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Laboratory Bulletin

Date: **September 20, 2022**
To: **Edmonton Zone – Physicians, Nurses, Laboratory Directors, and Managers**
From: **Clinical Biochemistry, North Sector, Alberta Precision Laboratories (APL)**
Re: **Implementation of high sensitivity troponin T (hs-TnT) at Royal Alexandra Hospital**

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Key Messages:

- The Roche high sensitivity troponin T (hs-TnT) assay will replace the Beckman hs-TnI assay at the Royal Alexandra Hospital on **Tuesday September 27, 2022.**
- Hs-TnT will be used alongside a new rule-in and rule-out chest pain algorithm involving 2 hour serial time points (Table 1 and 2). See the new hs-TnT Survival Guide for further details.
- Northeast Community Health Centre will remain with the Beckman hs-TnI assay and 3 hr chest pain protocol (see the hs-TnI Survival Guide). Roche hsTnT and Beckman hsTnI produce different results and should not be directly compared for trending purposes. Different troponin assays will not trend in Epic. See Appendix 1 for a list of assays used across Edmonton Zone.
- A major limitation of the Roche hs-TnT assay is susceptibility to hemolysis interference, which falsely decrease results. The laboratory will cancel certain hemolyzed specimens and trigger recollection. To avoid delays in turnaround time (TAT), hemolysis should be prevented as much as possible by following AHS best practice for blood collection.

Background:

- Implementation of hs-TnT is part of a large-scale provincial project to adopt the latest generation of Roche instruments at major urban hospitals across Alberta.
- The hs-TnT 2-hour rapid protocol has been successfully used in other hospitals across Canada and has been in use in Calgary for over 8 years.
- Evidence supports the Roche hs-TnT assay in rapid diagnostic decisions for patients presenting with chest pain and shows excellent clinical sensitivity (98.7 – 99.9%) at low levels to rule-out acute myocardial infarction (AMI). Studies further support serial troponin measurements to calculate delta values at 0 & 2 hour and 2 & 4 hour intervals to rule-in or exclude AMI (Figure 1).
- These changes are consistent with clinical practice guidelines and is supported by a joint Alberta Health Services (AHS)/APL working group representing Cardiology, Emergency Medicine, and Laboratory Medicine within Edmonton Zone*.

Action Required:

- Be familiar with the switch to Roche hs-TnT and corresponding laboratory changes at RAH.
- Draw high quality blood samples free of hemolysis to prevent delays in TAT.
- Recognize there are different troponin assays and chest pain protocols used within the Edmonton Zone (Appendix 1). Do not interpret results interchangeably across sites with different assays.

Inquiries and feedback may be directed to:

Dr. Josh Raizman, Clinical Biochemist, APL, 780-718-2402 or josh.raizman@aplabs.ca
Dr. Dennis Lefebvre, ER physician, RAH, dclefebvre@gmail.com

This bulletin has been reviewed and approved by:
Dr. Kareena Schnabl, Section Chief, Clinical Biochemistry, North Sector, APL
Dr. Michael Mengel, Medical Director, North Sector, APL

*Working group clinical members:
Emergency Department: Drs. Brian Rowe, Shandra Doran, Dennis Lefebvre
Cardiology: Drs. Sean van Diepen, Michelle Graham, and Robert Welsh

Table 1: Summary of reporting scheme for the Roche hs-TnT assay

	Reporting details	Notes
Units	ng/L (whole numbers)	N/A
Reference interval	<14 ng/L	Values above this limit will be flagged as high.
Critical Value	≥53 ng/L	Only outpatient / community troponin critical value will be phoned out to ordering provider
Reporting limits	3 ng/L to endpoint	N/A
Delta value	Reported for 0 - 2 hour delta and 2 - 4 hour delta	Reported if a previous hs-TnT value on the same patient and method is within 4 hours
Result comments	Pathway interpretive comments & method identification comments	N/A

Table 2: Interpretive comments reported with hs-TnT for in-hospital and community patients

A) In-hospital patients:

hs-TnT result (ng/L)	Comment	Flagging
<5	For patients with a non-ischemic ECG, a Troponin T, High Sensitivity of 4 ng/L or less on presentation is highly sensitive for excluding acute myocardial infarction, provided the specimen was collected more than 3-hours from symptom onset. However, for patients with symptoms less than 3-hours duration or concerning clinical presentations, repeat troponin testing at 2-hours after the initial sample is recommended. Please note that patients with ischemic ECG changes and/or high-risk clinical presentations should be considered for further evaluation irrespective of troponin results.	Normal
5 -13	Troponin T, High Sensitivity is below the upper reference limit (14 ng/L) and results are not consistent with myocardial infarction or injury. However, patients with acute symptoms (less than 6-hours) or concerning clinical presentations should undergo repeat troponin testing at 2-hours after the initial sample. • A 2-hour change of 3 ng/L or less is highly sensitive for excluding acute myocardial infarction. • A 2-hour change of 4-9 ng/L may indicate acute myocardial injury. Repeat clinical evaluation, ECG and troponin at 4-hours after the initial sample is recommended. • A 2-hour change of 10ng/L suggests an acute myocardial injury and may represent acute myocardial infarction in the appropriate clinical scenario. Please note that patients with ischemic ECG changes and/or high-risk clinical presentations should be considered for further evaluation irrespective of troponin results.	Normal
14 - 52	Troponin T, High Sensitivity has a non-specific/non-diagnostic elevation. Interpretation is highly dependent on clinical presentation and patient history. New elevations are concerning; however, many patients have chronic elevations in troponin and measured concentrations near the patient's baseline are reassuring. Patients with acute symptoms (less than 6 hours) or concerning clinical presentations should undergo repeat troponin testing at 2-hours after the initial sample. • A 2-hour change of 3 ng/L or less suggests acute myocardial infarction is unlikely. • A 2-hour change of 4-9 ng/L may indicate acute myocardial injury. Repeat clinical evaluation, ECG and troponin at 4-hours after the initial sample is recommended.	High

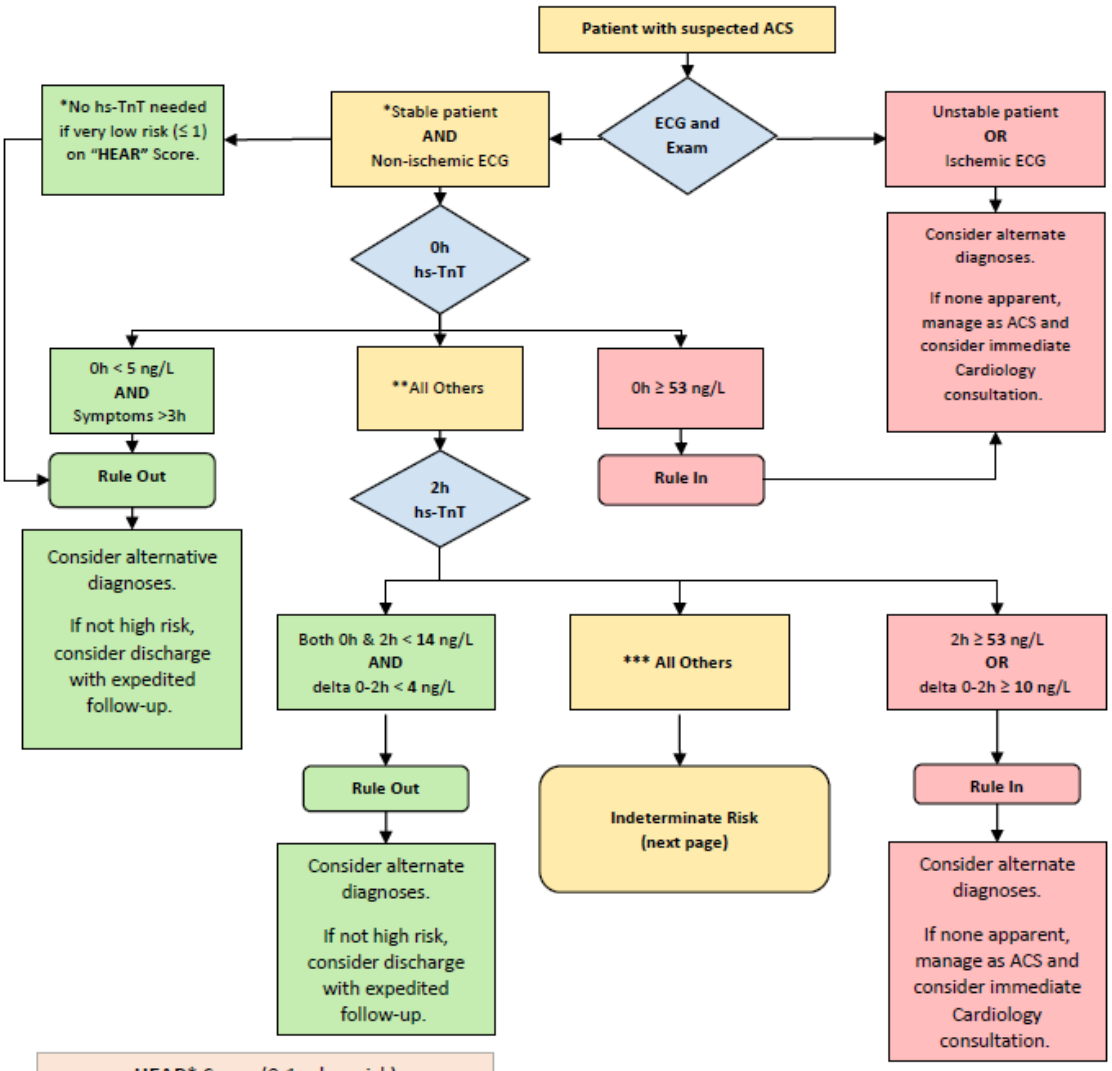
	• A 2-hour change of 10 ng/L suggests an acute myocardial injury and may represent acute myocardial infarction in the appropriate clinical scenario. Please note that patients with ischemic ECG changes and/or high-risk clinical presentations should be considered for further evaluation irrespective of troponin results.	
≥53	Clear elevation of Troponin T, High Sensitivity consistent with acute myocardial injury or infarction in the appropriate clinical context. Repeat troponin testing at 2-hours after the initial sample may be helpful to assess for ongoing myocardial injury.	Critical

B) Community patients

hs-TnT result (ng/L)	Comment	Flagging
<14	Troponin T, High Sensitivity is below the upper reference limit (14 ng/L) and results are not consistent with myocardial infarction or injury, provided the specimen was collected more than 3 hours from the onset of symptoms. Patients with active symptoms, ischemic ECG changes and/or concerning clinical presentations should be considered for urgent evaluation irrespective of troponin results.	Normal
14 - 52	Troponin T, High Sensitivity has a non-specific/non-diagnostic elevation. Interpretation is highly dependent on clinical presentation and patient history. New elevations are concerning; however, many patients have chronic elevations in troponin and measured concentrations near the patient's baseline are reassuring. Patients with active symptoms. Ischemic ECG changes and/or concerning clinical presentations should be considered for urgent evaluation irrespective of troponin results.	High
≥53	Clear elevation of Troponin T, High Sensitivity consistent with myocardial injury or infarction. Interpretation is highly dependent on clinical presentation and patient history. Many patients have chronic elevations in troponin and measured concentrations near the patient's baseline are reassuring. New troponin elevations are concerning and urgent assessment in an emergency department may be indicated in the appropriate clinical context.	Critical

Figure 1: The new reporting scheme supports the following chest pain pathway which outlines the risk management of patients presenting with suspected AMI to acute care setting (see hs-TnT Survival Guide for more details)

Part I



HEAR* Score (0-1 = low risk)			
History		Highly suspicious	2
		Moderately suspicious	1
		Slightly suspicious	0
ECG		Significant ST-depression	2
		Non-specific repolarization disturbance, LBBB, LVH, Paced	1
		Normal	0
Age		≥ 65 years	2
		45 – 64 years	1
		≤ 44 years	0
Risk Factors	☐ Diabetes ☐ Current smoker ☐ HTN (diagnosed) ☐ HL (diagnosed) ☐ Family hx CAD ☐ Obesity	≥ 3 risk factors or history of atherosclerotic disease	2
		1 or 2 risk factors	1
		No risk factors known	0

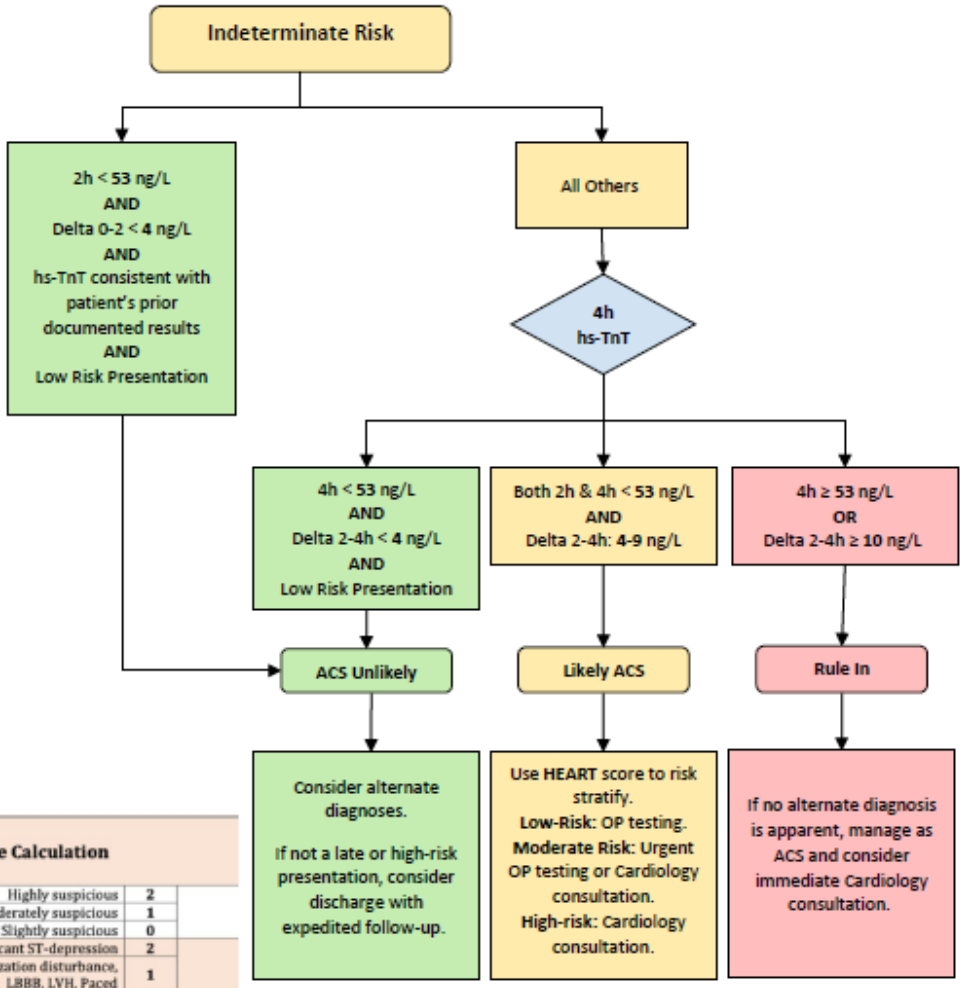
Note:

***** Consider using a structured risk assessment tool such as the HEAR (HEART without the TnT testing) to aid decision making for **very low risk** patients.

****** For all patients with abnormal hs-TnT results, check the medical record for prior results. Many patients have stable abnormalities in hs-TnT and measured concentrations similar to the patient's baseline are reassuring.

******* **The indeterminate risk pathway** arm relies on expert opinion, the experience in Calgary, and our Edmonton Zone hs-TnI chest pain pathway (initiated 2019). It aligns with current guideline recommendations.

Part II: Intermediate Risk



HEART Score Calculation			
History	Highly suspicious		2
	Moderately suspicious		1
	Slightly suspicious		0
ECG	Significant ST-depression		2
	Non-specific repolarization disturbance, LBBB, LVH, Paced		1
	Normal		0
Age	≥ 65 years		2
	45 – 64 years		1
	≤ 44 years		0
Risk Factors	☐ Diabetes ☐ Current smoker ☐ HTN (diagnosed) ☐ HL (diagnosed) ☐ Family hx CAD ☐ Obesity	≥ 3 risk factors or history of atherosclerotic disease	2
		1 or 2 risk factors	1
		No risk factors known	0
hs-cTnT (Peak)	> 3x normal limit (43ng/L or greater)		2
	1-3x normal limit (14-42ng/L)		1
	< normal limit (<14ng/L)		0
		Total (10 maximum)	

HEART Score Interpretation	
Low Risk	0-3
Moderate Risk	4-6
High Risk	7-10

Note:

* Consider using a structured risk assessment tool such as the HEART score to aid decision making for all patients without indications for Cardiology consultation.

** For all patients with abnormal hs-TnT results, check the medical record for prior results. Many patients have stable abnormalities in hs-TnT and measured concentrations similar to the patient's baseline are reassuring.

***The indeterminate risk pathway arm relies on expert opinion, the experience in Calgary, and our Edmonton Zone hs-TnI chest pain pathway (started 2019). It aligns with current guideline recommendations.

Appendix 1: Summary of different troponin assays in Edmonton Zone as of September 27, 2022.

Different assays are not comparable and should not be used for trending.

Site	Troponin assay	Chest Pain protocol
University of Alberta Hospital	Roche hs-TnT	2-hour
Royal Alexandra Hospital		
Grey Nuns Hospital		
Misericordia Hospital		
Sturgeon Hospital		
Strathcona Community Hospital	Beckman hs-TnI	3-hour
Leduc Community Hospital		
Westview Health Center		
Northeast Health Centre		
Fort Saskatchewan Community Hospital	Siemens Stratus conventional TnI	6-hour
East Edmonton Urgent Care Centre		
Devon General Hospital		
Redwater Health Center		
DynaLIFE Medical Labs (community)	Siemens Atellica hs-TnI	Not Applicable