**Gastroesophageal reflux disease phenotype algorithm**

Background:

Gastroesophageal reflux disease (GERD) is a common gastrointestinal disease with prevalence in the United States of ~14-20% in adults and <10% in children. Symptoms include impaired expulsion of gastric reflux, dysphagia, vomiting, and respiratory problems. Relevant treatments include lifestyle changes, medication (proton pump inhibitors, H2 receptor blockers and antacids), and surgery.

Case inclusion criteria:

-Individuals 1,095 days old or older with relevant ICD9 code for GERD (530.81 or 530.11) in two or more in person visits, on separate calendar days.

 *Plus*

- Individual’s medical record includes two or more prescriptions for GERD -related medications (see Table 1)

 *Or*

- Individuals 1,095 days old or older with relevant ICD9 code GERD (530.81) in three or more in person visits, on separate calendar days.

Case exclusion criteria:

* Individual’s medical record includes one or more of the ICD9 codes shown in Table2.

Controls:

 - Individuals 1,095 days old or older

 - Must have two or more in person visits in the last 5 years

 - No diagnosis code for GERD (530.81 or 530.11)

 - No history of relevant medications (see Table1)

 - No exclusionary ICD 9 codes (see Table3)

Covariates:

 -Age

 -Gender

 -Ethnicity

 -Race

 -BMI

 - History of reflux esophagitis, strictures, Barrett’s(ICD9)

 -History of cerebral palsy, severe mental retardation (ICD9)

 -Procedures (imaging, endoscopy, pH monitoring)

 -History of surgery (fundoplication)

 -Age in days of all in person visits per EMR

Table1. Medications related to Gastroesophageal reflux disease

|  |
| --- |
| Proton Pump Inhibitors (PPIs) |
| Generic name |  |
| **Omeprazole**  | Prilosec |
| **Omeprazole and sodium bicarbonate**  | Zegerid |
| **Esomeprazole** | Nexium |
| **Lansoprazole** | Prevacid |
| **Dexlansoprazole** | Dexilant, Kapidex |
| **Pantoprazole** | Protonix |
| **Rabeprazole**  | Aciphex |
| Histamine2 receptor antagonists |
| Generic name |  |
| **Cimetidine** | Tagamet |
| **Nizatidine** | Axid |
| **Ranitidine** | Zantac |
| **Famotidine** | Pepcid, Fluxid |
| Prokinetics |
| Generic name |  |
| **Metoclopramide** | Reglan |
| **Cisapride** | Prepusid, Propulsid |
| Antacids |
| Generic name |  |
| **Aluminum hydroxide** | Amphojel |
| **Magnesium hydroxide** | Milk of Magnesium |
| **Simethicone** | Mylanta, Gas-x |
| **Calcium Carbonate** | Tums |
| **Sodium Bicarbonate** | Alka-Seltzer |

Table2. Case exclusion criteria

|  |  |
| --- | --- |
| **ICD9 codes** | **Diagnosis** |
| 530.0 | Achalasia |
| 530.5 | Dyskinesia of the esophagus |
| 530.84 | Tracheoesophageal fistula |
| 531.xx | Gastric ulcers |
| 533.xx | Peptic ulcer disease |
| 150.xx | Malignant neoplasm of esophagus |
| 151.xx | Malignant neoplasm of stomach |
| 112.84 | Candidal esophagitis |
| 054.79 | Herpes esophagitis |
| 078.5 | Cytomegalovirus |
| 042 | Human Immunodeficiency Virus disease |
| 553.3 | Diaphragmatic Hernia |
| 750.3 | Tracheoesophageal Fistula,esophageal atresia and stenosis |
| 536.3 | Gastroparesis |
| 710.1 | Scleroderma |
| 758.x | Chromosomal anomalies |
| 359.0 | Congenital hereditary muscular dystrophy |
| 359.1 | Hereditary progressive muscular dystrophy |

Table3. Control exclusion criteria

|  |  |
| --- | --- |
| **ICD9 codes** | **Diagnosis** |
| 530.x | Diseases of the esophagus |
| 531.x | Gastric ulcer |
| 532.x | Duodenal ulcer |
| 533.x | Peptic ulcer site usnpecified |
| 534.x | Gastrojejunal ulcer |
| 535.x | Gastritis and duodenitis |
| 536.x | Disorders of function of stomach |
| 112.84 | Candidal esophagitis |
| 054.79 | Herpes esophagitis |
| 078.5 | Cytomegalovirus |
| 042 | Human Immunodeficiency Virus disease |
| 553.3 | Diaphragmatic Hernia |
| 750.3 | Tracheoesophageal Fistula,esophageal atresia and stenosis |
| 750.4 | Other specified anomalies of esophagus |
| 750.5 | Congenital hypertrophic pyloric stenosis |
| 750.6 | Congenital hiatus hernia |
| 758.x | Chromosomal anomalies |
| 710.1 | Scleroderma |
| 318.1 | Severe intellectual disabilities |
| 318.2 | Profound intellectual disabilities |
| 343.x | Infantile cerebral palsy |
| 359.0 | Congenital hereditary muscular dystrophy |
| 359.1 | Hereditary progressive muscular dystrophy |
| V12.79 | Personal history of other diseases of digestive system |