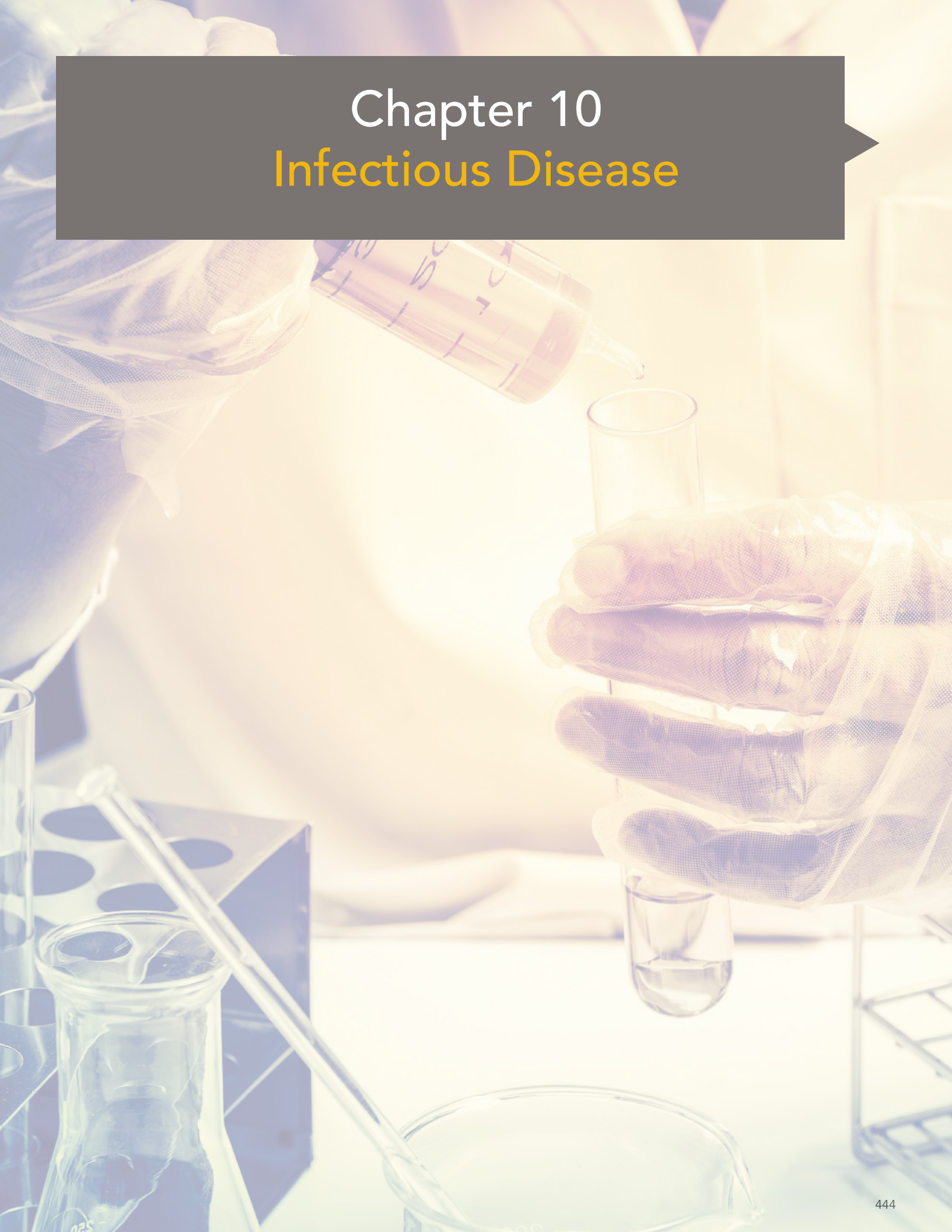


Chapter 10
Infectious Disease

Infectious Disease

Infectious diseases are caused by microbes, tiny organisms like bacteria and viruses that require a microscope to be seen. These microscopic organisms are everywhere, from the air we breathe to the things we touch. Many live naturally in the human body. There are more microbial cells inside of a human body than there are human cells (1, 2).

The human-microbe relationship is complex: some promote health, and others promote disease. Many microbes are essential for maintaining good health by helping us digest food and produce vitamins (2). Microbes that cause infectious disease are called pathogens. Some pathogens make a person very sick and then leave him/her immune to future attacks, while others can cause a long-term infection resulting in death. Some infectious diseases last a lifetime and cause infrequent symptoms.

The discovery of antibiotics is considered one of the greatest medical achievements of all time. Since physicians began using penicillin in 1942, millions of lives have been saved. Today, overuse and misuse of antibiotics – such as not finishing a prescribed course or using them when it's not necessary-- contributes to the development of drug-resistant bacteria (3). Drug-resistance makes us vulnerable to infections we might otherwise be able to cure with conventional antibiotics (3). The medical and public health communities are working together to prevent drug-resistant bacteria from becoming more common (4).

Vaccines prevent infectious disease without contributing to disease-resistance (5). A vaccine contains part of a disease-causing microbe that was killed or weakened and thus is no longer able to cause illness. When a person receives a vaccine, the body's immune system develops protective antibodies that will attack the disease-causing microbes if it tries to infect a person in the future.

Despite the use of vaccines to prevent disease and antibiotics to treat it, infectious diseases are responsible for more deaths worldwide than any other single cause. The estimated annual cost of medical care for infectious disease treatment in the United States is about $120 billion (6).

In this section of the Health of Boston, we will examine indicators for the following infectious diseases: hepatitis B and C, influenza, salmonellosis, and tuberculosis.

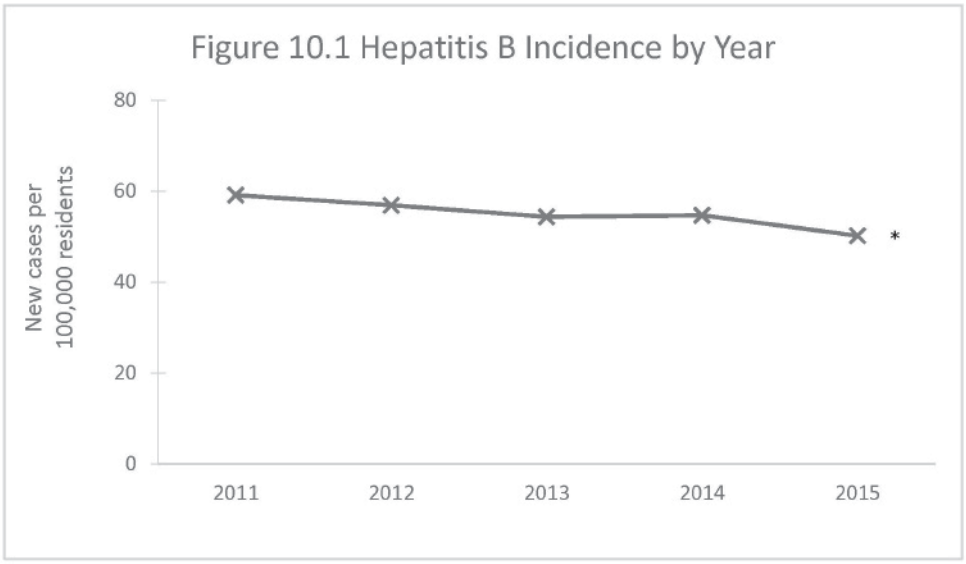
Hepatitis B & C

Hepatitis, which means inflammation of the liver, results most frequently from heavy alcohol use or viral infections (7). Hepatitis A, B, and C are types of viral infections. Hepatitis A is an acute diarrheal disease, and people usually recover without treatment. Hepatitis B and C begin as acute infections, but have the potential to become chronic. Vaccines are available for hepatitis A and B, but not hepatitis C.

Chronic hepatitis B infection can cause considerable damage to the liver. The likelihood of a hepatitis B infection becoming chronic depends upon the age of infection. Infants and children are more likely to develop chronic hepatitis B compared with adults. Approximately 25%–50% of children infected between the ages of 1 and 5 years develop chronic hepatitis. Hepatitis B is spread when bodily fluids from an infected person enter the body of an uninfected person. This can occur through sexual contact, mother-to-child transmission at birth, sharing of personal items (e.g. toothbrushes, razors, etc.), and direct contact with blood or open sores of an infected person. There is a vaccine for hepatitis B, and routine vaccination is recommended for all infants and children as well as adults at high risk for exposure to the virus.

Transmission of hepatitis C is similar to hepatitis B, although the likelihood of transmission via sexual contact and sharing of personal items is much lower (8). While a vaccine to prevent hepatitis C infection does not exist, highly effective treatments for those infected with hepatitis C virus have become available in the last few years (9). The development of chronic hepatitis C is not age-dependent. Approximately 70%–85% of people who become infected with the hepatitis C virus develop chronic infection (8). People with acute hepatitis B and C infections do not always have symptoms. When present however, symptoms include fever, vomiting, stomach pain, dark urine, and being jaundiced (having yellow skin and eyes). Chronic infections may eventually produce symptoms similar to acute infections and develop into irreversible liver damage or liver cancer (7, 8).

In the U.S., more than 4 million people have chronic hepatitis B or C, but many people do not know they are infected (7, 8). In 2014, the rate of chronic hepatitis B in the U.S. was estimated at 7.1 per 100,000 population; the rate of past-or-present hepatitis C was 52.3 (10).



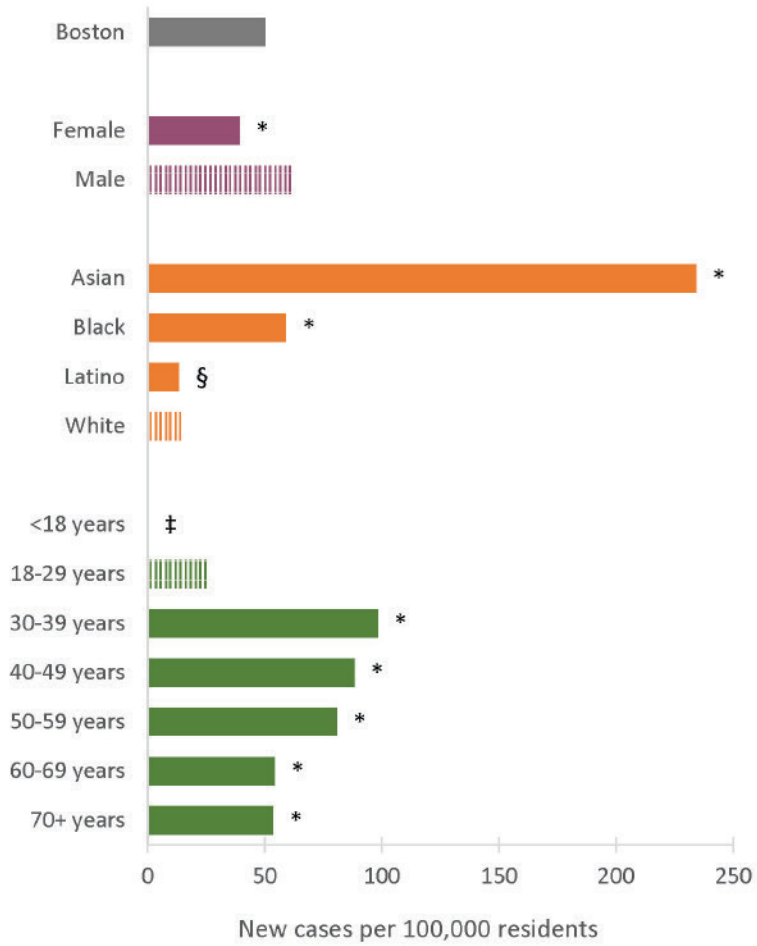
* Statistically significant change over time

DATA SOURCE: Infectious Disease Bureau, Boston Public Health Commission

In 2015, the incidence rate for hepatitis B infection was 50.2 new cases per 100,000 residents. Between 2011 and 2015, the incidence rate for hepatitis B decreased by 14%.

In 2015, the incidence rate for hepatitis B infection among Boston residents was 50.2 new cases per 100,000 residents. The hepatitis B incidence rate for females (39.3) was 36% lower than the rate for males (61.4). The hepatitis B incidence rate for Asian residents (234.1) was almost 17 times the rate for White residents (14.1), and the rate for Black residents (59.1) was 4 times the rate for White residents. The rates for all age groups presented were higher than the rate for residents ages 18-29 (25.7). The biggest difference was found among residents ages 30-39 (98.2) with a rate almost 4 times the rate for residents ages 18-29.

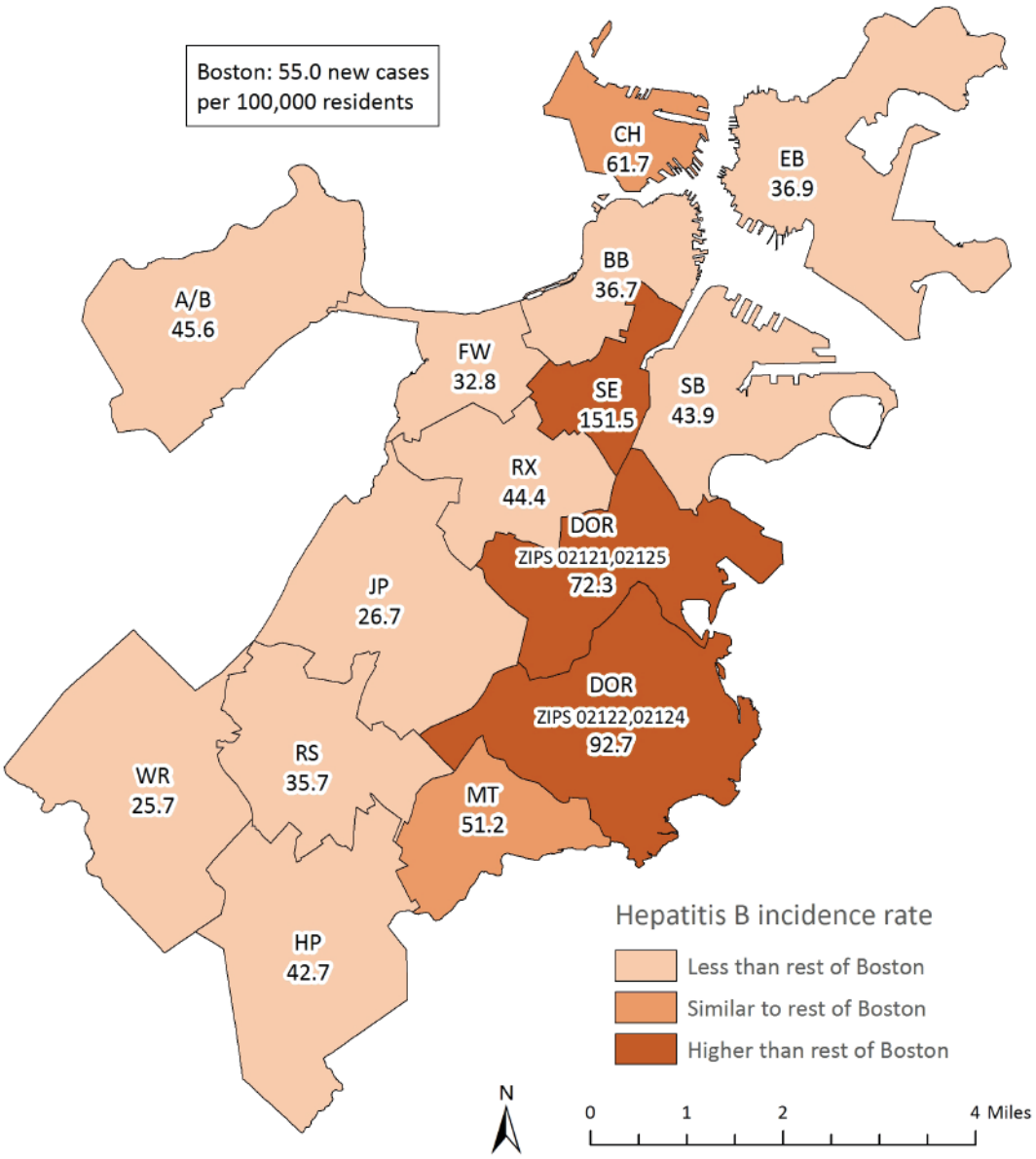
Figure 10.2 Hepatitis B Incidence by Selected Indicators, 2015



* Statistically significant difference when compared to reference group
‡ Rates not presented due to a small number of cases
§ Rates are based on 20 or fewer cases and should be interpreted with caution.

NOTE: Bars with patterns indicate the reference group within each selected indicator.
DATA SOURCE: Infectious Disease Bureau, Boston Public Health Commission

Figure 10.3 Hepatitis B Incidence[1] by Neighborhood, 2011-2015



[1] 5-year average annual rates

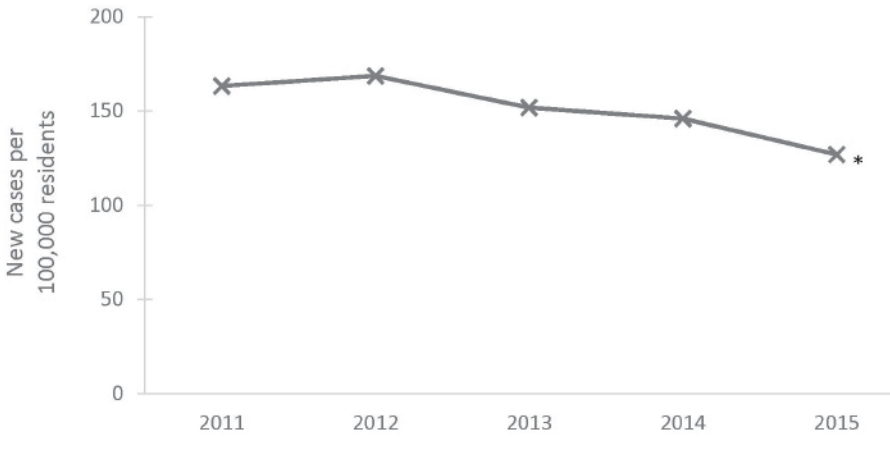
NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End. "SE" includes the South End and Chinatown.

DATA SOURCE: Infectious Disease Bureau, Boston Public Health Commission

In 2011-2015, the incidence rate for hepatitis B infection among Boston residents was 55.0 new cases per 100,000 residents. The rate of hepatitis B infection was higher among residents in Dorchester (zip codes 02121, 02125), Dorchester (zip codes 02122, 02124), and the South End compared with the rest of Boston. The rate of hepatitis B infection was lower among residents in Allston/Brighton, Back Bay, East Boston, Fenway, Hyde Park, Jamaica Plain, Roslindale, Roxbury, South Boston, and West Roxbury compared with the rest of Boston.

In 2015, the incidence rate for hepatitis C infection was 126.9 new cases per 100,000 residents. Between 2011 and 2015, the incidence rate for hepatitis C infection among Boston residents decreased by 22%.

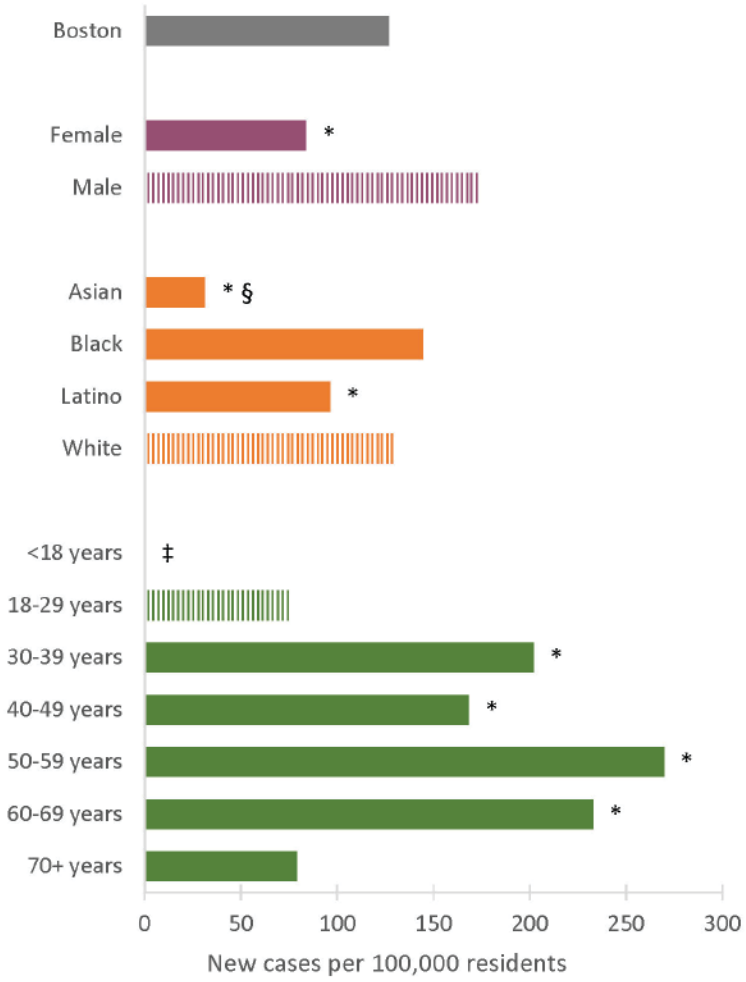
Figure 10.4 Hepatitis C Incidence by Year



* Statistically significant change over time

DATA SOURCE: Infectious Disease Bureau, Boston Public Health Commission

Figure 10.5 Hepatitis C Incidence by Selected Indicators, 2015



* Statistically significant difference when compared to reference group
‡ Rates not presented due to a small number of cases
§ Rates are based on 20 or fewer cases and should be interpreted with caution.

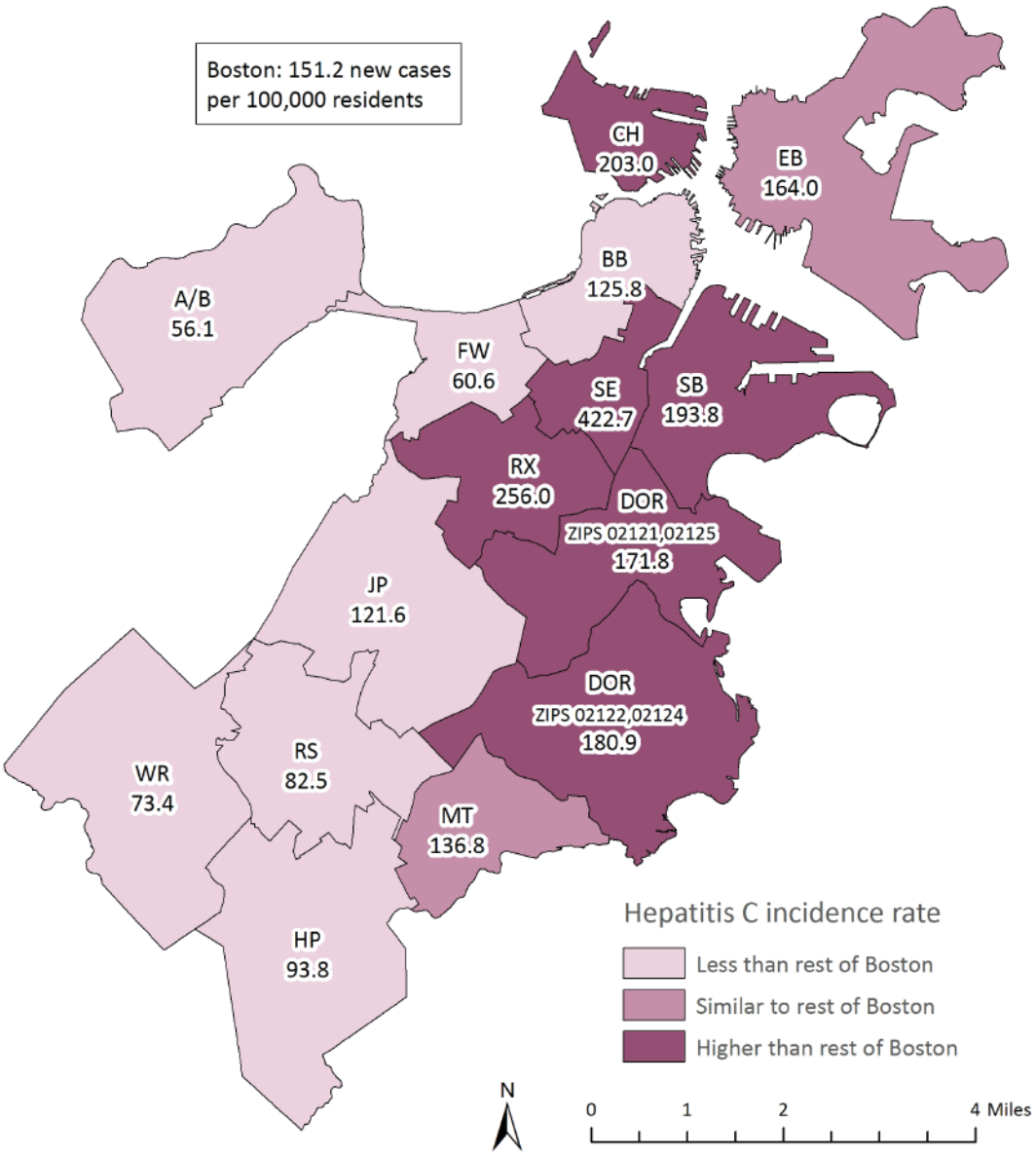
NOTE: Bars with patterns indicate the reference group within each selected indicator.
DATA SOURCE: Infectious Disease Bureau, Boston Public Health Commission

In 2015, the incidence rate for hepatitis C infection among Boston residents was 126.9 new cases per 100,000 residents. The hepatitis C incidence rate for females (83.8) was 52% lower than the rate for males (173.3). The rates for Asian (31.3) and Latino (96.3) residents were 76% and 26% lower, respectively, than the rate for White residents (129.4). The rates for those ages 30-39 (202.0), 40-49 (168.3), 50-59 (269.6), and 60-69 (232.7) were higher than the rate for residents ages 18-29 (74.6). The biggest difference was found among those ages 50-59 with a rate almost 4 times the rate for residents ages 18-29.

Hepatitis C
Healthy People 2020 Target: 11.4 cases per 100,000 population

U.S. 2013: 16.1
MA 2013: 17.2
Boston 2015: 22.1

Figure 10.6 Hepatitis C Incidence[1] by Neighborhood, 2011-2015



[1] 5-year average annual rates

NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End. "SE" includes the South End and Chinatown.

DATA SOURCE: Infectious Disease Bureau, Boston Public Health Commission

In 2011-2015, the incidence rate for hepatitis C infection among Boston residents was 151.2 new caes per 100,000 residents. The rate of hepatitis C infection was higher among residents in Charlestown, Dorchester (zip codes 02121, 02125), Dorchester (zip codes 02122, 02124), Roxbury, South Boston, and the South End compared with the rest of Boston. The rate of hepatitis C infection was lower among residents in Allston/Brighton, Back Bay, Fenway, Hyde Park, Jamaica Plain, Roslindale, and West Roxbury compared with the rest of Boston.

Influenza

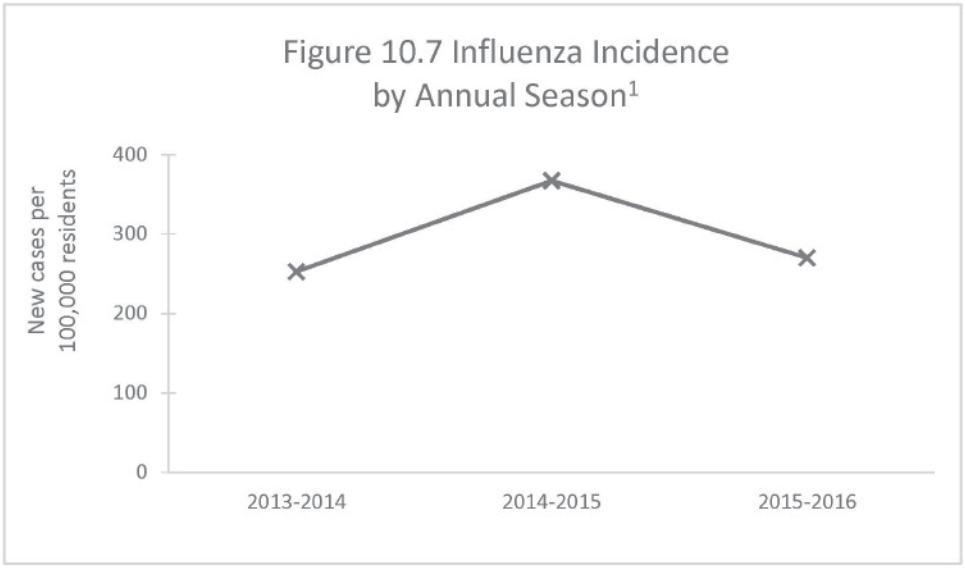
Influenza, or the "flu," is a respiratory system (nose, throat, and lungs) infection caused by the influenza virus. Every year, a flu epidemic hits the United States during the fall and winter months, commonly referred to as flu season. Flu is very contagious and can be spread to people up to 6 feet away in the form of respiratory droplets released during coughing, sneezing, or talking (11). The flu and common cold have similar symptoms that include fever, cough, sore throat, runny nose, body aches, and fatigue. However, the flu is different from the common cold in that symptoms are usually more intense and the severity of illness is less predictable, sometimes resulting in hospitalization or death. Although most people recover within a few days to two weeks, complications such as pneumonia, bronchitis, and sinus and ear infections may occur. People with certain chronic medical conditions, pregnant women, young children, and the elderly, are especially vulnerable to developing serious flu-related complications (11). The cumulative incidence of influenza-related hospitalizations in the U.S. between October of 2015 and April of 2016 is estimated at 31.3 per 100,000 (12).

Prevention strategies

The flu vaccine and frequent hand washing are the best ways to prevent the flu. New influenza vaccines are developed each year to accommodate the ever-changing genetic code of the influenza virus. Individuals must be vaccinated every year (13). Although the vaccine has been proven to prevent disease, income, education, and place of residence among older individuals can be barriers to vaccination (14).

CDC guidelines suggest that people with flu-like symptoms should stay home for at least 24 hours after their fever is gone (without the use of a fever-reducing medicine), except to get medical care or for other necessities (15). Furthermore, it is recommended that a sick individual covers his/her nose and mouth with a tissue when coughing or sneezing, and then throws the tissue in the trash thereafter. We can all minimize transmission of flu-like viruses by minimizing contact with our eyes, noses, and mouths, and by cleaning and disinfecting surfaces and objects that may be contaminated by frequent touching (keyboards, telephones, etc.) (11).

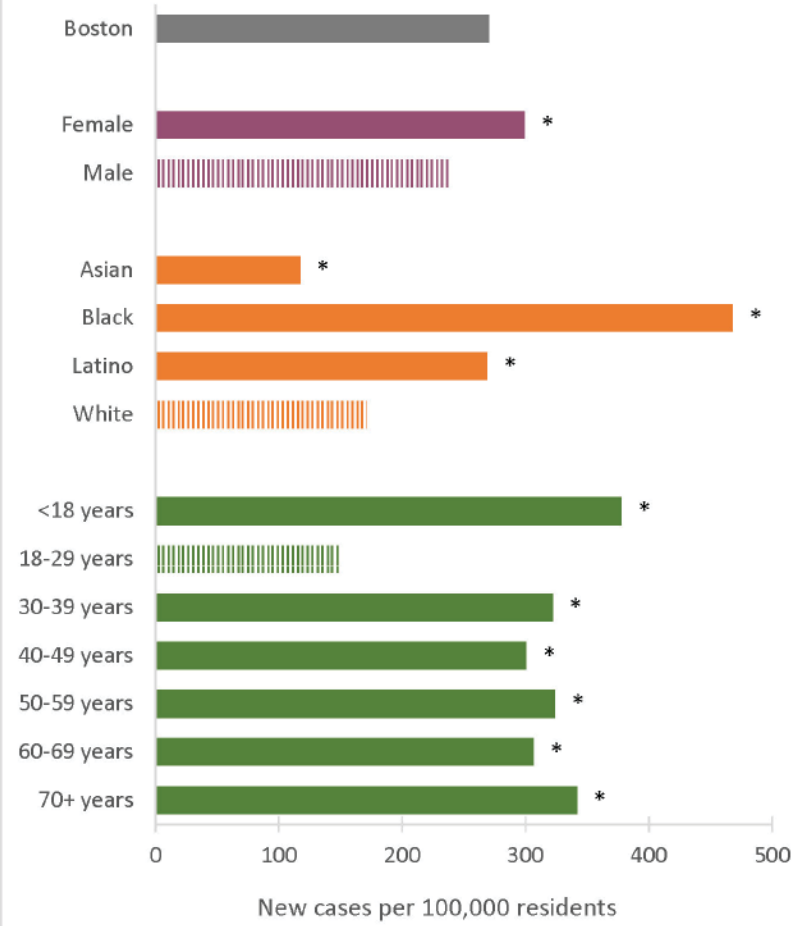
During the 2015-2016 influenza season, the incidence rate of influenza was 270.3 new cases per 100,000 residents. Between the 2013-14 and 2015-16 seasons there was no significant change in the influenza incidence rate among Boston residents.



[1] November-April

DATA SOURCE: Infectious Disease Bureau, Boston Public Health Commission

Figure 10.8 Influenza Incidence by Selected Indicators, 2015-2016 Season[1]

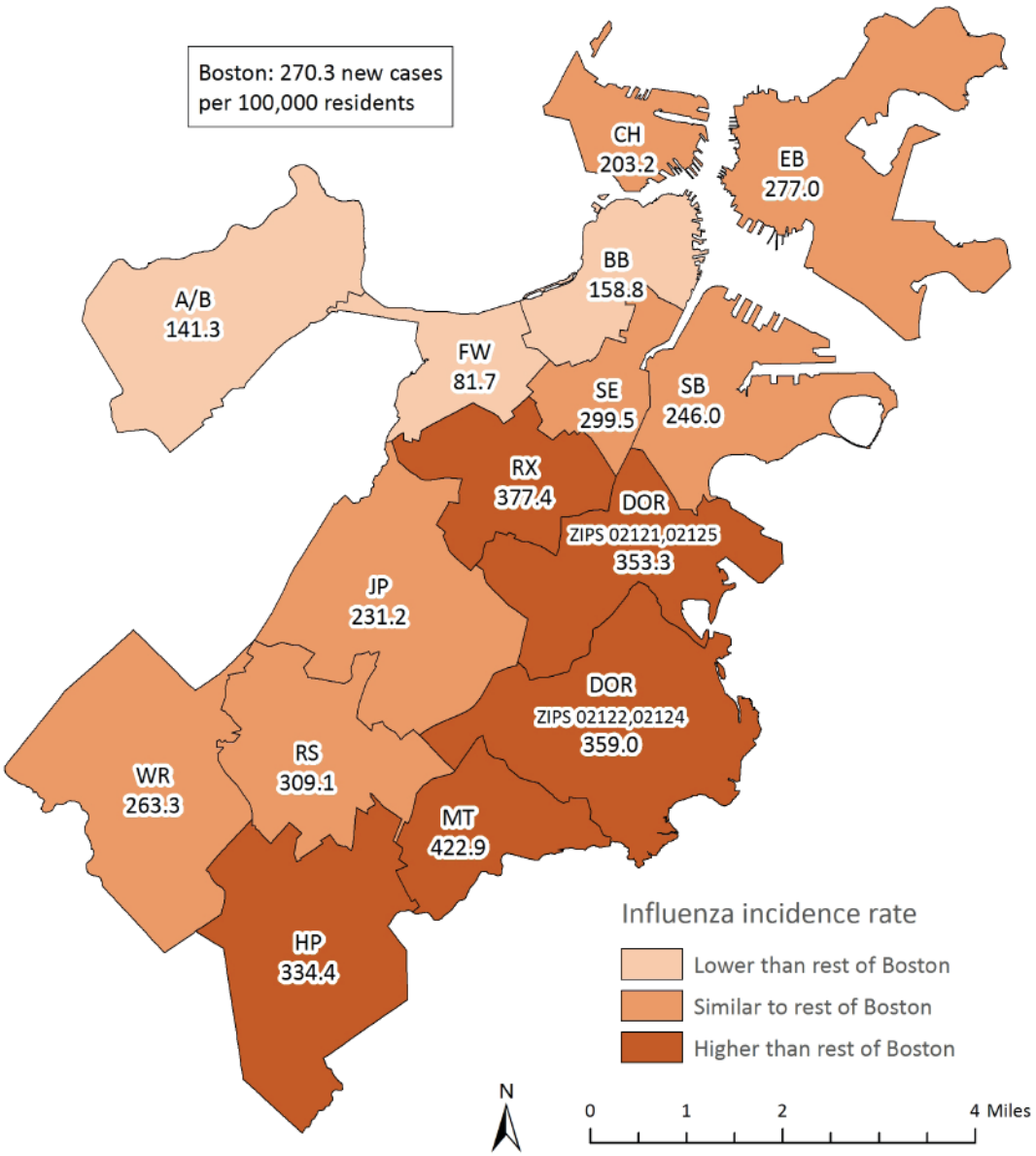


* Statistically significant difference when compared to reference group
[1] November 2015 - April 2016

NOTE: Bars with patterns indicate the reference group within each selected indicator.
DATA SOURCE: Infectious Disease Bureau, Boston Public Health Commission

For the 2015-2016 influenza season, the incidence rate for influenza among Boston residents was 270.3 new cases per 100,000 residents. The influenza incidence rate for females (299.2) was 25% higher than the rate for males (238.8). The influenza incidence rate was higher for Black (468.1) and Latino (268.8) residents and lower for Asian residents (117.2) compared with White residents (170.8). The biggest difference was found among Black residents whose influenza incidence rate was almost 3 times the rate for White residents. The rates for all age groups were higher than the rate for residents ages 18-29 (148.2). The biggest difference was found among residents 18 years and younger (377.6) with a rate 2.5 times the rate of those ages 18-29.

Figure 10.9 Influenza Incidence by Neighborhood, 2015-2016 Season[1]



[1] November 2015 - April 2016

NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End. "SE" includes the South End and Chinatown.

DATA SOURCE: Infectious Disease Bureau, Boston Public Health Commission

For the 2015-2016 influenza season, the incidence rate for influenza among Boston residents was 270.3 new cases per 100,000 residents. The rate of influenza was higher among residents in Dorchester (zip codes 02121, 02125), Dorchester (zip codes 02122, 02124), Hyde Park, Mattapan, and Roxbury compared with the rest of Boston. The rate of influenza was lower among residents in Allston/Brighton, Back Bay, and Fenway compared with the rest of Boston.

Salmonella Infection

Salmonella bacteria live in the intestinal tracts of infected humans and animals. Most people infected with salmonella develop diarrhea, fever, vomiting, and abdominal cramps 12 to 72 hours after infection. Fortunately, most people with salmonella have a mild infection, and recover in four to seven days without treatment. In rare instances, hospitalization may be required (16).

Salmonella infection (salmonellosis) occurs when a person eats microscopic fecal material that contains the salmonella bacteria. Contamination of food with fecal material may occur during food processing, handling, or preparation. Undercooked or raw poultry, beef, milk, and eggs, are common sources of salmonella. In addition, handling animals such as reptiles, baby chicks, or small rodents, is another common source of infection. These animals are particularly likely to carry salmonella even when they are healthy.

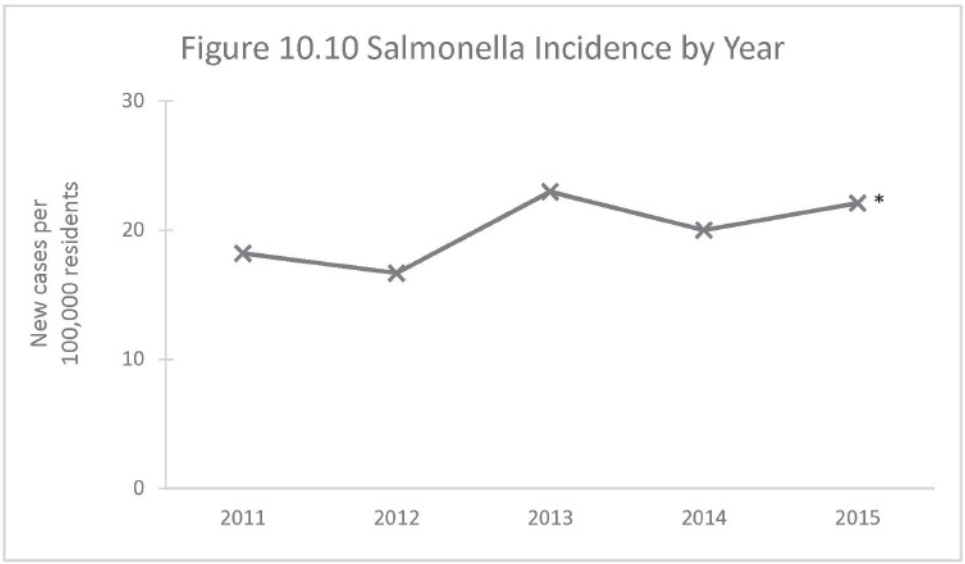
Prevention strategies

There is no vaccine for salmonellosis. The best way to prevent salmonella infection is to:

- Carefully wash hands with soap and water before and after preparing food, after using the toilet, and after handling pets.
- Cook foods thoroughly – especially poultry, ground beef, and eggs.
- Wash utensils, knives, cutting boards, counter tops, and dishes with clean soapy water before and after preparing food.
- Wash all fruits and vegetables with clean drinking water and use a brush if necessary.
- Refrigerate or freeze perishable foods without delay. Refrigerator temperatures should be at 40°F or below. Freezer temperatures should be below 0°F.

Salmonellosis occurs more commonly in children than in adults (16). Because most people do not seek treatment for their illness, many salmonella cases are not reported to the health department (16). For this reason, the actual number of cases in Boston is thought to be much higher than what is included in this report. The incidence rate for new illnesses of salmonellosis in the U.S. in 2013 was 16.1 per 100,000 population (17).

In 2015, the incidence rate for salmonella was 22.1 new cases per 100,000 residents. Between 2011 and 2015, the incidence rate for salmonella infection among Boston residents increased by 25%.



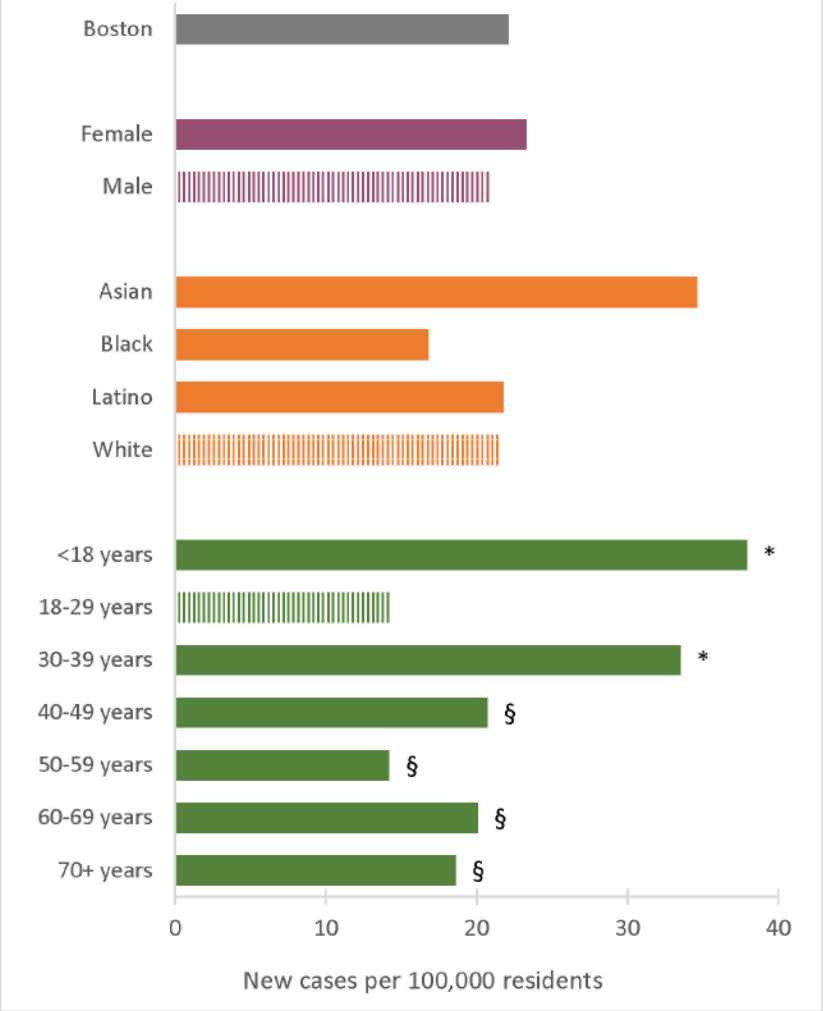
* Statistically significant change over time

DATA SOURCE: Infectious Disease Bureau, Boston Public Health Commission

Salmonella
Healthy People 2020 Target: 11.4 cases per 100,000 population

U.S. 2013: 16.1
MA 2013: 17.2
Boston 2015: 22.1

Figure 10.11 Salmonella Incidence by Selected Indicators, 2015

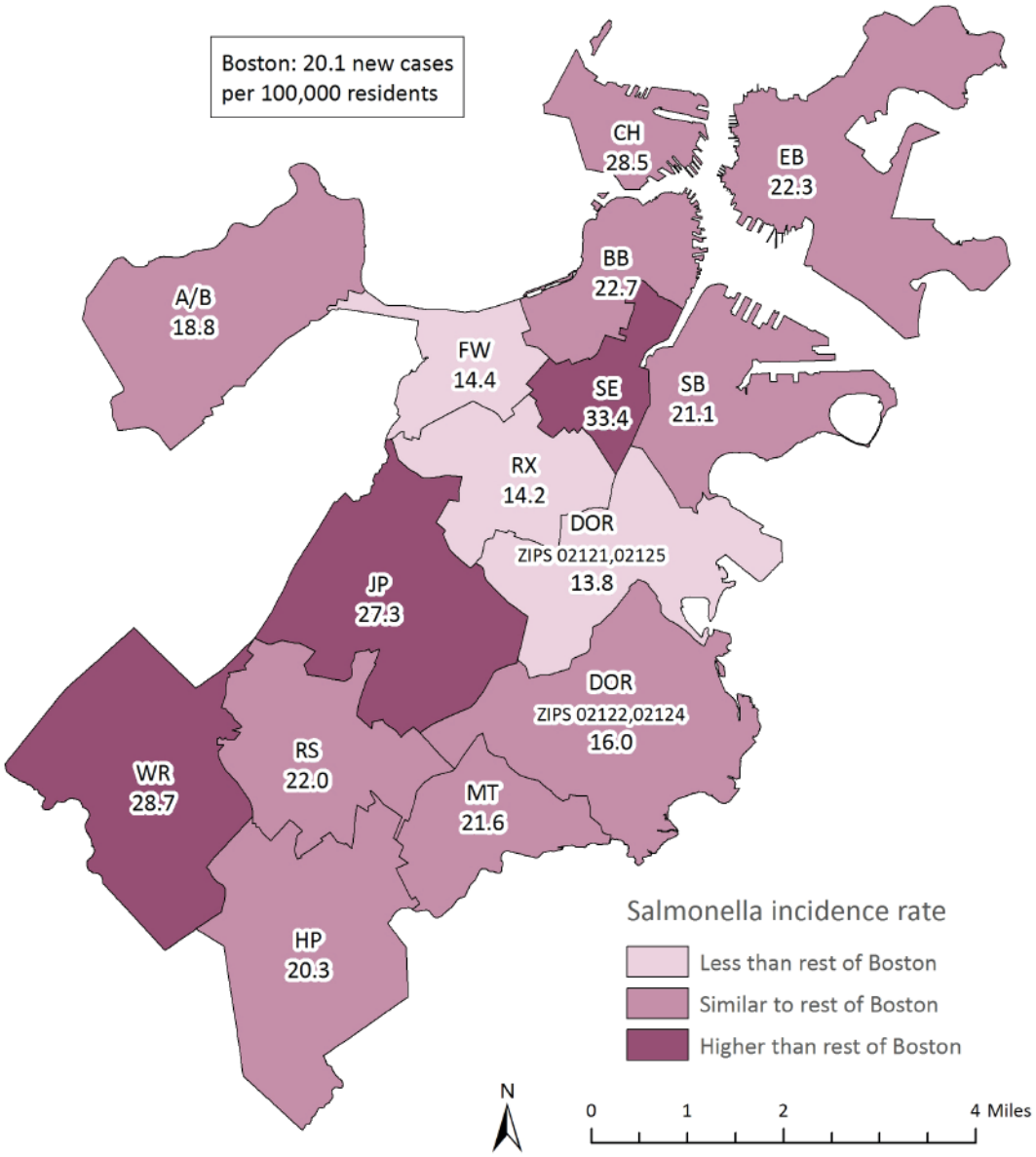


* Statistically significant difference when compared to reference group
§ Rates are based on 20 or fewer cases and should be interpreted with caution.

NOTE: Bars with patterns indicate the reference group within each selected indicator.
DATA SOURCE: Infectious Disease Bureau, Boston Public Health Commission

In 2015, the incidence rate for salmonella infection among Boston residents was 22.1 new cases per 100,000 residents. The rate for residents under the age of 18 (37.9) was 2.7 times the rate for residents ages 18-29 (14.3). The rate for residents ages 30-39 (33.5) was 2.3 times the rate for residents ages 18-29. There were no significant differences by sex or race/ethnicity.

Figure 10.12 Salmonella Incidence[1] by Neighborhood, 2011-2015



[1] 5-year average annual rates

NOTE: "BB" includes the Back Bay, Beacon Hill, Downtown, the North End, and the West End. "SE" includes the South End and Chinatown.

DATA SOURCE: Infectious Disease Bureau, Boston Public Health Commission

In 2011-2015, the incidence rate for salmonella infection among Boston residents was 20.1 new cases per 100,000 residents. The rate of salmonella infection among residents in Jamaica Plain, the South End, and West Roxbury was higher compared with the rest of Boston. The rate of salmonella infection among residents in Dorchester (zip codes 02121, 02125), Fenway, and Roxbury was lower compared with the rest of Boston.

Tuberculosis

Tuberculosis (TB) is an infectious disease caused by the bacterium Mycobacterium tuberculosis. The bacteria usually infect the lungs but can infect other parts of the body as well. TB is spread through the air when a person with an active infection releases respiratory particles into the air by coughing or sneezing.

Latent TB and Active TB

Not everyone exposed to TB becomes infected, and not everyone infected with TB becomes sick. In fact, most people who are infected are able to fight the bacteria, prevent it from spreading, and avoid symptoms altogether, in what is known as latent TB. A person with latent TB cannot spread the infection. However, the latent form can become active with time, at which point the infected person will become symptomatic and infectious to others. Although latent TB is often asymptomatic, treatment of latent TB is recommended to prevent the development of active TB. TB symptoms include severe cough with blood or sputum, chest pain, weakness, weight loss, chills, fever, and night sweats (18).

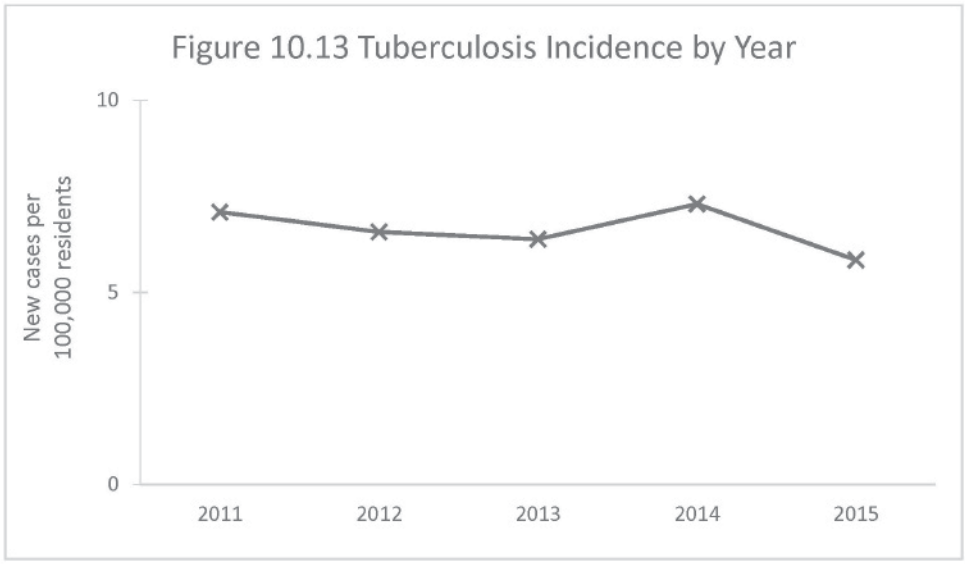
Screening and prevention

Tests to determine TB infection include a skin test and a blood test. A positive test result usually means that a person has been infected with the TB bacteria but does not necessarily mean that the person has an active TB infection. In some instances, because of cross-reactivity, people who received a vaccine for TB will have a positive skin test even though they are not infected with the TB bacteria. BCG, or bacille Calmette-Guerin, is a vaccine for TB, which is most commonly used in countries with high prevalence of TB. It is not generally recommended for use in the U.S. because of the low risk of infection domestically, because it is not consistently effective at preventing disease, and because it interferes with the skin test reactivity. In these cases, other diagnostic tests, such as blood tests, chest x-rays, and sputum samples, are needed to see whether the person has TB (18).

Treatment

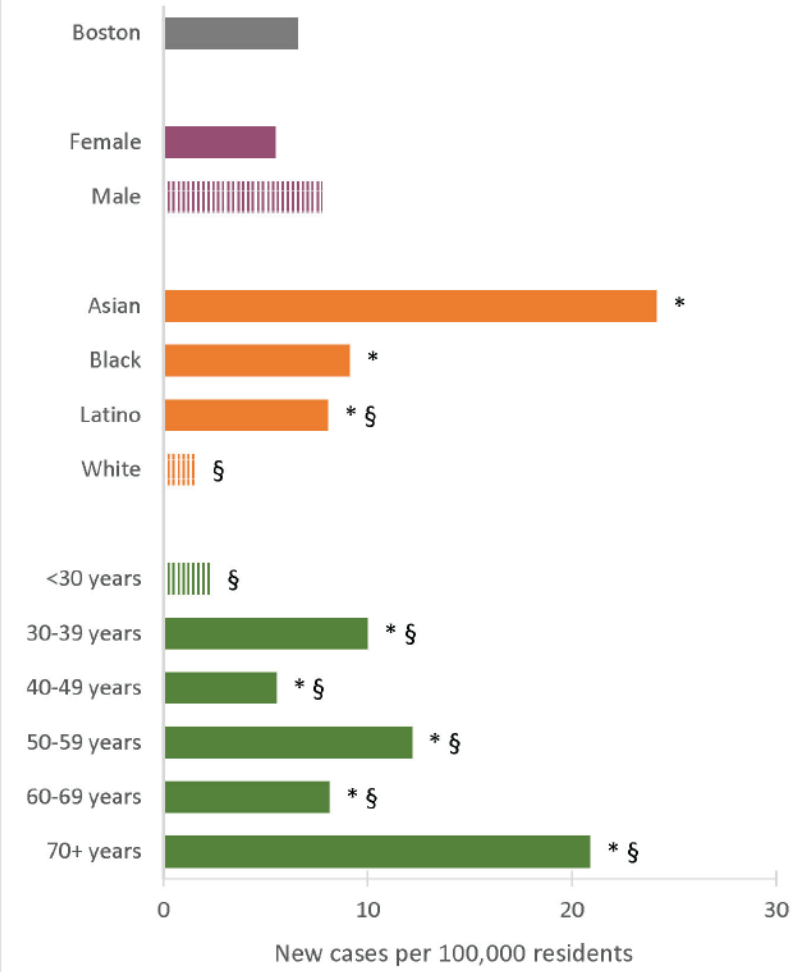
Tuberculosis can be treated by taking several drugs for 6 to 9 months. There are currently 10 drugs approved by the U.S. Food and Drug Administration for treating TB (19). Latent TB infection can also be treated with drugs in order to prevent active TB from developing. The treatment of latent TB infection is essential for controlling and eliminating TB infection in the U.S., where it has been in decline since 1992; the TB incidence rate has now leveled at 3.0 new cases per 100,000 in 2015 (20). However, most cases in the U.S. occur among immigrants from tuberculosis endemic areas (18); the incidence rate for foreign-born individuals in 2015 was 15.1 per 100,000 (20). Although the TB incidence rate in the U.S. is lower than in many other nations, TB represents one of the leading causes of death around the world, particularly among those infected with HIV (21).

In 2015, the incidence rate for tuberculosis was 5.8 new cases per 100,000 residents. Between 2011 and 2015 there was no significant change in the tuberculosis incidence rate among Boston residents.



DATA SOURCE: Infectious Disease Bureau, Boston Public Health Commission

Figure 10.14 Tuberculosis Incidence[1] by Selected Indicators, 2014-2015



* Statistically significant difference when compared to reference group
§ Rates are based on 20 or fewer cases and should be interpreted with caution.
[1] 2-year average annual rates

NOTE: Bars with patterns indicate the reference group within each selected indicator.
DATA SOURCE: Infectious Disease Bureau, Boston Public Health Commission

During 2014-2015, the average annual incidence rate for tuberculosis among Boston residents was 6.6 new cases per 100,000 residents. The tuberculosis incidence rates for Asian (24.1), Black (9.1), and Latino (8.0) residents were higher than that of White residents (1.6). The biggest difference was among Asian residents with a rate 15.5 times the rate of White residents. The rates for all age groups were higher than the rate for residents under age 30 (2.3). The biggest difference was found among residents ages 70 or older (20.9) with a rate 9 times the rate for those under age 30. There was no significant difference by sex.

Tuberculosis
Healthy People 2020: 1.0 new case per 100,000 population

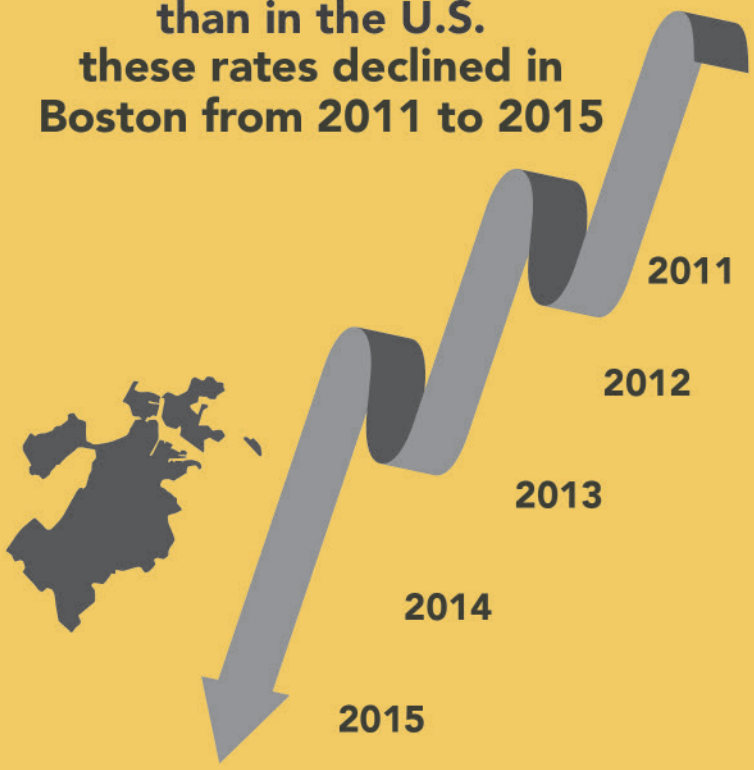
U.S. 2015: 3.0
MA 2015: 3.0
Boston 2015: 5.8

Summary

As expected, rates for hepatitis B, hepatitis C, salmonella, and TB, are higher in Boston than in the U.S. overall, which is likely explained by Boston's urban demographic composition with high immigrant representation. For hepatitis B and hepatitis C, the incidence rates reported for Boston in 2015 are both significantly lower from 2011, while for salmonella, the incidence rate reported for Boston in 2015 was significantly higher. We also identified racial/ethnic and age inequities for the majority of the infectious diseases reported in 2015. Most notably, the risk of hepatitis B and TB was approximately sixteen times greater in Asian residents than in White residents. Black residents also had 2 to 6 fold higher risk of hepatitis B, influenza, and TB relative to White residents. While higher incidence rates were concentrated in the middle-age categories for hepatitis B and hepatitis C, for other infectious diseases higher incidence rates were found in younger (influenza, salmonella) and elderly (influenza, TB) age categories. We also detected geographic variation in the incidence rates for infectious diseases at the neighborhood level. The neighborhoods Dorchester (zip codes 02121, 02125) and Dorchester (zip codes 02122, 02124), in particular, had elevated incidence rates for hepatitis B, hepatitis C, and influenza. The elevated incidence rates observed in Dorchester (zip codes 02121, 02125) and Dorchester (zip codes 02122, 02124) are likely explained by the sociodemographic composition of these neighborhoods. To reduce the inequities of infectious disease in the Boston population, interventions that target subpopulations at higher risk should address pathways (education, employment, foreign-language outreach) associated with insurance coverage, access to health care, and receipt of vaccination.

Infectious Disease

While in 2015 the rates for hepatitis B and hepatitis C infection were higher in Boston than in the U.S. these rates declined in Boston from 2011 to 2015

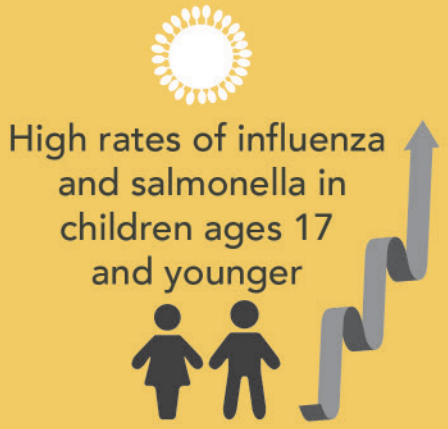


In 2015 the rate of hepatitis B was almost 17 times higher among Asian residents than among White residents

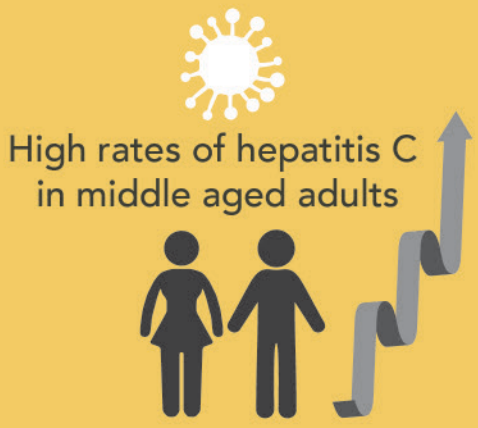
Asian
234.1
new cases per 1,000 residents

White
14.1
new cases per 1,000 residents

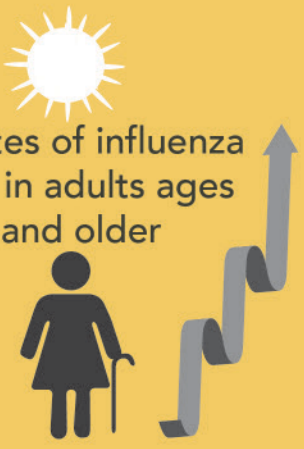
Selected infectious diseases and the age spectrum:



High rates of influenza and salmonella in children ages 17 and younger



High rates of hepatitis C in middle aged adults



High rates of influenza and TB in adults ages 70 and older

Health of Boston 2016-2017

Our Point of View: Thoughts from public health

Eliminating Hepatitis C is an achievable goal

By Marguerite Beiser, NP
Director, Hepatitis C Services
Boston Health Care for the Homeless Program

Hepatitis C (HCV) is a curable infection. Yes, you read that right. Thanks to advances in treatment (namely direct-acting antiviral therapy), Hepatitis C is no longer a death sentence. In fact, treatment greatly improves the health of the person, can be done at all stages of liver disease, is cost-effective, and prevents spread of the disease to others. With this tool, Massachusetts is now in the position where it can eliminate Hepatitis C.

What is in the way? There are many barriers to uptake of curative treatment and pursuing state-wide eradication. These barriers include:

- identification of undiagnosed individuals
- linkage of people living with HCV to experienced HCV-treaters
- negotiating cost and insurance issues
- support for individuals to ensure adherence to treatment
- prevention of reinfection for individuals once they are cured

Of paramount importance is the way we engage with individuals who use drugs. Particular recognition of the challenges for drug users is crucial, because they have traditionally had increased barriers to medical care and have ongoing risk factors for HCV transmission and reinfection.

At Boston Health Care for the Homeless Program (BHCHP), 23% of our patients are living with HCV. Experiencing homelessness and living with HCV infection is associated with higher healthcare utilization and cost as well as excess mortality from liver disease. Over 60% of patients at BHCHP have a substance use disorder (SUD) and injection drug use is the main route of transmission for HCV in our population.

Our Hepatitis C treatment program, in existence since 2014, provides HCV therapy keeping in mind the particular challenges related to homelessness and substance use disorders. Experienced primary care providers, a nurse and a care coordinator provide treatment within the patient's existing medical home. The model includes adherence support, harm reduction, and coordination with other providers, such as with behavioral health or office-based addiction treatment providers.

The results so far have been remarkable. Among the first 64 patients to receive HCV treatment, 97% were cured. The prevalence of history of SUDs was 92% and 73% of patients reported a history of injection drug use. Almost half of the group also had HIV. As our program has grown and treated patients with more active substance use, we have seen this cure rate evolve to 91.5% (184 out of 201) with 12 cases of reinfection and 8 individuals lost to follow up due to substance relapse. These results are similar to cure rates and reinfection rates in the general population.

Our experience shows that even among the most hard-to-reach members of our society, HCV treatment can be successful. That puts us in a position where we can eradicate Hepatitis C statewide. It will take political will and substantial investment that recognizes and reduces the particular challenges for populations who use drugs.

Our Point of View: Thoughts from a community resident

Struggling to afford medication for Hepatitis C

By a Community Resident

I was hurt and shocked when I found out I had Hepatitis C. My mom was a heroin addict and had it. She was always careful about things like sharing toothbrushes and razors. I was too young to understand. I didn't realize how serious it was. She was my mom. I loved her.

I had no idea that you could get it by sharing needles and cotton or having sex. My mom told me she got it when she got a tattoo before she even started using drugs. I found out I had it when I was pregnant with my second daughter. I'm not even sure how I got it. I was so ashamed. I didn't want anyone to know. I found out because I got really sick. I had a bad cold, my eyes turned yellow and my urine was dark. I had a great primary care doctor who I still see now. She told me it was undetectable. It still is.

I've never had to take medication for it. It scares me because what if I did need medication? The medication is so expensive. I wouldn't be able to afford it and then what would happen?

I have Mass Health but I have a lot of problems especially when I have to renew it. Right now, my daughter and I have been without insurance for a month. I have a newborn and no insurance. I had to pay out of pocket to take my daughter to the doctor.

That's why I think they should have more programs to help people pay for the medication. There are people who work and still can't afford them. They have to choose between paying for their medications and paying their bills.

I also wish there was more education. We have people who come and talk to us like once a year. But a lot of women still don't know a lot about Hepatitis C and HIV. They're afraid to get tested because they don't want to know. Maybe if someone explained to them how you get it and that there are medications available that would help.

References

1. Wenner M. Humans Carry More Bacterial Cells than Human Ones. Scientific American. Nov 30, 2007.

2. Willey JM, Sherwood LM, Woolverton CJ. Prescott's Microbiology: McGraw Hill; 2011.

3.World Health Organization. 10 Facts on Antimicrobial Resistance [01/05/17]. Available from: http://www.who.int/features/factfiles/antimicrobial_resistance/en/.

4. Antibiotic Resistance and the Threat to Public Health: Hearing before the House Committee on Energy and Commerce, Subcommittee on Health, United States House of Representatives(04/28/2010).

5. Mishra RP, Oviedo-Orta E, Prachi P, Rappuoli R, Bagnoli F. Vaccines and antibiotic resistance. Current opinion in microbiology. 2012;15(5):596-602.

6. National Institute of Allergy and Infectious Diseases, US Department of Health and Human Services, National Institutes of Health. Understanding Microbes in Sickness and in Health. September 2009.

7. Centers for Disease Control and Prevention. Hepatitis B Information for the Public [12/21/16]. Available from: https://www.cdc.gov/hepatitis/hbv/index.htm.

8. Centers for Disease Control and Prevention. Hepatitis C Information for the Public [12/21/16]. Available from: https://www.cdc.gov/hepatitis/hcv/index.htm.

9.Centers for Disease Control and Prevention. Hepatitis C FAQs for Health Professionals 2017 [02/02/17]. Available from: https://www.cdc.gov/hepatitis/hcv/hcvfaq.htm#section4.

10. Centers for Disease Control and Prevention, Division of Viral Hepatitis and National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention. Surveillance for Viral Hepatitis: United States 2014 [December 16, 2016]. Available from: http://www.cdc.gov/hepatitis/statistics/2014surveillance/index.htm.

11.Centers for Disease Control and Prevention. Influenza (Flu): Key Facts About Influenza (Flu) [01/05/17]. Available from: https://www.cdc.gov/flu/keyfacts.htm.

12. Davlin SL, Blanton L, Kniss K, Mustaquim D, Smith S, Kramer N, et al. Influenza Activity - United States, 2015-16 Season and Composition of the 2016-17 Influenza Vaccine. MMWR Morbidity and mortality weekly report. 2016;65(22):567-75.

13. Centers for Disease Control and Prevention. Seasonal Influenza (Flu): Key facts about seasonal flu vaccine [01/05/17]. Available from: https://www.cdc.gov/flu/protect/keyfacts.htm.

14. Nagata JM, Hernandez-Ramos I, Kurup AS, Albrecht D, Vivas-Torrealba C, Franco-Paredes C. Social determinants of health and seasonal influenza vaccination in adults >/=65 years: a systematic review of qualitative and quantitative data. BMC public health. 2013;13:388.

15. Centers for Disease Control and Prevention. Seasonal Influenza (Flu): the flu – what to do if you get sick [01/26/17]. Available from: https://www.cdc.gov/flu/takingcare.htm.

16. Centers for Disease Control and Prevention. Salmonella: What is Salmonellosis? [12/21/16]. Available from: http://www.cdc.gov/salmonella/general/index.html.

17. National Center for Health Statistics. Health, United States, 2015: With Special Feature on Racial and Ethnic Health Disparities. Hyattsville, MD2016.

18. Centers for Disease Control and Prevention. Tuberculosis (TB): basic TB facts [01/05/17]. Available from: https://www.cdc.gov/tb/topic/basics/default.htm.

19. Centers for Disease Control and Prevention, National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention, Division of TB Elimination. TB Elimination: general considerations for treatment of TB disease. [01/05/17]. Available from: https://www.cdc.gov/tb/publications/factsheets/treatment/treatmenthivnegative.pdf.

20. Salinas JL, Mindra G, Haddad MB, Pratt R, Price SF, Langer AJ. Leveling of Tuberculosis Incidence - United States, 2013-2015. MMWR Morbidity and mortality weekly report. 2016;65(11):273-8.

21. Centers for Disease Control and Prevention. Tuberculosis (TB): TB and HIV coinfection [01/05/17]. Available from: https://www.cdc.gov/tb/topic/basics/tbhivcoinfection.htm.