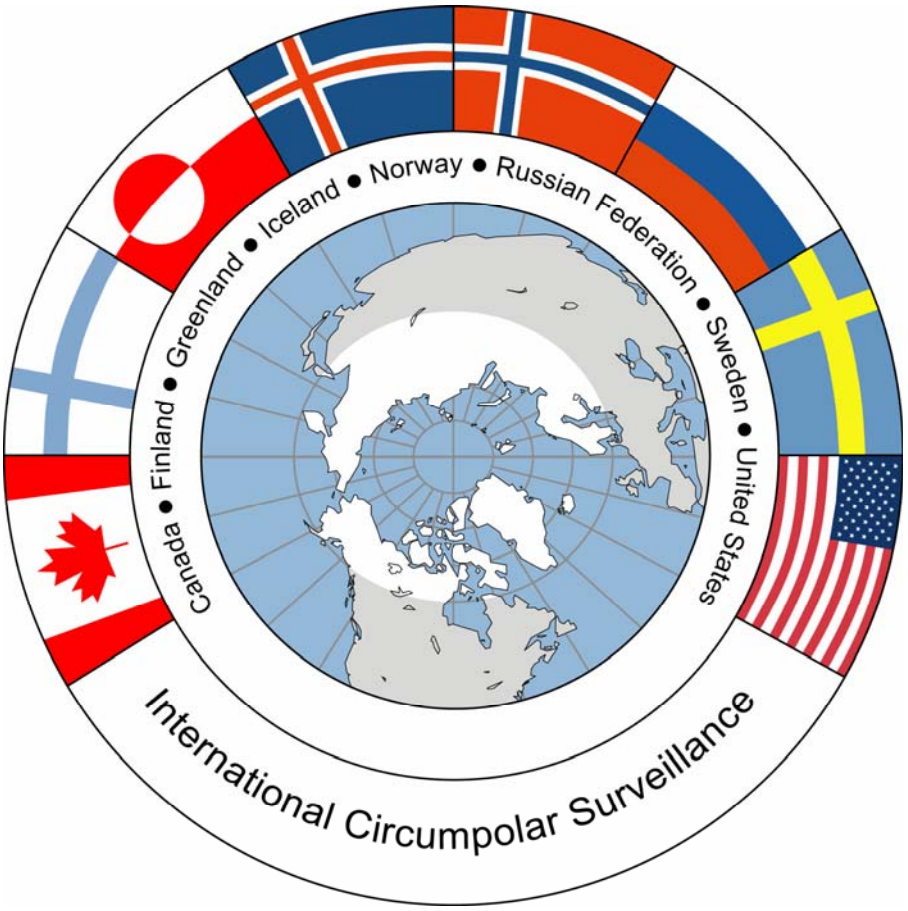
INTERNATIONAL CIRCUMPOLAR SURVEILLANCE (ICS) SUMMARY REPORT



YEAR 2002 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* (Sp), *Haemophilus influenzae* (Hi), *Neisseria meningitidis* (Nm), and groups A and B streptococcus (GAS, GBS). This report reviews the data collected for the year 2002.

Data on invasive disease with the organism *Streptococcus pneumoniae* are collected from all participating countries; data on invasive disease due to the remaining organisms are currently collected by the U.S. Arctic, Northern Canada, and, beginning with this reporting year, Greenland. A total of 1,698 cases of invasive pneumococcal disease were identified in 2002. Overall, rates of invasive *S. pneumoniae* were highest 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. Pneumococcal 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 due to *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 19 *H. influenzae* cases, 9 *N. meningitidis* cases, 47 group A streptococcus cases, and 25 group B streptococcus cases were reported in 2002. In general, the highest rates of disease as a result of all organisms 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 2002 Data

Country	*S. pneumoniae* n (rate*)	*H. influenzae* n (rate*)	*N. meningitidis* n (rate*)	group A strep n (rate*)	group B strep n (rate*)
Finland	599 (12)	N/A	N/A	N/A	N/A
Greenland	16 (28)	0 (0)	2 (4)	0 (0)	0 (0)
Iceland	45 (16)	N/A	N/A	N/A	N/A
N. Canada	35 (27)	8 (6)	1 (1)	5 (4)	2 (2)
Norway	914 (20)	N/A	N/A	N/A	N/A
U.S. Arctic	89 (14)	11 (2)	6 (1)	42 (7)	23 (4)
Total	1698 (16)	19 (2)	9 (1)	47 (6)	25 (3)

*Cases per 100,000

INTRODUCTION

In January, 1999, the United States and Canada began international cooperative 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 demonstrate resistance to commonly used antibiotics, they 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 2002 data has been submitted by Finland, Greenland, Iceland, Northern Canada, Norway, and the U.S. Arctic (Alaska). This report contains year 2002 data on all five surveillance organisms from Greenland, Northern Canada, and the U.S. Arctic, and *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 Arctic nations 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 55 years of age and older. 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.

ICS objectives include:

- Identify 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.

- Determine the comparability of laboratory and data collection methods, and negotiate standard protocols and quality control programs.

- Share and report data in agreed upon formats.

- Form 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.

- Form 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

ICS is coordinated by personnel at the Arctic Investigations Program, Centers for Disease Control and Prevention, in Anchorage, Alaska.

A case of invasive *Streptococcus pneumoniae*, *Haemophilus influenzae*, *Neisseria meningitidis*, or groups A and B streptococcus is defined 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 the surveillance area.

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

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 $\log_2$ dilution of each other regardless of testing method. Discrepancies of results are documented and examined to determine causes and solutions.

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 2002 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 2002 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 Landspitali 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 2002 were obtained form 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 Laborador.
  - 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 2002 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 2002 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.

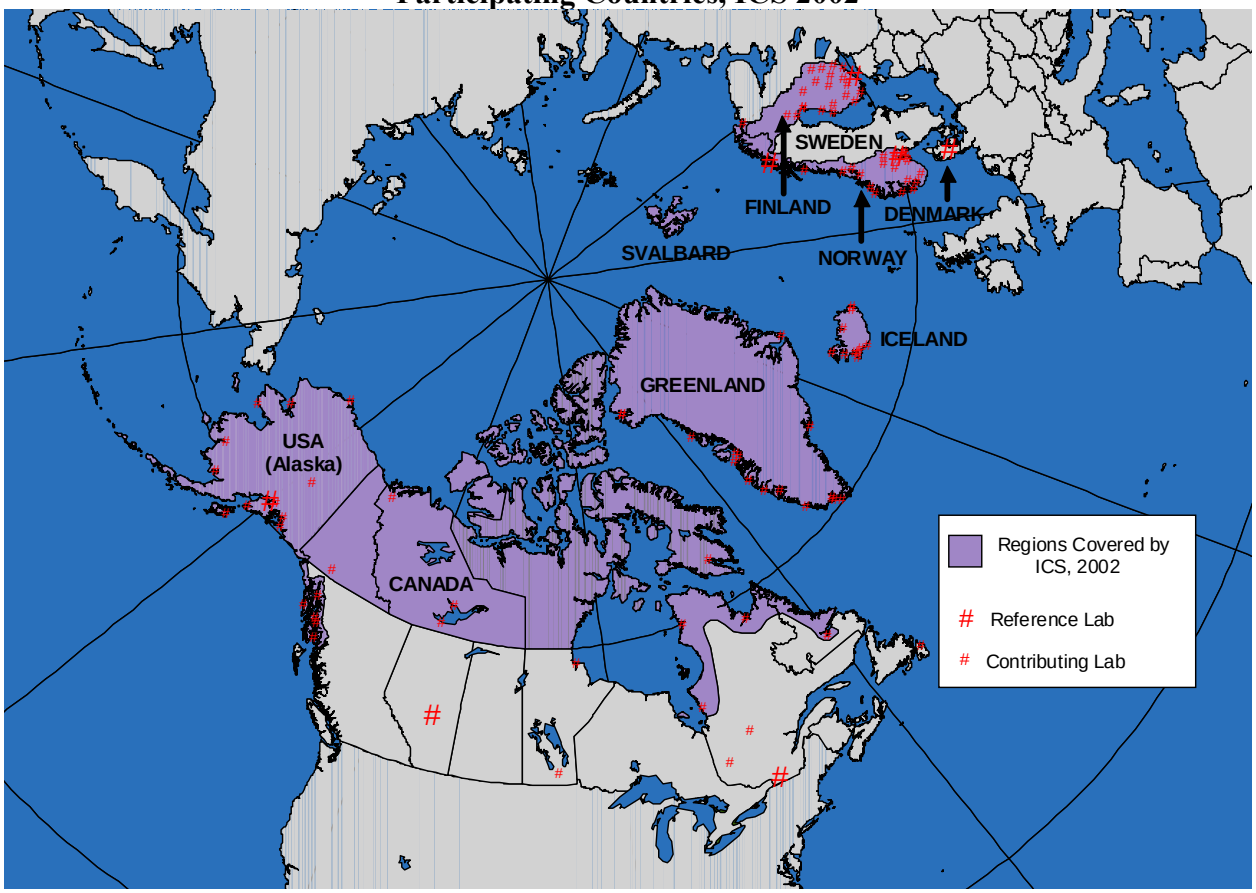
- 23 laboratories providing diagnostic services to residents of Alaska submitted to AIP isolates of Sp, Hi, Nm, GAS, and GBS cultured in blood, cerebrospinal fluid, or from other sterile sites.
  - Sp and Hi isolates are sertoyped by the Quellung method using Statens Serum Institute antisera.
  - Serogroup 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 siaDgene responsible for synthesis of the serogroup-specific polysialytransferase.

- 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 2002 were obtained from the website http://www.labor.state.ak.us

Participating Countries, ICS 2002



RESULTS

Streptococcus pneumoniae

Case Demographics

A total of 1,698 cases of invasive disease caused by *Streptococcus pneumoniae* were reported to ICS during 2002 by Finland, Greenland, Iceland, N. Canada, Norway, and the U.S. Arctic. The highest rates of disease (28 per 100,000) occurred in Greenland and the lowest in Finland (12 per 100,000) with an overall rate for the ICS circumpolar region of 16 per 100,000; 54% of all cases occurred in males. The median age of cases overall was 57 years with the lowest median age in N. Canada (27 years) and the highest in Norway (63 years). Case fatality ratios ranged from 7% in Norway to 19% in Greenland; the overall case fatality ratio was 8%.

***Streptococcus pneumoniae* Case Demographics, ICS 2002 Data**

Country	Population	# Cases	Rate*	Sex M (%)	Median Age (range) yrs	Deaths n (CFR†)
Finland	5,208,839	599	12	336 (56)	53 (0 – 95)	Unknown‡
Greenland	56,542	16	28	8 (50)	44 (0.5 – 61)	3 (19)
Iceland	287,559	45	16	31 (69)	47 (0.4 – 96)	7 (16)
N. Canada	127,721	35	27	19 (54)	27 (0.5 – 79)	3 (10)[a]
Norway	4,551,996	914	20	466 (51)	63 (0.1 – 97)	67 (7)[a]
U.S. Arctic	643,786	89	14	59 (66)	45 (0.2 – 94)	11 (12)
Total	10,876,443	1,698	16	919 (54)	57 (0 – 97)	91 (8)

*Number of cases per 100,000 per year
†Case fatality ratio
‡Case outcomes not reported from Finland
[a]Case outcomes unknown in cases from N. Canada (5), Norway (1)

***Streptococcus pneumoniae* by Age Category, ICS 2002 Data**

Age		Finland	Greenland	Iceland	N. Canada	Norway	U.S. Arctic
<2 yrs	Population	115,025	1,696	8,327	4,736	119,276	20,625
	Cases (%)	51 (8)	3 (19)	8 (18)	6 (17)	53 (6)	14 (16)
	Rate*	44	177	96	127	44	68
2-19 yrs	Population	1,149,165	17,310	78,389	43,822	1,062,478	194,454
	Cases (%)	57 (10)	2 (12)	4 (9)	10 (29)	44 (5)	13 (15)
	Rate*	5	12	5	23	4	7
20-64 yrs	Population	3,155,166	34,561	167,367	73,764	2,690,249	390,104
	Cases (%)	307 (51)	11 (69)	16 (35)	15 (43)	386 (42)	47 (53)
	Rate*	10	32	10	20	14	12
65+ yrs	Population	789,483	2,975	33,476	5,399	679,993	38,603
	Cases (%)	184 (31)	0 (0)	17 (38)	4 (11)	431 (47)	15 (17)
	Rate*	23	0	51	74	63	39
All ages	Population	5,208,839	56,542	287,559	127,721	4,551,996	643,786
	Cases	599	16	45	35	914	89
	Rate*	12	28	16	27	20	14

*Number of cases per 100,000 per year

When stratified by age, the highest rates of disease in each age category were in Greenland and N. Canada; 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 lowest rates were in Finland. 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

Streptococcus pneumoniae was diagnosed in each country throughout the year in 2002. With the exception of Greenland, the highest proportion of *S. pneumoniae* cases were diagnosed during the fourth quarter (October, November, December) of the calendar year. The Greenland data showed no distinct seasonality although the number of cases reported was small.

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. The highest rates of disease occurred in Aboriginal and Native populations less than 2 years of age in both countries.

***Streptococcus pneumoniae* by Race and Age Categories, ICS 2002 Data**

Age (yrs)		N. Canada*		U.S. Arctic†	
		Aboriginal	Non-Aboriginal	Native	Non-Native
<2	Population	3,593	1,143	5,356	15,269
	Cases (rate‡)	5 (139)	1 (87)	7 (131)	5 (33)
2-19	Population	31,801	12,021	49,057	145,397
	Cases (rate‡)	10 (31)	0 (0)	5 (10)	7 (5)
20-64	Population	37,331	36,433	63,373	326,731
	Cases (rate‡)	7 (19)	4 (11)	28 (44)	17 (5)
65+	Population	3,032	2,367	7,017	31,586
	Cases (rate‡)	3 (99)	1 (42)	3 (43)	10 (32)
All Ages	Population	75,757	51,964	124,803	518,983
	Cases (rate‡)	25 (33)	6 (12)	43 (34)	39 (8)

*Race unknown in 4 cases 20-64 years
†Race unknown in 2 cases <2 years, 1 case 2-19 years, 2 cases 20-64 years, 2 cases 65+ 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. Clinical diagnoses other than bacteremia and meningitis are not reported in the Finland and Iceland *S. pneumoniae* data. In Greenland, the clinical presentation reported most often was septicemia (44%); and in N. Canada, Norway, and the U.S. Arctic, it was pneumonia (71%, 43% and 62% respectively).

Clinical Presentation of Reported *Streptococcus pneumoniae* Cases, ICS 2002 Data

	Finland n (%)	Greenland n (%)	Iceland n (%)	N Canada n (%)	Norway n (%)	US Arctic n (%)
Pneumonia*	0 (0)	4 (25)	0 (0)	25 (71)	390 (43)	55 (62)
Septicemia	0 (0)	7 (44)	0 (0)	3 (9)	292 (32)	18 (20)
Bacteremia	580 (97)	0 (0)	44 (98)	2 (6)	113 (12)	3 (3)
Meningitis	19 (3)	4 (25)	1 (2)	2 (6)	68 (7)	5 (6)
Empyema	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	6 (7)
Cellulitis*	0 (0)	0 (0)	0 (0)	1 (3)	0 (0)	0 (0)
Septic arthritis	0 (0)	0 (0)	0 (0)	0 (0)	4 (<1)	0 (0)
Endocarditis	0 (0)	1 (6)	0 (0)	0 (0)	0 (0)	0 (0)
Peritonitis	0 (0)	0 (0)	0 (0)	2 (6)	0 (0)	0 (0)
Epiglottitis	0 (0)	0 (0)	0 (0)	0 (0)	1 (<1)	0 (0)
Amnionitis	0 (0)	0 (0)	0 (0)	0 (0)	1 (<1)	0 (0)
Other	0 (0)	0 (0)	0 (0)	0 (0)	43 (5)	2 (2)
Unknown	0 (0)	0 (0)	0 (0)	0 (0)	2 (<1)	0 (0)
Total Cases	599	16	45	35	914	89

*with bacteremia

Risk Factors

The most frequently reported medical conditions or risk factors associated with *Streptococcus pneumoniae* in adults 18 years and older were cigarette smoking and alcohol abuse. Cigarette smoking was reported in 47% of adult cases in N. Canada and 34% of adult cases in the U.S. Arctic. Alcohol abuse was reported in 47% of adult cases in N. Canada and 46% of adult cases in the U.S. Arctic; Greenland did not report risk factors in any cases.

***Streptococcus pneumoniae* Risk Factor/Medical Conditions in Adults*, ICS 2002 Data**

	N. Canada n (%)	U.S. Arctic n (%)
Cigarette Smoking	9 (47)	30 (48)
Chronic Lung Disease and/or Asthma	3 (16)	19 (30)
Alcohol Abuse	9 (47)	29 (46)
Immunosuppressive Therapy	2 (11)	3 (5)
Diabetes	4 (21)	6 (10)
Asplenia	1 (5)	6 (10)
Total Adult* Cases	19	63

*≥ 18 years

Vaccination Status

In Finland, Iceland, N. Canada, Norway, and the U.S. Arctic, 23-valent pneumococcal polysaccharide vaccine (PS23) is recommended for persons 55 years and older (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 (Finland, Iceland, Norway, U.S. Arctic) or greater than five years of age (N. Canada) 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. Seventeen and

seventy-nine percent of *Streptococcus pneumoniae* cases in children less than 2 years of age with known vaccination status were vaccinated with PCV7 in N. Canada and the U.S. Arctic, respectively. Only 3% of *Streptococcus pneumoniae* cases with known vaccination status in Norway were vaccinated with PCV7 indicating less frequent use of this vaccine. A similar pattern in Norway of vaccine use in adults eligible for PS23 vaccine is apparent. In N. Canada and the U.S. Arctic, higher percentages of adults eligible for PS23 vaccine are vaccinated.

***Streptococcus pneumoniae* Case Vaccination Status for Pneumococcal Vaccine, ICS 2002 Data**

	N. Canada	Norway	U.S. Arctic
Total cases eligible for PCV7 vaccine*	6	53	14
Vaccine status known in cases eligible for PCV7	6	37	14
Cases eligible for PCV7 vaccinated (%)†	1 (17)	1 (3)	11 (79)
Total cases eligible for PS23 vaccine‡	4	431	28
Vaccine status known in cases eligible for PS23	4	176	12
Cases eligible for PS23 vaccinated (%)†	3 (75)	8 (5)	7 (58)

*Children less than 2 years of age
†Percent of vaccine status known cases
‡Adults 55 years and older in the U.S. Arctic, 65 years and older in N. Canada and Norway

Serotypes

The most prevalent *Streptococcus pneumoniae* serotypes reported by ICS countries in 2002 were 4, 6B, 9V and 14, all of which are included in both the 7-valent conjugate vaccine and the 23-valent pneumococcal polysaccharide vaccine. Serotypes were not reported by Norway. In the following table, yellow highlights the top three most common serotypes in each country. In N. Canada serotypes 14 and 23F were equally ranked third.

***Streptococcus pneumoniae* Serotypes by Country, ICS 2002 Data**

Serotype	Finland n (%)	Greenland n (%)	Iceland n (%)	N. Canada n (%)	U.S. Arctic n (%)
1	5 (1)	2 (13)	1 (2)	9 (29)	0 (0)
3	46 (8)	2 (13)	4 (9)	0 (0)	4 (5)
4	83 (14)	1 (7)	0 (0)	0 (0)	12 (16)
5/10F	0 (0)	0 (0)	0 (0)	0 (0)	1 (1)
6A	24 (4)	1 (7)	0 (0)	0 (0)	3 (4)
6B	35 (6)	1 (7)	4 (9)	3 (10)	3 (4)
7	0 (0)	0 (0)	14 (32)	0 (0)	0 (0)
7F	32 (5)	0 (0)	0 (0)	0 (0)	6 (8)
8	8 (1)	1 (7)	0 (0)	6 (19)	5 (7)
9	0 (0)	0 (0)	3 (7)	0 (0)	0 (0)
9N	20 (3)	0 (0)	0 (0)	0 (0)	7 (9)
9V	45 (7)	1 (7)	0 (0)	1 (3)	0 (0)
10	5 (1)	0 (0)	0 (0)	0 (0)	0 (0)
10A	0 (0)	0 (0)	0 (0)	0 (0)	2 (3)
11	0 (0)	0 (0)	3 (7)	0 (0)	0 (0)
11A	12 (2)	0 (0)	0 (0)	0 (0)	0 (0)
12F	25 (4)	2 (13)	0 (0)	0 (0)	3 (4)

Serotype	Finland n (%)	Greenland n (%)	Iceland n (%)	N. Canada n (%)	U.S. Arctic n (%)
13	2 (<1)	0 (0)	0 (0)	0 (0)	0 (0)
14	81 (13)	1 (7)	5 (11)	4 (13)	5 (7)
15	0 (0)	0 (0)	1 (2)	0 (0)	0 (0)
15A	3 (<1)	0 (0)	0 (0)	0 (0)	0 (0)
15B	4 (1)	0 (0)	0 (0)	0 (0)	1 (1)
15C	2 (<1)	1 (7)	0 (0)	0 (0)	2 (3)
16	4 (1)	0 (0)	0 (0)	0 (0)	0 (0)
16F	0 (0)	0 (0)	0 (0)	0 (0)	4 (5)
17	2 (<1)	0 (0)	0 (0)	0 (0)	0 (0)
18	0 (0)	0 (0)	1 (2)	0 (0)	0 (0)
18B	1 (<1)	0 (0)	0 (0)	0 (0)	0 (0)
18C	29 (5)	0 (0)	0 (0)	0 (0)	0 (0)
19	0 (0)	0 (0)	2 (5)	0 (0)	0 (0)
19A	24 (4)	0 (0)	0 (0)	2 (6)	3 (4)
19F	23 (4)	0 (0)	0 (0)	1 (3)	2 (3)
20	6 (1)	0 (0)	0 (0)	0 (0)	0 (0)
22	0 (0)	0 (0)	1 (2)	0 (0)	0 (0)
22A	0 (0)	0 (0)	0 (0)	0 (0)	3 (4)
22F	21 (3)	1 (7)	0 (0)	0 (0)	4 (5)
23	0 (0)	0 (0)	5 (11)	0 (0)	0 (0)
23A	2 (<1)	0 (0)	0 (0)	0 (0)	0 (0)
23F	35 (6)	0 (0)	0 (0)	4 (13)	1 (1)
31	2 (<1)	0 (0)	0 (0)	0 (0)	0 (0)
33	7 (1)	0 (0)	0 (0)	0 (0)	0 (0)
33F	0 (0)	1 (7)	0 (0)	0 (0)	2 (3)
34	0 (0)	0 (0)	0 (0)	1 (3)	0 (0)
35B	1 (<1)	0 (0)	0 (0)	0 (0)	0 (0)
35F	9 (1)	0 (0)	0 (0)	0 (0)	0 (0)
38	3 (<1)	0 (0)	0 (0)	0 (0)	3 (4)
39	2 (<1)	0 (0)	0 (0)	0 (0)	0 (0)

Vaccine-Preventable Cases and Deaths

For the countries reporting serotype data, more than 87% 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 8-67% of *Strep pneumoniae* cases in children < 2 years of age in 2002. The proportion of deaths potentially preventable with use of the 23-valent polysaccharide vaccine related to *Streptococcus pneumoniae* ranged from 33% to 73%.

Proportion of Vaccine Preventable Cases/Deaths from Invasive Pneumococcal Disease, ICS 2002 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	500/568 (88)	11/12 (92)	11/12 (92)	24/25 (96)	55/63 (87)
Cases < 2 years old with serotype in the 7-valent pneumococcal conjugate vaccine	22/35 (63)	1/3 (33)	3/5 (60)	4/6 (67)	1/13 (8)
Deaths (all ages) for which the serotype was contained in the 23-valent pneumococcal vaccine	†	2 (67‡)	0	1 (33‡)	8 (73‡)

*Number of isolates serotyped by country by age group
†No outcome data reported by Finland
‡Percentage of total deaths

Outcome

A total of 91 deaths associated with *Streptococcus pneumoniae* were reported to ICS in 2002. Overall, the highest case fatality ratio (CFR) occurred in persons 65+ years of age (13%). Finland did not report outcome data.

***Streptococcus pneumoniae* Age-Specific Case-Fatality Ratios (CFR), ICS 2002 Data**

		<2 years	2-19 years	20-64 years	65+ years	All Ages
Greenland	# Cases	3	2	11	0	16
	Deaths (CFR)	0 (0)	0 (0)	3 (27)	0 (0)	3 (19)
Iceland	# Cases	8	4	16	17	45
	Deaths (CFR)	0 (0)	0 (0)	3 (19)	4 (23)	7 (16)
N. Canada	# Cases	6*	10	15*	4	35*
	Deaths (CFR)	0 (0)	0 (0)	2 (18)	1 (25)	3 (10)
Norway	# Cases	53	44	386*	431	914*
	Deaths (CFR)	2 (4)	1 (2)	14 (4)	50 (12)	67 (7)
U.S. Arctic	# Cases	14	13	47	15	89
	Deaths (CFR)	0 (0)	1 (8)	6 (13)	4 (27)	11 (12)
Total	# Cases	84*	73	475*	467	1099*
	Deaths (CFR)	2 (2)	2 (3)	28 (6)	59 (13)	91 (8)

*Outcome unknown in (1) N. Canada case < 2 years, (4) N. Canada and (1) Norway cases 20-64 years

Antimicrobial Susceptibility

***Streptococcus pneumoniae* Penicillin Susceptibility Results, ICS 2002 Data**

	# Tested	S*	I*	I* Serotypes	R*	R* Serotypes
Finland	599	568	27	†	4	†
Greenland	9	9	0		0	
Iceland	44	42	1	9	1	6B
N. Canada	31	30	1	9V	0	
U.S. Arctic	76	67	7	6A (2), 6B (2), 14 (1), 19A (2)	2	14 (1), 19F (1)

*S=Sensitive, I=Intermediate resistance, R=Fully resistant
†Finnish serotype data is not linked to antimicrobial susceptibility data

In 2002, 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, 2% were fully resistant to penicillin, 9% had intermediate resistance. The fully resistant isolates were serotypes 14 (50%) and 19F (50%). The isolates that showed intermediate resistance were serotypes 6A (29%), 6B (29%), 14 (14%), and 19A (29%). Finland submitted results from 599 isolates; 1% were fully resistant to penicillin and 5% had intermediate resistance. The Finnish serotype data is not linked to the antimicrobial susceptibility data, so no comparisons can be made. In Iceland, 2% of isolates tested had intermediate and full resistance to penicillin and consisted of one each serotype 9 and 6B, respectively.

Full resistance to trimethoprimsulfamethoxizole (TMP-Sulfa) was found in 17% of tested isolates from the U.S. Arctic, 6% from N. Canada, and 9% from Iceland. The isolates that were fully resistant in the U.S. Arctic were serotypes 6A (23%), 19A (23%), 6B (15%), 33F (15%), 14 (8%), 19F (8%), and 23F (8%). In N. Canada, both fully resistant isolates were serotype 23F. Isolates from Iceland that were fully resistant to TMP-Sulfa were serotypes 9 (50%), 6B (25%), and 23 (25%). Intermediate resistance to TMP-Sulfa was found in 3% of tested isolates from the U.S. Arctic (one each serotype 14 and 19F) and 5% from Iceland (one each serotype 6B and 9).

***Streptococcus pneumoniae* TMP-Sulfa Susceptibility Results, ICS 2002 Data**

	# Tested	S*	I*	I* Serotypes	R*	R* Serotypes
Iceland	43	37	2	6B (1), 9 (1)	4	6B (1), 9 (1), 23 (2)
N. Canada	31	28	1	6B	2	23F (2)
U.S. Arctic	76	61	2	14 (1), 19F (1)	13	6A (3), 6B (2), 14 (1), 19A (3), 19F (1), 23F (1), 33F (2)

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

In the U.S. Arctic, 9% of tested isolates were fully resistant to erythromycin and 4% from Iceland. The serotypes found in the fully resistant isolates from the U.S. Arctic were 6B (29%), 14 (29%), 6A (14%), 9N (14%), and 19F (14%). In Iceland, the isolates that were fully resistant to erythromycin were serotypes 14 (50%) and 6B (50%).

***Streptococcus pneumoniae* Erythromycin Susceptibility Results, ICS 2002 Data**

	# Tested	S*	I*	I* Serotypes	R*	R* Serotypes
Iceland	45	42	0		2	6B (1), 14 (1)
N. Canada	31	31	0		0	
U.S. Arctic	76	69	0		7	6A (1), 6B (2), 9N (1), 14 (2), 19F (1)

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

Antimicrobial testing was also done for ceftriaxone, ofloxacin/levoflox, chloramphenicol, vancomycin, clindamycin, and rifampin. In the U.S. Arctic three isolates out of 76 tested (4%) showed intermediate resistance to chloramphenicol; all isolates tested in Greenland and Iceland were sensitive to chloramphenicol. All isolates tested in N. Canada and the U.S. Arctic were sensitive to ceftriaxone, ofloxacin/levoflox, vancomycin, clindamycin, and rifampin.

Quality Control

In 2002, three QC panels of seven *Streptococcus pneumoniae* isolates each were shipped and tested by all three reference laboratories. Serotyping correlation for all 21 isolates was 100. Overall correlation of the MIC results within +/- one $\log_2$ dilution was 98.1%. MIC discrepancies between laboratories could be explained by differing ranges of antibiotic concentrations for each drug tested or incubation methods.

Haemophilus influenzae

Case Demographics

Greenland, N. Canada, and the U.S. Arctic reported the occurrence of *Haemophilus influenzae* in each country during 2002. Greenland reported no cases and therefore will not be included in the results. A total of 19 cases of invasive disease caused by *Haemophilus influenzae* were reported to ICS during 2002 by N. Canada and the U.S. Arctic. The rate of disease was higher in N. Canada (6 per 100,000) than it was in the U.S. Arctic (2 per 100,000). Median age of cases was higher in the U.S. Arctic (39 years) than in N. Canada (1 year).

***Haemophilus influenzae* Case Demographics, ICS 2002 Data**

Country	Population	# Cases	Rate*	Sex M (%)	Median Age (range) yrs	Deaths n (CFR†)
N. Canada	127,721	8	6	4 (57)‡	1 (<1-14)	0 (0)[a]
U.S. Arctic	643,786	11	2	5 (45)	39 (<1-74)	1 (9)
Total	771,507	19	2.5	9 (50)	2 (<1-74)	1 (6)

*Number of cases per 100,000 per year
†Case fatality ratio
‡Sex unknown in (1) case from N. Canada
[a]Case outcomes unknown in cases from N. Canada (2)

When stratified by age, the highest rates of disease for both N. Canada and the U.S. Arctic were in the <2 years age category where no cases were reported.

***Haemophilus influenzae* by Age Category, ICS 2002 Data**

Age		N. Canada	U.S. Arctic
<2 yrs	Population	4,736	20,625
	Cases (%)	6 (75)	3 (27)
	Rate*	126	15
2-19 yrs	Population	43,822	194,454
	Cases (%)	2 (25)	1 (9)
	Rate*	5	0.5
20-64 yrs	Population	73,764	390,104
	Cases (%)	0 (0)	4 (36)
	Rate*	0	1
65+ yrs	Population	5,399	38,603
	Cases (%)	0 (0)	3 (27)
	Rate*	0	8
All ages	Population	127,721	643,786
	Cases	8	11
	Rate*	6	2

*Number of cases per 100,000 per year

Race

Race and ethnicity data was reported in 7 of 8 *Haemophilus influenzae* cases from N. Canada. Rates of disease were highest (139 per 100,000) in Aboriginal cases less than two years of age. In the U.S. Arctic, overall rates of disease were five times higher in Native populations (5 per

100,000) than in non-Native populations (1 per 100,000); the highest rates of disease (56 per 100,000) occurred in Native children <2 years of age.

***Haemophilus influenzae* by Race and Age Categories, ICS 2002 Data**

Age (yrs)		N Canada*		US Arctic	
		Aboriginal	Non-Aboriginal	Native	Non-Native
<2	Population	3,593	1,143	5,356	15,269
	Cases (rate†)	5 (139)	0 (0)	3 (56)	0 (0)
2-19	Population	31,801	12,021	49,057	145,397
	Cases (rate†)	1 (3)	1 (8)	0 (0)	1 (0.7)
20-64	Population	37,331	36,433	63,373	326,731
	Cases (rate†)	0 (0)	0 (0)	3 (5)	1 (0.3)
65+	Population	3,032	2,367	7,017	31,586
	Cases (rate†)	0 (0)	0 (0)	0 (0)	3 (9)
All Ages	Population	75,757	51,964	124,803	518,983
	Cases (rate†)	6 (8)	1 (2)	6 (5)	5 (1)

*Race unknown in 1 case <2 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 (50% of reported cases). The most common clinical presentation in the U.S. Arctic was pneumonia (36% of reported cases), followed by septicemia (27%).

Clinical Presentation of Reported *Haemophilus influenzae* Cases, ICS 2002 Data

	N. Canada n (%)	U.S. Arctic n (%)
Pneumonia*	1 (12.5)	4 (36)
Septicemia	1 (12.5)	3 (27)
Bacteremia	1 (12.5)	0 (0)
Meningitis	4 (50)	2 (18)
Peritonitis	0 (0)	1 (9)
Pericarditis	0 (0)	1 (9)
Septic arthritis	1 (12.5)	0 (0)
Total	8	11

*with bacteremia

Risk Factors

Fifty-seven percent of adult (≥ 18 years) cases of *Haemophilus influenzae* reported in the U.S. Arctic indicated chronic lung disease as an associated risk factor, cigarette smoking was indicated in 43% of cases, diabetes in 18%, and immunosuppressive treatment and alcohol abuse in 14%. All reported *Haemophilus influenzae* cases in N. Canada occurred in children less than 18 years old.

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. One case in N. Canada had not received Hib conjugate vaccine and, in the second case, vaccine status was unknown. The one Hib case in the U.S. Arctic had received 2 doses of Hib vaccine.

***Haemophilus influenzae* Case Vaccination Status for Hib Vaccine, ICS 2002 Data**

	N. Canada	U.S. Arctic
Total cases eligible for Hib vaccine*	7	4
Vaccine status known in cases eligible for Hib vaccine	5	4
Cases eligible for Hib vaccine vaccinated (%)†	4 (80)	3 (75)

*Children less than 5 years of age
†Percent of vaccine status known cases

Serotypes

***Haemophilus influenzae* Serotypes by Country, ICS 2002 Data**

Serotype	N. Canada n (%)	U.S. Arctic n (%)
A	4 (57)	4 (36)
B	2 (29)	1 (9)
Non-typable	1 (14)	6 (55)
Total	7	11

*Of 8 Hi cases in N. Canada, 7 were serotyped

The most common *Haemophilus influenzae* serotype in N. Canada and the U.S. Arctic was type A, 57% and 36% of reported cases, respectively. The age range of the serotype A cases in N. Canada was 0.6-1.4 years and, in the U.S. Arctic, it was 0.5-74 years.

Outcome

One death associated with *Haemophilus influenzae* was reported to ICS in 2002 from the U.S. Arctic; there were no deaths in 6 of eight cases in N. Canada for which outcome was reported. The overall case fatality ratio for the U.S. Arctic was 9%. The death occurred in a 60 year old non-Native male and the isolate from the case was serotyped as an A.

Neisseria meningitidis

Case Demographics

Greenland, N. Canada and the U.S. Arctic each reported the occurrence of *Neisseria meningitidis* during 2002. A total of 9 cases of invasive disease caused by *Neisseria meningitidis* were reported to ICS. The rate of disease was highest in Greenland (4 per 100,000) and similar in N. Canada (1 per 100,000) and the U.S. Arctic (1 per 100,000). One death associated with *Neisseria meningitidis* was reported in the U.S. Arctic.

***Neisseria meningitidis* Case Demographics, ICS 2002 Data**

Country	Population	# Cases	Rate*	Sex M (%)	Median Age (range) yrs	Deaths n (CFR†)
Greenland	56,542	2	4	1 (50)	1.5‡	0 (0)
N. Canada	127,721	1	1	0 (0)	2	0 (0)
U.S. Arctic	643,786	6	1	1 (16)	12 (3-53)	1 (17)
Total	828,049	9	1	2 (22)	6 (1.5-53)	0 (0)

*Number of cases per 100,000 per year
†Case fatality ratio
‡Age unknown in one Greenland case

When stratified by age, the highest rates of disease occurred in cases less than two years of age in Greenland (59 per 100,000) and N. Canada (21 per 100,000), however, this represents only one case in each country. There were no cases in the U.S. Arctic in this age category. The highest rates of disease in the U.S. Arctic occurred in the 2-19 years age category (4 cases, 2 per 100,000).

Race

Race and ethnicity data were collected in N. Canada and the U.S. Arctic. The single case reported in N. Canada occurred in an aboriginal child less than two years of age. In the U.S. Arctic, overall rates of disease were higher in the Native population (2 per 100,000) than non-Native (1 per 100,000).

Clinical Presentation

All *Neisseria meningitidis* cases in Greenland and N. Canada and 5 of 6 cases in the U.S. Arctic presented clinically as meningitis; the remaining U.S. Arctic case presented with septicemia.

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, smoking, chronic lung disease and alcohol abuse were each reported in association with one adult (≥ 18 years) case.

Group A streptococcus

Case Demographics

Greenland, N. Canada, and the U.S. Arctic each reported the occurrence of group A streptococcus during 2002. Greenland reported no cases and therefore will not be included in the results. A total of 47 cases of invasive disease caused by group A streptococcus were reported to ICS. The rate of disease was highest in the U.S. Arctic (7 per 100,000) compared to N. Canada (4 per 100,000). Five deaths were associated with group A streptococcus, all in the U.S. Arctic.

Group A streptococcus Case Demographics, ICS 2002 Data

Country	Population	# Cases	Rate*	Sex M (%)	Median Age (range) yrs	Deaths n (CFR†)
N. Canada	127,721	5	4	4 (80)	36 (<1-76)	0 (0)
U.S. Arctic	643,786	42	7	20 (48)	41 (<1-82)	5 (12)
Total	818,042	47	6	24 (51)	41 (<1-82)	5 (11)

*Number of cases per 100,000 per year
†Case fatality ratio

When stratified by age, the highest rates of disease occurred in 65+ years of age in N. Canada (37 per 100,000) and the U.S. Arctic (18 per 100,000). High rates of disease also occurred in cases <2 years of age in both countries.

Group A streptococcus by Age Category, ICS 2002 Data

Age		N. Canada	U.S. Arctic
<2 yrs	Population	4,736	20,625
	Cases (%)	1 (20)	2 (5)
	Rate*	21	10
2-19 yrs	Population	43,822	194,454
	Cases (%)	0 (0)	10 (24)
	Rate*	0	5
20-64 yrs	Population	73,764	390,104
	Cases (%)	2 (40)	23 (55)
	Rate*	3	6
65+ yrs	Population	5,399	38,603
	Cases (%)	2 (40)	7 (17)
	Rate*	37	18
All ages	Population	127,721	643,786
	Total Cases	5	42
	Rate*	4	7

*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.

Group A streptococcus by Race and Age Categories, ICS 2002 Data

Age (yrs)		N. Canada*		U.S. Arctic*	
		Aboriginal	Non-Aboriginal	Native	Non-Native
<2	Population	3,593	1,142	5,356	15,269
	Cases (rate†)	1 (28)	0 (0)	2 (37)	0 (0)
2-19	Population	31,801	12,021	49,057	145,397
	Cases (rate†)	0 (0)	0 (0)	9 (18)	1 (1)
20-64	Population	37,331	36,433	63,373	326,731
	Cases (rate†)	1 (3)	0 (0)	8 (13)	15 (5)
65+	Population	3,032	2,367	7,017	31,586
	Cases (rate†)	2 (66)	0 (0)	1 (14)	5 (16)
All Ages	Population	75,757	51,964	124,803	518,983
	Cases (rate†)	4 (5)	0 (0)	20 (16)	21 (4)

*Race unknown in 1 N. Canada case 20-64 years, 1 U.S. Arctic cases 65+ years
†Number of cases per 100,000 per year

Clinical Presentation

In the U.S. Arctic, 45% of group A streptococcus cases presented clinically with cellulitis, 17% presented with septicemia. Two of the cases (40%) in N. Canada presented with septicemia and two (40%) with cellulitis.

Clinical Presentation of Reported group A streptococcus Cases, ICS 2002 Data

	N. Canada n (%)	U.S. Arctic n (%)
Pneumonia*	0 (0)	4 (9)
Bacteremia	0 (0)	3 (7)
Septicemia	2 (40)	7 (17)
Meningitis	0 (0)	1 (2)
Empyema	0 (0)	1 (2)
Cellulitis*	2 (40)	19 (45)
Necrotizing fasciitis	0 (0)	4 (9)
Peritonitis	0 (0)	1 (2)
Septic arthritis	0 (0)	1 (2)
Osteomyelitis	0 (0)	1 (2)
Other	1 (20)	0 (0)
Total	5	42

*with bacteremia

Risk Factors

N. Canada reported diabetes associated with one adult (≥ 18 years) case of group A streptococcus in 2002. In the U.S. Arctic, cigarette smoking was reported in 26% of adult cases, chronic lung disease in 16%, alcohol abuse in 23%, and diabetes was reported in 16%. Immune suppressive treatment was reported in 3 U.S. Arctic adult cases and injection drug use in one adult case.

Outcome

Five deaths in cases with group A streptococcus were reported from the U.S. Arctic (CFR 12%); one death occurred in each of the 2-19 and 20-64 year old age categories and three deaths occurred in the 65+ year old age category. No deaths were reported in N. Canada.

Group B streptococcus

Case Demographics

Greenland, N. Canada, and the U.S. Arctic each reported the occurrence of group B streptococcus during 2002. Greenland reported no cases and therefore will not be included in the results. A total of 25 cases of invasive disease caused by group B streptococcus were reported to ICS. The rate of disease was highest in the U.S. Arctic (4 per 100,000) compared to N. Canada (2 per 100,000). Five deaths were reported in the U.S. Arctic associated with group B streptococcus in 2002.

Group B streptococcus Case Demographics, ICS 2002 Data

Country	Population	# Cases	Rate*	Sex M (%)	Median Age (range) yrs	Deaths n (CFR†)
N. Canada	127,721	2	2	0 (0)	14 (<1-28)	0 (0)
U.S. Arctic	643,786	23	4	12 (52)	46 (<1-75)	5 (22)
Total	818,042	25	3	12 (48)	43 (<1-75)	5 (20)

*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 (21 per 100,000) and the U.S. Arctic (39 per 100,000).

Group B streptococcus by Age Category, ICS 2002 Data

Age		N. Canada	U.S. Arctic
<2 yrs	Population	4,736	20,625
	Cases (%)	1 (50)	8 (35)
	Rate*	21	39
2-19 yrs	Population	43,822	194,454
	Cases (%)	0 (0)	0 (0)
	Rate*	0	0
20-64 yrs	Population	73,764	390,104
	Cases (%)	1 (50)	10 (43)
	Rate*	1	3
65+ yrs	Population	5,399	38,603
	Cases (%)	0 (0)	5 (22)
	Rate*	0	13
All ages	Population	127,721	643,786
	Total Cases	2	23
	Rate*	2	4

*Number of cases per 100,000 per year

Four of the cases that occurred in the less than 2 years age category in the U.S. Arctic were early onset (less than 7 days old) and three cases were late onset (7 to 90 days) for rates of 40.4/100,000 and 30.3/100,000, respectively.

Race

Race and ethnicity data was collected in N. Canada and the U.S. Arctic. All invasive disease caused by group B streptococcus in N. Canada occurred in Aboriginals. The highest rates of disease occurred in N. Canada Aboriginal and Alaska non-Native cases less than two years of age, 28 and 46 per 100,000 respectively.

Group B streptococcus by Race and Age Categories, ICS 2002 Data

Age (yrs)		N. Canada		U.S. Arctic	
		Aboriginal	Non-Aboriginal	Native	Non-Native
<2	Population	3,593	1,142	5,356	15,269
	Cases (rate*)	1 (28)	0 (0)	1 (19)	7 (46)
2-19	Population	31,801	12,021	49,057	145,397
	Cases (rate*)	0 (0)	0 (0)	0 (0)	0 (0)
20-64	Population	37,331	36,433	63,373	326,731
	Cases (rate*)	1 (3)	0 (0)	3 (5)	7 (2)
65+	Population	3,032	2,367	7,017	31,586
	Cases (rate*)	0 (0)	0 (0)	1 (14)	4 (13)
All Ages	Population	75,757	51,964	124,803	518,983
	Cases (rate*)	2 (3)	0 (0)	5 (4)	18 (4)

*Number of cases per 100,000 per year

Clinical Presentation

In the U.S. Arctic, cellulitis was the most common clinical presentation (26%) reported for cases of group B streptococcus in 2002. One case in N. Canada presented with septicemia and one with cellulitis.

Clinical Presentation of Reported group B streptococcus Cases, ICS 2002 Data

	N. Canada n (%)	U.S. Arctic n (%)
Pneumonia*	0 (0)	3 (13)
Septicemia	1 (50)	5 (22)
Meningitis	0 (0)	5 (22)
Peritonitis	0 (0)	2 (9)
Cellulitis*	1 (50)	6 (26)
Endocarditis	0 (0)	1 (4)
Other	0 (0)	1 (4)
Total	2	23

*with bacteremia

Risk Factors

N. Canada reported smoking, alcohol abuse and immune suppressive treatment associated risk factors or medical conditions with the one adult (≥ 18 years) case of group B streptococcus in 2002. In the U.S. Arctic, diabetes was reported in 67% of adult cases, alcohol abuse in 27%, cigarette smoking in 20%, and chronic lung disease in 13%.

Outcome

Five deaths in cases with group B streptococcus were reported in the U.S. Arctic (CFR 22%); two deaths occurred each in the <2 and 20-64 age categories and one in the 65+ age category. No deaths were reported in N. Canada.

CONCLUSIONS

The ICS program continued to expand in 2002. 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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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 Laboratories	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 Qasigiannguit Hospital Ilulissat Hospital Qeqertarsuaq Hospital Uummannaq Hospital Upernavik Hospital Qaanaaq Hospital Ammassalik Hospital Ittoqqortoormiit Hospital

ICELAND

Reference Laboratory	Department of Microbiology, Landspitali 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 Cadham 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 Bœrum 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	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 Kanakanak 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