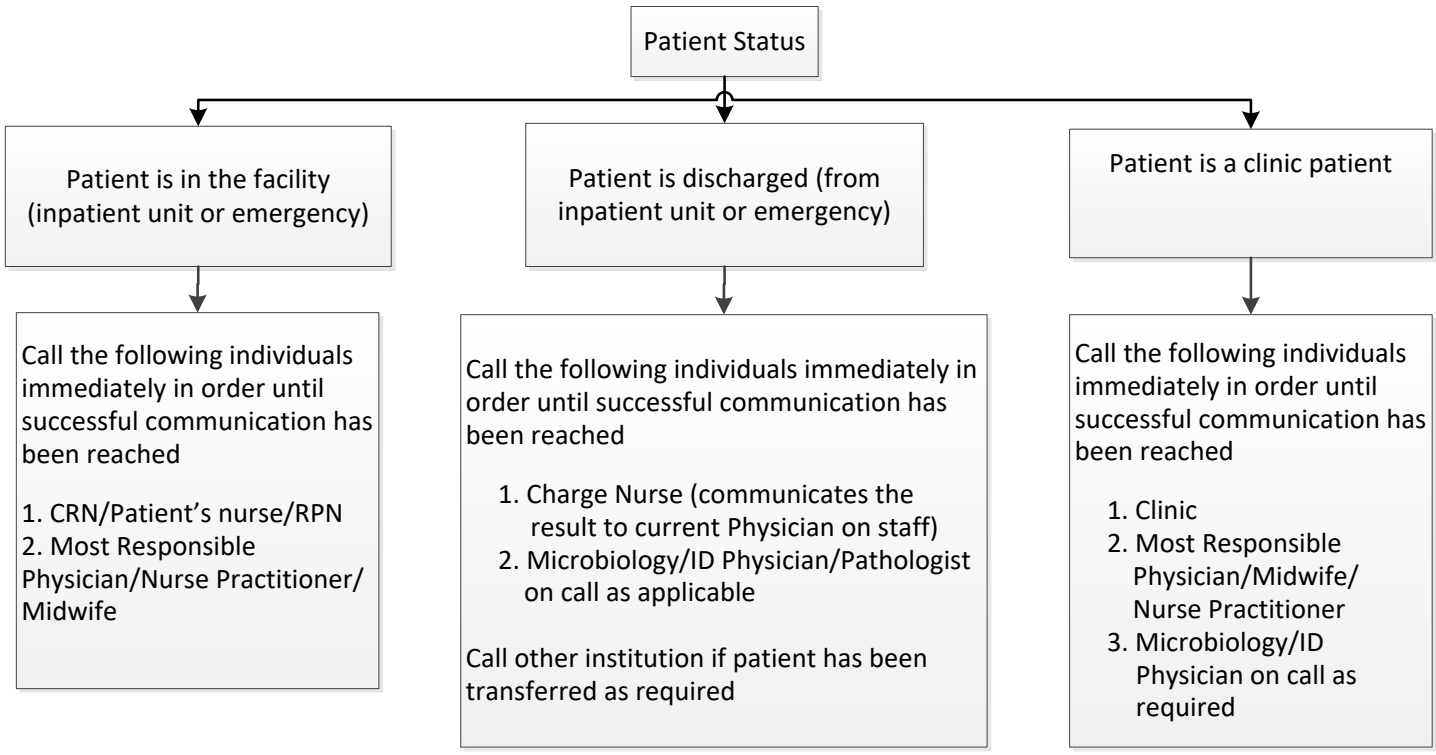
Purpose/Principle:

Critical Results are laboratory test results that are so abnormal that they generally indicate severe illness and are considered potentially life threatening without prompt medical intervention. The purpose of this policy is to ensure a consistent and safe approach to the communication and reporting of critical results by both laboratory and nursing staff. Both laboratory staff and nurses are accountable for communicating and reporting critical results in accordance with the procedure outlined in this policy. This policy and procedure ensures compliance with the Institute for Quality Management in Healthcare Requirements VIII.1 and VIII.5.1 guidelines of Laboratories R.R.O. 1990, Reg. 682 amendment to O.Reg336/04 and the Laboratory and Specimen Collection Centre Licensing Act R.S.O. 1990, c.L.1.

Policy:

All critical results (**first time and subsequent**) are communicated according to the procedure outlined in this policy. All patient care areas will follow a consistent process for the handling of a critical result called by the lab to the location where the order originated as described below. Unless otherwise specified in the list, pediatric critical values are considered the same as adult.

Process for Calling Critical Results*:



*Refer to *Communication and Escalation Policy and Procedure* to ensure timely communication of results

Procedure for communicating critical result(s):

1. ALL critical results will be telephoned immediately. If communication is not successful after following the algorithm ensure the result is verified and document all attempts of call including call times. Continue to call until successful communication of the critical result has been delivered. Please note that the procedure for calling Pathology Critical Results is different and discussed separately at the end of this document.

2. When calling the unit/department, the Lab staff will ask to speak to a nurse (CRN, or patient's RN or RPN), or ordering nurse practitioner, midwife or physician and/or most responsible physician, stating that they are calling regarding a critical result. **Only a registered nurse, registered practical nurse, nurse practitioner, CRN, midwife or physician may accept the results**. Critical results are not to be given to or accepted by Unit Clerks or any individuals other than those noted above.

3. If the registered nurse, registered practical nurse, nurse practitioner, CRN, midwife or physician cannot be reached after three phone attempts (approx. every 10 minutes) within 30 minutes, refer to the EPPIC Communication and Escalation Policy and Procedure.

4. If the patient has been transferred to another patient care unit from the original ordering unit, the nurse receiving the call will give the new location to the laboratory staff member immediately and a new call will be placed to the correct unit by the laboratory.

5. The Lab staff will state:

    - The name of the patient
    - Unique number
    - Date and time of the specimen as applicable
    - The type of test that the critical result refers to as well as the result and whether it is 'critical high' or 'critical low' as applicable

6. The individual accepting the result will read it back to the Lab staff to confirm accurate communication of results.

7. The Lab requests and records the name of the individual accepting the result in the Meditech Laboratory Information System. Click comment, F5, [RP] (report phoned). The canned text Phoned to will appear. The full name of the individual receiving the information must be manually entered. The date, time and name of reporting technologist logged onto the Meditech session and working on the patient's specimen will default in. This information and the name of the technologist reporting the result will appear on the final internal or external patient report as applicable and in the electronic medical record.

8. The individual accepting the results will document the value on the physician's order sheet with the date and time and their name and notify the nurse assigned to the patient.

9. The nurse assigned to the patient will then be responsible for immediately communicating the results to the Most Responsible Physician. Please refer to the EPPIC Communication and Escalation Policy.

10. All communication with the physician and associated patient assessments and interventions related to the critical result must be documented in the patient health record.

11. If a critical result is called to an inpatient area or outpatient or Emergency area after the patient has been discharged out of the hospital, the CRN will notify the current physician on staff to determine next steps (call patient at home, ask patient to return, etc.).

12. If the patient has been transferred to another facility, lab staff will notify a nurse/physician at the receiving facility. For critical results that may not be reported immediately due to the nature of the testing (such as Microbiology testing), the technologist shall refer to the patient LIS Data Screen available on the special function menu in Meditech to determine if a discharge disposition has been recorded. If the transferred location is available the technologist will communicate the critical result to the nurse attending the patient at the transferred to facility.

13. If the chart has been sent to Health Records, the nurse must recall the chart and document all communication on the progress notes.

CHEMISTRY CRITICAL RESULTS BY AGE

TEST NAME – Matrix	Age	Sex	Crit. Low	Crit. High	Units	Test Comment
Acetaminophen - Blood	0D	MF		992	umol/L	>4h post ingestion: Possible Toxicity: 992-1324 umol/L Toxic: >1324 umol/L Refer to Appendix A and EPPIC nomogram for acetaminophen
Bicarbonate - Blood	0D 15D 1Y	MF MF MF	3 5 10	40 40 40	mmol/L	
Bilirubin Total - Blood	0D 2D 3D 4D 5D 15D - 365D	MF MF MF MF MF MF		140 190 230 250 255 200	umol/L	
Calcium, Ionized - Blood	0D	MF	0.75	1.60	mmol/L	
Calcium, Total - Blood	0D 19Y	MF MF	1.90 1.50	3.10 3.50	mmol/L	
Carbamazepine - Blood	0D	MF		63	umol/L	
Carbon Dioxide - Blood	0D 15D 1Y	MF MF MF	3 5 10	40 40 40	mmol/L	
Carboxyhemoglobin - Blood	0D	MF		0.200	% fraction	**COHb EFFECT** 0.005-0.015 Non-smokers 0.040-0.050 Smokers (one to two packs/day) 0.080-0.090 Smokers (>2 packs/day) >0.200 Toxic >0.500 Lethal
Creatinine – Blood	0D 19Y	MF MF		335 440	umol/L	Non-renal Non-renal
Digoxin - Blood	0D	MF		3.5	nmol/L	Critical value of 3.5 nmol/L applicable at >6h post dose
Dilantin - Blood	0D	MF		80	umol/L	
Ethanol - Blood	0D	MF		65	mmol/L	Intoxicated 11-22 mmol/L Depressed CNS >22 mmol/L Fatal >87 mmol/L

TEST NAME – Matrix	Age	Sex	Crit. Low	Crit. High	Units	Test Comment
Gentamicin - Post - Blood	0D	MF		12	mg/L	Therapeutic Peak (less severe infections): 5.00 - 8.00 mg/L Therapeutic Peak (severe infections): 8.00 - 10.00 mg/L NOTE: this test is only useful in multiple daily dosing regimes or for patients with renal dysfunction reveiving once daily doses.
Gentamicin - Pre - Blood	0D	MF		4	mg/L	Therapeutic Trough (once daily dosing): <1.00 mg/L Therapeutic Trough (multiple daily dosing): <2.00 mg/L NOTE: it is appropriate to order this test with both once daily and multiple daily doses.
Glucose - Blood	0D 1M 16Y	MF MF MF	2.5 2.2 2.2	11.1 22.0 25.0	mmol/L	
Glucose - CSF	0D 18Y	MF MF	1.7 2.2	- -	mmol/L	
Lactate - Blood	0D	MF		3.0	mmol/L	
Lithium – Blood	0D	MF		2.0	mmol/L	12h post (trough)
Magnesium - Blood	0D 16Y	MF MF	0.40 0.50	1.20 2.00	mmol/L	
Methemoglobin - Blood	0D	MF		0.300	% fraction	
Osmolality - Blood	0D	MF	250	325	mmol/Kg	
pCO2 - Blood	0D	MF	20	70	mmHg	
pH - Blood	0D	MF	7.20	7.60		
pH – Cord	0D	MF	7.00			
pO2 - Arterial - Blood	0D	MF	40		mmHg	
Potassium - Blood	0D 18Y	MF MF	2.5 2.5	6.0 6.5	mmol/L	

TEST NAME – Matrix	Age	Sex	Crit. Low	Crit. High	Units	Test Comment
Salicylate - Blood	0D	MF		2.00	mmol/L	
Sodium - Blood	0D 18Y	MF MF	125 120	155 160	mmol/L	
Tobramycin - Post – Blood (sendout test)	0D	MF		12.0	mg/L	Therapeutic Peak (less severe infections): 5.00 - 8.00 mg/L Therapeutic Peak (severe infections): 8.00 - 10.00 mg/L NOTE: this test is only useful in multiple daily dosing regimes or for patients with renal dysfunction receiving once daily doses.
Tobramycin - Pre – Blood (sendout test)	0D	MF		4.0	mg/L	Therapeutic Trough (once daily dosing): <1.00 mg/L Therapeutic Trough (multiple daily dosing): <2.00 mg/L NOTE: it is appropriate to order this test with both once daily and multiple daily doses.
Uric Acid – Blood	0D 19Y	MF MF		710 770	umol/L	
Valproic Acid – Blood	0D	MF		1400	umol/L	
Vancomycin - Post - Blood	0D	MF		50.0	mg/L	Therapeutic Peak (less severe infections): 20.0 - 30.0 mg/L Therapeutic Peak (severe infections): 30.0 - 40.0 mg/L NOTE: this test is only useful in multiple daily dosing regimes or for patients with renal dysfunction reveiving once daily doses.
Vancomycin - Pre - Blood	0D	MF		25.0	mg/L	Therapeutic Trough (once daily dosing): 5.0 - 10.0 mg/L Therapeutic Trough (multiple daily dosing): 10.0 - 20.0 mg/L NOTE: it is appropriate to order this test with both once daily and multiple daily doses.

HEMATOLOGY CRITICAL RESULTS BY AGE

TEST NAME	Age	Sex	Crit. Low	Crit. High	Units	Comments
White Blood Count	0D 18Y	MF MF	1.0 1.0	30.0 40.0	$x10^9/L$	Call if new or unexpected
Hemoglobin	0D 7D 1M	MF MF MF	100 75 60	230 200 200	g/L	
Platelets	All	MF	30	1000	$x10^9/L$	
Absolute Neutrophils	All	MF	0.5	NA	$x10^9/L$	
Blood Smear	0D	MF	Any Blasts, Fragments, Sickle Cells, Malaria Marked/Moderate Spherocytes			Presence of malarial parasites on blood smear is reported to Public Health Ontario by Laboratory.
Rapid Malaria Test	0D	MF	Positive			Positive Rapid Malaria tests are reported to Public Health Ontario by Laboratory.

COAGULATION CRITICAL RESULTS BY AGE

TEST NAME	Age	Sex	Crit. Low	Crit. High	Units	Comments
International Standardized Ratio (INR)	0D 18Y	MF MF		4.0 5.0		
Partial Thromboplastin Time (PTT)	0D 3M 18Y	MF MF MF		60 50 150	s	
Fibrinogen	0D	MF	1.0	NA	g/L	

TRANSFUSION MEDICINE CRITICAL RESULTS BY AGE

TEST NAME	Age	Sex	Critical Result	Comments
Prenatal Antibody Titration	0D	F	≥16	
Type and Screen	0D	MF	Presence of an antibody that results in the delay of finding crossmatched compatible red blood cells	
Transfusion Reaction	0D	MF	Transfusion Related Acute Lung Injury (TRALI or Possible TRALI) Severe Allergic Reaction/Anaphylaxis Transfusion-Associated Circulatory Overload (TACO) Acute Hemolytic Delayed Hemolytic Bacterial Infection Post transfusion Infection (e.g. HIV, Hepatitis, Chagas, Malaria, West Nile) Post Transfusion Purpura (PTP) Transfusion Associated Graft vs. Host Disease (TA-GVHD) Adverse events due to suspected mislabeling of blood product or specimen	

MICROBIOLOGY CRITICAL RESULTS (All Patients)

All Critical Results are telephoned immediately (Within 1 hour from Receipt in Microbiology)	
Gram Stains and Cultures	• 1st positive result by either Gram Stain or Culture for the following specimen types ➢ Tissue Specimens ➢ Normally sterile body fluids/sites, i.e. spinal, joint, peritoneal and ocular ➢ Blood Cultures • Blood Cultures (1st Bottle) when Staph aureus identified (even if the gram stain was already called) • Any stat gram stain request (positive or negative result)

Urgent Results	
Influenza A/B/RSV (Tested in House)	These tests are performed in the Halton Healthcare Microbiology Lab: Results reported in < 4 hours during open hours.
C. difficile cytotoxin	
MRSA/VRE/CPE (1st Isolate/Patient)	
Catheter Urine Cultures on Paediatric patients (ONLY) <= 5 years of age	
Group A Strep (Throats, Genital Specimens)	
Group B Strep (Genital – Mothers at Term)	
Enteric PCR (Salmonella, Shigella, Shiga Toxin, Campylobacter)	
Newborn Screens	These tests are <u>NOT</u> performed in the Halton Healthcare Microbiology Lab: Results within 24 hours of receipt in lab.
All Reportable Diseases (i.e. Hepatitis, HIV, TB, Influenza A&B, Encephalitis , Legionnaires, Malaria etc.) Refer to EPPIC policy "Reportable Diseases to the Medical Officer of Health Policy"	
Herpes Simplex for Newborns and Mothers (At Term)	
Pneumocystic carinii	
CMV PCR	
Histoplasmosis (Culture or Urine Antigen)	
Blastomycosis (Culture or Urine Antigen)	

SURGICAL PATHOLOGY CRITICAL RESULTS (All Patients)

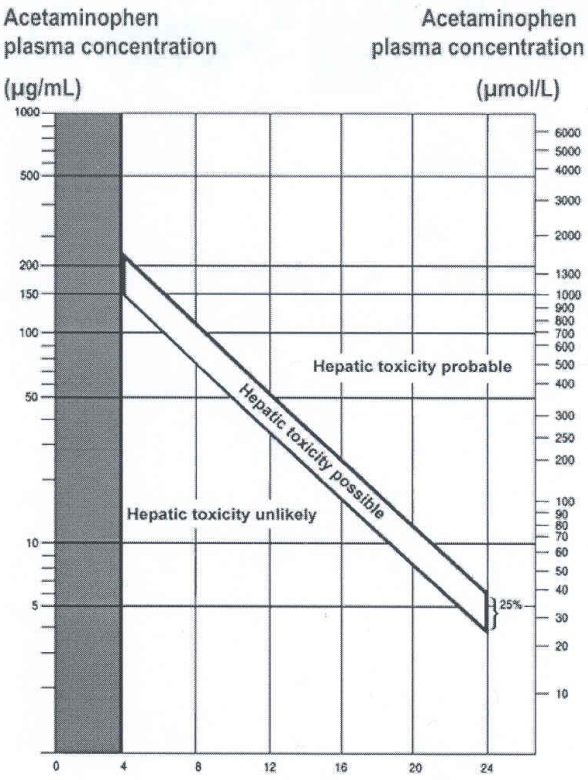
Surgical specimens, bone marrow, body fluid, cytology and blood smears with unpredicted, significant abnormal results will be reported by telephone to the ordering physician by the reporting pathologist. Evidence of the call will be documented in the patient's record according to the **Entering Results Phoned Comments for Pathologists procedure**.

Examples of Critical Diagnoses in Anatomic Pathology

Cases with immediate clinical consequences
Leukocytoclastic vasculitis
Uterine contents without villi or trophoblast
Fat in an endometrial curettage specimen
Mesothelial cells in a heart biopsy specimen
Fat in colonic endoscopic polypectomy specimens
Malignancy in superior vena cava syndrome
Neoplasms causing paralysis
Unexpected or discrepant findings
Significant disagreement between frozen section and final diagnoses
Significant disagreement between immediate interpretation and final FNA (fine needle aspiration) diagnosis
Unexpected organ/tissue or missing organ/tissue.
Unexpected malignancy
Significant disagreement and/or change between diagnoses of primary pathologist and outside pathologist consultation (at the original or consulting institution)
Infections
Bacteria or fungi in cerebrospinal fluid cytology in immunocompromised or immunocompetent patients
Pneumocystis organisms, fungi, or viral cytopathic changes in bronchoalveolar lavage, bronchial washing, or brushing cytology specimens in immunocompromised or immunocompetent patients
Acid-fast bacilli in immunocompromised or immunocompetent patients
Fungi in FNA specimen of immunocompromised patients
Bacteria in heart valve or bone marrow
Herpes in Papanicolaou smears of near-term pregnant patients
Any invasive organism in surgical pathology specimens of immunocompromised patients
Any other case that the pathologist deems to be a critical result

Appendix A

Matthew-Rumack Nomogram for Acetaminophen Poisoning



Conditions for the use of this chart:

1) Serum levels drawn before 4 hours may not represent peak levels.
2) The nomogram was designed for management of single acute ingestion of immediate-release dosage forms. See Overdose, Treatment for information on using this chart for overdose involving extended-release caplets.
3) The lower treatment line represents plasma acetaminophen levels 25% below corresponding levels on the standard nomogram treatment line and is included to allow for possible errors in acetaminophen plasma assays and estimated time from ingestion of an overdose.

Appendix B - Emergency Contact Information

A. PHYSICIANS

- Go to Connections>Directory>Physicians
- If you are having difficulty contacting a Physician please call switchboard

B. PATHOLOGISTS

- Pathologist on call schedule distributed to all sites via email
- Or call switchboard

C. MICROBIOLOGISTS

- Call Infectious Disease through switchboard for the Microbiologist on call

References:

1. OAML Protocol for Reporting Laboratory Test Results, Publication 020. June 2003.
2. Tietz, Fundamentals of Clinical Chemistry 5th Edition, Burtis et al, Chapter 46 pg 1027 Table 46-10.
3. IQMH Requirement VIII.5.1
4. Hospital for Sick Children Critical Results Reporting Policy
5. Keng et al. Standardization of haematology critical results management in adults: an International Council for Standardization in Haematology, ICSH, survey and recommendations. International Council for Standardization in Hematology, 2016, 38, 457-471.
6. MacFarlane et al. Survey of Ontario Hospitals Critical Values in Hematology. International Journal of Laboratory Hematology, 2015, 37, 36-43.
7. University Health Network Critical Results Reporting Policy
8. Canadian Society for Transfusion Medicine (CSTM), Standards for Hospital Transfusion Services. Version 4, April 2017.
9. Mount Sinai Hospital Critical Results Reporting Policy
10. Ontario Regional Blood Coordinating Network (ORBCoN), Resource Manual for Medical Directors of transfusion Medicine. Version 1, March 2013.

Related Documents:	NA
Reviewed By:	Office of Professional Practice Chief Nurse Professional Practice Leader Department of Laboratory Medicine Medical Advisory Committee Professional Practice Committee
IQMH Requirement:	HE074, VIII.5, VIII.5.1, HE051,