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Laboratory Bulletin

Date: June 17, 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) testing at University of Alberta Hospital (UAH) and Sturgeon Community Hospital (SCH)

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Key Messages:

- A new Roche high sensitivity troponin T (hs-TnT) assay will replace the current Beckman hs-TnI assay in a phased-in approach across 4 major Edmonton Zone hospitals (see Table 1 for implementation timeline and Appendix 1 for a summary of troponin assays across all sites).
- Smaller suburban and rural sites will not be switching to Roche at this time and will remain with a combination of hs- and conventional TnI assays.
- In the first phase, the **University of Alberta Hospital will go-live on Tuesday, June 21, 2022 at 11:00 AM** and the **Sturgeon Community Hospital will go live on Thursday, June 23, 2022 at 10:00 AM**. The remaining sites will implement hs-TnT at their designated go-live dates.
- The Misericordia Community Hospital, the Grey Nuns Community Hospital, and the Royal Alexandra Hospital will continue to use Beckman hs-TnI as an interim state until the designated go-live date. Hs-TnI and hs-TnT and will not trend in Epic.

Table 1. Roche hs-TnT implementation schedule in Edmonton Zone.

Site	Current assay	New assay	Go-Live date
*UAH	Beckman hs-TnI	Roche hs-TnT	June 21, 2022
*SCH	Beckman hs-TnI	Roche hs-TnT	June 23, 2022
MCH	Beckman hs-TnI	Roche hs-TnT	July 19, 2022
GNH	Beckman hs-TnI	Roche hs-TnT	July 21, 2022
RAH	Beckman hs-TnI	Roche hs-TnT	End of September, date TBD

*This bulletin applies to the University of Alberta Hospital and Sturgeon Community Hospital only. Other sites will continue to use Beckman hs-TnI until designated go-live.
MCH = Misericordia Community Hospital; GNH = Grey Nuns Community Hospital; RAH = Royal Alexandra Hospital; CCI = Cross Cancer Institute
TBD = to be determined

- Numerical values, 99th percentile upper reference limits (reference intervals), reporting limits, delta values, critical values, and interpretative comments will change (see Table 2 and 3; click here for more details: hsTnT Survival Guide; hsTnT Edmonton Zone Chest Pain Pathway).
- Rule-in/rule-out cut points and a new chest pain algorithm involving 0 & 2 hour and 2 & 4 hour serial time points are also changing to provincially align reporting (Figure 1).
- For troponin collected in the outpatient/community setting only, critical troponin levels will be phoned to the ordering provider when the result is ≥ 53 ng/L (Table 2).

Why this is important:

- Implementation of hs-TnT is part of a large-scale provincial project to replace all chemistry instrumentation with Roche.
- The use of hs-TnT in conjunction with a 2-hour rapid protocol has been successfully used in other hospitals across Canada and has already been used in Calgary for over 8 years.
- These changes will assist clinicians with evidence-based interpretation of troponin results and guide optimal patient management in conjunction with a multi-disciplinary chest pain pathway.

Background:

- 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).
- Additionally, elevated hs-TnT may not always represent AMI and could be due to other causes of myocardial injury. Therefore, clinical judgment is essential to ensure safe patient management.
- 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 transition from the Beckman hs-TnI assay to the Roche hs-TnT assay at your site.
- Be familiar with laboratory reporting changes and the new rapid chest pain pathway.
- Be aware of different troponin assays used within Edmonton Zone. Do not interpret results across sites with different assays.

Inquiries and feedback may be directed to:

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This bulletin has been reviewed and approved by:

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Table 2: Summary of new 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
Comments	Pathway interpretive comments & Method identification comments	N/A

Table 3: 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 3ng/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

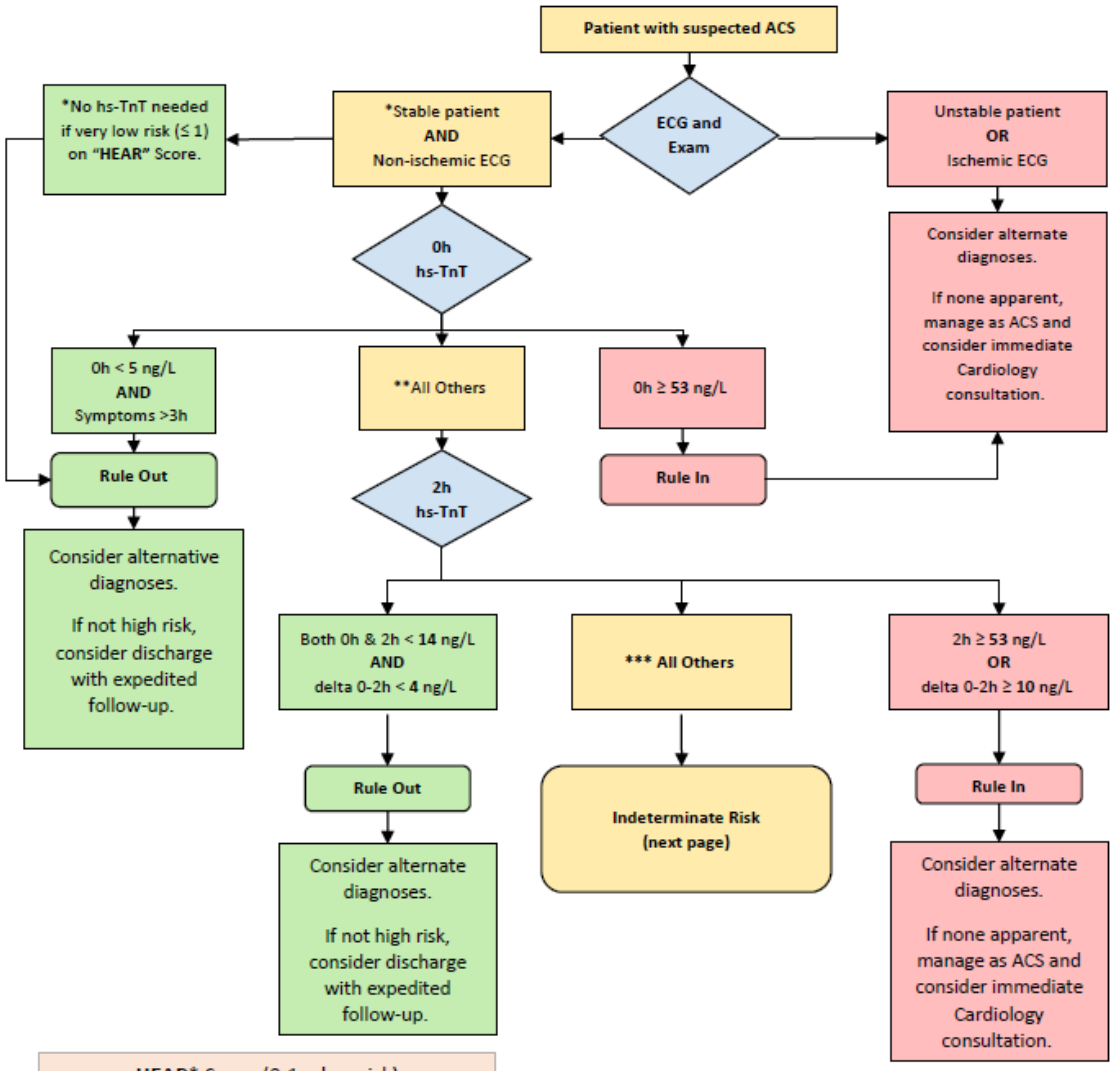
	• A 2-hour change of 10 ng/L suggests an acute myocardial injury and may represent acute myocardial infarction in the appropriate clinical scenario. Please note that patients with ischemic ECG changes and/or high-risk clinical presentations should be considered for further evaluation irrespective of 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 hsTnT 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

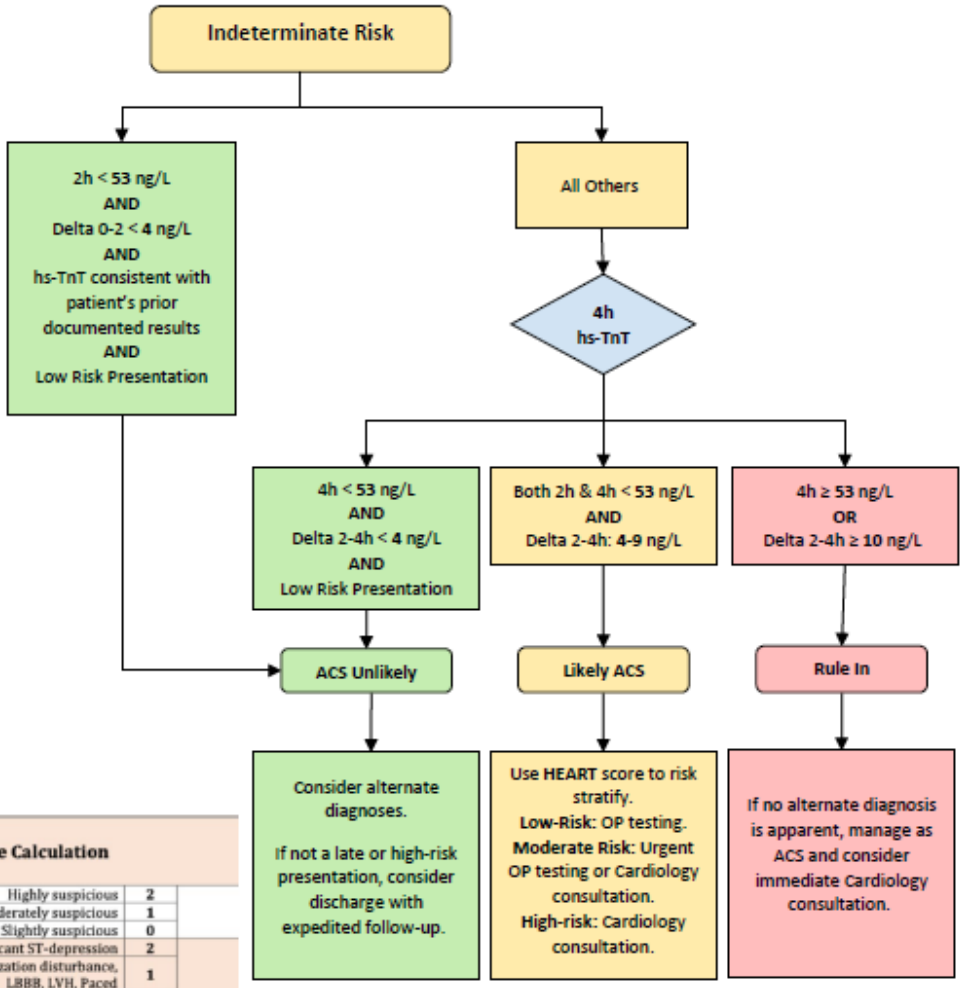
Note:

* 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 after September 2022.

Different assays are not comparable because they use produce different values and use different cutoffs.

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