Postdiarrheal Hemolytic Uremic Syndrome in New York State

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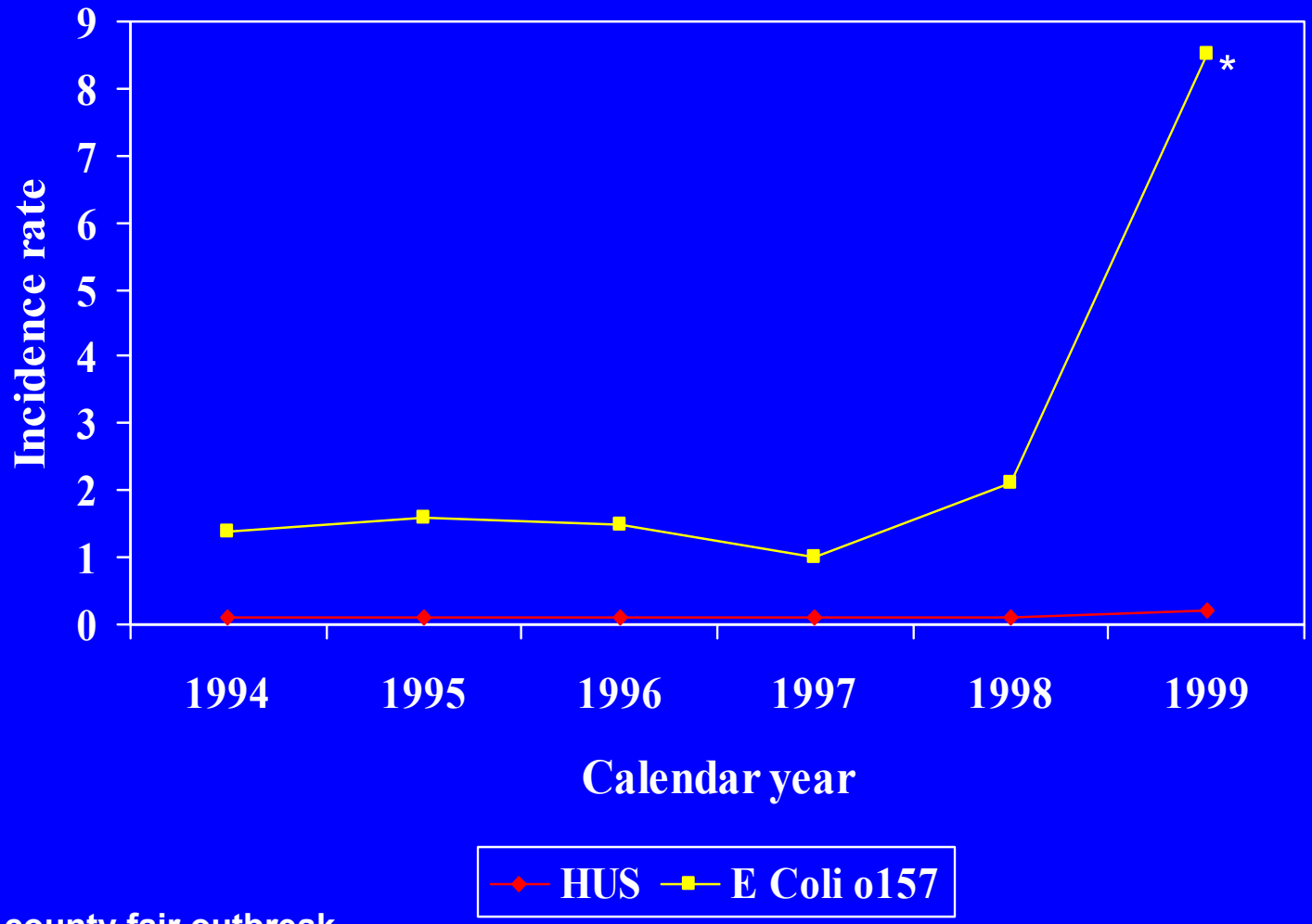
Background

- Diarrhea-associated Hemolytic Uremic Syndrome (HUS) is a major cause of acute renal failure in children
- Shiga toxin-producing Escherichia coli is the main cause of diarrhea-associated HUS
- The annual incidence of diarrhea-associated HUS ranges from 2.6 to 21.7 per 100,000 children
- 3% to 5% of HUS cases will die and 10% to 30% will have long-term renal dysfunction

Background (continued)

- Each year there are an estimated 20,000 *E Coli* 0157:H7 infections and 250 deaths in the U.S.
- HUS is thought to develop in 3% - 15% of children who were infected with *E Coli* 0157:H7
- Risk factors for the progression to HUS include extreme youth or old age, female, elevated white blood cell count, fever, and use of antiobiotic treatment

Incidence rate per 100,000 population for HUS and E Coli 0157 New York excluding New York City, 1994-1999



*A county fair outbreak

Objectives

- To evaluate the sensitivity of post-diarrheal HUS surveillance in New York excluding New York City (Upstate NY)
- To estimate the number of post-diarrhea HUS cases in Upstate NY
- To study the epidemiologic and clinical features of HUS cases in Upstate NY

Data Sources

- Reported confirmed or probable HUS cases in the New York Communicable Disease Surveillance System (NYSCDSS) for 1998 and 1999
- Cases hospitalized with a primary or secondary discharge diagnosis listed as HUS (ICD9 283.11) in the New York Statewide Planning and Research Cooperative System (SPARCS) for 1998 and 1999

Case Definition

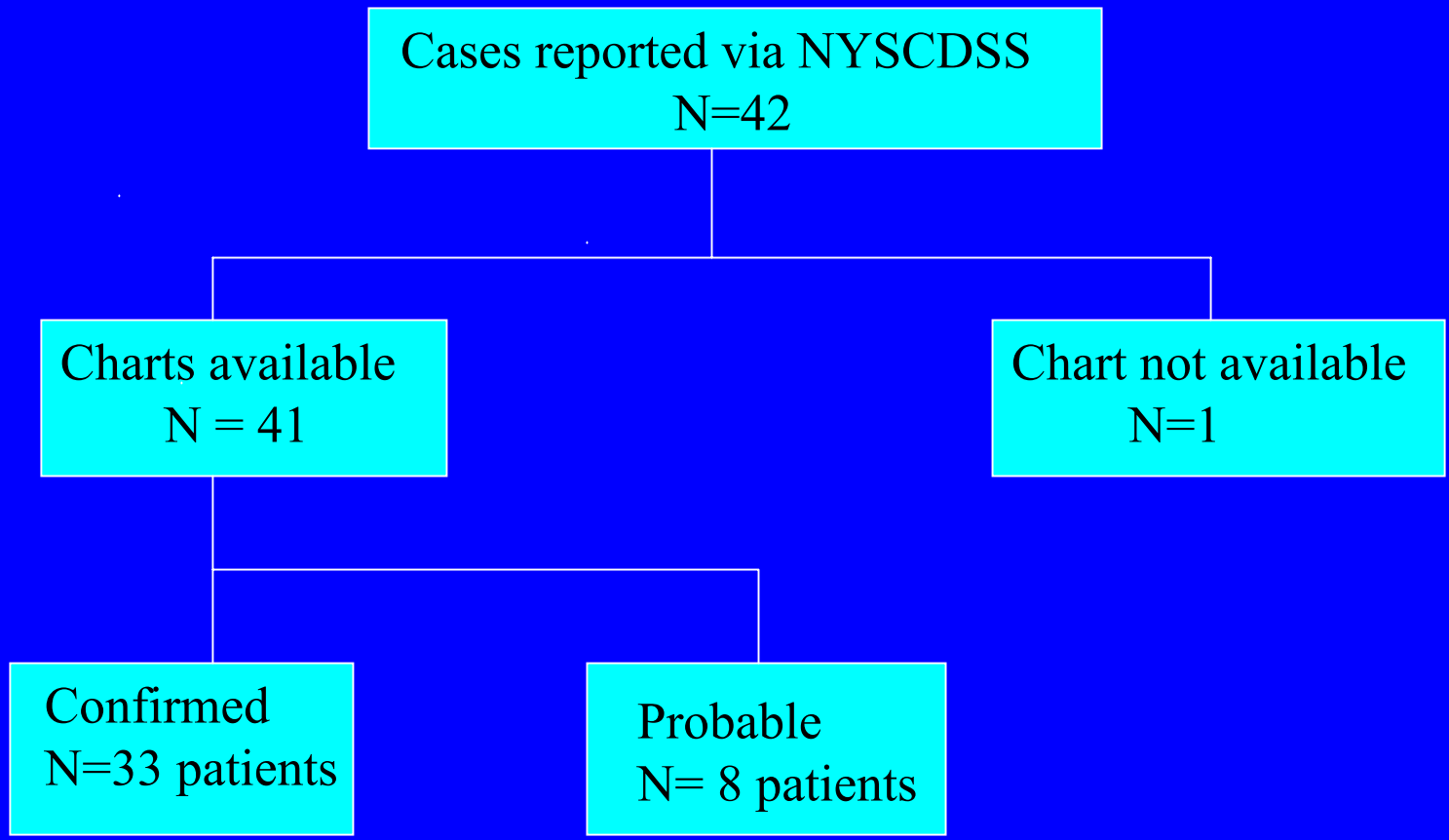
- Confirmed: acute onset of microangiopathic hemolytic anemia, acute renal injury, and low platelet count after onset of acute or bloody diarrhea

- Probable:
  - acute onset of anemia with microangiopathic changes, acute renal injury, and low platelet count
  - anemia without confirmed microangiopathic changes, acute renal injury, and low platelet count after onset of acute or bloody diarrhea

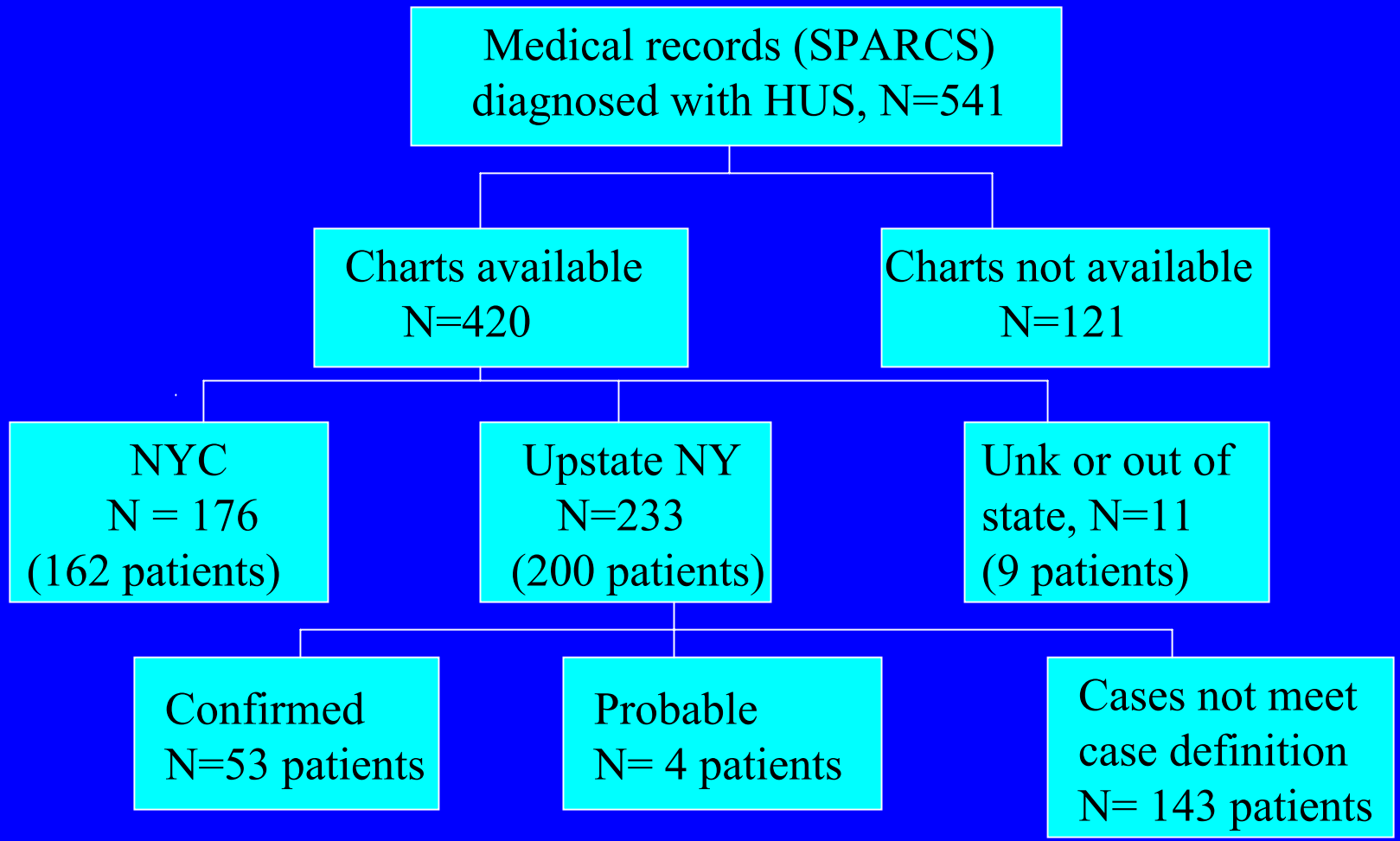
Methods

- Medical charts and case reports of HUS cases were matched by last name, first name, and date of birth
- The capture-recapture method was used to evaluate the completeness of reporting and to estimate the "true" number of post-diarrheal HUS cases
- Demographic characteristics, clinical features during hospitalization, and laboratory variables within a week of hospital stay were collected from the medical records

Results: HUS communicable disease data



Results: HUS hospital discharge data



Results : Sensitivity

Surveillance \ Hospital discharge	Yes	No	
Yes	37	5	42
No	20	D	
	57		N

Yes = Confirmed + Probable

D= 5*20/ 37 =3

N= 37+5+20+3 = 65 (estimated No. of diarrhea-associated HUS)

95% CL = (60, 69)

Sensitivity of surveillance system = 0.65

Results : Demographic features

Confirmed or probable HUS cases (N = 62)

- 50 cases were confirmed and 12 were probable (2 were drug induced HUS without mention of diarrhea, 10 had no microangiopathic changes)
- 44 (71%) cases were females
- 54 (87%) were whites
- Age: median was 6 years
  37 (60%) were 15 years or younger
- Hospital length of stay: median was 11 days
  mean was 12 days
- 14 (23%) cases were related to one outbreak
- 5 (8%) cases died

Results: Clinical features

Confirmed or probable HUS cases (N = 62)

Clinical Features	N (%)
Diarrhea	57 (93%)
Protein in urine	50 (82%)
Blood in urine	49 (80%)
Blood in Stool	42 (69%)
Blood transfusion	42 (69%)
E Coli isolated	36 (59%)
Fever	26 (42%)
Vomiting	27 (44%)
Hemodialysis	19 (31%)
Treated with antibiotics	17 (28%)

Results: Lab test results

Confirmed or probable HUS cases (N = 62)*

Characteristics	Mean (std)	Median	Range
Creatinine (mg/dl)	4.2(3.2)	3.3	0.3 -13.2
BUN (mg/dl)	72 (35.5)	70	8 - 146
Platelet / 1000	53 (40)	37	5 - 170
White blood cell / 1000	19 (8.3)	18	7 - 47
Hematocrit (%)	22 (6.8)	21	3 - 44

* Extreme values reported

Results

Characteristics of HUS cases by E Coli 0157:H7 isolation
N = 50 (number of cases that had stool culture)

Characteristics	Ecoli 0157:H7		
	Yes (N=36)	**No (N=14)**	**p-value**
Mean age at admission	21	33	
Mean length of hospital stay	12	14	
Mean duration from diarrhea onset to specimen collection	5	6	
Median BUN	61	82	< 0.02
Median Creatinine	3.3	6.0	< 0.01
Outbreak related	13 (100%)	0	< 0.01
Blood in stool	29 (81%)	8 (57%)	0.09

Conclusion & Discussion

- The 65% sensitivity of our surveillance system for HUS indicated the incidence of disease is higher than suggested
- Patients with HUS were more likely to to be young and females
- *E Coli* 0157:H7 is an important factor associated with HUS (72% of cultured cases grew *E Coli* 0157:H7)
- 7 of 12 probable cases had *E Coli* 0157:H7 isolated without evidence of red cell fragmentation demonstrating the difficulty in confirming HUS cases

Results : Sensitivity

Surveillance \ Hospital discharge	Yes	No	
Yes	37	5	42
No	34	D	
	71		N

Yes = Confirmed + Probable

D= 5*34/ 37 =5

N= 37+5+34+5 = 81 (estimated No. of diarrhea-associated HUS)

95% CL = (60, 69)

Sensitivity of surveillance system = 0.52

Results: Hospital discharge data