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Pop-up reminders in electronic medical records help eliminate unnecessary blood transfusions

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(PhysOrg.com) -- In one of the first studies to examine how electronic reminders unrelated to medication safety could improve clinical care, researchers from the Stanford University School of Medicine and Lucile Packard Children's Hospital have found that pop-up messages built into electronic medical records systems can prevent physicians from ordering unnecessary treatment. The automated reminders saved Packard Children's 460 unnecessary red blood cell transfusions and $165,000 in one year, while patients who needed transfusions still received them.

In recent years, evidence-based guidelines for when to transfuse red blood cells have become stricter, as new research has shown that transfusions carry greater infection risk and less benefit than previously thought. But doctors are often slow to change their habits; a 10-year lag between introduction of new clinical guidelines and their widespread adoption is common. To look for possible solutions to this problem, the researchers decided to build automated reminders about transfusion guidelines into the electronic medical record system at Packard Children's Hospital and assess how well physicians responded.

"Physicians don't like being constrained by rigid algorithms, but they don't mind being given data," said Eloa Adams, MD, first author of the new study, published online April 18 in *Pediatrics*.

The findings come out as the federal government continues to encourage

adoption of EMRs, contending that they will not only improve care but also save money — points that have been contested in some policy circles.

In the study, when a physician entered a computerized order for a red blood cell transfusion, the computer checked whether the patient had blood pressure and hemoglobin levels low enough to meet evidence-based transfusion criteria. Transfusing red blood cells, which deliver oxygen from the lungs to the body's tissues, is useful if the patient has lost blood (causing low blood pressure) or is anemic (indicated by low levels of the oxygen-carrying protein, hemoglobin). If the patient did not meet transfusion criteria, the doctor saw a pop-up window that presented data from current transfusion guidelines and asked whether to go ahead with the order.

The reduction in transfusions during the study suggests physicians benefit from "a push in the right direction at a critical time," said Adams, a pediatric critical care physician at Packard Children's and an instructor at the School of Medicine.

"We demonstrated that having clinical-decision support baked into the fiber of ordering practices can have a significant, durable impact on the delivery of clinical care," said David Cornfield, MD, the study's senior author. Cornfield is medical director of critical care at Packard Children's and professor of pediatric pulmonary medicine and of surgery at Stanford. He is also a member of the Stanford Cancer Center.

The reminder system allowed physicians to go ahead with a transfusion if, after seeing the current clinical guidelines, they still felt it was needed, Adams explained. "We recognize that clinical situations are variable," he said, adding that his main concern was preventing transfusions ordered solely on the basis of outdated guidelines. "Clinicians at the bedside should be making decisions that make

physiologic sense and are in the best interest of the patient."

The new study is the first to test automated reminders of clinical guidelines for blood transfusions in a pediatric setting, though reminders have been used successfully for other applications, such as to improve medication safety. The researchers implemented automated reminders in the pediatric intensive care unit and acute care wards at Packard Children's on Feb. 1, 2009. Blood transfusion use from that date to Jan. 31, 2010, was compared to data drawn from the prior year, before the reminders were in place. In the year after the reminders were implemented, fewer red-blood-cell transfusions were used per patient day in the hospital. Pre-transfusion hemoglobin levels for patients receiving red blood cells also decreased, indicating that doctors were adhering more closely to transfusion guidelines by ordering fewer transfusions for patients whose clinical status implied their circulation had an adequate capacity to carry oxygen.

"We were surprised that it was so effective," Adams said, adding that for a hospital like Packard Children's that already had an electronic medical record with computerized physician order entry in place, the reminders were inexpensive and easy to implement.

This type of intervention has many potential applications in other areas where clinical guidelines have changed, both for Packard Children's and for hospitals across the country, said Christopher Longhurst, MD, who was also an author on the study. Longhurst is chief medical information officer at Packard Children's and a clinical assistant professor of pediatrics. "We're showing you can use electronic medical records as a tool to improve health-care delivery, not just as a way to store records," he said. "You can take evidence-based medicine and bring it to the bedside in a decreased amount of time."