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| Supplement Table 1: ICD-9-CM codes identifying the study population of patients with pulmonary embolism and gastrointestinal hemorrhage. An algorithm for gastrointestinal hemorrhage was created first including ICD-9-CM codes based on Lewis et al. following by additional relevant codes reported in Li et al. and Joy et al. Any code which described perforation or lacked the mention of hemorrhage where subsequently excluded (grey). |
| Diagnosis Codes |   | Citations |
| Pulmonary embolism | Chung et al. |   |   |
|   | DRG code | Agrawal et al |   |   |
| Pulmonary embolism with MCC | 175 | 1 |   |   |
| Pulmonary embolism without MCC | 176 | 1 |   |   |
| Gastrointestinal hemorrhage | ICD-9-CM code | Lewis et al. | Joy et al | Li et al |
| UGIB |
| Ulcer of esophagus with bleeding | 530.21 |   | 2 | 3 |
| Acute gastric ulcer with hemorrhage | 531.0 | 1 | 2 |   |
| Acute gastric ulcer with hemorrhage, without mention of obstruction | 531.00 | 1 | 2 | 3 |
| Acute gastric ulcer with hemorrhage, with obstruction | 531.01 | 1 | 2 | 3 |
| Acute gastric ulcer with perforation | 531.1 | 1 |   |   |
| Acute gastric ulcer with perforation, without mention of obstruction | 531.1 | 1 |   |   |
| Acute gastric ulcer with perforation, with obstruction | 53111 | 1 |   |   |
| Acute gastric ulcer with hemorrhage and perforation | 5312 | 1 | 2 |   |
| Acute gastric ulcer with hemorrhage and perforation, without mention of obstruction | 53120 | 1 | 2 | 3 |
| Acute gastric ulcer with hemorrhage and perforation, with obstruction | 53121 | 1 | 2 | 3 |
| Acute gastric ulcer without mention of hemorrhage or perforation | 5313 | 1 |   |   |
| Acute gastric ulcer without mention of hemorrhage or perforation, without mention of obstruction | 53130 | 1 |   |   |
| Acute gastric ulcer without mention of hemorrhage or perforation, with obstruction | 53131 | 1 |   |   |
| Chronic or unspecified gastric ulcer with hemorrhage | 5314 | 1 | 2 |   |
| Chronic or unspecified gastric ulcer with hemorrhage, without mention of obstruction | 53140 | 1 | 2 | 3 |
| Chronic or unspecified gastric ulcer with hemorrhage, with obstruction | 53141 | 1 | 2 | 3 |
| Chronic or unspecified gastric ulcer with perforation | 5315 | 1 |   |   |
| Chronic or unspecified gastric ulcer with perforation, without mention of obstruction | 53150 | 1 |   |   |
| Chronic or unspecified gastric ulcer with perforation, with obstruction | 53151 | 1 |   |   |
| Chronic or unspecified gastric ulcer with hemorrhage and perforation | 5316 | 1 | 2 |   |
| Chronic or unspecified gastric ulcer with hemorrhage and perforation, without mention of obstruction | 53160 | 1 | 2 | 3 |
| Chronic or unspecified gastric ulcer with hemorrhage and perforation, with obstruction | 53161 | 1 | 2 |   |
| Chronic gastric ulcer without mention of hemorrhage or perforation | 5317 | 1 |   |   |
| Chronic gastric ulcer without mention of hemorrhage or perforation, without mention of obstruction | 53170 | 1 |   |   |
| Chronic gastric ulcer without mention of hemorrhage or perforation, with obstruction | 53171 | 1 |   |   |
| Gastric ulcer unspecified as acute or chronic without mention of hemorrhage or perforation | 5319 | 1 |   |   |
| Gastric ulcer, unspecified as acute or chronic, without mention of hemorrhage or perforation, without mention of obstruction | 53190 | 1 |   |   |
| Gastric ulcer, unspecified as acute or chronic, without mention of hemorrhage or perforation, with obstruction | 53191 | 1 |   |   |
| Acute duodenal ulcer with hemorrhage | 5320 | 1 | 2 |   |
| Acute duodenal ulcer with hemorrhage, without mention of obstruction | 53200 | 1 | 2 | 3 |
| Acute duodenal ulcer with hemorrhage, with obstruction | 53201 | 1 | 2 | 3 |
| Acute duodenal ulcer with perforation | 5321 | 1 |   |   |
| Acute duodenal ulcer with perforation, without mention of obstruction | 53210 | 1 |   |   |
| Acute duodenal ulcer with perforation, with obstruction | 53211 | 1 |   |   |
| Acute duodenal ulcer with hemorrhage and perforation | 5322 | 1 | 2 |   |
| Acute duodenal ulcer with hemorrhage and perforation, without mention of obstruction | 53220 | 1 | 2 | 3 |
| Acute duodenal ulcer with hemorrhage and perforation, with obstruction | 53221 | 1 | 2 | 3 |
| Acute duodenal ulcer without mention of hemorrhage or perforation | 5323 | 1 |   |   |
| Acute peptic ulcer of unspecified site without mention of hemorrhage and perforation, without mention of obstruction | 53330 | 1 |   |   |
| Acute duodenal ulcer without mention of hemorrhage or perforation, with obstruction | 53231 | 1 |   |   |
| Chronic or unspecified duodenal ulcer with hemorrhage | 5324 | 1 | 2 |   |
| Chronic or unspecified duodenal ulcer with hemorrhage, without mention of obstruction | 53240 | 1 | 2 | 3 |
| Chronic or unspecified duodenal ulcer with hemorrhage, with obstruction | 53241 | 1 | 2 | 3 |
| Chronic or unspecified duodenal ulcer with perforation | 5325 | 1 |   |   |
| Chronic or unspecified duodenal ulcer with perforation, without mention of obstruction | 53250 | 1 |   |   |
| Chronic or unspecified duodenal ulcer with perforation, with obstruction | 53251 | 1 |   |   |
| Chronic or unspecified duodenal ulcer with hemorrhage and perforation | 5326 | 1 | 2 |   |
| Chronic or unspecified duodenal ulcer with hemorrhage and perforation, without mention of obstruction | 53260 | 1 | 2 | 3 |
| Chronic or unspecified duodenal ulcer with hemorrhage and perforation, with obstruction | 53261 | 1 | 2 | 3 |
| Chronic duodenal ulcer without mention of hemorrhage or perforation | 5327 | 1 |   |   |
| Chronic duodenal ulcer without mention of hemorrhage or perforation, without mention of obstruction | 53270 | 1 |   |   |
| Chronic duodenal ulcer without mention of hemorrhage or perforation, with obstruction | 53271 | 1 |   |   |
| Duodenal ulcer unspecified as acute or chronic without mention of hemorrhage or perforation | 5329 | 1 |   |   |
| Duodenal ulcer, unspecified as acute or chronic, without hemorrhage or perforation, without mention of obstruction | 53290 | 1 |   |   |
| Duodenal ulcer, unspecified as acute or chronic, without mention of hemorrhage or perforation, with obstruction | 53291 | 1 |   |   |
| Acute peptic ulcer of unspecified site with hemorrhage | 5330 | 1 | 2 |   |
| Acute peptic ulcer of unspecified site with hemorrhage, without mention of obstruction | 53300 | 1 | 2 | 3 |
| Acute peptic ulcer of unspecified site with hemorrhage, with obstruction | 53301 | 1 | 2 | 3 |
| Acute peptic ulcer of unspecified site with perforation | 5331 | 1 |   |   |
| Acute peptic ulcer of unspecified site with perforation, without mention of obstruction | 53310 | 1 |   |   |
| Acute peptic ulcer of unspecified site with perforation, with obstruction | 53311 | 1 |   |   |
| Acute peptic ulcer of unspecified site with hemorrhage and perforation | 5332 | 1 | 2 |   |
| Acute peptic ulcer of unspecified site with hemorrhage and perforation, without mention of obstruction | 53320 | 1 | 2 | 3 |
| Acute peptic ulcer of unspecified site with hemorrhage and perforation, with obstruction | 53321 | 1 | 2 | 3 |
| Acute peptic ulcer of unspecified site without mention of hemorrhage and perforation | 5333 | 1 |   |   |
| Acute peptic ulcer of unspecified site without mention of hemorrhage and perforation, without mention of obstruction | 53330 | 1 |   |   |
| Acute peptic ulcer of unspecified site without mention of hemorrhage and perforation, with obstruction | 53331 | 1 |   |   |
| Chronic or unspecified peptic ulcer of unspecified site with hemorrhage | 5334 | 1 | 2 |   |
| Chronic or unspecified peptic ulcer of unspecified site with hemorrhage, without mention of obstruction | 53340 | 1 | 2 | 3 |
| Chronic or unspecified peptic ulcer of unspecified site with hemorrhage, with obstruction | 53341 | 1 | 2 | 3 |
| Chronic or unspecified peptic ulcer of unspecified site with perforation | 5335 | 1 |   |   |
| Chronic or unspecified peptic ulcer of unspecified site with perforation, without mention of obstruction | 53350 | 1 |   |   |
| Chronic or unspecified peptic ulcer of unspecified site with perforation, with obstruction | 53351 | 1 |   |   |
| Chronic or unspecified peptic ulcer of unspecified site with hemorrhage and perforation | 5336 | 1 | 2 |   |
| Chronic or unspecified peptic ulcer of unspecified site with hemorrhage and perforation, without mention of obstruction | 53360 | 1 | 2 | 3 |
| Chronic or unspecified peptic ulcer of unspecified site with hemorrhage and perforation, with obstruction | 53361 | 1 | 2 |   |
| Chronic peptic ulcer of unspecified site without mention of hemorrhage or perforation | 5337 | 1 |   |   |
| Chronic peptic ulcer of unspecified site without mention of hemorrhage or perforation, without mention of obstruction | 53370 | 1 |   |   |
| Chronic peptic ulcer of unspecified site without mention of hemorrhage or perforation, with obstruction | 53371 | 1 |   |   |
| Peptic ulcer of unspecified site unspecified as acute or chronic without mention of hemorrhage or perforation | 5339 | 1 |   |   |
| Peptic ulcer of unspecified site, unspecified as acute or chronic, without mention of hemorrhage or perforation, without mention of obstruction | 53390 | 1 |   |   |
| Peptic ulcer of unspecified site, unspecified as acute or chronic, without mention of hemorrhage or perforation, with obstruction | 53391 | 1 |   |   |
| Acute gastrojejunal ulcer with hemorrhage | 5340 | 1 | 2 |   |
| Acute gastrojejunal ulcer with hemorrhage, without mention of obstruction | 53400 | 1 | 2 |   |
| Acute gastrojejunal ulcer, with hemorrhage, with obstruction | 53401 | 1 | 2 |   |
| Acute gastrojejunal ulcer with perforation | 5341 | 1 |   |   |
| Acute gastrojejunal ulcer with perforation, without mention of obstruction | 53410 | 1 |   |   |
| Acute gastrojejunal ulcer with perforation, with obstruction | 53411 | 1 |   |   |
| Acute gastrojejunal ulcer with hemorrhage and perforation | 5342 | 1 | 2 |   |
| Acute gastrojejunal ulcer with hemorrhage and perforation, without mention of obstruction | 53420 | 1 | 2 |   |
| Acute gastrojejunal ulcer with hemorrhage and perforation, with obstruction | 53421 | 1 | 2 |   |
| Acute gastrojejunal ulcer without mention of hemorrhage or perforation | 5343 | 1 |   |   |
| Acute gastrojejunal ulcer without mention of hemorrhage or perforation, without mention of obstruction | 53430 | 1 |   |   |
| Acute gastrojejunal ulcer without mention of hemorrhage or perforation, with obstruction | 53431 | 1 |   |   |
| Chronic or unspecified gastrojejunal ulcer with hemorrhage | 5344 | 1 | 2 |   |
| Chronic or unspecified gastrojejunal ulcer with hemorrhage, without mention of obstruction | 53440 | 1 | 2 |   |
| Chronic or unspecified gastrojejunal ulcer, with hemorrhage, with obstruction | 53441 | 1 | 2 |   |
| Chronic or unspecified gastrojejunal ulcer with perforation | 5345 | 1 |   |   |
| Chronic or unspecified gastrojejunal ulcer with perforation, without mention of obstruction | 53450 | 1 |   |   |
| Chronic or unspecified gastrojejunal ulcer with perforation, with obstruction | 53451 | 1 |   |   |
| Chronic or unspecified gastrojejunal ulcer with hemorrhage and perforation | 5346 | 1 | 2 |   |
| Chronic or unspecified gastrojejunal ulcer with hemorrhage and perforation, without mention of obstruction | 53460 | 1 | 2 | 3 |
| Chronic or unspecified gastrojejunal ulcer with hemorrhage and perforation, with obstruction | 53461 | 1 | 2 | 3 |
| Chronic gastrojejunal ulcer without mention of hemorrhage or perforation | 5347 | 1 |   |   |
| Chronic gastrojejunal ulcer without mention of hemorrhage or perforation, without mention of obstruction | 53470 | 1 |   |   |
| Chronic gastrojejunal ulcer without mention of hemorrhage or perforation, with obstruction | 53471 | 1 |   |   |
| Gastrojejunal ulcer unspecified as acute or chronic without mention of hemorrhage or perforation | 5349 | 1 |   |   |
| Gastrojejunal ulcer, unspecified as acute or chronic, without mention of hemorrhage or perforation, without mention of obstruction | 53490 | 1 |   |   |
| Gastrojejunal ulcer, unspecified as acute or chronic, without mention of hemorrhage or perforation, with obstruction | 53491 | 1 |   |   |
| Acute gastritis, with hemorrhage | 53501 |   | 2 | 3 |
| Atrophic gastritis, with hemorrhage | 53511 |   | 2 | 3 |
| Gastric mucosal hypertrophy, with hemorrhage | 53521 |   | 2 | 3 |
| Alcoholic gastritis, with hemorrhage | 53531 |   |   | 3 |
| Other specified gastritis, with hemorrhage | 53541 |   | 2 | 3 |
| Unspecified gastritis and gastroduodenitis, with hemorrhage | 53551 |   | 2 | 3 |
| Duodenitis, with hemorrhage | 53561 |   | 2 | 3 |
| Eosinophilic gastritis, with hemorrhage | 53571 |   | 2 |   |
| Angiodysplasia of stomach and duodenum with hemorrhage | 53783 |   | 2 | 3 |
| Dieulafoy lesion (hemorrhagic) of stomach and duodenum | 53784 |   | 2 |   |
| Esophageal varices with bleeding | 4560 | 1 |   |   |
| Esophageal varices in diseases classified elsewhere, with bleeding | 45620 | 1 |   |   |
| Gastroesophageal laceration-hemorrhage syndrome | 5307 | 1 | 2 | 3 |
| Esophageal hemorrhage | 53082 | 1 | 2 | 3 |
| Esophageal leukoplakia | 53083 | 1 |   |   |
| Hematemesis | 5780 | 1 | 2 | 3 |
| Unspecified |
| Angiodysplasia of intestine with hemorrhage | 56985 | 1 | 2 | 3 |
| Dieulafoy lesion (hemorrhagic) of intestine | 56986 |   | 2 | 3 |
| Blood in stool | 5781 | 1 | 2 | 3 |
| Hemorrhage of gastrointestinal tract, unspecified | 5789 | 1 | 2 | 3 |
| Nonspecific abnormal findings in stool contents | 7921 | 1 |   |   |
| Acute post hemorrhagic anemia | 2851 |   |   | 3 |
| Intensive Care Unit Stay |
|   | Chang et al. | Nanchal et al. |   |   |
| Central venous catheter | 38.93 |   |   |   |
| Pulmonary artery catheterization | 89.63 |   |   |   |
|   | 89.64 |   |   |   |
|   | 89.66 |   |   |   |
|   | 89.67 |   |   |   |
|   | 89.68 |   |   |   |
| Noninvasive mechanical ventilation | 93.90 |   |   |   |
| Mechanical ventilation |   | 96.7 |   |   |
| Mechanical ventilation > 96 hours |   | 96.72 |   |   |
| Vasopressors |   | 0.17 |   |   |
| Thrombolytics | 99.10 | 99.10 |   |   |
| Procedure Codes |
| Esophagogastroduodenoscopy |   | Ananthakrishnan et al |   |   |
| Other esophagoscopy | 42.23 | 1 |   |   |
| Other gastroscopy | 44.13 | 1 |   |   |
| Endoscopic excision or destruction of lesion or tissue of esophagus | 42.33 | 1 |   |   |
| Other Endoscopy Of Small Intestine | 45.13 | 1 |   |   |
| Closed [Endoscopic] Biopsy Of Small Intestine | 45.14 | 1 |   |   |
| Esophagogastroduodenoscopy [Egd] With Closed Biopsy | 45.16 | 1 |   |   |
| Endoscopic control of gastric or duodenal bleeding | 44.43 | 1 |   |   |
| Colonoscopy |   | Obi et al. | Navaneethan et al |   |
| Transabdominal endoscopy of large intestine | 45.21 | 1 |   |   |
| Endoscopy of large intestine through artificial stoma | 45.22 | 1 | 2 |   |
| Colonoscopy | 45.23 | 1 | 2 |   |
| Flexible sigmoidoscopy | 45.24 | 1 | 2 |   |
| Closed [endoscopic] biopsy of large intestine | 45.25 | 1 | 2 |   |
| Endoscopic polypectoy of large intestine | 45.42 |   | 2 |   |
| \*Dark grey - excluded as associated with perforation or lacks hemorrhage |  |  |  |  |