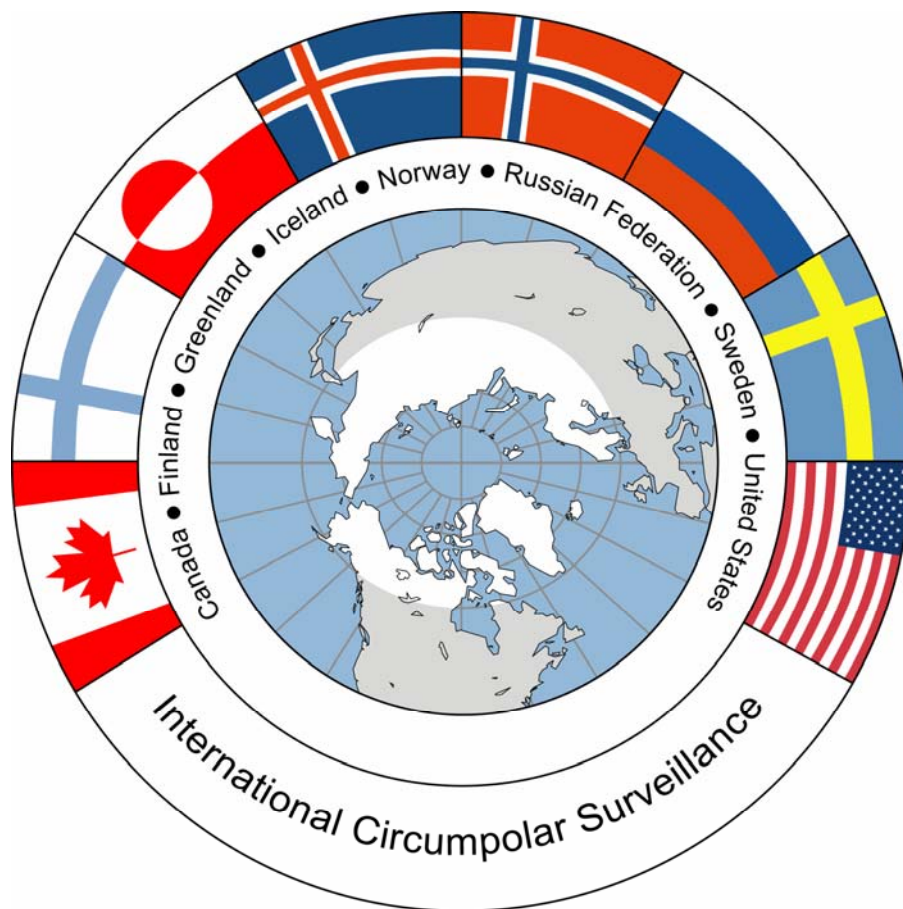


INTERNATIONAL CIRCUMPOLAR SURVEILLANCE (ICS) SUMMARY REPORT



YEAR 2001 DATA

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SUMMARY

International Circumpolar Surveillance (ICS), a population-based surveillance system for invasive bacterial diseases, has been established in the U.S. Arctic, Northern Canada, Greenland, Iceland, Norway, and Finland. Data collection began in 1999 and includes the organisms *Streptococcus pneumoniae*, *Haemophilus influenzae*, *Neisseria meningitidis*, and Groups A and B *Streptococcus*. This report reviews the data collected for the year 2001.

Data on invasive disease with the organism *Streptococcus pneumoniae* are collected from all participating countries; data on invasive disease with the remaining organisms are currently collected by the U.S. Arctic, Northern Canada, and, beginning with this reporting year, Greenland. A total of 1,741 cases of invasive pneumococcal disease were identified in 2001. Overall, rates of invasive *S. pneumoniae* were higher in individuals less than 2 years of age, however, the median age of cases was greater than 40 years in all countries except N. Canada. Case fatality ratios ranged from 4-29%. Race and ethnicity data are collected only in N. Canada and the U.S. Arctic; rates of invasive pneumococcal disease in Northern Canadian Aboriginals and U.S. Arctic Native populations were 60 and 25 cases per 100,000 population, respectively, which represents an increase in disease from 2000 in Northern Canadian Aboriginals and a decrease in disease in U.S. Arctic Natives. Pneumonia and septicemia were the most common clinical presentations; cigarette smoking was the most common risk factor. Vaccine status was reported from four countries: Canada, Greenland, Norway, and the U.S. Arctic and ranged from 0-36% of reported cases vaccinated. The most common *S. pneumoniae* serotypes in Finland and the U.S. Arctic are 4 and 14; in Iceland the most common serotype is 7; and in Greenland and N. Canada the most common serotype is 1.

Data on invasive disease with *Haemophilus influenzae*, *Neisseria meningitidis*, and Groups A and B *Streptococcus* are currently collected in Greenland, Northern Canada, and the U.S. Arctic. A total of 28 *H. influenzae* cases, 10 *N. meningitidis* cases, 32 Group A *Strep* cases, and 27 Group B *Strep* cases were collected in 2001. In general, the highest rates of disease occurred in N. Canada Aboriginal or Alaska Native persons less than two years of age; however in N. Canada the highest rates of meningococcal disease occurred in non-Aboriginals and in the U.S. Arctic the highest rates of invasive disease with *Haemophilus influenzae* occurred in the 65+ years of age category.

Surveillance Organisms Reported by Country, ICS 2001 Data

Country	<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*)
Finland	658 (13)	N/A	N/A	N/A	N/A
Greenland	7 (12)	0 (0)	3 (5)	1 (2)	3 (5)
Iceland	50 (18)	N/A	N/A	N/A	N/A
N. Canada	51 (40)	18 (14)	1 (1)	2 (2)	4 (3)
Norway	872 (19)	N/A	N/A	N/A	N/A
U.S. Arctic	103 (16)	10 (2)	6 (1)	29 (5)	20 (3)
Total	1741 (16)	28 (4)	10 (1)	32 (4)	27 (3)

*Cases per 100,000

INTRODUCTION

In January, 1999, the United States and Canada began an international cooperative initiative of population-based surveillance for invasive *Streptococcus pneumoniae* by all laboratories serving residents of the North American Arctic. In January, 2000, this surveillance system expanded to include invasive diseases with the following organisms: *Haemophilus influenzae* (all types), *Neisseria meningitidis*, Group A *Streptococcus*, and Group B *Streptococcus*. These pathogens were selected for ICS because rates of these diseases are elevated in indigenous peoples of the north, strains of these pathogens are rapidly acquiring resistance to commonly used antibiotics, these pathogens are routinely cultured in clinical laboratories, and clinically important serotypes of *Streptococcus pneumoniae*, *Haemophilus influenzae*, and *Neisseria meningitidis* are vaccine preventable in infants and adults.

Denmark's autonomous region of Greenland joined ICS in 2000, and Iceland, Norway (including Svalbard), and Finland joined in 2001. To date, year 2001 data has been submitted by Finland, Greenland, Iceland, Northern Canada, Norway, and the U.S. Arctic (Alaska). This report contains year 2001 data on all five surveillance organisms from Greenland, Northern Canada, and the U.S. Arctic, and only *Streptococcus pneumoniae* data from Finland, Iceland, and Norway.

GOALS

The goal of ICS is to establish an integrated network of hospital and public health facilities throughout the Arctic countries to monitor infectious diseases of concern. Linking public health facilities within the Arctic states will allow for the collection and sharing of uniform laboratory and epidemiological data that will describe the prevalence of infectious diseases in Arctic populations and assist in the formulation of prevention and control strategies.

The project, initiated in 1998, focused on establishing an ICS system for diseases caused by *Streptococcus pneumoniae*. This bacterium causes pneumonia, meningitis, and bacteremia in both the very young and the elderly. Once easily treated with antibiotics, this bacterium is now becoming resistant to commonly used antibiotics. This is of great concern to the public health community and is increasingly a target for surveillance by many countries worldwide. A polysaccharide vaccine is available for use in persons two years of age and older. In the U.S. Arctic, this vaccine is recommended for all those over 55 years of age. A conjugate vaccine for infants has been developed and is licensed for use in the U.S., Canada, and the European Union. The fact that diseases caused by *Streptococcus pneumoniae* are already being monitored by many public health authorities within the Arctic states makes establishing a circumpolar surveillance system for this infection feasible. In addition, due to the availability of polysaccharide and conjugate vaccines, much of the morbidity and mortality caused by *Streptococcus pneumoniae* is currently preventable.

Key objectives of ICS include:

- Identifying key public health contacts within Arctic countries. These persons should be familiar with infectious disease surveillance systems in place (particularly surveillance systems for diseases caused by *Streptococcus pneumoniae*) in the member country. Through correspondence and working group meetings, the scope and gaps of the surveillance systems are determined.

- Determining the comparability of laboratory and data collection methods, and negotiating standard protocols and quality control programs.
- Sharing and reporting data in agreed upon formats.
- The formation of a working group of key laboratory and public health contacts to coordinate pneumococcal surveillance within their respective jurisdictions. This group meets on a regular basis to review problems, progress, compliance, report generation, and future plans.
- The formation of a steering committee of national Arctic health experts to coordinate new objectives and initiatives within ICS.

This program forms a framework through which surveillance of other infectious diseases as well as prevention and control programs can be added. Other infectious diseases of circumpolar community concern include: other invasive bacterial diseases (caused by *Haemophilus influenzae*, *Neisseria meningitidis*, Groups A and B *Streptococcus*), tuberculosis, HIV, hepatitis, foodborne diseases (botulism, brucellosis), waterborne diseases, respiratory diseases of children such as those caused by respiratory syncytial virus, and chronic conditions related to infectious agents (hepatitis B virus and liver cancer, human papilloma virus, and cervical cancer). In addition, the surveillance model developed by this program for infectious disease may be adapted to monitor other non-infectious human health priorities of community concern.

METHODS

In the U.S. Arctic and Northern Canada, laboratory, demographic and clinical data are collected prospectively, while in Greenland, Iceland, Norway, and Finland, summary data are collected in aggregate at the end of the year.

Finland

- 23 district hospital laboratories participate in ICS.
 - Provide diagnostic microbiology services for all residents of Finland.
 - All invasive isolates of Sp submitted to the National Public Health Institute (KTL) laboratory in Oulu.
- Antimicrobial susceptibility testing of Sp isolates was performed by agar dilution method at district hospital laboratories as well as the KTL laboratory.
- Serotyping is performed at the KTL laboratory by counter-immune-electrophoresis.
- Population estimates for 2001 were obtained from the website <http://www.stat.fi>

Greenland

- 15 district hospital laboratories participate in ICS.
 - Provide diagnostic microbiology services for all residents of Greenland.
 - All invasive isolates of Sp, Hi, Nm, GAS, and GBS submitted to reference laboratories in Nuuk and Copenhagen.

- Antimicrobial susceptibility testing of Sp isolates was performed by agar dilution at the central laboratory at Queen Ingrid's Hospital in Nuuk.
- Serotyping was performed at the Statens Serum Institute in Copenhagen, Denmark, by the Quellung method.
- Clinical and demographic data for every case of invasive Sp, Hi, Nm, GAS, and GBS was collected by public health authorities at the end of the year and entered onto a standardized collection tool, the Bacterial Diseases Surveillance Form (BDSF), which is also used in Iceland, Northern Canada, and the U.S. Arctic.
- Population estimates for 2001 were obtained from the website <http://www.statgreen.gl>

Iceland

- 10 district hospital laboratories participate in ICS.
 - Provide diagnostic microbiology services for all residents of Iceland.
 - All invasive isolates of Sp submitted to the reference hospital in Reykjavik.
- Antimicrobial susceptibility testing of Sp isolates is performed by disc diffusion method at the Landspítali University Hospital (LUH) in Reykjavik and the laboratory at the regional hospital in Akureyri. All oxacillin resistant isolates are then analyzed by E test.
- Serotyping is performed at the LUH by coagglutination using antisera from Statens Serum Institute.
- Clinical and demographic data for every case of invasive Sp was collected by public health authorities at the end of the year and entered onto the same collection form (BDSF) used in Greenland, Northern Canada, and the U.S. Arctic.
- Population estimates for 2001 were obtained from the website <http://www.hagstofa.is>

Northern Canada

- 14 Canadian laboratories participate in ICS.
 - Provide diagnostic microbiology services for all residents of the Yukon Territory, Northwest Territories, Nunavut, Northern Quebec, and Northern Labrador.
 - Submit all invasive isolates of Sp, Hi, Nm, GAS, and GBS to one of two reference laboratories in Canada.
 - Sp, Hi, GAS, and GBS isolates are serotyped by the Quellung method using Statens Serum Institute antisera.
- Antimicrobial susceptibility of Sp, GAS, and GBS isolates was tested by micro-broth dilution (according to NCCLS recommendations).

- Communicable disease consultants located within one of the five regions of Northern Canada provided clinical and demographic information on the same collection form (BDSF) used in Greenland, Iceland, and the U.S. Arctic.
- Laboratory and clinical data are forwarded to the ICS coordinator at AIP in Anchorage.
- Population estimates for 2001 were obtained from the website <http://www.statcan.ca>

Norway

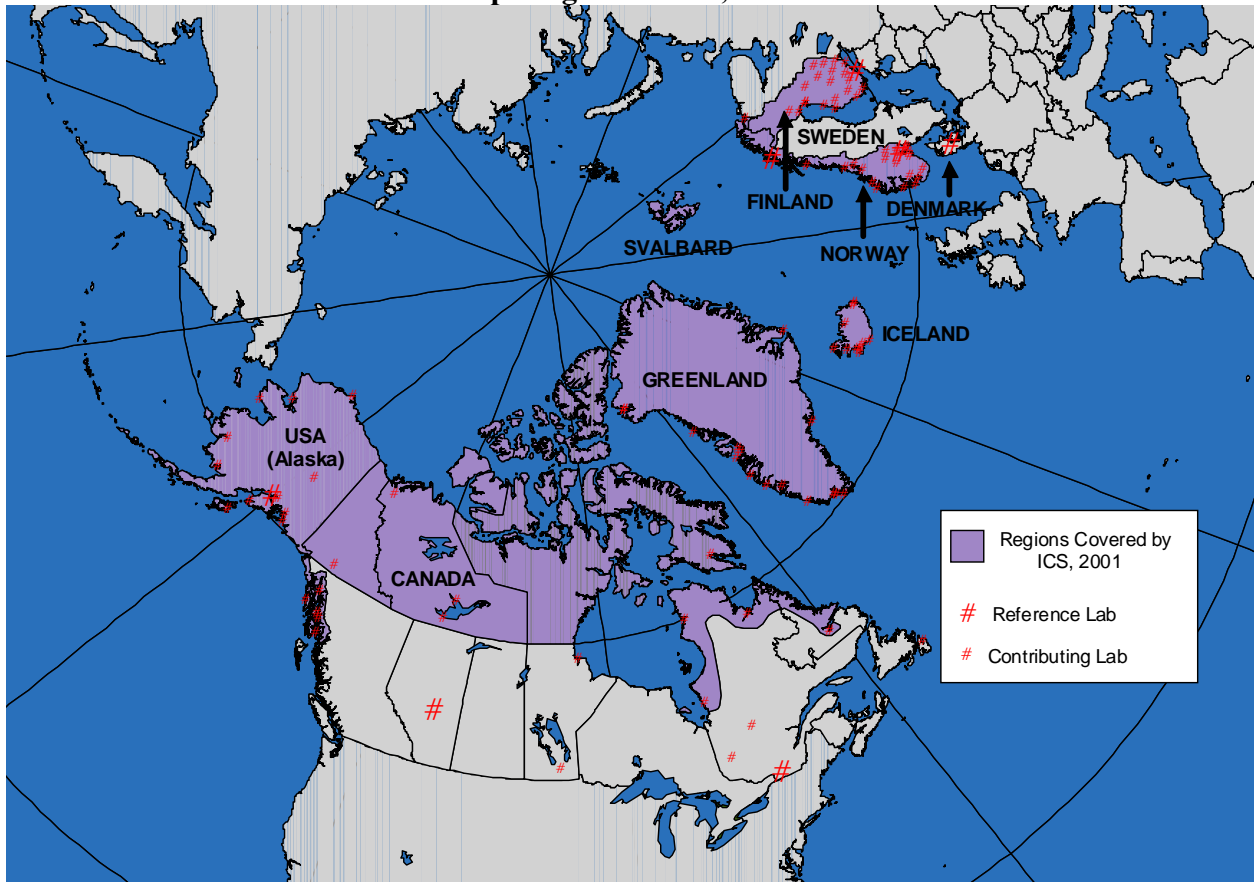
- 33 district hospital laboratories participate in ICS.
 - Provide diagnostic microbiology services for all residents of Norway.
 - All invasive isolates of Sp submitted to one of two reference laboratories in Oslo or Tromso.
- Antimicrobial susceptibility testing of Sp isolates is performed using the disc diffusion method at district hospital laboratories, the reference laboratory in Tromso or the main national laboratory in Oslo.
- Serotyping is performed at the Statens Serum Institute in Denmark by the Quellung method.
- Population estimates for 2001 were obtained from the website <http://www.ssb.no>

U.S. Arctic

- Population-based surveillance in the state of Alaska
 - Since 1980 for invasive Hi.
 - Since 1986 for invasive Sp.
 - Since 1999 for invasive diseases caused by Nm, GAS, and GBS.
 - Coordinated by the Arctic Investigations Program (AIP), National Center for Infectious Disease, Centers for Disease Control and Prevention, in Anchorage, Alaska.
- 23 laboratories providing diagnostic services to residents of Alaska submitted to AIP isolates of Sp, Hi, Nm, GAS, and GBS cultured in blood, cerebrospinal fluid, or from other sterile sites.
 - Sp and Hi isolates are serotyped by the Quellung method using Statens Serum Institute antisera.
 - Serogroup testing of Nm isolates from Alaska is performed at the Canadian National Centre for Meningococcal Disease in the CNS Infections Laboratory in Winnipeg.
 - ◆ By the slide agglutination method using specific antisera.
 - ◆ By PCR detection of the siaD gene responsible for synthesis of the serogroup-specific polysialyltransferase.
- Antimicrobial susceptibility testing of Sp isolates is performed at AIP by micro-broth dilution (according to NCCLS recommendations).

- Clinical and demographic information on each case-patient is recorded by AIP research nurses onto the same collection form (BDSF) used in Greenland, Iceland, and Northern Canada.
- Population estimates for 2001 were obtained from the website <http://www.labor.state.ak.us>

Participating Countries, ICS 2001



RESULTS

Streptococcus pneumoniae

Case Demographics

A total of 1,741 cases of invasive disease caused by *Streptococcus pneumoniae* were reported to ICS during 2001 by Finland, Greenland, Iceland, N. Canada, Norway, and the U.S. Arctic. The highest rates of disease (40 per 100,000) occurred in Northern Canada and the lowest in Greenland (12 per 100,000) with an overall rate for the ICS circumpolar region of 16 per 100,000; 52% of all cases occurred in males. Median age of cases overall was 57 years with the lowest median age in N. Canada (28 years) and the highest in Norway (63 years). Case fatality ratios ranged from 4% in N. Canada to 29% in Greenland; the overall case fatality ratio was 9%.

Streptococcus pneumoniae Case Demographics, ICS 2001 Data

Country	Population	#		Sex	Median Age (range) yrs	Deaths n (CFR†)
		Cases	Rate*	M (%)		
Finland	5,195,000	658	13	349 (53)	53 (0-94)	Unknown‡
Greenland	56,542	7	12	5 (71)	46 (1-60)	2 (29)
Iceland	285,054	50	18	29 (58)	41 (0-92)	6 (13) ^a
N. Canada	127,870	51	40	27 (53)	28 (0-82)	2 (4) ^a
Norway	4,503,436	872	19	437 (50)	63 (0-96)	72 (8)
U.S. Arctic	633,630	103	16	50 (49)	41 (0-101)	12 (12) ^a
Total	10,801,532	1,741	16	897 (52)	57 (0-101)	94 (9)

*Number of cases per 100,000 per year

†Case fatality ratio

‡Case outcomes not reported from Finland

^aCase outcomes unknown in cases from Iceland (2), N. Canada (6), U.S. Arctic (1)

Streptococcus pneumoniae Rates by Age Category, ICS 2001 Data

Age		Finland	Greenland	Iceland	N. Canada	Norway	U.S. Arctic
<2 yrs	Population	123,956	1,696	8,527	4,742	118,938	20,199
	Cases (%)	48 (7)	2 (29)	9 (18)	8 (16)	47 (5)	17 (17)
	Rate*	39	118	106	169	40	84.2
2-19 yrs	Population	1,153,494	17,310	78,389	43,873	1,049,453	191,247
	Cases (%)	54 (8)	0 (0)	8 (16)	14 (28)	52 (6)	16 (16)
	Rate*	5	0	10	32	5	8.4
20-64 yrs	Population	3,127,910	34,561	165,089	73,850	2,656,219	385,104
	Cases (%)	340 (52)	5 (71)	19 (38)	24 (47)	365 (42)	54 (52)
	Rate*	11	15	12	33	14	14
65+ yrs	Population	789,640	2,975	33,049	5,405	678,826	37,080
	Cases (%)	216 (33)	0 (0)	14 (28)	5 (10)	408 (47)	17 (16)
	Rate*	27	0	42	93	60	43
All ages	Population	5,195,000	56,542	285,054	127,870	4,503,436	633,630
	Cases	658	7	50	51	872	103
	Rate*	13	12	18	40	19	16

*Number of cases per 100,000 per year

When stratified by age, the highest rates of disease in each age category were in N. Canada. The lowest rates were in Finland and Greenland; however, the total number of cases reported in Greenland was small and therefore rates are unstable and should be regarded only as an indication of relative differences. The highest rates of disease in all countries occurred in those cases less than two years of age and in cases 65+ years of age, with the exception of Greenland, where no cases were reported in individuals 65+ years of age.

Seasonality

In Greenland and Iceland, the highest proportion of *Streptococcus pneumoniae* cases reported were diagnosed during July in 2001. N. Canada showed peaks in March, August, and October. Finland, Norway, and the U.S. Arctic showed no distinct seasonality of invasive disease caused by *Strep pneumoniae*.

Race

Race and ethnicity data was collected in N. Canada and the U.S. Arctic. Rates of invasive pneumococcal disease were consistently higher in Aboriginal and Native populations than in non-Aboriginal and non-Native populations. In N. Canada, 96% of all cases occurred in Aboriginal peoples. In the U.S. Arctic, there was a higher number of non-Native cases; however, rates of disease were half those found in the Native cases in all age groups.

***Streptococcus pneumoniae* Rates by Race and Age Categories, ICS 2001 Data**

Age (yrs)	N. Canada*		U.S. Arctic†		
	Aboriginal	Non-Aboriginal	Native	Non-Native	
<2	Population	3,560	1,182	5,340	14,859
	Cases (rate‡)	8 (225)	0 (0)	5 (94)	8 (54)
2-19	Population	31,515	12,358	48,154	143,093
	Cases (rate‡)	13 (41)	1 (8)	4 (8)	7 (5)
20-64	Population	36,995	36,855	61,686	323,418
	Cases (rate‡)	20 (54)	1 (3)	17 (28)	32 (10)
65+	Population	3,005	2,400	6,677	30,403
	Cases (rate‡)	4 (133)	0 (0)	5 (75)	11 (36)
All Ages	Population	75,075	52,795	121,857	511,773
	Cases (rate‡)	45 (60)	2 (4)	31 (25)	58 (11)

*Race unknown in 3 cases 20-64 years, 1 case 65+ years

†Race unknown in 4 cases <2 years, 5 cases 2-19 years, 5 cases 2-64 years

‡Number of cases per 100,000 per year

Clinical Presentation

The most common clinical presentations associated with *Streptococcus pneumoniae* were pneumonia, bacteremia or septicemia, and meningitis. In Finland and Iceland, the clinical presentation reported most often was bacteremia (95% and 96% respectively); in Greenland, it was meningitis (43%); in Norway, it was septicemia (44%); and in N. Canada and the U.S. Arctic, it was pneumonia (80% and 64% respectively).

Clinical Presentation of Reported *Streptococcus pneumoniae* Cases, ICS 2001 Data

	Finland n (%)	Greenland n (%)	Iceland n (%)	N Canada n (%)	Norway n (%)	US Arctic n (%)
Pneumonia	0 (0)	2 (29)	0 (0)	41 (80)	372 (43)	66 (64)
Septicemia	0 (0)	2 (29)	0 (0)	2 (4)	386 (44)	16 (15)
Bacteremia	627 (95)	0 (0)	48 (96)	3 (6)	0 (0)	4 (4)
Meningitis	31 (5)	3 (43)	1 (2)	3 (6)	72 (8)	8 (8)
Empyema	0 (0)	0 (0)	0 (0)	2 (4)	0 (0)	0 (0)
Cellulitis	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	3 (3)
Necrotizing fasciitis	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (1)
Septic arthritis	0 (0)	0 (0)	0 (0)	0 (0)	7 (1)	1 (1)
Osteomyelitis	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (1)
Peritonitis	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	2 (2)
Epiglottitis	0 (0)	0 (0)	0 (0)	0 (0)	1 (<1)	0 (0)
Other	0 (0)	0 (0)	0 (0)	0 (0)	34 (4)	2 (2)
Unknown	0 (0)	0 (0)	1 (2)	0 (0)	0 (0)	0 (0)
Total Cases	658	7	50	51	872	103

Risk Factors

The most frequently reported medical conditions or risk factors associated with *Streptococcus pneumoniae* cases were cigarette smoking and alcohol abuse. Cigarette smoking was reported in 26% of cases in N. Canada, 25% of cases in the U.S. Arctic, and 14% of cases in Greenland. Alcohol abuse was reported in 23% of cases in the U.S. Arctic and 18% of cases in N. Canada; Greenland did not report alcohol abuse in any cases.

***Streptococcus pneumoniae* Cases Risk Factor/Medical Conditions, ICS 2001 Data**

	Greenland n (%)	N. Canada n (%)	U.S. Arctic n (%)
Cigarette Smoking	1 (14)	13 (26)	26 (25)
Chronic Lung Disease and/or Asthma	0 (0)	4 (8)	20 (19)
Alcohol Abuse	0 (0)	9 (18)	24 (23)
Immunosuppressive Therapy	0 (0)	0 (0)	4 (4)
Diabetes	0 (0)	3 (6)	6 (6)
Injection Drug User	0 (0)	0 (0)	5 (5)
Total Cases	7	51	103

Vaccination Status

In Finland, Iceland, N. Canada, Norway, and the U.S. Arctic, 23-valent pneumococcal polysaccharide vaccine (PS23) is recommended for persons over 55 years (U.S. Arctic), over 60 years (Iceland) or over 65 years of age (Finland, N. Canada, Norway), and to persons greater than two years of age with specific medical problems. The pneumococcal 7-valent conjugate vaccine (PCV7) was introduced into the infant immunization schedule in the U.S. Arctic in January, 2001. Vaccine data was not reported from Finland and Iceland. Vaccine status was missing from a high percentage of cases from Norway and the U.S. Arctic. Seventeen to thirty-six percent of *Streptococcus pneumoniae* cases with known vaccination status were vaccinated with PS23 in the U.S. Arctic and N. Canada. Only 2% of *Streptococcus pneumoniae* cases with

known vaccination status in Norway were vaccinated with PS23 indicating less frequent use of this vaccine.

***Streptococcus pneumoniae* Case Vaccination Status for Pneumococcal Vaccine, ICS 2001 Data**

	Greenland	N. Canada	Norway	U.S. Arctic
Total cases	7	51	872	104
Vaccinated n (%)*	0 (0)	8 (17)	10 (2)	21 (36)
Vaccination status missing n (%)	1 (14)	4 (8)	426 (49)	45 (43)

*Percent of cases for which vaccine status is known (total cases – status missing cases)

Serotypes

The most prevalent *Streptococcus pneumoniae* serotypes reported by ICS countries in 2001 were 1, 4, 6B, and 14, three of which are included in the 7-valent conjugate vaccine (4, 6B, 14) and all are included in the 23-valent pneumococcal polysaccharide vaccine. Serotypes were not reported by Norway. In the following table, yellow highlights the top four most common serotypes in each country. In Greenland, only three serotypes were reported; in Iceland, serotypes 9, 14, and 19 were equally ranked third; and, in the U.S. Arctic, serotypes 6B and 9V were also equally ranked third.

***Streptococcus pneumoniae* Serotypes by Country, ICS 2001 Data**

Serotype	Finland	Greenland	Iceland	N. Canada	U.S. Arctic
1	14 (2)	2 (50)	0 (0)	22 (43)	5 (5)
3	52 (8)	0 (0)	2 (4)	0 (0)	4 (4)
4	77 (12)	0 (0)	2 (4)	6 (12)	10 (11)
5	3 (1)	0 (0)	0 (0)	0 (0)	0 (0)
6A	21 (3)	0 (0)	1 (2)	0 (0)	3 (3)
6B	40 (6)	1 (25)	2 (4)	5 (10)	7 (8)
7	1 (<1)	0 (0)	11 (22)	0 (0)	0 (0)
7F	50 (8)	0 (0)	0 (0)	0 (0)	1 (1)
8	18 (3)	0 (0)	1 (2)	3 (6)	3 (3)
9	0 (0)	0 (0)	6 (12)	0 (0)	0 (0)
9N	18 (3)	0 (0)	0 (0)	0 (0)	3 (3)
9V	33 (5)	0 (0)	0 (0)	1 (2)	7 (8)
10	9 (1)	0 (0)	0 (0)	0 (0)	0 (0)
11A	7 (1)	0 (0)	0 (0)	0 (0)	4 (4)
12	1 (<1)	0 (0)	1 (2)	0 (0)	0 (0)
12F	22 (4)	1 (25)	0 (0)	2 (4)	6 (7)
14	64 (10)	0 (0)	6 (12)	5 (10)	16 (17)
14, 8	1 (<1)	0 (0)	0 (0)	0 (0)	0 (0)
15A	4 (1)	0 (0)	0 (0)	0 (0)	1 (1)
15B	6 (1)	0 (0)	0 (0)	0 (0)	0 (0)
15C	5 (1)	0 (0)	0 (0)	0 (0)	0 (0)
16	3 (1)	0 (0)	0 (0)	0 (0)	0 (0)
17F	0 (0)	0 (0)	0 (0)	0 (0)	1 (1)
18	1 (<1)	0 (0)	4 (8)	0 (0)	0 (0)
18B	1 (<1)	0 (0)	0 (0)	0 (0)	0 (0)
18C	24 (4)	0 (0)	0 (0)	2 (4)	2 (2)

Serotype	Finland	Greenland	Iceland	N. Canada	U.S. Arctic
19	0 (0)	0 (0)	6 (12)	0 (0)	0 (0)
19A	21 (3)	0 (0)	0 (0)	1 (2)	2 (2)
19F	27 (4)	0 (0)	0 (0)	0 (0)	2 (2)
19F, 39	1 (<1)	0 (0)	0 (0)	0 (0)	0 (0)
20	3 (1)	0 (0)	0 (0)	1 (2)	1 (1)
22F	24 (4)	0 (0)	0 (0)	1 (2)	2 (2)
23	0 (0)	0 (0)	8 (16)	0 (0)	0 (0)
23A	2 (<1)	0 (0)	0 (0)	0 (0)	0 (0)
23F	39 (6)	0 (0)	0 (0)	1 (2)	4 (4)
29	4 (1)	0 (0)	0 (0)	0 (0)	0 (0)
31	0 (0)	0 (0)	0 (0)	0 (0)	1 (1)
33	12 (2)	0 (0)	0 (0)	0 (0)	0 (0)
33F	0 (0)	0 (0)	0 (0)	0 (0)	3 (3)
34	4 (1)	0 (0)	0 (0)	0 (0)	1 (1)
35	2 (<1)	0 (0)	0 (0)	0 (0)	0 (0)
35B	2 (<1)	0 (0)	0 (0)	1 (2)	0 (0)
35F	5 (1)	0 (0)	0 (0)	0 (0)	0 (0)
38	2 (<1)	0 (0)	0 (0)	0 (0)	0 (0)
Non-typable	1 (<1)	0 (0)	0 (0)	0 (0)	2 (2)

Vaccine-Preventable Cases and Deaths

Proportion of Vaccine Preventable Cases/Deaths from Invasive Pneumococcal Disease, ICS 2001 Data

	Finland n/Denom* (%)	Greenland n/Denom* (%)	Iceland n/Denom* (%)	N. Canada n/Denom* (%)	U.S. Arctic n/Denom* (%)
Cases ≥ 2 years old with serotype in the 23-valent pneumococcal polysaccharide vaccine	498/576 (87)	3/3 (100)	10/11 (91)	42/43 (98)	68/75 (91)
Cases < 2 years old with serotype in the 7-valent pneumococcal conjugate vaccine	37/48 (77)	1/1 (100)	3/3 (100)	7/8 (88)	10/16 (63)
Deaths (all ages) for which the serotype was contained in the 23-valent pneumococcal vaccine	†	1 (50‡)	0	1 (50‡)	6 (60‡)

*Number of isolates serotyped by country by age group

†No outcome data reported by Finland

‡Percentage of total deaths

For the countries reporting serotype data, more than 86% of *Streptococcus pneumoniae* cases in persons ≥ 2 years of age were preventable with use of the 23-valent polysaccharide vaccine. Use of the 7-valent conjugate vaccine would have potentially prevented 63-100% of *Strep pneumoniae* cases in children < 2 years of age in 2001. In Greenland and N. Canada, 50% of deaths related to *Streptococcus pneumoniae* were potentially preventable with use of the 23-valent polysaccharide vaccine and in the U.S. Arctic, 60% of deaths reported were potentially preventable.

Outcome

A total of 94 deaths associated with *Streptococcus pneumoniae* were reported to ICS in 2001. Overall, the highest case fatality ratio (CFR) occurred in persons 65+ years of age (24%). Finland did not report outcome data. By country, N. Canada had the highest CFR in persons 65+ years of age (40%) and Greenland had the highest CFR over all ages (29%).

***Streptococcus pneumoniae* Age-Specific Case-Fatality Ratios (CFR), ICS 2001 Data**

		<2 years	2-19 years	20-64 years	65+ years	All Ages
Greenland	# Cases	2	0	5	0	7
	Deaths (CFR)	0 (0)	0 (0)	2 (40)	0 (0)	2 (29)
Iceland	# Cases	9	8	19	14*	50
	Deaths (CFR)	1 (11)	0 (0)	1 (5)	4 (33)	6 (13)
N. Canada	# Cases	8	14*	24*	5	51
	Deaths (CFR)	0 (0)	0 (0)	0 (0)	2 (40)	2 (4)
Norway	# Cases	47	52	365	408	872
	Deaths (CFR)	2 (4)	2 (4)	26 (7)	42 (10)	72 (8)
U.S. Arctic	# Cases	17	16*	54	17	103
	Deaths (CFR)	0 (0)	1 (7)	8 (15)	3 (18)	12 (12)
Total	# Cases	83	90*	467	444*	1,083
	Deaths (CFR)	3 (4)	3 (3)	37 (8)	52 (12)	94 (9)

*Outcome unknown in (2) N. Canada cases and (1) U.S. Arctic case 2-19 years, (4) N. Canada cases 20-64 years, (2) Iceland cases 65+ years

Antimicrobial Susceptibility

***Streptococcus pneumoniae* Penicillin Susceptibility Results, ICS 2001 Data**

	#			I* Serotypes	R*	R* Serotypes
	Tested	S*	I*			
Finland	658	631	21 †		6 †	
Greenland	3	3	0		0	
Iceland	44	41	3	6B (1), 9 (1), 19 (1)	0	
N. Canada	51	50	1	9V	0	
U.S. Arctic	91	79	7	6A (2), 6B (2), 9V (2), NT (1)	5	14 (2), 6B (2), 9V (1)

*S=Sensitive, I=Intermediate resistance, R=Fully resistant

†Finnish serotype data is not linked to antimicrobial susceptibility data

In 2001, antimicrobial susceptibility results were reported to ICS from Finland, Greenland, Iceland, N. Canada, and the U.S. Arctic. Of those isolates tested from the U.S. Arctic, 6% were fully resistant to penicillin, 8% had intermediate resistance. The fully resistant isolates were serotypes 14 (40%), 6B (40%), and 9V (20%). The isolates that showed intermediate resistance were serotypes 6A (29%), 6B (29%), 9V (29%), and non-typable (14.3%). Finland submitted results from 658 isolates; 1% were fully resistant to penicillin and 3% had intermediate resistance. The Finnish serotype data is not linked to the antimicrobial susceptibility data, so no comparisons can be made. In Iceland, 7% of isolates tested had intermediate resistance to penicillin and consisted one each of serotype 19, 6B and 9.

Full resistance to trimethoprim-sulfamethoxazole (TMP-Sulfa) was found in 19% of tested isolates from the U.S. Arctic, 8% from N. Canada, and 14% from Iceland. The isolates that were fully resistant in the U.S. Arctic were serotypes 6B (29%), 9V (18%), 14 (18%), 23F (18%), 33F (12%), and 6A (6%). In N. Canada, fully resistant isolates were serotypes 1 (25%), 23F (25%), 6B (25%), and 9V (25%). Isolates from Iceland that were fully resistant to TMP-Sulfa were serotypes 19 (50%), 23 (17%), 6B (17%), and 9 (17%). Intermediate resistance to TMP-Sulfa was found in 2.2% of tested isolates from the U.S. Arctic (one each serotypes 6A and 4) and 7% from Iceland (one each serotypes 23, 6A, and 9).

***Streptococcus pneumoniae* TMP-Sulfa Susceptibility Results, ICS 2001 Data**

	# Tested	S*	I*	I* Serotypes	R*	R* Serotypes
Iceland	43	34	3	23 (1), 6A (1), 9 (1)	6	19 (3), 23 (1), 6B (1), 9 (1)
N. Canada	51	47	0		4	1 (1), 6B (1), 9V (1), 23F (1)
U.S. Arctic	91	72	2	4 (1), 6A (1)	17	6A (1), 6B (5), 9V (3), 14 (3), 23F (3), 33F (2)

*S=Sensitive, I=Intermediate resistance, R=Fully resistant

In the U.S. Arctic, 13.2% of tested isolates were fully resistant to erythromycin and 7% from Iceland. The serotypes found in the fully resistant isolates from the U.S. Arctic were 6B (41.7%), 14 (25%), 6A (17%), and 9V (17%). In Iceland, the isolates that were fully resistant to erythromycin were serotypes 14 (67%) and 6B (33%).

***Streptococcus pneumoniae* Erythromycin Susceptibility Results, ICS 2001 Data**

	# Tested	S*	I*	I* Serotypes	R*	R* Serotypes
Iceland	42	39	0		3	14 (2), 6B (1)
N. Canada	50	50	0		0	
U.S. Arctic	91	79	0		12	14 (3), 6A (2), 6B (5), 9V (2)

*S=Sensitive, I=Intermediate resistance, R=Fully resistant

Antimicrobial testing was also done for ceftriaxone, ofloxacin/levoflox, chloramphenicol, vancomycin, clindamycin, and rifampin. In N. Canada, one isolate out of 50 tested (2%) showed intermediate resistance to ceftriaxone; all isolates tested in Greenland and Iceland were sensitive to ceftriaxone. All isolates tested in N. Canada and the U.S. Arctic were sensitive to ofloxacin/levoflox, chloramphenicol, vancomycin, clindamycin, and rifampin. In Iceland, two isolates were tested for vancomycin susceptibility and both were sensitive.

Haemophilus influenzae

Case Demographics

Greenland, N. Canada, and the U.S. Arctic reported the occurrence of *Haemophilus influenzae* in each country during 2001. Greenland reported no cases and therefore will not be included in the results. A total of 28 cases of invasive disease caused by *Haemophilus influenzae* were reported to ICS during 2001 by N. Canada and the U.S. Arctic. The rate of disease was higher in N. Canada (14 per 100,000) than it was in the U.S. Arctic (2 per 100,000). The percentage of males with disease was greater in the U.S. Arctic (70%) than in N. Canada (44%). Median age of cases was higher in the U.S. Arctic (42 years) than in N. Canada (1 year). The case fatality ratio (CFR) in the U.S. Arctic was twice the CFR in N. Canada.

***Haemophilus influenzae* Case Demographics, ICS 2001 Data**

Country	Population	#		Sex	Median Age (range) yrs	Deaths n (CFR [†])
		Cases	Rate*	M (%)		
N. Canada	127,870	18	14	8 (44) [‡]	1 (<1-71)	1 (9) ^a
U.S. Arctic	633,630	10	2	7 (70)	42 (1-78)	2 (20)
Total	761,500	28	4	15 (56)	2 (<1-78)	3 (14)

*Number of cases per 100,000 per year

†Case fatality ratio

‡Sex unknown in (1) case from N. Canada

^aCase outcomes unknown in cases from N. Canada (7)

When stratified by age, the highest rates of disease in each age category were in N. Canada with the exception of the 2-19 years age category where no cases were reported. The highest rates of disease occurred in those cases less than 2 years of age and in cases 65+ years of age in both N. Canada and the U.S. Arctic.

***Haemophilus influenzae* Rates by Age Category, ICS 2001 Data**

Age		N. Canada	U.S. Arctic
<2 yrs	Population	4,742	20,199
	Cases (%)	14 (78)	1 (10)
	Rate*	295	5
2-19 yrs	Population	43,873	191,247
	Cases (%)	0 (0)	2 (20)
	Rate*	0	1
20-64 yrs	Population	73,850	385,104
	Cases (%)	3 (17)	4 (40)
	Rate*	4	1
65+ yrs	Population	5,405	37,080
	Cases (%)	1 (6)	3 (30)
	Rate*	19	8
All ages	Population	127,870	633,630
	Cases	18	10
	Rate*	14	2

*Number of cases per 100,000 per year

Race

Race and ethnicity data was reported in 11 of 18 *Haemophilus influenzae* cases from N. Canada. All cases for which race is known occurred in Aboriginal populations. Rates of disease were highest (281 per 100,000) in cases less than two years of age. In the U.S. Arctic, overall rates of disease were twice as high in Native populations (3 per 100,000) than in non-Native populations (1 per 100,000); the highest rates of disease (15 per 100,000) occurred in Native individuals 65+ years of age.

***Haemophilus influenzae* Rates by Race and Age Categories, ICS 2001 Data**

Age (yrs)	N Canada*		US Arctic†		
	Aboriginal	Non-Aboriginal	Native	Non-Native	
<2	Population	3,560	1,182	5,340	14,859
	Cases (rate‡)	10 (281)	0 (0)	0 (0)	1 (7)
2-19	Population	31,515	12,358	48,154	143,093
	Cases (rate‡)	0 (0)	0 (0)	1 (2)	0 (0)
20-64	Population	36,995	36,855	61,686	323,418
	Cases (rate‡)	1 (3)	0 (0)	1 (2)	3 (1)
65+	Population	3,005	2,400	6,677	30,403
	Cases (rate‡)	0 (0)	0 (0)	1 (15)	2 (7)
All	Population	75,075	52,795	121,857	511,773
Ages	Cases (rate‡)	11 (15)	0 (0)	3 (3)	6 (1)

*Race unknown in 4 cases <2 years, 2 cases 20-64 years, 1 case 65+ years

†Race unknown in 1 case 2-19 years

‡Number of cases per 100,000 per year

Clinical Presentation

In N. Canada, the most common clinical presentation associated with *Haemophilus influenzae* was meningitis (33% of reported cases), followed by bacteremia (28%). The most common clinical presentation in the U.S. Arctic was pneumonia (50% of reported cases), followed by septicemia (40%).

***Clinical Presentation of Reported Haemophilus influenzae* Cases, ICS 2001 Data**

	N. Canada	U.S. Arctic
	n (%)	n (%)
Pneumonia	3 (17)	5 (50)
Septicemia	0 (0)	4 (40)
Bacteremia	5 (28)	0 (0)
Meningitis	6 (33)	0 (0)
Empyema	1 (6)	1 (10)
Cellulitis	1 (6)	0 (0)
Pericarditis	1 (6)	0 (0)
Septic arthritis	1 (6)	0 (0)
Total	18	10

Risk Factors

Thirty percent of cases of *Haemophilus influenzae* reported in the U.S. Arctic indicated alcohol abuse as an associated risk factor and cigarette smoking was indicated in 20% of cases. In N. Canada, 6% of cases reported alcohol abuse as a risk factor.

***Haemophilus influenzae* Cases Risk Factor/Medical Conditions, ICS 2001 Data**

	N. Canada	U.S. Arctic
	n (%)	n (%)
Cigarette Smoking	0 (0)	2 (20)
Chronic Lung Disease and/or Asthma	0 (0)	1 (10)
Alcohol Abuse	1 (6)	3 (30)
Immunosuppressive Therapy	0 (0)	1 (10)
Diabetes	0 (0)	0 (0)
Injection Drug User	0 (0)	0 (0)
Total Cases	18	10

Vaccination Status

The *Haemophilus influenzae* type b (Hib) conjugate vaccine is required as part of routine childhood vaccination in N. Canada and the U.S. Arctic. Two cases of Hib were reported in N. Canada and one in the U.S. Arctic. Both cases in N. Canada had received one dose of Hib conjugate vaccine; vaccine status for the one case in the U.S. Arctic was unknown.

***Haemophilus influenzae* Case Vaccination Status for Hib Vaccine, ICS 2001 Data**

	N. Canada	U.S. Arctic
Total Hi cases (all serotypes)	18	10
Vaccinated n (%)*	7 (88)	3 (75)
Vaccination status missing n (%)	10 (56)	6 (60)
Total Hib cases	2	1
Vaccinated (Hib) n (%)*	2 (100)	Unknown

*Percent of cases for which vaccine status is known (total cases – status missing cases)

Serotypes

***Haemophilus influenzae* Serotypes by Country, ICS 2001 Data**

Serotype	N. Canada	U.S. Arctic
A	9 (56)	0 (0)
B	2 (13)	1 (10)
D	0 (0)	2 (20)
F	0 (0)	3 (30)
Non-typable	5 (31)	4 (40)
Total	16*	10

*Of 18 Hi cases in N. Canada, 16 were serotyped

The most common *Haemophilus influenzae* serotypes in N. Canada were type A (56% of reported cases) and the non-typables (31%). In the U.S. Arctic, the most common serotypes were the non-typables (40%) and type F (30%).

Outcome

Three deaths associated with *Haemophilus influenzae* were reported to ICS in 2001; one death occurred in N. Canada and two in the U.S. Arctic for an overall case fatality ratio (CFR) of 6% and 20% respectively. The highest CFR in both countries occurred in cases that were 65+ years of age, 100% in N. Canada and 33% in the U.S. Arctic. In two of the deaths, the serotypes were non-typable; in one death in the U.S. Arctic, the serotype was type D.

Haemophilus influenzae Age-Specific Case-Fatality Ratios (CFR), ICS 2001 Data

Age (yrs)	N. Canada		U.S. Arctic	
	Cases	Deaths (CFR)	Cases	Deaths (CFR)
<2	14	0* (0)	1	0 (0)
2-19	0	0 (0)	2	0 (0)
20-64	3	0 * (0)	4	1† (25)
65+	1	1† (100)	3	1† (33)
All Ages	18	1 (6)	10	2 (20)

*Outcome unknown in (5) N. Canada cases <2 years, (2) N. Canada cases 20-64 years

†Serotype in N. Canada death non-typable; serotypes in U.S. Arctic deaths, 20-64 years non-typable, 65+ years type D

Neisseria meningitidis

Case Demographics

Greenland, N. Canada and the U.S. Arctic reported the occurrence of *Neisseria meningitidis* in each country during 2001. A total of 10 cases of invasive disease caused by *Neisseria meningitidis* were reported to ICS. The rate of disease was highest in Greenland (5 per 100,000) and similar in N. Canada (1 per 100,000) and the U.S. Arctic (1 per 100,000). Median age of cases was higher in the U.S. Arctic (37 years) than in Greenland (9 years) and N. Canada (1 year in one case). No deaths were reported associated with *Neisseria meningitidis* in 2001.

***Neisseria meningitidis* Case Demographics, ICS 2001 Data**

Country	Population	# Cases	Rate*	Sex M (%)	Median Age (range) yrs	Deaths n (CFR†)
Greenland	56,542	3	5	2 (67)	9 (2-13)	0 (0)
N. Canada	127,870	1	1	1 (100)	1 case – 1	0 (0)
U.S. Arctic	633,630	6	1	2 (33)	37 (1-90)	0‡(0)
Total	818,042	10	1	5 (50)	11 (1-90)	0 (0)

*Number of cases per 100,000 per year

†Case fatality ratio

‡Case outcome unknown in 1 case from U.S. Arctic

When stratified by age, the highest rates of disease occurred in cases less than two years of age in each country. In those cases less than two years of age, the highest rates occurred in Greenland, 59 cases per 100,000.

***Neisseria meningitidis* Rates by Age Category, ICS 2001 Data**

Age		Greenland	N. Canada	U.S. Arctic
<2 yrs	Population	1,696	4,742	20,199
	Cases (%)	1 (33)	1 (100)	1 (17)
	Rate*	59	21	5
2-19 yrs	Population	17,310	43,873	191,247
	Cases (%)	2 (67)	0 (0)	1 (17)
	Rate*	12	0	1
20-64 yrs	Population	34,561	73,850	385,104
	Cases (%)	0 (0)	0 (0)	3 (50)
	Rate*	0	0	1
65+ yrs	Population	2,975	5,405	37,080
	Cases (%)	0 (0)	0 (0)	1 (17)
	Rate*	0	0	3
All ages	Population	56,542	127,870	633,630
	Total Cases	3	1	6
	Rate*	5	1	1

*Number of cases per 100,000 per year

Race

Race and ethnicity data were collected in N. Canada and the U.S. Arctic. Overall rates of disease were higher in the non-Aboriginal (1.9 per 100,000) and non-Native (0.97 per 100,000) populations than in Aboriginal (0 per 100,000) and Native (0.8 per 100,000) populations. However, the highest rate of disease in the U.S. Arctic by age category occurred in Native cases less than two years of age (18.7 per 100,000). The highest rate of disease in N. Canada also occurred in the less than two years of age category (84.6 per 100,000), but in the non-Aboriginal population.

***Neisseria meningitidis* Rates by Race and Age Categories, ICS 2001 Data**

Age (yrs)	N. Canada		U.S. Arctic		
	Aboriginal	Non-Aboriginal	Native	Non-Native	
<2	Population	3,560	1,182	5,340	14,859
	Cases (rate*)	0 (0)	1 (85)	1 (19)	0 (0)
2-19	Population	31,515	12,358	48,154	143,093
	Cases (rate*)	0 (0)	0 (0)	0 (0)	1 (1)
20-64	Population	36,995	36,855	61,686	323,418
	Cases (rate*)	0 (0)	0 (0)	0 (0)	3 (1)
65+	Population	3,005	2,400	6,677	30,403
	Cases (rate*)	0 (0)	0 (0)	0 (0)	1 (3)
All	Population	75,075	52,795	121,857	511,773
Ages	Cases (rate*)	0 (0)	1 (2)	1 (1)	5 (1)

*Number of cases per 100,000 per year

Clinical Presentation

All *Neisseria meningitidis* cases in Greenland and N. Canada presented clinically as meningitis. In the U.S. Arctic, the most common clinical presentation was septicemia (50% of cases) followed by meningitis (33%).

Clinical Presentation of Reported *Neisseria meningitidis* Cases, ICS 2001 Data

	Greenland	N. Canada	U.S. Arctic
	n (%)	n (%)	n (%)
Pneumonia	0 (0)	0 (0)	1 (16.7)
Septicemia	0 (0)	0 (0)	3 (50)
Meningitis	3 (100)	1 (100)	2 (33.3)
Total	3	1	6

Risk Factors

Neither Greenland nor Canada reported any risk factors or other medical conditions associated with cases of *Neisseria meningitidis*. In the U.S. Arctic, asplenia was reported in association with one case.

Group A *Streptococcus*

Case Demographics

Greenland, N. Canada, and the U.S. Arctic reported the occurrence of Group A *Streptococcus* in each country during 2001. A total of 32 cases of invasive disease caused by Group A *Streptococcus* were reported to ICS. The rate of disease was highest in the U.S. Arctic (5 per 100,000) and similar in Greenland (2 per 100,000) and N. Canada (2 per 100,000). Overall, the incidence of disease was slightly higher in males (63%) than in females. Median age of cases was higher in the U.S. Arctic (45 years) than in N. Canada (1 year). Four deaths were associated with Group A *Streptococcus*, one case in Greenland and three cases in the U.S. Arctic.

Group A *Streptococcus* Case Demographics, ICS 2001 Data

Country	Population	#		Sex	Median Age (range) yrs	Deaths n (CFR†)
		Cases	Rate*	M (%)		
Greenland	56,542	1	2	1 (100)	1 case – 64	1 (100)
N. Canada	127,870	2	2	1 (50)	1 (0.91-0.94)	0 (0)
U.S. Arctic	633,630	29	5	18 (62)	47 (<1-83)	3 (10)
Total	818,042	32	4	20 (63)	45 (<1-83)	4 (13)

*Number of cases per 100,000 per year

†Case fatality ratio

When stratified by age, the highest rates of disease occurred in cases less than two years of age in N. Canada (42 per 100,000) and the U.S. Arctic (15 per 100,000). High rates of disease also occurred in cases 65+ years of age in the U.S. Arctic (11 per 100,000).

Group A *Streptococcus* Rates by Age Category, ICS 2001 Data

Age		Greenland	N. Canada	U.S. Arctic
<2 yrs	Population	1,696	4,742	20,199
	Cases (%)	0 (0)	2 (100)	3 (10)
	Rate*	0	42	15
2-19 yrs	Population	17,310	43,873	191,247
	Cases (%)	0 (0)	0 (0)	1 (3)
	Rate*	0	0	1
20-64 yrs	Population	34,561	73,850	385,104
	Cases (%)	1 (100)	0 (0)	21 (72)
	Rate*	3	0	6
65+ yrs	Population	2,975	5,405	37,080
	Cases (%)	0 (0)	0 (0)	4 (14)
	Rate*	0	0	11
All ages	Population	56,542	127,870	633,630
	Total Cases	1	2	29
	Rate*	2	2	5

*Number of cases per 100,000 per year

Race

Race and ethnicity data were collected by N. Canada and the U.S. Arctic. Rates of disease were higher in the Aboriginal and Native populations than in the non-Aboriginal and non-Native populations. All of N. Canada's Group A *Streptococcus* disease occurred in Aboriginals under the age of two for a rate of 56 per 100,000. In the U.S. Arctic, the highest rates of disease occurred in Natives under the age of two (38 per 100,000).

Group A *Streptococcus* Rates by Race and Age Categories, ICS 2001 Data

Age (yrs)	N. Canada		U.S. Arctic*		
	Aboriginal	Non-Aboriginal	Native	Non-Native	
<2	Population	3,560	1,182	5,340	14,859
	Cases (rate†)	2 (56)	0 (0)	2 (38)	1 (7)
2-19	Population	31,515	12,358	48,154	143,093
	Cases (rate†)	0 (0)	0 (0)	1 (2)	0 (0)
20-64	Population	36,995	36,855	61,686	323,418
	Cases (rate†)	0 (0)	0 (0)	8 (13)	12 (4)
65+	Population	3,005	2,400	6,677	30,403
	Cases (rate†)	0 (0)	0 (0)	1 (15)	3 (10)
All	Population	75,075	52,795	121,857	511,773
Ages	Cases (rate†)	2 (3)	0 (0)	12 (10)	16 (3)

*Race unknown in 1 case 20-64 years

†Number of cases per 100,000 per year

Clinical Presentation

In the U.S. Arctic, 41% of Group A *Streptococcus* cases presented clinically with septicemia; 28% presented with cellulitis. One of the cases in N. Canada presented with septicemia, the other with empyema. The single case in Greenland presented with meningitis.

Clinical Presentation of Reported Group A *Streptococcus* Cases, ICS 2001 Data

	Greenland	N. Canada	U.S. Arctic
	n (%)	n (%)	n (%)
Pneumonia	0 (0)	0 (0)	3 (10)
Septicemia	0 (0)	1 (50)	12 (41)
Meningitis	1 (100)	0 (0)	1 (3)
Empyema	0 (0)	1 (50)	2 (7)
Cellulitis	0 (0)	0 (0)	8 (28)
Necrotizing fasciitis	0 (0)	0 (0)	2 (7)
Epiglottitis	0 (0)	0 (0)	1 (3)
Total	1	2	29

Risk Factors

Greenland and N. Canada reported no associated risk factors or medical conditions with cases of Group A *Streptococcus* in 2001. In the U.S. Arctic, cigarette smoking and alcohol abuse were reported in 35% of cases, and chronic lung disease and diabetes were reported in 24% of cases.

Outcome

Four deaths in cases with Group A *Streptococcus* were reported to ICS in 2001. No deaths were reported in N. Canada, one death was reported in Greenland, and 3 deaths were reported in the U.S. Arctic (CFR 10%). All four deaths occurred in the 20-64 year old age category.

Group B *Streptococcus*

Case Demographics

Greenland, N. Canada, and the U.S. Arctic reported the occurrence of Group B *Streptococcus* in each country during 2001. A total of 27 cases of invasive disease caused by Group B *Streptococcus* were reported to ICS. The rate of disease was highest in Greenland (5 per 100,000) and similar in N. Canada (3 per 100,000) and the U.S. Arctic (3 per 100,000). The percentage of males with disease was higher in Greenland (67%) and the U.S. Arctic (65%) than in N. Canada where all disease occurred in females. Median age of cases was also higher in Greenland (67 years) and the U.S. Arctic (45 years) than in N. Canada (20 years). Three deaths were reported associated with Group B *Streptococcus* in 2001; two in Greenland and one in the U.S. Arctic.

Group B *Streptococcus* Case Demographics, ICS 2001 Data

Country	Population	#		Sex	Median Age (range) yrs	Deaths n (CFR†)
		Cases	Rate*	M (%)		
Greenland	56,542	3	5	2 (67)	67 (61-84)	2 (100)‡
N. Canada	127,870	4	3	0 (0)	20 (0-41)	0 (0)
U.S. Arctic	633,630	20	3	13 (65)	45 (0-86)	1 (5)
Total	818,042	27	3	15 (56)	45 (0-86)	3 (12)

*Number of cases per 100,000 per year

†Case fatality ratio

‡Case outcome unknown in 1 case

When stratified by age, the highest rates of disease occurred in cases less than two years of age in N. Canada (42 per 100,000) and the U.S. Arctic (15 per 100,000). In Greenland, two of three cases occurred in the 65+ age category (67 per 100,000).

Group B *Streptococcus* Rates by Age Category, ICS 2001 Data

Age		Greenland	N. Canada	U.S. Arctic
<2 yrs	Population	1,696	4,742	20,199
	Cases (%)	0 (0)	2 (50)	3 (15)
	Rate*	0	42.2	14.9
2-19 yrs	Population	17,310	43,873	191,247
	Cases (%)	0 (0)	0 (0)	1 (5)
	Rate*	0	0	0.5
20-64 yrs	Population	34,561	73,850	385,104
	Cases (%)	1 (33.3)	2 (50)	14 (70)
	Rate*	2.9	2.7	3.6
65+ yrs	Population	2,975	5,405	37,080
	Cases (%)	2 (66.7)	0 (0)	2 (10)
	Rate*	67.2	0	5.4
All ages	Population	56,542	127,870	633,630
	Total Cases	3	4	20
	Rate*	5.3	3.1	3.2

*Number of cases per 100,000 per year

Race

Race and ethnicity data was collected in N. Canada and the U.S. Arctic. Overall rates of disease were higher in Aboriginal and Native populations than in non-Aboriginal and non-Native populations. The highest rates of disease occurred in N. Canada Aboriginal and Alaska Native cases less than two years of age, 28 and 56 per 100,000 respectively.

Group B *Streptococcus* Rates by Race and Age Categories, ICS 2001 Data

Age (yrs)	N. Canada*		U.S. Arctic		
	Aboriginal	Non-Aboriginal	Native	Non-Native	
<2	Population	3,560	1,182	5,340	14,859
	Cases (rate†)	1 (28)	0 (0)	3 (56)	0 (0)
2-19	Population	31,515	12,358	48,154	143,093
	Cases (rate†)	0 (0)	0 (0)	1 (2)	0 (0)
20-64	Population	36,995	36,855	61,686	323,418
	Cases (rate†)	1 (3)	1 (3)	3 (5)	11 (3)
65+	Population	3,005	2,400	6,677	30,403
	Cases (rate†)	0 (0)	0 (0)	1 (15)	1 (3)
All	Population	75,075	52,795	121,857	511,773
Ages	Cases (rate†)	2 (3)	1 (2)	8 (7)	12 (2)

*Race unknown in 1 case <2 years

†Number of cases per 100,000 per year

Clinical Presentation

In Greenland and the U.S. Arctic, septicemia was the most common clinical presentation, 67% and 40% respectively, reported for cases of Group B *Streptococcus* in 2001. Fifty percent of cases in Canada presented with meningitis.

Clinical Presentation of Reported Group B *Streptococcus* Cases, ICS 2001 Data

	Greenland n (%)	N. Canada n (%)	U.S. Arctic n (%)
Pneumonia	0 (0)	0 (0)	4 (20)
Septicemia	2 (67)	1 (25)	8 (40)
Meningitis	1 (33)	2 (50)	1 (5)
Peritonitis	0 (0)	0 (0)	1 (5)
Cellulitis	0 (0)	0 (0)	3 (15)
Amnionitis	0 (0)	0 (0)	1 (5)
Osteomyelitis	0 (0)	0 (0)	2 (10)
Septic Arthritis	0 (0)	1 (25)	0 (0)
Total	3	4	20

Risk Factors

N. Canada reported no associated risk factors or medical conditions with cases of Group B *Streptococcus* in 2001. In Greenland and the U.S. Arctic, cigarette smoking and alcohol abuse were reported in 33% and 40% of cases respectively. Diabetes was reported in 25% of cases in the U.S. Arctic.

Outcome

Three deaths in cases with Group B Streptococcus were reported to ICS in 2001. No deaths were reported in N. Canada, two deaths were reported in Greenland, and 1 death was reported in the U.S. Arctic (CFR 5%). The two deaths in Greenland occurred in the 20-64 and 65+ age categories; the death in the U.S. Arctic was in the less than two year old age category.

Group B *Streptococcus* Age-Specific Case-Fatality Ratios (CFR), ICS 2001 Data

Age (yrs)	Greenland		N. Canada		U.S. Arctic	
	Cases	Deaths (CFR)	Cases	Deaths (CFR)	Cases	Deaths (CFR)
<2	0	0 (0)	2	0 (0)	3	1 (33)
2-19	0	0 (0)	0	0 (0)	1	0 (0)
20-64	1	1 (100)	2	0 (0)	14	0 (0)
65+	2*	1 (50)	0	0 (0)	2	0 (0)
All Ages	3*	2 (67)	4	0 (0)	20	1 (5)

*Case outcome unknown in 1 case

QUALITY CONTROL

Currently 37 clinical laboratories in the U.S. Arctic and N. Canada forward isolates from patients with invasive pneumococcal disease to reference laboratories in Alaska and Canada respectively. To ensure inter-laboratory comparability of *Streptococcus pneumoniae* serotyping and antimicrobial susceptibility testing between two reference laboratories in Canada (Alberta and Quebec) and one in the U.S. (Alaska), the ICS *Streptococcus pneumoniae* inter-laboratory quality control (QC) program was established in 1999.

Each reference laboratory is responsible for exporting one QC panel of seven *Streptococcus pneumoniae* isolates each year to each of the other laboratories using a transportation medium of their choice for a total of 21 *Strep pneumoniae* isolates per year. Serotyping was performed by Quellung reaction. Minimum inhibitory concentration (MIC) is determined for each QC isolate and for ATCC strain 49619 for those antibiotics which are routinely tested in each laboratory. MIC results for each laboratory are expected to be within one log₂ dilution of each other regardless of testing method. Discrepancies of results are documented and examined to determine causes and solutions.

In 2001, three QC panels of seven *Streptococcus pneumoniae* isolates each were shipped and tested by all three reference laboratories. Serotyping correlation for 20 isolates was 100%; one isolate was not included in the results as it was found to be non-typable. Overall correlation of the MIC results within +/- one log₂ dilution was 94.9%. MIC discrepancies between laboratories could be explained by differing ranges of antibiotic concentrations for each drug tested. Delays encountered during shipment of two of the panels have prompted labs to consider using charcoal culettes or to lyophilize the cultures for future shipments.

CONCLUSIONS

The ICS program continued to expand in 2001. In addition to collecting *Streptococcus pneumoniae* data from six Arctic countries, Greenland has joined N. Canada and the U.S. Arctic in reporting invasive bacterial disease caused by Hi, Nm, GAS and GBS. Monitoring rates of disease and levels of antimicrobial resistance in these pathogens via use of the ICS system is important, and efforts to expand ICS to include all circumpolar nations will continue.

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SOURCE

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REFERENCES

International Circumpolar Surveillance (ICS) Participants, 2001

FINLAND

Reference Laboratory	National Public Health Institute (KTL) Laboratory, Oulu
Laboratories	Et.-Pohjanmaan sh-piiri, Seinäjoen sairaalan mikrobiol. lab. Etelä-Karjalan keskussairaalan kl.mikrobiologian laboratorio HY – Serobakteriologian laitos Jorvin sairaala, kliinisen mikrobiologian laboratorio KYS – Mikrobiologian laboratorio Kainuun keskussairaalan mikrobiologian laboratorio Kanta-Hämeen keskussairaalan mikrobiologian laboratorio Keski-Pohjanmaan keskussairaalan mikrobiologian laboratorio Keski-Suomen keskussairaalan mikrobiologian laboratorio Kymenlaakson keskussairaalan mikrobiologian laboratorio Lapin keskussairaalan mikrobiologian laboratorio Länsi-Pohjan keskussairaalan laboratorio Mikkelin keskussairaalan mikrobiologian laboratorio OYKS – Mikrobiologian laboratorio Oulun kiakonissalairoksen laboratorio Pohjois-Karjalan keskussairaalan mikrobiologian laboratorio Päijät-Hämeen keskussairaalan mikrobiologian laboratorio Rauman aluesairaalan laboratorio Satakunnan keskussairaalan mikrobiologian laboratorio Savonlinnan keskussairaalan laboratorio TAYS – Mikrobiologian laboratorio TYKS – Mikrobiologian laboratorio Vaasan keskussairaalan mikrobiologian laboratorio

GREENLAND

Reference Laboratory	Statens Serum Institute, Copenhagen, Denmark Centralab at Queen Ingrid's Hospital, Nuuk, Greenland
Laboratories	Nanortalik Hospital Qaqortoq Hospital Narsaq Hospital Paamiut Hospital Maniitsoq Hospital Sisimut Hospital Aasiaat Hospital Qasigiannuguit Hospital Ilulissat Hospital Qeqertarsuaq Hospital Uummannaq Hospital Upernavik Hospital Qaanaaq Hospital Ammassalik Hospital Ittoqqortoormiit Hospital

ICELAND

Reference Laboratory	Department of Microbiology, Landspítali University Hospital, Reykjavik
Laboratories	Akranes Hospital Isafjordur District Hospital Stykkisholmur Local Health Center St. Joseph's Hospital Hafnarfjorour Municipal Hospital of Vestmannaeyjar Akureyri Egilstadir Health Center Selfoss Health Center Sudurnes Health Center (Keflavik) Regional Hospital Neskaupstadur

NORTHERN CANADA

Laboratory Centre for Disease Control	Respiratory Division, Bureau of Infectious Diseases, Laboratory Centre for Disease Control, Ottawa
Reference Laboratories	National Centre for Streptococcus, Provincial Laboratory of Public Health, Edmonton, AB Laboratoire de Santé Publique du Québec, Montréal, QC National Centre for Meningococcus, Provincial Laboratory of Public Health, Winnipeg, MB
Laboratories	Whitehorse General Hospital, Whitehorse, YK Stanton Regional Health Board, Yellowknife, NT H.H. Williams Memorial Hospital, Hay River, NT Inuvik Regional Hospital, Inuvik, NT Baffin Regional Hospital, Iqaluit, NU Churchill Regional Health Authority, Churchill, MB Cadam Provincial Laboratory, Winnipeg, MB Ungava Tulattavik Health Centre, Kuujjuaq, QC Inulitsavik Hospital, Puvirnituq, QC Cree Health Board, Chisasibi, QC CSSSR, Chibougamou, QC Val d'Or Hospital, Val d'Or, QC Melville Hospital, Goose Bay, NL Newfoundland Public Health Laboratory, St. John's, NL
Public Health	Yukon Communicable Disease Control, Whitehorse, YK Health Protection Unit, Government of NWT, Yellowknife, NT JA Hildes Northern Medical Unit, Winnipeg, MB Régie Régionale de la Santé et des Services Sociaux, Kuujjuaq, QC Région Cri de la Baie James, Module de Santé Publique, Montreal, QC Communicable Disease Control, Health Laborador Corporation, Goose Bay, NL IMPAct Coordinator, Vaccine Evaluation Centre, Vancouver, BC

NORWAY

Reference Laboratory	Oslo/Tromso
Laboratories	Frederikstad, Østf. SSH Sarpsborg SH Akershus SSH, SiA Bærum SH Aker SH Fürsts laborat, Oslo Dr. Willes med.lab. Radiumhospitalet Folkehelsa, vir.lab. Folkehelsa, bakt.lab. Forsv.mik.lab.Folk.h. Rikshospitalet, mik.lab. Ullevål SH, mik.lab. Lab. klin. mikrob. Oslo Lillehammer mik.lab Elverum mik.lab. Buskerud SSH, mik.lab. Vestfold SSH, mik.lab. Telelab Vest-Agder SSH, mik.lab. Rogaland SSH, mik.lab. Haukeland SH, mik.lab. Sogn-Fk. SSH, mik.lab. Ålesund FSH, mik.lab. Molde FSH, mik.lab. Trondheim RSH, mik.lab. Innherred SH, mik.lab. Namdal SH, mik.lab. Nordland SSH, mik.lab. Tromsø RSH, mik.lab. Kirkenes SH, mik.lab. Laboratorium INA/div. Haugesund, mik.lab.

U.S. ARCTIC

Reference Laboratory	Arctic Investigations Program, National Center for Infectious Diseases, Centers for Disease Control and Prevention, Anchorage, AK
Laboratories	<p>Alaska Native Medical Center, Anchorage, AK Alaska Regional Hospital, Anchorage, AK Bartlett Regional Hospital, Juneau, AK Bassett Army Hospital, Fort Wainwright, AK Central Peninsula General Hospital, Soldotna, AK Cordova Community Medical Center, Cordova, AK Elmendorf Air Force Base Hospital, Anchorage, AK Fairbanks Memorial Hospital, Fairbanks, AK Kakanak Hospital, Dillingham, AK Ketchikan Regional Hospital, Ketchikan, AK Manilaq Medical Center, Kotzebue, AK Norton Sound Regional Hospital, Nome, AK Petersburg Medical Center, Petersburg, AK Providence Alaska Medical Center, Anchorage, AK Providence Island Medical Center, Kodiak, AK Samuel Simmonds Memorial Hospital, Barrow, AK Sitka Community Hospital, Sitka, AK South Peninsula Hospital, Homer, AK Southeast Area Regional Health Corporation, Sitka, AK State Public Health Laboratory, Division of Public Health, Department of Health and Social Services, Anchorage, AK Valdez Community Hospital, Valdez, AK Valley Hospital, Palmer, AK Wrangell General Hospital, Wrangell, AK Yukon-Kuskokwim Delta Regional Hospital, Bethel, AK</p>