

Appendix

Gaps in prenatal hepatitis B screening and management of HBsAg positive pregnant persons in the United States, 2015-2020

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Appendix Table 1. ICD Codes for Live Birth

	ICD9/10 Codes	Code Description
Live Birth	Z370	Single live birth
	Z375	Other multiple births, all liveborn
	Z3750	Multiple births, unspecified, all liveborn
	Z3751	Triplets, all liveborn
	Z3752	Quadruplets, all liveborn
	Z3753	Quintuplets, all liveborn
	Z3754	Sextuplets, all liveborn
	Z372	Twins, both liveborn
	Z3759	Other multiple births, all liveborn
	Z376	Other multiple births, some liveborn
	Z3760	Multiple births, unspecified, some liveborn
	Z3761	Triplets, some liveborn
	Z3762	Quadruplets, some liveborn
	Z3763	Quintuplets, some liveborn
	Z3764	Sextuplets, some liveborn
	Z3769	Other multiple births, some liveborn
	Z379	Outcome of delivery, unspecified
	Z373	Twins, one liveborn and one stillborn
	V270	Outcome of delivery, single liveborn
	V275	Outcome of delivery, other multiple birth, all liveborn
	V272	Outcome of delivery, twins, both liveborn
	V276	Outcome of delivery, other multiple birth, some liveborn
	V273	Outcome of delivery, twins, one liveborn and one stillborn
	650	Normal delivery
	V279	Outcome of delivery, unspecified outcome of delivery
	O80	Encounter for full-term uncomplicated delivery
	O82	Encounter for cesarean delivery without indication

Appendix Table 2. CPT Codes for Delivery

	CPT Codes	Code Description
Delivery	59614	Vaginal delivery only, after previous cesarean delivery (with or without episiotomy and/or forceps)
	59618	Delivery Procedures After Previous Cesarean Delivery
	59620	Cesarean delivery only, following attempted vaginal delivery after previous cesarean delivery
	59622	Cesarean delivery only, following attempted vaginal delivery after previous cesarean delivery
	59400	Vaginal Delivery, Antepartum and Postpartum Care Procedures
	59409	Vaginal delivery only (with or without episiotomy and/or forceps)
	59410	Vaginal delivery only (with or without episiotomy and/or forceps)
	59510	Cesarean Delivery Procedures
	59514	Cesarean delivery only
	59515	Cesarean delivery only
59610	Delivery Procedures After Previous Cesarean Delivery	
59612	Vaginal delivery only, after previous cesarean delivery (with or without episiotomy and/or forceps)	

Appendix Table 3. CPT Codes for Hepatitis-B Screening

	CPT Codes	Code Description
HBsAg	80055	Obstetric Panel (AMA)
	87340	Hepatitis-B Surface Antigen, Reflex Confirmation
	87341	Hepatitis-B Surface Antigen, Confirmation
	80074	Hepatitis Panel, Acute (AMA)
	80081	Obstetric Panel (AMA) with HIV

Appendix Table 4. ICD 9/10 Codes for Chronic Hepatitis B

	ICD 9/10 Codes	Code Description
CHB	B18.1	CHB without HDV
	B18.0	CHB with HDV
	B19.10	Unspecified viral hepatitis B without hepatic coma
	Z22.51	Carrier of viral hepatitis B
	V02.61	Carrier of viral hepatitis B
	070.32	CHB without mention of hepatic coma or hepatitis delta
	070.33	CHB without mention of hepatic coma with hepatitis delta
	070.22	CHB with hepatic coma without hepatitis delta
070.2	CHB with hepatic coma with hepatitis delta	

Appendix Table 5. CPT Codes for CHB Monitoring

	CPT Codes	Code Description
Alanine Aminotransferase (ALT)	80076	Hepatic function panel
	84460	Alanine Aminotransferase (ALT)
	80053	Comprehensive metabolic panel (CMP)
HBV DNA Test	87515	Hepatitis B virus detection by nucleic acid using direct probe technique
	87516	Hepatitis B virus DNA, Qualitative, Real-Time PCR
	87517	Hepatitis B Virus DNA, Qualitative Real-Time PCR
HBeAg Test	87350	Hepatitis B e Antigen

Appendix Table 6. Antiviral Treatment Codes

HBV antivirals	Brand and generic names	Tenofovir/tenofovir disoproxil fumarate/Viread/ Tenofovir alafenamide/Vemlidy Entecavir/ Baraclude Lamivudine/Epivir-HBV/Epivir Adefovir/Hepsera telbivudine/Tyzeka Emtricitabine/ Emtriva Pegylated interferon alpha-2a/Pegasys/Pegasys-P Interferon alfa-2b/Intron A Pegylated interferon alpha-2b/Peg-Intron HIV combination drugs that contains lamivudine or tenofovir (Atripla, Biktarvy, Cimduo, Combivir, Complera, Delstrigo, Descovy, Epzicom, Genvoya, Odefsey, Stribild, Symfi, Symfi Lo, Symtuza, Triumeq, Trizivir, Truvada, Dovato)
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Appendix Table 7. Demographics characteristics of 506,794 unique pregnancies between 1/1/2015 and 12/31/2019 in continuous enrollment at least 42 weeks before delivery

Characteristics	Categories	N	(%)
Age (yrs) at the time of pregnancy	15-19	6,519	1.3%
	20-29	169,590	33.5%
	30-39	304,651	60.1%
	40-55	26,034	5.1%
Race	Asian	42,625	8.4%
	Black	47,354	9.3%
	Hispanic	73,769	14.6%
	White	333,792	65.9%
	Unknown	9,254	1.8%
Education	Less than 12th grade	2,001	0.4%
	High school diploma	93,469	18.4%
	Less than bachelor's degree	272,849	53.8%
	Bachelor's degree or higher	137,362	27.1%
	Unknown	1,113	0.2%
Number of children	0	56,762	11.2%
	1	165,627	32.7%
	2	174,308	34.4%
	>=3	110,097	21.7%

Appendix Table 8. Demographic characteristics of 1,437 HBsAg positive pregnancies, 2015-2019

	Categories	N	%
Age (yrs) at the time of pregnancy	15-19	3	0.2%
	20-29	232	16.1%
	30-39	1,026	71.4%
	40-55	176	12.3%
Race	Asian	661	46.0%
	White	418	29.1%
	Black	185	12.9%
	Hispanic	130	9.1%
	Unknown	43	3.0%
Education	Less than bachelor's	680	47.3%
	Bachelor's degree plus	505	35.1%
	High school diploma	242	16.8%
	Less than 12th grade	5	0.4%
	Unknown	5	0.4%
Number of children	0	104	7.2%
	1	476	33.1%
	2	574	39.9%
	>=3	283	19.7%

Appendix Table 9. Monitoring of CHB with testing for ALT, HBV DNA and HBeAg among 1,437 unique pregnancies diagnosed with CHB, 2015-2019

	2015	2016	2017	2018	2019	TOTAL
CHB MONITORING DURING PREGNANCY						
Having at least one CPT code for ALT during pregnancy	186 59.7%	197 67.2%*	210 70.4%**	184 70.0%**	192 70.8%**	969 67.4%
Having at least one CPT code for HBV DNA during pregnancy	114 35.5%	135 46.1%*	154 51.9%**	107 40.7%	126 46.5%*	637 44.3%
Having at least one CPT code for HBeAg during pregnancy	89 28.5%	102 34.8%	100 33.3%	74 28.1%	90 33.2%	455 31.6%
Having at least one CPT code for ALT in conjunction with either one code for HBeAg or HBV DNA during pregnancy	126 40.3%	138 47.1%	157 52.5%	112 42.6%	126 46.5%	659 45.8%
CHB MONITORING IN THE 12 MONTHS AFTER DELIVERY						
Having at least one CPT code for ALT within 12 months after delivery	101 45.5%	96 48.5%	100 49.3%	79 44.4%	76 46.6%	452 47.0%
Having at least one CPT code for HBV DNA within 12 months after delivery	58 26.1%	62 31.6%	68 33.5%	45 25.3%	42 25.8%	275 28.6%
Having at least one CPT code for HBeAg within 12 months after delivery	32 14.4%	23 11.7%	27 13.3%	21 11.8%	19 11.7%	122 12.7%
Having at least one CPT code for ALT in conjunction with either one code for HBeAg or HBV DNA within 12 months after delivery	53 23.8%	58 29.6%	58 28.57%	43 24.2%	39 23.9%	251 26.1%

* p<0.05 compared with 2015, **p<0.01 compared with 2015.

Appendix Table 10. Demographics factors associated with HBV-directed monitoring (ALT + HBV DNA/HBeAg) 0-12 months after delivery among 962 unique pregnancies with CHB diagnosis in continuous enrollment at least 12 months after delivery, 2015-2020

Characteristics		Number (%)	Univariate analysis		Multivariate analysis	
			Odds Ratio, (95% CI)	P	Adjusted Odds Ratio, (95% CI)	p
Age	15-29	27 (18.9 %)	(ref)		(ref)	
	30-39	192 (27.1%)	1.60 (1.01-2.51)	0.04	1.38 (0.86-2.23)	0.19
	40-55	32 (28.8%)	1.74 (0.96-3.12)	0.06	1.46 (0.79-2.72)	0.23
Race	Asian	164 (36.4%)	(ref)		(ref)	
	Black	28 (22.9%)	0.52 (0.33-0.83)	<0.01*	0.63 (0.38-1.02)	0.06
	Hispanic	12 (15.6%)	0.32 (0.17-0.62)	<0.01*	0.34 (0.17-0.65)	<0.01*
	White	42 (14.9%)	0.31 (0.21-0.45)	<0.01*	0.30 (0.21-0.45)	<0.01*
Education	<= high school	31 (19.9%)	(ref)		(ref)	
	Less than bachelor's	119 (26.5%)	1.45 (0.93-2.27)	0.10	1.33 (0.84-2.11)	0.23
	Bachelor's degree plus	99 (28.1%)	1.57 (1.00-2.48)	0.05	1.24 (0.37-2.02)	0.37
Number of children	0	7 (11.1%)	(ref)		(ref)	
	1	80 (28.8%)	3.23 (1.41-6.43)	<0.01*	3.10 (1.25-7.71)	0.02
	2	108 (26.2%)	2.84 (1.26-6.43)	0.01	2.45 (1.00-6.07)	0.05
	>=3	56 (26.8%)	2.93 (1.26-6.80)	0.01	2.95 (1.17-7.44)	0.02

Note: Boldface indicates statistical significance (p<0.05, *p<0.01)

Appendix Table 11. Correlation analysis of demographics on HBV antiviral treatment during pregnancy among 1,437 unique pregnancies, 2015-2019

Characteristics		Number (%)	Univariate analysis	
			OR, (95% CI)	p
Age (yrs)	15-29	15 (6.4%)	(ref)	
	30-39	76 (7.4%)	1.17 (0.66-2.08)	0.58
	40-55	10 (5.7%)	0.88 (0.39-2.02)	0.77
Race	Asian	70 (10.6%)	(ref)	
	Black	6 (3.2%)	0.28 (0.12-0.66)	< 0.01 *
	Hispanic	3 (2.3%)	0.20 (0.06-0.64)	< 0.01 *
	White	18 (4.3%)	0.38 (0.22-0.65)	< 0.01 *
Education	high school or less	19 7.7%	(ref)	
	Less than bachelor's	43 (6.3%)	0.81 (0.46-1.42)	0.46
	Bachelor's degree plus	38 (7.5%)	0.98 (0.55-1.73)	0.94
Number of children	0	8 (7.7%)	(ref)	
	1	33 (6.9%)	0.89 (0.40-1.99)	0.78
	2	46 (8.0%)	1.04 (0.487-2.28)	0.91
	>=3	14 (4.95%)	0.62 (0.25-1.54)	0.31

Note: Boldface indicates statistical significance (*p<0.01)

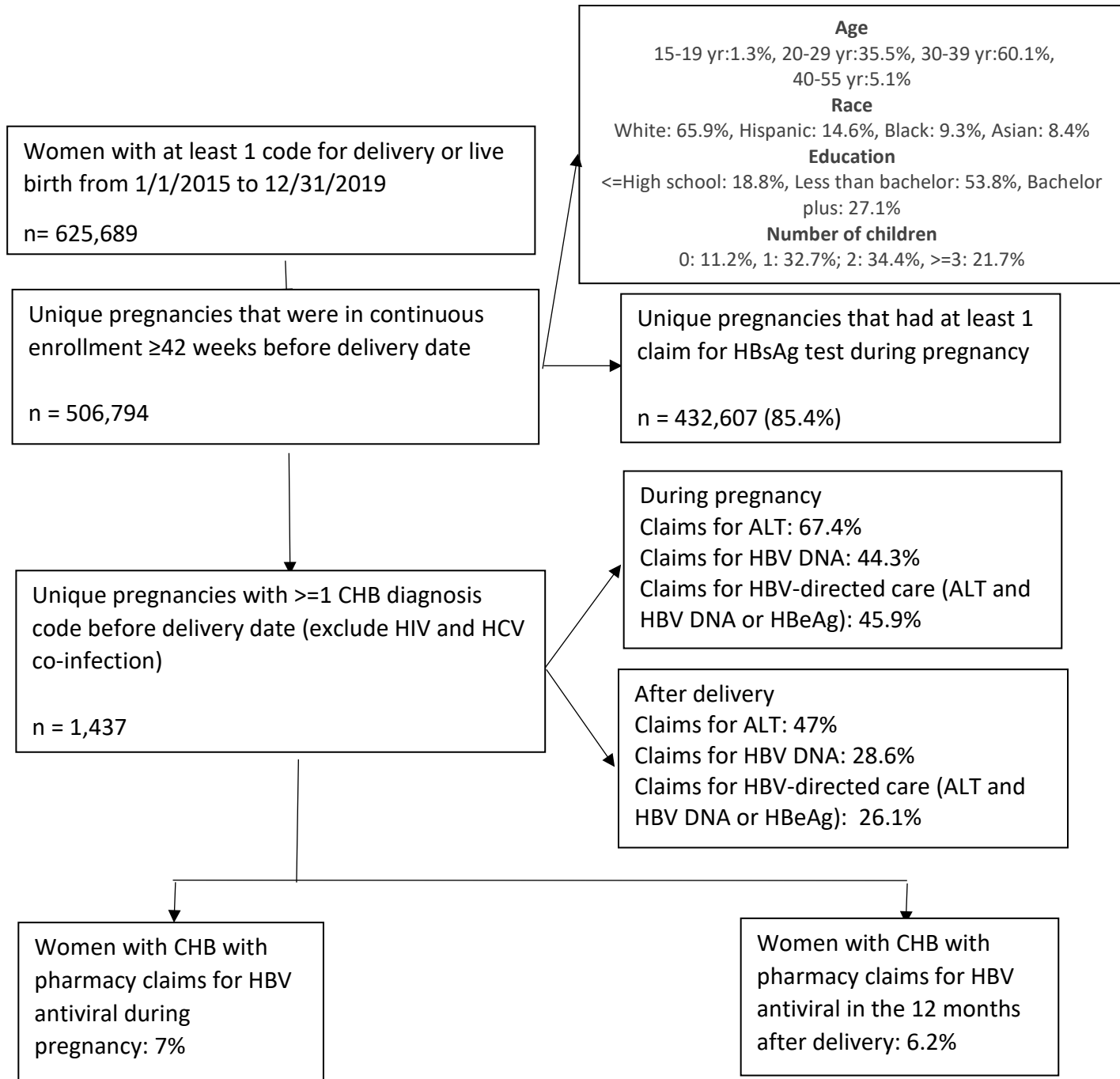
Appendix Table 12. Demographics factors associated with claims for HBV antiviral treatment 0-12 months after delivery among the pregnancies with CHB diagnosis in continuous enrollment at least 12 months after delivery, 2015-2020

Characteristics		Number (%)	Univariate analysis	
			Odds Ratio, (95% CI)	P
Age (yrs)	15-29	7 (4.9%)		
	30-39	47 (6.6%)	1.38 (0.61-3.12)	0.44
	40-55	6 (5.4%)	1.11 (0.36-3.40)	0.86
Race [†]	Asian	40 (8.9%)		
	Black	4 (3.3%)	0.35 (0.12-0.99)	0.05
	Hispanic	2 (2.6%)	0.27 (0.06-1.16)	0.08
	White	13 (4.6%)	0.50 (0.26-0.94)	0.03
Education [†]	<= high school	11 (7.1%)		
	Less than bachelor's	25 (5.6%)	0.78 (0.37-1.61)	0.51
	Bachelor's degree plus	23 (6.5%)	0.92 (0.44-1.93)	0.82
Number of children	0	2 (3.2%)		
	1	21 (7.6%)	2.49 (0.56-10.91)	0.22
	2	30 (7.3%)	2.40 (0.55-10.28)	0.24
	>=3	7 (3.4%)	1.06 (0.21-5.22)	0.07

Note: Boldface indicates statistical significance (p<0.05)

[†] Unknown in one woman

Appendix Figure 1. Flow chart cascade of hepatitis B testing, care, and treatment among pregnancies in Optum, 2015-2020.



Appendix Figure 2. HBV disease monitoring in the 12 months after delivery, 2015-2020

