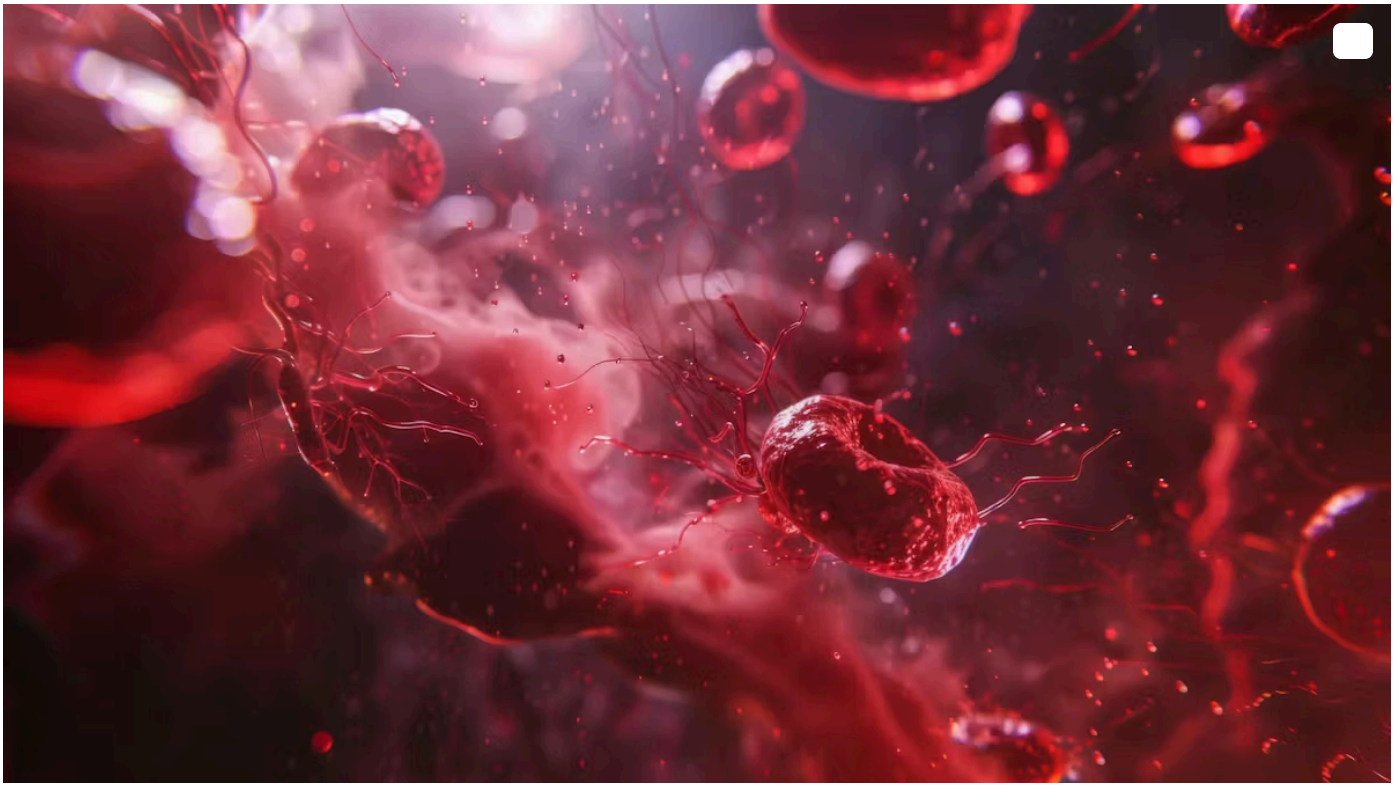
MEDICAL LABORATORY OBSERVER

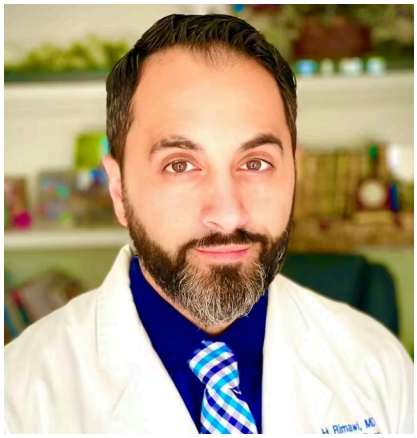


HEMATOLOGY

The risks of in vitro hemolysis and the importance of early detection in critical care medicine — an ICU clinician's perspective

Christina Wichmann May 5, 2026 6 min read

As the number one source of preanalytical error, hemolysis occurs when red blood cells rupture and falsely elevate potassium levels up to 152%.[1,2] Despite its prevalence throughout different areas of the hospital, hemolysis is not visible in whole blood and can go unrecognized. In the intensive care unit (ICU), hemolysis rates of up to 5% have been reported, potentially impacting management of critical patients.[3,4]



We recently connected with Dr. Ramzy Rimawi, a specialist in critical care medicine and infectious diseases at Emory University School of Medicine to discuss the impact of *in vitro* hemolysis on the ICU. Last year, Dr. Rimawi co-authored a paper titled "Handling hemolytic blood samples from high-risk clinical areas: A call to action,"[5] which focused on the need for greater education, detection, and prevention of *in vitro* hemolysis. The paper, published in *The Journal of Applied Laboratory Medicine*, was authored by eight experts: Drs. Alan Wu, Jerrold Levy, Frank Peacock, Ramzy Rimawi, Manuel Sanchez Luna, Christopher Farnsworth, Hugo Stiegler, and Robert Christenson.

Learn more about *in vitro* hemolysis and its impact on patient care in Dr. Rimawi's own words.

MLO: As an ICU physician, what are your biggest concerns related to in vitro hemolysis?

Dr. Rimawi: My greatest concern with *in vitro* hemolysis in the ICU is that it directly delays or misdirects care. When a sample sent for potassium testing is hemolyzed, it's unclear whether the value reflects the patient's true condition or is a compromised specimen. That uncertainty forces a difficult choice — act on a potentially inaccurate result or delay treatment while waiting for repeat testing. In

critically ill patients, either option carries real risk, exposing critically ill patients to real harm.

MLO: What are the risks of inaccurate potassium results in the ICU?

Dr. Rimawi: One risk is treating a patient for an elevated potassium when, in fact, their true level is actually normal. For example, administering medication to lower potassium, based on an inaccurate result, can subject them to critically low potassium levels.

In many cases, this happens when potassium appears falsely elevated due to hemolysis. Potassium directly controls the heart's electrical activity. If a clinician lowers potassium when the true level is normal, the heart's electrical signals can become unstable. That instability can trigger dangerous rhythm disturbances or cause the heart to stop all together. In ICU patients—many of whom already have heart or kidney disease—even small shifts in potassium can disrupt electrical conduction and lead to life-threatening arrhythmias.

MLO: What are the risks of high potassium, and how can clinicians determine whether an elevated result reflects true hyperkalemia or hemolysis?

Dr. Rimawi: Ultimately, the most common and serious risk is cardiac arrhythmia. High potassium disturbs the heart's electrical activity, which can slow the heart rate, change its rhythm, or cause the heart to stop all together. These effects can occur quickly, especially in patients with kidney disease or underlying heart conditions.

High potassium can also cause muscle weakness, paralysis, respiratory failure, and worsening kidney function by contributing to acidosis. However, cardiac complications remain the most immediate and life-threatening concern.

The challenge is that mild or moderate hyperkalemia often has no obvious clinical signs. EKG changes typically appear late, when potassium levels are

already dangerous. If clinicians wait for symptoms or EKG abnormalities, the patient may already be at high risk for cardiac arrest. That is why accurate laboratory results are essential, and why *in vitro* hemolysis represents such a serious patient safety issue.

MLO: Do you feel there is enough education and awareness about the issue of in vitro hemolysis in hospitals across the country?

Dr. Rimawi: No, there is not enough education or awareness. Many clinicians rely entirely on the laboratory to identify hemolysis, rather than actively questioning results that don't align with the clinical picture. In my own analysis of 100 patients with elevated potassium, later confirmed to be due to *in vitro* hemolysis, I found that approximately half were treated for hyperkalemia that was not real. That represents unnecessary treatment and avoidable risks for patients.

MLO: What needs to be done to reduce the prevalence of preanalytical errors, including hemolysis?

Dr. Rimawi: *In vitro* hemolysis will never be completely eliminated. The more important issue is how quickly it is detected. A hemolyzed sample is far less dangerous if it is recognized immediately. The real risk arises when hemolysis isn't identified until hours later, after clinical decisions have already been made.

Faster detection can prevent unnecessary treatment, repeat testing, and patient harm. I often compare it to a car problem: if smoke is coming from the engine, waiting for the check-engine light, means damage has already happened. People may keep driving, unaware there's an issue, until the car ends up in the shop. In healthcare, we need a better way for that warning light to come on sooner. Early recognition of *in vitro* hemolysis allows clinicians to intervene before harm occurs.

MLO: How can technology be helpful when it comes to hemolysis detection?

Dr. Rimawi: Speed—it's the single most important factor. If I can detect in vitro hemolysis faster at the point of care, using technology like the GEM Premier 7000 with iQM3, I can make decisions faster. I can repeat testing sooner, when needed, or ignore a compromised result without delay. This can reduce unnecessary treatments, repeat blood collection, and delays in care, all of which are especially important in critically ill patients.

MLO: How can we make reduced prevalence and increased detection the standard of care?

Dr. Rimawi: Education and access are key. Clinicians need to understand that rapid hemolysis-detection tools exist and how to use them in real time. These technologies should not be limited to large academic centers. Because *in vitro* hemolysis occurs in all hospitals, early detection should be widely available to become a true standard of care.

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About the Author

Christina Wichmann

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