

# Diabetes patients do better after surgery when their blood sugar is managed by pharmacists

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A pharmacy-led glycemic control program is linked to improved outcomes for surgical patients with diabetes and those who develop stress-induced hyperglycemia or high blood sugars as a result of surgery, according to a new Kaiser Permanente study published in the *American Journal of Pharmacy Benefits*.

The study compared [patients](#) who had [surgery](#) after the glycemic control program started to patients who had surgery before the program started.

Patients in the glycemic control program were more than twice as likely to have well-controlled blood sugar after surgery. They also had fewer post-surgical complications and associated costs, fewer hospital readmissions and fewer visits to the emergency department.

"Patients with diabetes and uncontrolled blood sugar are more likely to have complications after surgery, such as wound infections that can land them back in the hospital, said David Mosen, PhD, lead author and researcher at the Kaiser Permanente Center for Health Research in Portland, Oregon.

"We know that controlling blood sugar in these patients produces better clinical outcomes, but surgeons and anesthesia providers may not have the time or expertise to appropriately monitor and adjust insulin regimens after surgery," said Karen Mularski, MD, co-author and

hospitalist from Kaiser Permanente in Portland, Oregon. "Establishing a pharmacy-led care team dedicated to addressing the specific needs of diabetes patients undergoing surgery was crucial to improving blood sugar and overall outcomes."

The authors say this is the first study to show that a pharmacist-based glucose control program can potentially improve outcomes for surgery patients, and also lead to lower costs. Most prior research has focused on cardiovascular surgery patients and those in intensive care, where glucose control has already been shown to be important.

As part of the intervention, which began in 2009, every surgical patient at the Kaiser Permanente Sunnyside Medical Center in Portland, Ore., had a blood sugar screening when they were admitted to the hospital. Those with known diabetes, or whose blood sugar readings revealed the development of a clinical condition called surgery-induced stress hyperglycemia, were referred to the Glycemic Control Team—a group of inpatient pharmacists whose sole job was to manage blood sugar in these patients.

Researchers compared 4,811 eligible patients in the first year of the intervention and 5,465 patients in the second year of the intervention to 1,277 patients in 2008, the year before the intervention started. Results were controlled for clinical and socioeconomic factors, and were similar for both years of the intervention. After the second year patients in the intervention were:

- More than two times as likely to have well-controlled blood sugar the day following surgery.
- 69 percent less likely to have hypoglycemia ([low blood sugar](#)) in the three days following surgery.
- 33 percent less likely to be readmitted to the hospital in the three months after discharge.

- 28 percent less likely to visit the emergency department in the three months after discharge.

Because post-surgical complications and readmissions were reduced, associated costs were also reduced. On average, the patients in the intervention incurred \$284 per month lower medical costs in the six months following discharge compared to the control group.

As part of the intervention, the pharmacists worked with Kaiser Permanente surgeons, hospitalists, endocrinologists, diabetes educators, and nutritionists to develop a protocol that included recommendations on when to begin and end intravenous insulin, how to transition from intravenous to subcutaneous insulin, how to adjust insulin doses, and how to manage patients on tube feedings or IV nutrition.

Once they received training on the protocol, the glycemic pharmacists, who were at the hospital for 10 hours a day, 7 days a week, met individually with most patients to obtain a history and to explain why they were having their blood sugar checked so often and why they might be receiving insulin in the hospital, even if they were not on insulin at home.

The glycemic pharmacists wrote and adjusted insulin orders, ordered relevant [blood sugar](#) and lab tests, requested consults with dietitians and diabetes educators, and made recommendations on post-discharge orders for insulin, oral medications, and diabetic supplies.

The authors caution that this was not a randomized trial, and although they controlled for differences between the pre- and post-intervention patients, they could not rule out the possibility of other factors contributing to the improved outcomes.

Provided by Kaiser Permanente

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