The Use of BioSense Data for Surveillance of Gastrointestinal (GI) Illness

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Objective

Identify methods by which chief complaint and final diagnosis data received by BioSense may be used for Gastrointestinal (GI) surveillance

Background

- Biosurveillance data is useful for describing trends in respiratory and gastrointestinal (GI) diseases
  - Chief complaints (CCs) are timely indicators of GI illness
  - Final Diagnoses indicators are more specific than CCs, but may be influenced by billing considerations
- BioSense is a Centers for Disease Control and Prevention (CDC) national near real-time biosurveillance system.
- The BioSense system currently receives data from more than 370 hospitals, as well as national daily batched data from over 1100 Department of Defense (DoD) and Veterans Affairs (VA) medical facilities.
- Trends in respiratory disease/influenza are monitored with the BioSense Influenza Module – this poster represents the results from initial analyses to develop a similar in depth understanding of GI illness data
- BioSense maps chief complaint and diagnosis data to 11 syndromes and 78 sub-syndromes (indicators)
- One of the 11 syndromes is GI illness and 6 of the sub-syndromes (abdominal pain; anorexia, diarrhea, food poisoning, intestinal infections, ill-defined; and nausea and vomiting) represent gastrointestinal concepts. (Table 1)
- BioSense sub-syndromes were recently developed and require ongoing evaluation and enhancement. BioSense is in the process of comparing its sub-syndrome definitions with ESSENCE for consistency and accuracy.

Table 1. GI- Related Sub-syndrome Definitions

Indicator	Free text key word concepts	ICD-9 codes/description
Abdominal Pain	Abdominal/Stomach pain,cramp,pressure or problem, appendicitis, belly ache/pain, diverticulitis, epigastric pain, indegestion, quadrant pain (left upper/lower left/lower/right upper/etc…)	789.00-.09 abdominal pain 789.6 -.69 abdominal tenderness
Anorexia	Anorexia, not eating	783.0 anorexia
Diarrhea	Colitis, diarrhea, diarrhea and vomiting, enteritis, loose bowel movement, loose stool, nausea and diarrhea, rotovirus	787.91 diarrhea
Food poisoning	Food intoxication, food poisoning	003.0 Salmonella gastroenteritis 003.9 Salmonella infection unspecified 005.0 -.9 Food poisoning
Intestinal infections, ill-defined	Epigastritis, gastritis, gastroenteritis, stomach flu, stomach virus	009.0 -.3 Infectious colitis & gastroenteritis, Infectious diarrhea
Nausea and vomiting	Bringin up, dry heaves, emesis, hyperemesis, nausea, nauseous, queasiness, retch, sickness, spit up, throw up, vomit	787.01 - .03 nausea alone, vomiting alone, or nausea with vomiting

Methods

- Study Period:
  - VA and DoD data: August 2004 – May 2007
  - Hospital data: May 2006 – May 2007
- Examined GI Illness indicators for trends in rate
  - In order to compare the rates of the BioSense data sources to one another we calculated a relative risk value for each week by dividing each week's rate by the rate of a reference period week, the week of July 14th 2007
- Identified the most common diagnosis for each indicator
- Examined the frequency of GI related chief complaints mapping to diagnoses for:
  - The same indicator
  - Another GI related indicator
  - A non-GI related indicator

Results

- Hospital ED visits mapped most frequently to three GI-related sub-syndromes based on their CCs and diagnoses: abdominal pain, diarrhea, and nausea and vomiting. (Figure 1)
- Hospital ED visits mapped to GI-related sub-syndromes based on CCs more frequently than did visits with diagnoses. (Figure 1)
- For all three data sources, "Abdominal pain, other specified site" [789.09] was the most common diagnosis, accounting for approximately 20% of GI-related diagnoses. (Figure 2).
- For hospital ED visits with a final diagnosis assigned to the GI syndrome, 60% also had a CC assigned to the GI syndrome. However, similar figures for the sub-syndromes showed that these indicators match less often. (Figure 3)
- We observed seasonal increases in several GI indicators during the 2006-2007 winter season for the hospital and DoD data.
- The most prominent increases were for ED CC data among the diarrhea and nausea and vomiting sub-syndromes. Both sub-syndromes showed two distinct winter peaks which coincided with known Norovirus outbreaks in various communities across the US. (Figure 4 & 5)
- Examination of visits with a diarrhea CC indicated that about 50% of such visits map to the GI syndrome or a GI-related sub-syndrome based on their final diagnosis. 43% map to a non GI-related sub-syndrome. (Figure 6)

Figure 1. Percent of Visits with GI Indicators Among All ED Visits, by Diagnosis Type
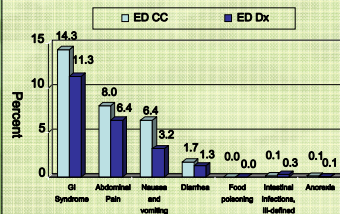

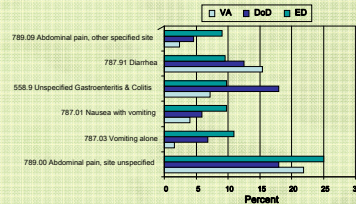### Figure 2. Percent of Most Common GI Syndrome ICD-9 Diagnoses by Data Source

Figure 3. Percent of Visits with a GI Chief Complaint Among Visits with a GI Syndrome Final Diagnosis
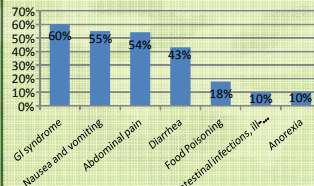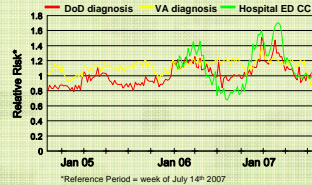

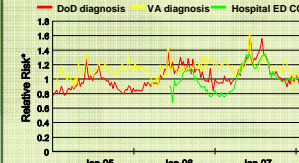### Figure 4. Diarrhea Subsyndrome by Week and Data Source

*Reference Period = week of July 14th 2007

Figure 5. Nausea & Vomiting Subsyndrome by Week and Data Source

Figure 6. Final Diagnosis Assignments Among Hospital ED Visits with a Complaint of Diarrhea

Syndrome	% of Visits	Sub-Syndrome	% of Visits
GI	45.8%	Diarrhea	20.4%
Respiratory	8.3%	Nausea & vomiting	13.3%
Fever	4.9%	Abdominal Pain	10.0%
Neurological	1.2%	Dehydration	6.4%
Hemorrhagic Illness	1.2%	Mental disorders	5.6%
Specific Infection	1.0%	Intestinal infections, ill-defined	3.9%
Rash	0.5%	Urinary tract infections	2.7%
Localized Cutaneous Lesion	0.3%	All GI-related sub-syndromes	47.8%
All non-GI Syndromes	17.6%	All non-GI related sub-syndromes	43.0%

Discussion

- The majority of the 6 GI-related sub-syndromes capture symptoms [chief complaints] rather than specific diseases [diagnoses]
- Chief complaint indicators are variably concordant with final diagnosis indicators
- BioSense data may be useful for monitoring seasonal Norovirus outbreaks
- Final diagnoses are more specific than CCs, but may be influenced by billing considerations.
- Chief complaints and final diagnoses reported to BioSense can play an important role in providing situational awareness on the national level for GI illness.
- BioSense will conduct further analyses to:
  - Examine trends in outpatient and inpatient patient classes and among different demographic categories
  - Adjust for facility specific confounding effects on rates
- BioSense plans to collaborate with GI illness subject matter experts

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For more information

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