

Title: Determinants of smoking abstinence and the effect of smoking on vascular outcomes one year after major noncardiac surgery: Analyses from the Vascular Events in Noncardiac Surgery Patients Cohort Evaluation (VISION) Study

Ofori Sandra N, MBBS, MSc,^{1,2} Marcucci Maura, MSc, MD,^{1,2,3} Mbuagbaw Lawrence MD, MPH, PhD^{1,4} Conen David, MD, PhD,^{2,3} Flavia Borges, MD, PhD,^{1,2,3} Clara Chow, MBBS, PhD^{5,6} Daniel I. Sessler, MD,⁷ Matthew Chan, MBBS, PhD,⁸ Graham Hillis, MD, PhD,^{9,10,11} Devereaux PJ, MD, PhD,^{1,2,3} on behalf of the VISION study investigators.

Background: Surgery is considered a “teachable moment” and smokers have to stop smoking for surgery. Nonetheless, most restart soon after leaving the hospital. What factors determine continued abstinence after surgery remains unclear. We therefore aimed to evaluate potential determinants of smoking abstinence after non-cardiac surgery, and associations between smoking and 1-year vascular outcomes.

Methods: We analyzed data from VISION, a prospective cohort study of 40,004 patients in 28 countries, aged ≥ 45 years, enrolled between August 2007 and November 2013 and followed for 1 year after surgery. We categorized patients as never-smokers (n=21,195), ex-smokers (quit >4 weeks preoperatively, n=13,163), and current smokers (smoking ≤ 4 weeks preoperatively, n=5,480).

Using multivariable regression models, we evaluated the relationship between preoperative smoking status and the primary outcomes of abstinence at 30 days and one year after surgery; we also evaluated the secondary outcomes including a composite outcome of all-cause death, stroke, or myocardial infarction at one year.

Results: Of current smokers with complete data, 1995/5298 (38%) and 1838/4658 (40%) were abstinent at 30-days and 1-year, respectively. Median (interquartile range) time to resumption was 5 (2-12) days post-surgery. Perioperatively, 7.2% of current smokers were on smoking cessation pharmacotherapy. Older age (30 days: adjusted risk ratio [aRR] 1.23, 95% CI 1.17-1.28; 1-year aRR 1.21, 95% CI 1.12-1.32), pharmacotherapy use (30 days: aRR 1.25, 95% CI 1.08-1.43), having recent high-risk coronary artery disease (30-days aRR 1.40, 95% CI 1.02-1.92; 1-year aRR 1.41, 95% CI 1.29-1.55), active cancer (30-days aRR 1.38, 95% CI 1.23-1.55; 1-year aRR 1.37, 95% CI 1.18-1.59), and major vascular (30-days aRR 1.48, 95% CI 1.28-1.71; 1-year aRR 1.20, 95% CI 1.02-1.41) or thoracic surgery (30-days aRR 1.69, 95% CI 1.39-2.04; 1-year aRR 1.41, 95% CI 1.26-1.56) predicted abstinence. One-year abstinence was less likely when patients stopped smoking 0-1 day before surgery (aRR 0.53, 95% CI 0.43-0.66) and 2-14 days before surgery (aRR 0.76, 95% CI 0.71-0.82) compared to >14 days before surgery. Current smokers were more likely to experience vascular complications at 1-year than patients who never smoked (adjusted hazard ratio 1.13, 95% CI 1.01-1.26).

Conclusion: Most current smokers having major noncardiac surgery resume smoking shortly after surgery. Patients who stopped smoking for longer before surgery were more likely to remain quit. Few smokers obtain smoking cessation pharmacotherapy. Interventions to prevent smoking resumption after surgery remain a priority.

-
- ¹ Department of Health Research Methods, Evidence, and Impact, McMaster University, Hamilton, ON, Canada
 - ² Population Health Research Institute, Hamilton, ON, Canada
 - ³ Department of Medicine, McMaster University, Hamilton, ON, Canada
 - ⁴ Biostatistics Unit, St. Joseph's Healthcare, Hamilton, Ontario, Canada
 - ⁵ Westmead Applied Research Centre, University of Sydney, Sydney, Australia
 - ⁶ Westmead Hospital, Sydney, Australia
 - ⁷ Department of Outcomes Research, Cleveland Clinic, Cleveland, OH, United States
 - ⁸ The Chinese University of Hong Kong, Hong Kong Special Administrative Region, China (M.T.C., L.Z.).
 - ⁹ The George Institute for Global Health, University of Sydney, Sydney, Australia
 - ¹⁰ Royal Perth Hospital, Perth, Australia
 - ¹¹ University of Western Australia, Perth