**Table 1. Surgical procedural obtained from the Discharge Abstract Database.**

|  |  |
| --- | --- |
| **VARIABLE** | **CODES** |
|  |  |
| **Vascular Surgery** |  |
| Open Abdominal aortic aneurysm repair | CCI 1.KA.76 (all sub-codes) , 1.KA.80.LA, 1.KA.80.LA-XX-A, I.KA.80.LA-XX-K, 1.KA.80.LA.XX-N, 1.KA.80.LA-XX-Q, 1.KA.87 (should be accompanied with ICD-10 code I71.4 or I71.9 on same admission) |
| Endovascular Abdominal aortic repair | CCI 1.KA.80.GQ-NR-N |
| Below Knee Amputation | CCI 1.VQ.93 |
| Above Knee Amputation | CCI 1.VC.93 |
| Peripheral vascular surgery | CCI 1.KG.76, 1.KG.57.LA-X (exclude 1.KG.57.GQ-X), 1.KG.87 |
| **General & Hepatobiliary Surgery** |  |
| Large Bowel/Rectum surgery | CCI 1.NM.87.LA, 1.NM.87.RN, 1.NM.87.RD, 1.NM.87.RE, 1.NM.87.TF, 1.NM.87.TG, 1.NM.87.WJ  (except 1.NM.87.BA), 1.NM.89.RN, 1.NM.89.TF, 1.NM.91.RN, 1.NM.91.RD, 1.NM.91.RE, 1.NM.91.TF, 1.NM.91, TG, 1.NQ.87 (except 1.NQ.87.BA), 1.NQ.89,  CCI 1.NM.87.DA, 1.NM.87.DF. 1.NM.87.DE, 1.NM.87.DN, 1.NM.87.DX, 1.NM.87.DY, 1.NM.87.GB, 1.NM.89.DF, 1.NM.89.DX, 1.NM.91.DF, 1.NM.91.DE, 1.NM.91.DN, 1.NM.91.DX, 1.NM.91.DY |
| Gastrectomy | CCI 1.NF.87.RP, 1.NF.87.RG, 1.NF.87.RJ, 1.NF.87.LA, 1.NF.87.SH, 1.NF.87.RH, 1.NF.87.RK  1.NF.89.LA-XX-F, 1.NF.91 (all sub-codes)  1.NF.89.DA-XX-F, 1.NF.87.DG, 1.NF.87.DH, 1.NF.87.DQ, 1.NF.87.DA, 1.NF.87.GX, 1.NF.87.DJ, 1.NF.87.DL |
| Esophagectomy | CCI 1.NA.87.LP, 1.NA.87.LB, 1.NA.87.LB-XX-G, 1.NA.87.LB-XX-F, 1.NA.89.LB, 1.NA.89.LB-XX-G, 1.NA.89.LB-XX-F, 1.NA.89.QF, 1.NA.89.QF-XX-G, 1.NA.89.QF-XX-F, 1.NA.90, 1.NA.91.LB, 1.NA.91.LB-XX-G, 1.NA.91.LB-XX-F, 1.NA.91.QF, 1.NA.91.QF-XX-G, 1.NA.91.QF-XX-F  CCI 1.NA.87.DB, 1.NA.87.DB-XX-G, 1.NA.87.DB-XX-F, 1.NA.87.EZ, 1.NA.87.FA, 1.NA.87.FA-XX-G, 1.NA.87.FA-XX-F, 1.NA.91.DB, 1.NA.91.DB-XX-G, 1.NA.91.DB-XX-F, 1.NA.91.FA, 1.NA.91.FA-XX-G, 1.NA.91.FA-XX-F |
| Partial Liver resection + Biliary bypass | CCI 1.OA.87.LA, 1.OA.87.LA-AZ, 1.0E.80.(all sub-codes), 1.OE.76.(all sub-codes), CCI 1.OA.87.DA |
| Pancreatic surgery +  Pancreatico-duodenectomy | CCI 1.OJ.87, 1.OJ.89, 1.OK.87, 1.OK.89, 1.OK.91 |
| **Thoracic Surgery** |  |
| Open Pneumonectomy + lobectomy | CCI 1.GR.87.NW, 1.GR.87.QB, 1.GR.89.NW, 1.GR.89.QB, 1.GR.91.NW, 1.GR.91.NW-XX-A to 1.GR.91.NW-XX-L, 1.GT.87.NW, 1.GT.87.QB, 1.GT.89.NW, 1.GT.89.QB, 1.GT.91 |
| VATS lobectomy | CCI 1.GR.87.DA, 1.GR.89.DA, 1.GT.87.DA, 1.GT.89.DA |
| **Major Uro-gynaecology Surgery** |  |
| Nephrectomy | CCI 1.PC.87.LA, 1.PC.87.LA-XX-E, 1.PC.87.LA-XX-G, 1.PC.89.LB, 1.PC.89.PF, 1.PC.89.QF, 1.PC.91.LB, 1.PC.89.PF, 1.PC.91.QF, 1.PC.87.DA, 1.PC.89.DA, 1.PC.91.DA |
| Hysterectomy | CCI 1.RM.89.LA , 1.RM.91.LA, 1.RM.89.AA, 1.RM.89.CA, 1.RM.89.DA, 1.RM.91.AA, 1.RM.91.CA, 1.RM.91.DA |
| **Orthopaedic Surgery** |  |
| Total Hip Joint Replacement | CCI 1.VA.53 |
| Total Knee replacement | CCI 1.VG.53 |
| Spinal surgery | CCI 1.SC.74, 1.SC.75, 1.SC.80, 1.SC.87, 1.SC.89 |
| **Neurosurgery** |  |
| Open craniotomy, craniectomy, posterior fossa surgery | CCI 1.AA.52 (EXCEPT 1.AA.52.HA, percutaneous approach), 1.AB.52, 1.AC.87, 1.AJ87, 1.AK87, 1.AN.87 |

**Table 2. Patient comorbidities identified using the International Classification of diseases (ICD) 10 codes in the Discharge Abstract Database unless specified otherwise.**

|  |  |
| --- | --- |
| **VARIABLE** | **CODES** |
| Myocardial Infarction | ICD-10 I21.0-I21.9, I22.0-I22.9, I25.2 |
| Coronary artery disease | ICD-10 I20, I21, I22, I23, I24, I25 |
| Congestive heart failure | CHF database: DIAGDATE any point prior to indexed surgical procedure. |
| Atrial fibrillation | ICD-10 I48 |
| Diabetes Mellitus | ODD database: DIAGDATE any point prior to indexed surgical procedure. |
| Diabetes without  complications | ICD-10 E10.0, E10.1. E10.6, E10.8, E10.9, E11.0, E11.1. E11.6, E11.8, E11.9, E12.0,  E12.1, E12.6, E12.8, E12.9, E13.0, E13.1, E13.6, E13.8, E13.9, E14.0, E14.1, E14.6, E14.8, E14.9 |
| Diabetes with chronic complications | ICD-10 E10.2-E10.5, E10.7, E11.2-E11.5, E11.7, E12.2-12.5, E12.7, E13.2-E13.5, E13.7,  E14.2-14.5, E14.7 |
| Hypertension | HYPER database: DIAGDATE any point prior to indexed surgical procedure. |
| Cerebrovascular disease | ICD-10 I60, 161, 163, I64, I65, I66, I67, I68, I69, G45.x, G46.x, H340 |
| Hemiplegia or Paraplegia | ICD-10 codes G04.1; G11.4; G80.1, G80.2, G81, G82, G83.0, G83.4, G83.9 |
| Peripheral vascular Disease | ICD-10 codes I70, I71, I73.1, I73.8, I73.9, I77.1, I79, K55.1, ZZ95.8, Z95.9 K55.8 K55.9 |
| Chronic Renal Insufficiency | ICD-10 codes I12.0, I13, N03.2 - N03.7, N05.2-N05.7, N18; N19; N25.0; Z49.0-Z49.2, Z94.0, Z99.2 |
| Dialysis (pre-surgery) | OHIP G326, G860, G862, G863, G865, G866,G332, G861, G864 |
| Chronic lung disease - Asthma, COPD | ASTHMA database: ADMDATE any point prior to indexed surgical procedure.  COPD database: DIAGDATE any point prior to indexed surgical procedure. |
| Dementia | ICD-10 F00 - F03, F05.1, G30, G31.1 |
| Venous Thromboembolic disease | ICD-10 I80.0, I80.1, I80.2, I80.8, I82.2, I82.8, I82.9 |
| Primary Malignancy | ICD-10 C00.0-26.9, C30-34.99, c37-41.9, C45.0-58, C60-76, C81-85, C88, C90-97 |
| Secondary Malignancy | ICD-10 C77.0-C80.9 |
| Rheumatological disease | ICD-10 M05, M06, M31.5, M32-34, M35.1, M35.3, M360 |
| Liver disease | ICD-10 B18, K70.0 - K70.3, K70.9, K71.3 - K71.5, K71.7, K73, K74, K76.0, K76.2 - K76.4, K76.8, K76.9, Z94.4, I85.0, I85.9, I86.4, I98.2, K70.4, K71.1, K72.1,K72.9; K76.5, K76.6, K76.7 |
| Mild Liver Disease | ICD B18.x, K70-K70.3, K70.9, K71.3-K71.5, K71.7, K73.x, K74.x, K76.0, K76.2-K76.4, K76.8, K76.9, Z94.4 |
| Moderate or severe Liver disease | ICD I85.0, I85.9, I86.4, I98.2, K70.4, K71.1, K72.1, K72.9, K76.5, K76.6, K76.7 |
| Peptic Ulcer disease | ICD-10 K25-28 |
| AIDS/HIV | ICD-10 B20.x-B22.x, B24.x |

*Comorbidities identified up to 3 years prior to the surgical intervention.*

*CHF Congestive heart failure; COPD Chronic obstructive pulmonary disease; HYPER Hypertension; ODD Ontario diabetes database; OHIP Ontario Health Insurance Plan*

**Table 3. Regression model predicting the outcome of DAH30**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Variable | Parameter Estimate | Lower 95% CL | Upper 95% CL | p-value |
| Age | -0.0316 | -0.0374 | -0.0259 | <0.0001 |
| Male | 0.2079 | 0.1506 | 0.2652 | <0.0001 |
| Hypertension | -0.0372 | -0.0779 | 0.0034 | 0.0720 |
| COPD | -0.2525 | -0.2952 | -0.2098 | <0.0001 |
| Asthma | -0.0850 | -0.1207 | -0.0493 | <0.0001 |
| CAD | -0.1630 | -0.2821 | -0.0440 | 0.0078 |
| Diabetes | -0.1346 | -0.1766 | -0.0926 | <0.0001 |
| Stroke | -0.1935 | -0.4353 | 0.0483 | 0.1155 |
| Chronic Renal Disease | -1.2688 | -1.6167 | -0.9208 | <0.0001 |
| Charlson ≥ 2 | -0.5241 | -0.6432 | -0.4051 | <0.0001 |
| Teaching Hospital | -0.0335 | -0.9063 | 0.8392 | 0.9394 |
| Surgery Duration | -0.0085 | -0.0010 | -0.0070 | <0.0001 |
| Surgical Volume | -0.0001 | -0.0002 | 0.0000 | 0.0978 |
| Total beds | 0.0010 | -0.0016 | 0.0037 | 0.4437 |
| EVAR | 4.9632 | 4.4021 | 5.5242 | <0.0001 |
| Hysterectomy | 3.6492 | 3.2597 | 4.0387 | <0.0001 |
| Joint | 3.0466 | 2.4708 | 3.6225 | <0.0001 |
| Nephrectomy | 2.9263 | 2.4906 | 3.3619 | <0.0001 |
| Neurosurgery | 3.4657 | 2.9020 | 4.0293 | <0.0001 |
| Open lung | 1.6483 | 1.0831 | 2.2136 | <0.0001 |
| PAD | 2.0794 | 1.3100 | 2.8488 | <0.0001 |
| Spine | 3.7080 | 2.9198 | 4.4962 | <0.0001 |
| Upper GI | 0.4338 | -0.2384 | 1.1059 | 0.2033 |
| VATS Lung | 3.5894 | 3.0373 | 4.1415 | <0.0001 |
| Open AAA | 0.4658 | -0.0232 | 0.9547 | 0.0617 |
| Lower GI | REF |  |  |  |

*AAA Abdominal aortic aneurysm; CAD Coronary artery disease; CL Confidence limit; COPD Chronic obstructive pulmonary disease; DAH Days alive and out of hospital; EVAR Endovascular aortic aneurysm repair; GI Gastrointestinal; PAD Peripheral arterial disease; VATS Video assisted thoracic surgery*

**Table 4. Postoperative complications within 30-days after surgery for good and bad DAH30 groups.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Complication** | **Good DAH30**  **N=486,087** | **Poor DAH30**  **N=51,250** | **Total**  **N=537,337** | **P-Value** |
| Myocardial infarction | 825 (0.2%) | 1,632 (3.2%) | 2,457 (0.5%) | <.001 |
| Heart Failure | 918 (0.2%) | 1,290 (2.5%) | 2,208 (0.4%) | <.001 |
| Stroke | 156 (0.0%) | 440 (0.9%) | 596 (0.1%) | <.001 |
| Pulmonary embolism | 235 (0.0%) | 344 (0.7%) | 579 (0.1%) | <.001 |
| Respiratory failure | 250 (0.1%) | 1,050 (2.0%) | 1,300 (0.2%) | <.001 |
| Infection | 3,294 (0.7%) | 7,387 (14.4%) | 10,681 (2.0%) | <.001 |
| Acute kidney injury | 332 (0.1%) | 744 (1.5%) | 1,076 (0.2%) | <.001 |
| New-onset dialysis | 201 (0.0%) | 479 (0.9%) | 680 (0.1%) | <.001 |
| Shock | 107 (0.0%) | 443 (0.9%) | 550 (0.1%) | <.001 |
| Postoperative bleeding | 4,731 (1.0%) | 2,885 (5.6%) | 7,616 (1.4%) | <.001 |
| Postoperative leak + wound dehiscence | 2,378 (0.5%) | 3,058 (6.0%) | 5,436 (1.0%) | <.001 |

**Figure 1. Hospital specific risk-adjusted 30-day mortality, postoperative length of stay and assessment of DAH30 in 3 hospital risk groups.**

Red points and bars indicated the risk-adjusted value and 95% confidence interval for each hospital

DAH30 for low, medium and high risk groups is described using median (interquartile range)

