

# What Are Surgical Mortality Risks in Relatively Healthy ASA I and II Patients?

Chicago—How healthy is “healthy”?

According to the results of an analysis from the University of California, San Diego, surgical mortality in a relatively healthy (ASA I and II) patient population is decreasing across the United States. Nevertheless, the study of more than 1.5 million patients identified several clinical predictors of increased mortality risk in this population. Consideration of these factors, the researchers noted, may improve preoperative optimization of this surgical group.

Although many studies have examined perioperative mortality rates, few have focused specifically on healthier patients, according to Diana J. Hylton, MD, a resident at the San Diego, Calif., institution. Furthermore, while these individuals tend to have a lower risk for surgical complications than their counterparts with a greater comorbidity burden, they are not without serious risks.

“Our goal,” Dr. Hylton said, “was to develop a risk calculator to identify 30-day mortality in surgical patients. Specifically, we sought to identify key risk factors and the prevalence of mortality that these patients experienced.”

## Large Database

The researchers identified 1,543,617 patients in the database of the National Surgical Quality Improvement Program (NSQIP) who were classified as either ASA I or II between 2006 and 2013. Regression analysis was used to determine trends in mortality rates during this period. “But, as we all know, there’s variability in how anesthesia providers designate ASA class,” Dr. Hylton said. “So we had to remove patients who had been inappropriately designated as ASA I and II.”

She and her colleagues then identified 14 clinical variables potentially associated with mortality, and performed univariate logistic regression for each variable to test its relationship to mortality. All statistically significant variables were then included in the multivariate logistic regression model.

“We observed some interesting surgical characteristics,” she said. “Approximately 11% underwent emergency surgery and about 80% [had] general surgery. The overwhelming majority had general anesthesia for their surgery. With respect to lab abnormalities, approximately 12% had an elevated or depressed white blood cell count. For comorbidities, it was surprising that some 95% did not have diabetes. About 18% were smokers and 25% had hypotension.”

As Dr. Hylton reported at the 2016 annual meeting of the American Society of Anesthesiologists (abstract A2108), 0.11% of patients died within 30 days of their operation. Perhaps not surprisingly, there was a decrease in the mortality rate each year between 2006 and 2013 (odds ratio, 0.92; 95% CI, 0.90-0.95;  $P < 0.001$ ).

“It was surprising to find that thoracic surgery had a 30-day mortality rate of approximately 0.55%,” Dr. Hylton said. “With general surgery, the mortality rate was about 0.3%, and 0.03% for plastic surgery.”

There were 12 variables remaining in the logistic regression model, some of which were age, sex, ASA class, history of alcohol use, preoperative sepsis, emergency status of surgery, preoperative hematocrit, surgery duration, primary anesthesia type and surgical relative value units (Table).

<b>Table. Clinical Variables Predicting Mortality Risk</b>			
	<b>Reference</b>	<b>Odds Ratio (95% CI)</b>	<b>P Value</b>
<b>Age ≥65 years</b>	<65 years	7.76 (2.55-5.71)	<0.001
<b>ASA II</b>	ASA I	3.82 (2.55-5.71)	<0.001
<b>Male</b>	Female	1.70 (1.47-1.95)	<0.001
<b>History of alcohol abuse</b>	No history	1.67 (1.20-2.31)	0.002
<b>Preoperative pneumonia</b>	None	12.68 (7.05-22.83)	<0.001
<b>Preoperative sepsis</b>	None	2.36 (1.86-3.00)	<0.001
<b>Emergency surgery</b>	Nonemergent	1.42 (1.15-1.75)	0.001
<b>Preoperative Hct &lt;30</b>	Normal range (>30)	4.12 (3.32-5.10)	<0.001
<b>Preoperative creatinine ≥1.5</b>	<1.5	2.72 (2.13-3.47)	<0.001
<b>Surgery &gt;180 minutes</b>	≤180 minutes	3.08 (2.62-3.62)	<0.001
<b>General anesthesia</b>	Non-general anesthesia	1.74 (1.23-2.46)	0.002
<b>Work RVUs ≥40</b>	<40	3.45 (2.61-4.55)	<0.001

Hct, hematocrit; RVU, relative value unit

According to Dr. Hylton, these data may change the way clinicians view their so-called “healthy” patients. “We always think about ASA I and ASA II patients as being healthy and that they’ll do fine if we take them for surgery. But I think it’s helpful to know that these patients—particularly those with certain risk factors—actually have fairly high mortality rates.”

“There are several other analyses of the NSQIP database and other similar large databases, including those that find predictors for various subsets of the total database,” noted session co-moderator Uday Jain, MD, PhD, staff anesthesiologist at the Alameda Health System, in Oakland, Calif. “How do your predictors match up with those from these other studies?”

“There are very few studies on healthy ASA I and II patients,” Dr. Hylton replied. “There are some studies that have included all patients and others that have looked at high-risk patients. But we couldn’t find many studies of just healthy populations.”

“I’m trying to reconcile how an ASA II patient got into the operating room with pneumonia,” said session co-moderator Steven M. Shulman, MD, assistant professor of anesthesiology at Rutgers New Jersey Medical School, in Newark. “Were those all emergency cases?”

“It could have been,” Dr. Hylton said. “In some respects, pneumonia isn’t something that automatically excludes someone from being ASA I or II.

“In conclusion, there are a number of clinical predictors for increased mortality in our healthy patient populations,” she said. “Some of these were patients with pneumonia, lab abnormalities, systemic inflammatory response syndrome and age greater than 65. We believe these can, and should, be used to preoperatively optimize our patients.”

—*Michael Vlessides*

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*Dr. Hylton reported no relevant financial disclosures.*