

The 4Ts scoring system may reduce the need for laboratory testing for heparin-induced thrombocytopenia in low-risk children

Question

In children who are exposed to heparin, is the 4Ts clinical risk scoring system a useful predictor of heparin-induced thrombocytopenia (HIT)?

The study

Who? This retrospective study included 155 children (0 to 21 years) who were exposed to heparin or low-molecular-weight heparin and suspected to have HIT.

What? The study evaluated the accuracy of the 4Ts clinical risk scoring system (previously validated in adults) to quantify the risk of having HIT.

4Ts Score
<p>Variables: degree of Thrombocytopenia, Timing of fall in platelet count, presence of Thrombosis, and absence of Other explanation for thrombocytopenia</p> <p>Interpretation of scores: score ≥ 6 = high probability of HIT, score of 4 to 5 = intermediate probability; and score ≤ 3 = low probability</p>

What the researchers found

There were 5 cases of HIT confirmed in 155 patients who had laboratory testing for suspected HIT out of 4668 patients exposed to systemic heparin.

A low-risk 4Ts score had 100% sensitivity and negative predictive value, while a high-risk 4Ts score had 100% specificity and positive predictive value.

The bottom line

In heparin-exposed children with suspected HIT, a low-risk 4Ts score (that is, ≤ 3) may exclude the diagnosis of HIT without laboratory testing.

Summary of findings

Accuracy of the 4Ts scoring system for predicting HIT in children exposed to heparin

Risk classification based on 4Ts score	Number of people (% of study population)	Number of people with confirmed HIT	Accuracy of 4Ts score
High risk (score \geq 6)	3 (2%)	3	Specificity 100%, PPV 100%
Medium risk (score of 4 to 5)	114 (73%)	2	Sensitivity 40%, specificity 25.3%, PPV 1.8%, NPV 92.7%
Low risk (score \leq 3)	38 (25%)	0	Sensitivity 100%, NPV 100%

PPV = positive predictive value; NPV = negative predictive value

*This Evidence Summary is based on a study by Obeng EA, Harney KM, Moniz T, et al. **Pediatric heparin-induced thrombocytopenia: prevalence, thrombotic risk, and application of the 4Ts scoring system.** J Pediatr. 2015;166:144-50. PubMed (<https://www.ncbi.nlm.nih.gov/pubmed/25444534?dopt=Abstract>)*

Structured clinical assessment of probability for HIT in children may save lives.

Heparin-induced thrombocytopenia (HIT) is a rare, but life-threatening adverse drug reaction. It can cause debilitating consequences (like stroke or pulmonary embolism), loss of a limb, or death. The key to treatment is stopping heparin as soon as possible and starting an alternative anticoagulant (usually fondaparinux, argatroban, or potentially one of the new oral anticoagulants). HIT is more commonly seen after cardiac surgery and with use of unfractionated heparin at therapeutic doses, but it may sometimes occur with low-molecular-weight heparin or with the small amount of heparin used to flush arterial and vein catheters. The critical steps in preventing serious consequences due to this condition are awareness and fast action once HIT is suspected.

Preliminary testing for HIT antibodies can be performed using onsite immunoassays; however, these assays are known to have low specificity (high false-positive rate). Reference standard tests that have high specificity for HIT, such as the serotonin release assay, are not always available. It may take days or sometimes weeks for a result to be reported, especially if the sample must be shipped to another laboratory. During that time, patients who have HIT will be at risk for developing thrombosis if not properly

treated, whereas those who do not have HIT may be exposed to the bleeding risk of alternative anticoagulants without any benefit. For these reasons, a clinical tool that helps physicians decide which patients require reference laboratory testing and which ones do not would be extremely useful.

The 4Ts scoring system has been validated in adult patients and is recommended by experts in the field. The study by Obeng and colleagues tested its applicability in a pediatric population and reported results that are promising, but preliminary. Limitations of the study include retrospective calculation of the 4Ts score and use of an onsite HIT assay that has low specificity (detects all immunoglobulin types instead of just the IgG antibodies that cause HIT). Although a low 4Ts score excluded HIT, the total number of patients evaluated was small ($n = 38$) and more important, not all samples were tested with the reference assay (serotonin release assay). This raises concern that the prevalence of HIT may have been overestimated in this study (due to false-positive onsite immunoassay results).

What this study does well is illustrate the importance of using a structured clinical assessment of the likelihood of HIT before performing laboratory testing. Patients with a high 4Ts score should have heparin stopped and an alternative anticoagulant started *without* waiting for the test result. This approach has the potential to save lives by reducing the risk for HIT-associated thrombotic complications. As for patients with a low score, it may be possible to omit laboratory testing for HIT, but further data are needed to confirm the safety of this strategy.

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