in recent years. However, limited data exist addressing the mortality associated with HCV infection since the advent of DAAs. This study examines multiple-cause-of-death (MCOD) data from 2014 to 2017 to describe changes in HCV-associated mortality in the United States.

Methods. We examined death certificate information from public use MCOD data obtained from the National Center for Health Statistics. All-cause mortality associated with HCV, as defined by ICD-10 codes (B17.1 and B18.2), was evaluated. The age-adjusted crude mortality rate was calculated. Overall HCV-associated mortality, stratified by race and gender, was analyzed.

Results. From 2014 to 2017, the number of deaths associated with HCV, as listed in death certificates decreased from 19,613 to 17,253. This represents an average of 4% decrease in mortality each year. Crude age-adjusted mortality decreased from 5.01 (95% CI 4.93–5.08) deaths per 100,000 people in 2014 to 4.13 (95% CI 4.07–4.20) deaths per 100,000 people in 2017. Males had age-adjusted mortality of 6.82 (95% CI 6.76–6.88) and females had age-adjusted mortality of 2.59 (95% CI 2.55–2.63). African Americans had age-adjusted mortality of 7.50 (95% CI 7.37–7.63), and whites had age-adjusted mortality of 4.39 (95% CI 4.35–4.42) during the three-year period.

Conclusion. After the introduction of DAAs in 2014, mortality associated with HCV significantly decreased in the United States. There were differences in mortality rates by gender and race, which may reflect differences in HCV seroprevalence. With the availability of effective, well-tolerated HCV treatment, aggressive HCV screening and linkage to care is warranted, especially in high-risk populations.

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2900. High Rates of Experienced and Witnessed Opioid Overdose in PWID Receiving HCV Treatment: Data From the ANCHOR Study

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Session: 310. Hepatitis C: Progress on Elimination and Treatment
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Background. People who inject drugs (PWID) have significant morbidity and mortality associated with hepatitis C (HCV); however, harms associated with ongoing injecting drug use (IDU)—such as opioid overdose—may pose a more imminent risk, and often are not addressed as part of HCV treatment. Naloxone distribution is a simple, evidenced-based strategy to reduce mortality associated with opioid overdose.

Methods. ANCHOR is a single-center study embedded in an urban harm-reduction program evaluating treatment of HCV in PWID with chronic HCV, opioid use disorder (OUD), and IDU. Participants received HCV treatment and were offered collocated buprenorphine. At each study visit, patients self-reported experienced and witnessed overdose and were offered naloxone.

Results. The 100 enrolled participants are predominantly male (75%), median 57 years, black (93%) and inject opioids at least daily (58%). At baseline, 65% had ever experienced overdose, 91% had ever witnessed an overdose, and 35% had ever administered naloxone. Between day 0 and week 48, 15 patients (15%) experienced overdose; of which, 4 (4%) were fatal. The rate of experienced overdose was 15 overdoses per 100 person-years. In addition, 59 (59%) patients witnessed at least one overdose between day 0 and week 48. Seventy-three patients were dispensed naloxone at least once, and of those who witnessed an overdose, 48 (81%) administered naloxone. Nineteen (40%) patients who administered naloxone had never used naloxone before starting HCV treatment.

Conclusion. PWID with HCV, OUD, and ongoing IDU have high rates of personal and witnessed overdose during and after HCV treatment. Dispensing naloxone at HCV-related visits is highly acceptable among PWID, and results in high rates of naloxone utilization. To reduce morbidity and mortality in patients and their communities, ID providers should complement treatment of infections by prescribing naloxone for patients with OUD, ideally as part of a comprehensive package of harm reduction and OUD treatment.

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2901. Measles in the United States During the Postelimination Era, 2017–2019

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Session: 311. Vaccination II - Other
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Background. Measles, a vaccine-preventable viral illness that can cause serious complications, was declared eliminated from the United States in 2000 because of a successful measles vaccination program. Recent years have seen an increase in the number of measles cases and outbreaks. We summarized measles epidemiology in the United States during 2017–2019.

Methods. We reviewed US national surveillance data on confirmed measles cases reported to the Centers for Disease Control and Prevention during January 1, 2017–April 26, 2019. We describe the demographic characteristics, vaccination status, and disease epidemiology of measles cases.

Results. During 2017–April 2019, 1,196 measles cases were reported in 37 US States and Washington DC, including 146 (12%) importations from 37 countries; 108 (74%) of importations were US residents returning from travel abroad, of which 60 (56%) were unvaccinated and 31 (29%) had unknown vaccinations status. Among 1,148 cases who were US-residents, the highest incidence of measles was among infants and children aged 6–11 and 12–15 months (112 cases [19 cases/million person-years] and 106 cases [27 cases/million person-years], respectively). Among US-resident cases, 846 (74%) were unvaccinated and 163 (14%) had unknown vaccination status; 777 (68%) were considered to have preventable measles (i.e., were eligible for vaccination but unvaccinated). Among the 1,196 cases, 85 were single cases, and the remaining 1,111 represented 19 two-case chains and 34 outbreaks of 3 or more cases linked epidemiologically; the median outbreak size and duration was 6 cases (range, 3 to 452 cases) and 19.5 days (range, 5 to 205 days). A total of 934 (78%) of the 1196 cases and 13 (38%) of the 34 outbreaks occurred in under-immunized close-knit communities; eight outbreaks are ongoing.

Conclusion. Outbreaks of measles in the United States result from recurring measles introductions and subsequent measles spread, especially in under-immunized close-knit communities. To sustain measles elimination, it will be necessary to maintain timely routine high coverage with MMR vaccine, improve implementation of pretravel recommendations to minimize importations, and close immunity gaps in communities of US residents who remain unvaccinated.

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2902. Pertussis Antibody Levels in Preterm Infants After Maternal Tdap Immunization During Pregnancy

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Background. Maternal immunization with tetanus, diphtheria, acellular pertussis vaccine (Tdap) in the third trimester reduces infant pertussis, but data are lacking on how this strategy impacts pertussis antibody levels in large cohorts of preterm infants

Methods. We collected paired maternal delivery-cord sera from infants of women who received Tdap ≥7 days before birth. IgG to pertussis toxin (PT), filamentous hemagglutinin (FHA), fimbrial proteins (FIM) and pertactin (PRN) was quantified by Luminex assay (IU/mL). Geometric mean concentrations (GMC) with 95% confidence intervals (CI) for pertussis antibodies were calculated. Four infant groups were compared by weeks of gestation: very (<32), moderate (32–33) and late preterm (34–36), and term (≥37).

Results. 344 preterm and 688 term mother-infant pairs were included. Among preterm infants, mean maternal age was 31.2 years (range 15.1–39.3); 37% were white, 37% Hispanic, 17% Black, 8% Asian and 1% other. Fifty-six were very preterm infants (16%, mean gestation 30.5 weeks), 82 moderate (24%, 33.1 weeks), and 206 late (60%, 35.4 weeks); 17 (5%) were born at <30 weeks. For preterm infants, Tdap was administered at a mean gestation of 29.9 weeks (very 27.9; moderate 29.7; late 30.4; [$P < .001$]), and at a mean interval of 29.3 days before delivery (very 17.9; moderate 24; late 34.5 [$P < .001$]). Eleven (3%) women received Tdap during the second trimester (8 very, 2 moderate, 1 late). GMCs (95% CI) of pertussis-specific IgG at birth varied by gestation (table). Infant antibody levels as a proportion of maternal antibodies increased from 24 to 32% in infants < 30 weeks to 117 to 132% in those ≥37 weeks (P<.001).

Conclusion. Although levels are lower than in term infants, maternal immunization with Tdap results in substantial pertussis-specific antibodies in most preterm infants, especially late preterm infants.

Gestation group (week)	PT	FHA	FIM	PRN
<32 N = 56	8.3 (5.4-12.9) [38]	30.8 (20.5-45.9) [38]	153.8 (97.4-243.1) [34]	52.7 (34.1-81.6) [37]
32-33 N = 82	15.1 (10.8-21.0) [59]	61.6 (48.5-78.3) [56]	275.1 (187.6-403.5) [56]	90.5 (63.9-128.2) [49]
34-36 N = 206	23.1 (19.6-27.1) [85]	92.6 (81.8-104.9) [83]	498.0 (420.9-589.1 [80]	208.0 (171.6-252.1) [77]
≥37 N = 688	32.8 (30.0-35.9) [130]	134.7 (126.6-143.3) [132]	664.0 (606.7-726.8) [122]	295.9 (272.6-321.2) [117]

*Values are GMC in IU/mL (95% CI), [% of maternal value]

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2903. Post PCV13 Dynamics of NonVaccine Serotype (NVT): Disproportionate Increase of the Additional PCV20 Candidate Serotypes in Respiratory and Invasive Disease in Young Children

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