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CEIP Sentinel

California Emerging
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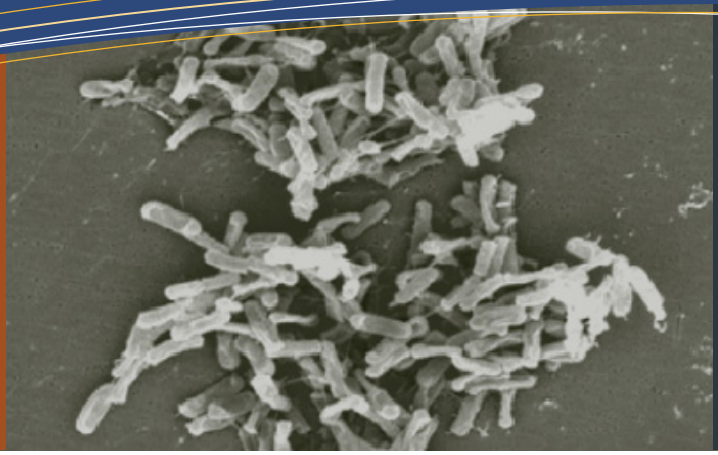


This issue

Clostridium difficile bacteria; CDC// Lois S. Wiggs, Public Health Image Library, ID# 9999.

The Scoop on Poop Transplantations *Clostridium difficile* Infection

Clostridium difficile infection (CDI) is caused by a spore-forming, gram positive bacillus and causes symptoms ranging from mild diarrhea to pseudomembranous colitis, sepsis and death.[1] Over the past several years, reports indicate that the incidence and severity of CDI have increased.[2] Antibiotics (i.e., metronidazole, vancomycin, and fidaxomicin) are the current recommended treatment for CDI. However, literature suggests that there is a 20% rate of recurrent disease post antibiotic treatment.[3-5] Fecal transplantation, which entails transplanting feces from a healthy donor to the patient with CDI via enema, colonoscopy, or nasogastric tube, is gaining increased attention as a successful treatment for recurrent CDI. Case studies, individual case reports, and, recently, a double-blind clinical trial have all demonstrated a cure rate of over 90%.[6,7] In fact, the clinical trial was stopped early after interim transplantation (94% cure rate) compared to traditional antimicrobial therapy (31% cure rate), or antimicrobial therapy with bowel lavage (23% cure rate).[7]

Although this form of treatment is inexpensive, simple and effective, it is still not yet widely used. Why? Could it be that patients find the idea of receiving someone else's fecal matter off-putting? A recent survey investigated public attitudes toward the use of fecal transplantation for recurrent CDI. Although respondents found most aspects of the procedure to be unappealing, the majority of respondents (85%) chose fecal transplantation over antibiotics alone after reviewing efficacy data.[8] Could it be then that physicians are skeptical about and turned-off by the procedure? One physician who uses the procedure reports that patients often make appointments with him as a last resort, after their regular physicians have been skeptical, despite the overwhelmingly positive data.[9]

As a potential solution to both patient and physician hesitation, researchers have found that "artificial poop" ('super probiotic' stool substitute containing 33 different bacteria) is also a successful treatment for recurrent CDI, and may be more acceptable to patients and physicians. [10] Just recently, the FDA has defined microbiota, including donor stool, as a biologic product. As a result, physicians will be

Continued on page 2

By: Ashley Williamson, MPH; Erin Parker, MPH; Erin Garcia, MPH; and Joelle Nadle, MPH

Transplantations Continued...

required to obtain adequate informed consent (see www.fda.gov for further details) before they can provide fecal transplantation to their patients. Even though this FDA application process will slow down implementation of this treatment, fecal transplantation for CDI is of proven effectiveness and is becoming increasingly popular.

[1]Kuijper EJ, Coignard B, Tull P. Emergence of *Clostridium difficile*-associated disease in North America and Europe. Clin Microbiol Infect 2006;12 Suppl 6:2-18.

[2] McDonald LC, Owings M, Jernigan DB. *Clostridium difficile* infection in patients discharged from US short-stay hospitals, 1996-2003. Emerg Infect Dis 2006;12(3):409-15.

[3] Musher DM, Aslam S, Logan N, et al. Relatively poor outcome after treatment of *Clostridium difficile* colitis with metronidazole. Clin Infect Dis 2005;40:1586-90.

[4] Pepin J, Routhier S, Gagnon S, Brazeau I. Management of a first recurrence of *Clostridium difficile*-associated disease in Quebec, Canada. Clin Infect Dis 2006;42:758-64.

[5] Louie TJ, Miller MA, Mullane KM, et al. Fidaxomicin versus vancomycin for *Clostridium difficile* infection. N Engl J Med 2011;364:422-31.

[6] Gough E, Shaikh H, Manges AR. Systematic review of intestinal microbiota transplantation (fecal bacteriotherapy) for recurrent *Clostridium difficile* infection. Clin Infect Dis 2011;53 (10):994-1002.

[7] Van Nood E, Vrieze A, Nieuwdorp M, et al. Duodenal infusion of donor feces for recurrent *Clostridium difficile*. N Engl J Med 2013;368 (5):407-15.

[8] Zipursky JS, Sidorsky TI, Freedman CA, Sidorsky MN, Kirkland KB. Patient attitudes toward the use of fecal microbiota transplantation in the treatment of recurrent *Clostridium difficile* infection. Clin Infect Dis 2012;55 (12):1652-8.

[9] Brandt LJ. Fecal microbiota transplantation: Patient and physician attitudes. Clin Infect Dis 2012;55(12):1659-60.

[10] Petrof EO, Gloor GB, Vanner SJ, et al. Stool substitute transplant therapy for the eradication of *Clostridium difficile* infection: RePOOPulating' the gut. Microbiome 2013;1:3.

Clostridium difficile Infection Infographic

get the scoop!

C. DIFFICILE INFECTIONS (CDI)

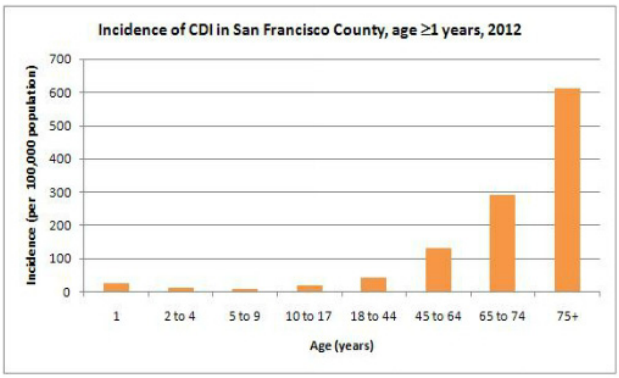
119.9 cases per 100,000 in 2012

125.4 cases per 100,000 in 2011

102.2 cases per 100,000 in 2010

CEIP CDI Surveillance

CEIP surveillance is conducted independently from other state mandated reporting. In 2012, CEIP identified 990 incident CDI cases in San Francisco County residents. Incidence increased dramatically with age, the highest incidence being in those 75 years and older (610 cases per 100,000 persons).



Who is getting CDI? And what do we know about them?

- 50.5% of cases were female *
- 59.0% were White, 25.6% were Asian, 13.9% were Black*
- 16.7% were Hispanic*

- 69.8% one ore more underlying conditions
- 62.3% previous antibiotic use
- 59.8% healthcare exposure**
- 45.6% community associated cases
- 24.1% admitted for CDI
- 21.8 % resident of a LTCF
- 17.0% previous immmunosuppressive therapy

* These percentages can only be directly compared to the population of San Francisco County.
**Healthcare exposure includes current chronic hemodialiysis or hospitalization, residence in a long-term care facility, a surgical procedure, or ER/observation unit visit within the 12 weeks prior to positive test.

Severity of CDI

81.1% Diarrhea (N=400)

18.7% Leukocytosis* (N=92)

9.9% Recurrent infection** (N=49)

2.8% Death (N=14)

Medical records were reviewed for all community-associated and a sample of healthcare facility-onset cases; a total of 495 medical charts were reviewed for clinical information.

*Leukocytosis is defined as a white blood cell count of 15,000 or more per micro liter.
**Recurrence is defined as an additional positive C.diff test within the 8 weeks following incidence stool.

For more information on the CDI surveillance project, contact HAI Project Coordinator, Joelle Nadle at jnadle@ceip.us.

Haemophilus haemolyticus: An Overlooked Bacterial Species Causing Invasive Disease

Laboratorians have previously found it difficult to distinguish two important species of *Haemophilus* due to limitations in diagnostic tools. New research has identified a specific biomarker and real-time PCR assay as a potential solution to this problem. Eight *Haemophilus* species account for approximately 10% of the bacterial flora in the human respiratory tract, with *H. influenzae* and *H. haemolyticus* being the most prevalent. Type b capsular *H. influenzae* (Hib) causes a spectrum of infectious diseases, including meningitis, sepsis, and pneumonia. Other encapsulated serotypes of H. influenzae (types a-f) are infrequent causes of invasive disease. Strains lacking a capsule are referred to as nontypeable (NT) and are associated with localized mucosal diseases such as otitis media, sinusitis and bronchitis[2]. *H. haemolyticus* has rarely been reported to cause invasive disease, and has been historically overlooked due to the lack of proper detection methods[1].

H. influenzae and *H. haemolyticus* are closely related and nearly indistinguishable due to similarities in colony and cellular morphology, biochemical characteristics, and genetic background[2]. These shared characteristics have made distinguishing the two by standard microbiology methods a challenge. The identification of *H. haemolyticus* is important because recent studies have shown that it may occasionally be found among presumed *H. influenzae* clinical isolates and should therefore be considered a cause of invasive disease. Currently available phenotypic assays fail to discriminate between the two species.

Several molecular tools have been assessed for their ability to differentiate these two species species resulting in the discovery of a proposed reliable marker gene, fuculose kinase gene (fucK), to distinguish *H. influenzae* from other *Haemophilus* species[1]. A real-time PCR assay targeting the *Haemophilus* protein D (hpd) has been developed and is highly specific for *H. influenzae*[1]. Theodore et al. recently evaluated both hpd and fucK assays against 16S rRNA gene phylogeny and found that these assays can be used to discriminate nonhemolytic *H. haemolyticus* from nontypeable *H. influenzae*[1]. The hpd PCR assay should used as the primary molecular tool for the detection of *H. influenzae*. If both PCR assays (hpd and fucK) are negative, it is a strong indicator of a non-*H. influenzae* isolate[1]. Since the fucK and hpd genes can be deleted in some *H. influenzae* strands, 16S rRNA gene sequencing can be used to assist with *H. influenzae* species identification[1]. Together, these molecular tools can help provide an improved estimate of the national burden of invasive *H. influenzae* infections.

[1]Theodore, M. Jordan, et al. "Evaluation of new biomarker genes for differentiating Haemophilus influenzae from Haemophilus haemolyticus." *Journal of clinical microbiology* 50.4 (2012): 1422-1424.

[2] McCrea, Kirk W., et al. "Relationships of nontypeable Haemophilus influenzae strains to hemolytic and nonhemolytic Haemophilus haemolyticus strains." *Journal of clinical microbiology* 46.2 (2008): 406-416.

[3] Morton, Daniel J., et al. "An invasive Haemophilus haemolyticus isolate." *Journal of clinical microbiology* 50.4 (2012): 1502-1503.

By: Sarah New, MPH & Pamala Daily Kirley, MT, MPH

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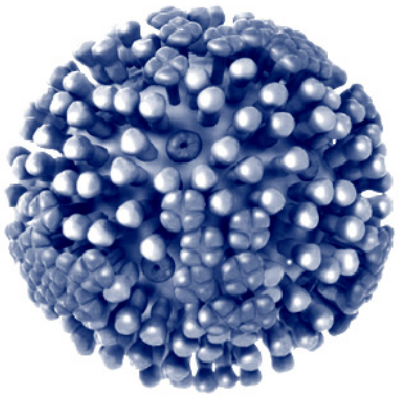
2012-2013 Influenza Season: An Overview

Annual influenza seasons vary in severity and manifest differently by age group and location. During the 2012-2013 season, some factors were similar across the nation, while others varied between regional areas. As part of the Centers for Disease Control and Prevention's (CDC) Influenza Hospitalization Network (FluSurv-NET), the CEIP has been conducting surveillance for laboratory-confirmed influenza cases hospitalized in Alameda, Contra Costa, and San Francisco counties since 2003. Each year from October 1 through April 30, CEIP requests that laboratorians submit influenza rapid test positive specimens to local public health laboratories for PCR testing to confirm influenza type and subtype for hospitalized patients. During the 2012-2013 influenza season, in many regions of the US, the peak of influenza hospitalizations occurred in late December. However, in the CEIP catchment area counties, the peak occurred about 4 weeks later, in late January.[1] Similar to national trends, CEIP counties experienced significantly increased activity this season compared to the last few post-pandemic seasons. Influenza viruses circulating in 2012-13 consisted primarily of influenza A (H3N2, H1N1), although influenza B strains were also present. Patients 65 years of age and older were more severely affected than younger individuals during the 2012-13 season. [1]

An interim report in February 2013 by the Flu VE Network, indicated influenza vaccine effectiveness was 56% for all age groups, similar to that seen in prior seasons .[2] However, overall influenza vaccine effectiveness in those aged 65 and older was only 27%, and effectiveness against H3N2 in this age group was only 9%. The evaluation found a much higher vaccine effectiveness(67%) against illness due to influenza B in this age group. [2]

On March 29, 2013, the first human infections with an avian influenza A (H7N9) virus were laboratory confirmed in China. As of May 31, 2013, China had reported 132 confirmed H7N9 infections in humans, of whom 37 (28%) died.[4] To date, no cases of influenza A (H7N9) have been detected in the US. The following websites have updated information: http://www.cdc.gov/flu/avianflu/h7n9-virus.htm and http://www.who.int/csr/don/en/.

Data from the ten EIPs and some additional sites are aggregated by the CDC. A summary of these data, or FluView, can be viewed online at: http://www.cdc.gov/flu/weekly/ in the section titled "Influenza-Associated



Generic Influenza Virion's Ultrastructure; CDC/Douglas Jordan. Public Health Image Library, ID#11823.

[1] CDC. Seasonal Influenza. 2012-2013 Flu Season Drawing to a Close. Available at: http://www.cdc.gov/flu/spotlights/2012-2013-flu-season-wrapup.htm.

[2] CDC. Interim Adjusted Estimates of Seasonal Influenza Vaccine Effectiveness — United States, February 2013. MMWR 2013;62(07);119-123.

[3] CDC. Fluview. 2012-2013 Influenza Season Week 16 ending April 20, 2013. Atlanta, GA: US Department of Health and Human Services, CDC; 2013. Available at: http://www.cdc.gov/flu/weekly/.

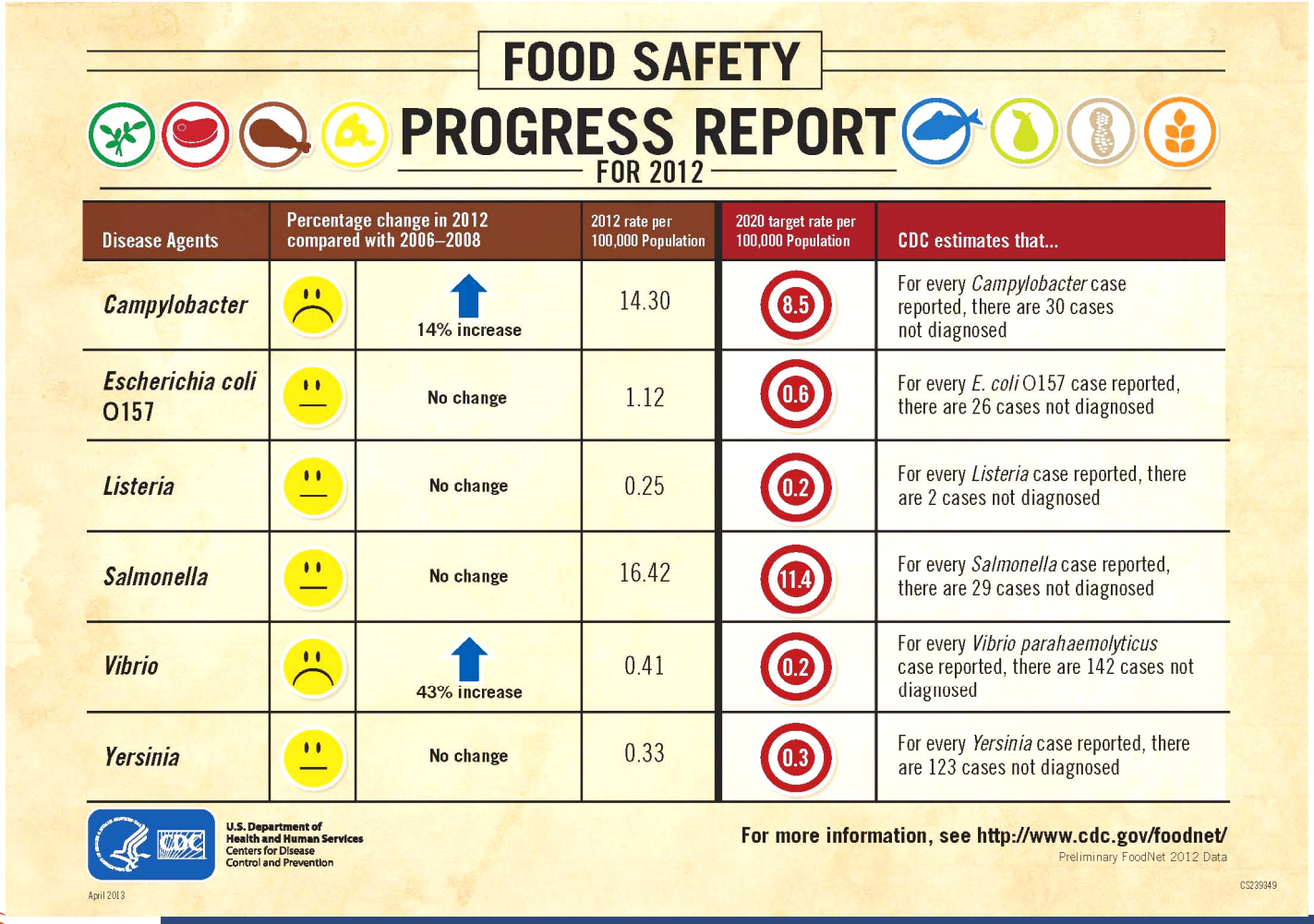
[4] CDC. Emergence of Avian Influenza A (H7N9) Virus Causing Human Illness—China, February-April 2013.MMWR 2013;62(Early Release);1-6.

By: Brittany Martin, MPH For more information on CEIP influenza surveillance, please contact Influenza Coordinator Pamala Daily Kirley pdaily@ceip.us

FoodNet's Annual MMWR Summary & 2012 US Food Safety Progress Report

FoodNet's annual MMWR article, "Incidence and Trends of Infection with Pathogens Transmitted Commonly Through Food-Foodborne Diseases Active Surveillance Network, 10 US Sites, 1996–2012" was published on April 19, 2013 (http://www.cdc.gov/mmwr/pdf/wk/mm6215.pdf). The report summarizes 2012 preliminary surveillance data and describes national FoodNet trends since 1996. The information contributes to our understanding of the human health impact of selected foodborne diseases and progress in protecting the public health. Key findings from the report are summarized below.

- The most frequent cause of bacterial foodborne infection is Salmonella, accounting for 40% of reported infections.
- Incidence of *Campylobacter* infection was 14% higher than in 2006–2008. *Campylobacter* was the second most common infection reported in FoodNet in 2012 (35%) with 14.3 cases per 100,000 population.
- *Vibrio* infection, though rare, increased 43% in 2012 when compared with 2006–2008.
- The incidence of laboratory-confirmed *Campylobacter*, *Cryptosporidium*, *Salmonella*, Shiga toxin-producing *Escherichia coli* (STEC) O157 and non-O157, *Shigella*, and *Yersinia* infection was highest among children aged <5 years; the incidence of *Listeria* and *Vibrio* infection was highest in adults aged ≥65 years.
- The incidence of STEC O157 infection (1.1 cases per 100,000 population), which had declined since 2006, was no longer decreasing in 2012, and now exceeds the previously met Healthy People 2010 target of 1 case per 100,000 persons.
- As a group, the incidence of infection with six key pathogens transmitted commonly through food (*Campylobacter*, *Listeria*, *Salmonella*, STEC O157, *Vibrio*, and *Yersinia*) was 22% lower in 2012 than in the first three years of surveillance (1996-1998), but was not significantly different than in 2006-2008.



FOOD SAFETY

PROGRESS REPORT FOR 2012

Disease Agents	Percentage change in 2012 compared with 2006–2008	2012 rate per 100,000 Population	2020 target rate per 100,000 Population	CDC estimates that...
Campylobacter	↑ 14% increase	14.30	8.5	For every *Campylobacter* case reported, there are 30 cases not diagnosed
Escherichia coli O157	No change	1.12	0.6	For every *E. coli* O157 case reported, there are 26 cases not diagnosed
Listeria	No change	0.25	0.2	For every *Listeria* case reported, there are 2 cases not diagnosed
Salmonella	No change	16.42	11.4	For every *Salmonella* case reported, there are 29 cases not diagnosed
Vibrio	↑ 43% increase	0.41	0.2	For every *Vibrio parahaemolyticus* case reported, there are 142 cases not diagnosed
Yersinia	No change	0.33	0.3	For every *Yersinia* case reported, there are 123 cases not diagnosed

For more information on FoodNet please contact Katie Wymore MPH kwymore@ceip.us

Open Positions

Please check the following websites for future postings:

www.phfe.org

www.ceip.us

Upcoming Events

June 2013

46th Annual SER Meeting
June 18-21, 2013 in Boston, MA
www.epiresearch.org

July 2013

2013 IAFP Annual Meeting
July 28-31, 2013 in Charlotte, NC
Early Registration by: June 26
www.foodprotection.org

September 2013

53rd Interscience Conference on Antimicrobial Agents and Chemotherapy (ICAAC)
September 10-13, 2013 in Denver, CO
Early Registration by: August 1
www.icaac.org

2013 CCDEH Annual Conference
September 23-27, 2013 in Lake Tahoe, CA
www.ccdeh.com

Save the date **- Under Surveillance 2013**
November 19, 2013
Oakland, CA
www.ceip.us

Attention Laboratorians & Infection Preventionists

Do you have a question about:

An invasive isolate for CEIP?

Need a courier pick up for an ABCs isolate?

Running low on isolate shipping supplies?

Trouble with transmitting a report?

Please call (510) 451-1344 or fax (510) 451-3210

A CEIP staff person will assist you.