Background

- Norovirus (NoV)-associated acute gastroenteritis (AGE) accounts for 212,000 deaths annually.
- Resource-limited countries account for 85% of NoV AGE and 99% of deaths.
- Tools are needed to determine the burden and risk groups of NoV infection and disease, and to better determine the need and potential impact of upcoming vaccines.
- Rapid active sampling (RAS) surveys represent a potential tool to quickly assess NoV disease burden and identify high risk populations.

Objectives

- To identify risk groups and factors for NoV infection and NoV-associated AGE among children living in rural Guatemala.
- To assess the utility of rapid active cross-sectional sampling (RAS) surveys as a tool to identify priority populations for NoV control.

Methods

- Households with children 6-weeks-18 years were screened by 2-stage cluster sampling and enrolled into one of 2 surveillance arms:
  1) A prospective participatory surveillance (PSS) system (included enrollment visit only)
  2) Two separate RAS surveys
- Clinical + known AGE risk factors were collected.
- Stool sample available on 76% of AGE and 51% of non-AGE AGE participants.

Results

- 1,299 children from 627 households were included in the PSS enrollment (Apr-Sep 2015), RAS Cycle 1 (Oct-Nov 2015), and RAS Cycle 2 (Jan-Feb 2016).
- Study groups had similar characteristics.
- Stool sample available on 76% of AGE and 51% of non-AGE AGE participants.
- Clinically, there were no statistically significant differences between NoV(+)/AGE and NoV(-)/AGE.

Factors Associated with Acute Gastroenteritis in Children

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>AGE (n=134)</th>
<th>No AGE (n=1,105)</th>
<th>Crude PR (CI)</th>
<th>Adjusted PR (CI)**</th>
</tr>
</thead>
<tbody>
<tr>
<td># children per HH&lt;5 years, mean (SD)</td>
<td>1.4 (1.0)</td>
<td>1.1 (0.9)</td>
<td>0.26 (0.10 – 0.43)*†</td>
<td>1.01 (0.99 – 1.03)</td>
</tr>
<tr>
<td># adults per HH≥18 years, mean (SD)</td>
<td>3.3 (1.5)</td>
<td>2.8 (1.3)</td>
<td>0.14 (0.03 – 0.24)*†</td>
<td>0.12 (0.02 – 0.22)*†</td>
</tr>
</tbody>
</table>

Factors Associated with Norovirus Infection in Children

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>All NoV(+) (n=79)</th>
<th>All NoV(-) (n=388)</th>
<th>Crude PR (CI)*</th>
<th>Adjusted PR (CI)**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breastfed (age&lt;2 years, n (%))</td>
<td>67 (89.3%)</td>
<td>559 (95.4%)</td>
<td>0.79 (1.48 – 0.11)*†</td>
<td>-1.19 (-2.23 – -0.16)*†</td>
</tr>
</tbody>
</table>

Factors Associated with Norovirus-Associated AGE in Children

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>NoV(+) AGE (n=15)</th>
<th>NoV(-) AGE (n=87)</th>
<th>Crude PR (CI)*</th>
<th>Adjusted PR (CI)**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Property Exposures</td>
<td></td>
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</tr>
<tr>
<td>- Natural water, n (%)</td>
<td>6 (40.0%)</td>
<td>12 (13.8%)</td>
<td>1.14 (0.24 – 0.23)*†</td>
<td>1.82 (0.45 – 3.19)*</td>
</tr>
<tr>
<td>- Bottled water, n (%)</td>
<td>2 (13.3%)</td>
<td>1 (1.1%)</td>
<td>1.54 (0.56 – 2.35)*†</td>
<td>2.10 (0.44 – 4.65)</td>
</tr>
</tbody>
</table>

Conclusions

- The rapid active cross-sectional sampling (RAS) surveys were effective in identifying several known factors associated with AGE and norovirus infection.
- In our population, younger children and children with greater household crowding were at increased risk of AGE.
- Having natural water on one’s property was a factor associated with NoV-associated AGE and wells were protective against AGE.
- Breastfeeding was protective against NoV infection.
- RAS surveys could be used as a cost-effective method to estimate burden of disease and identify at-risk populations for AGE and NoV.

References


Disclosures

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