

INVASIVE BACTERIAL DISEASE SURVEILLANCE REPORT, 2016

Emerging Infections Program

Active Bacterial Core Surveillance (ABCs)

Minnesota Department of Health

Diseases Included

- Group A Streptococcus page 5
- Group B Streptococcus page 12
- *Haemophilus influenzae* page 21
- *Neisseria meningitidis* page 28
- *Streptococcus pneumoniae* page 34
- Methicillin-resistant *Staphylococcus aureus* (MRSA) page 42
- Legionnaires' Disease page 49

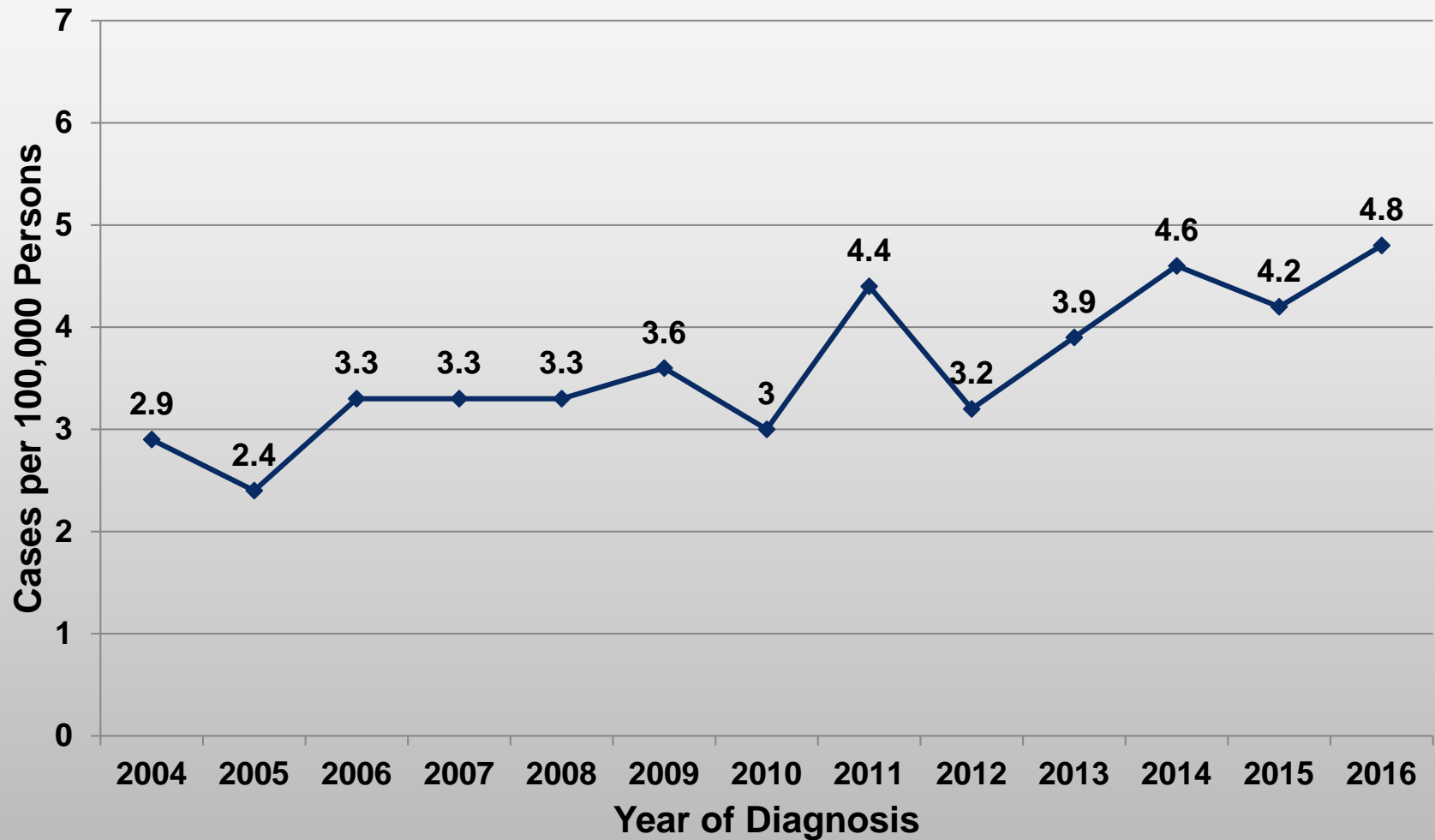
Surveillance Methods

- Cases include Minnesota residents with invasive infections due to Group A Streptococcus, Group B Streptococcus, *Haemophilus influenzae*, *Neisseria meningitidis*, *Streptococcus pneumoniae*, and methicillin-resistant *Staphylococcus aureus* (MRSA).
- Invasive infections are from normally sterile body sites such as blood, cerebrospinal fluid and others. These usually cause serious illnesses (disease).
- Legionellosis is also included in this report and has separate confirmatory testing criteria including urine antigen, culture, paired serology, and PCR or DFA combined with culture or urine antigen.

Surveillance Methods (cont.)

- All hospitals and reference laboratories serving Minnesotans are contacted routinely to identify cases.
- Species confirmation, antibiotic resistance and other testing is performed by the MDH Public Health Laboratory.
- Disease rates are based on Census data.
- The Centers for Disease Control and Prevention (CDC) includes these results from Minnesota and other states and regions in a network called Active Bacterial Core Surveillance (ABCs) which covers a population base of 42 million.

Incidence of Invasive Group A Streptococcal Disease, Minnesota, 2004-2016



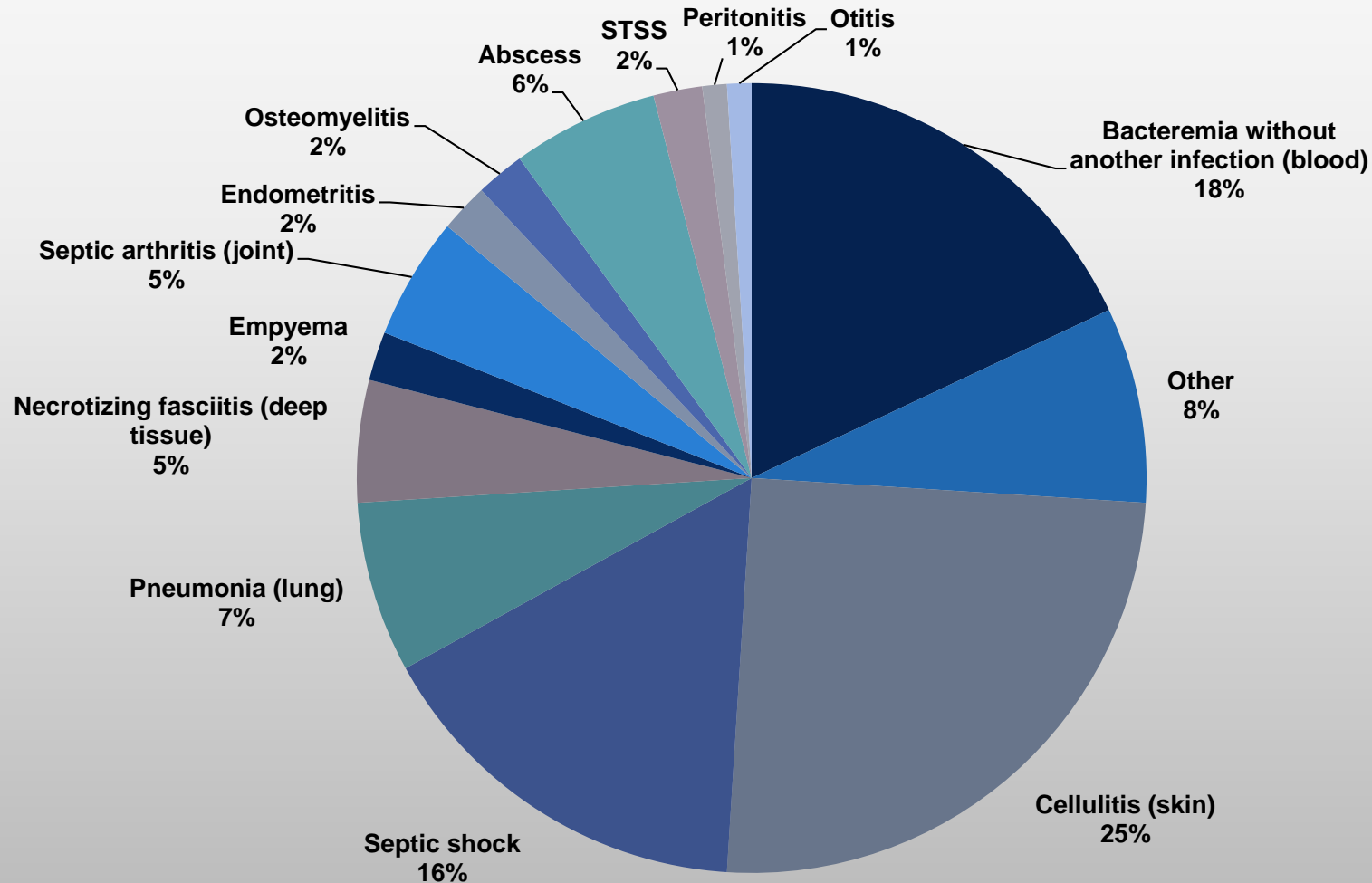
Incidence of Invasive Group A Streptococcal Disease by Gender and Age Group, Minnesota, 2016

Characteristic	Cases (n=277)	Incidence per 100,000 persons
Gender		
Male	149	5.2
Female	128	4.5
Age Group		
Under 1 yr.	5	7.1
1-4 yrs.	6	2.1
5-9 yrs.	7	1.9
10-19 yrs.	12	1.7
20-29 yrs.	22	3.0
30-39 yrs.	27	3.6
40-49 yrs.	19	2.9
50-59 yrs.	48	6.2
60-69 yrs.	52	8.3
70+ yrs.	79	14.3

Invasive Group A Streptococcal Disease Cases and Deaths by Age Group, Minnesota, 2016

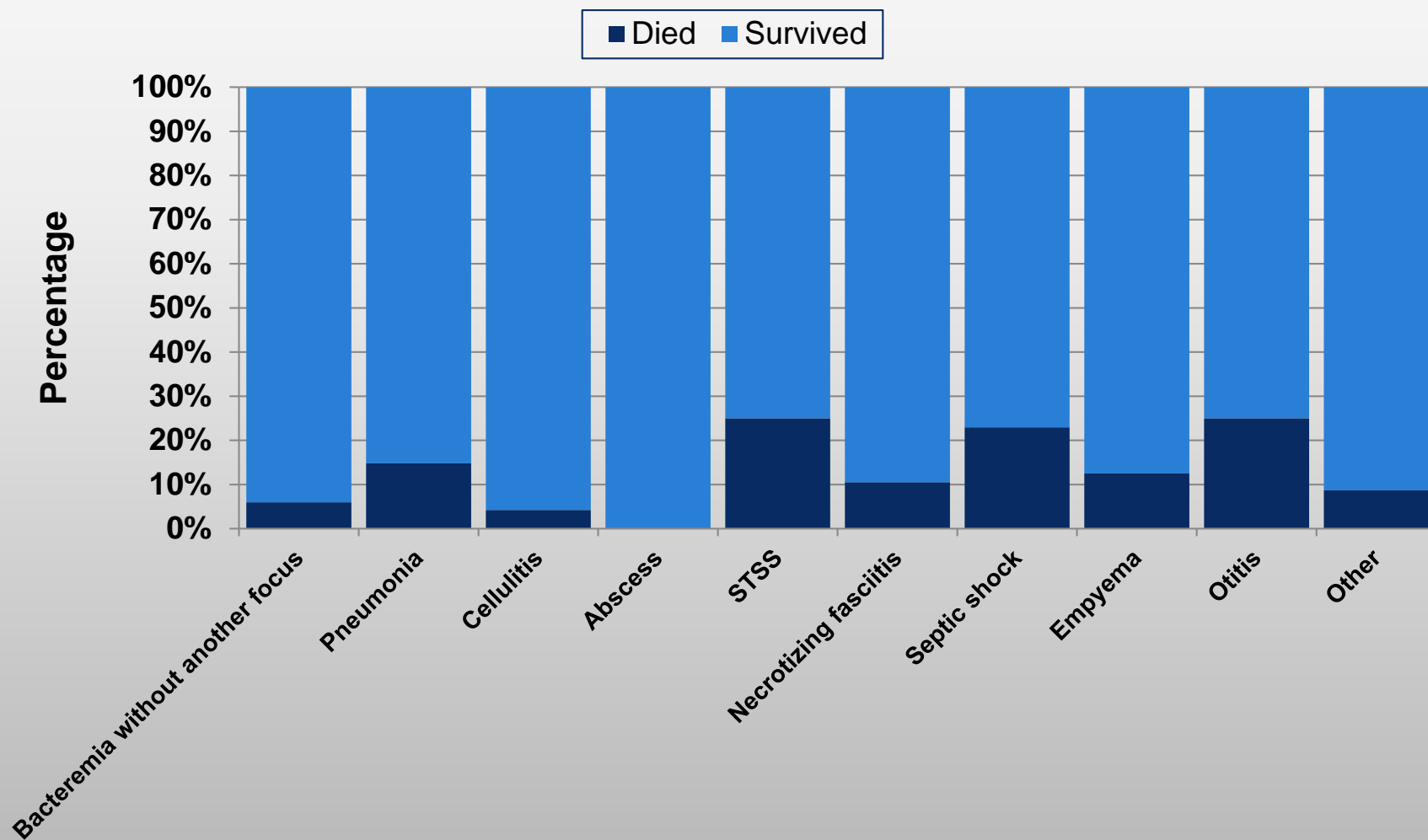
Age Group	Cases	Deaths	% Died
Under 1 yr.	5	1	20%
1-4 yrs.	6	0	0%
5-9 yrs.	7	0	0%
10-19 yrs.	12	0	0%
20-29 yrs.	22	1	4.5%
30-39 yrs.	27	0	0%
40-49 yrs.	19	1	5.3%
50-59 yrs.	48	5	10.4%
60-69 yrs.	52	5	9.6%
70+ yrs.	79	11	14%
Total	277	24	8.7%

Invasive Group A Streptococcal Disease by Type of Infection/Syndrome, Minnesota, 2016

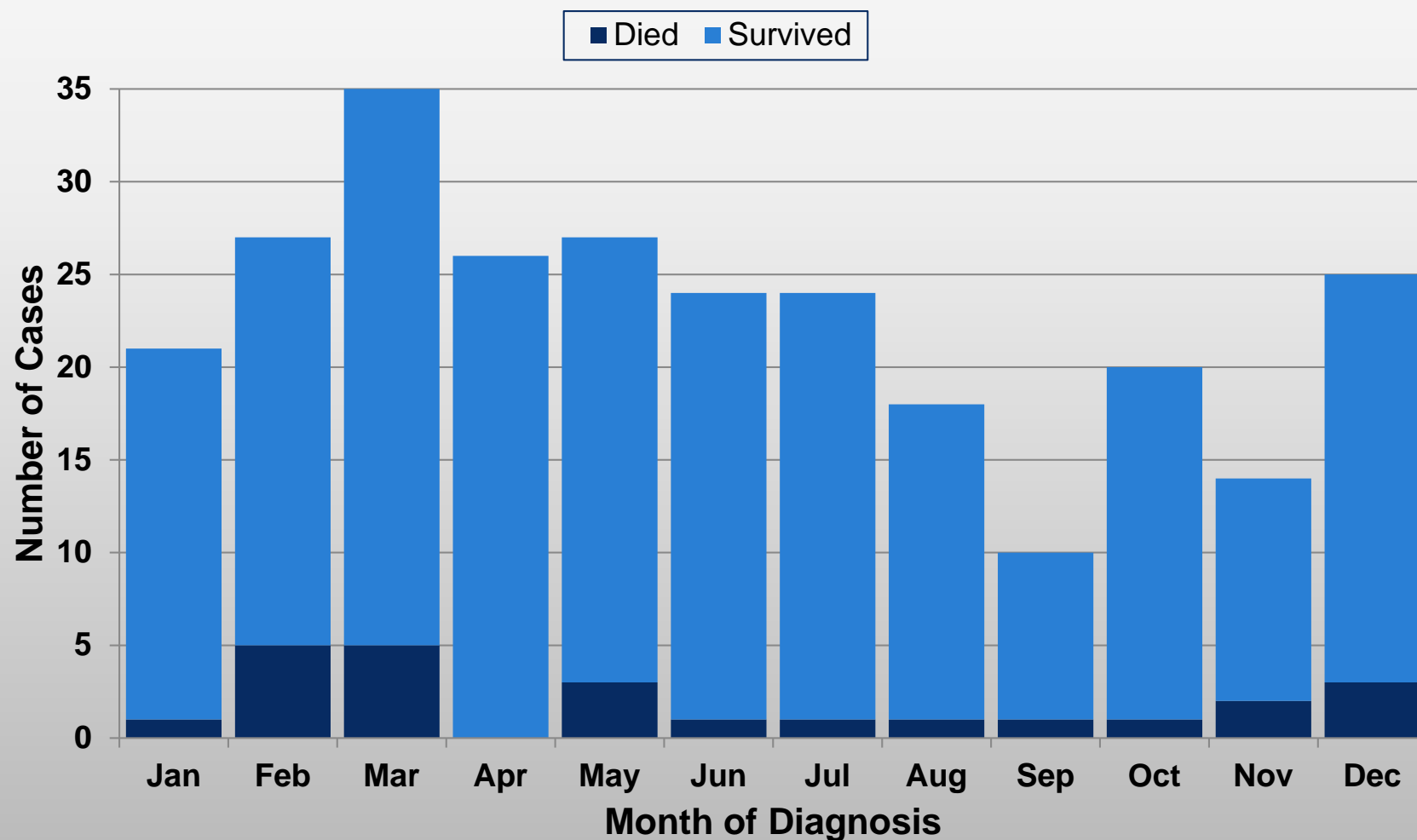


This chart represents 374 infections among 277 cases (some cases had >1 infection).

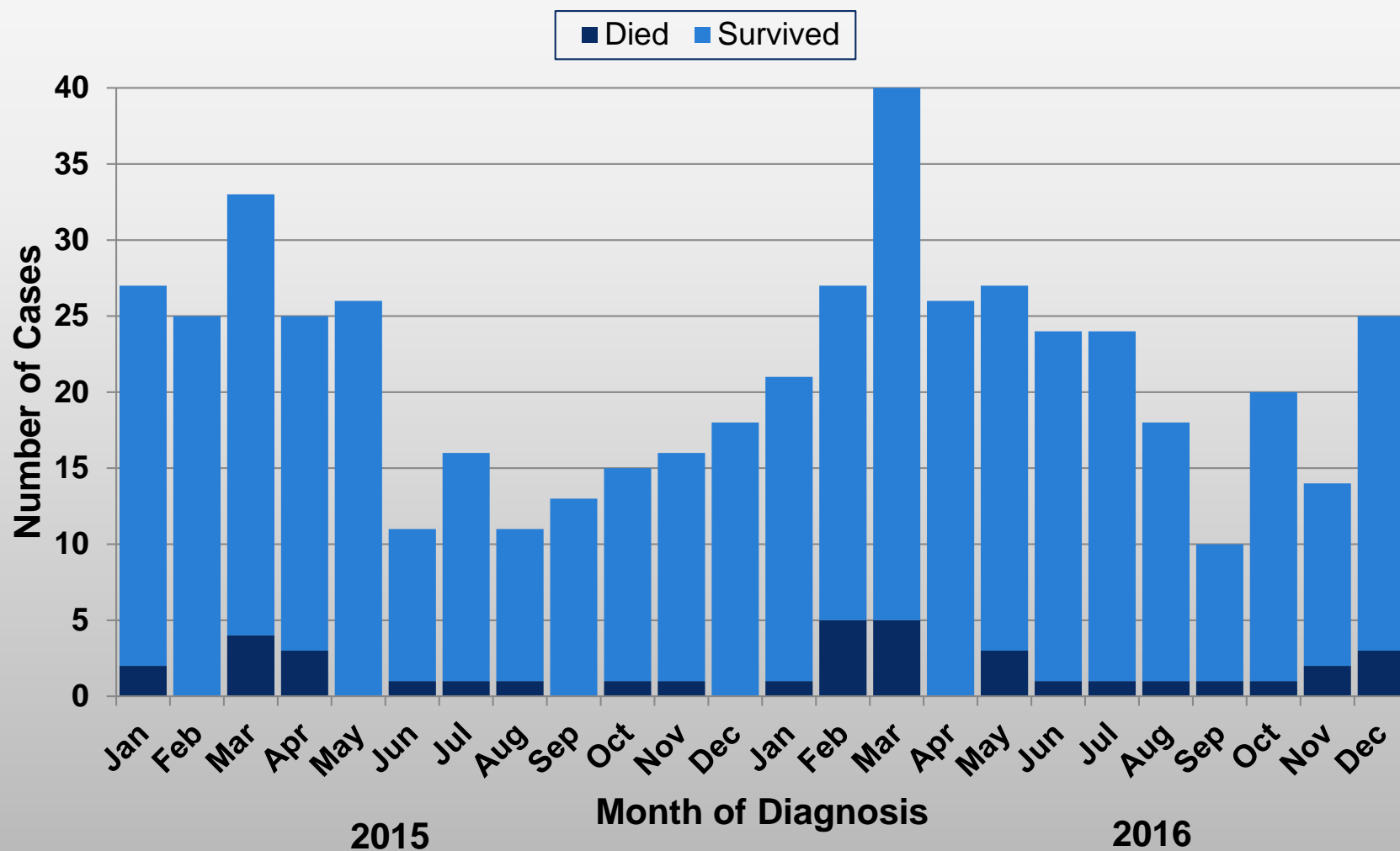
Outcome of Invasive Group A Streptococcal Disease by Type of Infection/Syndrome, Minnesota, 2016



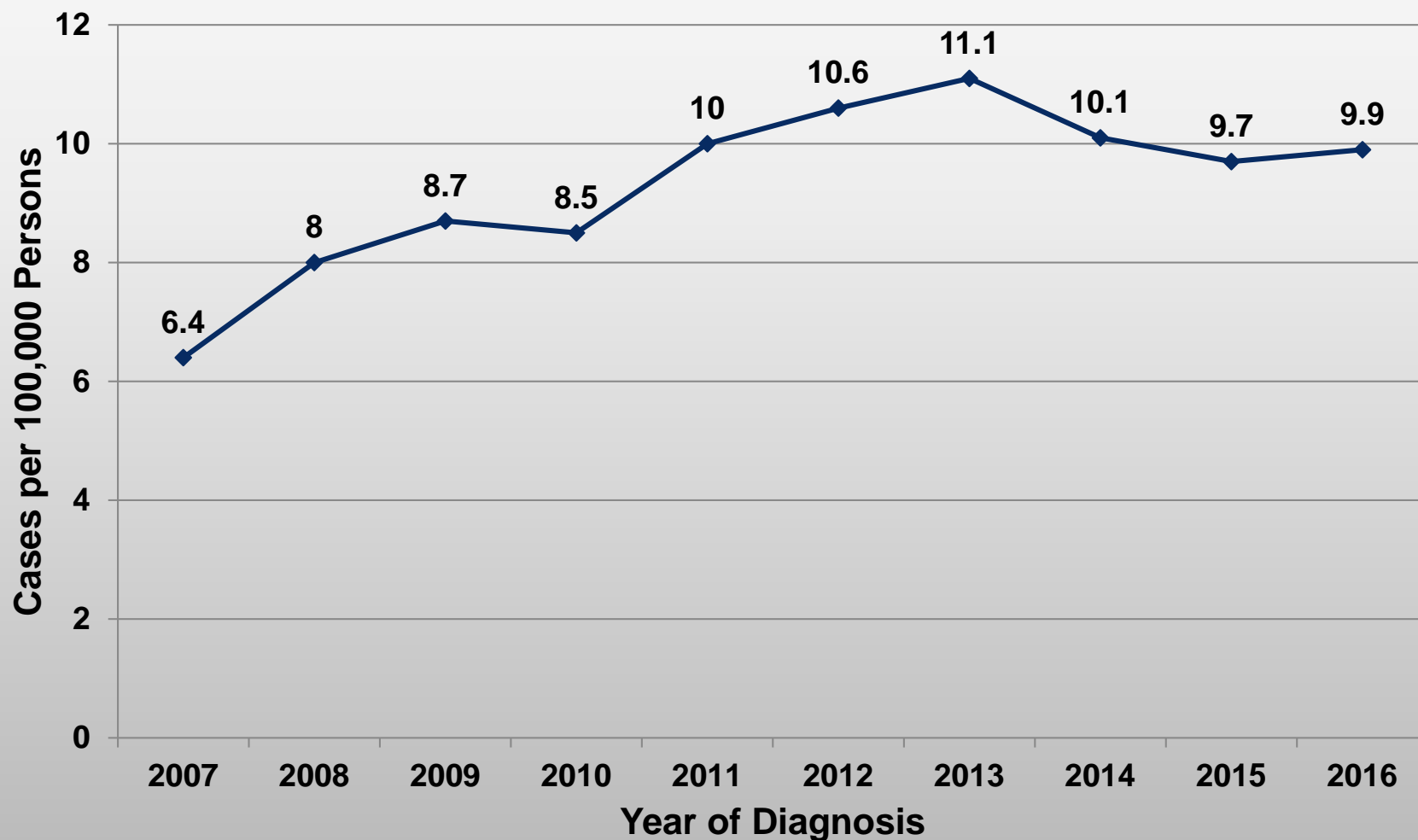
Cases of Invasive Group A Streptococcal Disease by Month of Diagnosis and Outcome, Minnesota, 2016



Cases of Invasive Group A Streptococcal Disease by Month of Diagnosis and Outcome, Minnesota, 2015-2016



Incidence of Invasive Group B Streptococcal Disease, Minnesota, 2007-2016



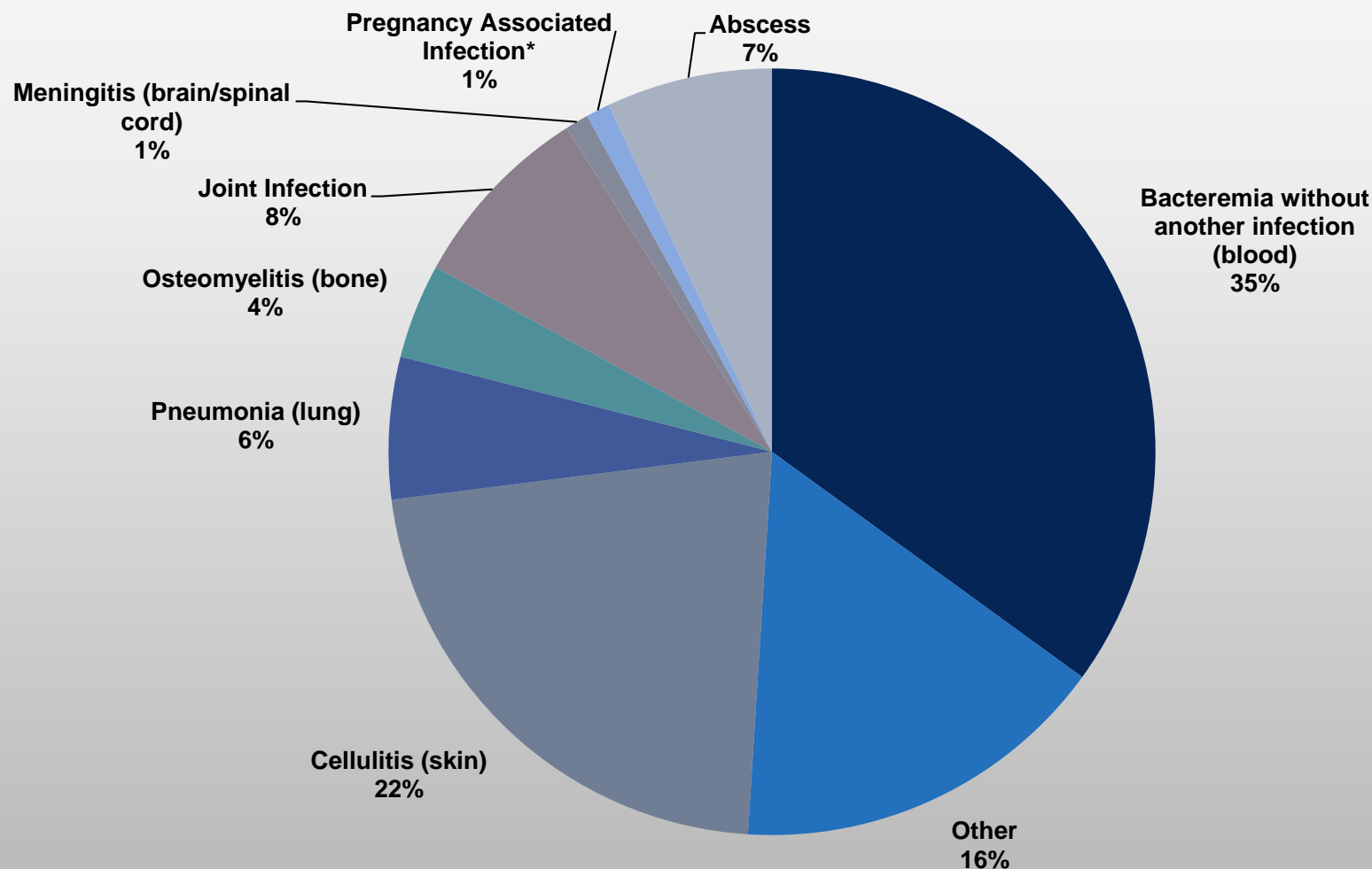
Incidence of Invasive Group B Streptococcal Disease by Gender and Age Group, Minnesota, 2016

Characteristic	Cases (n=544)	Incidence per 100,000 persons
Gender		
Male	300	11.0
Female	244	8.8
Age Group		
Under 1 yr.	35	49.8
1-4 yrs.	1	0.4
5-9 yrs.	0	0
10-19 yrs.	4	0.6
20-29 yrs.	16	2.2
30-39 yrs.	27	3.7
40-49 yrs.	41	6.1
50-59 yrs.	87	11.1
60-69 yrs.	148	24.6
70+ yrs.	185	34.2

Invasive Group B Streptococcal Disease Cases and Deaths by Age Group, Minnesota, 2016

Age Group	Cases	Deaths	% Died
Under 1 yr.	35	3	9%
1-4 yrs.	1	1	100%
5-9 yrs.	0	0	0%
10-19 yrs.	4	0	0%
20-29 yrs.	17	1	6%
30-39 yrs.	28	2	7%
40-49 yrs.	41	1	2%
50-59 yrs.	87	2	2%
60-69 yrs.	150	5	3%
70+ yrs.	185	12	6%
Total	544	27	5%

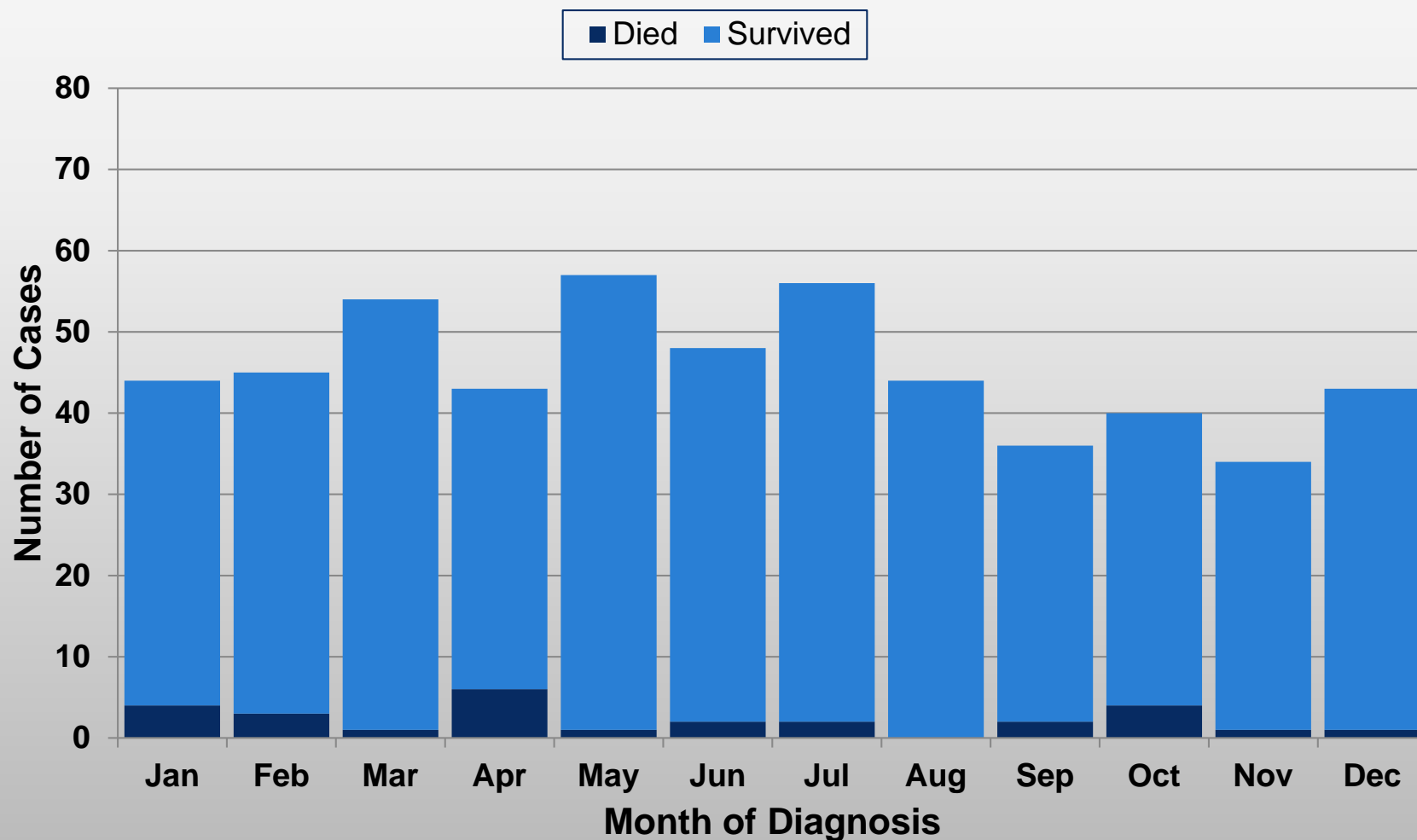
Invasive Group B Streptococcal Disease by Type of Infection/Syndrome, Minnesota 2016



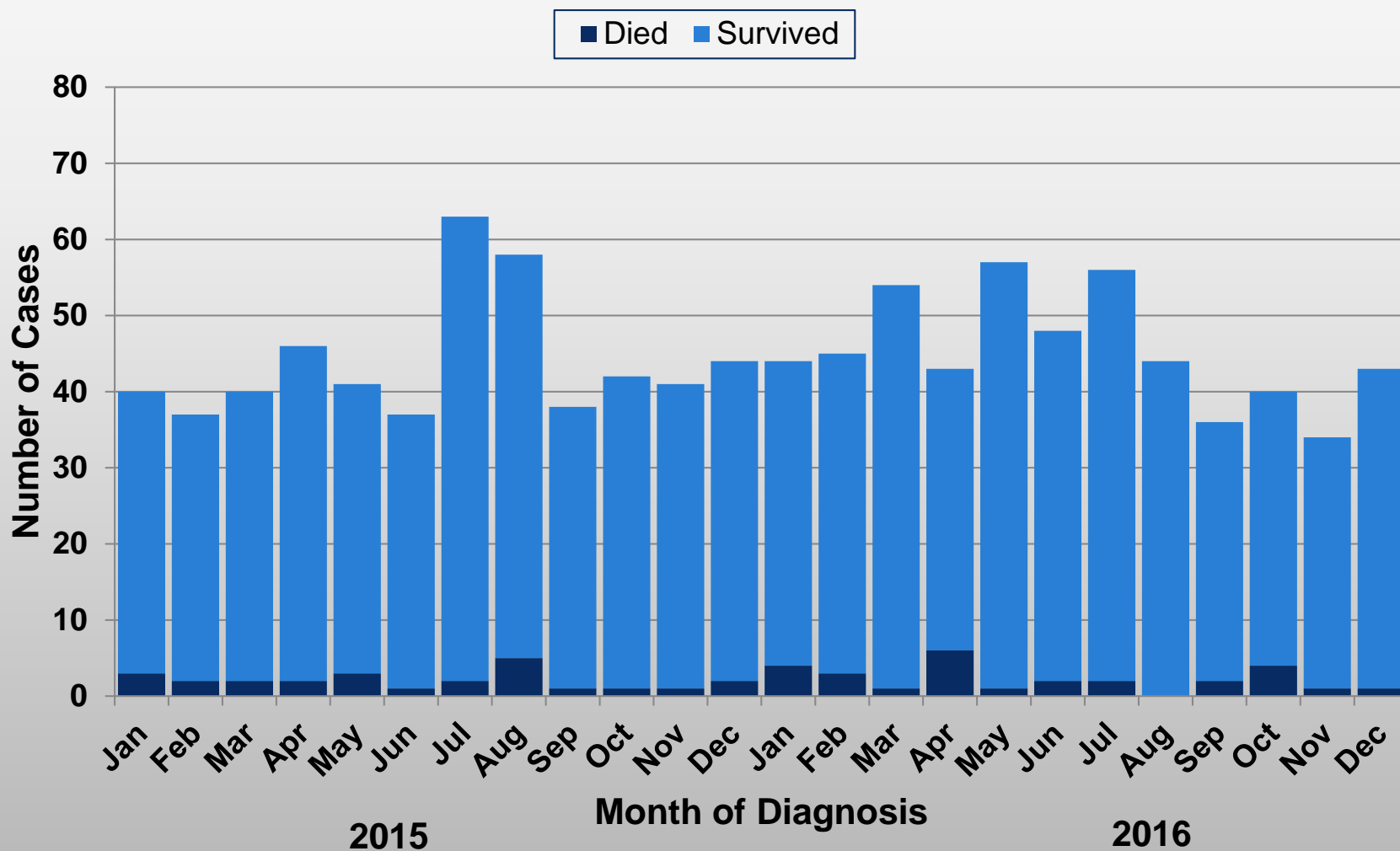
This chart represents 634 infections among 544 cases. (Some cases had >1 infection.)

* Mother had one of the following infections: Endometriosis, Septic Abortion, Choriamnionitis, or Placental/Amniotic Infection with fetal demise.

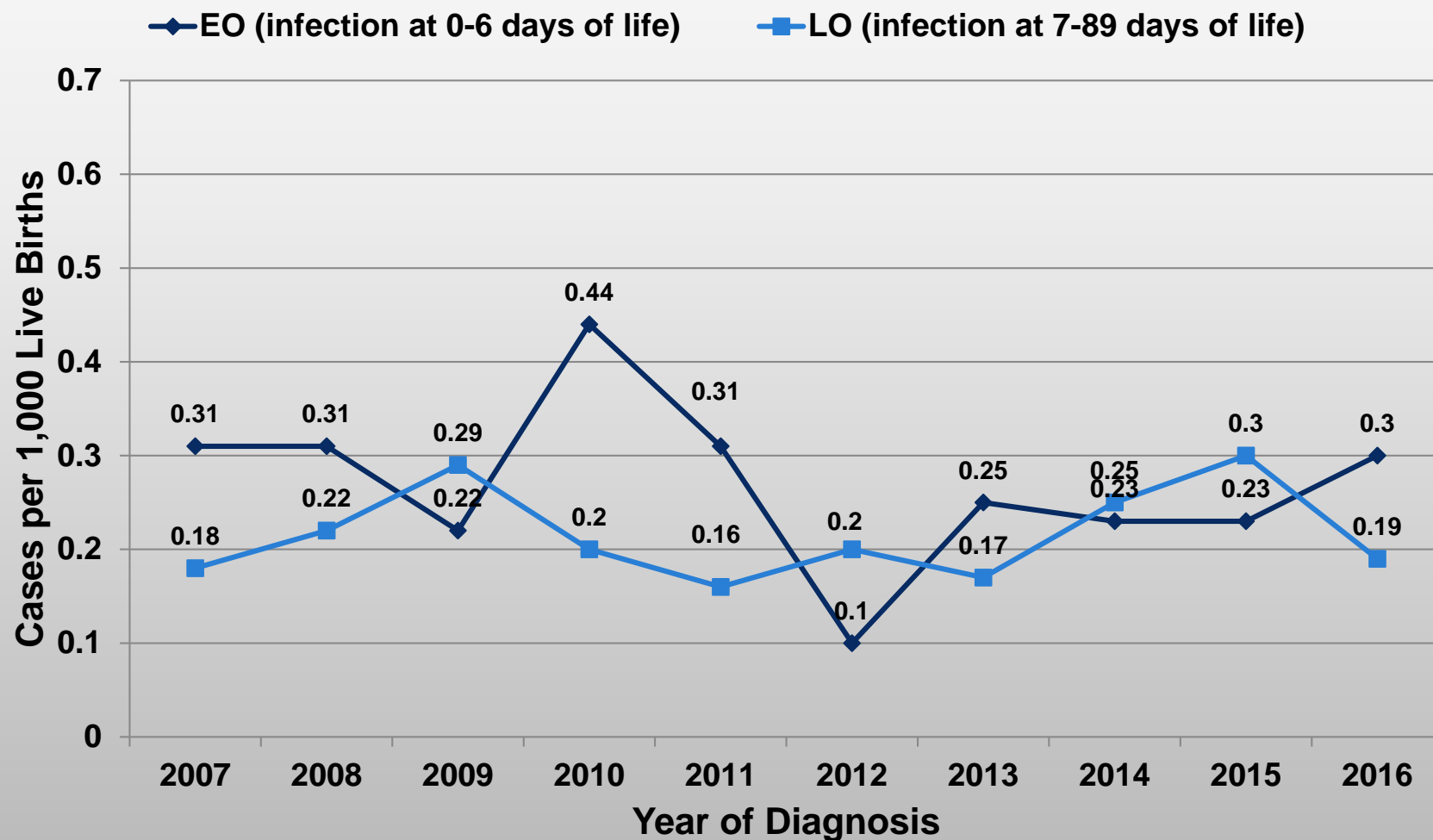
Cases of Invasive Group B Streptococcal Disease by Month of Diagnosis and Outcome, Minnesota, 2016



Cases of Invasive Group B Streptococcal Disease by Month of Diagnosis and Outcome, Minnesota, 2015-2016



Incidence of Invasive Early and Late-Onset Group B Streptococcal Disease, Minnesota, 2007-2016

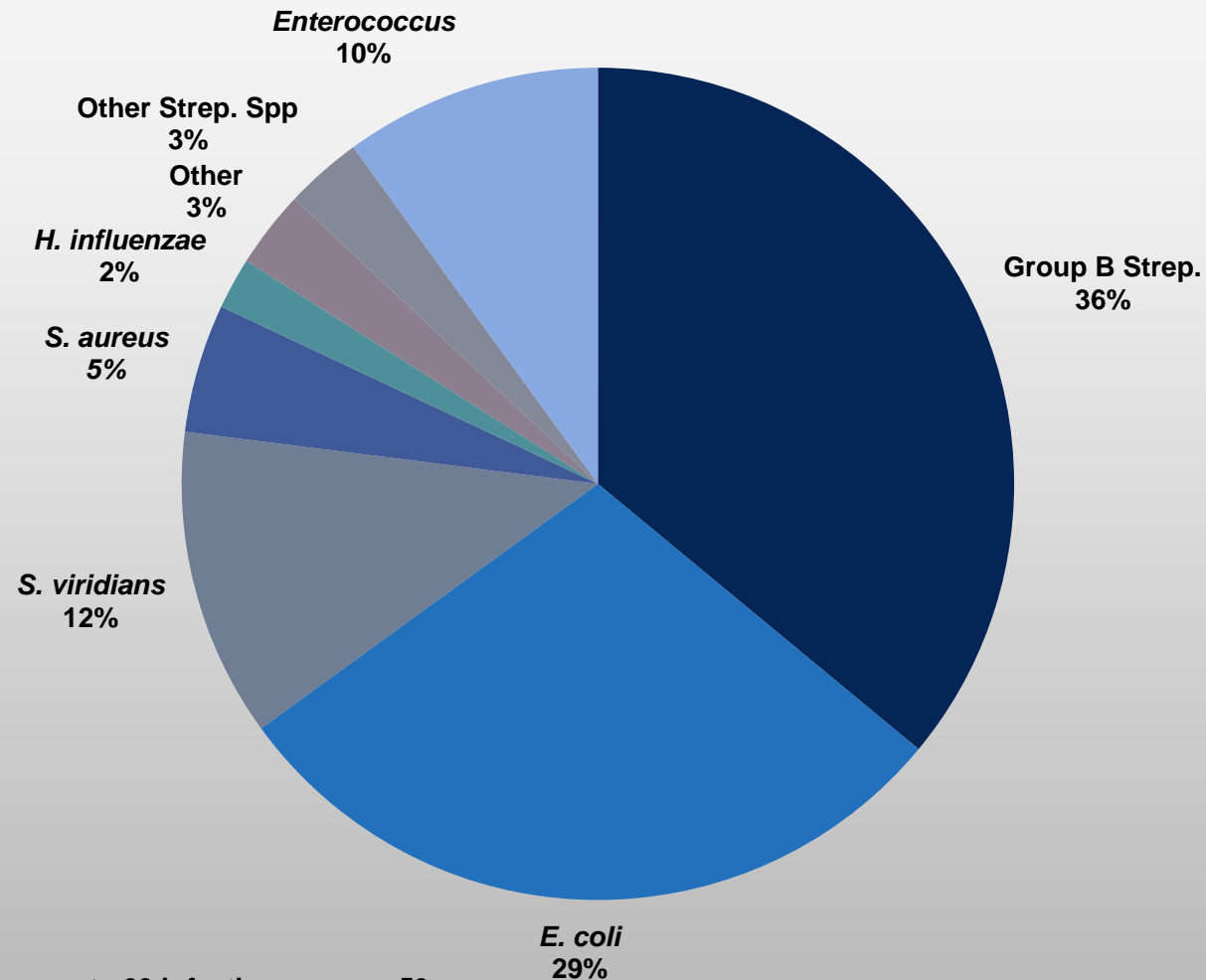


Early-Onset* Group B Streptococcal Disease by Race, Gestational Age and Outcome, Minnesota, 2016

Characteristic	Cases (n=21)	Percent
Race		
White	9	43%
Black	6	29%
Asian	1	5%
Multiple Races	2	10%
Unknown	3	14%
Gestational Age		
Under 32 weeks	3	14%
32-37 weeks	5	24%
Full-term	13	62%
Outcome		
Died	2	10%
Survived	19	90%

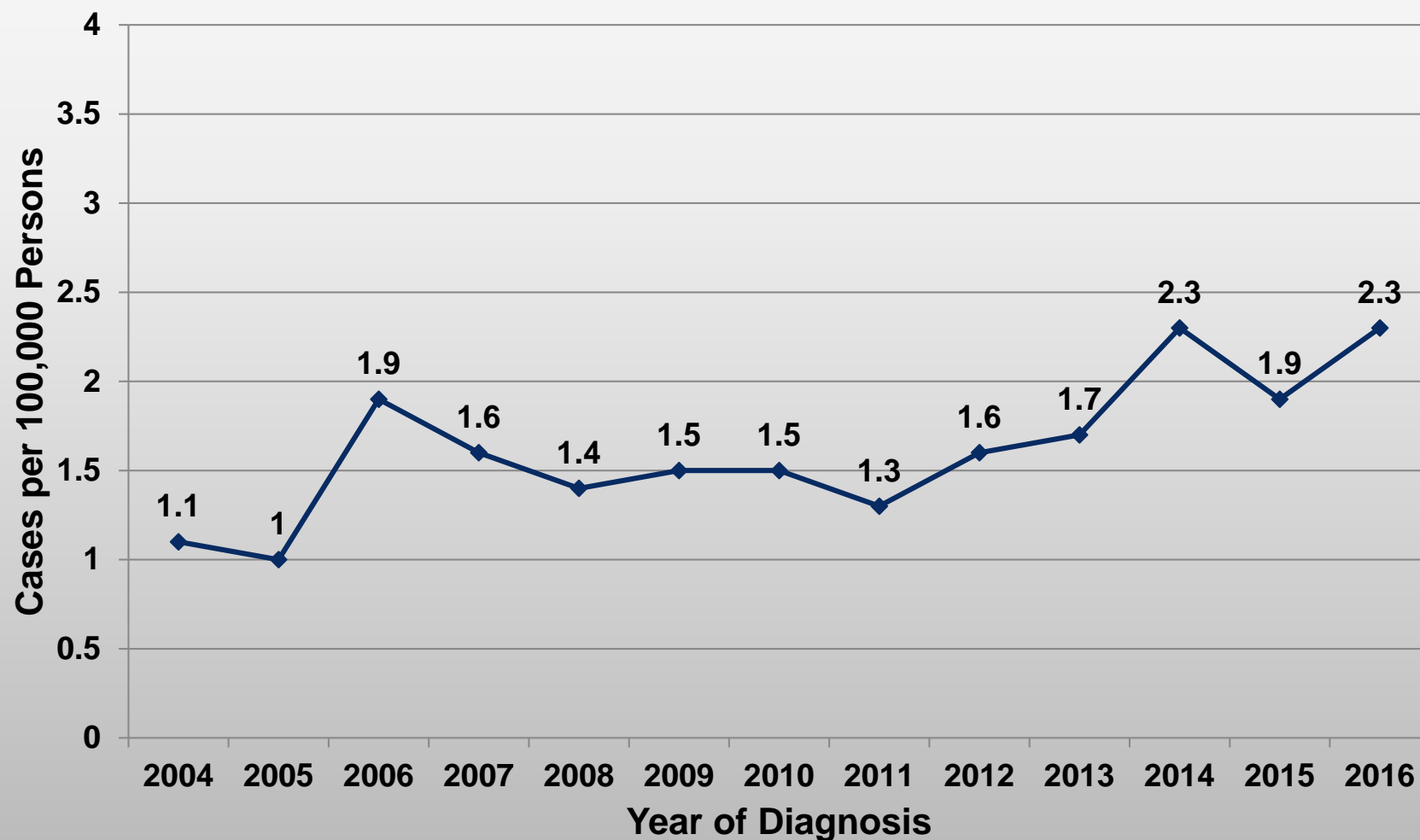
* onset 0-6 days of life

Invasive Neonatal Sepsis Disease in First 6 Days of Life by Pathogen, Minnesota, 2016*



* This chart represents 60 infections among 59 cases.

Incidence of Invasive *Haemophilus influenzae* Disease, Minnesota, 2004-2016



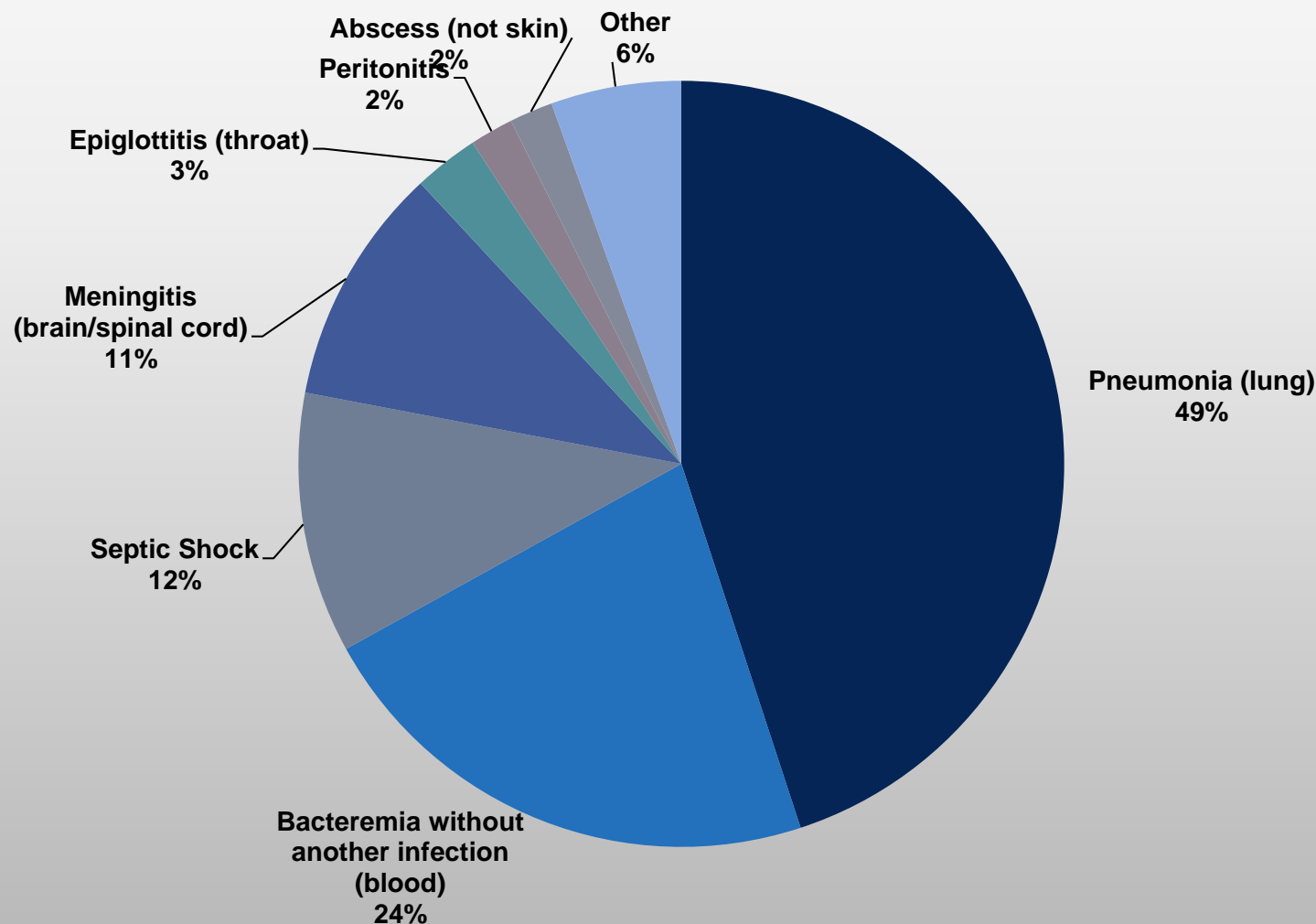
Incidence of Invasive *Haemophilus influenzae* Disease by Gender and Age Group, Minnesota, 2016

Characteristic	Cases (n=126)	Incidence per 100,000 persons
Gender		
Male	69	2.53
Female	57	2.07
Age Group		
Under 1 yr.	13	18.51
1-4 yrs.	9	3.21
5-9 yrs.	2	0.56
10-19 yrs.	1	0.14
20-29 yrs.	3	0.41
30-39 yrs.	8	1.09
40-49 yrs.	5	0.74
50-59 yrs.	11	1.40
60-69 yrs.	26	4.32
70+ yrs.	48	8.88

Invasive *Haemophilus influenzae* Disease Cases and Deaths by Age Group, Minnesota, 2016

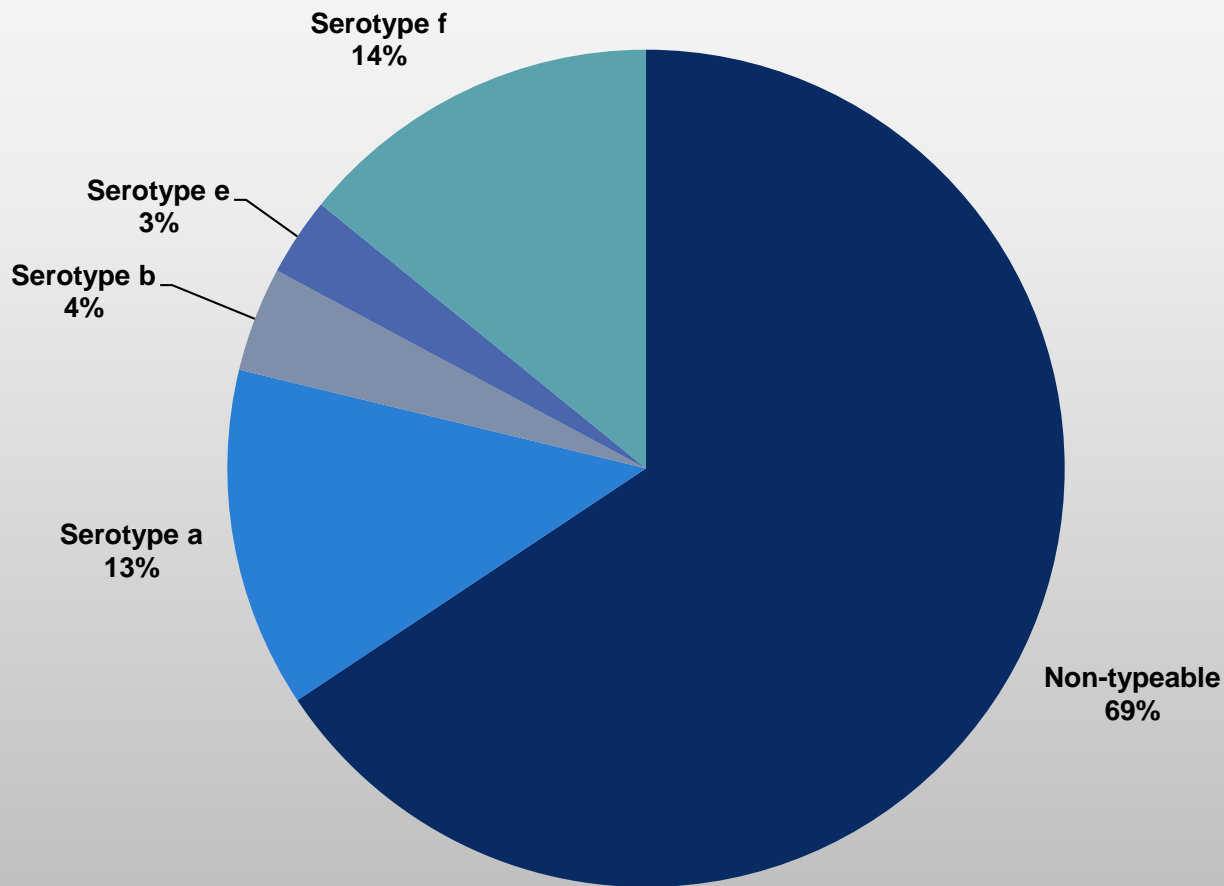
Age Group	Cases	Deaths	% Died
Under 1 yr.	13	2	2%
1-4 yrs.	9	0	--
5-9 yrs.	2	0	--
10-19 yrs.	1	0	--
20-29 yrs.	3	0	--
30-39 yrs.	8	0	--
40-49 yrs.	5	0	--
50-59 yrs.	11	0	--
60-69 yrs.	26	4	3%
70+ yrs.	48	10	8%
Total	126	16	13%

Invasive *Haemophilus influenzae* Disease by Type of Infection/Syndrome, Minnesota 2016



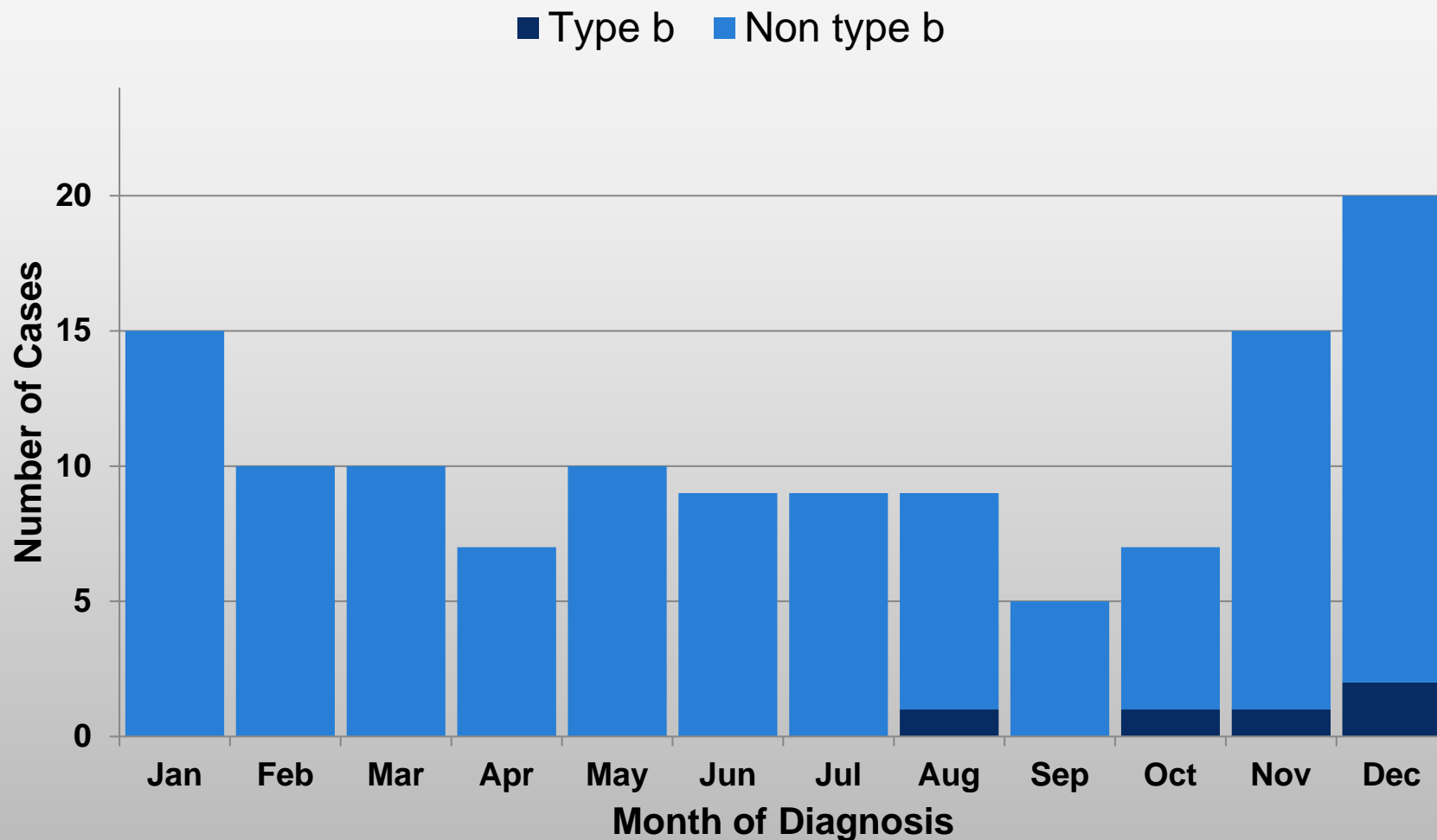
This graph represents 144 infections in 126 cases (some cases had > 1 infection).

Invasive *Haemophilus influenzae* Disease by Serotype, Minnesota 2016 (n=118*)

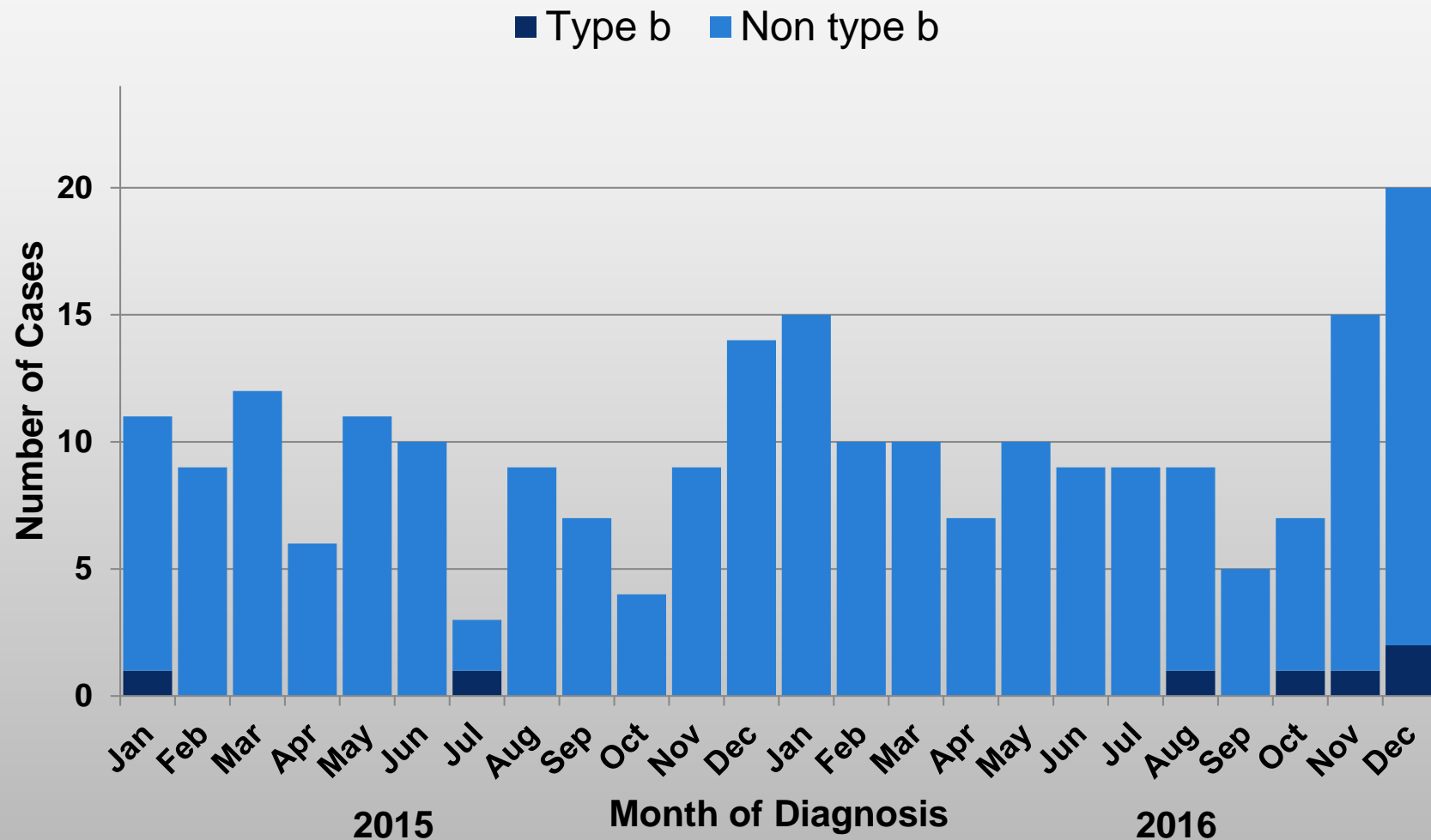


* 8 case isolates not available for serotyping

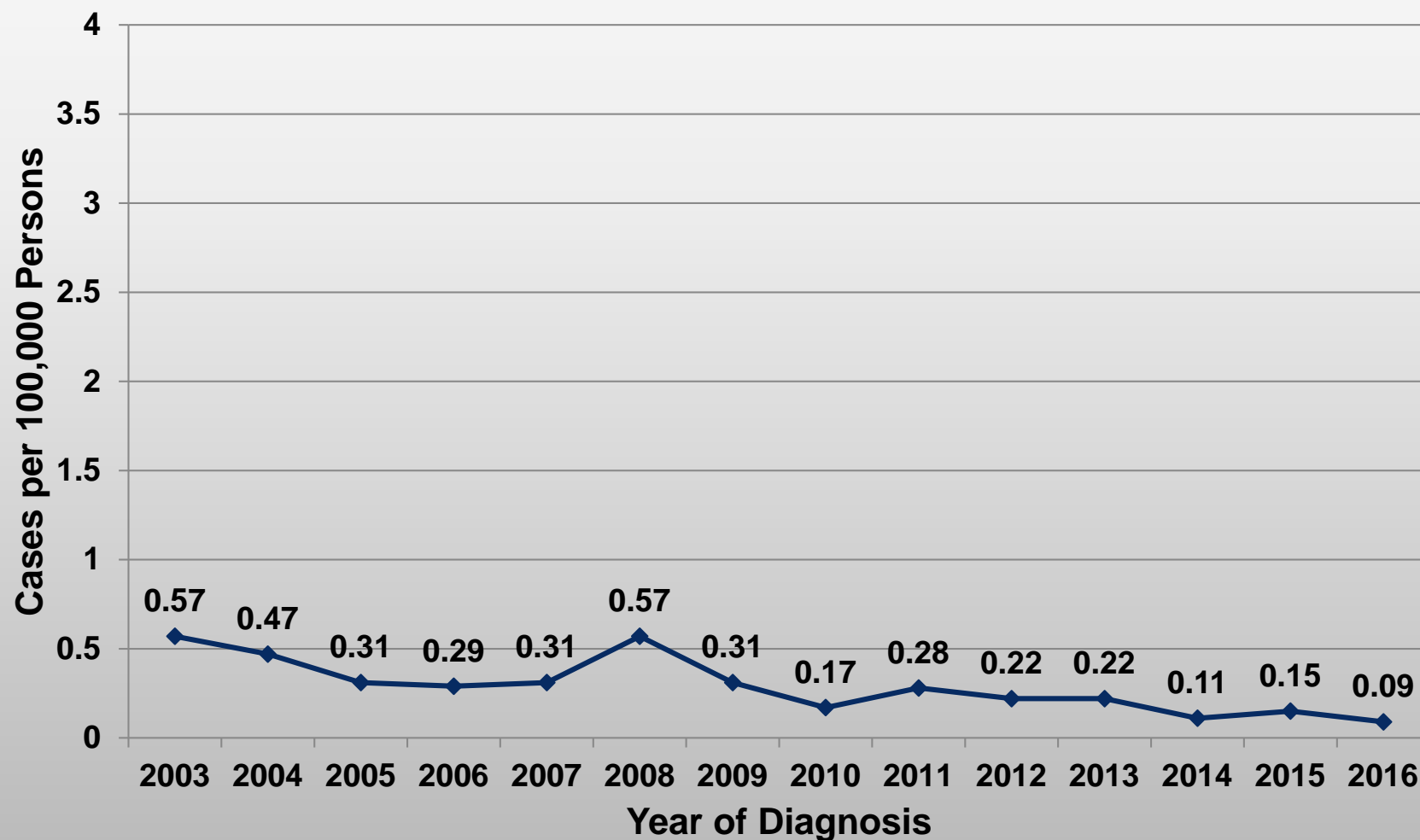
Cases of Invasive *Haemophilus influenzae* Disease by Month of Diagnosis and Serotype, Minnesota, 2016



Cases of Invasive *Haemophilus influenzae* Disease by Month of Diagnosis and Serotype, Minnesota, 2015-2016



Incidence of Invasive *Neisseria meningitidis* Disease, Minnesota, 2003-2016



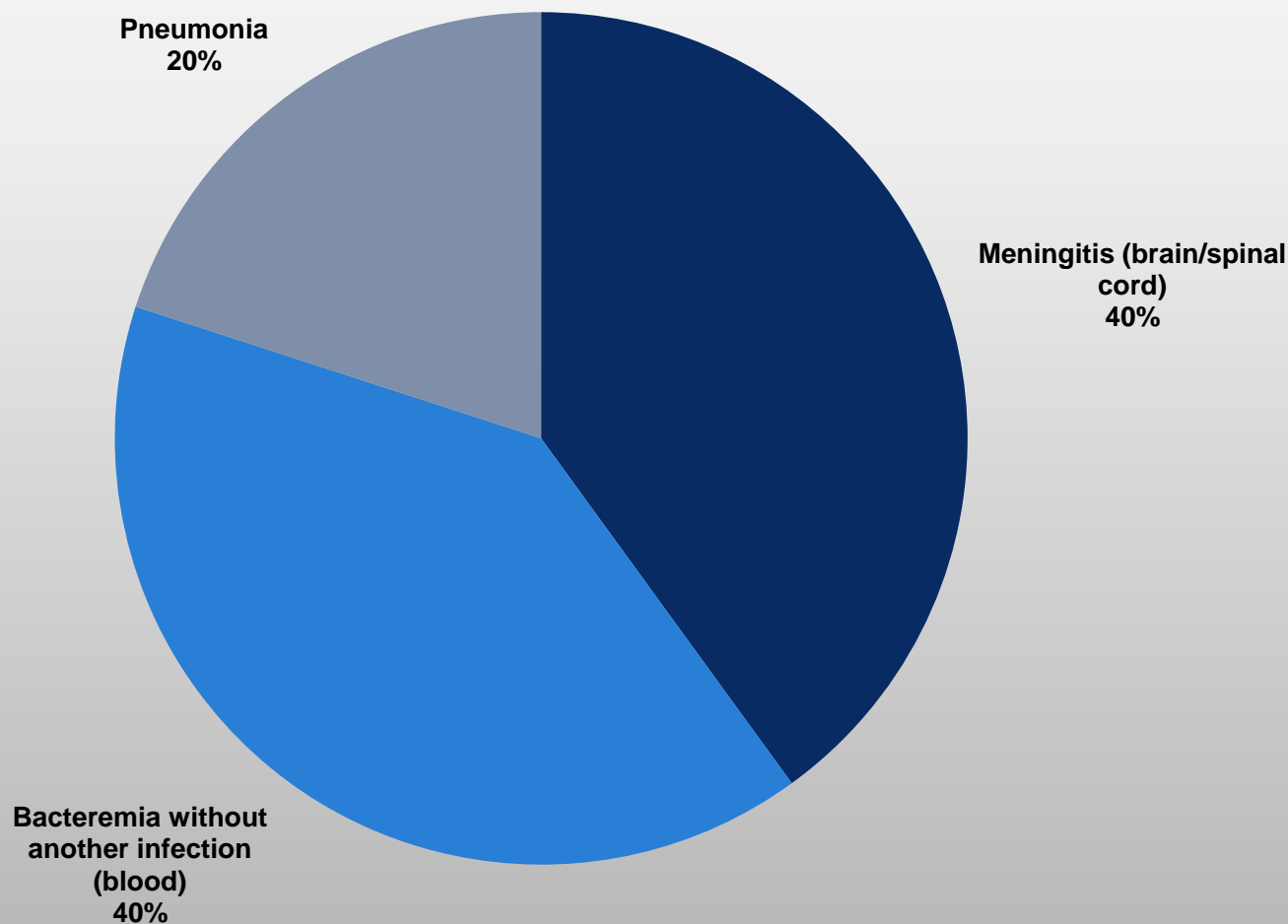
Incidence of Invasive *Neisseria meningitidis* Disease by Gender and Age Group, Minnesota, 2016

Characteristic	Cases (n=5)	Incidence per 100,000 persons
Gender		
Male	3	0.11
Female	2	0.07
Age Group		
Under 1 yr.	0	0
1-4 yrs.	0	0
5-9 yrs.	0	0
10-19 yrs.	2	0.28
20-29 yrs.	0	0
30-39 yrs.	1	0.14
40-49 yrs.	0	0
50-59 yrs.	0	0
60-69 yrs.	1	0.17
70+ yrs.	1	0.18

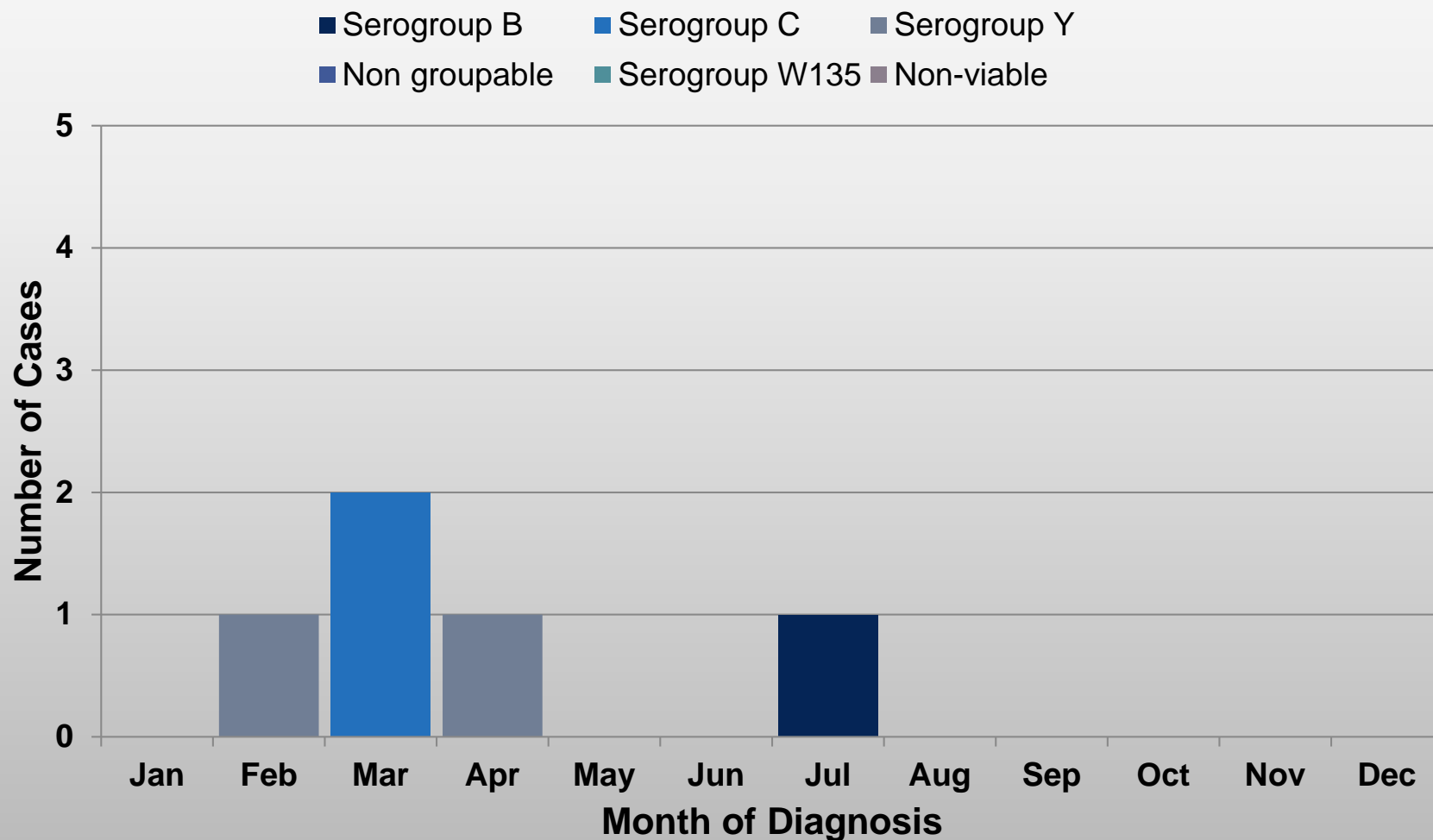
Invasive *Neisseria meningitidis* Disease Cases and Deaths by Age Group, Minnesota, 2016

Age Group	Cases	Deaths	% Died
Under 1 yr.	0	0	--
1-4 yrs.	0	0	--
5-9 yrs.	0	0	--
10-19 yrs.	2	0	--
20-29 yrs.	0	0	--
30-39 yrs.	1	0	--
40-49 yrs.	0	0	--
50-59 yrs.	0	0	--
60-69 yrs.	1	0	--
70+ yrs.	1	0	--
Total	5	0	--

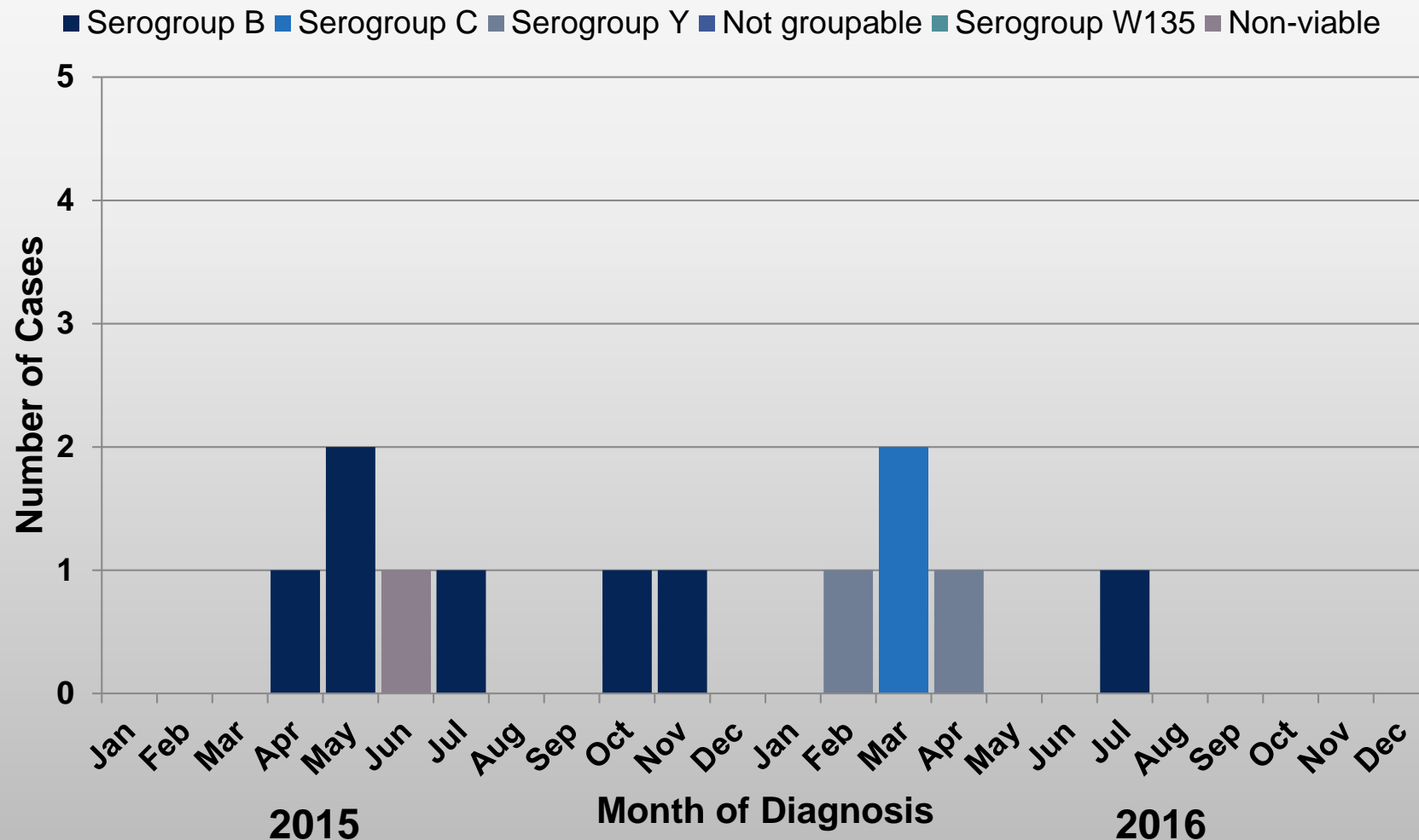
Invasive *Neisseria meningitidis* by Type of Infection/Syndrome, Minnesota 2016



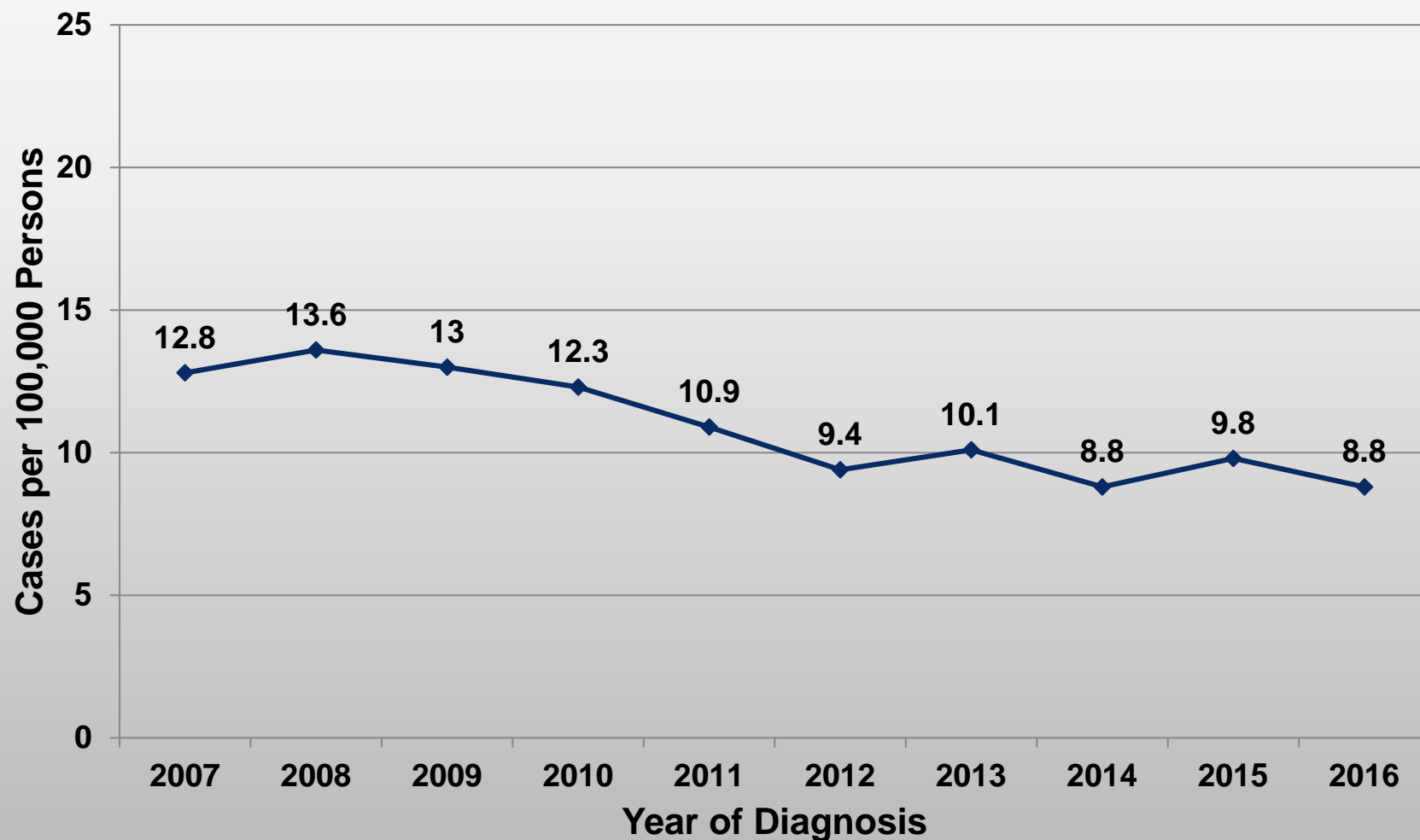
Cases of Invasive *Neisseria meningitidis* Disease by Month of Diagnosis and Serotype, Minnesota, 2016



Cases of Invasive *Neisseria meningitidis* Disease by Month of Diagnosis and Serotype, Minnesota, 2015-2016



Incidence of Invasive Pneumococcal Disease, Minnesota, 2007-2016



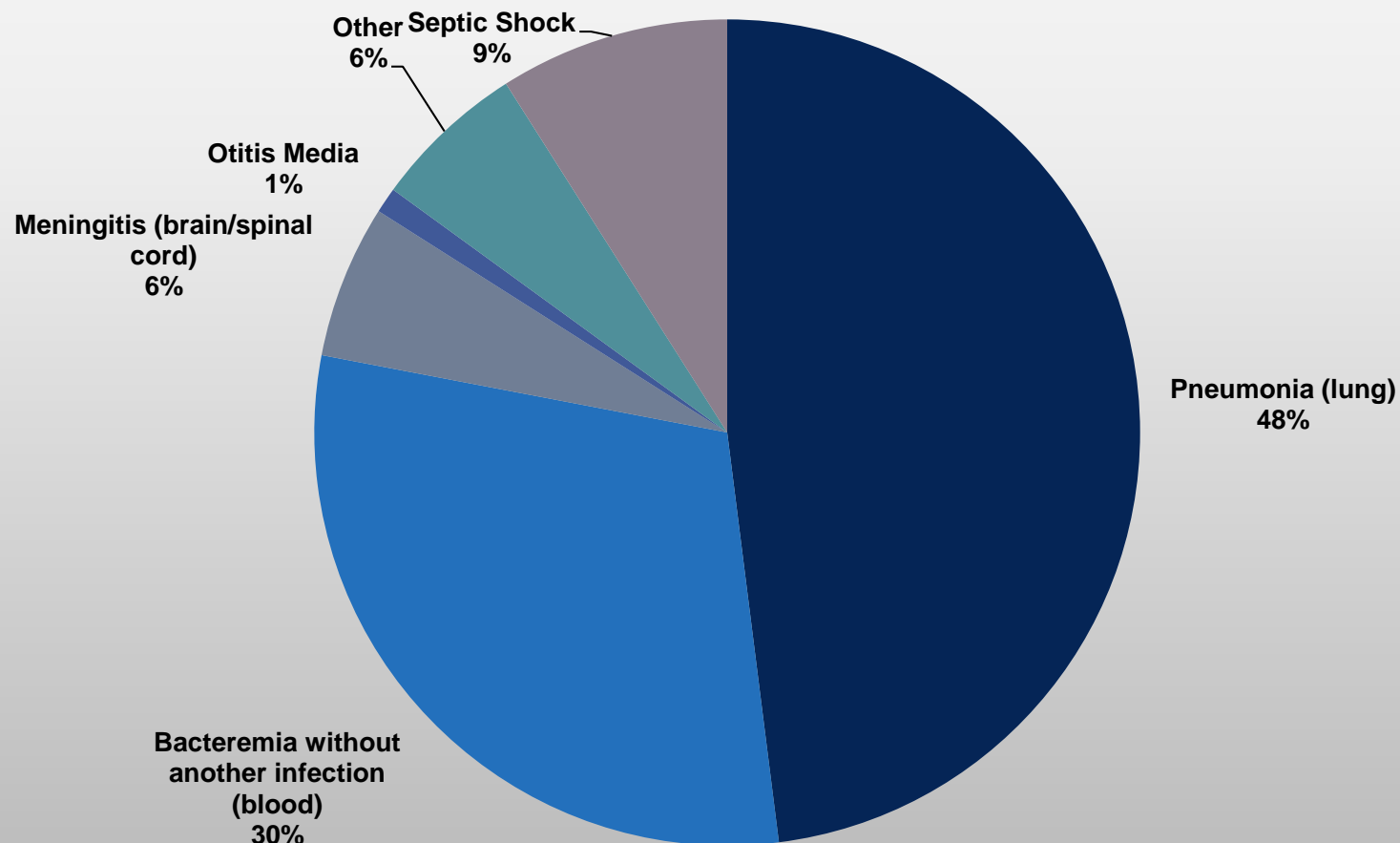
Incidence of Invasive Pneumococcal Disease by Gender and Age Group, Minnesota, 2016

Characteristic	Cases (n=485)	Incidence per 100,000 persons
Gender		
Male	249	9.1
Female	236	8.6
Age Group		
Under 1 yr.	18	25.6
1-4 yrs.	13	4.6
5-19 yrs.	13	1.2
20-29 yrs.	12	1.6
30-39 yrs.	32	4.4
40-49 yrs.	37	5.5
50-64 yrs.	147	13.1
65-79 yrs.	134	22.8
80+ yrs.	79	36.2

Invasive Pneumococcal Disease Cases and Deaths by Age Group, Minnesota, 2016

Age Group	Cases	Deaths	% Died
Under 1 yr.	18	0	0%
1-4 yrs.	13	1	8%
5-19 yrs.	13	0	0%
20-29 yrs.	12	0	0%
30-39 yrs.	32	2	6%
40-49 yrs.	37	4	11%
50-64 yrs.	147	14	10%
65-79 yrs.	134	15	11%
80+ yrs.	79	11	14%
Total	485	47	10%

Invasive Pneumococcal Disease by Type of Infection/Syndrome, Minnesota 2016*



*This chart represents 521 infections among 485 cases (some cases had > 1 infection).

Invasive Pneumococcal Isolates by Serotype Included in 13-Valent Conjugate Vaccine* by Age Group, Minnesota, 2016

Age Group	Isolates	# included in PCV-13	% included in PCV-13
Under 1 yr.	18	4	22%
1-4 yrs.	21	4	19%
5-19 yrs.	19	3	16%
20-29 yrs.	23	3	13%
30-39 yrs.	25	1	4%
40-49 yrs.	28	5	18%
50-64 yrs.	119	32	27%
65-79 yrs.	115	20	17%
80+ yrs.	85	16	19%
Total	453	88	19%

*Serotypes 1, 3, 4, 5, 6A, 6B, 7F, 9V, 14, 18C, 19A, 19F, 23F

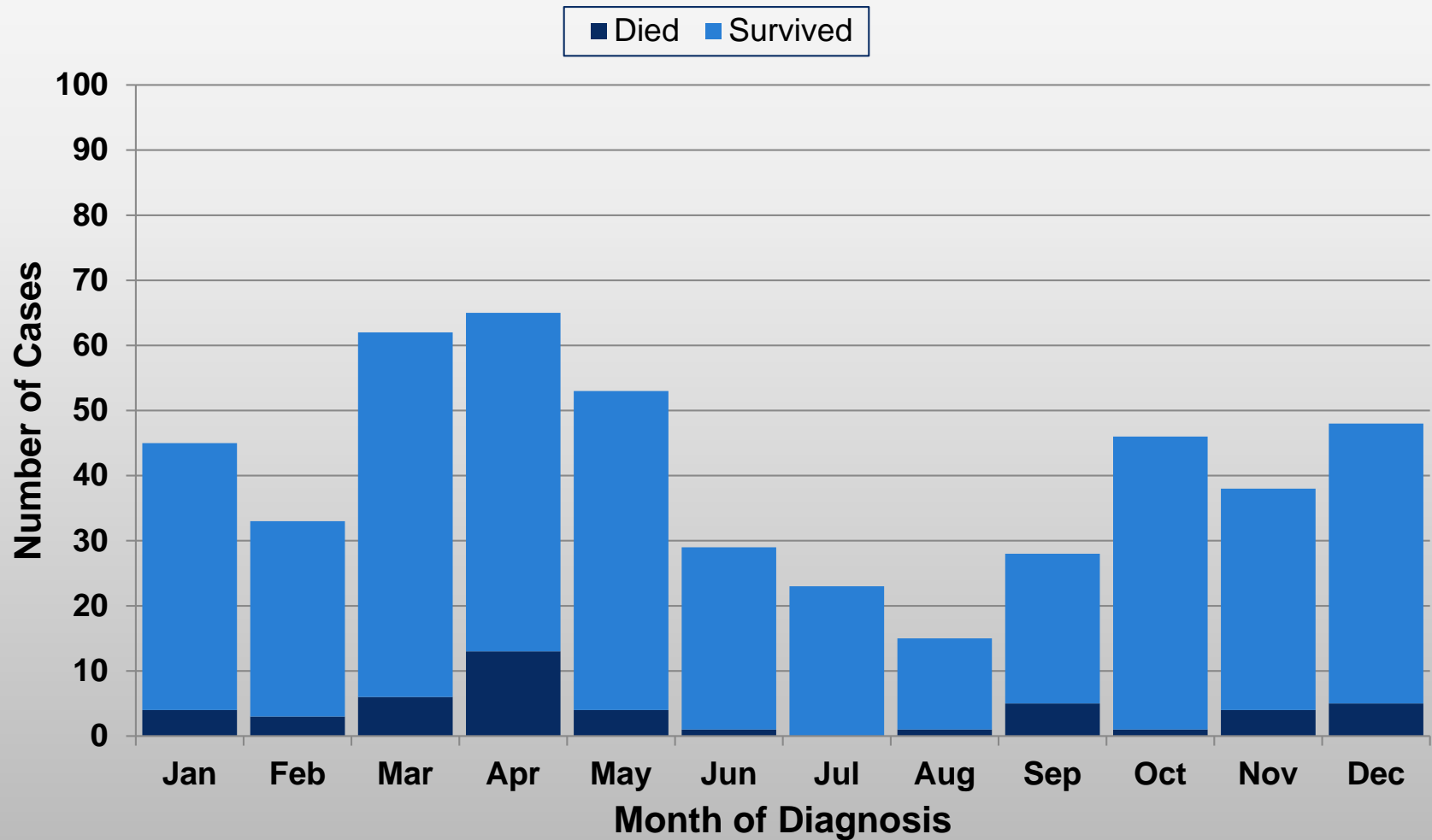
Invasive Pneumococcal Isolates by Resistance to Antimicrobial Agents, Minnesota, 2016 (n=456 viable isolates)

	Total Resistant Isolates	% Resistant Isolates
Penicillin resistance (R)*		
Meningitis breakpoints	84	18%
Non-meningitis breakpoints	2	<1%
Resistance to drug classes**		
No resistance	244	54%
R to 1 drug class	136	30%
R to 2-3 drug classes	47	10%
R to 4-5 drug classes	29	6%

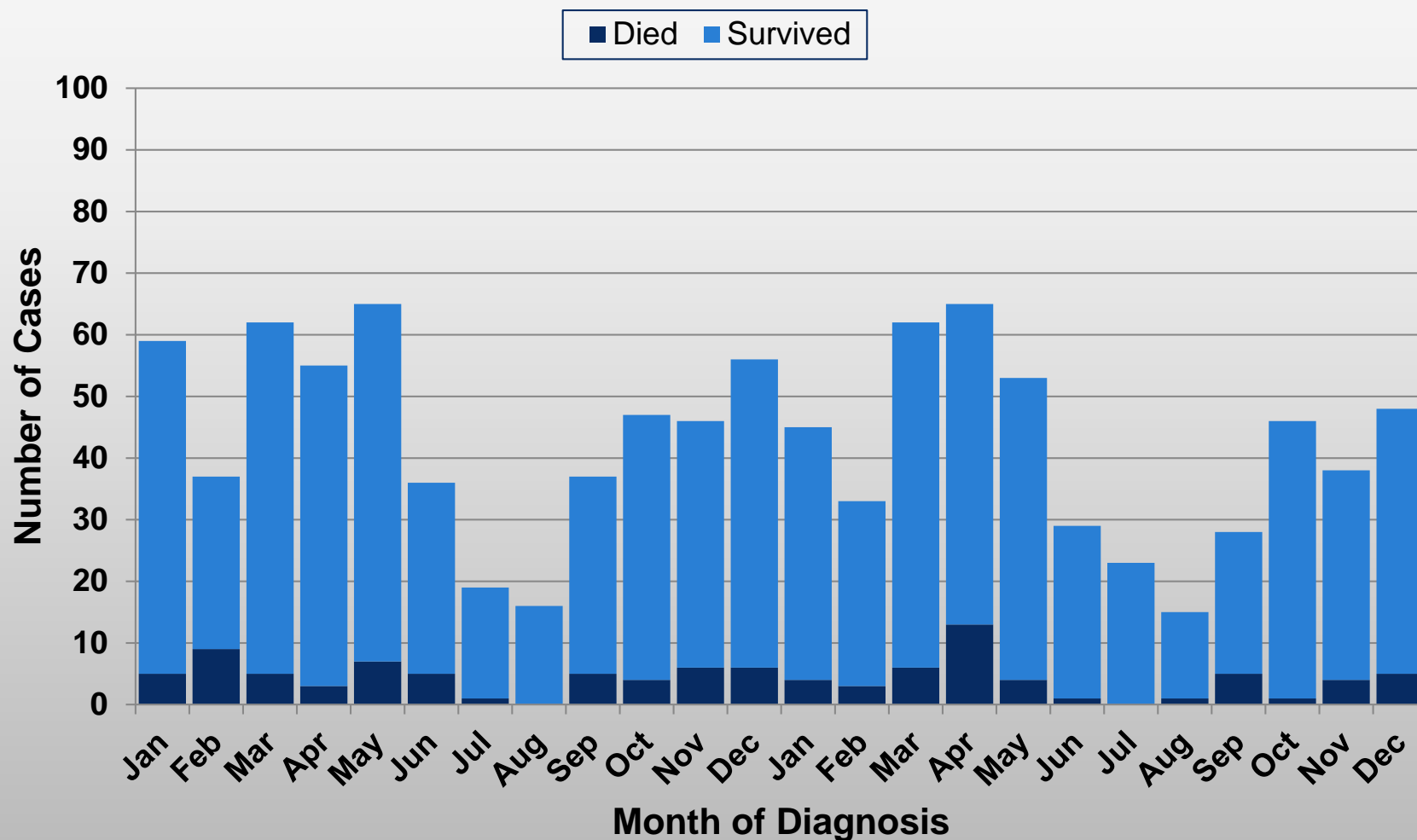
* Isolates with MIC \geq 0.12 μ g/ml are Penicillin-R for meningitis, \geq 8 μ g/ml for non-meningitis.

** Twelve drug classes assessed; R to beta-lactams was assessed by penicillin MIC \geq 0.12 μ g/ml.

Cases of Invasive Pneumococcal Disease by Month of Diagnosis and Outcome, Minnesota, 2016



Cases of Invasive Pneumococcal Disease by Month of Diagnosis and Outcome, Minnesota, 2015-2016



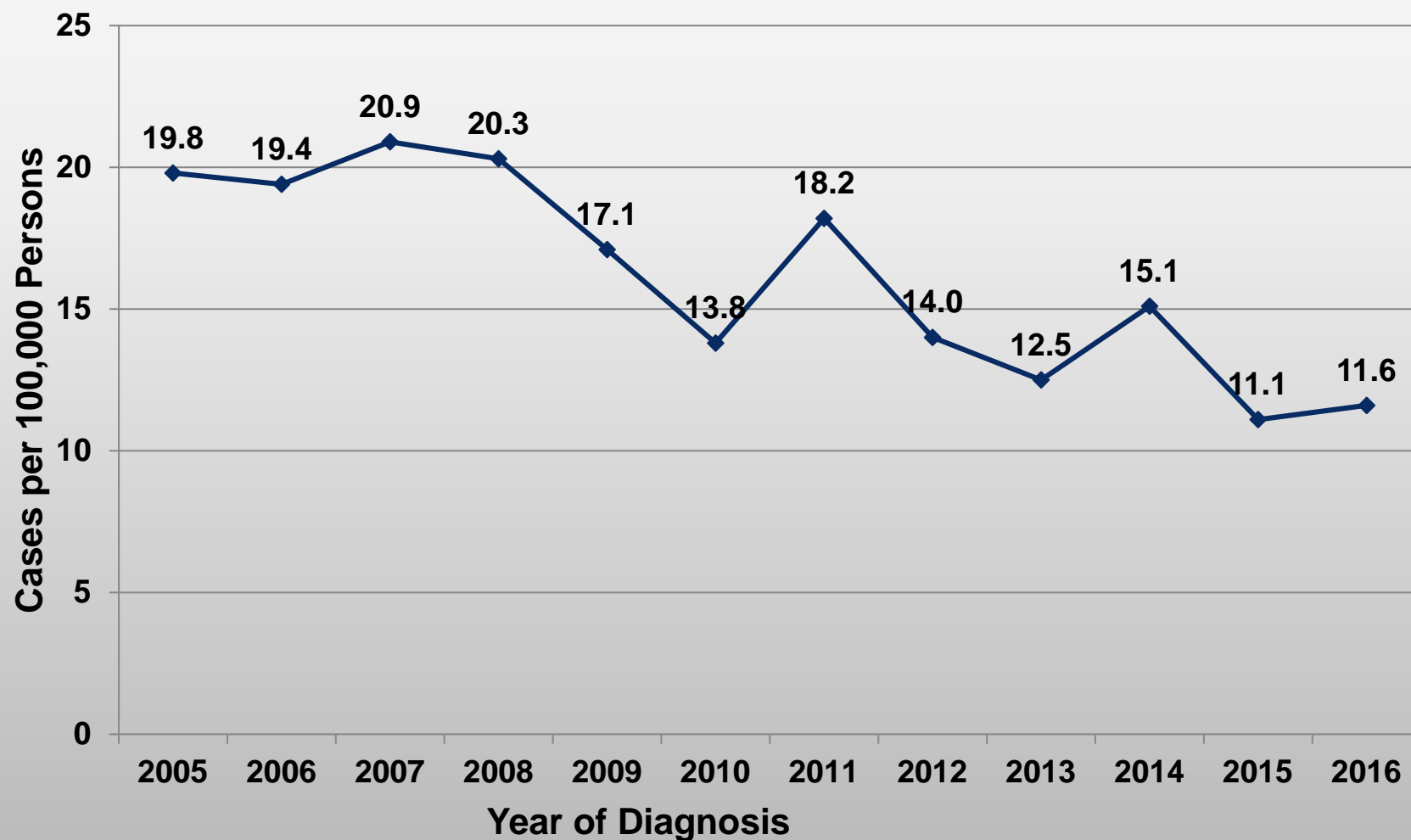
Invasive MRSA Surveillance Methods

- Cases include Hennepin and Ramsey County, Minnesota residents with invasive infections due to methicillin-resistant *Staphylococcus aureus* (MRSA).
- Invasive infections are from normally sterile body sites such as blood, cerebrospinal fluid and others. These usually cause serious illnesses (disease).
- All metro area hospitals and reference laboratories serving Minnesotans are contacted routinely to identify cases.

Invasive MRSA Surveillance Methods (cont.)

- Species confirmation, antibiotic resistance and other testing is performed by the MDH Public Health.
- Disease rates are based on census population data.
- The Centers for Disease Control and Prevention (CDC) includes these results from Minnesota and other states and regions in a network called Active Bacterial Core Surveillance (ABCs) which covers a population base of 42 million.

Incidence of Invasive MRSA Disease, Ramsey and Hennepin Counties, 2004-2016



* Data from years 2004-2007 includes Ramsey County only.

Incidence of Invasive MRSA Disease by Gender and Age Group, Ramsey and Hennepin Counties, Minnesota, 2016

Characteristic	Cases (n=206)	Incidence per 100,000 persons
Gender		
Male	130	14.9
Female	76	8.4
Age Group		
Under 1 yr.	1	4.0
1-4 yrs.	1	1.1
5-9 yrs.	1	0.9
10-19 yrs.	1	0.5
20-29 yrs.	13	4.8
30-39 yrs.	11	4.1
40-49 yrs.	19	9.0
50-59 yrs.	44	18.8
60-69 yrs.	52	27.6
70+ yrs.	63	41.1

Invasive MRSA Disease Cases and Deaths by Age Group, Ramsey and Hennepin Counties, Minnesota, 2016

Age Group	Cases	Deaths	% Died
Under 1 yr.	1	0	0%
1-4 yrs.	1	0	0%
5-9 yrs.	1	0	0%
10-19 yrs.	1	0	0%
20-29 yrs.	13	0	0%
30-39 yrs.	11	0	0%
40-49 yrs.	19	1	5.3%
50-59 yrs.	44	3	6.8%
60-69 yrs.	52	5	9.6%
70+ yrs.	63	12	19.0%
Total	206	21	10.2%

Incidence of Invasive MRSA Disease by Case Type, Ramsey and Hennepin Counties, Minnesota, 2016

Case Type	Cases	Incidence per 100,000 persons
Healthcare-associated	154	8.7
Community-associated	52	2.9

- Healthcare-associated if case had one or more of the following: MRSA infection was identified more than 3 days after hospital admission; history of hospitalization, surgery, dialysis or residence in a long-term care facility in the previous year; or, presence of an indwelling catheter.
- Community-associated: none of the previously mentioned criteria were met.

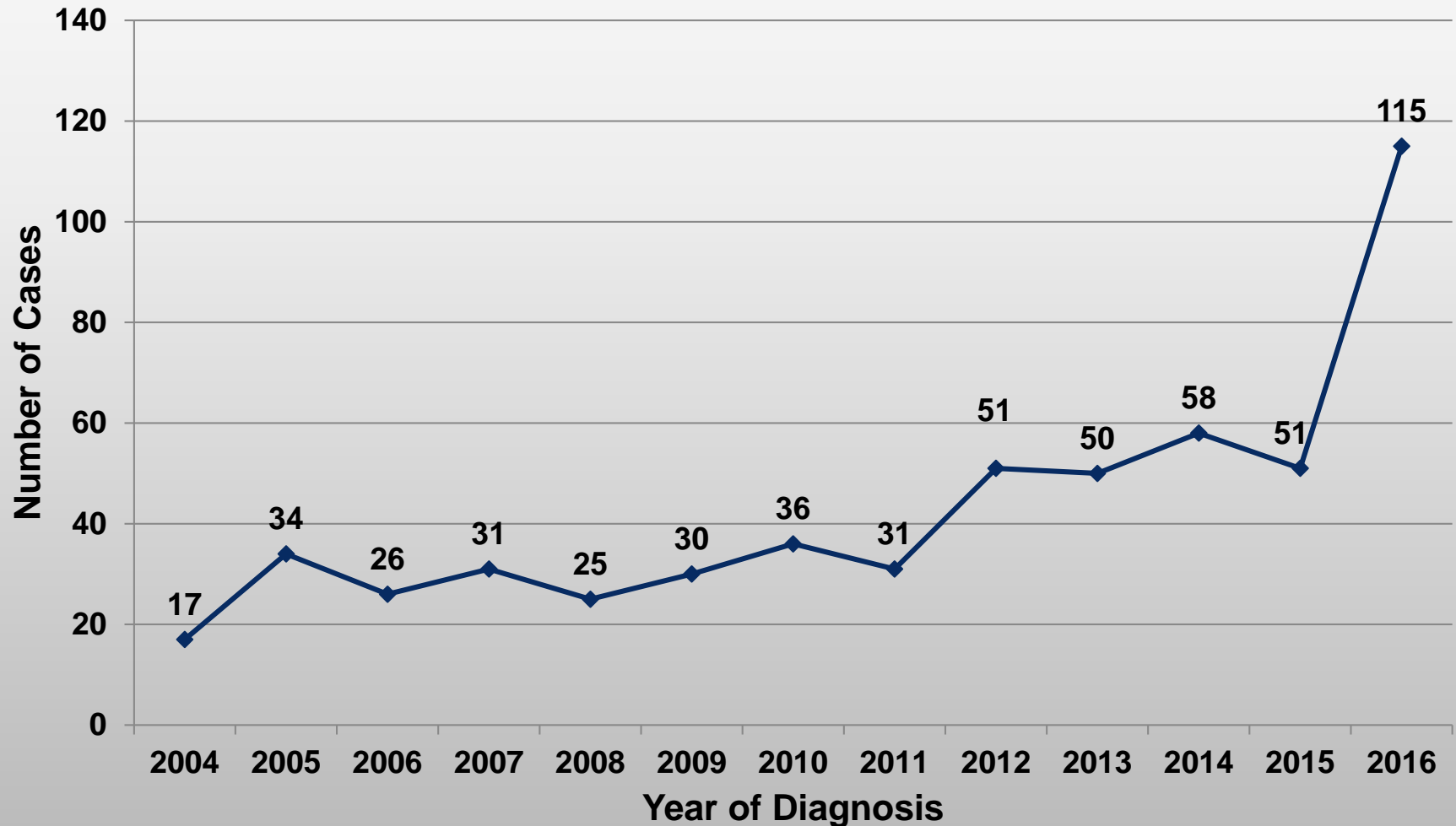
Invasive MRSA Disease by Type of Infection, Ramsey and Hennepin Counties, Minnesota, 2016

Type of Infection*	Cases
Bacteremia (blood)	157
Without another source of infection	63
With another source of infection	94
Septic arthritis (joint)	41
Pneumonia (lung)	23
Osteomyelitis (bone)	27
Cellulitis/skin abscess (skin)	44
Endocarditis (heart)	8
More than one infection type	184
Other infection**	51

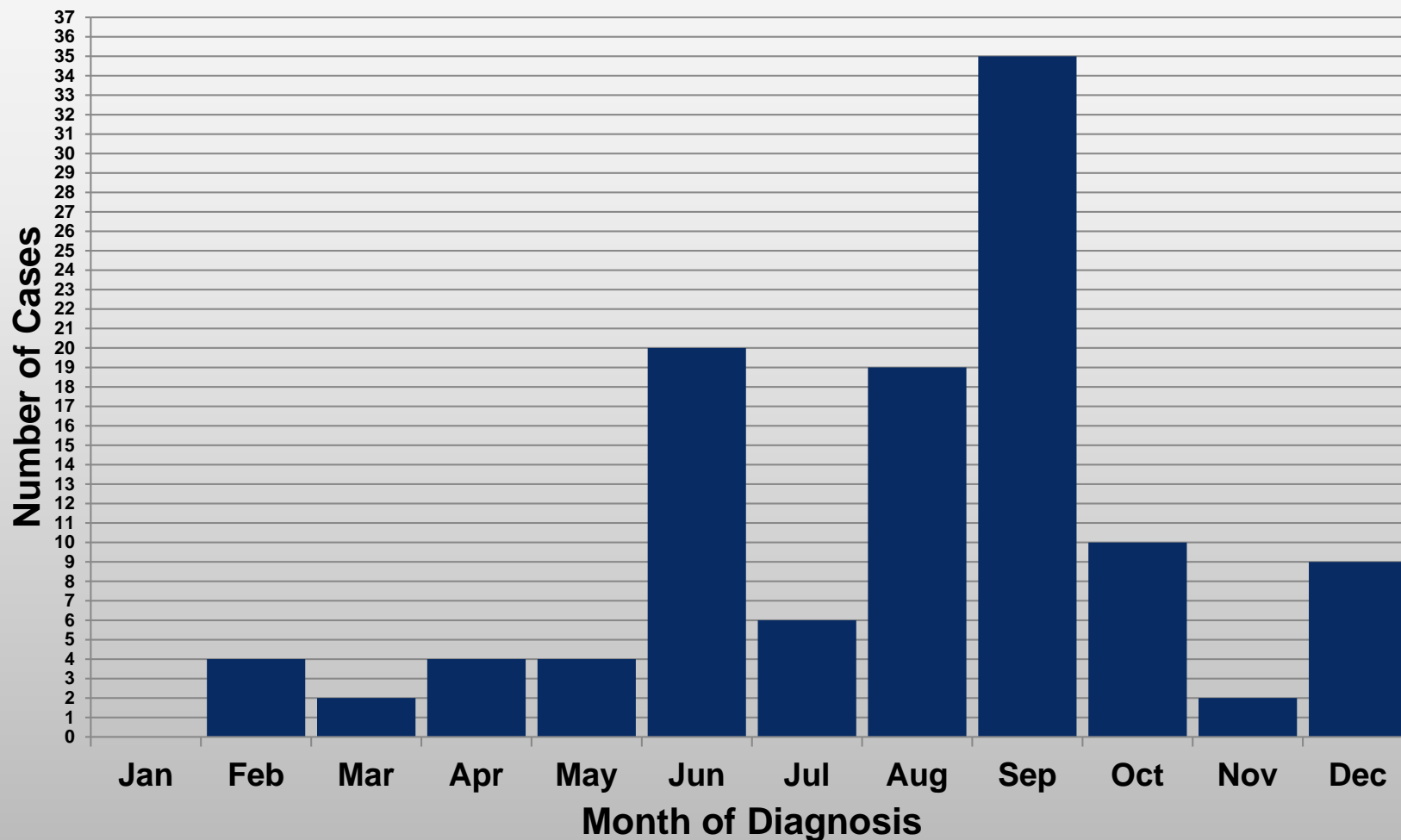
* Cases may have had more than 1 type of infections

** Other infections included bursitis, catheter site infection, chronic and/or pressure ulcers, empyema (pus), internal organ abscess, meningitis (brain/spinal cord), peritonitis, surgical incision or surgical site infections, septic emboli, septic shock, and urinary tract infections

Confirmed Legionnaires' Disease Cases By Year, Minnesota, 2004 - 2016



Confirmed Legionnaires' Disease Cases by Month of Diagnosis, Minnesota, 2016



Confirmed Legionnaires' Disease Cases by Age Group and Gender, Minnesota, 2016

Age Group	Male	Female	Total
18-29 yrs.	3	0	3
30-39 yrs.	4	3	7
40-49 yrs.	5	6	11
50-59 yrs.	22	12	34
60-69 yrs.	21	8	29
70+ yrs.	17	14	31
Total	72 (63%)	43 (37%)	115