

Study examines effect of increased blood flow during and after major surgery

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In a study that included high-risk patients undergoing major gastrointestinal surgery, the use of a cardiac-output guided intervention to improve hemodynamics (blood flow and blood pressure) during and after surgery did not reduce complications and the risk of death after 30 days, compared with usual care. However, when the current results were included in an updated meta-analysis, the intervention was associated with a clinically important reduction in complication rates, according to a study published by *JAMA*. The study is being released early online to coincide with its presentation at the American Thoracic Society International Conference.

Estimates suggest that more than 230 million patients undergo surgery worldwide each year, with reported mortality rates between 1 percent and 4 percent. Complications and deaths are most frequent among high-risk patients, those who are older or have other illnesses, and those who undergo major gastrointestinal or [vascular surgery](#), according to background information in the article.

Intravenous fluid and inotropic drugs (medications that affect the force with which the heart muscle contracts) have an important effect on patient outcomes, in particular following major [gastrointestinal surgery](#). Yet they are commonly prescribed using subjective criteria, leading to wide variation in clinical practice. One possible solution is the use of cardiac output monitoring to guide administration of intravenous fluid and inotropic drugs as part of a hemodynamic (blood flow) therapy algorithm (a step-by-step protocol for management of a health care

issue). Use of hemodynamic therapy algorithms has been recommended in a report commissioned by the U.S. Centers for Medicare & Medicaid Services and by the UK National Institute for Health and Care Excellence. A recent review, however, has suggested that the treatment benefit may be more marginal than previously believed.

Rupert M. Pearse, M.D., of Queen Mary University of London, and colleagues randomly assigned patients (50 years of age or older) undergoing major gastrointestinal surgery to a cardiac output-guided hemodynamic therapy algorithm for [intravenous fluid](#) and inotrope (dopexamine) infusion during and 6 hours following surgery (n = 368) or to usual care (n = 366).

The primary outcome, a composite of postoperative complications and death at 30 days following surgery, was met by 36.6 percent of patients in the intervention group and by 43.4 percent in the usual care group. Following adjustment for baseline patient risk factors, the observed treatment effect was not statistically significant. Five patients in the intervention group (1.4 percent) experienced serious adverse cardiac events within 24 hours of the end of the intervention period compared with none in the usual care group.

There were no significant differences for any of the secondary outcomes: pre-defined illness on day 7; infectious complications, critical care-free days, and all-cause mortality at 30 days following surgery; all-cause mortality at 180 days; and length of hospital stay.

The addition of the results of this study with other recent trials in a systematic review found that complications were less frequent among patients treated according to a hemodynamic therapy algorithm (intervention, 488/1,548 [31.5 percent] vs control, 614/1,476 [41.6 percent]). The findings of the effect on mortality indicated borderline evidence, but remained consistent with benefit.

"To the best of our knowledge, this is the largest trial of a perioperative, [cardiac output](#)-guided hemodynamic therapy algorithm to date. [This study] was designed to address several limitations in the previous trials," the authors write.

In an accompanying editorial, Elliott Bennett-Guerrero, M.D., of the Duke Clinical Research Institute, Durham, N.C., comments on the results of the systematic review performed by the authors of this study.

"These results further strengthen the overall conclusion that goal-directed therapy (GDT) of some type is probably beneficial for high-risk patients and has few documented adverse effects. Compared with the previous review, this updated analysis added 7 additional trials and reported statistically significant reductions in complications, infections, and hospital stay for patients who received GDT. These findings are consistent with reports by the Centers for Medicare & Medicaid Services and the National Institute for Health and Care Excellence, which recommend the use of hemodynamic therapy algorithms."

"The extent to which GDT will be translated into routine practice is difficult to predict and will depend on many factors. Goal-directed therapy is best achieved in environments that emphasize a multidisciplinary team approach to patient care, including anesthesiologists, surgeons, intensivists, and nurses. This approach is exemplified in the perioperative surgical home, which is gaining momentum as a model to improve outcome and reduce costs."

More information: [DOI: 10.1001/jama.2014.5305](https://doi.org/10.1001/jama.2014.5305)
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