



California Emerging Infections Program

2018 Data Highlights



California Emerging Infections Program (CEIP) core projects:

Active Bacterial Core surveillance (ABCs)

Foodborne Diseases Active Surveillance Network (FoodNet)

Healthcare-Associated Infections Community Interface (HAIC)

Human Papillomavirus Vaccine Impact Monitoring Surveillance Effort (HPV-Impact)

Influenza and RSV Hospitalization Surveillance (FluSurv-Net)

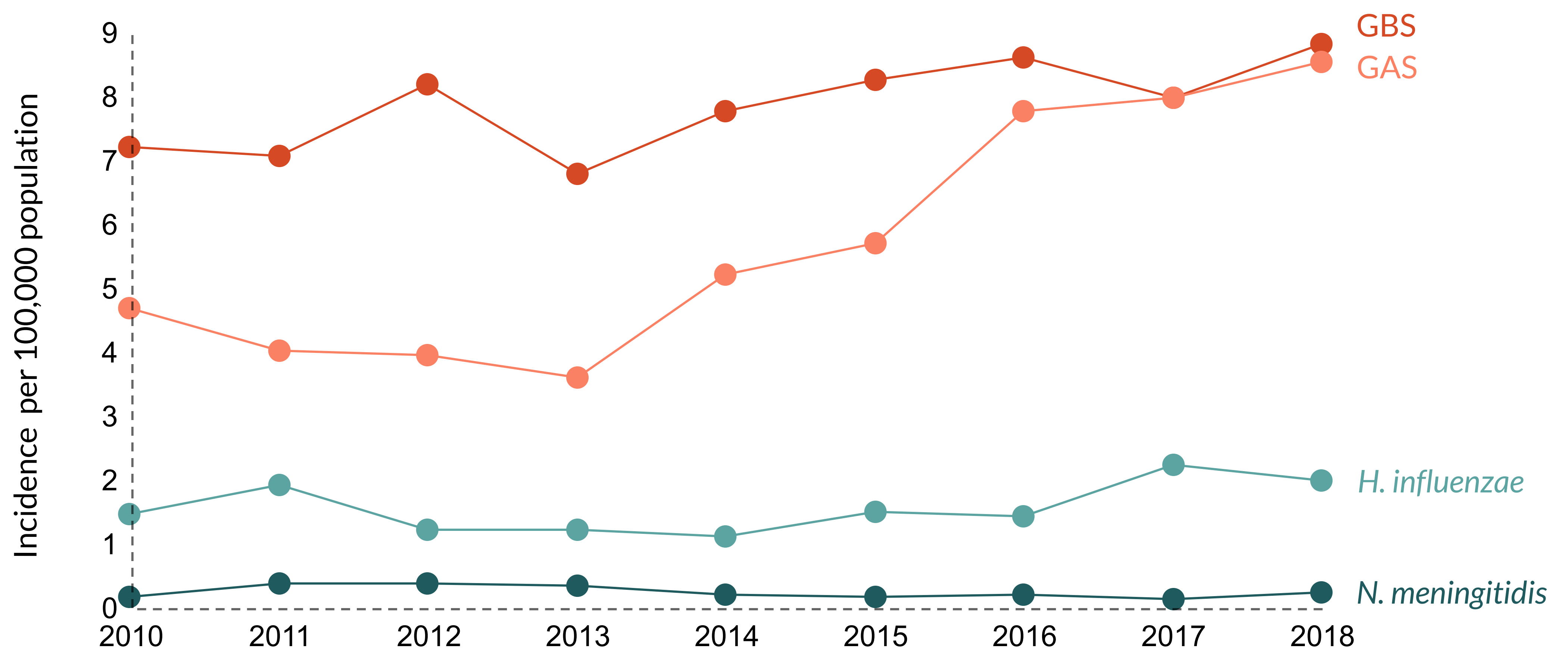
Released September 2019

Updated October 2019

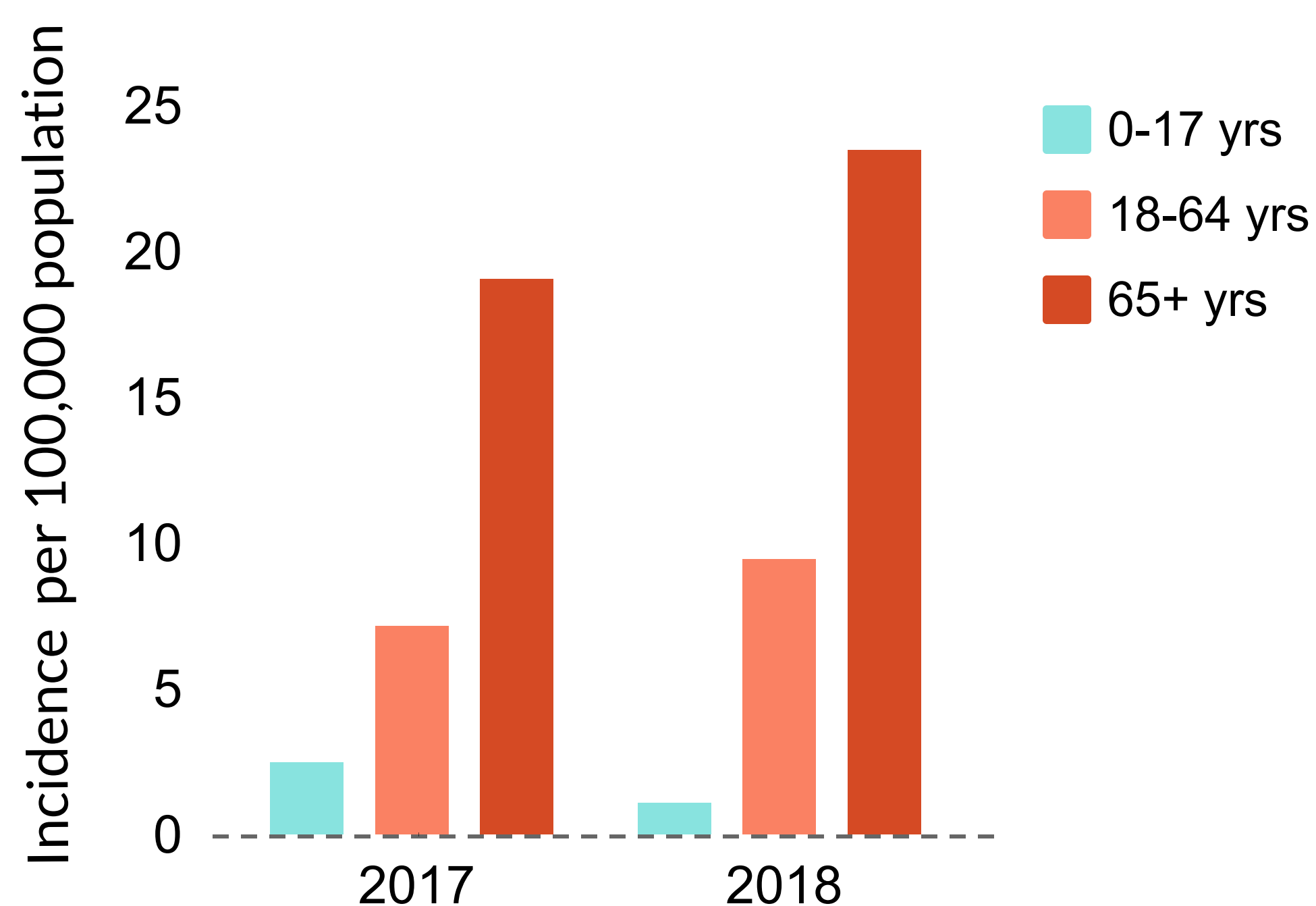
Active Bacterial Core surveillance (ABCs)

ABCs is an active, population-based surveillance effort in Alameda, Contra Costa, and San Francisco counties. ABCs determines the incidence and epidemiologic characteristics of invasive disease due to Group A *Streptococcus* (GAS), Group B *Streptococcus* (GBS), *Haemophilus influenzae*, *Neisseria meningitidis*, and *Streptococcus pneumoniae*.

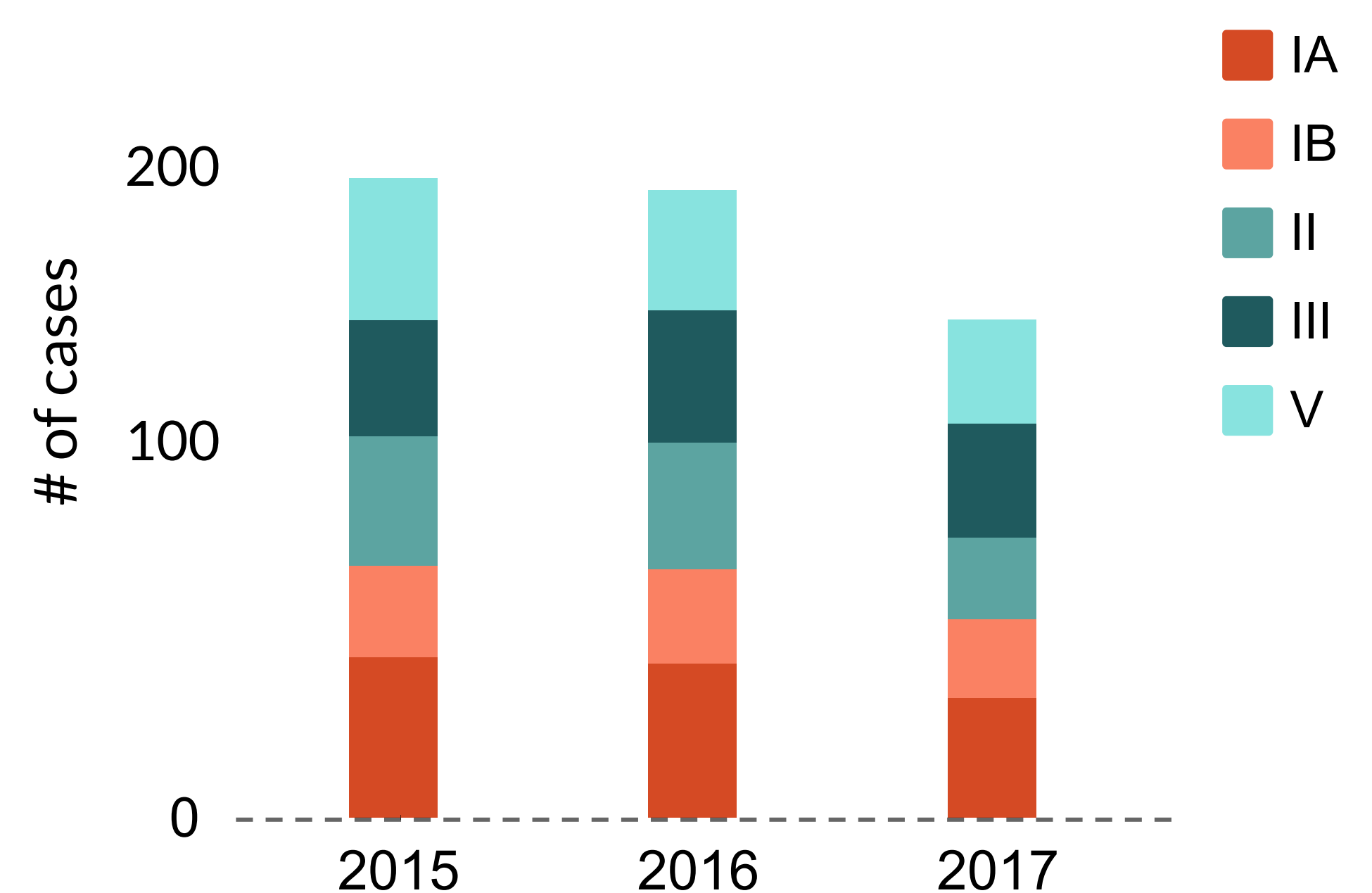
Incidence of **invasive Group A *Streptococcus*** continues to rise, 2010–2018



Invasive pneumococcal incidence **highest in older persons**, 2017-2018



Top five GBS serotypes, 2015-2017

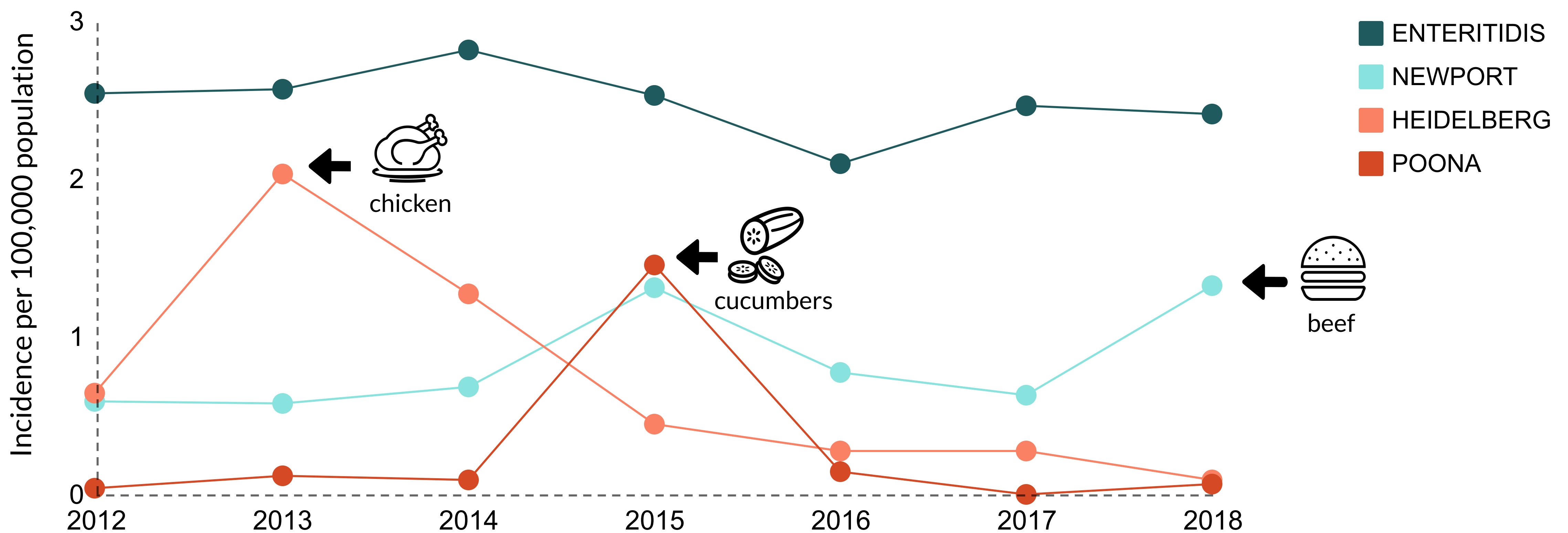


View data from all ten ABCs sites using CDC's interactive data tool <https://wwwn.cdc.gov/BactFacts/index.html>

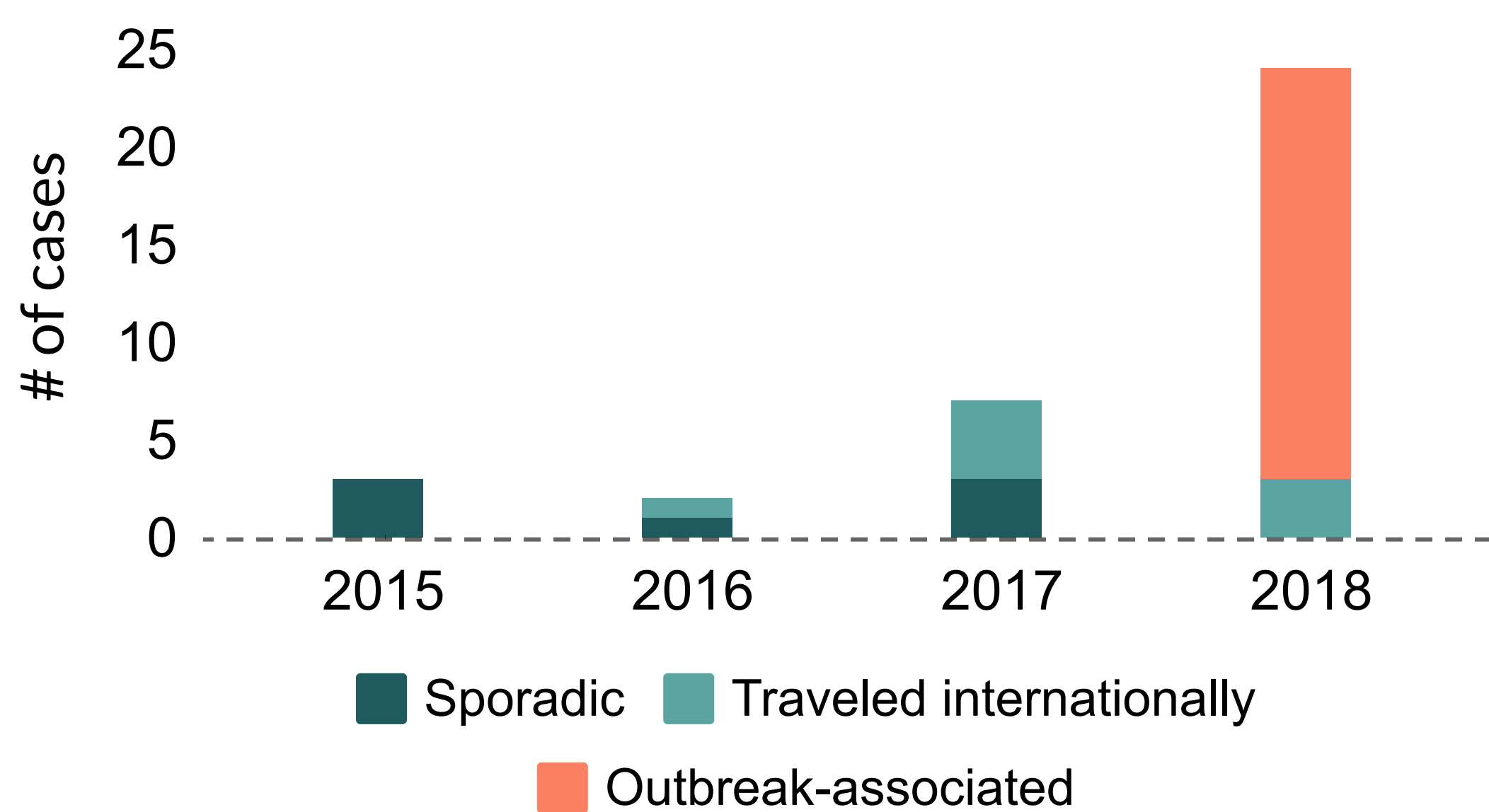
Foodborne Diseases Active Surveillance Network (FoodNet)

FoodNet conducts active, population-based surveillance in Alameda, Contra Costa, and San Francisco counties for pathogens commonly transmitted through food including *Salmonella*, *Shigella*, *Campylobacter*, Shiga toxin-producing *Escherichia coli* (STEC) O157 and non-O157, *Listeria monocytogenes*, *Yersinia*, *Vibrio*, and *Cyclospora*. FoodNet discontinued active surveillance for *Cryptosporidium* in December 2017.

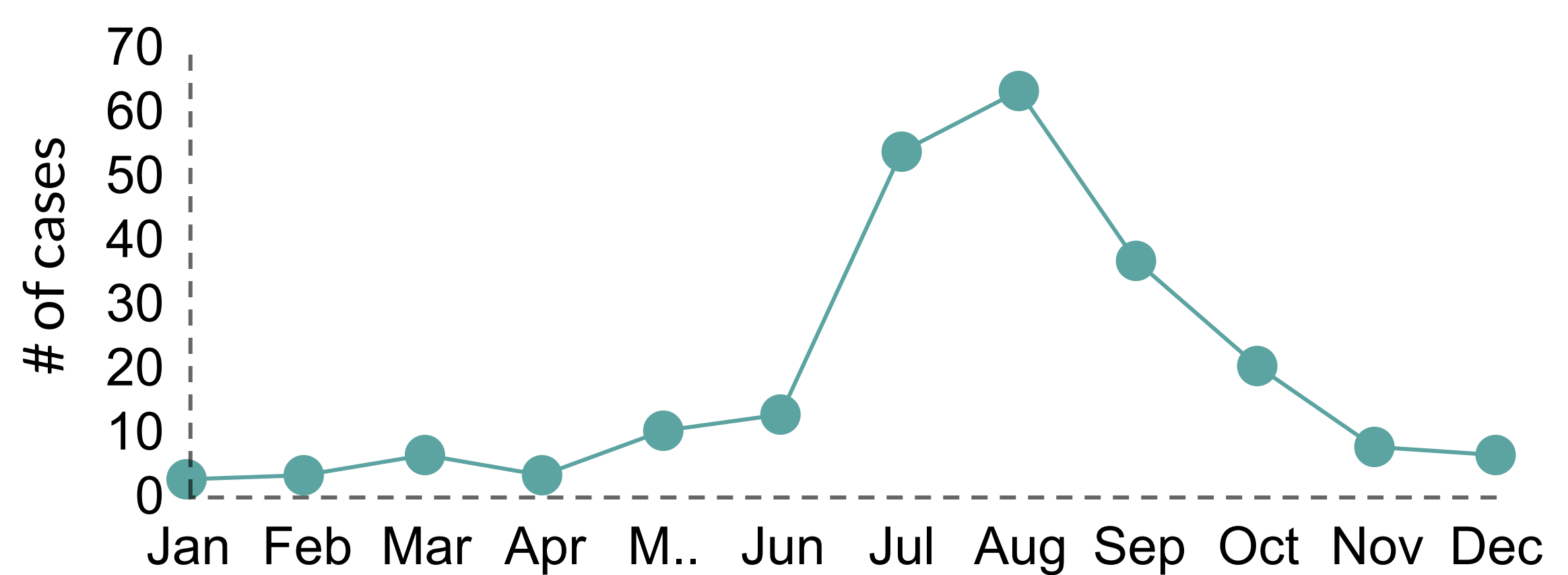
Salmonella Enteritidis incidence remains high
Annual fluctuation among other serotypes can be driven by outbreaks



Recent increase in *Cyclospora* infections due to foodborne outbreaks



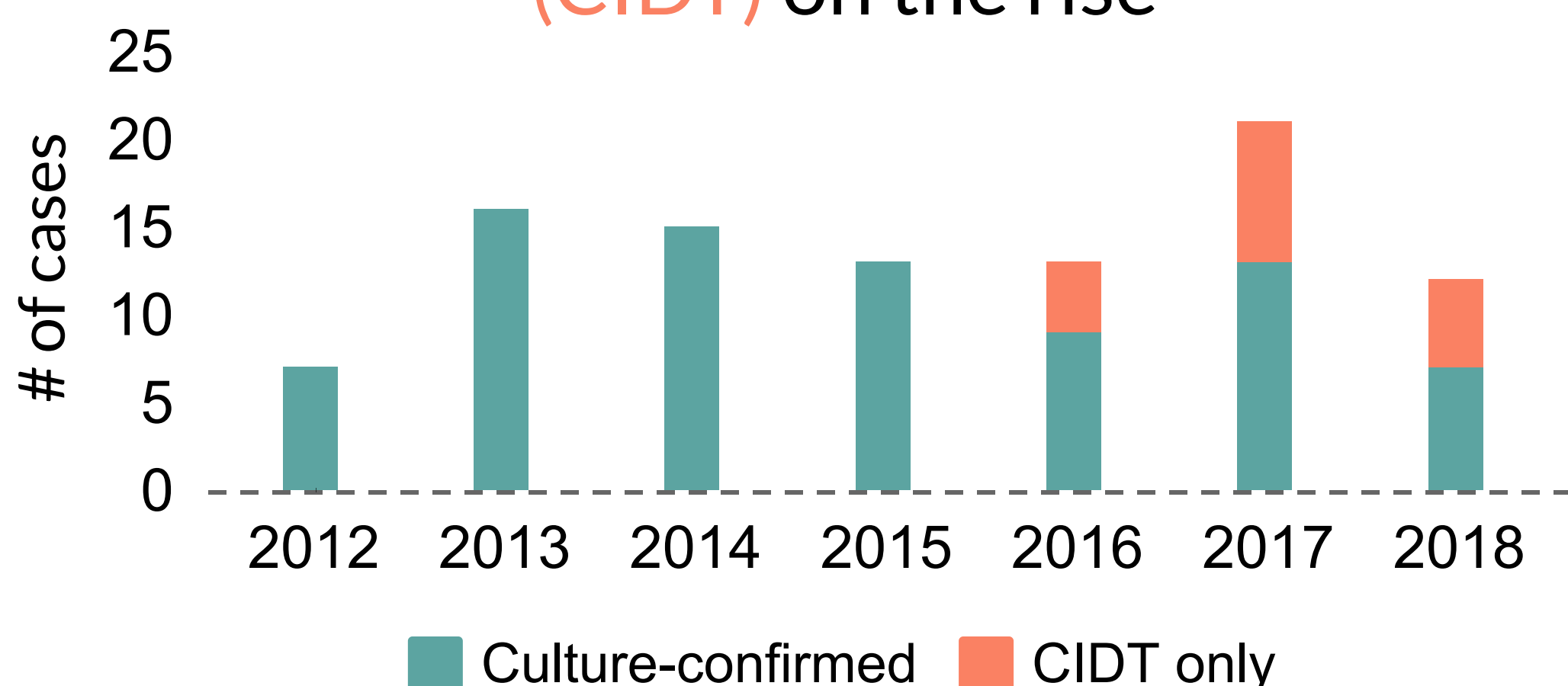
Seasonality of *Vibrio* infections, 2012-2018 (n=221)



Predominant *Vibrio* Species (%) and Sources (n), 2012-2018

Species	Stool	Ear	Wound	Blood
<i>Parahaemolyticus</i> (78%)	196	0	4	0
<i>Cholerae</i> (5%)	7	1	0	1
<i>Alginolyticus</i> (4%)	0	6	1	1
<i>Fluvialis</i> (4%)	6	0	0	1

Proportion of *Yersinia* cases diagnosed by culture-independent diagnostics test (CIDT) on the rise




View data from all ten FoodNet sites using CDC's interactive data tool www.cdc.gov/FoodNetFast

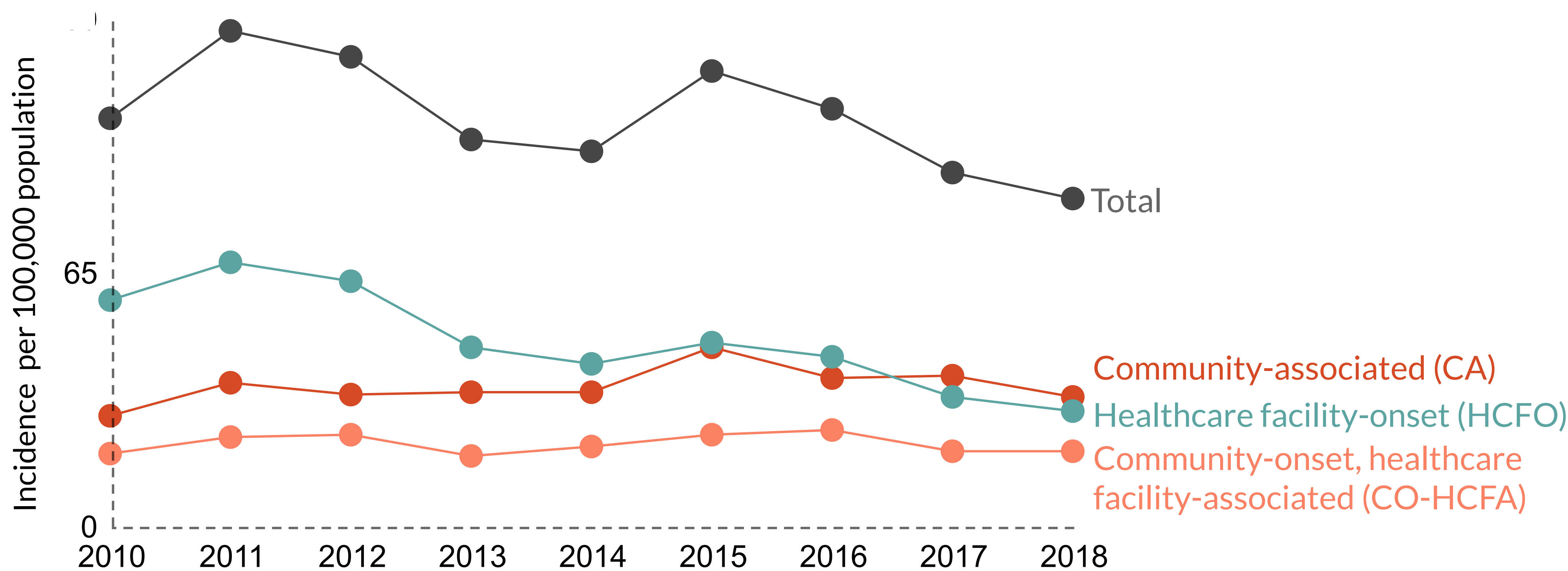
Healthcare-Associated Infections-Community Interface (HAIC)

HAIC conducts active, population-based surveillance for *Clostridioides difficile*, invasive methicillin-resistant *Staphylococcus aureus* (iMRSA) and methicillin-sensitive *Staphylococcus aureus* (iMSSA), candidemia (*Candida* spp. isolated from blood), and carbapenem-resistant *Enterobacteriaceae* (CRE). CEIP also collaborates with CDC to conduct point prevalence surveys of hospital-associated infections and appropriate antibiotic use, and collects data on conditions such as sepsis to help inform revisions to guidelines and definitions.

Clostridioides difficile Infections (CDI) in San Francisco County

Healthcare facility-onset incidence continues to decrease


Nomenclature of *Clostridium difficile* recently changed to *Clostridioides difficile*

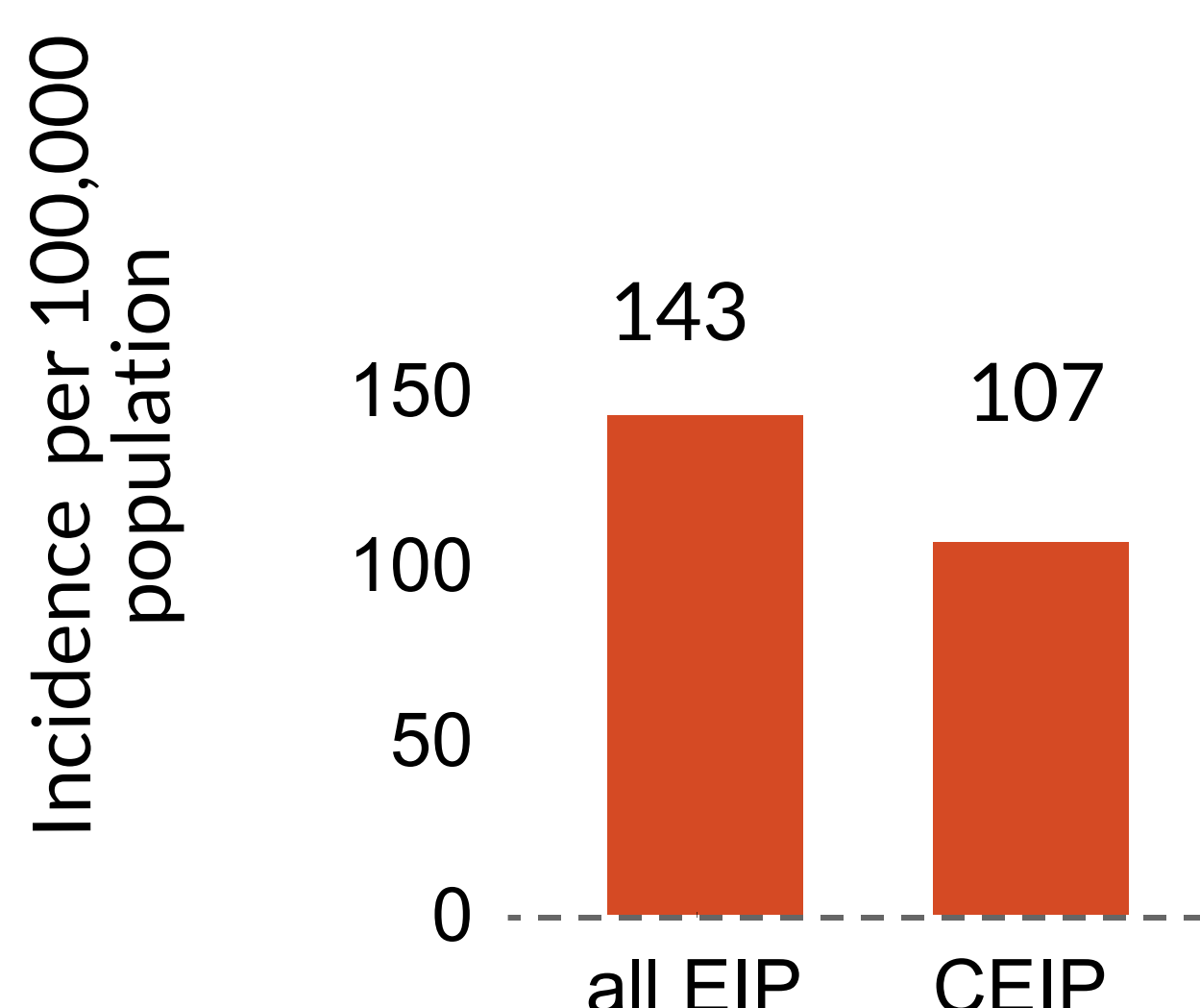


New CDI **treatment recommendations** from the Infectious Diseases Society of America in 2018

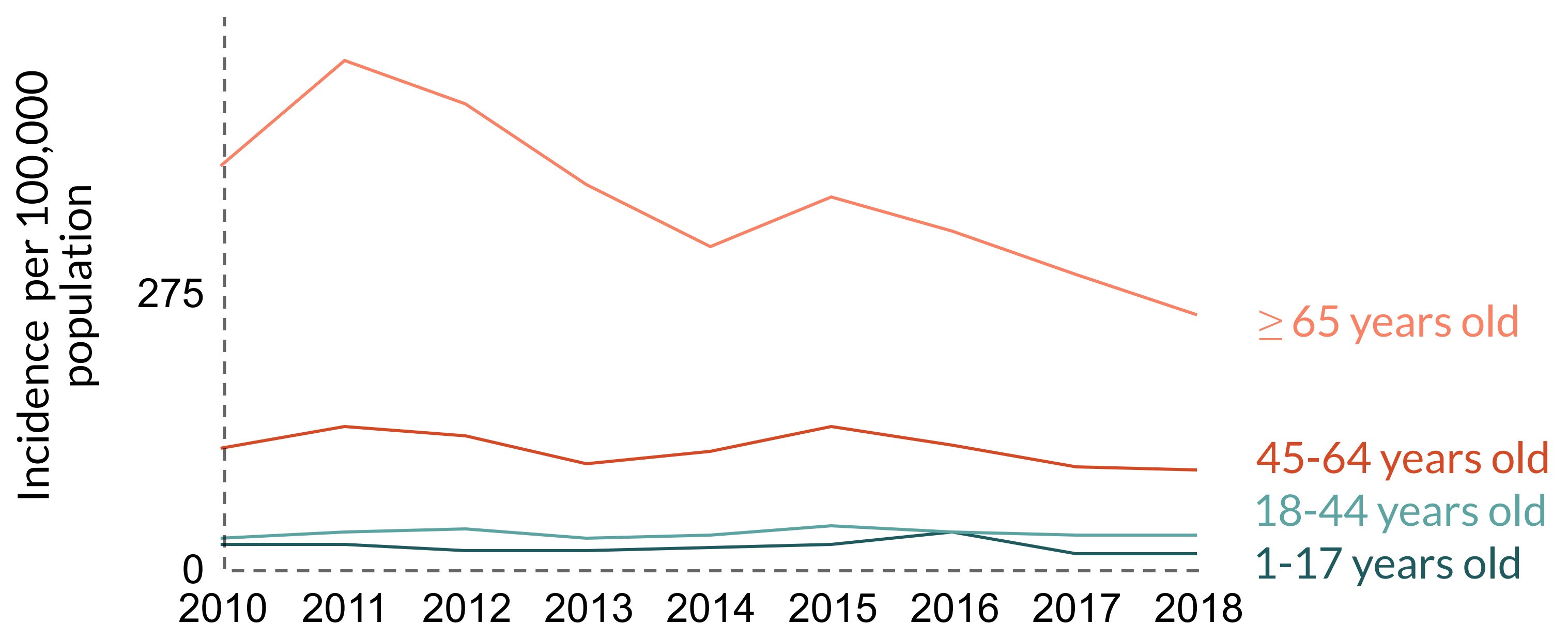
"...high-quality evidence, now favors a 10-day course of **vancomycin or fidaxomicin** rather than metronidazole for first-line therapy of mild/moderate CDI in adults."
-Larry K. Kociolek, MD, MSCI

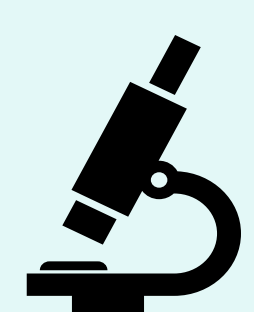
Full guidelines here: <https://www.idsociety.org/practice-guideline/clostridium-difficile/>

In 2016, CEIP incidence of CDI was **lower** compared to national EIP incidence



CDI incidence is **dropping** in persons ≥ 65 years old

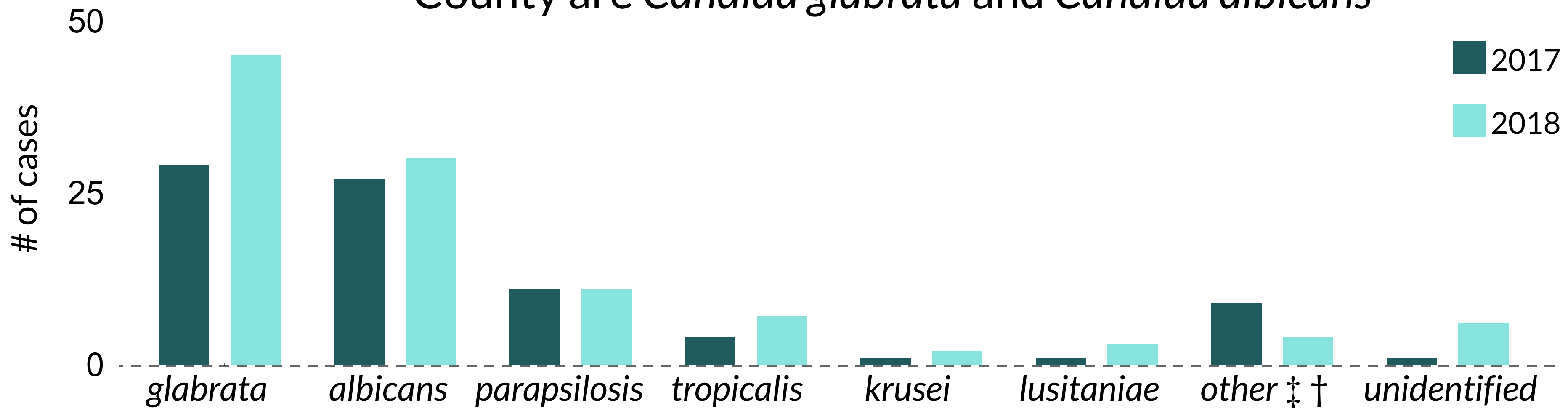


 **787**

total CDI stool specimens collected from 2010-2018. Isolates recovered from specimens undergo polymerase chain reaction (PCR) screening for toxin genes. Strain typing is performed using capillary-based PCR-ribotyping and results are analyzed against a library of standard profiles using BioNumerics.

Candidemia in Alameda County

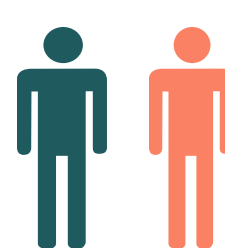
The predominant *Candida* species causing blood stream infections in Alameda County are *Candida glabrata* and *Candida albicans*

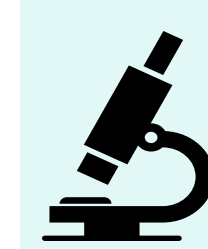


191
candidemia cases in 2017 and 2018

‡ 2017 other species: 5 *dubliniensis*, 2 *guilliermondii*, 1 *metapsilosis*, 1 *albicans/dubliniensis* † 2018 other species: 2 *kefyr*, 1 *lipolytica*, and 1 *pelliculosa*



69% had a central venous catheter in place on the same day or two days before blood culture

 50% were hospital-onset cases (blood culture collected ≥ 3 days into hospitalization)

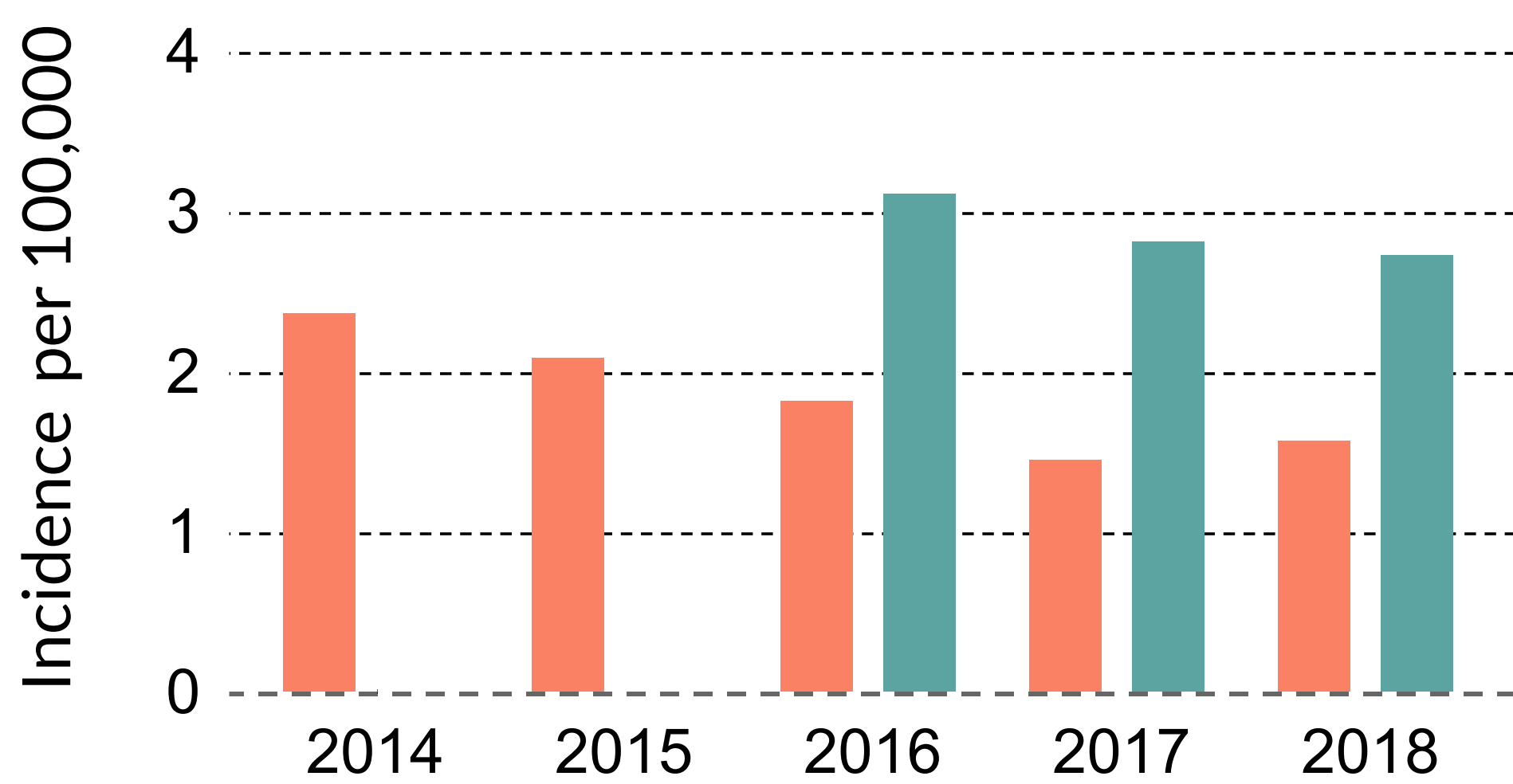


Thank you laboratorians for your isolate submissions! In 2018, we received 100 (93%) *Candida* isolates.

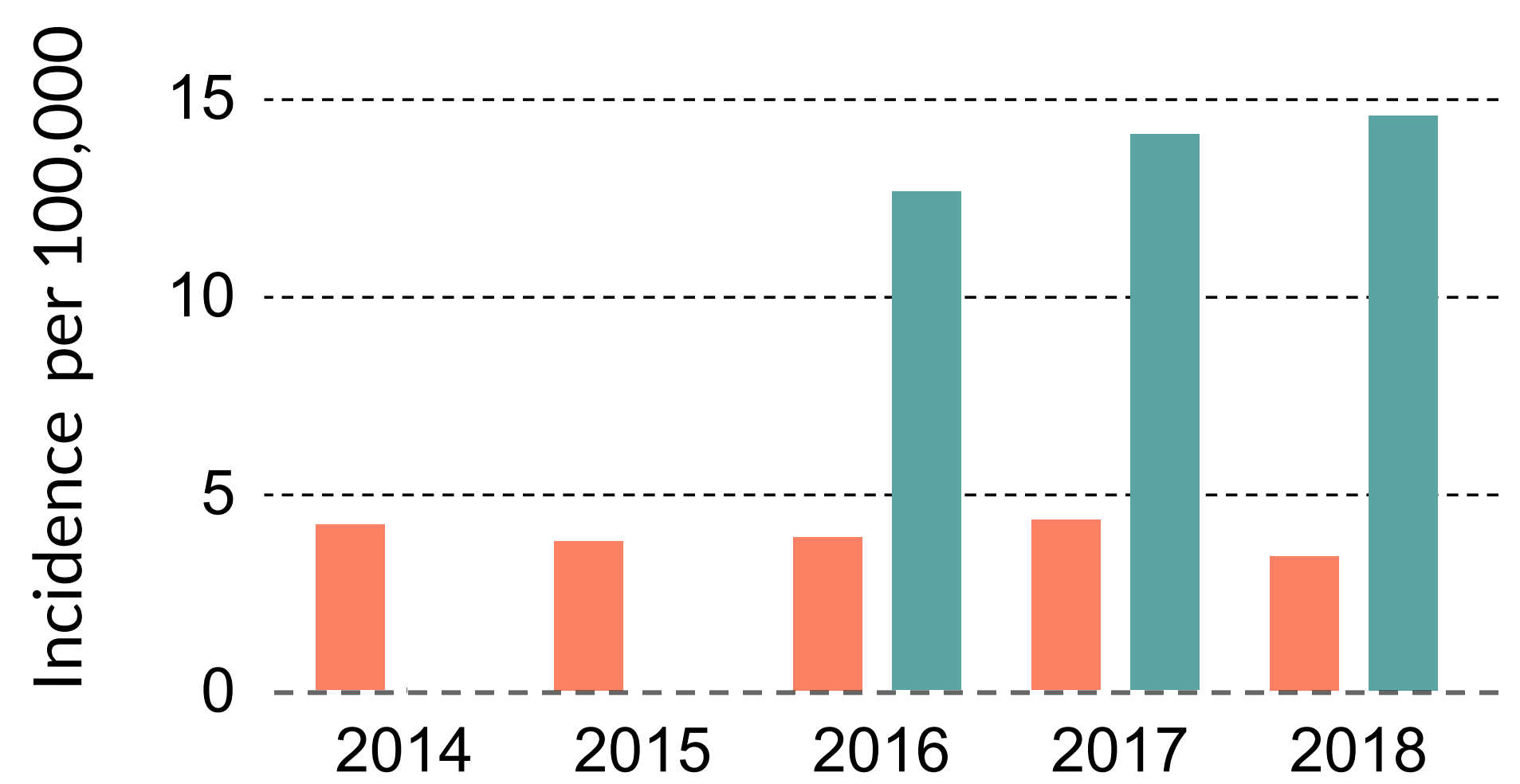
Staphylococcus aureus

-  Invasive methicillin-resistant *Staphylococcus aureus* (iMRSA) (surveillance began in 2005)
-  Invasive methicillin-sensitive *Staphylococcus aureus* (iMSSA) (surveillance began in 2016)

The incidence of hospital-onset iMSSA and iMRSA continues to decline



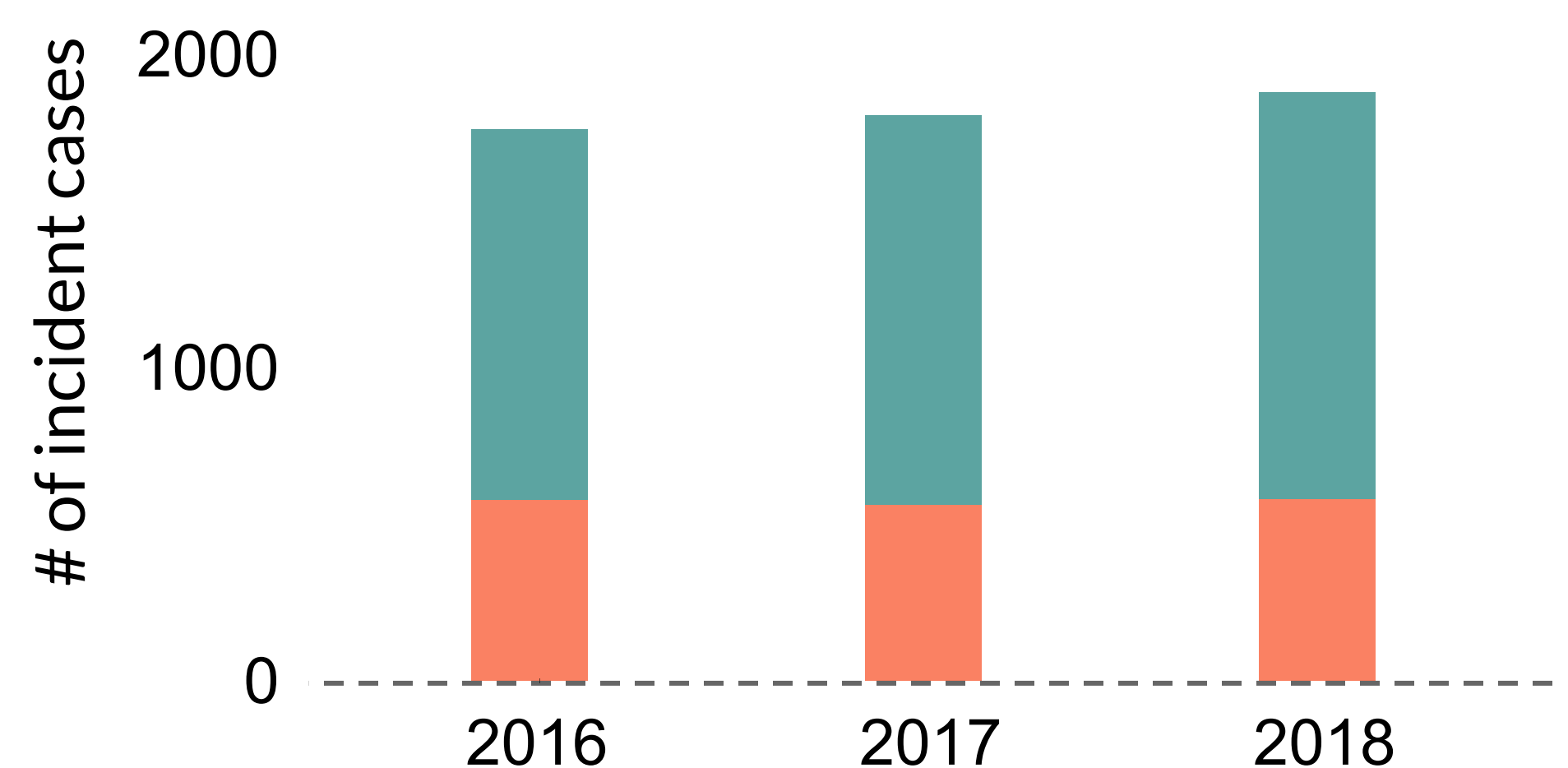
The incidence of community-associated iMSSA is increasing



From 2016-2018, compared to iMSSA, iMRSA cases experienced:

- significantly longer median lengths of hospital stays
- more infected pressure ulcers, pneumonia, septic emboli, and/or skin abscess
- more chronic pulmonary disease, cerebral vascular accident, HIV or AIDs, peripheral vascular disease, hematologic malignancy, pre-existing decubitus ulcers, abscesses/wounds, and/or chronic skin breakdown
- more likely to smoke tobacco and/or abuse drugs
- less likely to be diagnosed with bursitis, septic arthritis and/or obesity


The number of iMSSA incident cases are double that of iMRSA



Hospital onset: (+) culture as an inpatient on or after hospital day 3

Community-associated: (+) culture as an outpatient or inpatient on or before hospital day 3 without documented health care risk factor

Carbapenem-resistant *Enterobacteriaceae* (CRE)

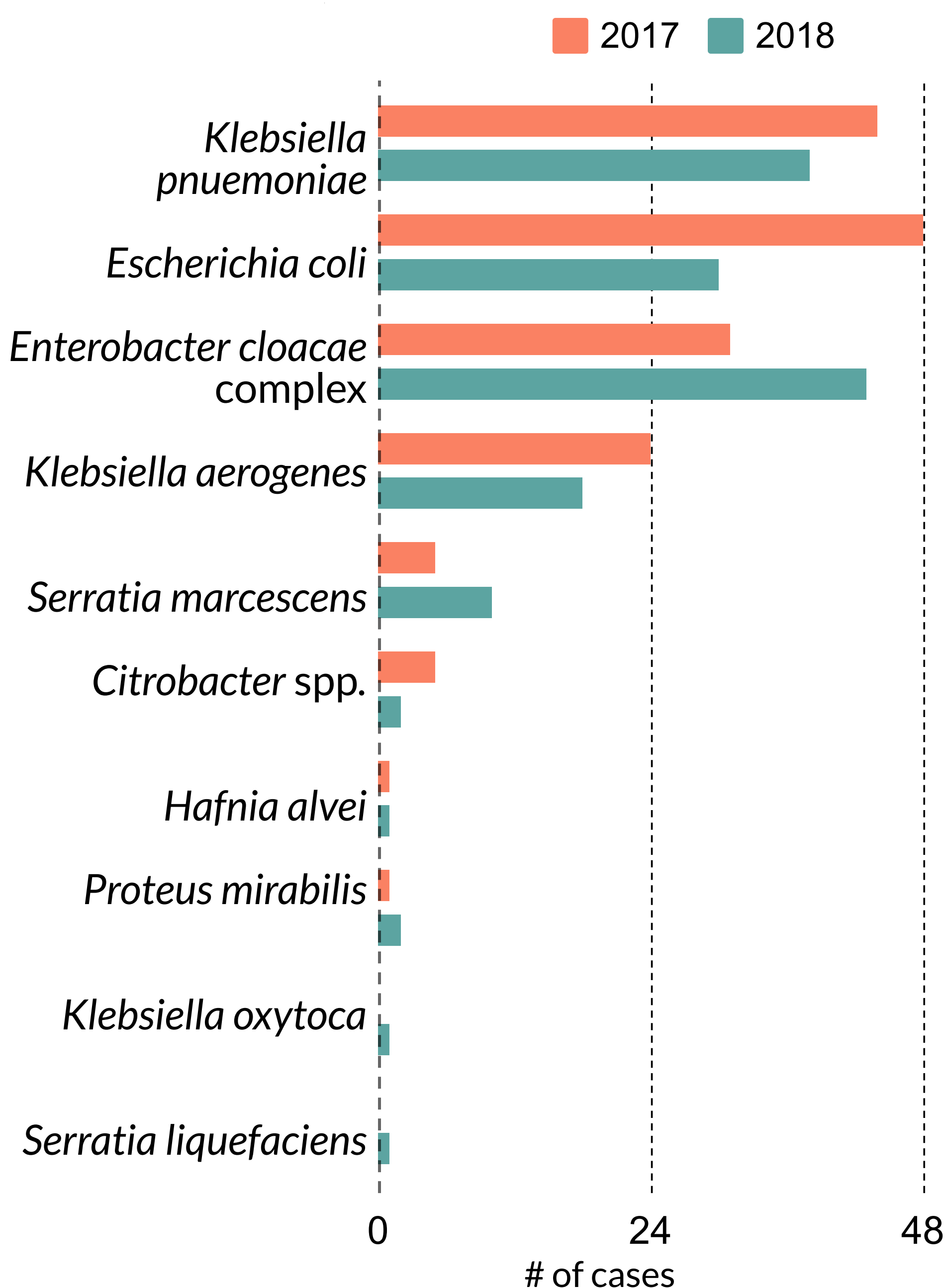
 CEIP began surveillance for carbapenem-resistant *Enterobacteriaceae* species (isolated from sterile and non-sterile sources) on January 1, 2017, in Alameda, Contra Costa, and San Francisco counties.

CRE is most frequently isolated from urine, followed by rectal swabs, respiratory sources, wounds and abscesses, 2017-2018

Species	Urine	Rectal Swab	Respiratory	Wound/ Abscess	Blood	Other*	Total
<i>Klebsiella pneumoniae</i>	38	25	10	2	3	5	83
<i>Escherichia coli</i>	47	9	2	6	6	8	78
<i>Enterobacter cloacae</i> complex	37	3	12	11	5	6	74
<i>Klebsiella aerogenes</i>	9	14	7	5	0	7	42
<i>Serratia marcescens</i>	4	0	5	2	1	2	14
<i>Citrobacter</i> spp.	5	1	0	1	0	0	7
<i>Proteus mirabilis</i>	3	0	0	0	0	0	3
<i>Hafnia alvei</i>	1	0	0	0	0	1	2
<i>Klebsiella oxytoca</i>	0	0	1	0	0	0	1
<i>Serratia liquefaciens</i>	0	0	0	1	0	0	1
Total	144	52	37	28	15	29	305

*Includes tissue, bone, CSF, and peritoneal, pleural, and joint fluids.

The big 3 - *Klebsiella* spp., *E. coli*, and *Enterobacter* spp. are the predominant species of CRE



78%
(238/305) of CRE isolates were tested for carbapenemase

24%
(58/238) of these isolates tested positive – primarily for the KPC and NDM genes

Organism	Positive Genotypic Tests				Positive Phenotypic Test	Total
	KPC	NDM	OXA	KPC & OXA		
<i>Klebsiella pneumoniae</i>	17	5	3*	0	3	28
<i>Enterobacter cloacae</i> complex	4	0	0	0	2	6
<i>Escherichia coli</i>	2	13	3**	0	0	18
<i>Serratia marcescens</i>	2	0	0	0	1	3
<i>Citrobacter</i> spp.	1	0	0	0	0	1
<i>Klebsiella oxytoca</i>	1	0	0	0	0	1
<i>Citrobacter freundii</i>	0	0	0	1^	0	1
Total	27	18	6	1	6	58

*OXA-48; **1 OXA, 1 OXA-48, 1 OXA-181; ^OXA-48

285 genotypic and phenotypic tests were performed on 238 isolates*

Genotypic Testing		Phenotypic Testing			Total
PCR	Whole Genome Sequencing	CarbaNP	Modified CIM	Modified Hodge Test	
170	65	29	17	4	285

*some isolates were tested with multiple methods

All *Proteus* spp. must be resistant to either ertapenem, meropenem or doripenem. *Citrobacter* spp. includes *C. freundii* and *C. youngae*.

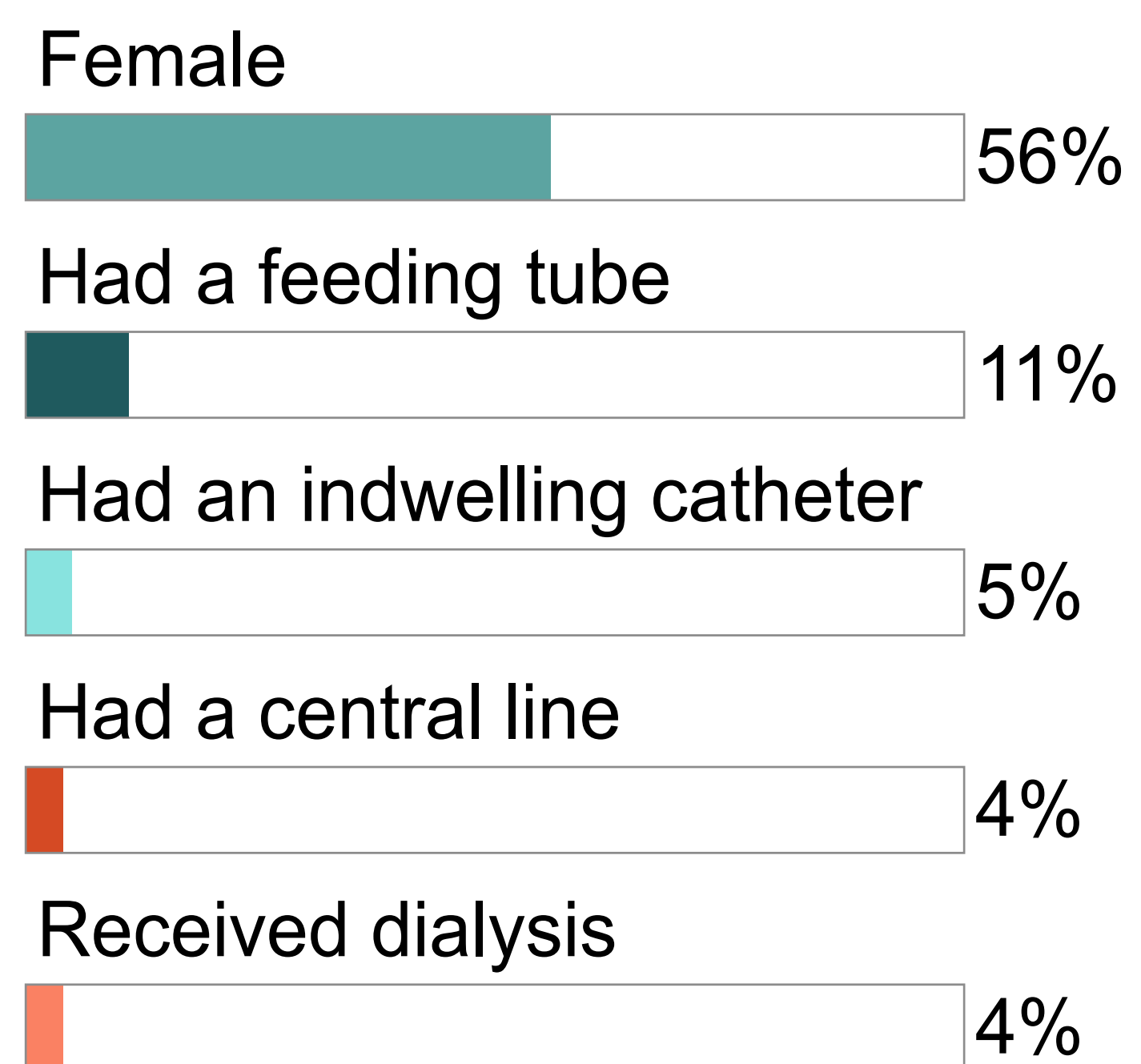
Nursing Home Prevalence Survey (NHPS)

The primary objectives of the NHPS were to: 1) estimate healthcare-associated infection (HAI) prevalence in a large sample of nursing home residents; 2) determine the distribution of HAI by infection type and pathogen (including antimicrobial-resistant pathogens); and 3) estimate the prevalence and describe the rationale for antimicrobial use (AU) in a large sample of nursing home residents. Additional objectives included: 1) assessing the quality of antimicrobial prescribing in selected clinical circumstances, and 2) estimating the burden of HAIs and AU among nursing home residents in the United States. HAIs are defined according to the 2012 McGeer criteria* for infection surveillance in long-term care populations.

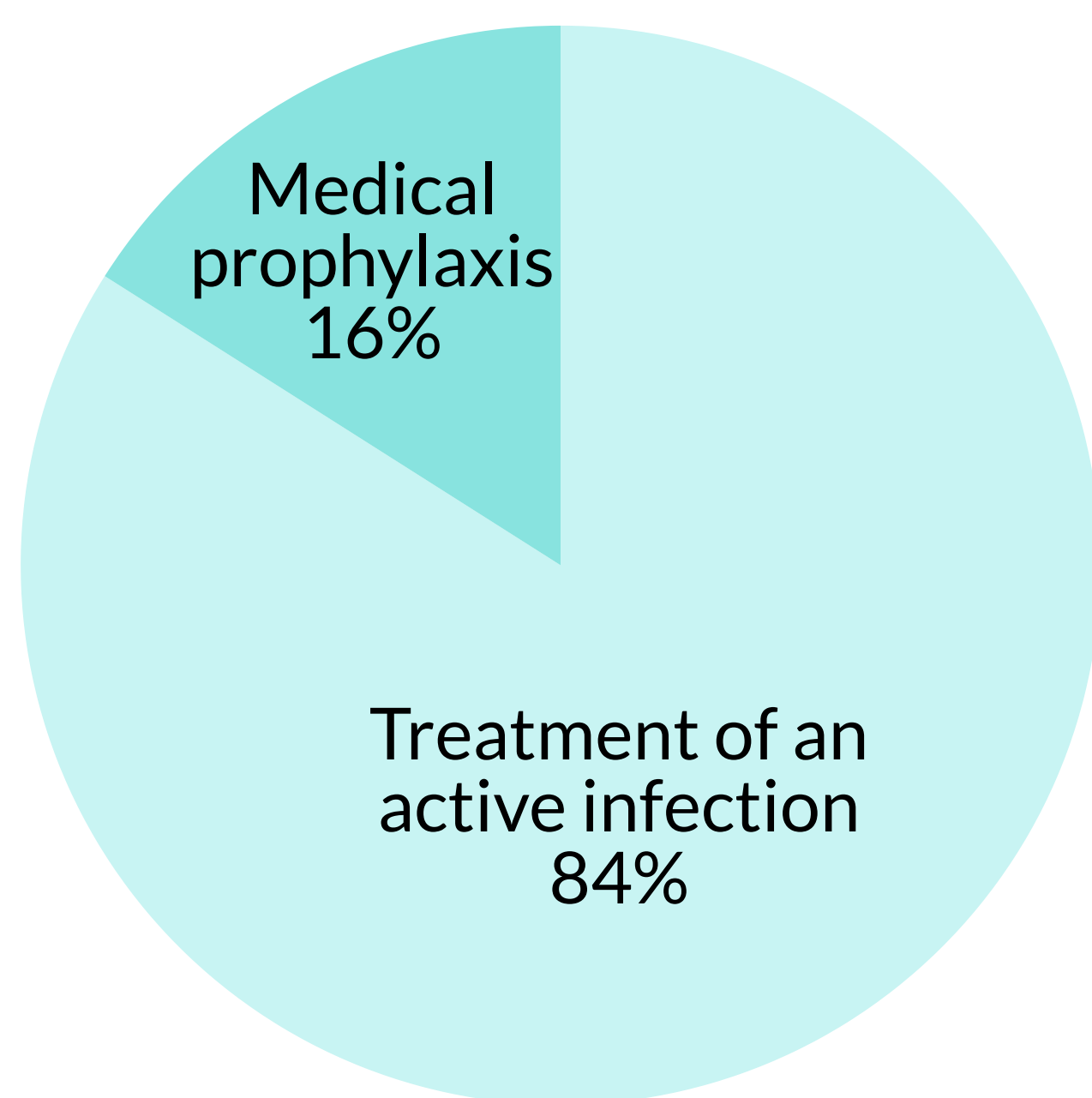
 CEIP recruited 22 nursing home facilities in Alameda, Contra Costa, and San Francisco counties for participation. Data were collected for 1,400 residents in 2017.

Nursing home resident characteristics

- 73** average age (range 21 to 108 years)
- 8%** received antimicrobials on the day of survey or the day before
- 24** healthcare-associated infections were detected, of these 42% were skin and mucosal infections, 21% respiratory infections, 17% urinary tract infections, 13% gastrointestinal infections, and 8% systemic infections




Majority of antimicrobials given for treatment of an active infection



Four most used drugs and routes

Drug	Route
Cephalexin	Oral
Trimethoprim	Oral
Sulfamethoxazole	Oral
Cefazolin	Intravenous

 CEIP, in collaboration with CDC, will conduct another phase of the Healthcare-Associated Infections and Appropriate Antimicrobial Use Prevalence Survey in acute care hospitals in 2020. One of the objectives of the 2020 survey is to identify changes over time in overall HAI prevalence and appropriate antimicrobial use. In fall 2019, we will begin recruiting facilities to participate.

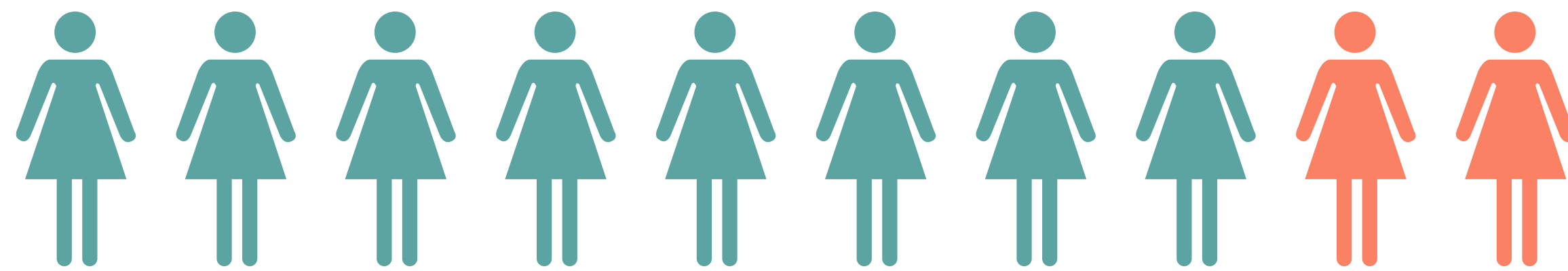
* Stone N, et al. Surveillance Definitions of Infections in Long-Term Care Facilities: Revisiting the McGeer Criteria. *Infect Control Hosp Epi* 2012;33:965-977.

Human Papillomavirus Vaccine Impact Monitoring Surveillance (HPV-Impact)

Since 2008, HPV-Impact has been conducting population-based surveillance of cervical pre-cancer in Alameda County to monitor the impact of the HPV vaccines. Effective January 1, 2018, HPV-Impact expanded surveillance efforts to include cervical cancer cases.

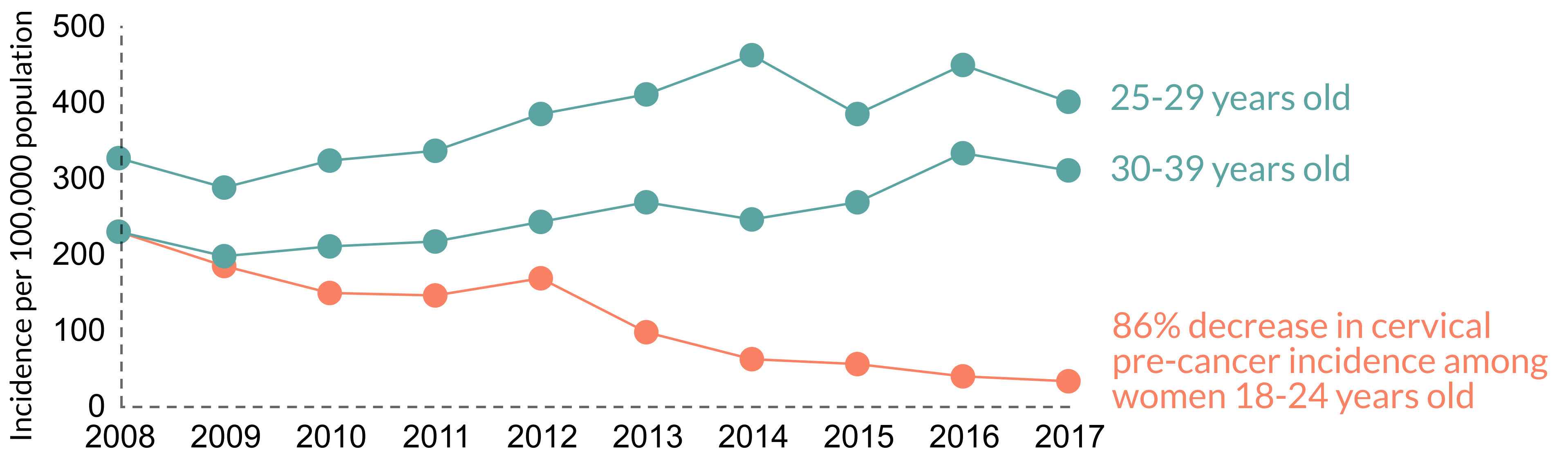
Most cervical pre-cancers would be prevented through HPV vaccination

8,080 cervical pre-cancers reported in Alameda County 2008-2016



8 in 10 Alameda County cervical pre-cancer specimens contained only HPV types covered by the currently available 9-valent vaccine.

Cervical pre-cancer diagnoses are declining in women 18-24 years old



Mandated reporting to the California Department of Public Health, HPV-Impact unit

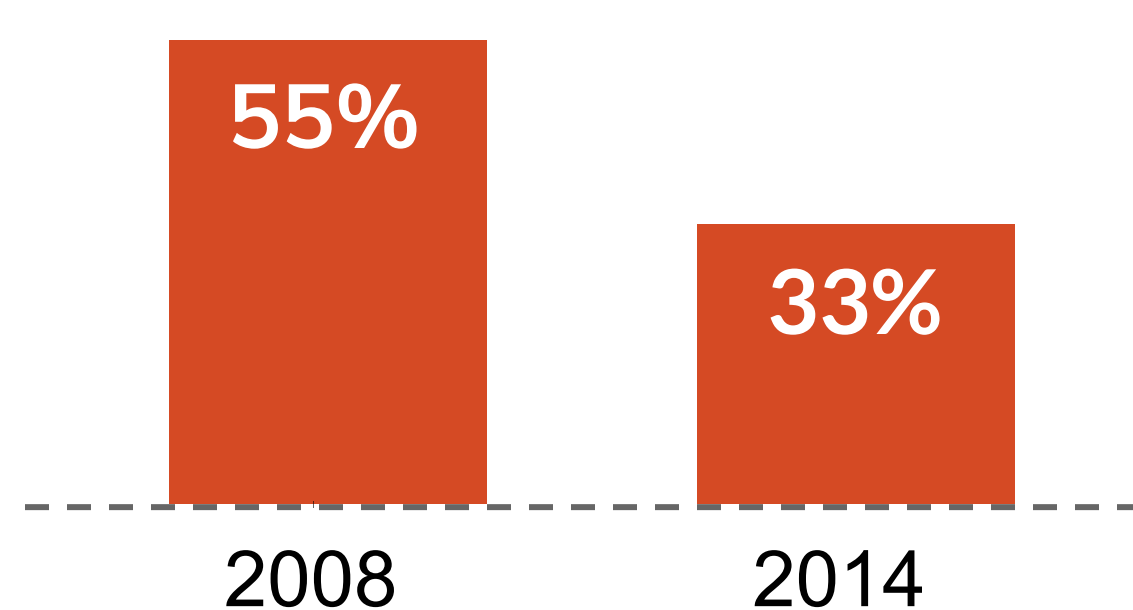
- Providers** complete case report forms when requested by HPV-Impact staff
- Laboratories** report all CIN2, CIN2/3, CIN3, and AIS cases among Alameda County residents; report cervical cancer cases upon request



Cervical intraepithelial neoplasia (CIN) grades 2, 2/3, 3, and adenocarcinoma in situ (AIS)

National HPV-IMPACT data

The proportion of cervical pre-cancers due to HPV types 16 and 18 has dropped 22% among **vaccinated** women aged 18-39.



Smaller declines were also observed among unvaccinated women, suggesting herd protection.

"This is clear evidence that the HPV vaccine is working to prevent cervical disease in young women in the United States."

- Nancy McClung, PhD, RN

HPV types 16 and 18 cause the majority of cervical cancers, and have been targeted by vaccination since 2006.

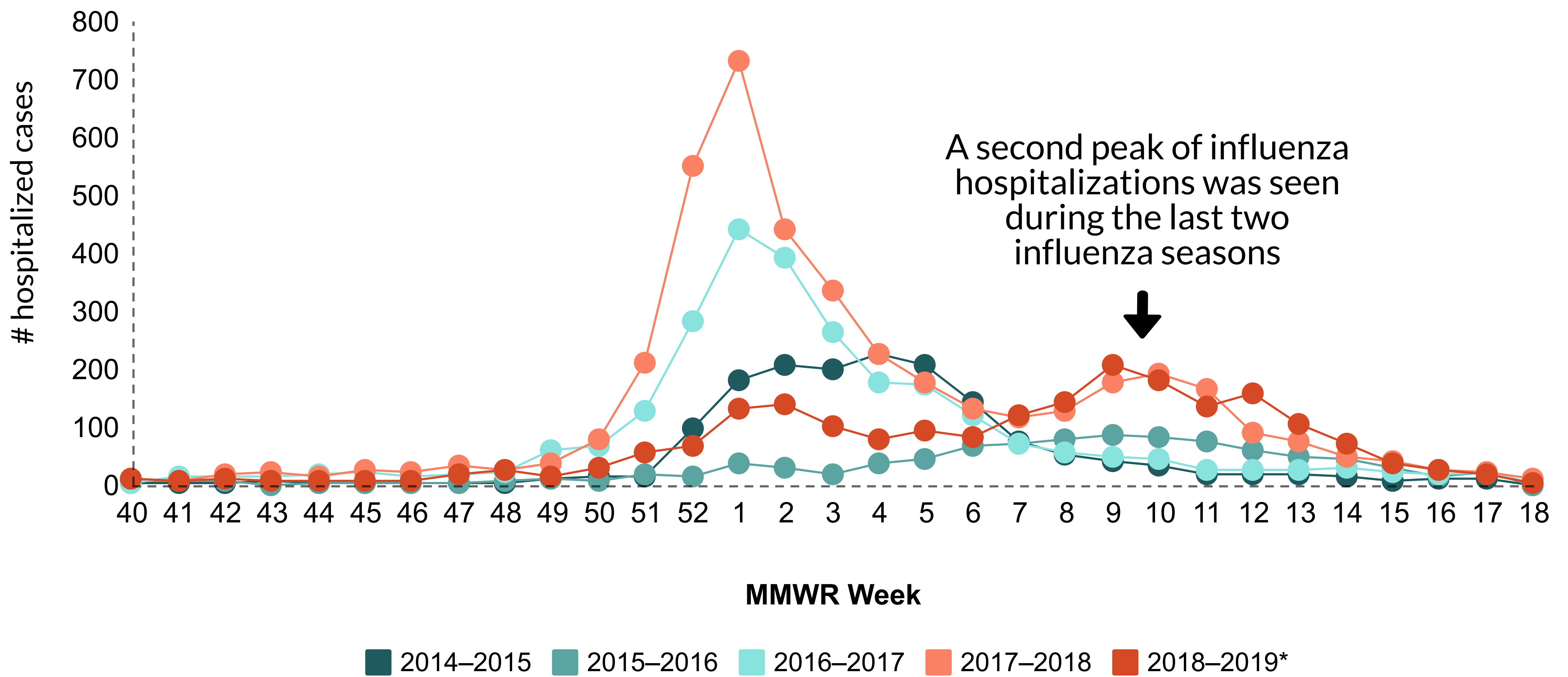
McClung, et al. March 2019. Cancer Epidemiol Biomarkers Prev

Note: Numbers may change due to updates to case status based on subsequent information received and delays in reporting

Influenza Hospitalization Surveillance Network (FluSurv-NET)

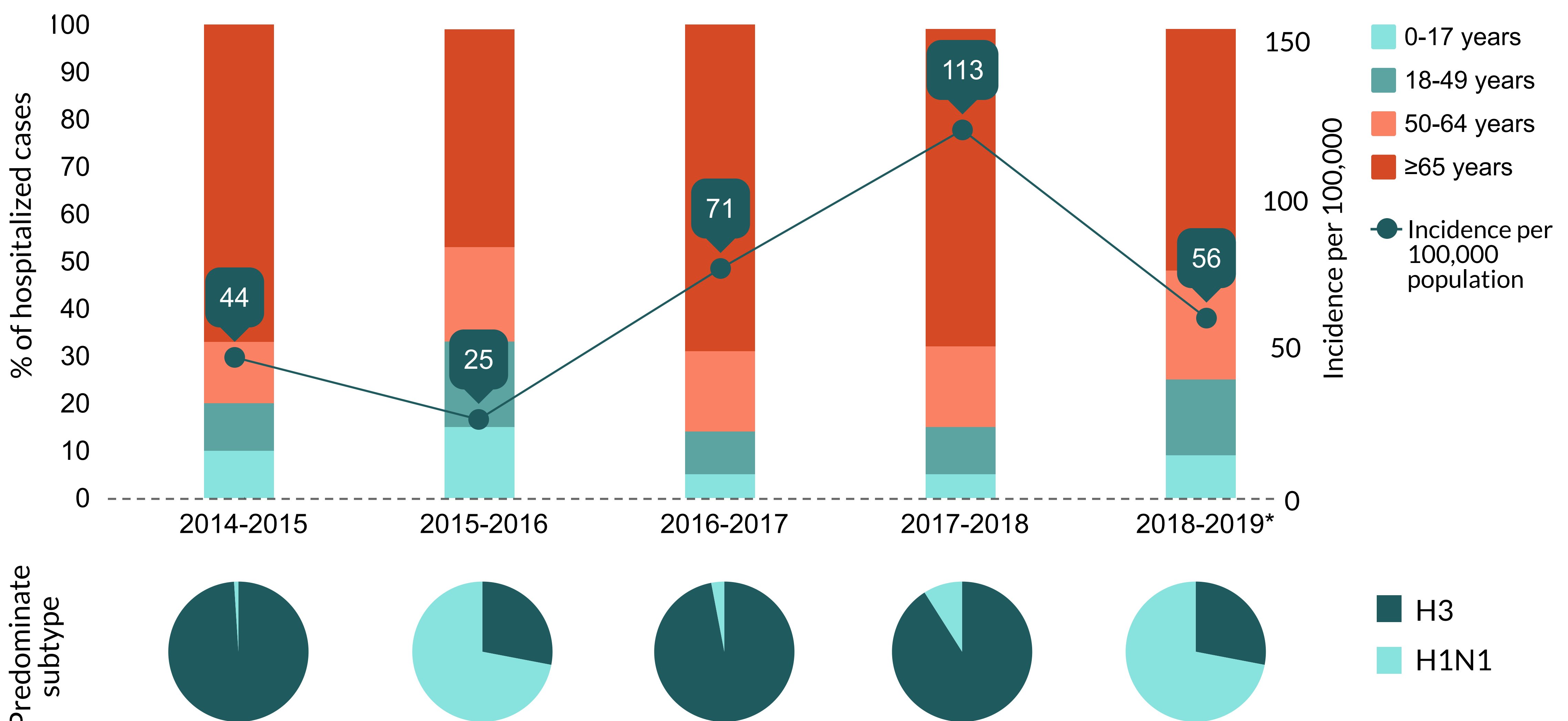
The Influenza Hospitalization Surveillance Network (FluSurv-NET) conducts population-based surveillance for laboratory-confirmed influenza-related hospitalizations in Alameda, Contra Costa, and San Francisco counties.

Influenza hospitalizations by MMWR week



MMWR, Morbidity and Mortality Weekly Report; Week #1 is the first week of the year that has at least four days in the calendar year; *2018-2019 data are preliminary

Overall incidence of hospitalized influenza and the proportion of cases aged ≥ 65 years were highest during H3 subtype dominant seasons



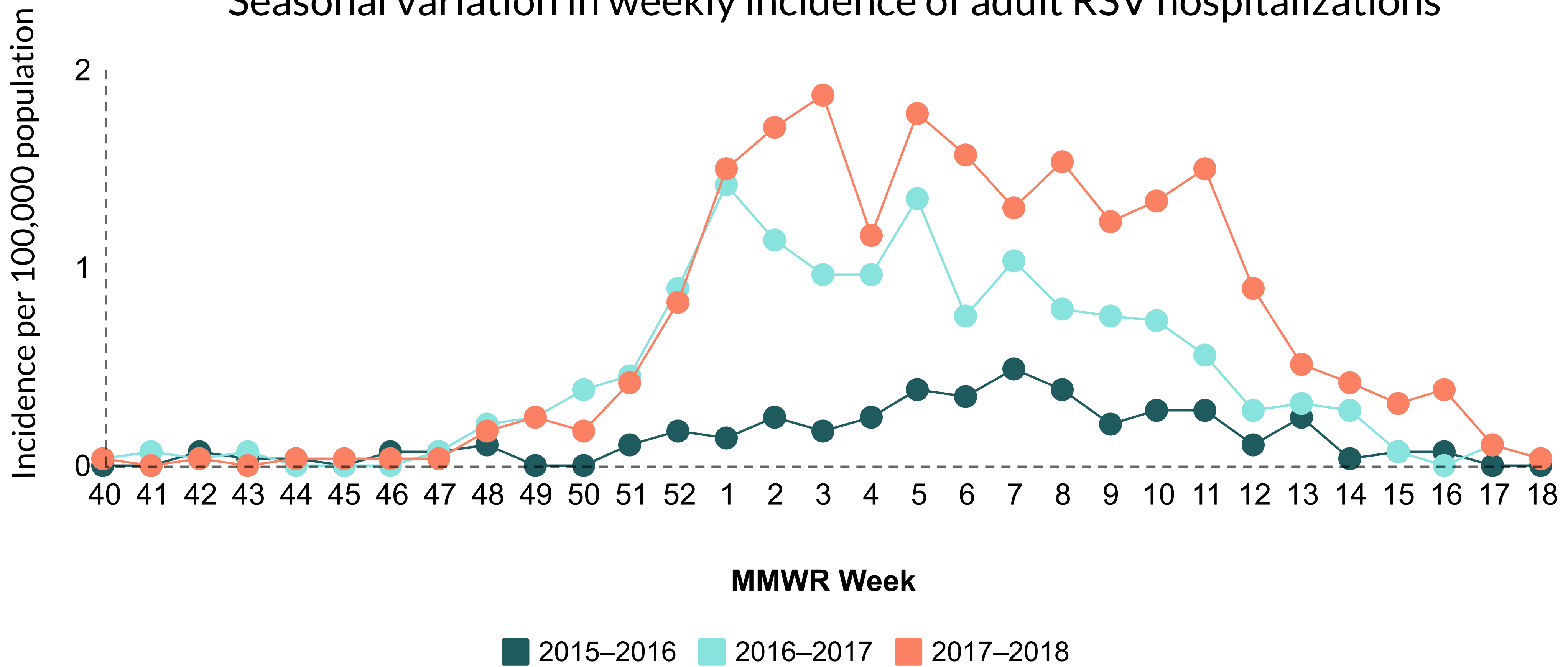
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Respiratory Syncytial Virus (RSV)

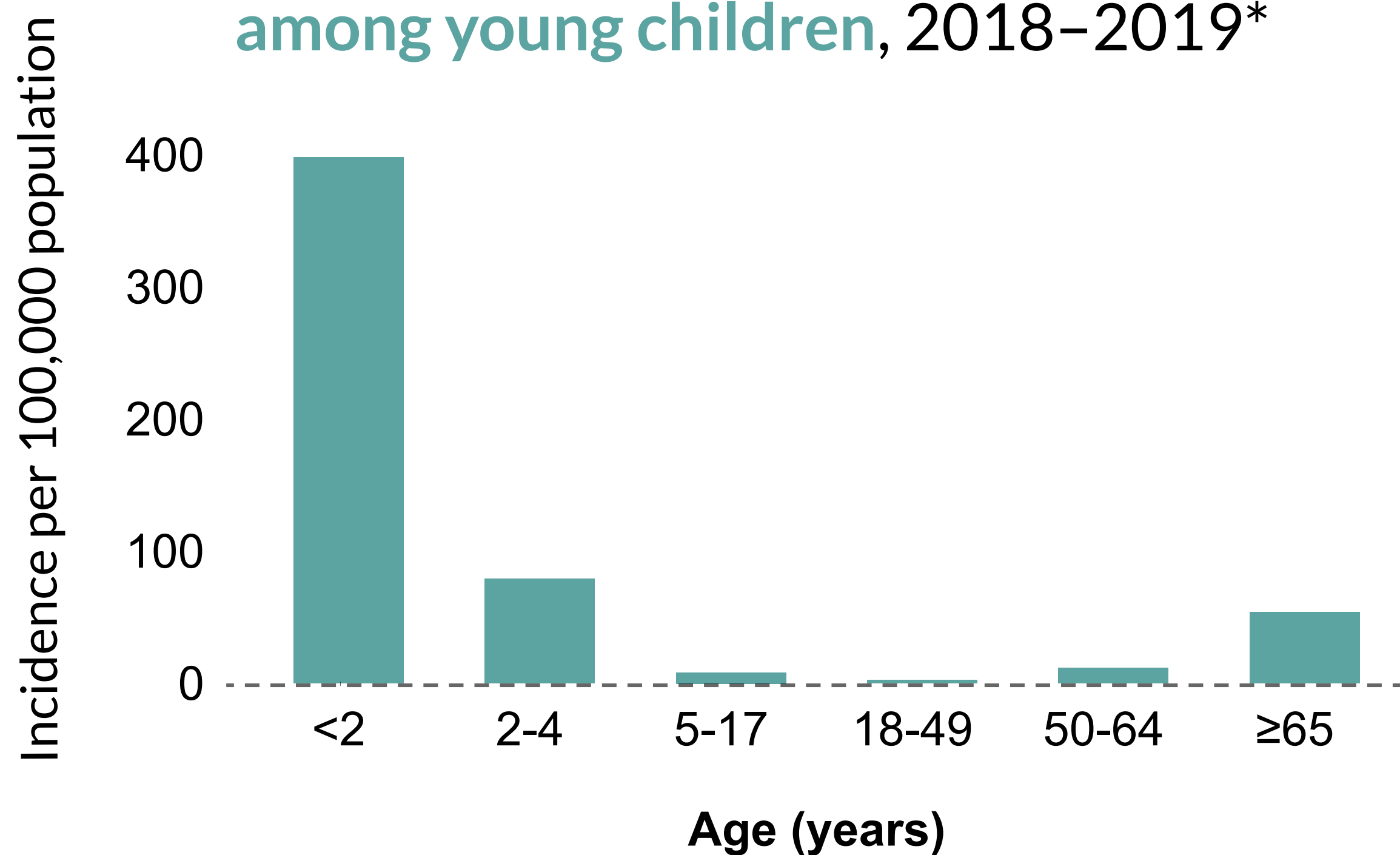
Since 2015, CEIP has conducted population based surveillance for RSV hospitalizations in Alameda, Contra Costa and San Francisco counties to estimate disease burden, inform vaccine development, and serve as a baseline for post-licensure vaccine impact. In 2018, this surveillance effort was expanded from adults aged >18 years to include all ages.

Seasonal variation in weekly incidence of adult RSV hospitalizations



MMWR, Morbidity and Mortality Weekly Report; Week #1 is the first week of the year that has at least four days in the calendar year

Hospitalized RSV incidence is highest among young children, 2018-2019*



*2018-2019 data are preliminary

There are currently no vaccines available to prevent RSV infection. However, there are over 20 products in development targeting three age groups:



- young infants (by maternal vaccination)
- older infants and young children
- older adults and adults with chronic conditions

Thank you for your continuing support and partnership with the California Emerging Infections Program. Your collaboration has been invaluable in allowing us to collect important public health data and conduct timely epidemiological studies. Thanks largely to your assistance, the national EIP network continues to be widely recognized as an essential component of the nation's public health surveillance system and a leader in addressing threats to the nation's health caused by emerging infectious diseases.

Please feel free to contact us with any questions.
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