ROTAVIRUS SURVEILLANCE IN ACTION
NEPAL

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Nepal Pediatric Society
Outline of Presentation

• Background
  • Rota disease and Surveillance

• Hospital-based surveillance of rotavirus gastroenteritis among children < 5 years of age, (2005-2011)

• Rotavirus and its genotype distribution among children <3 years presenting with acute watery diarrhoea, 2008

• Summary and Conclusion
<table>
<thead>
<tr>
<th>Population:</th>
<th>26.6 million</th>
</tr>
</thead>
<tbody>
<tr>
<td>CMR</td>
<td>54/1000 (down 64% since 1991)</td>
</tr>
<tr>
<td>NMR</td>
<td>33 / 1000</td>
</tr>
<tr>
<td>MMR</td>
<td>281 / 100,000 (DHS 2006)</td>
</tr>
</tbody>
</table>
Background

* Diarrhea is an important cause of morbidity and mortality among young children in In Nepal.
* Among the different causative agents, Rotavirus is the single most important etiological agent causing severe diarrhea in infants and young children worldwide (Bresee et al. 1999)
* Various epidemiologic studies conducted in Nepal identified rotavirus infection as the leading cause of diarrhea in childhood. They were of limited value
Hospital-based Surveillances of Rotavirus in Nepal

1. Rotavirus Gastroenteritis in Children under 5 years of age in Nepal (2010-2011)

2. Rotavirus and its Genotype Distribution among Children <3 years presenting with Acute Watery Diarrhea (2008)
Hospital-based Surveillance of Rotavirus Gastroenteritis in Children under 5 years of age in Nepal (2010-2011)

| **Study site:** | Kanti Children’s Hospital, Kathmandu, Nepal |
| **Sample processing site:** | Public Health Research Laboratory, Tribhuvan University Institute of Medicine, Kathmandu, Nepal |
| **Study period:** | 2010 to 2011 |
Distribution of Diarrhoea and Rotavirus cases by months Nepal, 2010-2011

No. of cases

- January: 155
- February: 154
- March: 162
- April: 140
- May: 145
- June: 149
- July: 146
- August: 149
- September: 140
- October: 134
- November: 163
- December: 175

Rotavirus positive cases

- January: 55
- February: 60
- March: 56
- April: 46
- May: 27
- June: 19
- July: 21
- August: 25
- September: 22
- October: 20
- November: 29
- December: 43
Results of Sentinel Surveillance, Institute of Medicine, Nepal, 2010-2011

- Rotavirus positive among all 1812 children enrolled:
  - 2010: 195/815 (24%)
  - 2011: 228/997 (23%)

- Rotavirus positive among hospitalized children
  - 2010: 128/402 (32%)
  - 2011: 209/813 (26%)

- Rotavirus positive among outpatients
  - 2010: 67/413 (16%)
  - 2011: 19/184 (14%)
Percent Rotavirus among Hospitalized Diarrhea Cases by Month, Nepal, 2010-2011

- % of rotavirus positive cases in 2010 in hospitalized cases
- % of rotavirus positive cases in 2011 in hospitalized cases
Percent Rotavirus Positive among Hospitalized Patients with Diarrhea, by Age Group, Nepal 2010-2011

- 0-11 months
- 12-23 months
- 24-59 months
- Total

### 2010
- 0-11 months: 30%
- 12-23 months: 28%
- 24-59 months: 10%
- Total: 35%

### 2011
- 0-11 months: 25%
- 12-23 months: 26%
- 24-59 months: 15%
- Total: 30%
Percent Rotavirus Positive among Outpatients with Diarrhea by Age Group, Nepal, 2010-2011

- Percentage of rotavirus positive cases in hospital catchment area in 2010
- Percentage of rotavirus positive cases in hospital catchment area in 2011
Distribution of G genotypes among hospitalized rotavirus infected children

G12 = 48%
G1 = 23%
G2 = 13%
G3 = 2%
G9 = 6%
Non-type = 8%
Distribution of P Genotypes among hospitalized Rota Virus infected children

- **P[4]** (12%)
- **P[6]** (34%)
- **P[8]** (42%)
- Mxd P types (4%)
- Non-type (8%)
- P[6] (34%)
- P[4] (12%)
- P[8] (42%)
- Mxd P types (4%)
- Non-type (8%)
Distribution of G & P genotypes combinations among hospitalized rotavirus infected children

- **Non-typeable**: 6%
- **Mixed P-types**: 2%
- **G12P[8]**: 22%
- **G12P[6]**: 32%
- **G9P[6]**: 2%
- **G9P[8]**: 10%
- **G2P[4]**: 8%
- **G1P[8]**: 18%
- **G1P[6]**: 0%
Major Findings

* ¼ of diarrheal cases in the sentinel site tested were positive for rotavirus

* Rotavirus infection occurs year-round in Nepal but peaks in December to April

* Rota +ve was more common among the very young children (<24 months)

* More common hospitalized diarrhoeal cases

* G12 (48%), and P[8] (42%) serotypes were most common

* Most prevalent combination genotype was G12P[6] (32%)
Rotavirus and its Genotype Distribution among Children <3 years Presenting with Acute Watery Diarrhoea

* Study population: Children < 3 years with non bloody watery diarrhoea

* Site: Patan Hospital

* Study Period: January – March 2008
Proportion of Rota Positive Cases

- Rotavirus +: 53%
- Rotavirus -: 47%

Total sample collected: 119
Age distribution & Rota status

Peak incidence of rota gastroenteritis occurred between 6-24 months\textsuperscript{4,5}
Distribution of Rotavirus by Gender

<table>
<thead>
<tr>
<th></th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total No.</td>
<td>84</td>
<td>35</td>
</tr>
<tr>
<td>Rota +ve</td>
<td>41</td>
<td>22</td>
</tr>
<tr>
<td>Rota -ve</td>
<td>43</td>
<td>13</td>
</tr>
</tbody>
</table>

P value 0.162
Signs and Symptoms

All study children

- Fever: 104
- Nausea: 2
- Vomiting: 97
- Mild dehydration: 27
- Moderate dehydration: 13
- Severe dehydration: 18
Clinical features among Rota +ve & -ve cases

P value sig only for vomiting
## Analysis of stool RME (Total 82)

<table>
<thead>
<tr>
<th></th>
<th>Rota +ve</th>
<th>Rota -ve</th>
</tr>
</thead>
<tbody>
<tr>
<td>Presence of WBC</td>
<td>14.3%</td>
<td>41%</td>
</tr>
<tr>
<td>WBC &gt; 10/HPF</td>
<td>0</td>
<td>10.2%</td>
</tr>
<tr>
<td>Mucus</td>
<td>2.4%</td>
<td>12.8%</td>
</tr>
</tbody>
</table>
Rota cases distribution by Inpatient and outpatient

<table>
<thead>
<tr>
<th></th>
<th>In patients</th>
<th>Out patients</th>
<th>Total number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rota +ve</td>
<td>22</td>
<td>97</td>
<td>99</td>
</tr>
<tr>
<td>Rota -ve</td>
<td>13</td>
<td>9</td>
<td>47</td>
</tr>
</tbody>
</table>

P value 0.522
## Identified Strains of Rotavirus

<table>
<thead>
<tr>
<th></th>
<th>P 6</th>
<th>P 8</th>
<th>P 9</th>
<th>P NT</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>G 1</td>
<td>8 (13%)</td>
<td>3 (5%)</td>
<td>0</td>
<td>0</td>
<td>11 (17%)</td>
</tr>
<tr>
<td>G 3</td>
<td>2 (3%)</td>
<td>4 (6%)</td>
<td>0</td>
<td>0</td>
<td>6 (9%)</td>
</tr>
<tr>
<td>G 9</td>
<td>1 (2%)</td>
<td>16 (25%)</td>
<td>1 (2%)</td>
<td>2 (3%)</td>
<td>20 (32%)</td>
</tr>
<tr>
<td>G 12</td>
<td>13 (21%)</td>
<td>10 (16%)</td>
<td>0</td>
<td>2 (3%)</td>
<td>25 (40%)</td>
</tr>
<tr>
<td>G NT</td>
<td>1 (2%)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1 (2%)</td>
</tr>
<tr>
<td>Total</td>
<td>25 (40%)</td>
<td>33 (52%)</td>
<td>1 (2%)</td>
<td>4 (6%)</td>
<td>63 (100%)</td>
</tr>
</tbody>
</table>
Rotavirus serotypes: Nepal

* Most prevalent G and P serotype:
  Present study: G12 (40%) and P8 (25%)
  TUTH study 2006/2007\(^5\): G12 (48% and 29%);
  P8 (47% and 35%)

* Most prevalent combination of G & P serotypes:
  Present study- G9P8 (25%); G12P6 (21%)
  TUTH Study\(^5\)- G12P6 (34% and 24%)
Conclusion

* One in four children suffer from Rota Virus Diarrhoea in Nepal. It is a significant public health problem.
* Most common in children below 24 months.
* Seasonal Peak occurring during December to April
* More common in hospitalized diarrheal cases
* Most prevalent G and P serotype is G12P (8). G12 strain appears to be increasing among the circulating rotavirus strain.
  * Need to generate more evidences in genotyping by strengthening and expanding sentinel surveillance.
* Rota Virus control measures including case management should be strengthened.
* Prevention through immunization with rotavirus vaccine will prevent morbidity and mortality.
  * The level of protection that can be conferred by current rotavirus vaccines against the strains circulating in Nepal needs to be evaluated.
Thank You !!!