treated promptly, but the majority of infected infants do not receive timely diagnosis or treatment. Better risk stratification is needed to predict which women are more likely to transmit the infection.

Methods. This study enrolled women who presented for delivery and their infants at the Percy Boland Women's Hospital in Santa Cruz, Bolivia. Pregnant women were screened for Chagas disease by rapid test. The infants of seropositive mothers underwent diagnostic testing with microscopy ("micromethod") and quantitative polymerase chain reaction (qPCR) as newborns and at one- and nine-month follow-up. Mothers completed surveys about demographics and medical history.

Results. Among 5,828 enrolled women, 1,271 (21.8%) screened positive for Chagas disease. Of the 1,325 infants of seropositive mothers, 113 (8.5%) were diagnosed with congenital Chagas disease by microscopy or qPCR. Cesarean delivery was significantly associated with lower odds of vertical transmission (adjusted OR: 0.63, 95% CI: 0.41–0.98, p=0.040). Congenital infection was more common in twins (adjusted OR: 3.30, 95% CI: 1.97–5.54, p< 0.001) and male infants (adjusted OR: 1.50, 95% CI: 1.01–1.22, p=0.045).

Conclusion. Our findings suggest that Cesarean delivery may be protective against vertical transmission of *T. cruzi*, while twins and male infants may have an increased risk. A better understanding of risk stratification for congenital Chagas disease may help improve regional initiatives to reduce disease burden.

Disclosures. **All Authors**: No reported disclosures

33. Concerning Trends of Pediatric Leprosy in Minas Gerais, Brazil and Associations with Number of Municipality Medical Facilities

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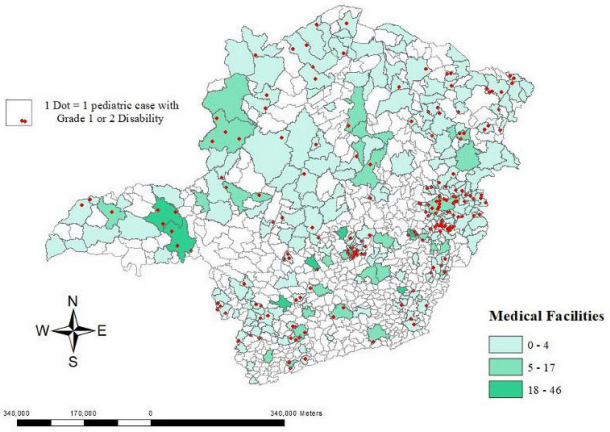
Session: O-7. Around the World - Understanding Infectious Disease and Health Interventions

Background. Leprosy in children under 15 years of age, and in particular, the presence of leprosy grade 2 disability (G2D) in children, signifies ongoing transmission and the need for improved surveillance. Our objective was to describe the epidemiology of pediatric leprosy in Minas Gerais, Brazil and to explore associations with access to medical facilities.

Methods. A cross-sectional study was conducted using data from the Brazilian Notifiable Diseases Surveillance System (SINAN) from 2002–2017. Incident cases were included if they resided in a municipality with both adult and pediatric cases. Municipalities were divided by the number of medical facilities per municipality: < 5, 5–17, and 18 or higher. Analyses compared pediatric cases across two time periods (2002–2009 and 2010–2017) and number of medical facilities / municipality using chi-square, t-tests, and logistic regression.

Results. A total of 27,725 cases were reported with 1,611 under 15 years of age. Overall incidence declined from 34.8 per 100,000 to 13.6 per 100,000 during the study period with pediatric incidence declining from 2.6 per 100,000 to 0.8 per 100,000. Time period 2 (TP2) showed an increase in the proportion of pediatric G2D (2.58% vs 1.91%, p < 0.0001) when compared to time period 1 (TP1). Mean age of diagnosis in children was younger in TP2 then in TP1 (10.06 vs 10.43, p=0.02). In 2017, the pediatric incidence in municipalities with the fewest medical facilities was 0.95 per 100,000 compared to 0.23 per 100,000 in municipalities with > 5 facilities (p=0.009). There was significantly higher odds of disability at diagnosis (grades 1 and 2) in pediatric cases residing in municipalities with < 5 medical facilities (aOR 1.88; 95% CI 1.37–2.59), adjusted for age and sex. See map (Fig 1).

Figure 1. Cases of Pediatric Disability By Number of Municipality Medical Facilities from 2002–2017 (White areas without reported pediatric leprosy)



Conclusion. The *increasing* proportion of G2D in children in the second half of the study period despite declining incidence suggest occult infections among children and adults alike in Minas Gerais. Furthermore, the average age of diagnosis in children should increase, not decrease, if *M. leprae* transmission was truly declining. Lastly, the association between fewer municipality health facilities and increased disability suggest barriers to timely diagnosis and a critical area of focus for research into access to healthcare and leprosy risk.

Disclosures. **All Authors**: No reported disclosures

34. Impact of Universal Mass Vaccination Programs of Children Against Hepatitis a with 2-dose and 1-dose Schedules: A Systematic Literature Review

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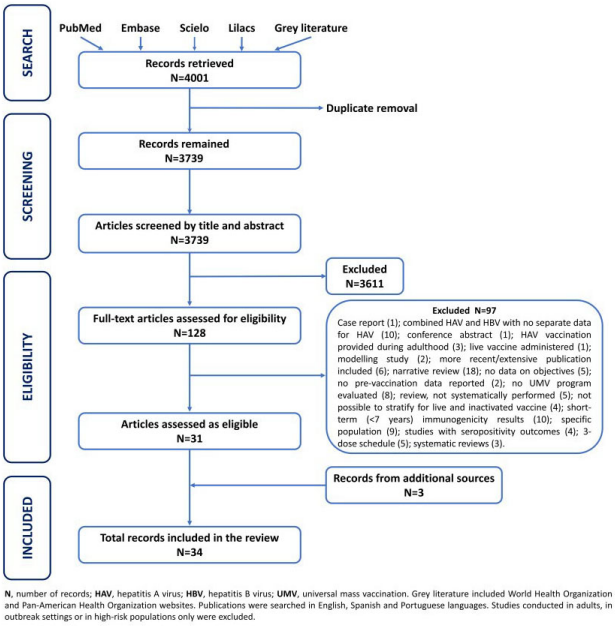
Session: O-7. Around the World - Understanding Infectious Disease and Health Interventions

Background. With more than 100 million new hepatitis A (HepA) virus (HAV) infections estimated each year, HepA is a serious health concern worldwide. Several countries implemented 2- or 1-dose universal mass vaccination (UMV) programs of children with HAV vaccines. Here we present the first systematic review describing the impact of 2- and 1-dose UMV programs on HepA incidence and related health outcomes.

Methods. We systematically searched several databases for data published between Jan 2000–Jul 2019 (**Figure 1**). We assessed available evidence for 2- and 1-dose UMV programs with inactivated HAV vaccine in children worldwide, in terms of impact on HepA incidence, disease severity and mortality, vaccine efficacy, vaccine effectiveness and antibody persistence.

Figure 1. PRISMA flowchart



N, number of records; **HAV**, hepatitis A virus; **HBV**, hepatitis B virus; **UMV**, universal mass vaccination. Grey literature included World Health Organization and Pan-American Health Organization websites. Publications were searched in English, Spanish and Portuguese languages. Studies conducted in adults, in outbreak settings or in high-risk populations only were excluded.

Results. 3739 articles were screened and 34 studies were included in our analysis (**Figure 1**). 18 real-world studies in 9 countries showed that HepA incidence declined in all ages following introduction of 2-dose and 1-dose UMV programs and persisted for at least 14 years (2-dose) and at least 6 years (1-dose) (**Figure 2**). Evidence for 1-dose schedule was limited to only 3 studies. HAV related outcomes (disease severity, mortality) decreased after UMV with either 2-dose or 1-dose schedule. Vaccine effectiveness for the 2-dose schedules was ≥ 95% over 3–5 years. Vaccine efficacy for the 1-dose schedule was > 98% over 0.1–7.5 years. Anti-HAV antibody persistence in vaccinated children was documented up to 15 years with ≥ 90% seropositivity rates for the 2-dose schedule and up to 10 years with ≥ 74.3% seropositivity rates for the 1-dose schedule. Anti-HAV antibody GMC data is presented in **Table 1**.

Figure 2. Impact of vaccination on hepatitis A incidence in countries implementing 2-dose or 1-dose schedules (data from studies presenting 'all ages' incidence data)

US, United States. The year of HepA vaccine introduction is mentioned next to each country. *For some states, the year of vaccine introduction was 1995. The incidence values represent the mean incidence during pre- and post-vaccination periods for Israel (Levine at al, 2015), the US (Averhoff et al, 2001; Wasley et al, 2005; Singleton et al, 2010) and Argentina (Vacchino et al, 2008; Vizzotti et al, 2014) ; range of annual incidence during pre- and post-vaccination periods for Panama (Estripeaut et al, 2015), the US (Daniels et al, 2009), Uruguay (Romero et al, 2012) and Brazil (Souto et al, 2019); annual incidence during pre- and post-vaccination periods for Israel (Belmaker et al, 2007; Chodick et al, 2008; Dagan et al, 2005) Saudi Arabia (Al-Mosa, 2011) and the US (Erhart & Ernst, 2012; Murphy et al, 2016). Two other studies included in our review (Fisenka et al, 2008 [Belarus]; Wang et al, 2019 [China]) do not present 'all ages' data.

Table 1. Anti-HAV antibody GMCs following vaccination with 2-dose and 1-dose schedules, data from studies included in our review

Conclusion. The implementation of 2- and 1-dose UMV programs against HAV induced decreases in disease incidence and related outcomes. Experience with 2-dose schedule is extensive, with wide geographical use, while evidence beyond 10 years for the 1-dose schedule has not yet been demonstrated. Continued and robust surveillance is needed to monitor the epidemiology, vaccine effectiveness, antibody persistence and protection (particularly in the absence of natural boosting) in order to have a strong, scientifically sound basis for decision makers when concluding on HepA prevention strategies in their countries.

	Country, study period (reference)	Time after vaccination, years (range)	Children tested	Clinical assay	Anti-HAV GMC mIU/mL (95% CI)	Persistence of HAV-antibodies % (n/N)
2-dose schedule	**China*** (Bian et al, 2010)	10	110	MEIA	61.59 (51.92–73.07)	≥5 mIU/mL: 99.09 (109/110) ≥10 mIU/mL: 90.0 (90/110)
	Argentina, 2008–2014 (Espul et al, 2017)	7	53 7**	ECLIA	712.5 (526.4–964.5) 257.2 (81.3–813.6)	≥3 mIU/mL: 100 (53/53) 100 (7/7)
	Argentina, 2007–2007 (Lopez et al, 2010)	10	48	Automated ELFA	261 (199–341)	≥20 mIU/mL: 97.9 (47/48)
	Argentina, 2010–2012 (Lopez et al, 2015)	14–15	30	Automated ELFA	253 (181–353)	≥20 mIU/mL: 100 (30/30)
	United States of America* (Raczniak et al, 2013)	11.1 (3.5–15.1)	101	Modified ELISA	NA	≥20 mIU/mL: 95 (96/101)
		≥7.5 to <9	1 (1–2 years old) 3 (3–6 years old) 3 (≥7 years old)		48 (NA) 115 (12–1114) 125 (11–1358)	NA
		≥9 to <11	10 (1–2 years old) 7 (3–6 years old) 17 (≥7 years old)		144 (78–263) 160 (94–271) 201 (117–343)	100 (7/7)
		≥11 to <13	26 (1–2 years old) 8 (3–6 years old) 11 (≥7 years old)		98 (66–147) 298 (51–1749) 211 (112–397)	100 (8/8)
		≥13 to <15	5 (1–2 years old) 5 (3–6 years old) 1 (≥7 years old		21 (6–77) 80 (40–159) 81	100 (5/5)
		≥15	1 (3–6 years old)		43	100 (1/1)
	Panama, 2016–2017 (Abadia et al, 2019)	Mean: 8.2 (7.0–9.7)	300	NA	123.9 (111.5–137.7)	≥15 mIU/mL 97.7% (293/300)
1-dose schedule	**Argentina**, 2013–2014 (Uruena et al, 2016)	Median: 7.7 (6.3–9.2)	1088	MEIA	170.5 (163.2–178.2)	≥10 mIU/mL: 97.4 (1060/1088)
	Argentina, 2008–2014 (Espul et al, 2017)	7	204	ECLIA	125.6 (118.8–141.1)	≥3 mIU/mL: 100 (204/204)
	Nicaragua, 2005–2012 (Mayorga et al, 2016)	7.5	97	MEIA	81 (64–101)	NA
	Panama, 2016–2017 (Abadia et al, 2019)	Mean: 8.1 (7.0–10.0)	300	ELISA	40.2 (34.2–47.4)	≥15 mIU/mL 74.3 (223/300)

HAV, hepatitis A virus; **GMC**, geometric mean concentration; **CI**, confidence interval; **NA**, not available; **MEIA**, microparticle enzyme immunoassay; **ECLIA**, electrochemiluminescence immunoassay; **ELFA**, enzyme-linked fluorescent assay; ELISA, enzyme-linked immunosorbent assay. *Study period not reported. ** This group received a vaccine dose and a booster dose

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35. Missed and Unrecorded Drug Use Among Infective Endocarditis Cases Is Associated with Underestimated Burden of Disease and Fragmented Care: Evidence from Six States

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Session: O-8. Bacteremia and Endocardits

Background. Studies using national administrative data suggest that hospitalizations for drug use-associated infective endocarditis (DUA-IE) have increased over the last ten years. However, drug use as a contributing factor to IE hospitalizations is often missed or not included in coding documentation, resulting in undercount of DUA-IE. We assessed whether missed drug use during IE hospitalizations was associated with higher levels of fragmented care and underestimation of DUA-IE burden.

Methods. We analyzed data from State Inpatient Databases and State Emergency Department Databases from six states (FL, GA, IA, NY, UT, VT) from 2011–2015. Patients older than 16 with ICD-9/10 codes for admissions with IE were included. IE was categorized as DUA using ICD-9/10 codes for drugs/conditions associated with injection drug use. We labeled IE cases as a "missed" DUA-IE case if they had no diagnosis of drug use during their index hospitalization but received a drug use diagnosis during an ED visit or inpatient stay in the calendar year of their index IE hospitalization. We compared "missed" DUA-IE cases to DUA-IE cases where drug use was identified in the index hospitalization and non-DUE-IE cases with respect to demographics, length of stay (LOS) and total charges. To assess care fragmentation, we stratified IE groups by whether the patient was admitted to 1 or >1 hospital within 90-days of the index IE admission.

Results. There were 52147 non-DUA-IE cases, 6872 DUA-IE cases, and 2676 "missed" DUA-IE cases identified by linking drug use across multiple encounters. Missed cases represented a 39% increase in total DUA-IE cases. Compared to DUA-IE cases identified at index hospitalizations, missed cases were more likely to be older, Black, insured by Medicare, and from rural areas. They also had higher 30-day readmission rate (23.2% vs 14.5%, p< 0.001) and higher charges (p< 0.001), with similar LOS. Fragmented care was most common among patients with missed DUA-IE (33.3%), followed by DUA-IE cases identified during index hospitalization (20.5%) and non-DUA-IE cases (13.7%).

Table 1

Table 1: Characteristics of infective endocarditis (IE) episodes according to category of drug use, evidence from six states, 2011-2015[a]

Characteristic	Drug Use Category[b]			P-value[c]
	Non-DUA-IE	Index DUA-IE	Missed DUA-IE	
No. (%)	52147 (84.5)	6872 (11.1)	2676 (4.3)	
Age, median (IQR)	72 (23)	41 (24)	48 (26)	<0.001
Female, No. (%)	2505 (48.1)	3021 (44.4)	1205 (45.3)	<0.001
Race, No. (%)				
White	35463 (68.0)	4872 (70.9)	1696 (63.4)	<0.001
Black	8345 (16.0)	860 (12.5)	577 (21.6)	<0.001
Hispanic	4306 (8.3)	642 (9.3)	209 (7.8)	0.005
Other	4033 (7.7)	498 (7.3)	194 (7.3)	0.259
Insurance, No. (%)				
Medicare	36635 (70.3)	1427 (20.8)	1102 (41.2)	<0.001
Medicaid	4418 (8.5)	2621 (38.1)	784 (29.3)	<0.001
Private	8023 (15.4)	858 (12.5)	324 (12.1)	<0.001
Self-pay	1468 (2.8)	1368 (19.9)	319 (11.9)	<0.001
Other	1603 (3.1)	598 (8.7)	147 (5.5)	<0.001
Hospital Rurality, No. (%)[d]				
Large Urban	30341 (58.2)	4072 (59.3)	1497 (55.9)	0.013
Small Urban	14367 (27.6)	2107 (30.7)	839 (31.4)	<0.001
Rural	7439 (14.3)	693 (10.1)	340 (12.7)	<0.001
Drug/Condition Associated with IE, No. (%)				
Opiate	0 (0)	4390 (63.9)	1658 (62.0)	<0.001
Cocaine	0 (0)	2140 (31.1)	599 (22.4)	<0.001
Amphetamine	0 (0)	643 (9.4)	225 (8.4)	<0.001
Hepatitis C	0 (0)	4239 (61.7)	977 (36.5)	<0.001
Number of Hospitals per IE Episode, No. (%)[e]				
One	45028 (86.4)	5466 (79.5)	1786 (66.7)	<0.001
Two	6367 (12.2)	1122 (16.3)	683 (25.5)	<0.001
Three or more	752 (1.4)	284 (4.1)	207 (7.7)	<0.001

Abbreviations: IE = infective endocarditis; DUA = drug use-associated; IQR = interquartile range

[a] Data from State Inpatient Databases and State Emergency Department Databases from six states (FL, GA, IA, NY, UT, VT), pooled across years from 2011-2015. IE hospitalizations identified using ICD-9/10 codes.

[b] In accordance with prior studies, drug use categories defined by ICD-9/10 codes for drugs and conditions associated with injection drug use, including opiates, cocaine, amphetamines, and hepatitis C. Non-DUA-IE refers to IE episodes without any associated drug use. Index DUA-IE refers to IE episodes in which an ICD-9/10 code for drug use was used during the same episode. Missed DUA-IE refers to IE episodes in which an ICD-9/10 codes for drug use was not used during the IE episode, but was recorded during a different inpatient stay or ED visit within the same calendar year.

[c] P-values refer to global comparison for differences across drug use groups, with ANOVA for continuous variables and Chi-Square tests for categorical variables. Bonferroni corrected p-value using alpha 0.05 = 0.002.

[d] Hospital rurality defined using simplified adaptation of UIC codes as reported in state databases.

[e] Measure of number of hospitals at which a patient received care for a single episode of IE within 90 days of their index IE hospitalization. Transfers between hospitals (e.g. transfer for cardiac surgery) were counted as only one hospitalization, with the location assigned to the discharging hospital.