and increasing bone resorption. Malignancy is the second most common cause of hypercalcemia. Tumor metastasis to the bone causes break down and calcium is pushed into the blood stream. Some cancers can produce PTH-like substances that drive the serum calcium up.
Normal serum calcium could still mean the patient is hypercalcemic if the albumin level is low. A similar situation exists in patients with chronic renal failure.

Hypocalcemia occurs with hypoalbuminemia. The most common causes are malnutrition, as in alcoholics, and large-volume IV infusions.

**Clinical Significance:**

**Increased levels**
- Hyperparathyroidism
- Nonparathyroid PTH-producing tumor (e.g., lung or renal carcinoma)
- Metastatic tumor to bone
- Paget’s disease of bone
- Prolonged immobilization
- Mild-alkali syndrome
- Vit D intoxication
- Lymphoma
- Granulomatous infections such as sarcoidosis and tuberculosis
- Addison’s disease
- Acromegaly
- Hyperthyroidism

**Decreased levels**
- Hypoparathyroidism
- Renal failure
- Hyperphosphatemia
- Rickets, Osteomalacia
- Vit D deficiency
- Malabsorption
- Pancreatitis
- Fat embolism
- Alkalosis
Chloride

Norms:
- Adult/Elderly – 90-110 mEq/L or 98-106 mmol/L (SI Units)
- Child – 90-110 mEq/L
- Newborn – 96-106 mEq/L
- Premature infant – 95-110 mEq/L

Critical Values: < 80 or > 115 mEq/L

This is part of electrolyte testing. Chloride is interpreted with the other electrolytes to investigate acid-base balance and hydrational status.

Explanation:

Chloride is the major extracellular anion. It maintains electrical neutrality, mostly as a salt with sodium. As sodium moves, chloride follows. Because water moves with sodium and chloride, chloride also affects water balance. Chloride also serves as a buffer to assist in acid-base balance.

Hypochloremia and hyperchloremia rarely occur alone and usually are part of parallel shifts in sodium or bicarbonate levels. Signs and symptoms of hypochloremia include hyperexcitability of the nervous system and muscles, shallow breathing, hypotension, and tetany. Signs and symptoms of hyperchloremia include lethargy, weakness, and deep breathing.

Clinical Significance:

Increased levels
- Dehydration
- Excessive infusion of normal saline solution
- Metabolic acidosis
- Renal tubular acidosis
- Cushing’s syndrome
- Kidney dysfunction
- Hyperparathyroidism
- Eclampsia
- Respiratory alkalosis

Decreased levels
- Overhydration
- Syndrome of inappropriate secretion of antidiuretic hormone
- CHF
- Vomiting or prolonged gastric suction
- Chronic diarrhea or high-output GI fistula
- Chronic respiratory acidosis
- Metabolic alkalosis
Salt-losing nephritis
Addison’s disease
Diuretic therapy
Hypokalemia
Aldosteronism
Burns
**Creatinine Clearance**

**Norms:**  
Adult (<20 yrs)  
- Male – 90-139 ml/min or 0.87-1.34 ml/sec/m²  
- Female – 80-125 ml/min or 0.77-1.2 ml/sec/m²  
Values decrease 6.5 ml/min/decade of life after age 20 with decline in glomerular filtration rate (GFR)  
Newborn – 40-65 ml/min

This test is used to measure the GFR of the kidney.

**Explanation:**

Creatinine is a catabolic product of creatine phosphate which is used in skeletal muscle contractions. Production of creatine and subsequently, creatinine, depends on muscle mass. Creatinine is excreted exclusively by the kidneys. Creatinine clearance is a calculation made by knowing the urine and serum creatinine level and measures the GFR.

The amount of filtrate made in the kidney depends on the amount of blood to be filtered and the ability of the glomeruli to filter. As with the BUN, if kidney disease is unilateral, there may not be a decrease in creatinine clearance.

**Clinical Significance:**

**Increased levels**  
- Exercise  
- Pregnancy  
- High cardiac output syndromes

**Decreased levels**  
- Impaired kidney function  
- Conditions causing decreased GFR such as CHF cirrhosis with ascites, shock, and dehydration
Creatinine, Serum

Norms: Elderly – Decrease in muscle mass may cause decreased values
       Adult
       Male – 0.6-1.2 mg/dl
       Female – 0.5-1.1 mg/dl or 44-97 mmol/L (SI units)
       Adolescent – 0.5-1.0 mg/dl
       Child – 0.3-0.7 mg/dl
       Infant – 0.2-0.4 mg/dl
       Newborn – 0.3-1.2 mg/dl

Critical Values: >4 mg/dl (indicates serious impairment in renal function)

Creatinine is used to diagnose impaired renal function.

Explanation:

This test measures the amount of creatinine in the blood. Creatinine is a catabolic product of creatinine phosphate, which is used in skeletal muscle contraction. The daily production of creatinine is fairly constant because it is dependant upon muscle mass, which does not fluctuate very much on a day-to-day basis. Creatinine is excreted entirely by the kidneys and is therefore directly proportional to renal excretory function. The only occasion for creatinine to increase would be in the presence of renal disorders such as glomerulonephritis, pyelonephritis, acute tubular necrosis, and urinary obstruction.

Creatinine levels are used in conjunction with BUN levels to diagnose renal impairment. But unlike BUN, creatinine is not affected by hepatic function. Creatinine levels tend to rise later than BUN levels. Therefore, creatinine is indicative of a more chronic disease process. In general, a doubling of creatinine suggests a 50% reduction in the glomerular filtration rate.

Clinical Significance:

Increased levels
Diseases affecting renal function, such as glomerulonephritis, pyelonephritis, acute tubular necrosis, urinary tract obstruction, reduced renal blood flow, diabetic nephropathy, nephritis
Rhabdomyolysis
Acromegaly
Gigantism

Decreased levels
Debilitation
Decreased muscle mass – ie, muscular dystrophy, myasthenia gravis
**Blood Glucose or Fasting Blood Sugar**

**Norms:**
- Cord – 45-96 mg/dl or 2.5-5.3 mmol/L (SI units)
- Premature infant – 20-60 mg/dl or 1.1-3.3 mmol/L
- Neonate – 30-60 mg/dl or 1.7-3.3 mmol/L
- Infant – 40-90 mg/dl or 2.2-5.0 mmol/L
- Child <2 yrs – 60-100 mg/dl or 3.3-5.5 mmol/L
- Child >2 to adult – 70-105 mg/dl or 3.9-5.8 mmol/l
- Elderly – increase in normal range after age 50 yrs

**Critical Values:**
- Adult male - <50 and >400 mg/dl
- Adult female - <40 and >400 mg/dl
- Infant - <40 mg/dl
- Newborn - <30 and >300 mg/dl

This test directly measures fasting blood glucose levels and is used to evaluate diabetic patients.

**Explanation:**

Glucose is controlled through a feedback system involving glucagons and insulin. When glucose levels are low in the fasting state, glucagons is secreted from the pancreas. Glucagon breaks down glycogen down to glucose in the liver and glucose levels rise. When glucose levels are higher after eating insulin is secreted from the pancreas. Insulin attaches to insulin receptors in muscle, liver, and fatty cells where it drives glucose into the cell to be metabolized to glycogen, amino acid, and fatty acids. Then blood glucose levels decrease.

True glucose elevations indicate diabetes mellitus. There are many other reasons why glucose levels may increase such as hormone levels, stress, and recently eating. Hypoglycemia also has many causes such as drugs and insulin overdose.

**Clinical Significance:**

Increased levels
- Diabetes mellitus
- Acute stress response
- Cushing’s syndrome
- Pheochromocytoma
- Chronic renal failure
- Glucagonoma
- Acute pancreatitis
- Diuretic therapy
- Corticosteroid therapy
- Acromegaly
Decreased levels

- Insulinoma
- Hypothyroidism
- Hypopituitarism
- Addison’s disease
- Extensive liver disease
- Insulin overdose
- Starvation
Thyroxine, Free – T₄

Norms:

<table>
<thead>
<tr>
<th>Age</th>
<th>ng/dl</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-4 days</td>
<td>2-6</td>
</tr>
<tr>
<td>2 wks-20 yrs</td>
<td>0.8-2</td>
</tr>
<tr>
<td>Adult</td>
<td>0.8-2.7</td>
</tr>
</tbody>
</table>

Free thyroxine is used to evaluate thyroid function in patients who may have protein abnormalities that could affect total T₄ levels. This test is used to diagnose thyroid function and to monitor replacement and suppressive therapy.

Explanation:

Thyroid hormone is made up of thyroxine (T₄) and triiodothyronine (T₃). The largest portion is T₄ and the majority of that, as much as 99%, is bound to proteins such as thyroxine-binding globulin (TBG) and albumin. Only 1% to 5% of total T₄ is unbound or “free.” This free portion is the metabolically active thyroid hormone. Total T₄ is a measure of bound and free amounts of the hormone. Therefore, abnormalities in protein levels can significantly affect the results. Free T₄ is not affected by these abnormalities and is therefore a more accurate assessment of thyroid function than total T₄. Overall, greater than normal levels indicates hyperthyroid states and lower than normal levels indicates hypothyroid states.

Clinical Significance:

Increased levels
- Primary hyperthyroid states
- Acute thyroiditis
- Struma ovarii

Decreased levels
- Hypothyroid states
- Pituitary insufficiency
- Hypothalamic failure
- Iodine insufficiency
- Nonthyroid illnesses
**Glycosylated Hemoglobin (GHb) or Hemoglobin A1C (HbA1c)**

**Norms:**
- Adult/Elderly – 4%-8%
- Child – 1.8%-4%
- Good diabetic control – 7% or less
- Fair diabetic control – 10%
- Poor diabetic control – 13-20%

This test measures the amount of HbA1c in the blood. It provides an accurate long-term index of the patient’s average blood glucose and therefore is used to monitor diabetes treatment.

**Explanation:**

In adults about 98% of the hemoglobin in the RBC is hemoglobin A. HbA1c is the component of hemoglobin A that most strongly combines with glucose in the process of glycosylation. As the RBC circulates, it combines its HbA1 with some of the glucose in the bloodstream to form glycohemoglobin (GHb). The amount of GHb depends on the amount of glucose the RBC comes in contact with over its 120-day life span, therefore reflecting the average blood sugar level for the 100- to 120-day period before the test. The more glucose the RBC is exposed to, the greater the GHb percentage. This test is not influenced by short-term variations such as food intake, exercise, or stress. The elevation in GHb occurs about 3 weeks after the sustained elevation in blood glucose. It takes at least 4 weeks for the GHb to decrease after a sustained reduction in blood glucose.

**Clinical Significance:**

**Increased levels**
- Newly diagnose diabetic patient
- Poorly controlled diabetic patient
- Nondiabetic hyperglycemia such as acute stress response, Cushing’s syndrome
- Splenectomized patients
- Pregnancy

**Decreased levels**
- Hemolytic anemia
- Chronic blood loss
- Chronic renal failure
Lactic Dehydrogenase – LDH or Isoenzyme LDH 5 specific for the liver

Norms: Adult/Elderly – 45-90 U/L (30 degree C),
       115-225 IU/L or 0.4-1.7 mmol/L (SI units)
       Isoenzyme LDH 5 – 0%-5%
       Child – 60-170 U/L (30 degree C)
       Infant – 100-250 U/L
       Newborn – 160-450 U/L

LDH is an intracellular enzyme used to support the diagnosis of injury or disease of the heart, liver, RBCs, kidneys, skeletal muscle, brain, and lungs.

Explanation:

LDH 5 is the isoenzyme that indicates hepatocellular injury or disease. The heart, RBCs, skeletal muscle, lung, kidney, and pancreas all are followed by looking at other isoenzymes. The mechanism works much the same as the other enzymes. When there is injury to the cells containing LDH, it is spilled out into the bloodstream and the labs show elevated levels.

Clinical Significance: (for GI purposes)

Increased level
   Hepatic disease
   Intestinal ischemia and infarction
   Advanced solid tumor malignancies
   Pancreatitis (LDH 4)
Lipase

Norms: 0-110 U/L or 0-417 U/L (SI units)

Lipase is used to evaluate for pancreatic disease.

Explanation:

Lipase is secreted by the pancreas into the duodenum to break down triglycerides into fatty acids. Like amylase, lipase is secreted into the bloodstream when there is damage to or disease affecting the pancreatic acinar cells.

The most common cause of elevated lipase levels is acute pancreatitis where levels can rise to 5-10 time normal values. Lipase levels usually rise a little later than amylase and remain elevated for 5-7 days. This makes lipase a more useful tool in late diagnosis of acute pancreatitis. Lipase is not as useful in chronic pancreatitis or pancreatic carcinoma.

Other conditions can be associated with elevated levels of lipase. Since lipase is secreted through the kidneys, elevated levels can be seen in renal failure. Elevated lipase levels can also be associated with intestinal infarction or obstruction. However, in nonpancreatic diseases, lipase levels are usually only 3 times the upper limit of normal.

Clinical Significance:

Increased levels
- Pancreatic disease
- Biliary disease
- Renal failure
- Intestinal disease
- Peptic ulcer disease
- Salivary gland inflammation or tumor
Postprandial Glucose

Norms: 2-hour PPG
- 0-50 yrs: <140 mg/dl or 7.8 mmol/L (SI units)
- 50-60 yrs: <150 mg/dl
- 60 yrs and older: <160 mg/dl
- 1-hour glucose screen for gestational diabetes: <140 mg/dl

The 2-hour PPG test is used to test for diabetes mellitus by measuring the amount of glucose in the patient’s blood 2 hours after a meal.

Explanation:

In a healthy patient, insulin is secreted immediately after a meal is eaten and glucose levels will have returned to normal within 2 hours. In this test, a meal is used as a glucose challenge to see if glucose levels return to normal 2 hours after eating a meal. In patients with diabetes, the glucose level is still elevated at 2 hours after eating the meal.

If the results are >140 and <200, further studies such as a glucose tolerance test should be completed. If the 2-hour PPG is >200, the diagnosis of diabetes mellitus can be made.

Clinical Significance:

Increased levels
- Diabetes mellitus
- Gestational diabetes mellitus
- Malnutrition
- Hypothyroidism
- Acute stress response
- Cushing’s syndrome
- Pheochromocytoma
- Chronic renal failure
- Glucagonoma
- Diuretic therapy
- Corticosteroid therapy
- Acromegaly
- Extensive liver disease

Decreased levels
- Insulinoma
- Hypothyroidism
- Hypopituitarism
- Addison’s disease
- Insulin overdose
- Malabsorption or maldigestion
Potassium (K)

Norms:
- Adult/Elderly – 3.5-5.0 mEq/L or 3.5-5.0 mmol/L (SI Units)
- Child – 3.4-4.7 mEq/L
- Infant – 4.1-5.3 mEq/L
- Newborn – 3.9-5.9 mEq/L

Critical Values:
- Adult - <2.5 or >6.5 mEq/L
- Newborn - <2.5 or >8.0 mEq/L

This electrolyte is important to the cardiac function. It is tested as part of complete routine evaluations, especially in patients who take diuretics or heart medications.

Explanation:

K is the major cation within the cell. The difference in concentrations between intracellular concentration and the serum concentration maintains membrane electrical potential, especially in neuromuscular tissue. Because the serum concentration is so small compared to the intracellular concentration, small changes can have significant affects.

K is excreted by the kidneys. There is no reabsorption of K from the kidneys. Therefore, if K is not adequately supplied in the diet, serum K levels can drop rapidly.

K contributes to the metabolic portion of acid-base balance in that the kidneys can shift K\(^{+}\) for H\(^{+}\) ions to maintain physiologic pH.

Serum potassium concentration depends on many factors, including:
1. Aldosterone ( and to a lesser extent, glucocorticosteroids) – tends to increase renal losses of K
2. Sodium reabsorption – as sodium is reabsorbed, potassium is lost
3. Acid-base balance – alkalotic states tend to lower serum K by shifting it into the cell while acidotic states tend to raise serum K levels by reversing that shift

Symptoms of hyperkalemia include irritability, nausea, vomiting, intestinal colic, and diarrhea. EKG changes include peaked T waves, a widened QRS complex, and depressed ST segment. Signs of hypokalemia are related to a decrease in contractility of smooth, skeletal, and cardiac muscles, which results in weakness, paralysis, hyporeflexia, ileus, increased cardiac sensitivity to digoxin, cardiac arrhythmias, flattened T waves, and prominent U waves. K must be monitored in patients taking digitalis-like drugs because cardiac arrhythmias may be induced by hypokalemia and digoxin.

Clinical Significance:

Increased levels (hyperkalemia)
- Excessive dietary intake
Excessive IV intake
Acute or chronic renal failure
Addison’s disease
Hypoaldosteronism
Aldosterone-inhibiting diuretics
Crush injury to tissues
Hemolysis
Transfusion of hemolyzed blood
Infection
Acidosis
Dehydration

Decreased levels (hypokalemia)
Deficient dietary intake
Deficient IV intake
Burns
GI disorders
Diuretics
Hyperaldosteronism
Cushing’s syndrome
Renal tubular acidosis
Alkalosis
Licorice ingestion
Insulin administration
Glucose administration
Ascites
Renal artery stenosis
Cystic fibrosis
Trauma/surgery/burns
Prothrombin Time – PT

Norms: 11.0-12.5 seconds; 85%-100%
        Full anticoagulant therapy -> 1.5-2.0 times control value; 20%-30%

This is generally a test used to evaluate the adequacy of extrinsic system and common pathway in the clotting mechanism. It can also be used to evaluate liver function.

Explanation:

PT measures the clotting ability of factors I, II, V, VII, and X which are involved in the extrinsic system and common pathway. Factors I, II, V, VII, IX, and X are all produced in the liver. Therefore, if there is hepatocellular injury or disease and the production of these factors is decreased, there will be a prolongation of the PT.

Obstructive biliary disease can also affect PT because the necessary bile for fat absorption is not able to enter the gut. Vitamins A, D, E, and K are fat soluble and not absorbed. Vitamin K is needed for the synthesis of factors II, VII, IX, and X. Therefore, with a decrease in Vitamin K, serum concentrations of these factors will fall.

In order to differentiate between Vitamin K deficiency and hepatocellular disease, parenteral Vitamin K is administered. If PT returns to normal after 1-3 days of Vitamin K administration, it is probably obstructive biliary disease. If not, it is assumed that hepatocellular disease exists.

Clinical Significance:

Increased levels or prolongation of PT
   Liver disease such as cirrhosis or hepatitis
   Hereditary factor deficiency
   Vitamin K deficiency
   Bile duct obstruction
   Coumarin ingestion such as Coumadin or Panwarfin
   Disseminated intravascular coagulation
   Massive blood transfusion
   Salicylate intoxication
Sodium (Na)

Norms:  
- Adult/Elderly – 136-145 mEq/L or 136-145 mmol/L  
- Child – 136-145 mEq/L  
- Infant – 134-150 mEq/L  
- Newborn – 134-144 mEq/L

Critical Values:  
<120 or >160 mEq/L

This is part of the electrolytes testing. It is used to monitor and evaluate fluid and electrolyte balance and therapy.

Explanation:

Sodium is the major cation in the extracellular space. Therefore, sodium salts are the major determinants of extracellular osmolality. Blood sodium content is a result of a balance between dietary sodium intake and renal excretion.

Some factors that regulate sodium balance are:

1. Aldosterone – causes conservation of sodium by stimulating the kidneys to reabsorb sodium and decreasing renal losses
2. Natriuretic hormone – decreases renal absorption and increases renal losses of sodium
3. Antidiuretic hormone (ADH) – controls reabsorption of water at the distal tubules of the kidney, affecting the sodium serum levels by dilution and concentration

Physiologically, water and sodium are closely interrelated. Aldosterone, ADH, and natriuretic hormone assist in the compensatory actions of the kidney to maintain appropriate levels of free water. As free water increases or decreases, sodium concentration decreases and increases, respectively. The kidneys actions to regulate free water help maintain proper levels of sodium.

Symptoms of hyponatremia include confusion and lethargy and may progress to stupor and coma if levels continue to decline. Symptoms of hypernatremia include dry mucous membranes, thirst, agitation, restlessness, hyperreflexia, mania, and convulsions.

Clinical Significance:

Increased levels (hypernatremia)  
- Increased sodium intake  
  - Increased dietary intake  
  - Excessive sodium in IV fluids  
- Decreased sodium loss  
  - Cushing’s syndrome  
  - Hyperaldosteronism  
- Excessive free body water loss
GI loss (without rehydration)
Excessive sweating
Extensive thermal burns
Diabetes insipidus
Osmotic diuresis

Decreased levels (hyponatremia)
  Decreased sodium intake
    Deficient dietary intake
    Deficient sodium in IV fluids
  Increased sodium loss
    Addison’s disease
    Diarrhea, vomiting, or nasogastric aspiration
    Intraluminal bowel loss as in an ileus or mechanical obstruction
    Diuretic administration
    Chronic renal insufficiency
    Chronic renal insufficiency
    Large-volume aspiration of pleural or peritoneal fluid

Increased free body water
  Excessive oral water intake
  Hyperglycemia
  Excessive IV water intake
  CHF
  Ascites
  Peripheral edema
  Syndrome of inappropriate or ectopic secretion of ADH
Triiodothyronine – T₃

**Norms:**

<table>
<thead>
<tr>
<th>Age</th>
<th>ng/dl</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-3 days</td>
<td>100-740</td>
</tr>
<tr>
<td>1-11 mons</td>
<td>105-245</td>
</tr>
<tr>
<td>1-5 yrs</td>
<td>105-270</td>
</tr>
<tr>
<td>6-10 yrs</td>
<td>95-240</td>
</tr>
<tr>
<td>11-15 yrs</td>
<td>80-215</td>
</tr>
<tr>
<td>16-20 yrs</td>
<td>80-210</td>
</tr>
<tr>
<td>20-50 yrs</td>
<td>70-205</td>
</tr>
<tr>
<td>&gt;50 yrs</td>
<td>40-180</td>
</tr>
</tbody>
</table>

Triiodothyronine is used to evaluate thyroid function, primarily diagnose hyperthyroidism. It is also used to monitor thyroid replacement and suppressive therapy.

**Explanation:**

A large portion of T₃ is formed in the liver by conversion of T₄ to T₃. T₃ is less stable than T₄ because it is not bound as tightly to the serum proteins as T₄. Still, almost 70% of T₃ is bound while only minute quantities are “free” and metabolically active. Also, T₃ levels are not affected by alterations in serum proteins as the measurement of T₄ can be.

Nonthyroid diseases can decrease the levels of T₃ by diminishing the conversion of T₄ to T₃ in the liver. This makes T₃ less helpful in diagnosis of hypothyroid states. Because of this, T₃ levels are used primarily to assist in the diagnosis of hyperthyroid states. An elevated T₃ indicates hyperthyroidism, especially when T₄ is elevated as well. There is a rare form of hyperthyroidism called “T₃ toxicosis” where T₄ is normal and T₃ is elevated.

**Clinical Significance:**

**Increased levels**
- Primary hyperthyroid states
- Acute thyroiditis
- TBG increase

**Decreased levels**
- Hypothyroid states
- Pituitary insufficiency
- Hypothalamic failure
- Protein malnutrition and other protein-depleted states
- Nonthyroid illnesses
- Iodine insufficiency
- Hepatic disease
Thyroxine – T₄

Norms:

<table>
<thead>
<tr>
<th>Age</th>
<th>ug/dl</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-3 days</td>
<td>11-22</td>
</tr>
<tr>
<td>1-2 weeks</td>
<td>10-16</td>
</tr>
<tr>
<td>1-4 mons</td>
<td>8-16</td>
</tr>
<tr>
<td>1-5 yrs</td>
<td>7-15</td>
</tr>
<tr>
<td>5-10 yrs</td>
<td>6-13</td>
</tr>
<tr>
<td>10-15 yrs</td>
<td>5-12</td>
</tr>
<tr>
<td>Adult male</td>
<td>4-12</td>
</tr>
<tr>
<td>Adult female</td>
<td>5-12</td>
</tr>
<tr>
<td>Adult &gt;60</td>
<td>5-11</td>
</tr>
</tbody>
</table>

Critical Values: Adult - <2.0 mg/dl if myxedema coma possible; >20 mg/dl if thyroid storm possible
Newborn - <7.0 mg/dl

Thyroxine is used to diagnose thyroid function and to monitor replacement and suppressive therapy.

Explanation:

Serum T₄ is a direct measurement of the total amount of T₄, bound and free, in the patient’s blood. Levels that are greater than normal indicate hyperthyroid states and levels lower than normal indicates hypothyroid states.

T₄ makes up nearly all of what we call thyroid hormone. T₃ makes up less than 10% of thyroid hormone. Nearly all of both hormones are bound to proteins. Most of it is bound to thyroxine-binding globulin (TBG) and some to albumin and prealbumin. It is the unbound or “free” hormone that is metabolically active and working on the cells of the body. Therefore the test reliability can be affected by the amount of TBG in the body. These proteins can increase in pregnancy and patients taking oral contraceptives. To correct for this the levels of these carrier proteins are concomitantly measured.

Clinical Significance:

Increased levels
- Primary hyperthyroid states such as Graves’ disease, Plummer’s disease, toxic thyroid adenoma
- Acute thyroiditis
- Familial dysalbuminemic hyperthyroxinemia
- TBG increase as in pregnancy, hepatitis, congenital hyperproteinemia

Decreased levels
- Hypothyroid states such as cretinism, surgical ablation, myxedema
- Pituitary insufficiency
Hypothalamic failure
Protein malnutrition and other protein-depleted states
Iodine insufficiency
Nonthyroid illnesses such as renal failure, Cushing’s disease, cirrhosis, surgery, advanced cancer
Thyroid-Stimulating Hormone - TSH

Norms: Adult - 2-10 mU/ml or 2-10 mU/L (SI units)
       Newborn - 3-18 mU/L
       Cord - 3-12 mU/ml

TSH is used to diagnose primary hypothyroidism and to differentiate it from secondary (pituitary) and tertiary (hypothalamus) hypothyroidism. This test is also used to monitor the effectiveness of thyroid medications and screen newborns.

Explanation:

TSH is secreted from the pituitary gland in response to stimulation from thyrotropin-releasing hormone (TRH) from the hypothalamus. Lower than normal levels of T3 and T4 stimulate TRH and TSH. Therefore a compensatory increase of TRH and TSH occurs in patients with primary hypothyroid states.

In secondary or tertiary hypothyroidism there is dysfunction in the pituitary gland or the hypothalamus gland. TRH and TSH cannot be secreted. Even with stimulation of low levels of T3 and T4, there are almost zero levels of TRH and TSH.

When exogenous thyroid medication is used, the goal is either thyroid replacement for a non-functioning thyroid or suppression of the thyroid. In both cases, you are attempting to keep TSH secretion at a minimum. Therefore, you monitor the effectiveness of the medication by testing the TSH.

Clinical Significance:

Increased levels
- Primary hypothyroidism
- Thyroiditis
- Thyroid agenesis
- Congenital cretinism or congenital hypothyroidism
- Large doses of iodine
- Radioactive iodine injection
- Surgical ablation of thyroid
- Severe and chronic illnesses

Decreased levels
- Secondary hypothyroidism (pituitary or hypothalamus dysfunction)
- Hyperthyroidism
- Suppressive doses of thyroid medications
White Blood Cell Count and Differential – (WBC with diff)

**Norms:**

Total WBCs – Adult/Child >2yrs – 5000-10,000/mm$^3$

or 5-10.0 X 10$^9$/L (SI Units)

Child <2yrs – 6200-17,000/mm$^3$

Newborn – 9000-30,000/mm$^3$

**Differential Count**

<table>
<thead>
<tr>
<th>Cell Type</th>
<th>(%)</th>
<th>Absolute (per mm$^3$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neutrophils</td>
<td>55-70</td>
<td>2500-8000</td>
</tr>
<tr>
<td>Lymphocytes</td>
<td>20-40</td>
<td>1000-4000</td>
</tr>
<tr>
<td>Monocytes</td>
<td>2-8</td>
<td>100-700</td>
</tr>
<tr>
<td>Eosinophils</td>
<td>1-4</td>
<td>50-500</td>
</tr>
<tr>
<td>Basophils</td>
<td>0.5-1.0</td>
<td>25-100</td>
</tr>
</tbody>
</table>

**Critical Values:**

WBCs <2500 or >30,000/mm$^3$

White blood cell count and differential is helpful in the evaluation of the patient with infection, neoplasm, allergy, or immunosuppression.

**Explanation:**

There are two parts to this test. The total number of white blood cells and then the differential which measures the percentage of each type of leukocyte, the neutrophils, lymphocytes, monocytes, eosinophils, and basophils. An increased total count usually means there is infection, inflammation, tissue necrosis, or leukemic neoplasia in the body. Sometimes trauma or stress, either emotional or physical, may cause an increase in WBC. A decrease in WBC occurs when there is bone marrow failure as in antineoplastic chemotherapy or radiation therapy, marrow infiltration diseases, overwhelming infection, dietary deficiencies, and autoimmune diseases. The major function of leukocytes is to fight infection and react against foreign bodies or tissues.

The primary role for neutrophils is phagocytosis or killing and digestion of bacterial microorganisms. When the production of neutrophils increases quickly, early immature forms called “band” or “stab” cells are in circulation. This is what is known as a “left shift” in WBC production and is indicative of a bacterial infection.

Basophils are also called mast cells. Basophils and eosinophils are involved in allergic reactions. They carry out phagocytosis of antigen-antibody complexes. They do not respond to bacterial or viral infections.

There are two types of lymphocytes. T cells are involved in cellular-type immune reactions and B cell are involved in humoral immunity or antibody productions. The primary function of lymphocytes is to fight chronic bacterial infection and acute viral infections.
Monocytes fight bacterial infection much like neutrophils in that they are phagocytic. They can be produced more rapidly and spend a longer time in circulation than the neutrophils.

**Clinical Significance:**

**Increased levels (Leukocytosis)**
- Infection
- Leukemic neoplasia or other myeloproliferative disorders
- Other malignancy
- Trauma, stress, or hemorrhage
- Tissue necrosis
- Inflammation
- Dehydration
- Thyroid storm
- Steroid use

**Decreased levels (Leukopenia)**
- Drug toxicity
- Bone marrow failure
- Overwhelming infections
- Dietary deficiency such as Vit B12 or iron deficiency
- Congenital marrow aplasia
- Bone marrow infiltration
- Autoimmune disease
- Hypersplenism

*See pg 460 table 2-37 for specifics on the types of leukocytes.
Carbon Dioxide Content (CO₂ Content, Bicarbonate [HCO₃⁻])

Norms:  
- Adult/Elderly – 23-30 mEq/L or 23-30 mmol/L (SI Units)
- Child – 20-28 mEq/L
- Infant – 20-28 mEq/L
- Newborn – 13-22 mEq/L

Critical Values:  
< 6 mEq/L

This is an actual test of CO₂ in the blood. This is used to assist in evaluating the pH status of the patient and to assist in evaluation of electrolytes.

Explanation:

The CO₂ content measures H₂CO₃, dissolved CO₂ and the bicarbonate ion (HCO₃⁻) that exist in the serum. Because the amounts of H₂CO₃ and dissolved CO₂ are so small in the serum, CO₂ content is an indirect measure of the HCO₃⁻ anion. This anion plays a major role in acid-base balance. It is second in importance to the chloride ion is electrical neutrality.

Levels of HCO₃⁻ are regulated by the kidneys. Levels increase with alkalosis and levels decrease with acidosis. Air affects the specimen when tested with other serum electrolytes. Therefore, venous blood specimens are not highly accurate for measuring true CO₂ content or HCO₃⁻. It is used primarily as a rough guide as to acid-base balance.

Clinical Significance:

Increased levels
- Severe vomiting
- High-volume gastric suction
- Aldosteronism
- Use of mercurial diuretics
- COPD
- Metabolic alkalosis

Decreased levels
- Chronic diarrhea
- Chronic use of loop diuretics
- Renal failure
- Diabetic ketoacidosis
- Starvation
- Metabolic acidosis
- Shock