

Critical Values

Critical values are any “laboratory result which represents a pathophysiologic state at such variance with normal as to be life threatening unless some action is taken in a very short time and in which the state may not be readily detectable or highly suspected by clinical physician” (Lundberg, MLO, 8/77, p. 31).

Test limits have been selected to be not so wide as to reduce sense of urgency and to not merely confirm obvious clinical observations. It is recognized that there is some variation among hospital laboratories, reference laboratories, and professional organizations in selecting critical values. (Kost, MLO, 3/93, p. 22).

For tests and results listed below, laboratory personnel will automatically telephone a report to Primary Nurse or physician promptly upon completion of test, regardless of test priority. Critical values are “flagged” on patient’s chart with letter “C” (for critical value) after result.

I. ADULT		
Test	Low Limit	High Limit
Hematocrit	<18.0%	>78.0%
Hemoglobin	<7.0 g/dL	>25 g/dL
Platelets	<20,000/mm ³	
White Blood Count	<1,000/mm ³	>50,000/mm ³
INR		>4.9
Partial Thromboplastin Time		>120 seconds
Fibrinogen	<100 mg/dL	
Acetaminophen		>30 µg/mL
Blood Urea Nitrogen (BUN)		>100 mg/dL***
Calcium, Serum	<6.0 mg/dL	>14.0 mg/dL
Carbamazepine		>15 µg/mL
Creatinine		>7.4 mg/dL***
Dilantin® (Phenytoin)		>24 µg/mL
Digoxin		>2.5 ng/mL
Gentamicin	Trough >2 µg/mL	Peak >12 µg/mL
Glucose, Blood	<40 mg/dL	>500 mg/dL
Glucose, Spinal Fluid	<40 mg/dL	
Lithium		>1.5 mEq/L
Phenobarbital		>50.0 µg/mL
Phosphorus, Plasma or Serum	<1.0 mg/dL	
Potassium, Serum	<2.5 mEq/L	>6.0 mEq/L****
Salicylates		>35 mg/dL
Sodium, Serum	<120 mEq/L	>150 mEq/L
Theophylline		>20.0 µg/mL
Tobramycin, Peak	<10.00 µg/mL	
Tobramycin, Trough		>2.00 µg/mL
Troponin I		>0.12 ng/mL
Valproic Acid (Depakene®)		>120 µg/mL

Critical Values (Cont.)

I. ADULT		
Test	Low Limit	High Limit
Vancomycin	Trough >20 µg/mL	Peak >50 µg/mL
When calling critical BUN or Creatinine, always give doctor both results even if only 1 test is critical. Both tests are needed to interpret critical result. *Call critical Potassium immediately after first run. Tell physician you will repeat test and call back with confirmation.		
II. PEDIATRIC (newborn to 18 years of age)		
Tests with special limits for pediatric patients are listed below. If test is not listed, critical values are same as adult limits.		
Test	Low Limit	High Limit
Hemoglobin		
Newborn-2 weeks	<12 g/dL	>25 g/dL
2 weeks-6 months	<8 g/dL	>25 g/dL
6 months-18 years	<8 g/dL	>20 g/dL
Hematocrit		
Newborn-2 weeks	<33%	>75%
2 weeks-6 months	<25%	>75%
6 months-18 years	<20%	>60%
Platelets	<50,000/mm ³	>1,000,000/mm ³
White Blood Count	<2,000/mm ³	>30,000/mm ³
INR		>2.9
Partial Thromboplastin Time		>62 seconds
Bilirubin		
Newborn-2 weeks		>15.0 mg/dL
2 weeks-3 weeks		>18.0 mg/dL
3 weeks-18 years		>10.0 mg/dL
Creatinine		>3.7 mg/dL
Glucose, Blood		
Newborn-1 month	<40 mg/dL	>200 mg/dL
1 month-18 years	<40 mg/dL	>400 mg/dL
Sodium, Serum	<125 mEq/L	>150 mEq/L
Theophylline		20.0 µg/mL

III. QUALITATIVE CRITICAL RESULTS FOR ADULTS AND CHILDREN

Blood Bank and Immunology

Incompatible crossmatch

Transfusion reactions

Microbiology

Positive for growth and/or Gram stain on blood cultures on inpatients only.

At request of Indiana Regional Medical Center medical staff, positive blood cultures on outpatients will only be called between hours of 8 a.m. and 5 p.m.

Critical Values (Cont.)

Microbiology
Positive for growth and/or Gram stain on spinal fluid cultures
Positive results for AFB smear or culture
Presence of malarial parasites
Clinical Microscopy/Urinalysis
Positive test results for glucose in urine of newborns
Presence of pathologic crystals (cysteine, leucine, or tyrosine) on urinalysis

Hematology/Coagulation
Presence of malarial parasites on blood smear

Pathology
Presence of previously undiagnosed malignancy (except squamous cell carcinoma)
Presence of mycobacterial, fungal, or other significant infectious organisms identified on special stains
Change of frozen section diagnosis after review of permanent sections
Change of diagnosis or other significant finding noted in a revised report

IV. PATIENTS WITH PREVIOUS CRITICAL RESULTS
Other critical tests may be footnoted if previous critical values are from same admission thus repeated reporting by phone would not significantly affect patient outcome. For example, a patient has had a critically low calcium in previous 24 hours. This test could be footnoted with "test verified with previous result." However, if subsequent critical value shows a worsening condition, then critical result should be called since this may indicate an unexpected event for patient.
Repeat critical calls are required for some analytes. An example of a significant patient outcome requiring repeat critical calling would be a patient who has extremely high glucose upon admission and is getting insulin. Nursing staff needs to know result as quickly as possible in order to decide amount of insulin to be given for further treatment.

V. DIALYSIS PATIENTS												
1. For known Dialysis Outpatients, separate critical values have been defined by Dr. Ashok Chaddah. These "dialysis critical values" will be reviewed and approved annually by Dr. Chaddah. The tests listed below must always be called.												
<table border="1"> <thead> <tr> <th>Test</th> <th>Low Limit</th> <th>High Limit</th> </tr> </thead> <tbody> <tr> <td>Hemoglobin</td> <td><8 g/dL</td> <td>>25 g/dL</td> </tr> <tr> <td>Hematocrit</td> <td><20%</td> <td>>75%</td> </tr> <tr> <td>Potassium</td> <td><2.5 mEq/L</td> <td>>6.5 mg/dL</td> </tr> </tbody> </table>	Test	Low Limit	High Limit	Hemoglobin	<8 g/dL	>25 g/dL	Hematocrit	<20%	>75%	Potassium	<2.5 mEq/L	>6.5 mg/dL
Test	Low Limit	High Limit										
Hemoglobin	<8 g/dL	>25 g/dL										
Hematocrit	<20%	>75%										
Potassium	<2.5 mEq/L	>6.5 mg/dL										
2. For other tests, a critical result can be footnoted rather than phoned if patient is a known dialysis patient and has had a previous critical result. In these cases, the footnote "verified with previous result" can be entered as a chartable result comment in the LIS during verification. These tests include:												

Critical Values (Cont.)

Test	Low Limit	High Limit
BUN		>100 mg/dL
Creatinine		>7.4 mg/dL
Calcium (should always be accompanied by albumin and phosphorus)	<6.0 mg/dL	>14.0 mg/dL
Glucose	<40 mg/dL	>500 mg/dL
Sodium	<120 mEq/L	>150 mEq/L

If any of above tests exceed "delta limits" indicating a worsening condition, these results will be called during regular office hours. Example, creatinine has a delta limit of 50.0%. If subsequent value exceeds prior value by more than 50%, it will be called to physician's office during regular hours.

VI. PROCEDURE

Results of testing in which potentially life-threatening values are obtained must be:

- Telephoned to physician or to primary nurse within 60 minutes of test completion
- If telephoned to physician after office hours, provide physician with outpatient's telephone number which can be obtained from HIS System

To document appropriate action, create a chartable footnote with the following:

- Date and time of phone report
- Name of technologist making the phone call
- Name of person taking report

REFERENCES:

Harriet Lane Handbook. A manual for pediatric house officers. Edited by GK Siberry and R Iannone. 5th edition. Baltimore, MD. Mosby Press, 2000

Nathan and Orski's Hematology of Infancy and Childhood. Edited by DG Nathan, SH Orkin, and CJ Lantigua. 4th edition. Philadelphia, PA. WB Saunders Company, 1993

Blood Diseases of Infancy and Childhood. Edited by DR Miller, RL Baehner, CE McMillan, and LP Miller. 5th edition. St. Louis, MO. CV Mosby Press, 1984

Coulter Viewpoint Issue No. 17, 1995

CRITICAL VALUES:

Written by D. Tozer 9/27/93

REVISED:

2/21/94, 11/06/95, 8/22/96, 12/4/97, 4/19/99, 5/4/00, 2/7/01, 3/5/03, 1/12/04, 2/17/04, 6/29/04, 10/1/04, 6/2/06, 10/10/07, 11/09/07, 3/7/08, 7/29/10