

Study questions usefulness of 'rainbow draw'

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University of Iowa researchers have shown that most of the extra vials of blood drawn for lab tests never get used and are instead discarded.

They hope their data will raise awareness of the problem and help reduce the practice, which is often called the "rainbow draw" because each tube has a different colored top denoting which test the blood will undergo.

UI pathology professor Matthew Krasowski, MD, PhD, was sure many of those extra tubes drawn to cover the possible need for additional tests were never used, but he knew he needed hard data to confirm this, and to convince providers to reduce the practice.

Krasowski and Robert Humble, a [medical student](#) at the UI Carver College of Medicine, took advantage of University of Iowa Hospitals and Clinics' [electronic medical record](#) system to review six years' worth of information on the number of extra tubes of blood drawn for different departments and how often those tubes were used for add-on testing.

A total of 370,601 extra tubes of blood were collected between May 2009 and June 2015. The majority came from inpatient units (46 percent), while outpatient units accounted for 30 percent, and the emergency department (ED) for 24 percent. Overall, only 7 percent of these extra tubes were used for add-on tests, and some tube types were used less than four times out of 1,000. The findings were published Nov. 7 in the journal *JAMA Internal Medicine*.

"I was surprised at how low the usage was," says Humble, who conducted the study as part of his Iowa Medical Student Summer Research Fellowship. "Although I somewhat expected to see these results for the ED, I was surprised by how much this also happened in inpatient and clinic settings."

Krasowski notes that a number of misconceptions appeared to be driving the practice: physicians weren't sure what tests might be needed and wanted to cover their bases, or a phlebotomist or nurse thought they would save patients from needing a second blood draw if they took extra tubes the first time.

"Our study proves that routine use of extra tubes is wasteful. Most are not used," Krasowski says. "And, in fact, most add-on tests [that are needed] can use other tubes already used for other testing."

For most patients, especially in the ED or outpatient units, the minor blood loss from extra draws is not usually a problem, although it could add to patient discomfort. However, drawing extra tubes could increase the risk of biohazard exposure for personnel who handle tubes and, in the case of more severely ill or pediatric patients, extra blood drawn on top of other needed blood testing may contribute to anemia.

For Krasowski, however, the biggest harm with routine use of the rainbow draw is how wasteful the practice is - it consumes phlebotomy and laboratory resources in the collection, processing, and disposal of specimens, he says.

In addition, laboratory testing contributes significantly to the overall cost of health care.

"Institutions and providers should reconsider routine use of extra tubes and instead define circumstances where extra tubes are likely to be

needed," he says. "The take-home message is not that these tubes are never used - that is not the case. But as a routine practice it doesn't make sense."

Krasowski notes that the study did reveal examples where collecting extra tubes was done as part of a thoughtful practice.

The best example was in cardiology where the provider would draw two tubes but only use the second tube if there were certain results from testing on the first tube. Only then would she use the second, with a light blue cap, for add-on testing. In that case the second tube was used about half of the time.

Over the study period several changes occurred that were followed by a significant decrease in the number of extra tubes collected. One involved collaboration between the pathology lab staff and the nursing and medical leadership of two outpatient clinics that were responsible for a high volume of extra tubes. That approach produced a rapid drop in the number of extra tubes of more than 80 percent. The second change was institution-wide and involved a shift to paperless (electronic) test ordering, which began in 2010. Over the next 4 to 5 years, the number of extra tubes fell significantly. In the summer of 2014 this paperless approach was further refined with a direct interface between the electronic medical record and the lab information system so that labels are only printed for specifically ordered tubes. In this new system, labels would not be available for unneeded, extra tubes. The number of extra tubes dropped again.

"When people could use the excuse, 'I didn't know what we needed, so I just drew extra tubes,' that practice happened a lot," Krasowski says. "In contrast, having to specifically order a test made that a more thoughtful process and has reduced the number of tubes drawn."

Over the study period the number of extra tubes collected dropped by approximately 80 to 90 percent and the utilization of extra tubes increased to approximately 13 percent.

More information: Robert M. Humble et al, The "Rainbow" of Extra Blood Tubes—Useful or Wasteful Practice?, *JAMA Internal Medicine* (2016). [DOI: 10.1001/jamainternmed.2016.6834](https://doi.org/10.1001/jamainternmed.2016.6834)

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