Seasonal patterns of gastrointestinal illness

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OBJECTIVE

To investigate seasonal patterns of gastrointestinal (GI) illness among children and adults.

BACKGROUND

Seasonal patterns of acute gastroenteritis are reported in the literature for children with peaks in cold weather months. Adults are less well studied and findings as to whether there are seasonal patterns of GI illness are mixed, depending on the disorder.

METHODS

Subjects were all patients treated for gastroenteritis in MA from Oct 2001 to Oct 2005. Data were diagnoses for all hospital visits (ED, inpatient, observation). GI visits (N= 1,167,711) were selected by ICD-9 codes using BioSense criteria. Ten age groups were defined (0, 1-2, 3-5, 6-10, 11-14, 15-17, 18-39, 40-59, 60-74, 75+; labeled 0-9 on graphs). State-wide weekly rates of GI illness by age group were calculated using estimated population values from the US Census. Rates for any GI Dx and Dx by 3-digit ICD-9 categories were studied.

The effects of season, age group, and their interaction on rates of GI illness were evaluated using negative binomial regression. Post-hoc tests were performed to compare seasons for each age group when the interaction was significant.

RESULTS

In Figure 1, numbers of visits with a GI Dx are displayed as overlapping one-year time series for children and adults. Seasonal patterns are more apparent for children with winter to spring peaks.

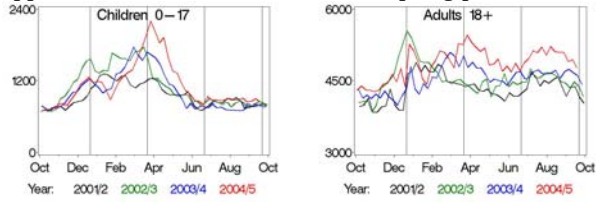

Figure 1. Weekly number of hospital visits for children and adults with any GI diagnosis over a 4 year period.

In Figure 2, the significant interaction effect of season and age on overall rates of GI illness is shown. For all child age groups, rates were greatest during the winter and each season differed from all others for children 0-5. For ages 6-17, seasons besides winter did not always differ from each other. For adults, winter rates were greatest for age 18-39 (but not different from summer) and age 75+. For adults 40-74, fall rates were lowest, but other seasons did not differ. Thus, winter rates were most distinct for the very youngest age groups, but sometimes did not differ from other seasons for older ages.

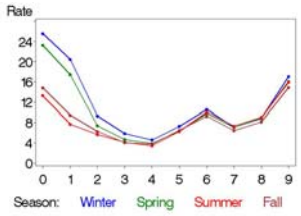

Figure 2. Average weekly rates of GI illness per 10,000 residents of Massachusetts by age group and season.

To investigate how rates for individual Dx categories impact overall rates of GI illness, categories were analyzed separately. The interactive effects for three categories with the highest rates are shown in Figure 3. The pattern for category 787 (Symptoms involving digestive system including nausea and vomiting) resembles the pattern for overall GI illness in Figure 2. For children, the same is true for category 558 (Noninfectious gastroenteritis and colitis). For adults, the seasonal pattern for 558 is similar to the overall pattern, but increased rates for the oldest adult ages are not observed. For category 789 (Other symptoms involving abdomen and pelvis), there are higher rates for adults than for children, and for summer versus the other months.

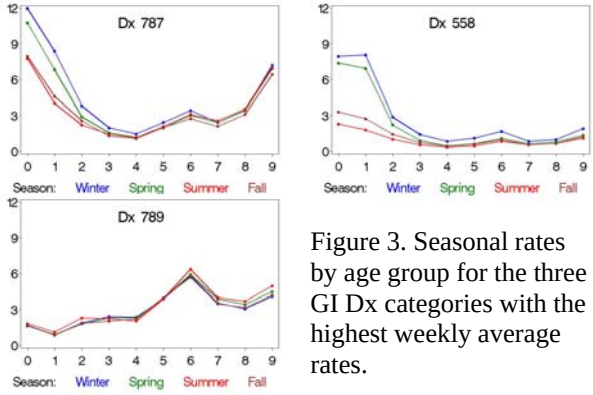

Figure 3. Seasonal rates by age group for the three GI Dx categories with the highest weekly average rates.

CONCLUSIONS

Seasonal effects for GI diagnoses were observed for both children and adults, but effects varied in size and significance by age and Dx category. Most surveillance systems monitor overall rates of illness and do not distinguish age groups. This study shows that both age group and Dx category effect seasonal patterns of GI illness. Thus, a single data stream fails to capture the complexity of age- and Dx-related patterns. Surveillance sensitivity would be improved by use of separate models for children and adults. Further, separate diagnostic categories may be warranted based on age.