Supplemental Table 1: ICD-9 codes used to identify deep vein thrombosis and pulmonary embolism

ICD-9 Code	Description
Deep Vein Thrombosis – acute events	
451.1	Phlebitis and thrombophlebitis of deep veins of lower extremities
451.11	Deep vein thrombosis, femoral
451.19	Deep vein thrombosis, other leg veins
451.2	Phlebitis and thrombophlebitis of lower extremities, unspecified
451.81	Phlebitis and thrombophlebitis of iliac vein
451.83	Phlebitis and thrombophlebitis of deep veins of upper extremities
451.84	Phlebitis and thrombophlebitis of upper extremities, unspecified
451.89	Phlebitis and thrombophlebitis of other sites
451.9	Phlebitis and thrombophlebitis of unspecified site
453.2	Embolism and thrombosis of inferior vena cava
453.4	Acute venous embolism and thrombosis of deep vessels of lower extremity
453.40	Acute venous embolism and thrombosis of unspecified deep vessels of lower extremity.
453.41	Acute venous embolism and thrombosis of deep vessels of proximal lower extremity.
453.42	Acute venous embolism and thrombosis of deep vessels of distal lower extremity.
453.8	Acute venous embolism and thrombosis of other specified veins
453.82	Acute venous embolism and thrombosis of deep veins of upper extremity
453.83	Acute venous embolism and thrombosis of upper extremity, unspecified
453.84	Acute venous embolism and thrombosis of axillary veins
453.85	Acute venous embolism and thrombosis of subclavian veins
453.86	Acute venous embolism and thrombosis of internal jugular veins
453.87	Acute venous embolism and thrombosis of other thoracic veins
453.89	Acute venous embolism and thrombosis of other specified veins
453.9	Other venous embolism and thrombosis of unspecified site
Pulmonary Embolism – acute events	
415.11	Iatrogenic pulmonary embolism and infarction
415.13	Saddle embolus of pulmonary artery
415.19	Other pulmonary embolism and infarction
Deep Vein Thrombosis – chronic events	
453.5	Chronic venous embolism and thrombosis of deep vessels of lower extremity
453.50	Chronic venous embolism and thrombosis of unspecified deep vessels of lower extremity
453.51	Chronic venous embolism and thrombosis of deep vessels of proximal lower extremity.
453.52	Chronic venous embolism and thrombosis of deep vessels of distal lower extremity.
453.7	Chronic venous embolism and thrombosis of other specified vessels
453.72	Chronic venous embolism and thrombosis of deep veins of upper extremity
453.73	Chronic venous embolism and thrombosis of upper extremity, unspecified

453.74	Chronic venous embolism and thrombosis auxiliary veins
453.75	Chronic venous embolism and thrombosis of subclavian veins
453.76	Chronic venous embolism and thrombosis of internal jugular veins
453.77	Chronic venous embolism and thrombosis of other thoracic veins
453.79	Chronic venous embolism and thrombosis of other specified veins
Pulmonary embolism – chronic events	
416.2	Chronic pulmonary embolism and infarction

Note: Patients were excluded from our cohort if they had ICD-9 codes listed in this table for either acute or chronic DVT or PE in the 365 days prior to admission or prior to surgery. ICD-9 codes for acute events listed in this table were used to identify post-operative DVT or PE events.

Supplemental Table 2: ICD-9 procedure codes for orthopedic and abdominal-pelvic surgery

ICD-9 Code	Description
Major Orthopedic Surgery	
81.40	Repair of hip, not elsewhere classified
81.51	Total hip replacement
81.52	Partial hip replacement
81.53	Revision of hip replacement, not otherwise specified
81.42	Five-in-one repair of knee
81.43	Triad knee repair
81.44	Patellar stabilization
81.45	Other repair of the cruciate ligaments
81.46	Other repair of the collateral ligaments
81.47	Other repair of the knee
81.54	Total knee replacement
81.55	Revision of knee replacement, not otherwise specified
79.15	Closed reduction of fracture with internal fixation, femur
79.35	Open reduction of fracture with internal fixation, femur
820	Fracture of neck of femur
Abdominal/Pelvic Surgery	
41.2	Splenotomy
41.5	Total splenectomy
43.0	Gastrotomy
43.3	Pyloromyotomy
43.5	Partial gastrectomy w/ anastomosis to esophagus
43.6	Partial gastrectomy w/ anastomosis to duodenum
43.7	Partial gastrectomy w/ anastomosis to jejunum
44.5	Revision of gastric anastomosis
45.8	Total intra-abdominal colectomy
48.5	Abdominoperineal resection of rectum
50.0	Hepatotomy
50.3	Lobectomy of liver
50.4	Total hepatectomy
52.3	Marsupialization of pancreatic cyst
52.4	Internal drainage of pancreatic cyst
52.6	Total pancreatectomy
52.7	Radical pancreaticoduodenectomy
53.7	Repair of diaphragmatic hernia, abdominal approach
54.0	Incision of abdominal wall
54.3	Excision or destruction of lesion or tissue of abdominal wall or umbilicus
54.4	Excision or destruction of peritoneal tissue
66.4	Total unilateral salpingectomy

68.0	Other incision and excision of uterus
68.3	Subtotal abdominal hysterectomy
68.4	Total abdominal hysterectomy
68.6	Radical abdominal hysterectomy
68.8	Pelvic evisceration
68.9	Other and unspecified hysterectomy
69.3	Paracervical uterine denervation
17.11	Laparoscopic repair of direct inguinal hernia with graft or prosthesis
17.12	Laparoscopic repair of indirect inguinal hernia with graft or prosthesis
17.13	Laparoscopic repair of inguinal hernia with graft or prosthesis, nos
17.21	Laparoscopic bilateral repair of direct inguinal hernia with graft or prosthesis
17.22	Laparoscopic bilateral repair of indirect inguinal hernia with graft or prosthesis
17.23	Laparoscopic bilateral repair of inguinal hernia, one direct and one indirect, with graft or prosthesis
17.24	Laparoscopic bilateral repair of inguinal hernia with graft or prosthesis, nos
41.33	Open biopsy of spleen
41.41	Marsupialization of splenic cyst
41.42	Excision of lesion or tissue of spleen
41.43	Partial splenectomy
41.93	Excision of accessory spleen
41.94	Transplantation of spleen
41.95	Repair and plastic operations on spleen
41.99	Other operations on spleen
42.40	Esophagectomy, nos
42.41	Partial esophagectomy
42.42	Total esophagectomy
42.53	Intrathoracic esophageal anastomosis w/ interposition of small bowel
42.54	Other intrathoracic esophagoenterostomy
42.55	Intrathoracic esophageal anastomosis w/ interposition of colon
42.56	Other intrathoracic esophagocolostomy
42.63	Antesternal esophageal anastomosis w/ interposition of small bowel
42.64	Other antesternal esophagoenterostomy
42.65	Antesternal esophageal anastomosis w/ interposition of colon
42.66	Other antesternal esophagocolostomy
42.91	Ligation of esophageal varices
43.42	Local excision of other lesion or tissue of stomach
43.49	Other destruction of lesion or tissue of stomach
43.81	Partial gastrectomy w/ jejuna transposition
43.89	Other partial gastrectomy
43.91	Total gastrectomy w/ intestinal interposition
43.99	Other total gastrectomy
44.00	Vagotomy, nos
44.01	Truncal vagotomy (has one case)

44.02	Highly selective vagotomy
44.03	Other selective vagotomy
44.11	Transabdominal gastroscopy
44.15	Open biopsy of stomach
44.21	Dilation of pylorus by incision
44.29	Other pyloroplasty has 6 cases
44.31	High gastric bypass has 1 case
44.38	Laparoscopic gastroenterostomy
44.39	Other gastroenterostomy
44.40	Suture of peptic ulcer, nos
44.41	Suture of gastric ulcer site
44.42	Suture of duodenal ulcer site
44.61	Suture of laceration of stomach
44.63	Closure of other gastric fistula
44.64	Gastropexy
44.65	Esophagogastroplasty
44.66	Other procedures for creation of esophagogastric sphincteric competence
44.67	Laparoscopic procedures for creation of esophagogastric sphinctericcompetence
44.68	Laparoscopic gastroplasty
44.69	Other repair of stomach
44.91	Ligation of gastric varices
44.92	Intraoperative manipulation of stomach
44.95	Laparoscopic gastric restrictive procedure
44.96	Laparoscopic revision of gastric restrictive procedure
44.97	Laparoscopic revision of gastric restrictive devices
44.99	Gastric operation nec
45.00	Incision of intestine, nos
45.01	Incision of duodenum
45.02	Other incision of small intestine
45.03	Incision of large intestine
45.11	Transabdominal endoscopy
45.15	Open biopsy of small intestine
45.21	Transabdominal endoscopy of large intestine
45.26	Open biopsy of large intestine
45.31	Other local excision of lesion of duodenum
45.32	Other destruction of lesion of duodenum
45.33	Local excision of lesion or tissue of small intestine, except duodenum
45.34	Other destruction of lesion of small intestine, except duodenum
45.41	Excision of lesion or tissue of large intestine
45.49	Other destruction of lesion of large intestine
45.50	Isolation of intestinal segment, nos
45.51	Isolation of segment of small intestine

45.52	Isolation of segment of large intestine
45.61	Multiple segmental resection of small intestine
45.62	Other partial resection of small intestine
45.63	Total removal of small intestine
45.90	Intestinal anastomosis, nos
45.91	Small-to-small intestinal anastomosis
45.92	Anastomosis of small intestine to rectal stump
45.93	Other small-to-large intestinal anastomosis
45.94	Large-to-large intestinal anastomosis
45.95	Anastomosis to anus
46.01	Exteriorization of small intestine
46.03	Exteriorization of large intestine
46.10	Colostomy, nos
46.11	Temporary colostomy
46.13	Permanent colostomy
46.14	Delayed opening of colostomy
46.20	Ileostomy, nos
46.21	Temporary ilesostomy
46.22	Continent ileostomy
46.23	Other permanent ileostomy
46.40	Revision of intestina stoma, nos
46.41	Revision of stoma of small intestine
46.42	Repair of pericolostomy hernia
46.43	Other revision of stoma of large intestine
46.50	Closure of intestinal stoma, not otherwise specified
46.51	Closure of stoma of small intestine
46.52	Closure of stoma of large intestine
46.60	Fixation of intestine, nos
46.61	Fixation of small intestine to abdominal wall
46.62	Other fixation of small intestine
46.63	Fixation of large intestine to abdominal wall
46.64	Other fixation of large intestine
46.72	Closure of fistula of duodenum
46.73	Suture of laceration of small intestine, except duodenum
46.74	Closure of fistula of small intestine, except duodenum
46.75	Suture of laceration of large intestine
46.76	Closure of fistula of large intestine
46.79	Other repair of intestine
46.80	Intra-abdominal manipulation of intestine, nos
46.81	Intra-abdominal manipulation of small intestine
46.82	Intra-abdominal manipulation of large intestine

46.91	Myotomy of sigmoid colon
46.92	Myotomy of other parts of colon
46.93	Revision of anastomosis of small intestine
46.94	Revision of anastomosis of large intestine
46.97	Transplant of intestine
46.99	Other operations on intestines
48.21	Transabdominal proctosigmoidoscopy
48.25	Open biopsy of rectum
48.40	Pull through resection of rectum, nos
48.41	Submucosal resection of rectum
48.42	Lap pull-through resection of rectum
48.43	Open pull-through resection of rectum
48.49	Other pull-through resection of rectum
48.50	Abdominoperineal resection of rectum
48.51	Laparoscopic abdominoperineal resection of rectum
48.52	Open abdominoperineal resection of rectum
48.59	Other abdominoperineal resection of rectum
48.71	Suture of laceration of rectum
48.74	Rectorectostomy
48.75	Abdominal proctopexy
50.12	Open biopsy of liver
50.14	Laparopscopic liver biopsy
50.19	Other diagnostic procedures on liver
50.21	Marsupialization of lesion of liver
50.22	Partial hepatectomy
50.23	Opn abltn liver les/tiss
50.25	Laparopscopic ablation of liver lesion or tissue
50.26	Abltn liver les/tiss nec oct06-
50.29	Other destruction of lesion of liver
50.51	Auxiliary liver transplant
50.59	Other transplant of liver
50.61	Closure of laceration of liver
50.69	Other repair of liver
51.02	Trocar cholecystostomy
51.03	Other cholecystostomy
51.04	Other cholecystotomy
51.13	Open biopsy of gallbladder or bile ducts
51.19	Other diagnostic procedures on biliary tract
51.21	Other partial cholecystectomy
51.22	Cholecystectomy
51.23	Laparoscopic cholecystectomy

51.24	Laparoscopic partial cholecystectomy
51.31	Anastomosis of gallbladder to hepatic ducts
51.32	Anastomosis of gallbladder to intestine
51.33	Anastomosis of gallbladder to pancreas
51.34	Anastomosis of gallbladder to stomach
51.35	Other gallbladder anastomosis
51.36	Choledochoenterostomy
51.37	Anastomosis of hepatic duct to gastrointestinal tract
51.39	Other bile duct anastomosis
51.41	Common duct exploration for removal of calculus
51.42	Common duct exploration for relief of other obstruction
51.43	Insertion of choledochohepatic tube for decompression
51.49	Incision of other bile ducts for relief of obstruction
51.51	Exploration of common duct
51.59	Incision of other bile duct
51.61	Excision of cystic duct remnant
51.62	Excision of ampulla of vater (with reimplantation of common duct)
51.63	Other excision of common duct
51.69	Excision of other bile duct
51.71	Simple suture of common bile duct
51.72	Choledochoplasty
51.79	Repair of other bile ducts
51.81	Dilation of sphincter of oddi
51.82	Pancreatic sphincterotomy
51.83	Pancreatic sphincteroplasty
51.89	Other operations on sphincter of oddi
51.91	Repair of laceration of gallbladder
51.92	Closure of cholecystostomy
51.93	Closure of other biliary fistula
51.94	Revision of anastomosis of biliary tract
51.95	Removal of prosthetic device from bile duct
51.99	Other operations on biliary tract
52.01	Drainage of pancreatic cyst by catheter
52.09	Other pancreatotomy
52.12	Open biopsy of pancreas
52.19	Other diagnostic procedures on pancreas
52.22	Other excision or destruct of lesion or tissue of pancreas or panc duct
52.51	Proximal pancreatectomy
52.52	Distal pancreatectomy
52.53	Radical subtotal pancreatectomy
52.59	Other partial pancreatectomy

52.80	Pancreatic transplant, nos
52.81	Reimplantation
52.82	Homotransplant of pancreas
52.83	Heterotransplant of pancreas
52.92	Cannulation of pancreatic duct
52.95	Other repair of pancreas
52.96	Anastomosis of pancreas
52.99	Other operations on pancreas
53.00	Unilateral repair of inguinal hernia, nos
53.01	Repair of direct inguinal hernia
53.02	Repair of indirect inguinal hernia
53.03	Repair of direct inguinal hernia w/ graft or prosthesis
53.04	Repair of indirect inguinal hernia w/ graft or prosthesis
53.05	Repair of inguinal hernia w/ graft or prosthesis, nos
53.10	Bilateral repair of inguinal hernia, nos
53.11	Bilateral repair of direct inguinal hernia
53.12	Bilateral repair of indirect inguinal hernia
53.13	Bilateral repair of inguinal hernia, one direct and one indirect
53.14	Bilateral repair of direct inguinal hernia w/ graft or prosthesis
53.15	Bilateral repair of indirect inguinal hernia w/ graft or prosthesis
53.16	Bilateral repair of inguin hernia, 1 direct 1 indirect, w/ graft or pros
53.17	Bilateral inguinal hernia repair w/ graft or prosthesis, nos
53.21	Unilateral repair of femoral hernia
53.29	Other unilateral femoral herniorrhaphy
53.31	Bilateral repair of femoral hernia w/ graft or prosthesis
53.39	Other bilateral femoral herniorrhaphy
53.41	Repair of umbilical hernia w/ prosthesis
53.42	Laparopscopic repair of umbilical hernia with graft or prosthesis
53.43	Other laparoscopic umbilical heriorrhaphy
53.49	Other umbilical herniorrhaphy
53.51	Incisional hernia repair has 2 cases
53.59	Repair of other hernia of anterior abdominal wall
53.61	Incisional hernia repair w/ prosthesis
53.62	Laparopscopic incisional hernia repair with graft or prosthesis
53.63	Other laparoscopic repair of other hernia of anterior abdominal wall with graft or prosthesis
53.69	Repair of other hernia of anterior abdominal wall w/ prosthesis
53.71	Lap repair of diaphragmatic hernia, abdominal approach
53.72	Other and open repair of diaphragmatic hernia, abdominal approach
53.75	Repair of diaphragmatic hernia, abdominal approach, nos
54.11	Exploratory laparotomy

54.12	Reopening of recent laparotomy site
54.19	Other laparotomy
54.21	Laparoscopy
54.22	Biopsy of abdominal wall or umbilicus
54.23	Biopsy of abdominal wall or umbilicus
54.29	Other diagnostic procedures on abdominal region
54.51	Laparoscopic lysis of peritoneal adhesions
54.59	Other lysis of peritoneal adhesions
54.61	Reclosure of postoperative disruption of abdominal wall
54.62	Delayed closure of granulating abdominal wound
54.63	Other suture of abdominal wall
54.64	Suture of peritoneum
54.71	Repair of gastroschisis
54.72	Other repair of abdominal walls
54.73	Other repair of peritoneum
54.74	Other repair of omentum
54.75	Other repair of mesentery
54.92	Removal of foreign body from peritoneal cavity has 1 case
54.93	Creation of cutaneoperitoneal fistula
54.94	Creation of peritoneovascular shunt
54.95	Incision of peritoneum
56.51	Formation of cutaneous ureteroileostomy
56.52	Revision of cutaneous ureteroileostomy
56.61	Formation of other cutaneous ureterostomy
56.62	Revision of other cutaneous ureterostomy
56.71	Urinary diversion to intestine
56.72	Revision of ureterointestinal anastomosis
59.00	Retroperitoneal dissection, nos
65.01	Laparoscopic oophorotomy
65.09	Other oophorectomy
65.12	Other biopsy of ovary
65.21	Marsupialization of ovarian cyst
65.22	Wedge resection of ovary
65.23	Laparoscopic marsupialization of ovarian cyst
65.24	Laparoscopic wedge resection of ovary
65.25	Other laparoscopic local excision or destruction of ovary
65.29	Other local excision or destruction of ovary
65.31	Laparoscopic unilateral oophorectomy
65.39	Other unlilateral oophorectomy
65.41	Laparoscopic unilateral salpingooophorectomy
65.49	Other unilateral salpingoophorectomy

65.51	Other removal of both ovaries at same operative episode
65.52	Other removal of remaining ovary
65.53	Laparoscopic removal of both ovaries at same operative episode
65.54	Laparoscopic removal of remaining ovary
65.61	Other removal of both ovaries and tubes at same operative episode
65.62	Other removal of remaining ovary and tube
65.63	Laparoscopic removal of both ovaries and tubes at same operative episode
65.64	Laparoscopic removal of remaining
65.71	Other simple suture of ovary
65.72	Other reimplantation of ovary
65.73	Other salpingo oophoroplasty
65.74	Laparoscopic simple suture of ovary
65.75	Laparoscopic reimplantation of ovary
65.76	Laparoscopic salpingooophoroplasty
65.79	Other repair of ovary
65.81	Laparoscopic lysis of adhesions of ovary and fallopian tube
65.89	Other lysis of adhesions of ovary and fallopian tube
65.92	Transplantation of ovary
65.93	Manual rupture of ovarian cyst
65.94	Ovarian denervation
65.95	Release of torsion of ovary
65.99	Other operations on ovary
66.01	Salpingotomy
66.02	Salpingostomy
66.11	Biopsy of fallopian tube
66.19	Other diagnostic procedures on fallopian tubes
66.31	Other bilateral ligation and crushing of fallopian tubes
66.32	Other bilateral ligation and division of fallopian tubes
66.39	Other bilateral destruction or occlusion of fallopian tubes
66.51	Removal of both fallopian tubes at same operative episode
66.52	Removal of remaining fallopian tube
66.61	Excision or destruction of lesion of fallopian tube
66.62	Salpingectomy w/ removal of tubal pregnancy
66.63	Bilateral partial salpingectomy, nos
66.69	Other partial salpingectomy
66.71	Simple suture of fallopian tube
66.72	Salpingo-oophorostomy
66.73	Salpingo-salpingostomy
66.74	Salpingo-uterostomy
66.79	Other repair of fallopian tube
66.92	Unilateral destruction or occlusion of fallopian tube

66.93	Implantation or replacement of prosthesis of fallopian tube
66.94	Removal of prosthesis of fallopian tube
66.96	Dilation of fallopian tube
66.97	Burying of fimbriae in uterine wall
66.99	Other operation of fallopian tube
68.13	Open biopsy of uterus
68.14	Open biopsy of uterine ligaments
68.19	Other diagnostic procedures on uterus and supporting structures
68.23	Endometrial ablation
68.29	Other excision or destruction of lesion of uterus
68.31	Laparoscopic supracervical hysterectomy [lsh]
68.39	Other subtotal abdominal hysterectomy
68.41	Lap total abdominal hyst oct06-
68.49	Total abd hyst nec/nos oct06-
68.61	Lap radical abdomnl hyst oct06-
68.69	Radical abd hyst nec/nos oct06-
69.19	Other excision or destruction of uterus and supporting structures
69.21	Interposition operation
69.22	Other uterine suspension
69.23	Vaginal repair of chronic inversion of uterus
69.29	Other repair of uterus and supporting structures
69.41	Suture of laceration of uterus
69.42	Closure of fistula of uterus
69.49	Other repair of uterus
69.98	Other operations on supporting structures of uterus

Supplemental Table 3: Anticoagulation medications

Heparin
Warfarin
Ardeparin
Bemiparin
Certoparin
Enoxaparin
Parnaparin
Tinaziparin
Dalteparin
Reviparin
Nadroparin

Supplemental Table 4: Examples of text used to identify outpatient VTE events

Event	Context classification stage	Text
DVT	a	In the course of this patient's treatment he has developed a left lower extremity DVT
DVT	a	may have DVT, agree w/ recommendation to evaluate in the ER ASAP
DVT	a, b	His RLE venous duplex is positive for DVT
DVT	a, b	pt found to have proximal DVT
DVT	a, b	Ultrasound positive for DVT, new clot eviden referred back to ER for care
DVT	a	On that admission he was diagnosed with bilateral calf DVTs and started on anticoagulation
DVT	a	And dry with trace pedal edema and some swelling on the left side greater than the right due to his DVT which is on the left
PE	a	Your INR goal for PE is 2-3
PE	a	Pulmonary embolism 4
PE	a, b	found to have bilateral massive PE and left DVT. no prior episodes of DVT/PE
PE	a	Indication for Anticoagulation Therapy: Pulmonary Embolism
PE	a, b	Patient has been found to have a small pe He has been started on anticoagulation
PE	a, b	Pt found to have bilateral PEs
PE	a	Problems-PEs, anticoagulated
PE	a, b	Diagnosis: PE

Note: Context classification stage a identified mentions of PE, DVT, and VTE with no specific language ruling out acute occurrence such as negation, historical aspect, or family history. Context classification stage b identified mentions of PE, DVT, and VTE with explicit language or additional rules that reflect expressions and templates commonly used by the VA clinicians to confirm an acute occurrence.