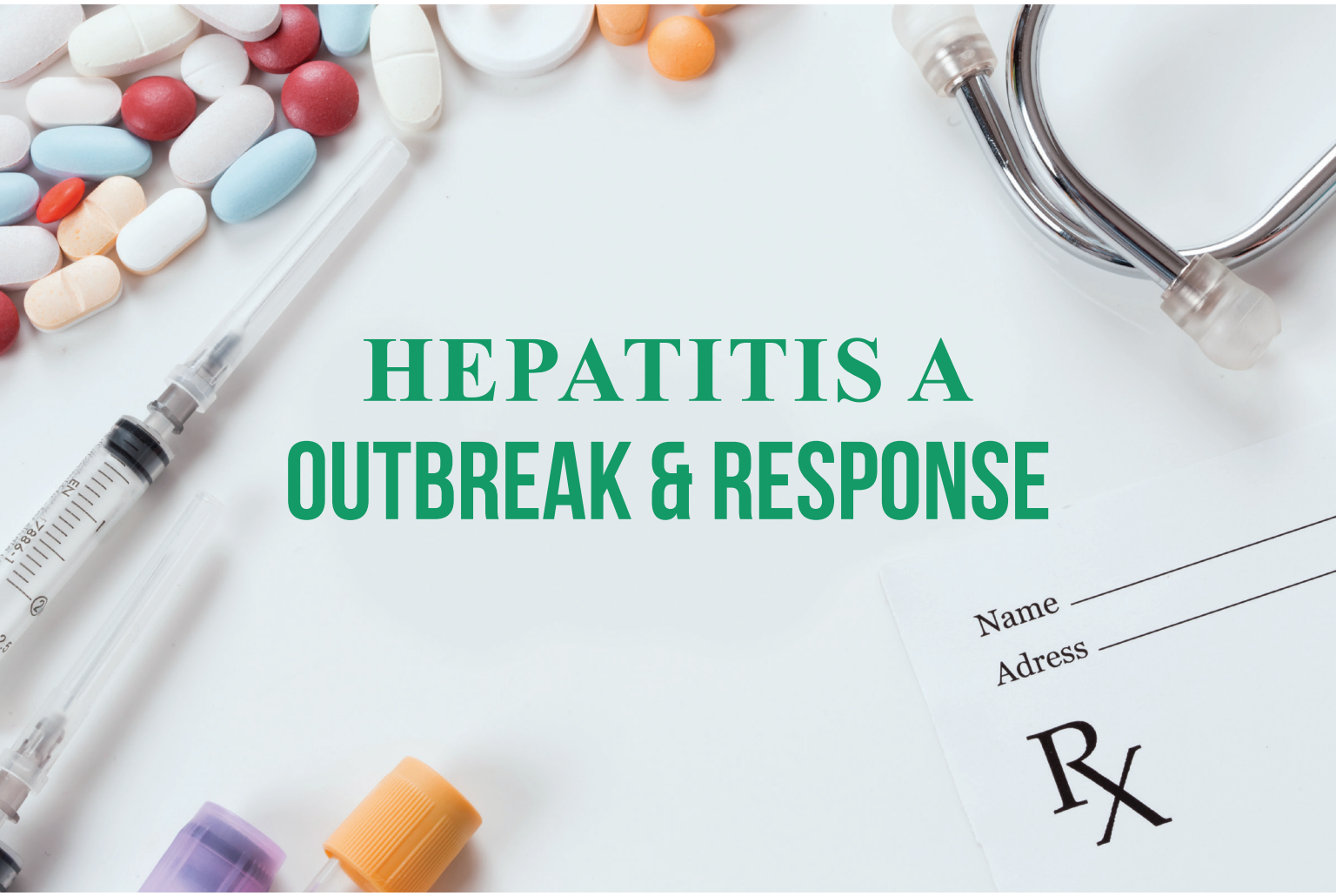
OAKLAND COUNTY
MICHIGAN
HEALTH DIVISION

AUG 2016 - MAY 2018



HEPATITIS A
OUTBREAK & RESPONSE

HEPATITIS A OUTBREAK & RESPONSE

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INTRODUCTION

Hepatitis A is a viral infection typically spread from person to person via fecal-oral transmission and causing acute liver infection, with varying levels of disease severity and symptoms[1]. The hepatitis A virus (HAV) itself is a 27 to 32nm diameter single-stranded RNA virus that belongs to the picornaviridae family and lies within the Hepatovirus genus[2]. Hepatotropic in nature, HAV replicates in the liver upon introduction into the host's system where it is then excreted in bile to the gastrointestinal tract, ultimately being shed in the host's stool[1]. HAV is predominantly non-cytopathic. This means it does not directly damage liver cells, leading researchers to suggest disease severity may be caused by the hosts own immune response to the virus, rather than HAV itself[3]. There are seven total genotypes of HAV, of which IV, V, and VI circulate in monkeys and apes while types I, II, III, and VII are found in the human population[1]. Additionally, there are two subgenotypes for each genotype, A and B, along with further specification using phylogenetic analysis such as cluster US-IA1 and US-IA2[1]. Although most isolates are from North America, it is estimated that 80% of isolates are subgenotype IA, 17% are subgenotype IB, and 3% are IIIA[1].

Traditionally, HAV is categorized as a nonenveloped virus, yet Feng et al.[4] found that HAV released after proliferation in the host's liver cells are enveloped with host-derived membranes. These membranes are thought to elude antibodies and the host's immune response[4]. Enveloped HAV can be found circulating in the blood while nonenveloped HAV is shed in the hosts feces[4]. Both enveloped and nonenveloped HAV are inectious[4], though nonenveloped HAV is more likely to be spread from person to person due to the relative ease of fecal-oral transmission versus blood-borne transmission. Once in the environment, HAV may survive for hours on a person's hands and for several days on indoor surfaces[5]. Additionally, HAV can survive for up to one year in fresh and salt water, for days to weeks in dried feces, and is resistant to low PH, varying humidity, heating, and freezing, especially when the virus is found in organic matter[1,5]. Hand sanitizer is not effective in neutralizing hepatitis A. Some common modes of HAV transmission include person to person contact, men who have sex with men (MSM), illicit drug use, contaminated food and water, and international travel to HAV endemic countries[1]. Ultimately, the best way to prevent HAV transmission and illness is through vaccination. One dose of vaccine is postulated to provide 95% immunity while full vaccination with a second vaccine dose results in nearly full immunity to hepatitis A. Per the CDC, approximately 9% of adults over the age of 19 have received two doses of the hepatitis A vaccine, leaving a large majority of the population with partial or no immunity as of 2015 (barring those with previous HAV infection)[10].

Upon transmission and viral uptake in a susceptible host, symptoms may begin to appear after 15 to 50 days with an average incubation period of 28 to 30 days[6]. Communicability can occur up to two weeks before symptoms appear and for one week after jaundice onset[6]. The potential two-week period prior to symptoms poses public health challenges in preventing disease transmission as the communicable individual may spread the virus unknowingly. Some symptoms of hepatitis A include nausea, vomiting, sudden abdominal pain, fatigue, loss of appetite, dark urine, diarrhea, and finally jaundice[7]. Adults are more likely to have symptoms than children; some people may be asymptomatic altogether[7]. Approximately 50% of children under the age of six do not develop symptoms from HAV infection while the majority of the other 50% have mild illness from infection[7,19,20]. Fulminant liver failure and death are typically rare occurrences as most symptoms typically subside within two months of infection[1]. It is estimated that HAV case fatality rate in the United States among all HAV cases is anywhere from 0.3% to 0.6% and approximately 2% for people over the age of 40[8]. Furthermore, a study by Lee, Chang, Moon et al. (2015) suggests there is a strong correlation between HAV load and disease severity, however, HAV viral load is rarely known or reported[9]. In developing countries with higher poverty rates and increased HAV transmission, HAV disease burden is generally less than that of developed countries[19]. This is due to residents in developing countries being more likely to have been exposed to HAV and other enteric pathogens as children, therefore, they are less likely to have symptoms or severe HAV infection and acquire lifelong immunity[19].

ABOUT THIS DOCUMENT

The purpose of this document is to detail the current outbreak of hepatitis A in Oakland County. This document aims to identify the role of each department within the Health Division in regard to the hepatitis A outbreak response.

OUTBREAKS

Past Outbreaks

There have been multiple outbreaks of hepatitis A in the United States. In 2013, a multistate outbreak of hepatitis A – genotype 1B lasted four months and was eventually linked back to pomegranate seeds imported to the U.S. from Turkey[11]. In total, the 2013 outbreak involved 10 states, reported no deaths, and caused 162 confirmed illnesses, 44% of which resulted in hospitalization[11]. Three years later, in 2016, two more outbreaks of hepatitis A occurred, one in Hawaii and one spanning nine states from New York to California[12,13]. The four-month outbreak in Hawaii was traced back to contaminated scallops imported from the Philippines, resulting in 292 confirmed cases, 25.34% of which were hospitalized[12]. Traceback evidence from the second 2016 outbreak implicated frozen strawberries imported from Egypt which were often used in Tropical Smoothie Café's smoothies [13]. No deaths were reported; there were 143 confirmed cases, 39.16% of which were hospitalized [13].

Current Outbreaks

Currently, there are outbreaks of hepatitis A, genotype 1B in Michigan, California, Utah, Kentucky, Indiana, and West Virginia [14]. Per the CDC, the majority of cases in the outbreak states are people who are homeless or report illicit drug use as well as those who are in direct close contact with them [14]. As of May 9th, 2018, Michigan has the largest hepatitis A outbreak in the country with a hospitalization rate that is 9.9% greater than the next highest outbreak state, Kentucky. The highest concentration of outbreak cases in Michigan are within the southeast counties of Wayne, Oakland, Macomb, and the City of Detroit. Overall, cases have been reported in 35 of Michigan's 83 counties, with higher case counts in areas that are closest to the three major southeast counties [18].

Counts and Outbreak Hospitalization Rates for Hepatitis A by States Experiencing an Outbreak, 2018*

	Number of Cases	Hospitalizations	Hospitalization Rate
Utah	239	126	52.7%
California	704	461	65.5%
Kentucky	448	315	70.3%
Michigan	833	668	80.2%
Indiana	94	46	48.9%
West Virginia	73	51	69.9%

TABLE 1. *Exact dates of current case counts by state: Utah- May 14th, California- April 11th, Kentucky- May 4th, Michigan- May 9th, Indiana- May 11th, West Virginia- May 11th. [14,15,16,17,18].

HEPATITIS A IN OAKLAND COUNTY

Overview

The current HAV outbreak in Oakland County began in early April of 2016 and has continued into May of 2018. As of May 9th, there have been 120 confirmed cases and 98 hospitalizations (81.6%). Age of HAV cases range from 18-90 years old with an average of 46 years and a median of 44.5 years. Further characteristics of Oakland County cases are shown in Table 2.

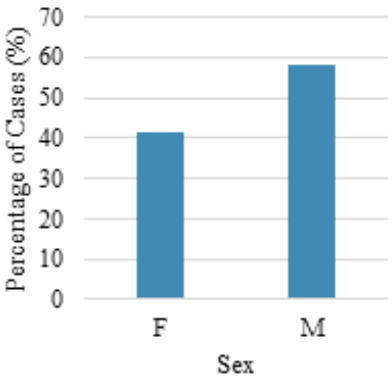
Oakland County Health Division's (OCHD) outbreak response involves efforts and coordination within internal departments as well as external community partners. Departments that played major roles in combating hepatitis A within the Health Division include Communicable Disease, Environmental Health Services, Public Health Nursing Services, Clinic Services, and Health Education. This coordination allowed for a timely, effective response to exposure incidents and the overall outbreak.

Oakland County Cases: April 01, 2016 – May 04, 2018

HAV Cases	Count (n)	Percentage
Occupation		
Healthcare Workers	7	5.8%
Food Handlers	8	5.0%
High Risk Groups		
Inmates	3	2.5%
IV Drug Use	26	21.7%
Non-IV Drug Use	12	10.0%
Homeless	1	0.8%
Men who sleep with men/men who sleep with men & women	8	6.7%
Comorbidities		
Hepatitis C	17	14.2%
Diabetes	11	9.2%
Symptoms and Mortality		
Symptomatic	115	95.8%
Jaundice	84	70.6%
Death	4	3.3%

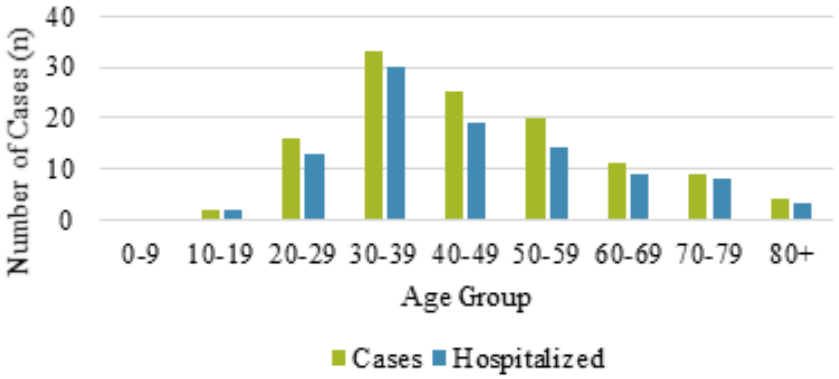
TABLE 2.

Percent of HAV Cases by Sex



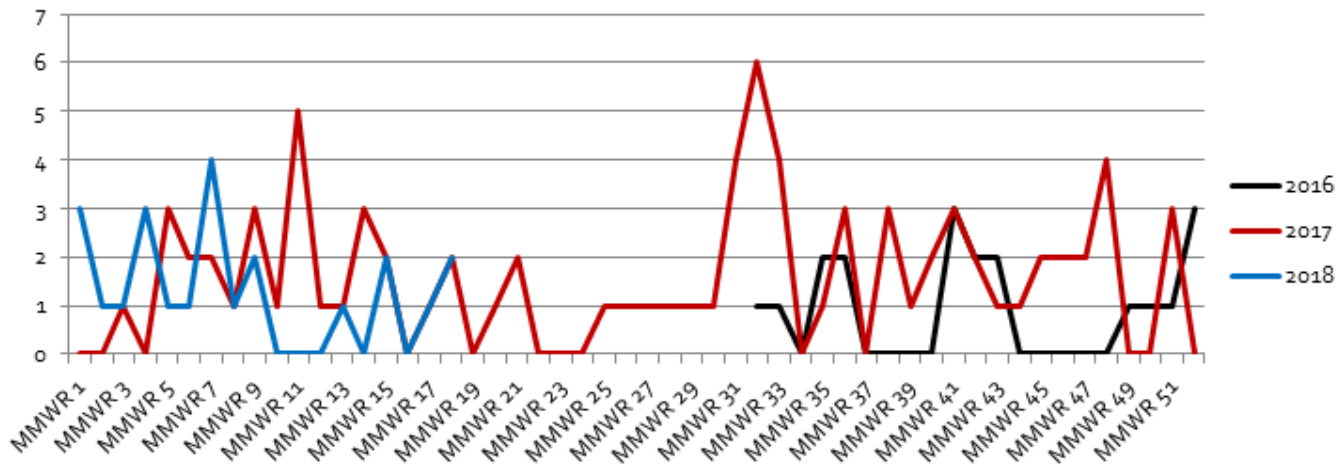
Female: 41.7%
Male: 58.3%

HAV Cases and Hospitalizations by Age Group: April 1, 2016 - May 5, 2018



Hospitalization Rate: **0-9 (0); 10-19 (100%), 20-29 (81.3%), 30-39 (90.9%), 40-49 (76%), 50-59 (70%), 60-69 (81.8%), 70-79 (88.9%), 80+ (75%)**

Confirmed and Probable Hepatitis A Cases by MMWR Week Oakland County, Starting August 2016



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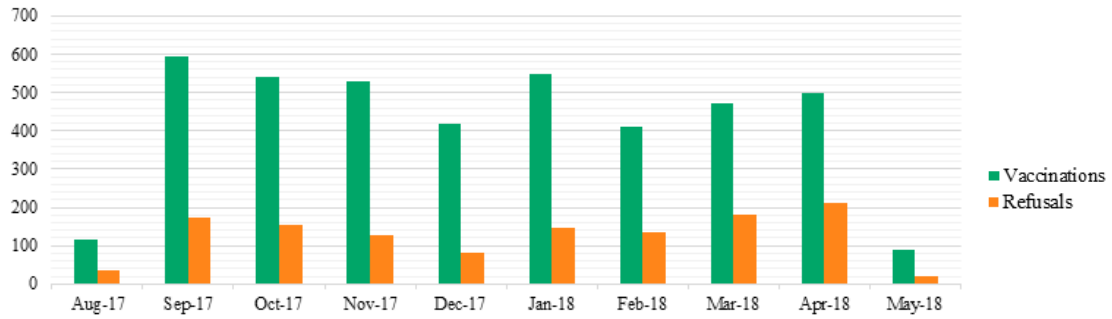
Communicable Disease Unit

The Communicable Disease Unit (CD) consists of public health nurses, epidemiologists, and clerks who work together in the classification, reporting, and surveillance of hepatitis A cases. Additionally, the CD unit may be involved in vaccination efforts. As of May 05, 2018, the CD unit received 716 reported hepatitis A cases. One hundred twenty cases were confirmed, one case is classified as probable, and 595 were not cases. Cases are classified by an epidemiologist who accounts for laboratory results, general symptoms, the presence of jaundice, elevated liver enzymes, and whether the individual is at high risk for contracting the disease. The presence of a positive HAV IgM or exposure to a laboratory confirmed case of hepatitis A in conjunction with at least one general symptom, and either jaundice or elevated liver function tests defines a confirmed case.

Investigations may begin with CD unit clerks fielding reports from healthcare facilities and collecting basic patient information before the case is assigned to a Public Health Nurse. The CD unit nurses are pivotal in case investigations, as they are responsible for collecting information quickly and educating the patient to prevent secondary transmission to close contacts. Finally, the epidemiologists are responsible for classifying cases, identifying potential sources of disease transmission, and coordinating the response to prevent secondary exposures.

Number of Jail Vaccinations by Month



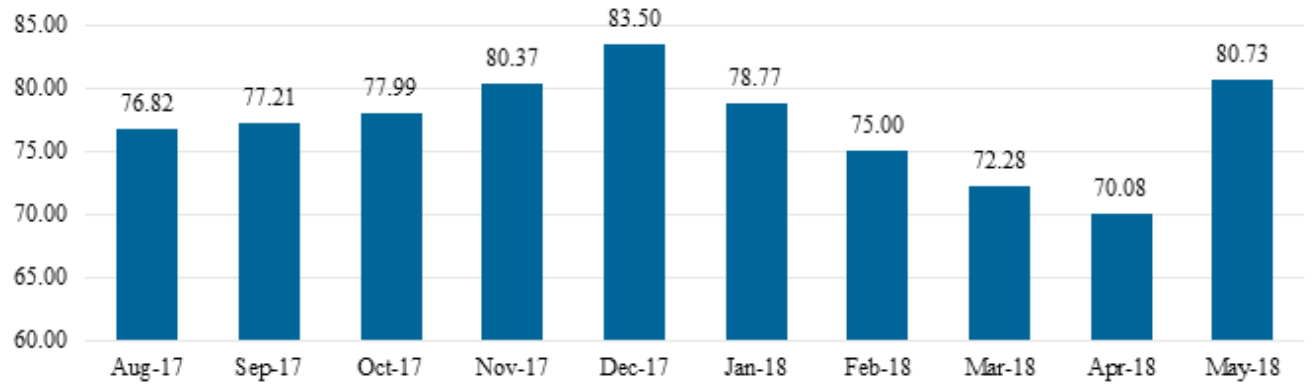
Public Health Nursing Services

From August of 2016 to May 11th of 2018, Oakland County has conducted a total of 239 vaccination outreach clinics, 174 of which were located at the Oakland County Jail. The remaining 65 outreach efforts took place in homeless shelters and warming centers, substance abuse treatment facilities, food service restaurants, soup kitchens, health clinics, schools, community service agencies, an assisted living facility, a domestic abuse treatment center, a women's inpatient program, and a LGBTQ community center.

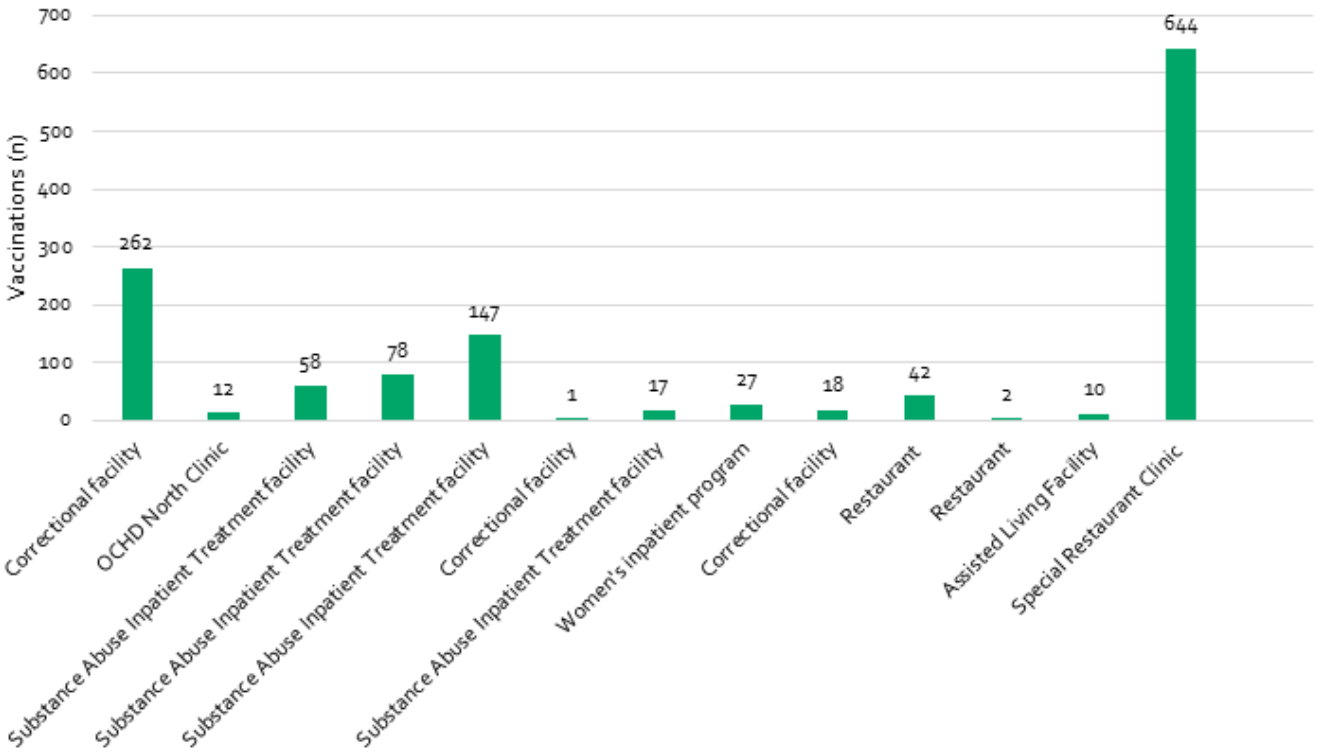
Outreach at the jail is done five days a week on a regular basis for all new inmates. Vaccine is transported from the Oakland County Clinic to the jail where a Health Division employee educates the inmates about hepatitis A and offers vaccination given by a clinic nurse. The educator's role in jail vaccination is crucial to create a relationship with the inmates to maximize vaccine uptake. Trust between inmates and the health educator is a barrier to vaccination as many inmates believe the government is a harmful entity. With the help of nurses from the clinic in addition to various support staff, 83.4% of inmates that are eligible have been vaccinated.

There have been 13 clinics so far in response to a hepatitis A exposure. In total, 1,318 vaccinations were provided to people that were potentially exposed to hepatitis A as post-exposure prophylaxis. These efforts often involve employees working overtime and weekends to ensure individuals can receive vaccination within 14 days of their exposure. Additionally, environmental health sanitarians conduct inspections at food establishments where a large exposure has occurred.

Jail Vaccine Uptake (%)



Vaccinations from Exposure Response by Incident Location



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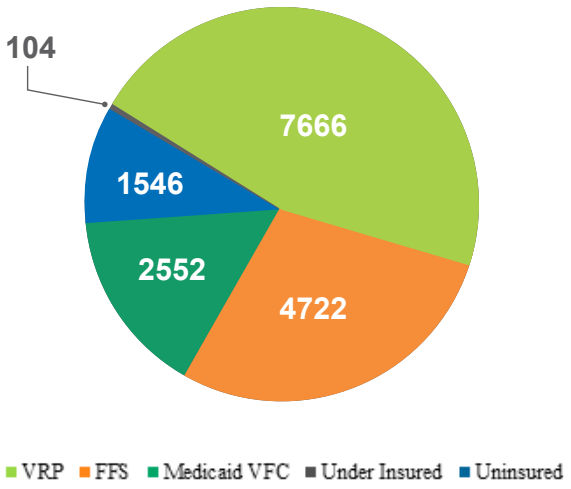
Vaccine Use

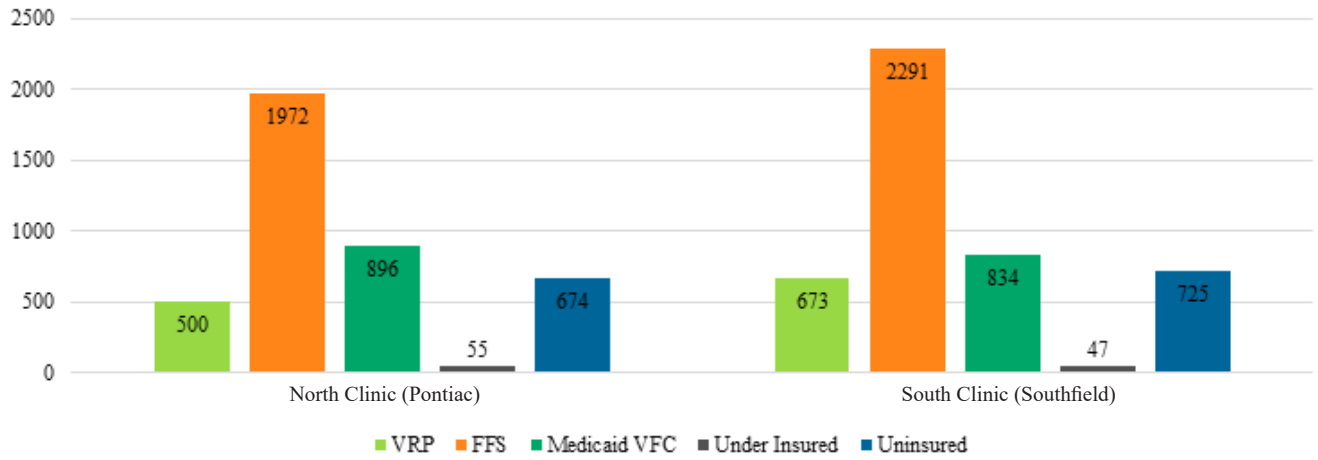
High risk groups for hepatitis A transmission are eligible to receive free VRP vaccine provided by the Michigan Department of Health and Human Services (MDHHS). If the individual has insurance, fee-for service (FFS) vaccine is administered. For those who are uninsured or underinsured, a sliding scale is applied to ensure money is not a barrier to vaccination. For children under 18, hepatitis A Vaccine for Children (VFC) is administered and calculated by the patient's weight. Finally, in cases of an exposure, hepatitis A Immune Globulin may be administered as a prophylactic measure to prevent infection. The purchase of biologics units along with portable coolers allowed for ample vaccine transportation and storage.

From August 1, 2016 to April 30, 2018, OCHD staff has administered 16,590 hepatitis A vaccines. OCHD clinics, along with outreach efforts, account for the majority of vaccinations. However, the Women, Infants and Children (WIC) clinics in Pontiac and Walled Lake are also involved in vaccination efforts.

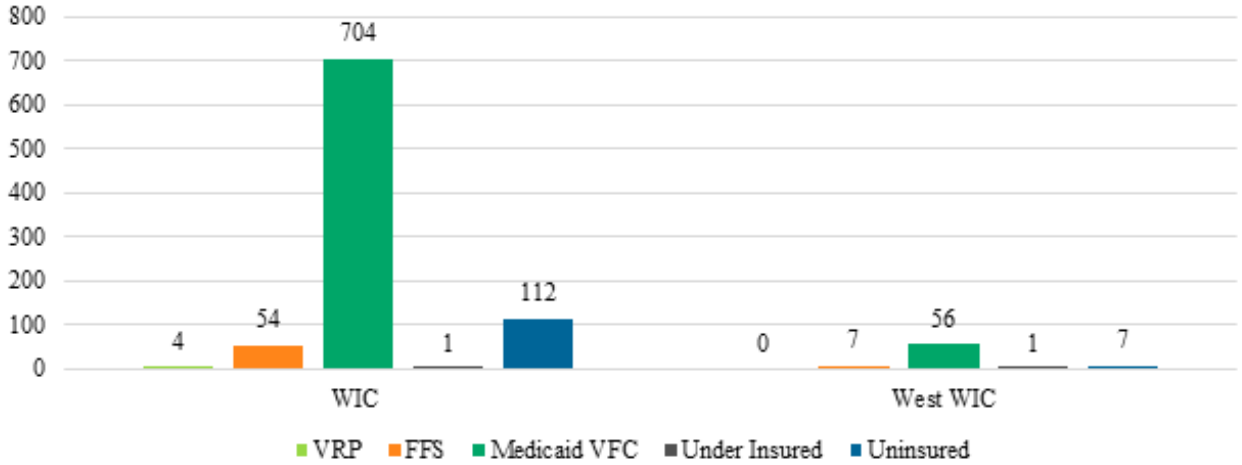
Total Vaccine Given

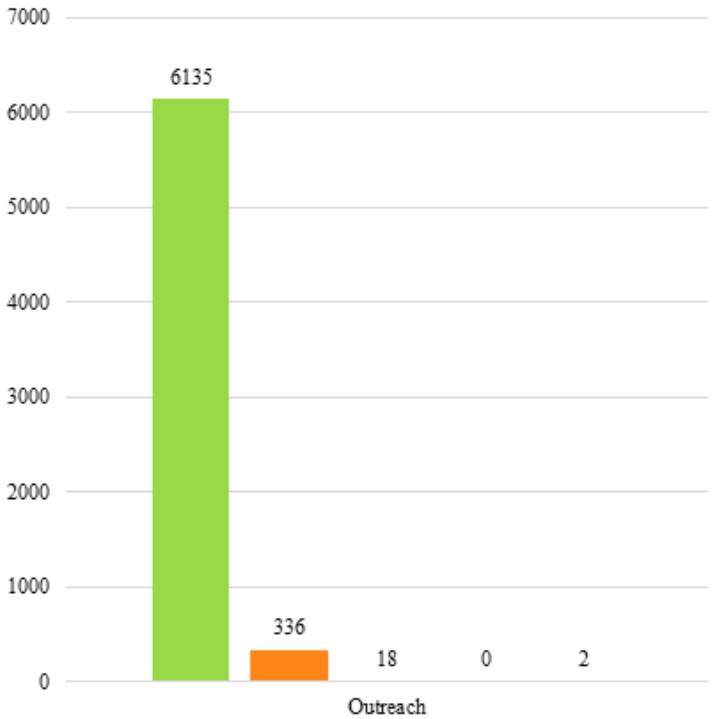


Vaccinations by Clinic and Type of Vaccine



WIC Vaccinations





Outreach Vaccinations

VRP FFS Medicaid VFC
Under Insured Uninsured

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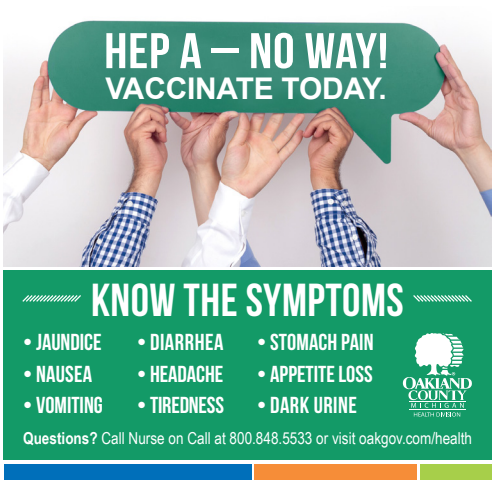
Communication and Education

Public awareness and education efforts are an integral part of OCHD's work combating the HAV outbreak. The Health Education unit and Nurse on Call staff are on the forefront of these efforts.

There have been multiple instances where Nurse on Call employees worked extended hours in response to a large exposure. They provide incident-specific information in addition to outbreak and virus education. Staff ensure callers are aware of local resources such as clinics giving HAV vaccines. As of August 7, 2018, Nurse on Call has fielded 1525 calls relating to hepatitis A.

Health Education is essential in creating and distributing educational materials. They have aided in creating 8 press releases, 187 social media posts that have reached an estimated 170,040 people, and 30,832 poster handouts. Health Education has conducted several promotions through social media, billboards, brochures, signage, bus advertisements, and promotion at events. The "Hep A-No Way!" campaign encourages the public to contact their primary care physician, pharmacy, or OCHD for more information about vaccines and symptoms.

In addition to community-wide efforts, OCHD targeted education towards high-risk groups and non-English speakers. All written educational materials were translated into Spanish, Arabic, and Mandarin. Letters, posters, and brochures were disseminated to all food establishments in Oakland County promoting prevention and vaccination efforts. Food safety presentations were offered in conjunction to festivals and outreach clinics. Large festival/event coordinators were also contacted to offer educations materials for the food service employees and participants.



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