### Supplemental Table 1 – Current Procedural Terminology codes for head and neck surgery

| Organ System                  | Procedure                  | CPT (malignant)                                                                 |
|-------------------------------|----------------------------|--------------------------------------------------------------------------------|
| Larynx/upper trachea          | Laryngectomy               | 31365, 31367, 31368, 31370, 31375, 31380, 31382, 31390, 31395, 31420, 31785    |
|                               | Suspension microlaryngoscopy | 31400                                                                            |
| Neck                          | Dissection                 | 38542, 38700, 38720, 38724                                                      |
| Oral Cavity                   |                            | 40816, 40814, 40812, 40810, 40818                                                |
| Tongue                        |                            | 41112, 41113, 41114, 41110, 41116, 41135, 41140, 41145, 41150, 41153, 41130, 41120, 41155 |
| Mouth (other)                 |                            | 41827, 41826, 41825                                                            |
| Parotid                       | Parotidectomy              | 42415, 42410, 42420, 42425, 42426                                                |
| Submandibular Gland           |                            | 42440                                                                            |
| Cutaneous                     |                            |                                                                                  |
| External auditory Canal       |                            | 69150, 69155, 69145                                                            |
| Face/Head/Neck                | 11440, 11446, 11640, 11641, 11642, 11643, 11644, 11645, 11646, 11420, 11426, 11620, 11621, 11622, 11623, 11624, 11626, 21011, 21012, 21013, 21014, 21015, 21016, 21552, 21554, 21555, 21556, 21557, 21558, 30150, 30160, 40500, 40530 |
| Lip                           |                            | 40527, 40525, 40510, 40520, 40530, 40500                                        |
| Endocrine                     | Thyroid                    | 6020, 60212, 60220, 60225, 60240, 60252, 60254, 60260, 60270, 60271            |
| Parathyroid                   |                            | 60500, 60502, 60505, 60512                                                      |
| Carotid Body Tumor            |                            | 60605, 60600                                                                    |
| Skull Base                    | Craniectomy                | 61518, 61548, 61580, 61581, 61582, 61583, 61584, 61585, 61590, 61591, 61592, 61595, 61600, 61601, 61605, 61606, 61607, 61608, 67412, 67420, 61618 |
| Hypopharynx                   |                            | 43100, 43287, 43288, 43286                                                      |
| Reconstruction                | 14020, 14021, 14040, 14041, 15756, 15757, 15758, 20956, 20955, 20962, 20970, 20969, 43496 |
| Adjacent tissue               |                            | 14060, 14061, 14301, 14302                                                      |
| Loco-regional + graft         |                            | 15630, 15620, 15610, 15600, 15731, 15576, 15574, 15572, 15570, 15730, 15733, 15734, 15736, 15650, 15740, 15750, 15760, 15770 |
### Supplemental Table 2 – Postoperative adverse events in both the derivation and validation cohorts

| Postoperative Adverse Event                          | Derivation Cohort (n=31399) | Validation Cohort (n=12302) |
|------------------------------------------------------|-----------------------------|-----------------------------|
| **Death*, (%)**                                      | 209 (0.7)                   | 57 (0.4)                    |
| **Surgical Adverse Events, (%)**                     |                             |                             |
| Superficial wound infection                          | 647 (2.1)                   | 269 (2.2)                   |
| Deep space infection*                                | 333 (1.1)                   | 99 (0.8)                    |
| Wound Dehiscence                                     | 393 (1.3)                   | 148 (1.2)                   |
| **Cardiovascular Adverse Events, (%)**               |                             |                             |
| Acute Myocardial Infarction*                         | 114 (0.4)                   | 50 (0.2)                    |
| Cardiac Arrest*                                      | 99 (0.3)                    | 29 (0.2)                    |
| **Respiratory Adverse Events, (%)**                  |                             |                             |
| Pneumonia                                            | 568 (1.8)                   | 186 (1.5)                   |
| Failure to wean off ventilator*                      | 446 (1.4)                   | 105 (0.9)                   |
| Reintubation*                                        | 371 (1.2)                   | 136 (1.1)                   |
| **Renal Adverse Events, (%)**                        |                             |                             |
| Progressive Renal Insufficiency                      | 21 (0.07)                   | 10 (0.08)                   |
| Acute Renal Failure*                                 | 35 (0.1)                    | 6 (0.05)                    |
| **Infectious Adverse Events, (%)**                   |                             |                             |
| Urinary Tract Infection                              | 213 (0.7)                   | 57 (0.4)                    |
| Sepsis*                                              | 328 (1)                     | 73 (0.6)                    |
| Septic Shock*                                        | 73 (0.2)                    | 24 (0.2)                    |
| **Neurological Adverse Events, (%)**                 |                             |                             |
| Stroke*                                              | 72 (0.2)                    | 26 (0.2)                    |
| **Hematologic Adverse Events, (%)**                  |                             |                             |
| Bleeding requiring transfusion*                      | 1596 (5.1)                  | 516 (4.2)                   |
| Pulmonary Embolism*                                  | 101 (0.3)                   | 34 (0.3)                    |
| Deep Vein Thrombosis                                 | 140 (0.4)                   | 55 (0.5)                    |
| **Return to OR*, (%)**                              | 1799 (5.7)                  | 661 (5.4)                   |

OR: Operating Room. * indicates a major postoperative adverse event.