

Using age & syndrome to characterize epidemic winter-seasonal acute gastroenteritis

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OBJECTIVE

We describe age- and syndrome-specific emergency department (ED) visit patterns for diarrhea and vomiting associated with periods of confirmed epidemic rotavirus and presumed epidemic norovirus in New York City (NYC).

BACKGROUND

Acute gastroenteritis (AGE) epidemics are a major cause of illness and death worldwide. Winter AGE epidemics are commonly due to rotavirus (RV) or norovirus (NV). Epidemic RV annually causes ~600,000 deaths worldwide and ~70,000 hospitalizations in the US¹. Globally, RV infection almost exclusively impacts children <5 yrs^{2,3}. Epidemic NV is not age-limited. NVs are estimated to cause ≤50% of all foodborne AGE outbreaks, and a considerable burden of institutional AGE in the US⁴. Laboratory NV testing is complex, expensive and rarely performed. In contrast, accurate, rapid testing and a specific ICD9 code allow for detailed RV surveillance. Our analysis uses RV hospitalizations to identify confirmed RV activity and to characterize associated ED visits in NYC.

METHODS

To estimate incident winter-season AGE we calculated weekly diarrhea (with or without vomiting) and vomiting (no diarrhea) syndrome ED visits by age in excess of summer baselines. We used 2001-2004 hospitalization data (SPARCS) to designate RV predominant periods as consecutive weeks encompassing 90% of seasonal RV hospitalizations (ICD9 008.61). Epidemic AGE occurring outside these confirmed RV periods was presumed due to NV. Estimates of age- and syndrome-specific excess ED visits provided a surrogate measure of RV- and NV-attributable morbidity.

RESULTS

We estimate that >30,000 ED visits per year were due to epidemic winter-seasonal AGE in NYC. Periods of confirmed RV predominance were marked by sharp increases in ED visits among children <5yr, with proportionately more diarrhea than vomiting. In contrast, epidemic AGE outside confirmed RV periods saw marked increases across ages, and a ratio of ~1:1 excess diarrhea to excess vomiting syndrome visits (Figs 1&2). Age- and syndrome-specific patterns suggest NV predominated during the ED visit peak in Dec 2004, RV during the Feb-May 2005 period and the sharp and sustained diarrhea increase in Dec 2005 was due to an early start of RV season.

CONCLUSION

The rapid citywide increase in diarrheal and vomiting syndrome visits that begins each autumn across age groups presents a picture consistent with classic “epidemic winter vomiting”, understood as most often due to the NV family of viruses^{2,3}. The rapid, predominantly diarrheal increase confined to those <5yrs of age is consistent with RV^{1,2}, and correlates with retrospective RV hospitalizations. Recent research suggests the impact from both RV and NV is underestimated^{2,4}. Our NYC study gives a method for rapid estimation of RV- and NV-attributable impact by age. Forthcoming hospitalization data will allow us to evaluate our 2005 and 2006 estimates of RV activity. Timely viral laboratory surveillance will ultimately allow for better determination of the etiology of seasonal epidemic AGE.

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2. Parashar U et al. Rotavirus. *EID* 1998; 4:561-70.
3. Bresee J et al. Generic protocols for hospital-based surveillance to estimate the burden of gastroenteritis in children. (Geneva: WHO) 2000; 1-44.
4. Widdowson M-A et al. Norovirus & Foodborne Disease, United States, 1991-2000. *EID* 2005; 11:95-102.

Figure 1. Weekly relative excess AGE syndrome visits (observed/expected) to NYC EDs and rotavirus confirmed hospitalizations in NYC.

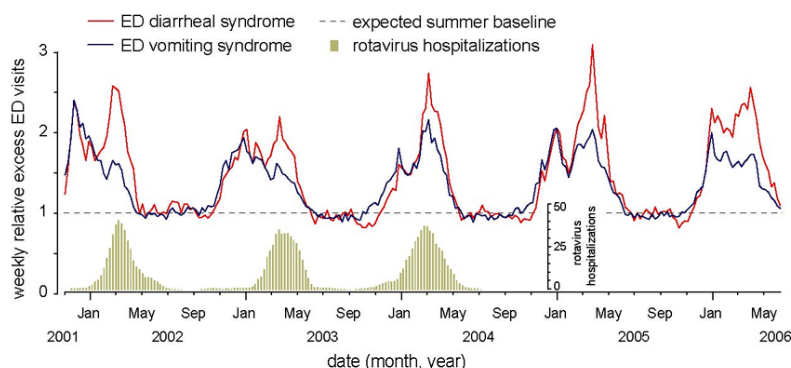


Figure 2. Weekly relative excess AGE syndrome ED visits (observed/expected) by age group in NYC

