

Surveillance of Invasive Bacterial Disease in Alaska, 2001 - 2002

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Alaska Statewide Invasive Bacterial Disease

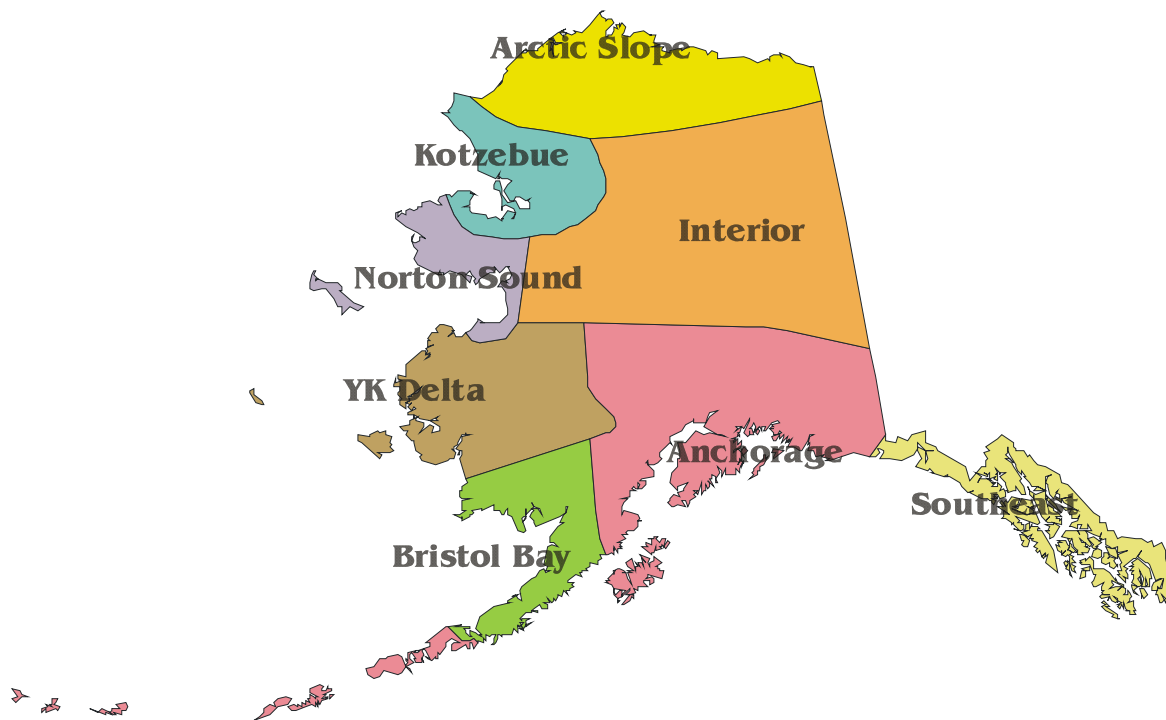
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Summary

The Centers for Disease Control and Prevention's Arctic Investigations Program (AIP) in Anchorage, Alaska, maintains a statewide surveillance system for invasive diseases caused by *Streptococcus pneumoniae*, *Haemophilus influenzae*, *Neisseria meningitidis*, and Groups A and B Streptococci. Laboratories throughout the state are requested to send to AIP any isolates of these organisms recovered from a blood culture, CSF, or other normally sterile site. Isolate identification is confirmed and, when appropriate, serotyped and tested for antimicrobial susceptibility. The objectives of this system are to provide information on disease rates within the state, monitor the emergence of antimicrobial resistance, and to monitor the effectiveness of implemented vaccine programs, such as the 23-valent pneumococcal polysaccharide vaccine, the 7-valent pneumococcal conjugate vaccine and *Haemophilus influenzae* type b vaccines.

Figure 1: Invasive Bacterial Disease Surveillance Regions – Alaska, 2001 - 2002



In 2001 - 2002, the total number of cases of invasive disease caused by these organisms reported to AIP were 192 *S. pneumoniae*, 21 *H. influenzae*, 12 *N. meningitidis*, 70 Group A Strep and 43 Group B Strep. Alaska Native populations had higher rates of disease than non-Native populations in all invasive disease except those caused by Group B Strep. Rates of invasive pneumococcal disease were highest in Norton Sound; *H. influenzae* rates were highest in YK Delta. Rates for each organism by region are presented in the following tables.

Table 1: Surveillance Organisms Reported by Region – Alaska, 2001

Region	<i>S. pneumoniae</i> n (rate*)	<i>H. influenzae</i> n (rate*)	<i>N. meningitidis</i> n (rate*)	Group A Strep n (rate*)	Group B Strep n (rate*)
Anchorage	61 (14.9)	7 (1.7)	4 (1.0)	19 (4.6)	19 (4.6)
Arctic Slope	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Bristol Bay	0 (0)	0 (0)	0 (0)	1 (13.3)	0 (0)
Interior	14 (14.5)	0 (0)	1 (1.0)	7 (7.2)	0 (0)
Kotzebue	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Norton Sound	6 (60.0)	0 (0)	1 (10.0)	0 (0)	0 (0)
Southeast	17 (23.5)	2 (2.8)	0 (0)	1 (1.4)	1 (1.4)
YK Delta	5 (20.9)	1 (4.2)	0 (0)	1 (4.2)	0 (0)
Total	103 (16.3)	10 (1.6)	6 (0.9)	29 (4.6)	20 (3.2)

*Cases per 100,000

Table 2: Surveillance Organisms Reported by Region – Alaska, 2002

Region	<i>S. pneumoniae</i> n (rate*)	<i>H. influenzae</i> n (rate*)	<i>N. meningitidis</i> n (rate*)	Group A Strep n (rate*)	Group B Strep n (rate*)
Anchorage	59 (14.1)	9 (2.2)	4 (1.0)	28 (6.7)	17 (4.1)
Arctic Slope	1 (16.0)	0 (0)	0 (0)	0 (0)	0 (0)
Bristol Bay	1 (13.6)	0 (0)	0 (0)	1 (13.6)	0 (0)
Interior	11 (11.2)	1 (1.0)	2 (2.0)	5 (5.1)	4 (4.1)
Kotzebue	1 (12.5)	0 (0)	0 (0)	1 (12.5)	0 (0)
Norton Sound	5 (49.9)	0 (0)	0 (0)	0 (0)	0 (0)
Southeast	5 (6.9)	0 (0)	0 (0)	2 (2.8)	2 (2.8)
YK Delta	6 (24.8)	1 (4.1)	0 (0)	4 (16.5)	0 (0)
Total	89 (13.8)	11 (1.7)	6 (0.9)	41 (6.4)	23 (3.6)

*Cases per 100,000

Introduction

AIP conducts statewide surveillance of invasive *Streptococcus pneumoniae*, *Haemophilus influenzae*, *Neisseria meningitidis*, and Groups A and B *Streptococcus*. This program is part of a passive, laboratory-based surveillance system in which laboratories from all hospitals throughout the state are encouraged to participate. The population included in the AIP surveillance is the State of Alaska, which totaled 633,630 persons in 2001 and 643,786 persons in 2002 (*Alaska Department of Labor & Workforce Development*, <http://alms.labor.state.ak.us>). Case detection occurs year-round as participating laboratories send isolates recovered from sterile sites to the AIP lab in Anchorage, accompanied by basic demographic and clinical information on the cases. Materials and forms for isolate shipment and data collection are provided to each lab by AIP. At year-end, AIP asks that each laboratory review their records and provide information on any cases that may have been overlooked. In 2001 and 2002, 24 labs in Alaska participated in the invasive disease surveillance system, either by sending isolates to the AIP lab throughout the year, conducting year-end record reviews, or both.

AIP defines a case of invasive *Streptococcus pneumoniae*, *Haemophilus influenzae*, *Neisseria meningitidis*, or Groups A and B *Streptococcus* as an isolate of the bacteria from a normally sterile site, including blood, cerebrospinal fluid, pleural fluid, peritoneal fluid or joint fluid that has been taken from a resident of Alaska. In addition, for Group A *Streptococcus*, isolates are requested from deep tissue infections such as might be collected from surgical debridement of cases of necrotizing fasciitis.

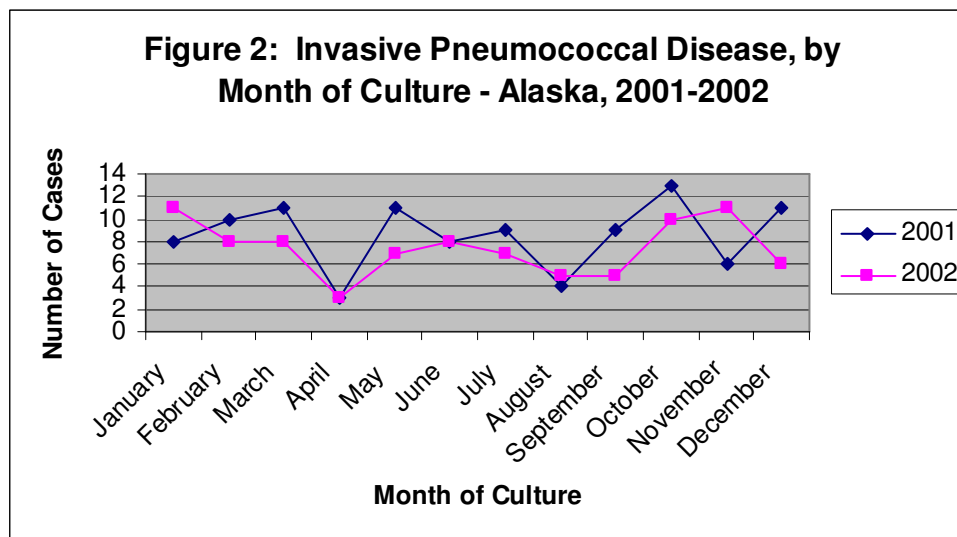
Invasive Pneumococcal Disease

Overall Incidence

A total of 92 pneumococcal isolates were received at AIP in 2001 and 76 pneumococcal isolates were received in 2002. An additional 11 cases in 2001 and 13 cases in 2002 were detected through year-end follow up with participating labs throughout the state for a total of 103 cases of invasive pneumococcal disease in 2001 and 89 cases in 2002. Overall invasive pneumococcal cases rates for 2001 and 2002 were 16.3 and 13.8 per 100,000 persons per year respectively. Alaska rates for 2001 and 2002 were slightly less than the Active Bacterial Core Surveillance (ABCs) 2001 national projected rate of 17.1/100,000 (*Active Bacterial Core Surveillance (ABCs) Report Emerging Infections Program Network Streptococcus pneumoniae, 2001*). ABCs is a surveillance system operated in 9 states which covers a population of over 36 million persons.

Seasonality

Invasive *Streptococcus pneumoniae* cases were identified in each month of 2001 and 2002. The smallest number of cases was reported in April during both years.



Race

In 2001 and 2002, the state population was comprised of 19% Alaska Natives (*Alaska Department of Labor & Workforce Development: <http://almlis.labor.state.ak.us> 11/30/2003; 2001, Alaska Natives 121,857, non-Natives 511,773; 2002, Alaska Natives 124,803, non-Natives 518,983*). The percentages of all reported *S. pneumoniae* cases that occurred in 2001 and 2002 among Alaska Natives were 30% and 48%, respectively. In 2001, a total of 31 cases occurred among Alaska Natives, resulting in an age-adjusted rate of 26.2/100,000 persons per year. Seventy-two cases occurred among the non-Native population for an age-adjusted rate of 14/100,000 persons per year. The age-adjusted rate ratio of *S. pneumoniae* disease for the Alaska Native population compared with the non-Native population in 2001 is 1.9. In 2002, a total of 43 cases occurred among Alaska Natives, resulting in an age-adjusted rate of 36/100,000

persons per year. Forty-six cases occurred among the non-Native population for an age-adjusted rate of 8.6/100,000 persons per year. The age-adjusted rate ratio of pneumococcal disease for the Alaska Native population compared with the non-Native population in 2002 is 4.2.

Table 3: Invasive *Streptococcus pneumoniae* Cases by Race – Alaska, 2001-2002

Year	Race	Cases n (%)	Age Adjusted Rate*	% Male	Deaths n (%)
2001	Alaska Native	31 (30)	26.2	42	4 (13)
	Non-Native†	72 (70)	14	52	8 (11)
	Total	103		49	12 (12)
2002	Alaska Native	43 (48)	36	47	5 (12)
	Non-Native‡	46 (52)	8.6	46	6‡ (13)
	Total	89		66	11 (12)

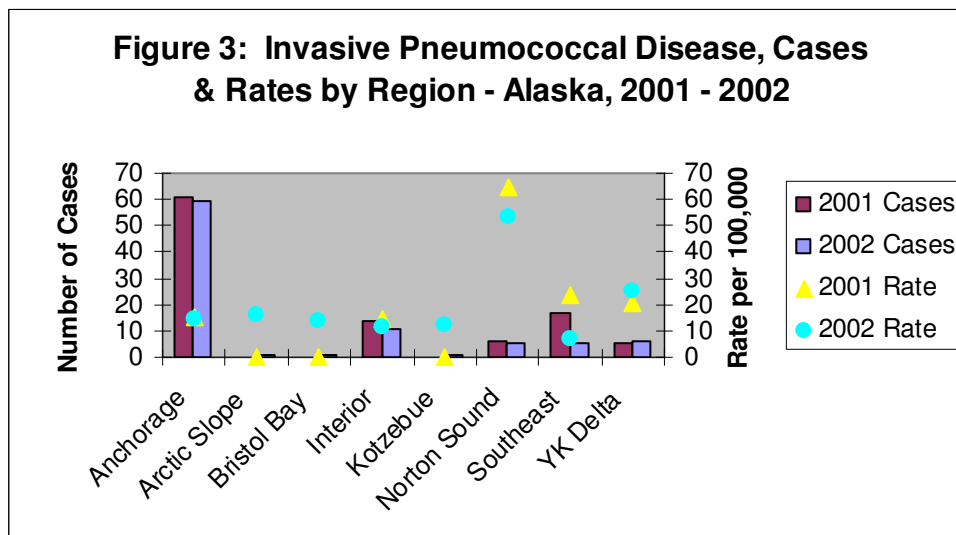
*Cases per 100,000 per percent distribution of Alaska 2000 population

†Includes 14 cases in 2001 and 8 cases in 2002 for which race was unknown

‡Includes 1 death in 2002 for which race was unknown

Region

The highest percentage of invasive pneumococcal disease cases occurred in the Anchorage area in 2001 and 2002, 59% (61 cases) and 66% (59 cases) respectively. Rates of disease, however, were highest in Norton Sound both years; 64.4/100,000 persons per year in 2001 and 53.5/100,000 persons per year in 2002.



Age

Cases occurred in all age groups in 2001 and 2002. In 2001, the age of cases ranged from 0.2 years to 100.6 years with a median of 40.5 years. In 2002, cases ranged in age from 0.2 years to 94.3 years with a median of 45.4 years. Overall, the highest rates of disease occurred in children less than 2 years old and in adults greater than 65 years old during both 2001 and 2002.

Figure 4: Invasive Pneumococcal Disease by Age Group - Alaska, 2001-2002

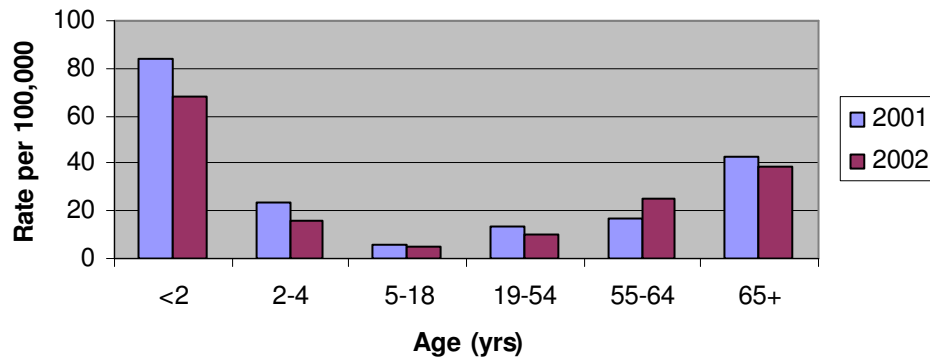


Figure 5: Invasive Pneumococcal Disease, Cases & Rates by Age Group & Race - Alaska, 2001

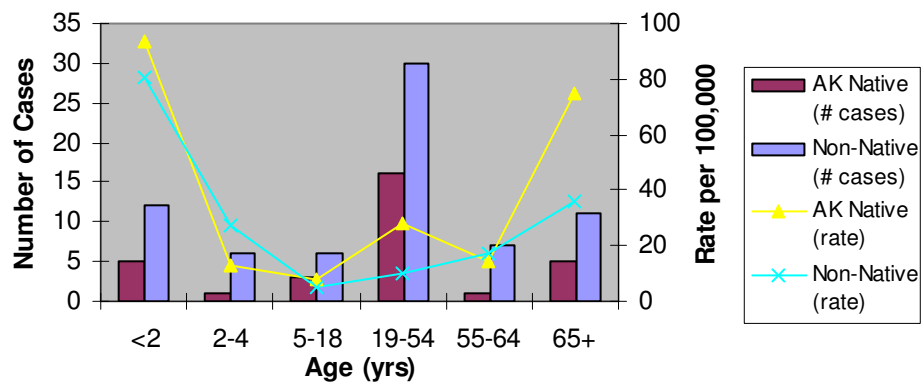
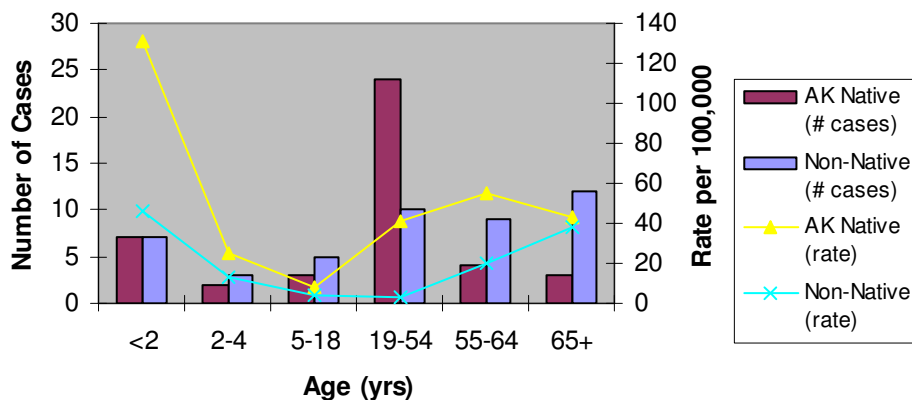


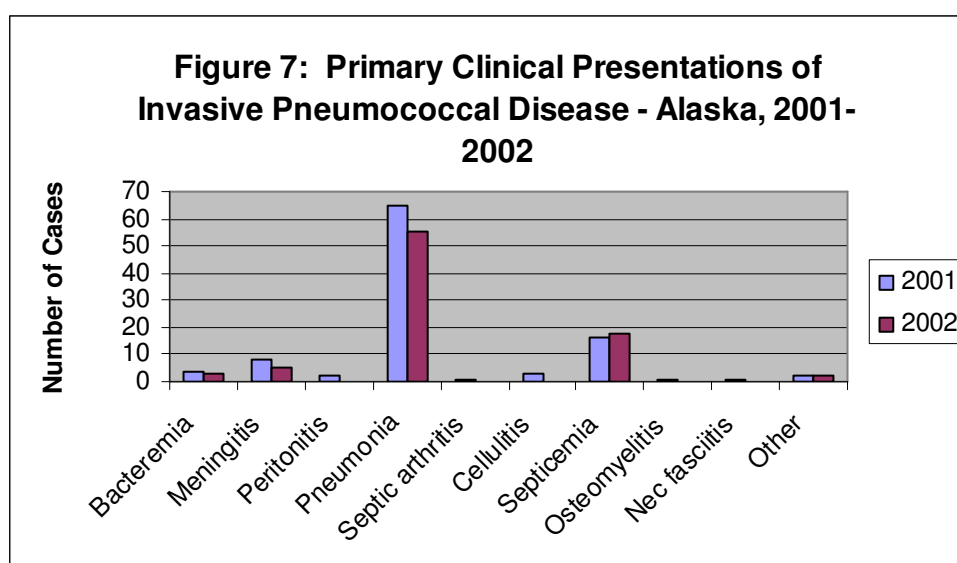
Figure 6: Invasive Pneumococcal Disease, Cases & Rates by Age Group & Race - Alaska, 2002



When stratified by age and race, the highest rates of disease in 2001 and 2002 occurred in Alaska Native children less than 2 years old; 93.6/100,000 persons per year in 2001 and 130.7/100,000 persons per year in 2002. High rates of invasive pneumococcal disease also occurred in Alaska Natives greater than 65 years old in 2001, 74.9/100,000 persons per year, however, rates of disease in this age category declined to 42.8/100,000 persons per year in 2002. Overall during 2001 and 2002, rates of disease were higher in the Alaska Native population in all age categories with the exception of the 2-4 year old and 55-64 year old categories in 2001.

Clinical Presentation

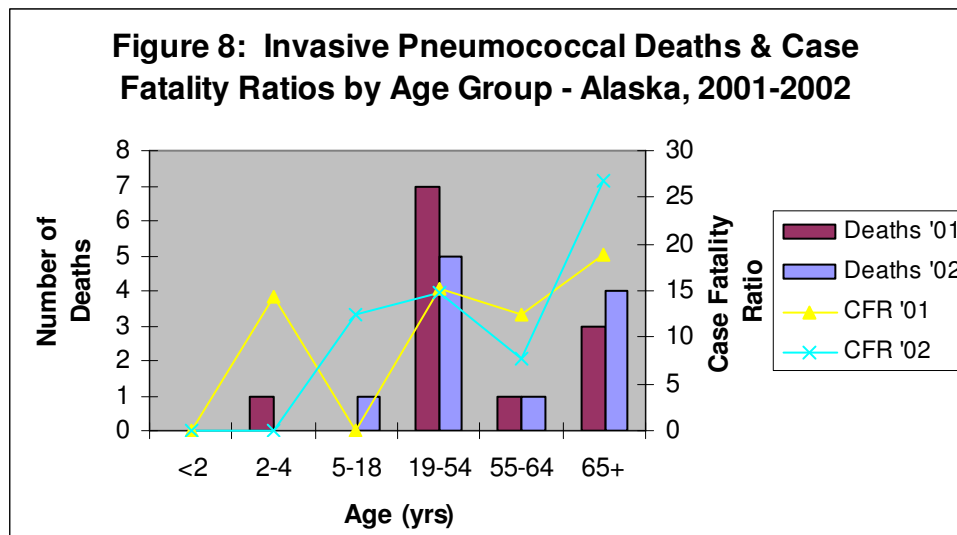
The primary clinical presentation was determined by a review of the discharge diagnoses indicated in each patient's individual medical record associated with the illness resulting in the culture. In cases with multiple discharge diagnoses, the most serious diagnosis related to the pneumococcal infection was recorded as the primary clinical presentation. Pneumonia was the most common primary clinical presentation in 2001 (63%) and 2002 (62%) followed by septicemia (15.5% in 2001 and 20% in 2002). Six cases had a secondary pneumococcal-related diagnosis in 2001: 2 pneumonia and 1 each endocarditis, septic arthritis, cellulitis and unspecified other. In 2002, nine cases had a secondary pneumococcal-related diagnosis; eight of these were pneumonia and one was septic arthritis.



In 2001 and 2002, blood was the most common source of a positive culture which was used to identify 93% of the 103 cases in 2001 and 91% of the 89 cases in 2002. Cerebrospinal fluid was the positive site for 4% of cases in 2001 and 6% of cases in 2002. The remaining cases in 2001 were identified through joint fluid, peritoneal fluid and other unidentified sterile site (1 case each). In 2002, the remaining cases were identified through pleural fluid (4 cases) and one case through an unidentified sterile site.

Mortality

In 2001, the overall case fatality ratio for *S. pneumoniae* in Alaska was 11.7% (12 deaths out of 103 cases) and in 2002, it was 12.4% (11 deaths out of 89 cases). In both years, the case fatality ratio for non-Natives was higher than Natives; 13.8% (8 deaths) in non-Natives compared to 12.9% (4 deaths) in Natives in 2001 and 13% (6 deaths) in non-Natives compared to 11.6% (5 deaths) in Natives in 2002. Although the majority of deaths occurred in the 19-54 year old age category in both 2001 (7 deaths) and 2002 (5 deaths), the highest case fatality ratios occurred in the 65+ age category; 18.8% (3 deaths) in 2001 and 26.7% (4 deaths) in 2002.



Serotype

Serotyping of invasive pneumococcal isolates is performed at AIP using internationally standardized methods. Serotype identification is based on the organism's polysaccharide capsule which is a principle virulence factor for pneumococci. This information provides a way to subtype organisms and to determine if the infection was due to a type that could be prevented by use of one of the two available pneumococcal vaccine types. Serotyping was performed on 91 of the 103 *S. pneumoniae* cases that occurred in Alaska in 2001 and on 76 of the 89 cases in 2002.

Table 4: Invasive Pneumococcal Serotype Distribution by Race and Age Group – Alaska, 2001

Serotype	Total n (%)	Alaska Native				Non-Native				Unknown
		<2	2-18	19-64	65+	<2	2-18	19-64	65+	All Ages
01	5 (5.4)	-	3	2	-	-	-	-	-	-
03	4 (4.3)	-	-	-	-	-	1	3	-	-
04	10 (10.9)	-	-	1	-	-	2	3	2	2
06A	3 (3.3)	-	-	-	-	-	-	1	1	1
06B	7 (7.6)	-	-	1	-	3	-	2	1	-
07F	1 (1.1)	-	-	-	-	-	-	1	-	-
08	3 (3.3)	1	-	1	-	-	-	1	-	-
09N	3 (3.3)	-	-	2	-	-	-	1	-	-
09V	7 (7.6)	-	-	2	1	-	-	2	1	1
11A	4 (4.3)	-	-	1	-	-	-	2	1	-
12F	6 (6.5)	-	-	1	-	-	-	5	-	-
14	16 (17.4)	1	-	1	-	1	3	4	1	5
15A	1 (1.1)	-	-	1	-	-	-	-	-	-
17F	1 (1.1)	-	-	-	1	-	-	-	-	-
18C	2 (2.2)	-	-	-	-	-	-	-	1	1
19A	2 (2.2)	-	-	-	-	1	1	-	-	-
19F	2 (2.2)	1	-	-	-	1	-	-	-	-
20	1 (1.1)	-	-	-	-	1	-	-	-	-
22F	2 (2.2)	-	-	-	1	-	-	1	-	-
23F	4 (4.3)	-	-	-	1	-	-	-	1	2
31	1 (1.1)	-	-	-	-	-	-	1	-	-
33F	3 (3.3)	1	-	1	-	1	-	-	-	-
34	1 (1.1)	-	-	-	-	-	-	1	-	-
NT*	2 (2.2)	-	-	1	-	-	-	1	-	-
Total	91	4	3	15	4	8	7	29	9	12

*Non-typable

Table 5: Invasive Pneumococcal Serotype Distribution by Race and Age Group – Alaska, 2002

Serotype	Total n (%)	Alaska Native				Non-Native				Unknown
		<2	2-18	19-64	65+	<2	2-18	19-64	65+	All Ages
03	4 (5.3)	-	1	1	1	-	-	1	-	-
04	12 (15.8)	-	-	4	1	-	-	5	1	1
05/10F	1 (1.3)	-	-	1	-	-	-	-	-	-
06A	3 (3.9)	1	-	1	-	-	-	-	-	1
06B	3 (3.9)	-	1	-	-	-	-	-	2	-
07F	6 (7.9)	-	-	5	-	-	-	1	-	-
08	5 (6.6)	-	-	2	-	-	-	1	-	2
09N	7 (9.2)	-	-	2	-	-	-	1	3	1
10A	2 (2.6)	-	-	-	-	-	1	1	-	-
12F	3 (3.9)	-	-	1	-	1	-	-	-	1
14	5 (6.6)	1	-	2	-	-	-	1	1	-
15B	1 (1.3)	-	-	-	-	-	1	-	-	-
15C	2 (2.6)	1	-	-	-	-	1	-	-	-
16F	4 (5.3)	-	-	2	-	-	1	-	1	-
19A	3 (3.9)	-	1	1	-	1	-	-	-	-
19F	2 (2.6)	-	-	2	-	-	-	-	-	-
22A	3 (3.9)	1	-	1	-	-	-	1	-	-
22F	4 (5.3)	1	-	1	-	1	1	-	-	-
23F	1 (1.3)	-	-	-	-	-	-	1	-	-
33F	2 (2.6)	-	-	-	1	-	-	-	1	-
38	3 (3.9)	2	-	-	-	1	-	-	-	-
Total	76	7	3	26	3	4	5	13	9	6

Table 6: Invasive Pneumococcal Serotype Distribution by Region – Alaska, 2001-2002

	Anchorage		Arctic Slope		YK Delta		Bristol Bay		Kotzebue		Southeast		Interior		Norton Sound	
Serotype	2001	2002	2001	2002	2001	2002	2001	2002	2001	2002	2001	2002	2001	2002	2001	2002
01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-
03	2	1	-	-	-	1	-	1	-	1	-	-	2	-	-	-
04	7	7	-	-	-	-	-	-	-	-	2	-	1	5	-	-
05/10F	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
06A	3	2	-	-	-	1	-	-	-	-	-	-	-	-	-	-
06B	4	3	-	-	-	-	-	-	-	-	1	-	2	-	-	-
07F	1	2	-	-	-	-	-	-	-	-	-	-	-	1	-	3
08	3	4	-	1	-	-	-	-	-	-	-	-	-	-	-	-
09N	3	6	-	-	-	-	-	-	-	-	-	-	-	1	-	-
09V	4	-	-	-	-	-	-	-	-	-	2	-	1	-	-	-
10A	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11A	3	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
12F	1	2	-	-	-	-	-	-	-	-	5	1	-	-	-	-
14	9	4	-	-	1	-	-	-	-	-	3	1	3	-	-	-
15A	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
15B	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15C	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1
16F	-	3	-	-	-	-	-	-	-	-	-	-	-	1	-	-
17F	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
18C	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
19A	2	1	-	-	-	-	-	-	-	-	-	-	-	1	-	1
19F	1	1	-	-	-	-	-	-	-	-	1	-	-	1	-	-
20	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
22A	-	1	-	-	-	2	-	-	-	-	-	-	-	-	-	-
22F	-	3	-	-	1	1	-	-	-	-	1	-	-	-	-	-
23F	2	1	-	-	-	-	-	-	-	-	1	-	1	-	-	-
31	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
33F	2	2	-	-	1	-	-	-	-	-	-	-	-	-	-	-
34	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
38	-	1	-	-	-	1	-	-	-	-	-	-	-	1	-	-
NT*	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-

*Non-typable

In 2001, the most common serotypes were 14 (16 isolates, 17.4%) and 4 (10 isolates, 10.9%). The serotype 14 cases were distributed throughout the state, 9 in Anchorage, 3 each in the Southeast and Interior and one in the YK Delta. Serotype 4 cases occurred in Anchorage (7 cases), the Interior (5 cases) and Southeast (2 cases). In 2002, the most common serotypes were

4 (12 isolates, 15.8%) and 9N (7 cases, 9.2%). Both serotype 4 and serotype 9N cases occurred in Anchorage (7 cases serotype 4, 6 cases serotype 9N) and the Interior (5 cases serotype 4, 1 case serotype 9N).

Vaccine Serotypes

Two vaccine types are licensed for prevention of pneumococcal disease. In 2001, the pneumococcal conjugate vaccine (PCV7) was included in the Alaska childhood vaccination schedule. This vaccine provides protection against the 7 most common pneumococcal serotypes causing invasive disease among children (types 4, 6B, 9V, 14, 18C, 19F, 23F). The table below shows the proportion of invasive infections from 2001 and 2002 that were due to serotypes found in the PCV7 vaccine.

Table 7: Proportion of Invasive Isolates Contained in the PCV7 Vaccine by Age Group and Race – Alaska, 2001-2002

Age (yrs)	Alaska Native (%)		Non-Native (%)		Total (%)	
	2001	2002	2001	2002	2001	2002
<2	2 (40%) of 5	1 (14%) of 7	5 (63%) of 8	0 (0%) of 4	10 (59%) of 17	1 (8%) of 13
2-4	0 (0%) of 0	0 (0%) of 2	1 (33%) of 3	0 (%) of 2	4 (67%) of 6	0 (0%) of 4
5+	6 (27%) of 22	10 (33%) of 30	19 (45%) of 42	11 (44%) of 25	30 (43%) of 69	22 (37%) of 59
Total	8 (31%) of 27	11 (28%) of 39	25 (47%) of 53	11 (35%) of 31	44 (48%) of 92	27 (36%) of 76

The 23-valent polysaccharide vaccine (Ps23V) is recommended in Alaska for all persons 55 years and older, and for persons over age 2 who are at higher risk for pneumococcal disease. Revaccination is recommended after 6 years. In 2001 and 2002, for persons 55 years and older, 18 (86%) of 21 and 22 (88%) of 25 cases serotyped, respectively, were potentially vaccine preventable invasive pneumococcal illnesses.

Vaccination Status

In 2001, pneumococcal vaccine status was known for 59 (57%) of the 103 cases; 21 cases (20%) did receive a pneumococcal vaccine prior to illness and 38 cases (37%) had no record of a pneumococcal vaccine. Pneumococcal vaccine status in 2002 was known for 57 (64%) of the 89 cases; 31 cases (35%) did receive a pneumococcal vaccine prior to illness. Twenty-six (29%) had no record of a pneumococcal vaccine.

A PCV7 vaccine failure is defined as invasive pneumococcal disease caused by a serotype contained in the PCV7 vaccine in an individual who has had at least two doses of vaccine. There were no vaccine failures in 2001 or 2002.

Two of the 12 deaths in 2001 and 5 of the 11 deaths in 2002 from invasive *S. pneumoniae* were due to serotypes found in the PCV7 vaccine. None of these deaths, however, occurred in persons in the age group for which vaccine is recommended (< 2 years). Six of the 12 fatal cases in 2001 (50%) and 8 of 11 in 2002 (73%) were due to serotypes contained within the 23-valent

polysaccharide vaccine. Three cases in each year occurred in persons 55 years or older which is the age group eligible for this vaccine. Vaccine status was known for 8 of the 12 deaths in 2001 and 5 of the 11 deaths in 2002. It is unknown if these individuals received the 7-valent or 23-valent vaccine.

Table 8: Invasive Pneumococcal Disease, Serotypes of Fatal Cases – Alaska, 2001-2002

Serotype	2001		2002	
	Deaths (%)	Serotype Frequency	Deaths (%)	Serotype Frequency
03†	1 (25%)	4	0 (0%)	0
04*†	1 (10%)	10	4 (33%)	12
6A	1 (33%)	3	0 (0%)	0
07F†	0 (0%)	0	1 (17%)	6
09N†	1 (33%)	3	0 (0%)	0
09V*†	1 (14%)	7	0 (0%)	0
10A†	0 (0%)	0	1 (50%)	2
16F	0 (0%)	0	1 (25%)	4
17F†	1 (100%)	1	0 (0%)	0
19F*†	0 (0%)	0	1 (50%)	2
22F†	1 (50%)	2	0 (0%)	0
31	1 (100%)	1	0 (0%)	0
33F†	0 (0%)	0	1 (50%)	2
NT	2 (100%)	2	0 (0%)	0

*Serotypes contained in the PCV7 vaccine

†Serotypes contained in the 23-valent polysaccharide vaccine

Overall, 50% of all pneumococcal-related mortality in 2001 and 73% in 2002 was potentially preventable with the use of the 23-valent polysaccharide vaccine in persons over 2 years old.

Table 9: Potentially Vaccine Preventable Invasive Pneumococcal Deaths – Alaska, 2001

	< 2 years	2-4	5-18	19-54	55-64	65+	Total
PCV7	0	0	0	1 (14%)	1 (100%)	0	2 (17%)
Ps23V	0	1 (100%)	0	2 (29%)	1 (100%)	2 (67%)	6 (50%)
Total	0	1	0	7	1	3	12

Table 10: Potentially Vaccine Preventable Invasive Pneumococcal Deaths – Alaska, 2002

	< 2 years	2-4	5-18	19-54	55-64	65+	Total
PCV7	0	0	0	3 (60%)	1 (100%)	1 (25%)	5 (45%)
Ps23V	0	0	1 (100%)	4 (80%)	1 (100%)	2 (50%)	8 (73%)
Total	0	0	1	5	1	4	11

Associated Medical Conditions

The presence of one or more associated medical conditions was reported in 67% of invasive pneumococcal cases in 2001 and 74% in 2002. Data on associated medical conditions was unavailable for 7% (7 cases) in 2001 and 3% (3 cases) in 2002. Cigarette smoking was the most prevalent risk factor observed in adults in both years followed closely by alcohol abuse.

Table 11: Associated Medical Conditions Identified in Invasive Pneumococcal Cases – Alaska, 2001-2002*

Medical Condition	Adult Cases (≥ 18 years)	
	2001, n=70 Cases (%)	2002, n=62 Cases (%)
Diabetes	6 (9)	6 (10)
Cigarette smoking	26 (37)	30 (48)
Chronic lung disease	18 (26)	19 (31)
Alcohol abuse	24 (34)	29 (47)
Immunosuppressive treatment	4 (6)	3 (5)
Injection drug use	5 (7)	0 (0)
Asplenia	0 (0)	2 (3)

*More than one risk factor was identified in several cases

Antibiotic Resistance

Susceptibility testing was performed on 91 isolates in 2001 and 76 isolates in 2002. Results of the testing are presented in the following two tables.

Table 12: Antibiotic Resistance in Invasive *Streptococcus pneumoniae* Isolates – Alaska, 2001

Antibiotic	Susceptible	Intermediate	Resistant	I + R	Total Tested
Penicillin	79 (87%)	7 (8%)	5 (5%)	12 (13%)	91
TMP-sulfa	72 (79%)	2 (2%)	17 (19%)	19 (21%)	91
Erythromycin	79 (87%)	0	12 (13%)	12 (13%)	91
Ceftriaxone	85 (93%)	6 (7%)	0	6 (7%)	91
Tetracycline	89 (98%)	0	2 (2%)	2 (2%)	91
Chloramphenicol	91 (100%)	0	0	0	91
Rifampin	91 (100%)	0	0	0	91
Vancomycin	91 (100%)	0	0	0	91
Levoflox	91 (100%)	0	0	0	91
Clindamycin	83 (100%)	0	0	0	83

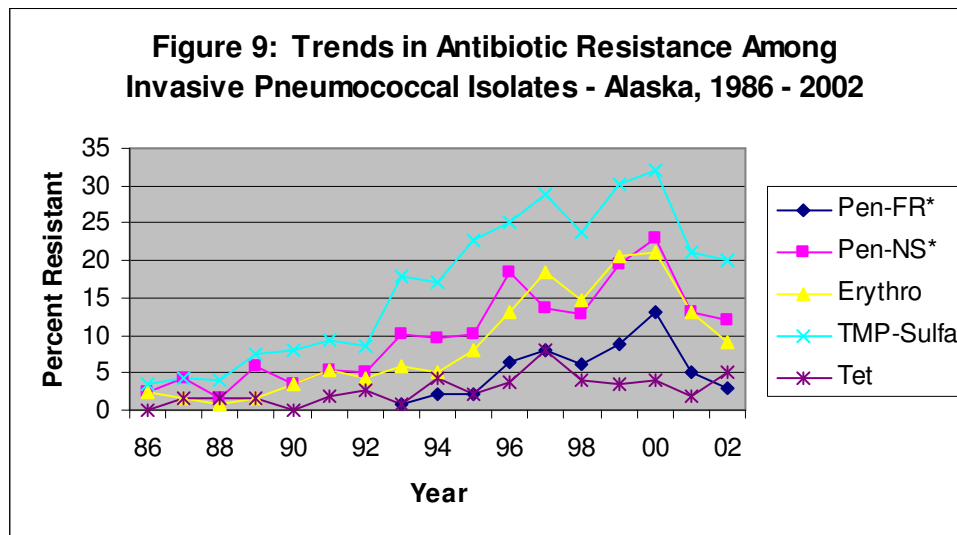
Table 13: Antibiotic Resistance in Invasive *Streptococcus pneumoniae* Isolates – Alaska, 2002

Antibiotic	Susceptible	Intermediate	Resistant	I + R	Total Tested
Penicillin	67 (88%)	7 (9%)	2 (3%)	9 (12%)	76
TMP-sulfa	61 (80%)	2 (3%)	13 (17%)	15 (20%)	76
Erythromycin	69 (91%)	0	7 (9%)	7 (9%)	76
Ceftriaxone	73 (96%)	3 (4%)	0	3 (4%)	76
Tetracycline	72 (95%)	0	4 (5%)	4 (5%)	76
Chloramphenicol	74 (97%)	0	2 (3%)	2 (3%)	76
Rifampin	76 (100%)	0	0	0	76
Vancomycin	76 (100%)	0	0	0	76
Levoflox	48 (100%)	0	0	0	48
Clindamycin	74 (97%)	0	2 (3%)	2 (3%)	76

Cut points from the Minimum Inhibitory Concentration (MIC) Interpretive Standards were used to determine if an isolate was ‘susceptible’, ‘intermediate’, or ‘resistant’ to the antibiotic being

tested (*National Committee for Clinical Laboratory Standards (NCCLS) MIC Testing, Supplemental Tables, M100-S10 (M7), January, 2000*). The MIC Interpretive Standards definitions of ‘susceptible’, ‘intermediate’, and ‘resistant’ can be found in the Appendix.

Serotypes found in the PCV7 vaccine are more likely to be non-susceptible to penicillin and erythromycin than non-vaccine serotypes. One potential benefit of the vaccine is an anticipated decline in antibiotic resistance among circulating pneumococci. The data in the following graph supports this assumption; since the initiation of the PCV7 vaccine in 2001, antibiotic resistance has dropped. TMP-sulfa resistance has declined from 32.1% of isolates tested in 2000 to 20% in 2002, erythromycin resistance from 20.8% in 2000 to 9% in 2002, and penicillin fully resistant isolates from 13.2% in 2000 to 3% in 2002.



*Pen-FR = fully resistant, Pen-NS = non-susceptible

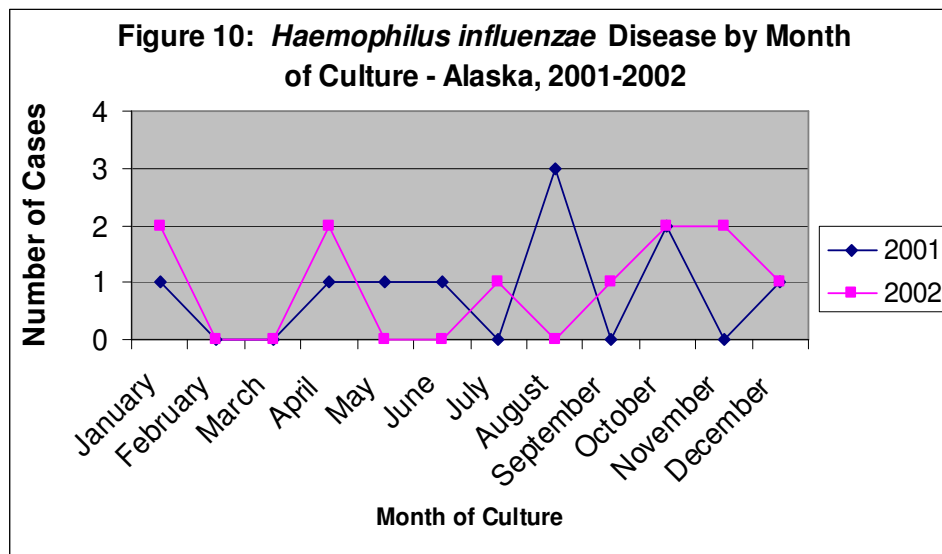
Invasive *Haemophilus influenzae*

Overall Incidence

In 2001, there were 10 cases of invasive *Haemophilus influenzae* in Alaska, giving a statewide rate of 1.6/100,000 persons per year. This rate was slightly higher than the national projected rate of 1.3/100,000 persons per year, as stated in the *Active Bacterial Core Surveillance (ABCs) Report Emerging Infections Program Network, 2001*. In 2001, two *Haemophilus influenzae* cases resulted in death, giving a case-fatality ratio of 20%.

In 2002, there were 11 cases of invasive *Haemophilus influenzae* in Alaska, for a statewide rate of 1.7/100,000 persons per year. This rate was higher than the national projected rate of 1.3/100,000 persons per year, according to the *Active Bacterial Core Surveillance (ABCs) Report Emerging Infections Program Network, 2002*. One of these cases resulted in death, giving a case-fatality ratio of 9.1%.

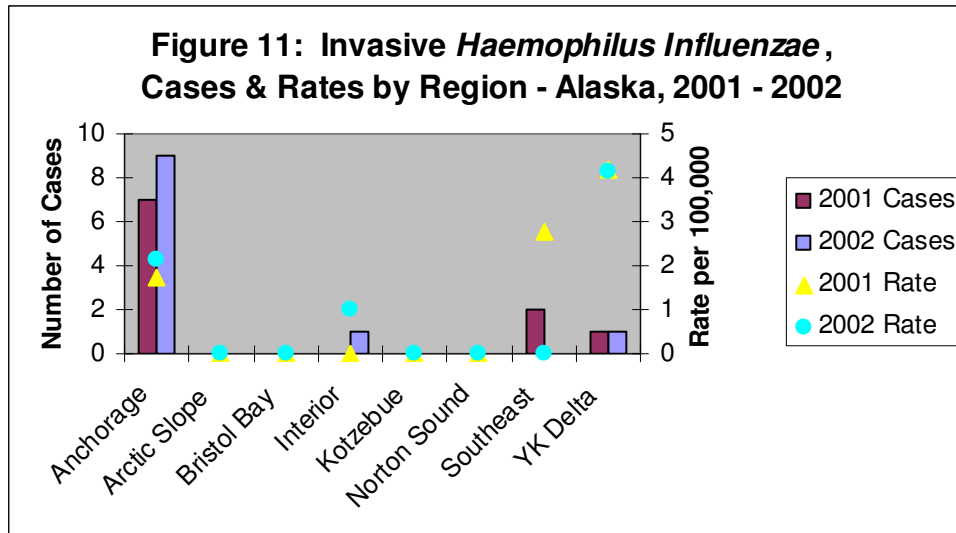
Seasonality



No true trends in seasonality are evident.

Region

The Anchorage area had the highest numbers of reported cases and percentages of reported cases both years. The Anchorage area had 70% (7 cases) and 82% (9 cases) in 2001 and 2002, respectively. The Yukon-Kuskokwim Delta area presented only one case both years and had the highest disease rate of just over 4.1/100,000 persons per year in both years. The Southeast region had two cases in 2001 and the Interior had one case in 2002.



Race

Table 14: Invasive *Haemophilus influenzae* Cases by Race – Alaska, 2001-2002

	Race	Cases n (%)	Age Adjusted Rate *	% Male	Deaths n (%)
2001	Alaska Native	3 (30)	2.4	66.7	0 (0)
	Non-Native†	7 (70)	1.4	83.3	2 (29)
	Total	10		70	2 (20)
2002	Alaska Native	6 (55)	4.6	33.3	0 (0)
	Non-Native	5 (45)	1.0	60	1 (20)
	Total	11		45.5	1 (9)

*Cases per 100,000 per percent distribution of Alaska 2000 population

†Includes 1 case for which race was unknown

In 2001, 60% of the cases occurred in non-Natives and 46% in 2002. Age-adjusted rates were calculated for Alaska Natives and non-Natives. The age-adjusted rate ratio of *H. influenzae* disease for the Alaska Native population compared with the non-Native population in 2001 was 1.7 and 4.6 in 2002.

Age

Haemophilus influenzae cases ranged in age from infancy to 78 years of age in 2001 (median 41.5 years) and from infancy to 73 years of age in 2002 (median 39.2 years). Overall, the highest rates of disease occurred in children less than 2 years old and in adults greater than 65 years old during both 2001 and 2002.

Figure 12: Invasive *Haemophilus Influenzae* by Age Group - Alaska, 2001 - 2002

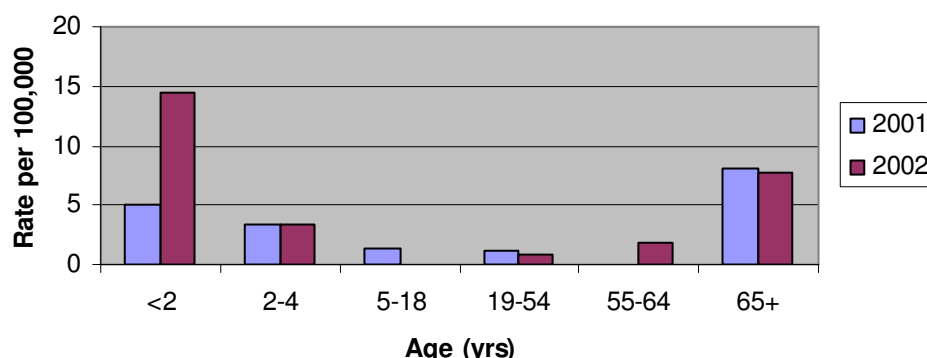
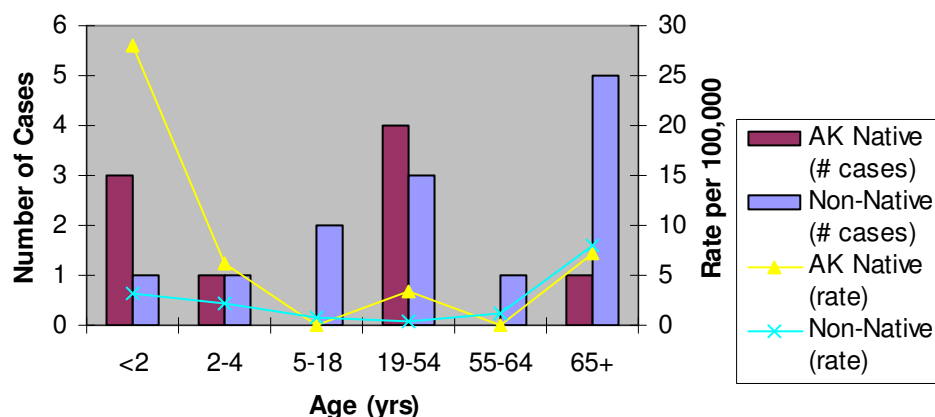


Figure 13: Invasive *Haemophilus influenzae*, Cases & Rates by Age Group & Race - Alaska, 2001-2002



Rates of disease in Alaska Native versus non-Native populations by age group were variable between the years 2001 and 2002; overall numbers of cases and rates by race and age group for the two year reporting period are presented in Figure 13. In 2001, the highest rates of disease occurred in Alaska Natives 2 to 4 years of age (12.8/100,000 persons per year) and those greater than 65 years old (15/100,000 persons per year). There were no cases of *Haemophilus influenzae* in the 2-4 year old age group in non-Natives and the rate of disease in those greater than 65 was less than half that of the Alaska Native population in that category. No *H. influenzae* cases were reported in Alaska Natives less than two years old in 2001, however, in 2002, the rate of disease in this age category increased to 56/100,000 persons per year compared to a rate of 0 in non-Native children less than two years old.

Clinical Presentation

Primary clinical presentations were determined by a review of the discharge diagnoses from each patient's individual medical record associated with the illness resulting in the culture. For cases

with more than one diagnosis, the most serious *Haemophilus influenzae*-related diagnosis was recorded as the primary clinical presentation.

In 2001, all isolates of *Haemophilus influenzae* were from blood samples. In 2002, eight isolates were from blood samples, two were from CSF, and one from peritoneal fluid.

Table 15: Primary Clinical Presentation of Invasive *Haemophilus influenzae* - Alaska, 2001-2002

Primary Presentation	2001 Cases	2002 Cases
	n (%)	n (%)
Pneumonia	5 (50)	4 (36.4)
Septicemia	4 (40)	3 (27.3)
Meningitis	0 (0)	2 (18.2)
Empyema	1 (10)	0 (0)
Peritonitis	0 (0)	1 (9.1)
Pericarditis	0 (0)	1 (9.1)
Total	10	11

Serotypes

All isolates received at AIP are serotyped. The bacterial capsule is the basis for serotyping and is the primary virulence factor. Serotype B has been the most common serotype in the past, but its prevalence has decreased with use of the childhood Hib vaccine. Surveillance of serotypes is important for monitoring vaccine effectiveness and emergence of non-vaccine serotypes.

Table 16: Serotypes of Invasive *Haemophilus influenzae* Cases by Race – Alaska, 2001-2002

Serotype	2001				2002		
	AK Native	Non-Native	Unknown	Total	AK Native	Non-Native	Total
A	-	-	-	0 (0)	2	2	4 (36.4)
B	-	1	-	1 (10)	1	-	1 (9.1)
D	-	2	-	2 (20)	-	-	0
F	1	1	1	3 (30)	-	-	0
NT	2	2	-	4 (40)	3	3	6 (54.5)
Total	3	6	1	10	6	5	11

In 2001, the most common serotype was F. In 2002, serotype A was the most prevalent, accounting for 4 (36.4%) of the 11 cases. Four cases were non-typable in 2001 and 6 were non-typable in 2002.

Hib

In recent years, the prevalence of *Haemophilus influenzae* type B has declined due to increased use of a childhood vaccine against this serotype. In 2001, only one case was reported in a 36-year old non-Native male. In 2002, only one case occurred in an Alaska Native infant female who had received two doses of PedVaxHib, but also had low birth weight and chronic lung problems. The statewide rate for both 2001 and 2002 was 0.16/100,000 persons per year.

Antibiotic Resistance

Table 17: Antibiotic Susceptibilities of *Haemophilus influenzae* isolates – Alaska, 2001-2002

Antibiotic	2001			2002		
	Susceptible	Intermediate	Resistant	Susceptible	Intermediate	Resistant
Chloramphenicol	9 (90%)	1 (10%)	-	11 (100%)	-	-
Ceftriaxone	10 (100%)	-	-	11 (100%)	-	-
TMP/sulfa	9 (90%)	-	1 (10%)	9 (81.8%)	1 (9.1%)	1 (9.1%)

Susceptibility to ceftriaxone was 100% for both 2001 and 2002. One isolate demonstrated intermediate susceptibility for chloramphenicol and one isolate was resistant to TMP/sulfa in 2001. In 2002, all isolates were susceptible for chloramphenicol. Intermediate susceptibility for TMP/sulfa was demonstrated by one isolate; one isolate showed resistance to TMP/sulfa also.

Table 18: Summary of Invasive *Haemophilus influenzae* Case Characteristics, Alaska, 2001

Sex	Age (Yrs)	Race	Anchorage /Other	Site of Isolation	Clinical Presentation(s)	Serotype*	Associated Medical Conditions	Outcome
F	0.9	Non-Native	Anchorage	Blood	Septicemia	F	None	
F	2	AK Native	Anchorage	Blood	Empyema, pneumonia	F	Chronic lung disease, Immunosuppressed	
F	5	Unknown	Anchorage	Blood	Septicemia	F	None	
M	31	AK Native	Other	Blood	Pneumonia	NT	Cigarette smoking, alcohol abuse	
M	36	Non-Native	Other	Blood	Pneumonia	B	None	
M	46	Non-Native	Other	Blood	Septicemia	NT	Alcohol abuse	Death
M	46	Non-Native	Anchorage	Blood	Pneumonia	NT	Cigarette smoking, alcohol abuse	
M	70	Non-Native	Anchorage	Blood	Septicemia	D	None	Death
M	73	AK Native	Other	Blood	Pneumonia	NT	None	
M	78	Non-Native	Other	Blood	Pneumonia	D	None	

*NT = non-typeable

Table 19: Summary of Invasive *Haemophilus influenzae* Case Characteristics, Alaska, 2002

Sex	Age (Yrs)	Race	Anchorage /Other	Site of Isolation	Clinical Presentation(s)	Serotype*	Associated Medical Conditions	Outcome
M	2 days	AK Native	Anchorage	Blood	Septicemia	NT	None	
M	0.4	AK Native	Other	CSF	Meningitis	A	None	
F	0.7	AK Native	Other	Blood	Pneumonia	B	Chronic lung disease	
M	2	Non-Native	Anchorage	Blood	Pericarditis, pneumonia	NT	None	
F	24	AK Native	Anchorage	Peritoneal Fluid	Peritonitis	NT	None	
F	39	AK Native	Anchorage	CSF	Meningitis	NT	Cigarette smoking, alcohol abuse	
F	40	AK Native	Other	Blood	Septicemia	A	Cigarette smoking, chronic lung disease	
M	59	Non-Native	Anchorage	Blood	Pneumonia	A	Chronic lung disease, diabetes	Death
M	72	Non-Native	Other	Blood	Pneumonia	NT	Cigarette smoking, chronic lung disease	
F	72	Non-Native	Other	Blood	Septicemia, cellulitis	NT	Immunosuppressed	
F	73	Non-Native	Anchorage	Blood	Pneumonia	A	Chronic lung disease, diabetes	

*NT = non-typeable

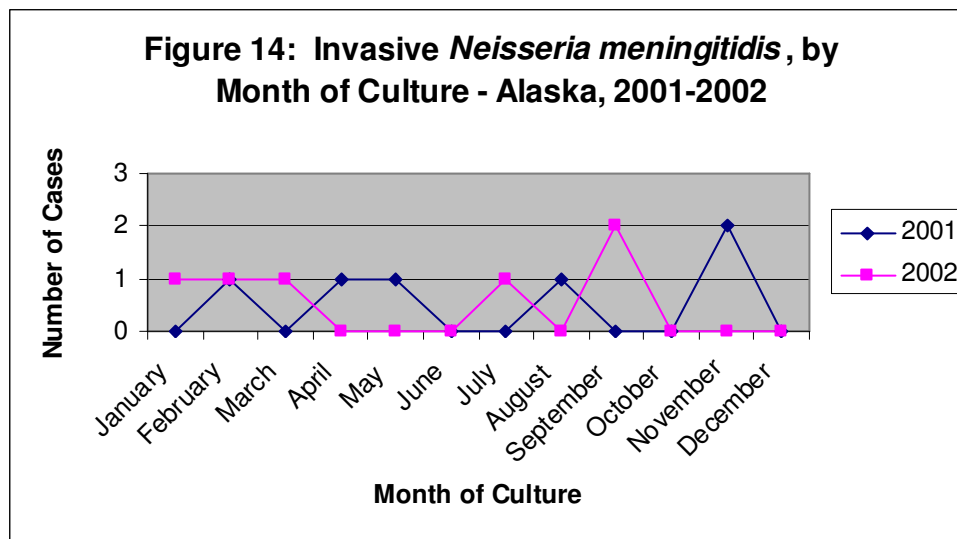
Invasive *Neisseria meningitidis*

Overall Incidence

A total of 6 cases of invasive *Neisseria meningitidis* were reported to AIP in each year of 2001 and 2002 for an overall rate of invasive *N. meningitidis* disease in the state of Alaska of 0.9. The Alaska rates are similar to the ABCs 2001 and 2002 national projected rates of 0.7/100,000 and 0.5/100,000, respectively (*Active Bacterial Core Surveillance (ABCs) Report Emerging Infections Program Network Neisseria meningitidis, 2001 & 2002*). There were no invasive *N. meningitidis*-related deaths in Alaska in 2001. In 2002, there was one death which resulted in a case fatality ratio of 17%.

Seasonality

N. meningitidis cases occurred throughout the year; no clusters of related cases were reported.



Race

In 2001, 83% of invasive *N. meningitidis* cases in Alaska occurred in the non-Native population for an age-adjusted rate of 1.0/100,000 persons per year compared to the Alaska Native rate of 0.6/100,000 persons per year. Cases of *N. meningitidis* were split between the Alaska Native and non-Native populations in 2002; there were three in each group. The age-adjusted rate of disease in Alaska Natives was 1.8/100,000 persons per year and the non-Native rate was 0.6/100,000 persons per year.

Table 20: Invasive *Neisseria meningitidis* Cases by Race – Alaska, 2001 - 2002

Year	Race	Cases n (%)	Age Adjusted Rate*	% Male	Deaths n (%)
2001	Alaska Native	1 (17)	0.6	0	0 (0)
	Non-Native	5 (83)	1.0	40	0 (0)
	Total	6		33	0 (0)
2002	Alaska Native	3 (50)	1.8	0	0 (0)
	Non-Native	3 (50)	0.6	33	1 (33)
	Total	6		17	1 (17)

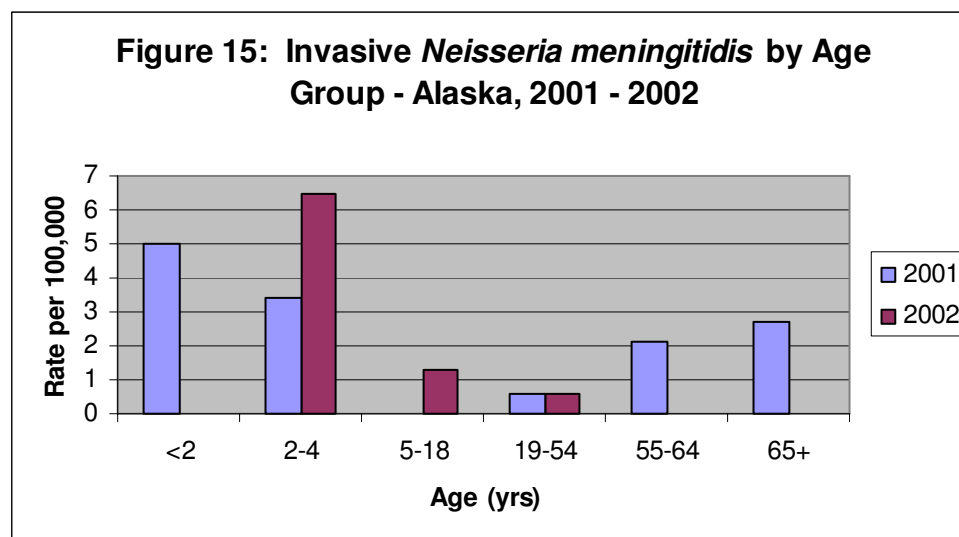
*Cases per 100,000 per percent distribution of Alaska 2000 population

Region

Four of the six invasive *N. meningitidis* cases in 2001 occurred in Anchorage; the remaining two cases were in the Interior and Norton Sound. In 2002, four of the six cases occurred in Anchorage and the remaining two in the Interior.

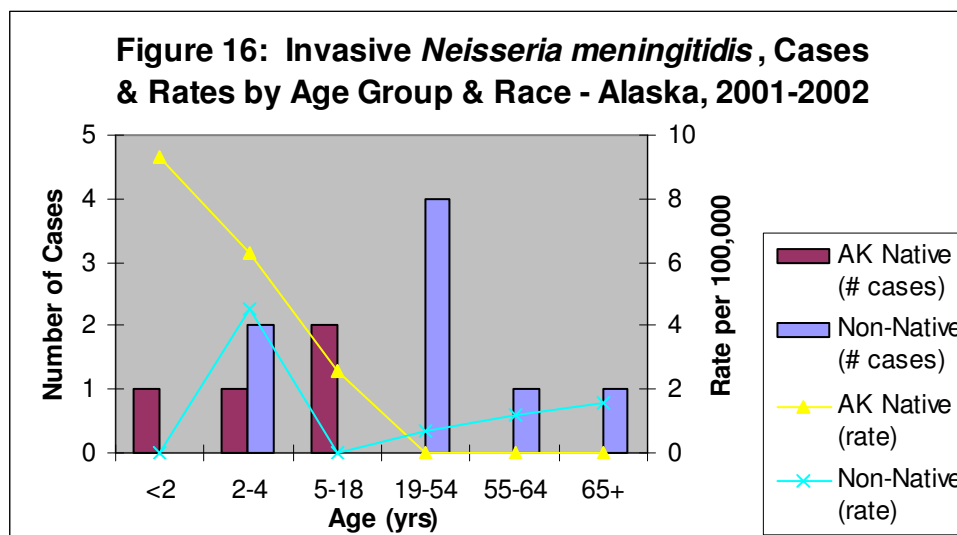
Age

Invasive *N. meningitidis* cases reported in 2001 ranged in age from 0.5 to 90 years old; the median age was 36.9 years. Highest rates of disease occurred in children less than two years old (5/100,000 persons per year) and children 2-4 years old (3.4/100,000 person per year). In 2002, cases ranged in age from 2.9 years to 52.6 years with a median age of 12.1 years. Children 2-4 years old had the highest rates of disease, 6.5/100,000 persons per year.



Rates of disease in Alaska Native versus non-Native populations by age group were variable between the years 2001 and 2002. In 2001, the highest rates of disease occurred in Alaska Native children less than 2 years of age (18.7/100,000 persons per year). There were no cases of invasive *Neisseria meningitidis* in children less than 2 years old in non-Natives. No *N. meningitidis* cases were reported in Alaska Natives 2 - 4 years old in 2001, however, in 2002, the

rate of disease in this age category increased to 12.5/100,000 persons per year compared to a rate of 4.4/100,000 persons per in non-Native children 2 – 4 years old.



Clinical Presentation

The primary clinical presentation was determined by a review of the discharge diagnoses indicated in each patient's individual medical record associated with the illness resulting in the culture. In cases with multiple discharge diagnoses, the most serious diagnosis related to the *N. meningitidis* infection was recorded as the primary clinical presentation. See Table 21 for the primary clinical presentations of invasive *N. meningitidis* in Alaska in 2001 and 2002.

N. meningitidis was isolated from blood samples in 4 of 6 (67%) cases in 2001. The remaining 2 cases in 2001 were isolated from cerebrospinal fluid and another unspecified sterile site. In 2002, 3 cases (50%) had *N. meningitidis* isolated from blood and three from cerebrospinal fluid.

Table 21: Primary Clinical Presentations of Invasive *Neisseria Meningitidis* – Alaska, 2001 - 2002

Primary Presentation	2001 Cases	2002 Cases
	n (%)	n (%)
Meningitis	2 (33)	5 (83)
Septicemia	3 (50)	1 (17)
Pneumonia	1 (17)	0 (0)
Total	6	6

Mortality

There were no *N. meningitidis*-related deaths reported in Alaska in 2001. In 2002, one patient died due to infection with *Neisseria meningitidis* resulting in a case-fatality ratio of 17% for the year (1 death out of 6 cases).

Table 22: Summary of Invasive *Neisseria Meningitidis* Case Characteristics, Alaska, 2001

Sex	Age (yrs)	Race	Anchorage /Other	Site of Isolation	Clinical Presentation(s)	Associated Medical Conditions
F	0.6	AK Native	Other	Blood	Septicemia	None
F	4.0	Non-Native	Anchorage	CSF	Meningitis	None
M	24.4	Non-Native	Anchorage	Other	Meningitis	Unknown
F	49.3	Non-Native	Anchorage	Blood	Septicemia	None
M	60.9	Non-Native	Other	Blood	Septicemia	Asplenia
F	90.0	Non-Native	Anchorage	Blood	Pneumonia	None

Table 23: Summary of Invasive *Neisseria Meningitidis* Cases Characteristics, Alaska, 2002

Sex	Age (yrs)	Race	Anchorage /Other	Site of Isolation	Clinical Presentation(s)	Associated Medical Conditions	Outcome
F	2.9	Native	Anchorage	Blood	Meningitis	None	-
M	4.3	Non-Native	Anchorage	CSF	Meningitis	None	-
F	7.0	Native	Other	Blood	Septicemia	None	-
F	17.3	Native	Other	CSF	Meningitis	None	-
F	46.8	Non-Native	Anchorage	CSF	Meningitis	Cigarette smoking, alcohol abuse	Death
F	52.6	Non-Native	Anchorage	Blood	Meningitis, pneumonia	Chronic lung disease	-

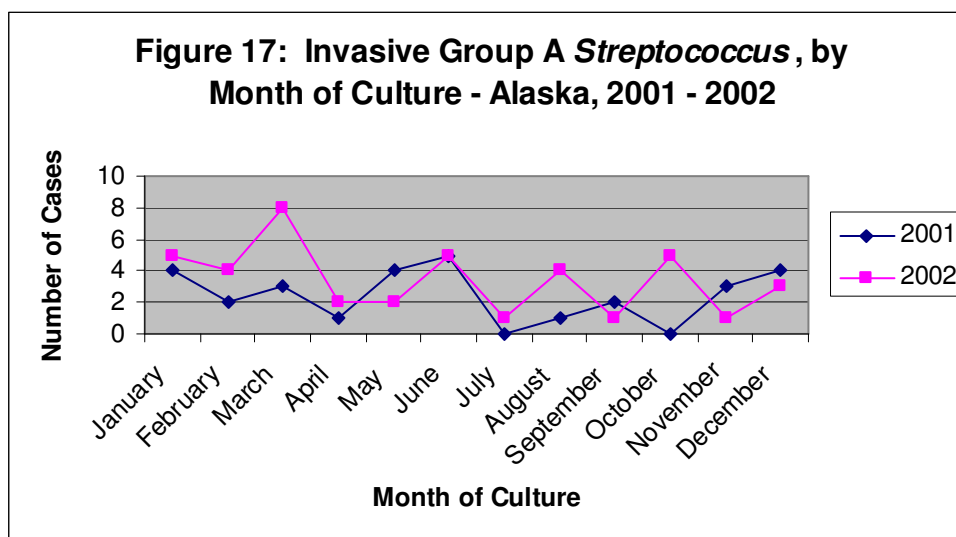
Invasive Group A *Streptococcus*

Overall Incidence

A total of 29 cases of invasive Group A *Streptococcus* (GAS) were reported to AIP in 2001 and a total of 41 cases were reported in 2002. Overall rates of invasive GAS disease in the state of Alaska were 4.6/100,000 persons per year in 2001 and 6.4/100,000 persons per year in 2002. The Alaska rates are higher than the ABCs 2001 and 2002 national projected rates of 3.7/100,000 and 3.2/100,000, respectively (*Active Bacterial Core Surveillance (ABCs) Report Emerging Infections Program network group A streptococcus, 2001 & 2002*). In 2001, there were 3 GAS-related deaths and 5 GAS-related deaths in 2002 for case fatality ratios of 10% and 12%, respectively.

Seasonality

Cases of Group A *Streptococcus* occurred throughout the year in 2001 and 2002. No apparent trends in seasonality appear in either year.



Race

In 2001, 41% of invasive GAS cases in Alaska occurred in the Alaska Native population for an age-adjusted rate of 10.5/100,000 persons per year which was higher than the non-Native rate of 3.2/100,000 persons per year. Age-adjusted rates of invasive GAS increased in both the Alaska Native and non-Native populations in 2002 to 14.3/100,000 persons per year and 4/100,000 persons per year, respectively.

Table 24: Invasive Group A *Streptococcus* Cases by Race – Alaska, 2001 - 2002

Year	Race	Cases n (%)	Age Adjusted Rate*	% Male	Deaths n (%)
2001	Alaska Native	12 (41)	10.5	58	2 (17)
	Non-Native	17† (59)	3.2	63	1 (6)
	Total	29		62	3 (10)
2002	Alaska Native	19 (46)	14.3	58	2 (11)
	Non-Native	22† (54)	4	33	3 (14)
	Total	41		46	5 (12)

*Cases per 100,000 per percent distribution of Alaska 2000 population

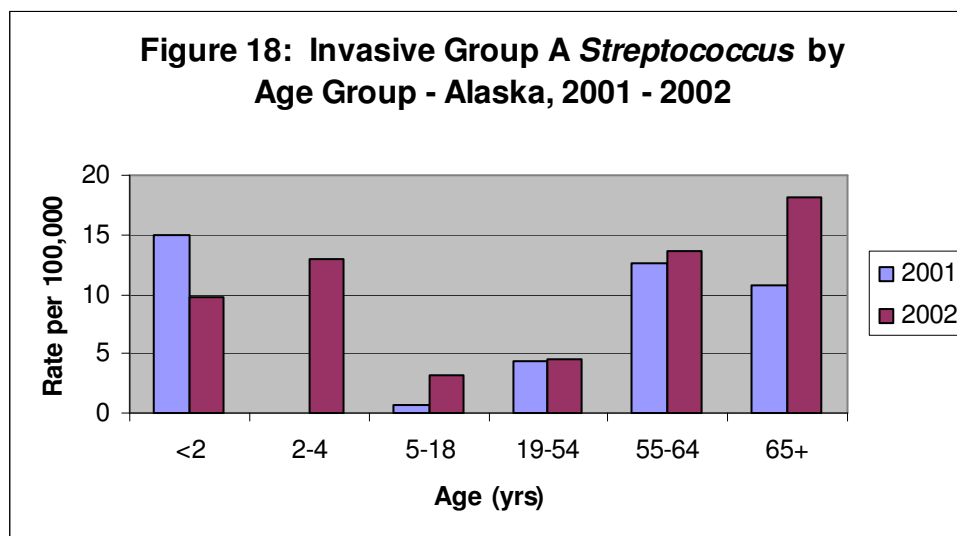
†Includes one case for which race was unknown

Region

Nineteen (66%) of the 29 invasive Group A *Streptococcus* cases in 2001 were reported in Anchorage, 7 cases in the Interior and one case each in Bristol Bay, the Southeast and YK Delta. In 2002, 68% (28 cases) occurred in Anchorage, 5 in the Interior, 4 in YK Delta, 2 in the Southeast and one each in Kotzebue and Bristol Bay.

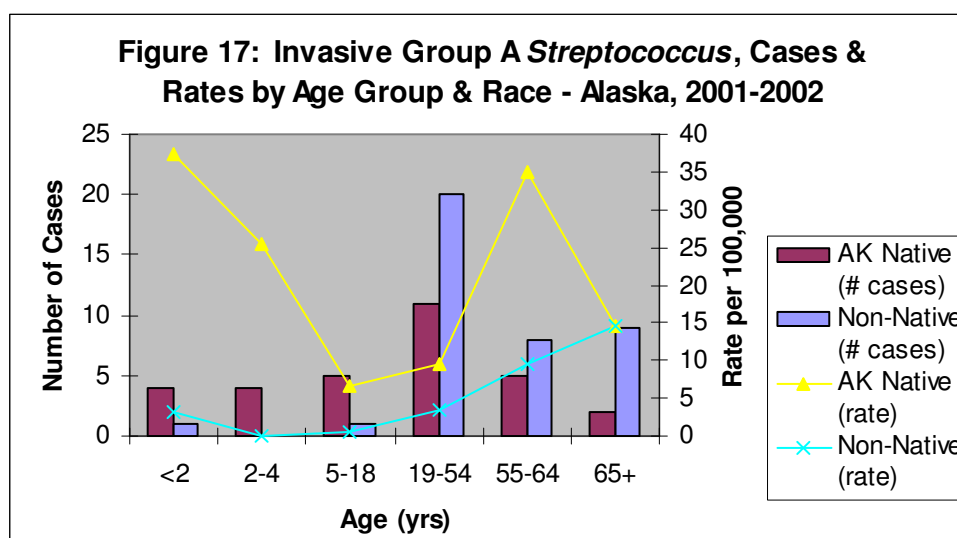
Age

Invasive Group A *Streptococcus* cases reported in 2001 ranged in age from 0.1 to 83.4 years old; the median age was 46.5 years. Highest rates of disease occurred in children less than two years old (14.9/100,000 persons per year) and in the 55 - 64 year old age category (12.6/100,000 person per year). In 2002, cases ranged in age from 0.1 years to 82.3 years with a median age of 41 years. The highest rates of disease occurred in the 65 and older age category, 18.1/100,000 persons per year.



Rates of invasive Group A *Streptococcus* disease in Alaska Natives were higher in the majority of age categories in 2001 and 2002 versus non-Native populations. In 2001, the highest rates of

disease occurred in Alaska Natives 55 – 64 years old (43.1/100,000 persons per year) and Alaska Native children less than 2 years of age (37.5/100,000 persons per year). The highest Group A *Strep* disease rate in the non-Native population occurred in the 65 and older age category (9.9/100,000 persons per year). In 2002, the highest rates of disease occurred in Alaska Native children 2 – 4 years old (50/100,000 persons per year) and less than two years old (37.3/100,000 persons per year). No cases were reported in the non-Native population in either of these age categories.



Clinical Presentation

The primary clinical presentation was determined by a review of the discharge diagnoses indicated in each patient's individual medical record associated with the illness resulting in the culture. In cases with multiple discharge diagnoses, the most serious diagnosis related to the GAS infection was recorded as the primary clinical presentation. Table 25 shows the primary clinical presentations of invasive Group A *Streptococcus* in Alaska for 2001 and 2002.

Group A *Streptococcus* was isolated from blood samples in all 2001 cases. In 2002, GAS was isolated from blood in 35 (85%) of 41 cases; the remaining cases were isolated from abscesses (3 cases), wound samples (2 cases) and one unspecified sterile site.

Table 25: Primary Clinical Presentations of Invasive Group A *Streptococcus* – Alaska, 2001 - 2002

Primary Presentation	2001 Cases n (%)	2002 Cases n (%)
Septicemia	11 (38)	6 (15)
Cellulitis	8 (28)	18 (44)
Pneumonia	4 (14)	4 (10)
Empyema	2 (7)	1 (2)
Bacteremia	0 (0)	2 (5)
Meningitis	1 (3)	1 (2)
Epiglottitis	1 (3)	0 (0)
Peritonitis	0 (0)	1 (2)
Septic arthritis	0 (0)	1 (2)
Osteomyelitis	0 (0)	1 (2)
Necrotizing fasciitis	1 (3)	6 (15)
Other	1 (3)	0 (0)
Total	29	41

Table 26: Summary of Invasive Group A *Streptococcus* Case Characteristics, Alaska, 2001

Sex	Age (yrs)	Race	Anchorage /Other	Site of Isolation	Clinical Presentation(s)	Associated Medical Conditions	Outcome
M	0.1	AK Native	Other	Blood	Pneumonia	Chronic lung disease	
M	0.7	Non-Native	Other	Blood	Septicemia	None	
F	1.6	AK Native	Anchorage	Blood	Septicemia	None	
F	5.5	AK Native	Anchorage	Blood	Empyema, pneumonia	None	
M	22.8	Non-Native	Anchorage	Blood	Empyema, pneumonia	None	
M	25.6	Non-Native	Other	Blood	Meningitis, pericarditis, septic arthritis	None	
F	29.4	Non-Native	Anchorage	Blood	Septicemia	Cigarette smoking, alcohol abuse, injection drug use	
M	32.1	Non-Native	Anchorage	Blood	Septicemia	Unknown	
F	35.5	AK Native	Anchorage	Blood	Cellulitis	None	
M	37.8	AK Native	Anchorage	Blood	Cellulitis	Alcohol abuse	
M	37.8	AK Native	Other	Blood	Septicemia	Cigarette smoking, alcohol abuse	
M	38.6	Non-Native	Anchorage	Blood	Septicemia	Cigarette smoking, alcohol abuse	
M	42.4	AK Native	Anchorage	Blood	Cellulitis	Cigarette smoking, chronic lung disease, alcohol abuse	
M	43	Non-Native	Anchorage	Blood	Pneumonia	Cigarette smoking, chronic lung disease, alcohol abuse	
M	46.5	AK Native	Anchorage	Blood	Cellulitis	Cigarette smoking, alcohol abuse	
M	51.5	Non-Native	Other	Blood	Necrotizing fasciitis, cellulitis	Cigarette smoking	
F	52	Non-Native	Other	Blood	Cellulitis	Diabetes	
F	53.9	Non-Native	Anchorage	Blood	Septicemia	Cigarette smoking, chronic lung disease, diabetes	Death
F	54.5	Non-Native	Anchorage	Blood	Septicemia	None	
F	55.6	AK Native	Other	Blood	Cellulitis	Alcohol abuse	
M	56.5	Non-Native	Other	Blood	Cellulitis	Cigarette smoking, alcohol abuse	
M	58.8	AK Native	Other	Blood	Other	Alcohol abuse	Death
M	60.5	Unknown	Other	Blood	Septicemia	Diabetes	
F	62.5	Non-Native	Anchorage	Blood	Pneumonia, necrotizing fasciitis, cellulitis	Chronic lung disease, diabetes	
M	63.2	AK Native	Anchorage	Blood	Septicemia	Diabetes	Death
F	65.9	AK Native	Anchorage	Blood	Septicemia	None	
M	66.6	Non-Native	Anchorage	Blood	Cellulitis	Diabetes	
F	80	Non-Native	Anchorage	Blood	Pneumonia	Chronic lung disease	
M	83.4	Non-Native	Anchorage	Blood	Epiglottitis	Cigarette smoking, chronic lung disease, diabetes	

Table 27: Summary of Invasive Group A *Streptococcus* Case Characteristics, Alaska, 2002

Sex	Age (yrs)	Race	Anchorage /Other	Site of Isolation	Clinical Presentation(s)	Associated Medical Conditions	Outcome
M	0.1	AK Native	Anchorage	Blood	Septicemia	None	
F	0.6	AK Native	Other	Abscess	Cellulitis	None	
F	2.3	AK Native	Other	Blood	Cellulitis	Chronic lung disease	
M	2.5	AK Native	Other	Blood	Meningitis	None	
M	3.3	AK Native	Other	Abscess	Cellulitis	None	
M	4	AK Native	Other	Blood	Septicemia	Chronic lung disease	
F	5.7	Non-Native	Anchorage	Blood	Osteomyelitis	None	
F	12.4	AK Native	Anchorage	Blood	Cellulitis	None	
M	15.9	AK Native	Other	Abscess	Cellulitis	None	
M	17.7	AK Native	Anchorage	Blood	Septicemia	None	Death
F	18.9	AK Native	Anchorage	Blood	Cellulitis	Chronic lung disease	
F	21.5	Non-Native	Anchorage	Blood	Necrotizing fasciitis	Cigarette smoking	
F	21.5	Non-Native	Anchorage	Blood	Cellulitis, other	Cigarette smoking	
M	24.3	AK Native	Other	Blood	Cellulitis	None	
F	25.2	Non-Native	Anchorage	Blood	Septicemia	None	
M	25.2	AK Native	Anchorage	Blood	Bacteremia	None	
F	25.5	Non-Native	Anchorage	Wound	Necrotizing fasciitis, cellulitis	Cigarette smoking	
F	32.1	AK Native	Other	Blood	Septicemia	Alcohol abuse	
F	33.8	Non-Native	Anchorage	Blood	Septic arthritis, cellulitis	None	
F	40.7	Non-Native	Anchorage	Blood	Peritonitis, cellulitis	Alcohol abuse	
M	41	Non-Native	Anchorage	Wound	Necrotizing fasciitis, cellulitis	None	
M	43.2	Non-Native	Anchorage	Other	Empyema, pneumonia, cellulitis	Cigarette smoking, injection drug use	
F	44.8	Non-Native	Anchorage	Blood	Cellulitis	None	
M	45	Non-Native	Anchorage	Blood	Cellulitis	Cigarette smoking	
M	50.1	AK Native	Anchorage	Blood	Cellulitis	Alcohol abuse	
M	53	AK Native	Anchorage	Blood	Bacteremia	Alcohol abuse, diabetes	
M	53.7	AK Native	Anchorage	Blood	Cellulitis	Alcohol abuse, diabetes	
F	56.1	AK Native	Anchorage	Blood	Pneumonia, cellulitis	Cigarette smoking, chronic lung disease, alcohol abuse	
F	56.5	Non-Native	Anchorage	Blood	Cellulitis	Cigarette smoking, chronic lung disease	Death
F	57.1	Non-Native	Other	Blood	Cellulitis	None	
M	60.3	Non-Native	Anchorage	Blood	Pneumonia, cellulitis, other	Alcohol abuse	
F	61.6	AK Native	Anchorage	Blood	Pneumonia	Cigarette smoking, chronic lung disease, immuno-suppressive treatment	
F	61.7	Non-Native	Anchorage	Blood	Necrotizing fasciitis	None	
M	64.5	Non-Native	Other	Blood	Cellulitis	Chronic lung disease, diabetes	
F	69.6	Non-Native	Other	Blood	Cellulitis	None	
F	69.7	AK Native	Anchorage	Blood	Cellulitis	None	Death
M	70.1	Non-Native	Anchorage	Blood	Necrotizing fasciitis	Diabetes	Death
F	72.9	Non-Native	Other	Blood	Cellulitis	None	
M	75.6	Non-Native	Anchorage	Blood	Necrotizing fasciitis	None	
F	77.9	Non-Native	Anchorage	Blood	Septicemia	None	Death
M	82.3	Unknown	Other	Blood	Pneumonia, cellulitis	None	

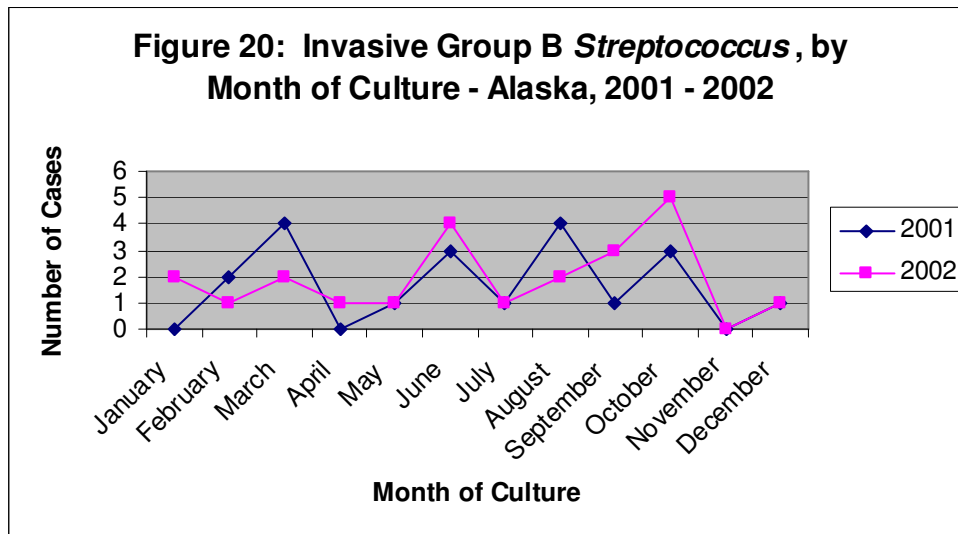
Invasive Group B *Streptococcus*

Overall Incidence

A total of 20 cases of invasive Group B *Streptococcus* (GBS) were reported to AIP in 2001 and a total of 23 cases were reported in 2002. Overall rates of invasive GBS disease in the state of Alaska were 3.6/100,000 persons per year in 2001 and 2002. The Alaska rate is lower than the ABCs 2001 and 2002 national projected rates of 6.9/100,000 and 7.0/100,000, respectively (*Active Bacterial Core Surveillance (ABCs) Report Emerging Infections Program Network group B streptococcus, 2001 & 2002*). In 2001, there was one GBS-related death and 5 GBS-related deaths in 2002 for case fatality ratios of 5% and 22%, respectively.

Seasonality

Cases of Group B *Streptococcus* occurred throughout the year in 2001 and 2002. No apparent seasonal trends appear in either year.



Race

In 2001, 25% of invasive Group B *Streptococcus* cases in Alaska occurred in the Alaska Native population for an age-adjusted rate of 4.4/100,000 persons per year compared with the non-Native rate of 2.9/100,000 persons per year. Age-adjusted rates of invasive GBS decreased slightly in the Alaska Native population in 2002 (4.2/100,000 persons per year) and increased in the non-Native population to 3.4/100,000 persons per year.

Table 28: Invasive Group B *Streptococcus* Cases by Race – Alaska, 2001 - 2002

Year	Race	Cases n (%)	Age Adjusted Rate*	% Male	Deaths n (%)
2001	Alaska Native	5 (25)	4.4	80	0 (0)
	Non-Native	15 (75)	2.9	60	1 (7)
	Total	20		65	1 (5)
2002	Alaska Native	5 (22)	4.2	60	0 (0)
	Non-Native	18 (78)	3.4	50	5 (28)
	Total	23		52	5 (22)

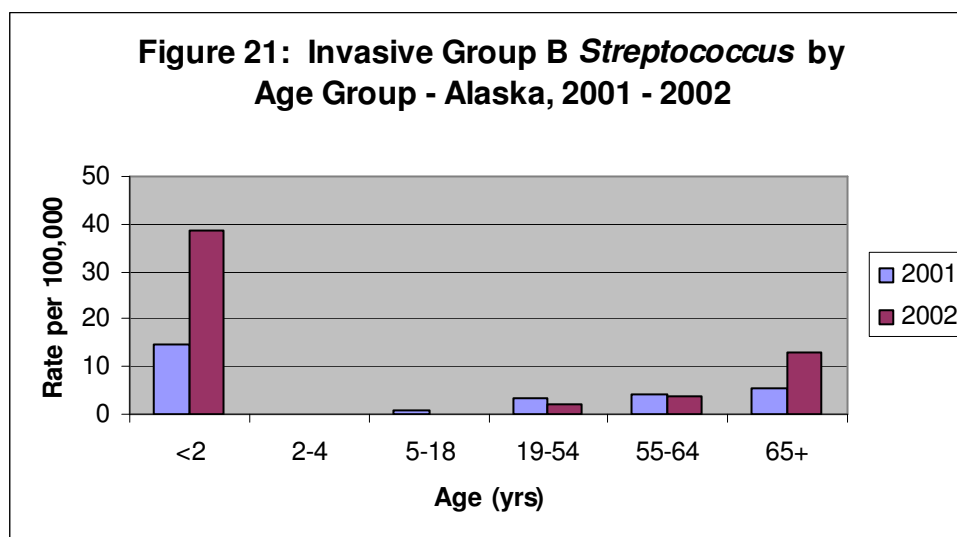
*Cases per 100,000 per percent distribution of Alaska 2000 population

Region

In 2001, 19 of the 20 reported GBS cases occurred in Anchorage; one case was reported in Southeast Alaska. Seventy four percent (17 cases) of invasive GBS reported in 2002 occurred in Anchorage; four cases occurred in the Interior and two cases occurred in Southeast.

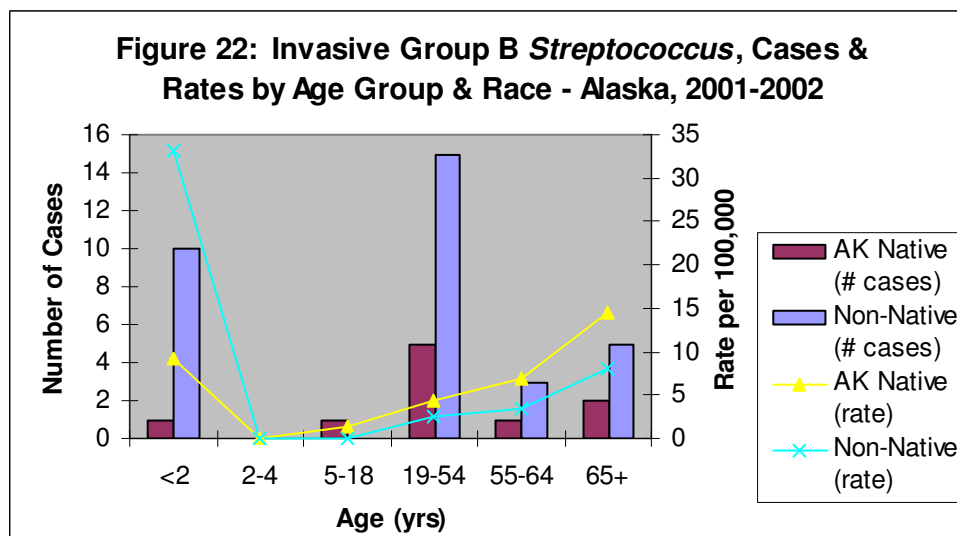
Age

Invasive Group B *Streptococcus* cases reported in 2001 ranged in age from newborn to 85.6 years old; the median age was 45 years. Highest rates of disease occurred in children less than two years old (14.9/100,000 persons per year) and in the 65 and older age category (5.4/100,000 person per year). In 2002, cases ranged in age from newborn to 75.4 years with a median age of 46.3 years. As in 2001, the highest rates of disease occurred in children less than two years old and person 65 and older, however, the rates more than doubled in each category to 38.8/100,000 in the less than two year olds and to 13/100,000 in the 65 and older age group.



Rates of GBS disease in Alaska Native versus non-Native populations by age group were variable between the years 2001 and 2002. In 2001, the highest rates of disease occurred in non-Native children less than 2 years of age (20.2/100,000 persons per year). There were no cases of

invasive GBS in children less than 2 years old in Alaska Natives, however, in 2002, the rate of disease in this age category increased to 18.7/100,000 persons per year. Rates of disease in non-Native children less than two years of age more than doubled in 2002 to 45.8/100,000 persons per year.



Clinical Presentation

The primary clinical presentation was determined by a review of the discharge diagnoses indicated in each patient's individual medical record associated with the illness resulting in the culture. In cases with multiple discharge diagnoses, the most serious diagnosis related to the GBS infection was recorded as the primary clinical presentation. In 2001, the most common clinical presentation was septicemia which occurred in 8 cases (40%). Two cases of osteomyelitis had additional presentations, one with septic arthritis and one with cellulitis. The most common clinical presentation in 2002 was cellulitis (6 cases, 26%); there were no additional presentations reported.

Group B *Streptococcus* was isolated from blood in 18 (90%) of 20 cases in 2001; one case was isolated from cerebrospinal fluid and one from joint fluid. In 2002, 74% (17 of 23 cases) were isolated from blood, 3 cases from cerebrospinal fluid, 2 cases from autopsy samples and one case from an unspecified sterile site.

Table 29: Primary Clinical Presentations of Invasive Group B *Streptococcus* – Alaska, 2001 - 2002

Primary Presentation	2001 Cases	2002 Cases
	n (%)	n (%)
Septicemia	8 (40)	5 (22)
Cellulitis	3 (15)	6 (26)
Pneumonia	4 (20)	3 (13)
Meningitis	1 (5)	5 (22)
Amnionitis	1 (5)	0 (0)
Peritonitis	1 (5)	2 (9)
Endocarditis	0 (0)	1 (4)
Osteomyelitis	2 (10)	0 (0)
Other	0 (0)	1 (4)
Total	20	23

Table 30: Summary of Invasive Group B *Streptococcus* Case Characteristics, Alaska, 2001

Sex	Age (yrs)	Race	Anchorage /Other	Site of Isolation	Clinical Presentation(s)	Associated Medical Conditions	Outcome
M	1 day	Non-Native	Anchorage	Blood	Septicemia	None	Death
M	1 day	Non-Native	Anchorage	Blood	Septicemia	None	
F	0.03	Non-Native	Anchorage	CSF	Meningitis	None	
M	18.8	AK Native	Anchorage	Joint fluid	Cellulitis	Alcohol abuse	
F	23.9	Non-Native	Anchorage	Blood	Pneumonia	None	
F	29.4	AK Native	Anchorage	Blood	Osteomyelitis, cellulitis	Diabetes	
F	36.9	Non-Native	Anchorage	Blood	Amnionitis	None	
M	42.3	Non-Native	Anchorage	Blood	Cellulitis	Alcohol abuse	
M	44.1	Non-Native	Anchorage	Blood	Septicemia	Cigarette smoking, chronic lung disease, alcohol abuse	
F	44.6	Non-Native	Anchorage	Blood	Cellulitis	None	
M	45.4	AK Native	Anchorage	Blood	Septicemia	Cigarette smoking, alcohol abuse	
M	47	Non-Native	Anchorage	Blood	Septicemia	Cigarette smoking, alcohol abuse	
M	47	Non-Native	Anchorage	Blood	Pneumonia	Cigarette smoking, alcohol abuse	
M	49.5	Non-Native	Anchorage	Blood	Peritonitis	Cigarette smoking, alcohol abuse	
F	51	Non-Native	Anchorage	Blood	Septicemia	Diabetes	
F	53.6	Non-Native	Anchorage	Blood	Septicemia	Cigarette smoking	
M	56.1	AK Native	Anchorage	Blood	Pneumonia	Cigarette smoking, alcohol abuse, diabetes	
M	56.2	Non-Native	Anchorage	Blood	Osteomyelitis, septic arthritis	Diabetes	
M	76.8	AK Native	Other	Blood	Septicemia	Diabetes	
M	85.6	Non-Native	Anchorage	Blood	Pneumonia	Cigarette smoking	

Table 31: Summary of Invasive Group B *Streptococcus* Case Characteristics, Alaska, 2002

Sex	Age (yrs)	Race	Anchorage /Other	Site of Isolation	Clinical Presentation(s)	Associated Medical Conditions	Outcome
F	1 day	Non-Native	Anchorage	Blood	Septicemia	None	
F	1 day	Non-Native	Anchorage	Blood	Pneumonia	None	
F	0.01	Non-Native	Anchorage	CSF	Meningitis	None	
F	0.01	Non-Native	Anchorage	CSF	Meningitis	None	
M	0.1	Non-Native	Anchorage	CSF	Meningitis	None	
F	0.2	Non-Native	Anchorage	Autopsy	Other	Unknown	Death
F	0.2	AK Native	Other	Blood	Meningitis	None	
F	0.3	Non-Native	Other	Autopsy	Pneumonia	None	Death
F	28	Non-Native	Anchorage	Blood	Cellulitis	Diabetes	
M	39.8	Non-Native	Other	Blood	Peritonitis	Cigarette smoking, alcohol abuse, diabetes	
M	42.9	Non-Native	Anchorage	Blood	Septicemia	Cigarette smoking, alcohol abuse, diabetes	
M	46.3	AK Native	Other	Blood	Endocarditis	Diabetes	
M	46.7	AK Native	Anchorage	Peritoneal fluid	Peritonitis	Alcohol abuse	
M	49	Non-Native	Anchorage	Blood	Septicemia	Cigarette smoking	Death
F	49.8	AK Native	Anchorage	Blood	Cellulitis	Diabetes	
M	51.5	Non-Native	Other	Blood	Cellulitis	Diabetes	
M	55.8	Non-Native	Anchorage	Blood	Meningitis	Alcohol abuse	Death
F	63.1	Non-Native	Other	Blood	Cellulitis	Diabetes	
M	65.9	AK Native	Anchorage	Blood	Cellulitis	Diabetes	
F	70.1	Non-Native	Anchorage	Blood	Cellulitis	None	
M	72.9	Non-Native	Anchorage	Blood	Pneumonia	Chronic lung disease, diabetes	Death
M	74	Non-Native	Anchorage	Blood	Septicemia	Diabetes	
M	75.4	Non-Native	Anchorage	Blood	Septicemia	Chronic lung disease	

Appendix

MIC Interpretive Standards Definitions:

NCCLS provides recommended interpretive categories for various Minimum Inhibitory Concentration values (cut points) for each organism which are defined as follows:*

1. Susceptible (S):

The “susceptible” category implies that an infection due to the strain may be appropriately treated with the dosage of antimicrobial agent recommended for that type of infection and infecting species, unless otherwise contraindicated.

2. Intermediate (I):

The “intermediate” category includes isolates with antimicrobial agent MICs that approach usually attainable blood and tissue levels and for which response rates may be lower than for susceptible isolates. The “intermediate” category implies clinical applicability in body sites where the drugs are physiologically concentrated (e.g., quinolones and β -lactams in urine) or when a high dosage of a drug can be used (e.g., β -lactams). The “intermediate” category also includes a buffer zone which should prevent small, uncontrolled technical factors from causing major discrepancies in interpretations, especially for drugs with a narrow pharmacotoxicity margins.

3. Resistant (R):

Resistant strains are not inhibited by the usually achievable systemic concentrations of the agent with normal dosage schedules and/or fall in the range where specific microbial resistance mechanisms are likely (e.g., β -lactamases) and clinical efficacy has not been reliable in treatment studies.

* NCCLS, MIC Testing, Supplemental Tables, M100-S10 (M&), January 2000, p.9.