

Supplementary Online Content

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This supplementary material has been provided by the authors to give readers additional information about their work.

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eAppendix 2. Definitions Related to Cause of Death

1. Vascular death was defined as any death with a vascular cause and included those deaths following a myocardial infarction, cardiac arrest, stroke, cardiac revascularization procedure (i.e., percutaneous coronary intervention [PCI] or coronary artery bypass graft [CABG] surgery), pulmonary embolus, hemorrhage, or deaths due to an unknown cause.
2. Non-vascular death was defined as any death due to a clearly documented non-vascular cause (e.g. trauma, infection, malignancy).

eAppendix 3. Study Definitions of Preoperative Patient Characteristics

1. **Age** – Patient age in years was recorded and subsequently categorized as 45-64 years of age, 65-74 years of age, and ≥ 75 years of age.
2. **Sex** – Male or female.
3. **History of coronary artery disease** – A current or prior history of any one of the following: i. angina; ii. myocardial infarction or acute coronary syndrome; iii. a segmental cardiac wall motion abnormality on echocardiography or a segmental fixed defect on radionuclide imaging; iv. a positive radionuclide exercise, echocardiographic exercise, or pharmacological cardiovascular stress test demonstrating cardiac ischemia; v. coronary angiographic or computer tomography (CT) coronary angiographic evidence of atherosclerotic stenosis $\geq 50\%$ of the diameter of any coronary artery; vi. ECG with pathological Q waves in two contiguous leads.
4. **Recent high-risk coronary artery disease** – A physician diagnosis ≤ 6 months prior to noncardiac surgery of: a myocardial infarction, acute coronary syndrome, Canadian Cardiovascular Society Class (CCSC) III angina, or CCSC IV angina

CCSC III angina - angina occurring with level walking of 1-2 blocks or climbing ≤ 1 flight of stairs at a normal pace

CCSC IV angina - inability to carry on any physical activity without the development of angina.
5. **History of cardiac arrest** – A patient with a prior history of a cardiac arrest.
6. **History of congestive heart failure** – A physician diagnosis of a current or prior episode of congestive heart failure or prior radiographic evidence of vascular redistribution, interstitial pulmonary edema, or frank alveolar pulmonary edema.

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- 7. History of peripheral vascular disease** – A physician diagnosis of a current or prior history of: intermittent claudication, vascular surgery for atherosclerotic disease, an ankle/arm systolic blood pressure ratio ≤ 0.90 in either leg at rest, or angiographic or doppler study demonstrating $\geq 70\%$ stenosis in a noncardiac artery.
- 8. History of stroke** – A physician diagnosis of a current or prior stroke, or CT or magnetic resonance (MR) evidence of a stroke.
- 9. History of a transient ischemic attack (TIA)** – A physician diagnosis of a current or prior TIA.
- 10. History of deep venous thrombosis (DVT) or pulmonary embolus (PE)** – A patient with a current or prior history of a DVT or PE.
- 11. Diabetes** – Patient stated that they have a diagnosis of diabetes or a physician has previously recorded that the patient has diabetes. This included gestational diabetes at the time of noncardiac surgery, but not past gestational diabetes that had resolved.
- 12. Hypertension** – A physician diagnosis of hypertension.
- 13. Current atrial fibrillation** – A patient with a current history of atrial fibrillation.
- 14. Obstructive sleep apnea** – A physician or sleep study diagnosis of obstructive sleep apnea.
- 15. Chronic obstructive pulmonary disease (COPD)** – A physician current or prior diagnosis of chronic bronchitis, emphysema, or COPD, or a patient provided a history of daily production of sputum for at least 3 months in 2 consecutive years.

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- 16. Active cancer** – A patient was designated as having active cancer if they fulfilled any of the following criteria: i. undergoing surgery for cancer; ii. known metastatic disease; or iii. patient had received active treatment for their cancer (e.g., chemotherapy, radiation, or surgery) within the 6 months prior to their surgery, but this did not apply to patients with non-melanoma skin cancers or surgery for a biopsy.
- 17. Urgent/Emergency surgery** – Emergency surgery was surgery that occurred <24 hours after a patient developed an acute surgical condition, and urgent surgery was surgery that occurred 24-72 hours after a patient developed an acute surgical condition.
- 18. Major orthopedic surgery** – A patient undergoing one or more of the following orthopedic surgeries: major hip or pelvis surgery, internal fixation of femur, knee arthroplasty, above knee amputations, or lower leg amputation (amputation below knee but above foot).
- 19. Major general surgery** – A patient undergoing one or more of the following general surgeries: complex visceral resection, partial or total colectomy or stomach surgery, other intra-abdominal surgery, or major head and neck resection for non-thyroid tumor.
- 20. Major urology or gynecology surgery** – A patient undergoing one or more of the following major urology or gynecology surgeries: nephrectomy, ureterectomy, bladder resection, retroperitoneal tumor resection, exenteration, cytoreduction surgery, hysterectomy, radical prostatectomy, or transurethral prostatectomy.
- 21. Major neurosurgery** – A patient undergoing one or more of the following neurosurgeries: craniotomy or major spine surgery (i.e., surgery involving multiple levels of the spine).

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22. Major vascular surgery – A patient undergoing one or more of the following vascular surgeries: thoracic aorta reconstructive vascular surgery, aorto-iliac reconstructive vascular surgery, peripheral vascular reconstruction without aortic cross-clamping, extracranial cerebrovascular surgery, or endovascular abdominal aortic aneurysm repair.

23. Major thoracic surgery – A patient undergoing one or more of the following thoracic surgeries: pneumonectomy, lobectomy, wedge resection of lung, resection of mediastinal tumor, or major chest wall resection.

24. Low-risk surgeries – A patient undergoing one or more of the following surgeries: parathyroid, thyroid, breast, hernia, local anorectal procedure, oophorectomy, salpingectomy, endometrial ablation, peripheral nerve surgery, ophthalmology, ears/nose/throat surgery, vertebral disc surgery, hand surgery, cosmetic surgery, arterio-venous access surgery for dialysis, or any other surgery not mentioned above.

eTable 1. Number of Participants From Each Center

Continent, country, city, center	Participants (n=15,133)
North America	(6132)
Canada	
<i>Hamilton</i>	
Hamilton Health Sciences	3144
St. Joseph's Healthcare	945
<i>Edmonton</i>	
University of Alberta Hospital	1523
<i>Winnipeg</i>	
Health Sciences Centre Winnipeg	411
United States	
<i>St. Louis</i>	
Washington University School of Medicine	109
South America	(1639)
Brazil	
<i>São Paulo</i>	
Hospital do Coracao	548
Colombia	
<i>Bucamaranga</i>	
Hospital Universitario de Santander	1091
Australia	(195)
Australia	
<i>Sydney</i>	
Westmead Hospital	195
Asia	(3558)
China	
<i>Hong Kong</i>	
Prince of Wales Hospital	2960
Malaysia	
<i>Kuala Lumpur</i>	
University Malaya Medical Centre	598
Europe	(3609)
Spain	
<i>Barcelona</i>	
Hospital de Sant Pau	1867
<i>Madrid</i>	
Hospital Gregorio Marañon	1742

eTable 2. Preoperative Participant Characteristics and Type of Surgery*

Patient characteristics and type of surgery	Total (n=15,133)	Peak Troponin T value			
		≤0.01 µg/L (n=13,376)	0.02 µg/L (n=494)	0.03-0.29 µg/L (n=1121)	0.03-0.29 µg/L (n=1121)
Age					
45-64 years	7697 (50.9%)	7236 (54.1%)	112 (22.7%)	308 (27.5%)	41 (28.9%)
65-74 years	3779 (25.0%)	3381 (25.3%)	108 (21.9%)	253 (22.6%)	37 (26.1%)
≥75 years	3657 (24.2%)	2759 (20.6%)	274 (55.5%)	560 (50.0%)	64 (45.1%)
Females	7794 (51.5%)	7018 (52.5%)	225 (45.5%)	494 (44.1%)	57 (40.1%)
History of coronary artery disease	1832 (12.1%)	1364 (10.2%)	113 (22.9%)	297 (26.5%)	58 (40.8%)
Recent high-risk coronary artery disease	173 (1.1%)	96 (0.7%)	9 (1.8%)	53 (4.7%)	15 (10.6%)
History of cardiac arrest	68 (0.4%)	53 (0.4%)	3 (0.6%)	9 (0.8%)	3 (2.1%)
History of congestive heart failure	703 (4.6%)	450 (3.4%)	56 (11.3%)	180 (16.1%)	17 (12.0%)
History of peripheral vascular disease	809 (5.3%)	540 (4.0%)	50 (10.1%)	186 (16.6%)	33 (23.2%)
History of stroke	696 (4.6%)	504 (3.8%)	48 (9.7%)	130 (11.6%)	14 (9.9%)
History of a transient ischemic attack	376 (2.5%)	284 (2.1%)	21 (4.3%)	61 (5.4%)	10 (7.0%)
History of DVT or PE	475 (3.1%)	380 (2.8%)	25 (5.1%)	64 (5.7%)	6 (4.2%)
Diabetes	2952 (19.5%)	2382 (17.8%)	145 (29.4%)	365 (32.6%)	60 (42.3%)

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eTable 2. Continued*

Patient characteristics and type of surgery	Total (n=15,133)	Peak Troponin T value			
		≤0.01 µg/L (n=13,376)	0.02 µg/L (n=494)	0.03-0.29 µg/L (n=1121)	0.03-0.29 µg/L (n=1121)
Hypertension	7709 (50.9%)	6436 (48.1%)	364 (73.7%)	796 (71.0%)	113 (79.6%)
Current atrial fibrillation	504 (3.3%)	344 (2.6%)	38 (7.7%)	116 (10.3%)	6 (4.2%)
Obstructive sleep apnea	773 (5.1%)	697 (5.2%)	23 (4.7%)	45 (4.0%)	8 (5.6%)
Chronic obstructive pulmonary disease	1282 (8.5%)	998 (7.5%)	88 (17.8%)	182 (16.2%)	14 (9.9%)
Active cancer	4015 (26.5%)	3566 (26.7%)	137 (27.7%)	288 (25.7%)	24 (16.9%)
Urgent/emergency surgery	2142 (14.2%)	1707 (12.8%)	97 (19.6%)	290 (25.9%)	48 (33.8%)
Urgent surgery	1706 (11.3%)	1363 (10.2%)	80 (16.2%)	233 (20.8%)	30 (21.1%)
Emergency surgery	436 (2.9%)	344 (2.6%)	17 (3.4%)	57 (5.1%)	18 (12.7%)
Type of surgery [‡]					
Major orthopedic	3094 (20.4%)	2573 (19.2%)	146 (29.6%)	340 (30.3%)	35 (24.6%)
Major general	3076 (20.3%)	2679 (20.0%)	106 (21.5%)	255 (22.7%)	36 (25.4%)
Major urology or gynecology	1888 (12.5%)	1710 (12.8%)	47 (9.5%)	118 (10.5%)	13 (9.2%)
Major neurosurgery	888 (5.9%)	795 (5.9%)	29 (5.9%)	58 (5.2%)	6 (4.2%)
Major vascular	504 (3.3%)	378 (2.8%)	28 (5.7%)	76 (6.8%)	22 (15.5%)
Major thoracic	376 (2.5%)	316 (2.4%)	27 (5.5%)	30 (2.7%)	3 (2.1%)
Low-risk	5960 (39.4%)	5524 (41.3%)	123 (24.9%)	282 (25.2%)	31 (21.8%)

* definitions in eAppendix 2.

[‡] Some patients underwent more than 1 type of surgery at the time of their index surgery.

DVT = deep venous thrombosis; PE = pulmonary embolus

eTable 3. Likelihood Ratios Associated With Peak Troponin T Measurements

Peak Troponin T measurements	Likelihood ratios (95% confidence interval)
≤ 0.01 $\mu\text{g/L}$	0.53 (0.47-0.60)
0.02 $\mu\text{g/L}$	2.22 (1.44-3.42)
0.03-0.29 $\mu\text{g/L}$	5.39 (4.57-6.34)
≥ 0.30 $\mu\text{g/L}$	10.71 (7.02-16.35)

eTable 4. Sensitivity Analysis of 12 893 Patients Who Did Not Have a Preoperative History of Coronary Artery Disease, Recent High-Risk Coronary Artery Disease, or Congestive Heart Failure

Peak troponin T measurements	Patients dying within 30 days after surgery (total of 208 deaths)			
	n/N*	% (95% CI)	Adjusted HR (95% CI)	P
≤0.01 µg/L	115/11720	1.0% (0.8-1.2)	1.0	
0.02 µg/L	14/361	3.9% (2.3-6.4)	2.23 (1.26, 3.96)	0.006
0.03-0.29 µg/L	64/733	8.7% (6.9-11.0)	4.94 (3.55, 6.88)	<0.001
≥0.30 µg/L	15/79	19.0% (11.9-29.0)	13.15 (7.52, 23.00)	<0.001

* n/N = number of patients who died in subgroup / total number of patients in subgroup.

% = percentage; CI = confidence interval; HR = hazard ratio

eTable 5. Sensitivity Analysis of 15 117 Patients Who Survived Until 36 Hours After Surgery

Peak troponin T measurements	Patients dying between 36 hours and 30 days after surgery (total of 266 deaths)			
	n/N*	% (95% CI)	Adjusted HR (95% CI)	P
≤0.01 µg/L	127/13369	0.9% (0.8, 1.1)	1.0	
0.02 µg/L	20/494	4.0% (2.6, 6.2)	2.49 (1.53, 4.05)	<0.001
0.03-0.29 µg/L	98/1115	8.8% (7.3, 10.6)	4.97 (3.71, 6.66)	<0.001
≥0.30 µg/L	21/139	15.1% (10.1, 22.0)	9.67 (5.90, 15.83)	<0.001

* n/N = number of patients who died in subgroup / total number of patients in subgroup.
 % = percentage; CI = confidence interval; HR = hazard ratio