Surveillance for acute hepatitis A and the link to prevention

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Characterizing Hepatitis A Epidemiology

• Prevalence of antibody
  – Exposures over lifetime
  – Demonstrates underlying pattern of immunity in population

• Disease incidence
  – New infections due to recent exposures
  – Characteristics reflect underlying pattern of population immunity
Describing the epidemiology of HAV: Prevalence vs. Incidence

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Prevalence</th>
<th>Incidence</th>
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<tbody>
<tr>
<td>Assess population immunity and susceptibility</td>
<td>+++</td>
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<tr>
<td>Monitor trends in incidence of and risk factors for disease</td>
<td>++</td>
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<tr>
<td>Assess burden of disease</td>
<td>-</td>
<td>++</td>
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<tr>
<td>Identify and control outbreaks</td>
<td>-</td>
<td>+++</td>
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<tr>
<td>Identify infected persons and at-risk contacts for preventive interventions (i.e. post-exposure prophylaxis)</td>
<td>-</td>
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Acute Viral Hepatitis

- Acute Viral Hepatitis
  - Clinical syndrome
    - Acute illness with jaundice, liver inflammation
  - Multiple causes
    - Viral hepatitis – A, B, C, D, E, non A-E
    - Other – Yellow fever, malaria, leptospirosis, etc
    - Causes indistinguishable without diagnostic testing

- AVH reportable disease in most countries
  - Value limited due to incomplete use of diagnostic tests
  - Diagnostic tests exist for all causes, but availability and costs limit use, especially in less developed countries
Rationale for Surveillance for Acute Viral Hepatitis A (and other types)

- Quantify burden of disease
- Measure risk of acute hepatitis A in all age groups
- Evaluate risk factors for HAV infection
- Define the need for and identify target groups for vaccination programs
- Measure the impact of vaccination strategies
- Provide basis for further investigations of HAV epidemiology: case/control studies, outbreak investigations
Characteristics of surveillance systems for acute hepatitis A

1. Standardized case definitions
   • Clinical criteria
   • Laboratory testing
2. Scope/type
   • Sentinel vs. population-based vs. national
3. Case ascertainment
   • Active vs. passive
4. Case investigation and reporting
   • Clinical and laboratory characteristics
   • Descriptors of time, place and of person (e.g. age, sex, ethnicity)
   • Exposures and risk factors during 2-6 weeks before illness onset
     (will vary by location and epidemiologic pattern)
Acute Hepatitis A Surveillance Case Definition

– Clinical criteria
   An acute illness with:
   • discrete onset of symptoms (e.g. fatigue, abdominal pain, loss of appetite, intermittent nausea, vomiting), and
   • jaundice or elevated serum aminotransferase levels

– Laboratory criteria
   • IgM antibody to hepatitis A virus (anti-HAV) positive
Incidence of Acute Viral Hepatitis; Tashkent, Uzbekistan; 1988-97

Source: M. Sharapov, Tashkent Pediatric Medical Institute
Distribution of Acute Viral Hepatitis Cases, by Age Group; Tashkent; 1997; n=243

Overall proportion anti-HAV positive = 85%

Source: M. Sharapov, Tashkent Pediatric Medical Institute
## Surveillance systems for acute viral hepatitis incidence: A range of possible approaches

<table>
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<tr>
<th>Characteristics</th>
<th><strong>Sentinel</strong></th>
<th><strong>Population-based</strong></th>
<th><strong>National</strong></th>
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<tbody>
<tr>
<td><strong>Pros</strong></td>
<td>• Disease reporting from a subset of facilities</td>
<td>• Reporting from all facilities in a defined area (e.g. province)</td>
<td>• All facilities in country</td>
</tr>
<tr>
<td><strong>Cons</strong></td>
<td>• Chosen sites may not be representative</td>
<td>• More resource intensive than sentinel surveillance</td>
<td>• Logistically difficult in large countries; feasible for small nations or if there is a strong, centralized infrastructure</td>
</tr>
</tbody>
</table>
National Notifiable Diseases Surveillance System

• Passive, universal system
  – ~58 diseases currently notifiable
    • Includes hepatitis A, hepatitis B and hepatitis C
  – Voluntary reporting to state health department and then to CDC
  – Limited data elements: demographics & some clinical/risk factors

• Critical for national trends
  – Reporting from all jurisdictions in the US

• Limitations
  – Underreporting of cases
  – Inconsistent application of case definition
  – Incomplete reporting of clinical and risk factor information
Sentinel Counties Surveillance Study and Emerging Infections Program

- Active, population based sentinel systems
  - Sentinel Counties Study of Viral Hepatitis
    - 6 US counties (total pop approx 4 million)
    - 1980s-2006
  - Emerging Infections Program
    - 5 US states + 1 cities (total pop approx. 25 million)
    - Established 2004

- Pros
  - More complete case ascertainment and investigation
  - More extensive information (including serum samples) collected for cases
Risk Factors Associated with Reported Hepatitis A, 1990-2000, United States

- Unknown: 46%
- Sexual or Household Contact: 14%
- International travel: 5%
- Homosexual activity: 10%
- Injection drug use: 6%
- Child/employee in day-care: 2%
- Food- or waterborne outbreak: 4%
- Contact of daycare child/employee: 20%
- Other Contact: 8%

Source: National Notifiable Disease Surveillance System
Hepatitis A incidence by age, United States, 1990-1997

Source: National Notifiable Disease Surveillance System
Hepatitis A Incidence

1987–1997

* Per 100,000 population

Source: NNDSS
HEPATITIS A IN THE UNITED STATES
Foundation for a vaccination policy

- Targeted vaccination of high risk groups
  - E.g. Travelers to endemic countries, men who have sex with men (MSM) and Illegal drug users
- Routine vaccination of children
  - 1996 - “high rate” communities
  - 1999 - 17 “high rate” states
  - 2006 - All children aged 12-23 months nationwide
Summary

• Decision on if/when/how to use vaccine requires multiple types of surveillance data
  – Prevalence data to
    • characterize patterns of immunity
    • identify who is susceptible and who is not
  – Acute disease incidence data to
    • assess burden of disease
    • identify individuals/groups/places at increased risk of disease

• In the U.S., acute hepatitis A incidence data provided basis for stepwise implementation of national vaccine policy
  – Defined the burden of disease
  – Identified groups and geographic areas where risk of hepatitis A and hepatitis A outbreaks was highest – and which accounted for majority of disease

• Acute disease incidence data critical to monitor impact of vaccination strategies and to modify those strategies to maximize impact
Summary

• Value of acute disease incidence data dependent on its quality
  – Requires
    • Consistent application of a standardized case definition
      – includes clinical criteria and laboratory confirmation
    • Mechanisms for systematic identification, investigation and reporting of cases
  – Approaches for implementing surveillance vary and are tailored to available resources and epidemiologic questions
    • Scope (sentinel/population-based/national)
    • Case ascertainment
    • Protocols and instruments for case investigation and reporting