

Low-cost blood test good predictor of increased bleeding risk in pediatric trauma patients

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A team of researchers from the Trauma Program at Children's Hospital Los Angeles conclude that an admission hematocrit provides a reliable screening test for identifying pediatric patients who are at an increased risk of bleeding after injury. Their retrospective review of approximately 1,340 trauma patients, ages 0 to 17 years, will be published in the *Journal of Trauma and Acute Care Surgery* and is currently [available](#) on PubMed.

Hematocrit is a blood test that measures the percentage of the volume of whole blood that is made up of [red blood cells](#). This measurement depends on the number and size of red blood cells. Contrary to earlier medical teachings, adult trauma studies have shown that a drop in hematocrit can occur immediately after injury - predicting ongoing occult, or non-obvious, [blood loss](#). To date, the use of hematocrit in triaging bleeding pediatric trauma patients had not been investigated.

In examining the [patient medical records](#) of all patients who presented to the level 1 [pediatric trauma center](#) at CHLA between 2005 and 2013, the researchers found that an admission hematocrit of ≥ 35 was able to identify children who required an intervention - either transfusion or operation - for bleeding, up to 67 hours after arrival.

Unintentional injury from trauma is the leading cause of death in children older than one year of age. Because young children can be far

more difficult to assess clinically than adults, identifying their injuries and assessing blood loss in these patients is more challenging, requiring resources including advanced imaging, inpatient observation and serial blood tests. Identifying pediatric intra-abdominal injury (IAI) is especially difficult, according to the CHLA researchers. Computed tomography (CT) scans are often used to evaluate patients, but these involve radiation exposure and increased cost.

"A quick and cost-effective measure, such as admission hematocrit, to identify [pediatric patients](#) who are at a high risk for bleeding could provide a critical improvement in optimizing care for children, while reducing costs," said principal investigator Christopher P. Gayer, MD, PhD, FAAP, FACS, of Trauma Attending in the Division of Pediatric Surgery at CHLA.

The results of the study showed a significant difference in admission hematocrit between patients who subsequently required a transfusion and those who did not. The cutoff figure of ≥ 35 had a 94 percent sensitivity, 77 percent specificity and nearly 100 percent negative predictive value. This led the researchers to conclude that use of this cutoff provides a reliable screening tool, due to its low false negative rate and high specificity for identifying those at increased risk of bleeding.

"Admission hematocrit can be done rapidly in the trauma bay, is relatively inexpensive, causes minimal harm and can aid in critical decision-making and rapid identification of occult bleeding. Our results show that a hematocrit level of less than 35% on admission predicts a greater likelihood for the need of transfusion in pediatric blunt [trauma patients](#)," said first author Jamie Golden, MD, a research fellow at CHLA.

The physicians noted that while a doctor's concern in the face of clinical signs of hemorrhagic shock should always take priority over lab data, a

repeat hematocrit can be quickly and easily performed if clinically indicated. They added that the results of their study, conducted retrospectively at a single site, require validation in a prospective, multicenter study.

Provided by Children's Hospital Los Angeles

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