# The Emergence of Serogroup Y Disease and the Epidemiology of Invasive Meningococcal Disease

# Colorado, 1997 - 2001

Lucinda Hammond, MSPH
Ken Gershman, MD, MPH
Colorado Department of Public Health and Environment
Communicable Disease Epidemiology

# Introduction

- A leading cause of bacterial meningitis & bloodstream infections in children/young adults
- Causes endemic (sporadic) and epidemic disease
- A dreaded infection:
  - May have rapid onset and fulminant course
  - Substantial morbidity/mortality
  - Rumor/misinformation

# Microbiology

- Polysaccharide capsule – basis for serogrouping
- ≥ 13 serogroups
  - B, C, Y most common in the US

# Invasive Disease

- Occurs primarily in newly infected persons
- Seasonal variation – highest Dec./Jan.
- Risk factors
  - Coincident viral URI
  - Immune system defects
  - Active/passive tobacco smoke
  - Crowding (e.g. military barracks)

# Clinical Manifestations

- Meningeal Infection → 50% of cases
- Bacteremia → up to 75% of cases
- Sepsis/meningococcemia → 5-20%
- Case-fatality: 9-12%  (sepsis: up to 40%)

# Background

- National study suggests that serogroup Y Disease (SYD) may be associated with a different clinical picture.

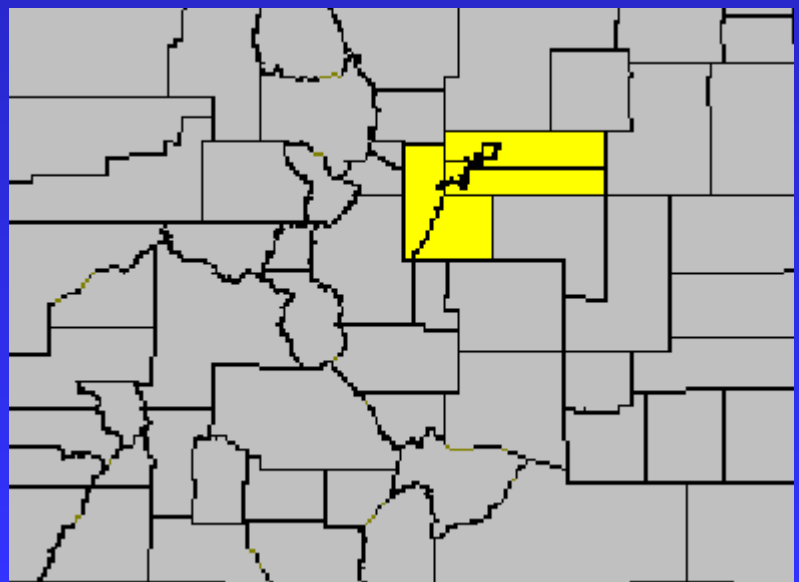
- The proportion of serogroup Y disease increased in the early to mid 1990s.

# Objective

- To describe the change in serogroup distribution in Colorado and characterize the subsequent effect of SYD on the epidemiology of IMD

# Methods

- Both Active and Passive Surveillance
  - Passive (Jan. 1997-June 2001, statewide)
  - Active (July 2000-Jun 2001, ABCs project in the 5 county Denver Metro area)



# Methods

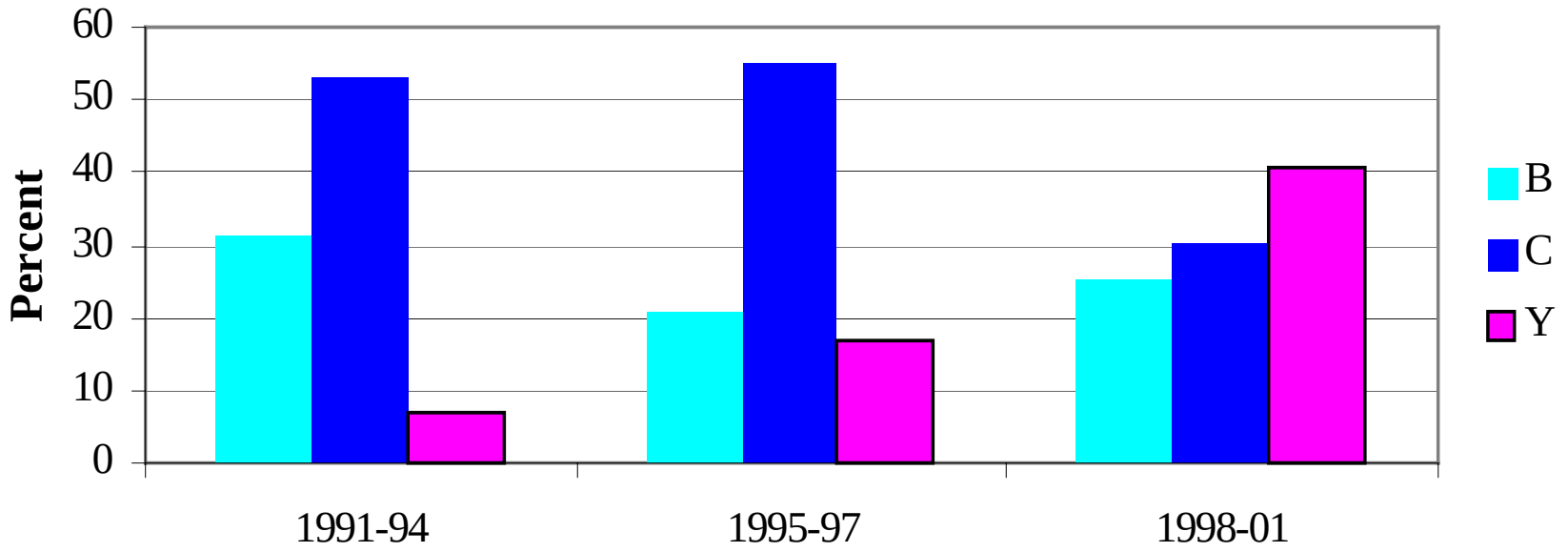
| Analysis | Time Period | N | Serogroup Available |
|---|---|---|---|
| Serogroup Distribution | Jan 91-Jun 01 | 396 | 70% |
| Demographics and Case Fatality | Jan 97-Jun 01 | 171 | 77% |
| Type of Infection | Jan 99-Jun 01 | 94 | 86% |

- Computed relative risks (RR) with 95% confidence intervals
- Age stratified into two groups (≥35 yrs vs. <35 yrs)

# Trends in Serogroup Distribution

**Figure 1 - Trends in Serogroup Distribution of Invasive Meningococcal Disease**

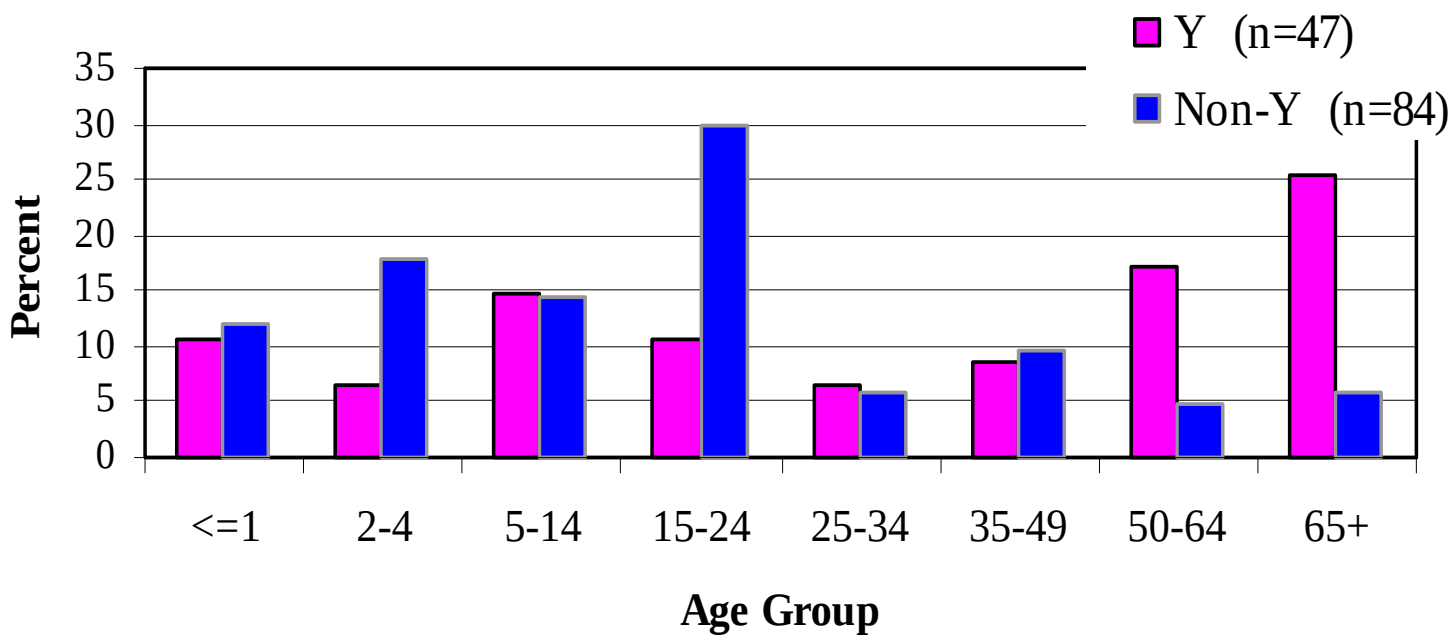
Colorado, January 1991 - June 2001



# Serogroup Y vs. Non Y by Age Group

**Figure 2 - Proportional Distribution of Serogroup Y vs non-Y Invasive Meningococcal Disease by Age Group**

January 1997 - June 2001



# Results - Age

- Persons with SYD were more likely than persons with IMD due to other serogroups to be

  **≥ 35 years**

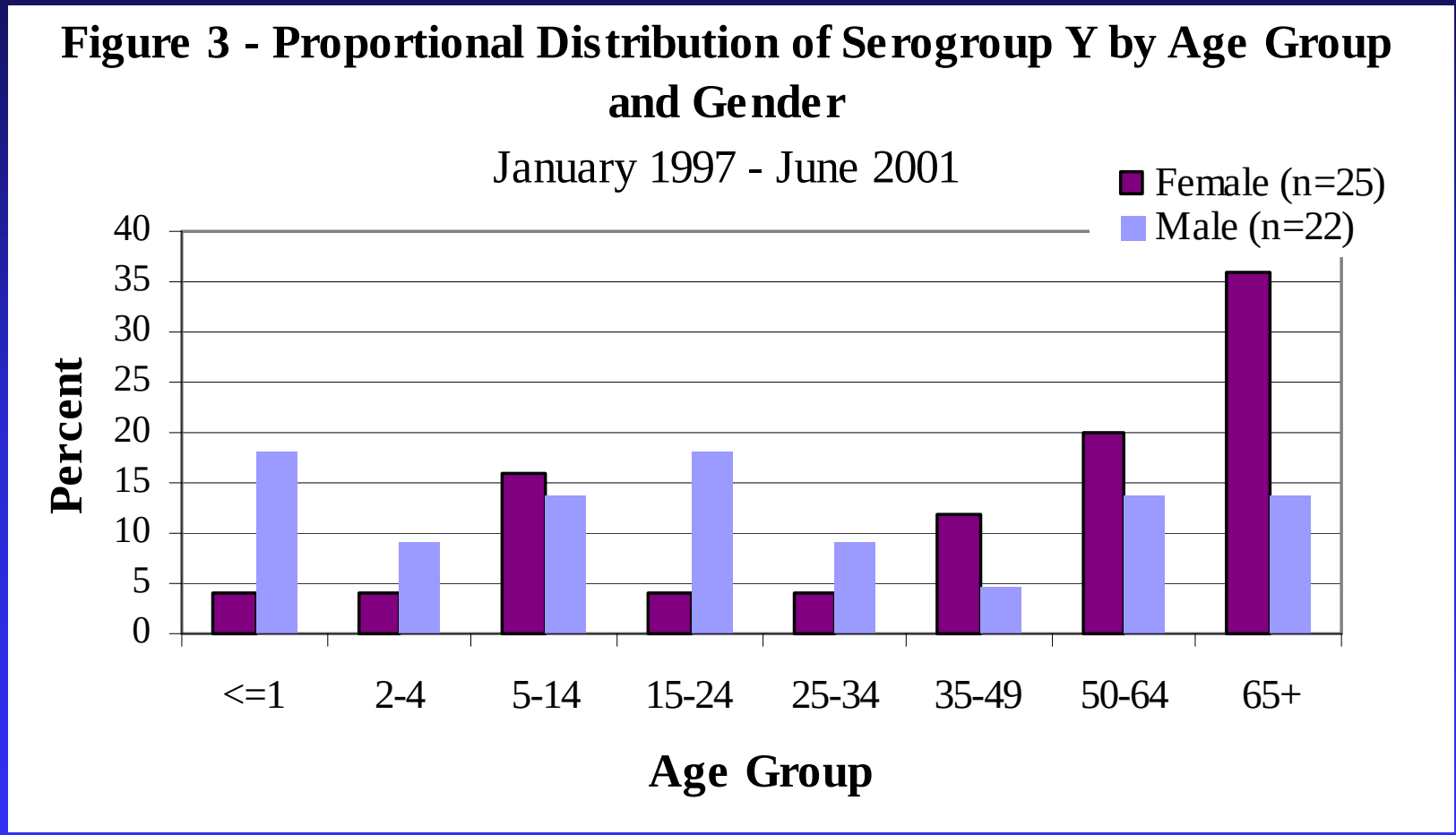
**RR=2.5  95%CI (1.5, 4.2)**

# Results – Age & Gender

- When stratified by gender, however, this association was limited to females

**RR=4.3 95%CI (2.0, 9.4)**

# Serogroup Y by Age Group and Gender



# Results – Age and Gender

- Female cases of SYD were significantly older than male cases

median age, 51 vs. 16 years

Wilcoxon Rank Sum, P=0.03

# Results – Type of Infection

- All cases of IMD with **pneumonia** occurred in persons ≥ 35 years (93% SYD).

- SYD cases more likely to have **pneumonia**
  - all ages **RR=18.9 95%CI (2.6, 137.7)**
  - ≥ 35 years **RR=5.5 95%CI (0.9, 35.1)**

- Data suggest SYD cases more likely to have **septic arthritis**

  **RR=2.9 95%CI (0.6, 15.0)**

# Results – Case Fatality Ratio

| Serogroup | Case Fatality Ratio (%) | | |
|---|---|---|---|
| | Total | < 35 Yrs | ≥ 35 Yrs |
| B | 9.4 | 6.9 | 33.3 |
| C | **22.7** | 23.5 | 20.0 |
| Y | 10.6 | **4.4** | **16.7** |

# Results – Other Variables

- Persons with SYD were similar to persons with other serogroups in terms of:
  - Race and Ethnicity
  - Metro vs. Non-Metro Residence
  - Gender

# Limitations

- Incomplete serogroup information
- Small numbers for some analyses
  - Type of Infection
  - Stratification (age and gender)

# Conclusions

- Persons with SYD are more likely:
  - To have pneumonia
  - ≥ 35 years
- Among those with SYD:
  - females are significantly older than males
  - persons ≥ 35 years have a substantially higher CFR