

APPENDIX:

Follow-up after gestational diabetes:
A fixable gap in women's preventive health care

Table S1. Detailed description of independent variables and outcomes.*

<p>Sample selection</p>	<p>Identification of index GDM deliveries:</p> <p>Identification of non-GDM deliveries</p>	<p>GDM was specified for women who delivered a first livebirth during the study interval and who received either one ICD-9 inpatient code or two outpatient codes of 648.8 for GDM. We required two outpatient codes to limit the possibility of clerical error. Women with a 648.8 code were excluded if they also had evidence of Type 2 diabetes prior to pregnancy, characterized as a claim with one ICD-9 code of 250.xx or related medications claims, whether or not a code of 250.xx was attached to a visit, except for women who had these medications prescribed in association with prior infertility treatment.</p> <p>The first appearance of a livebirth delivery not associated with a GDM diagnosis was selected as the index non-GDM delivery.</p>
<p>Independent Variable construction</p>	<p>Demographic characteristics</p> <p>Chronic medical conditions co-existing with GDM</p> <p>Prevention behavior indicators</p> <p>Conditions associated with pregnancy and delivery</p> <p>Postpartum conditions</p> <p>Health care system variables</p>	<p>The socioeconomic elements in the OLDW data set (race/ethnicity, education, geographic location and net worth of assets) are generated by an external source that uses a proprietary algorithm to impute variables based on a combination of self-report, modeling, census data, and a variety of individual-level data sources. Imputations are validated in this proprietary process, and those not meeting the threshold for accuracy are marked as ‘unknown.’ We chose to retain in our sample only those individuals with imputed values supported by validation criteria.</p> <p>A modified Charlson Comorbidity Index that excluded diabetes (19) was used to identify co-occurring medical conditions during the time period of a year before conception through delivery. Mental health conditions are presented as an aggregate of codes for psychosis, anxiety/OCD, bipolar/mania, major depressive disorder, suicidal ideation and postpartum depression in a previous pregnancy. We used the Explicit-Mention Substance Abuse Need for Treatment in Women (EMSANT-W) Algorithm (20) to identify substance abuse disorder.</p> <p>We characterized a few key prevention behaviors as a means of describing women’s acceptance of the concept of prevention prior to a GDM diagnosis. We include here: 1) the receipt of a flu shot, 2) any visit with a primary care clinician in the year prior to pregnancy; and 3) early timing of the first visit for prenatal care as defined from claims data using the National Committee for Quality Assurance (NCQA) algorithm (first general office consultation between index-280 and index-176 D and either an obstetric panel, TORCH, Rubella/Rh, or ultrasound procedure code during the first trimester) (21).</p> <p>Variables of interest were derived from the literature. These include gestational hypertension, pre-eclampsia/eclampsia, excess prenatal weight gain, oral hypoglycemic agents or insulin dependence during pregnancy, substance use during pregnancy, mental health diagnosis in pregnancy, preterm birth, Caesarian section, obstructed labor, hemorrhage and traumatic delivery.</p> <p>Postpartum depression in the year following delivery, characterized as any depression reported in this time period or a diagnosis of postpartum depression (ICD-9 code 648.4).</p> <p>Type, location and size of hospital where delivery occurred, type of provider attending the delivery and the time frame before or after the implementation of the 2010 Affordable Care Act (1/1/2012), which removed co-pays for many preventive measures.</p>
<p>Outcome variable construction</p>	<p>Glucose testing</p>	<ol style="list-style-type: none"> 1) within the recommended period of 56-84 days post-delivery 2) within six months, 3) within one year 4) within three years post-delivery

	<p>Primary Care Practitioner visits</p> <p>Repeat GDM</p> <p>Onset of Type 2 diabetes</p>	<p>5) the number and type of glucose tests during each time interval</p> <p>Any visit to a primary care clinician (internal medicine or family medicine)</p> <ol style="list-style-type: none"> 1) within six months 2) within one year 3) within three years post-delivery <p>We also measured the number of primary care visits for any cause over the three year post-delivery period</p> <p>The occurrence of repeat GDM pregnancy among those with a subsequent pregnancy during the three year follow-up period.</p> <p>Diagnosis of Type 2 diabetes at any time during the three years after an index GDM delivery.</p>
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1. * We used published studies and Damschroeder's Consolidated Framework for Implementation Science Research to identify factors potentially related to GDM follow-up. [Damschroeder LJ, Aron DC, Keith RE, et al. Fostering implementation of health services research findings into practice: A consolidated framework for advancing implementation science. *Implement Sci* 2009; **4**:50-65]

Table S2. Comparison of OLDW LABS data system with national data, general population, 2012

Attribute		OLDW Labs Lives	Privately Insured Lives	2012 US Population
Gender		49.7%	51.0%	51.0%
Female				
US Region	Northeast	9.9%	19.3%	17.8%
	Midwest	26.5%	22.9%	21.4%
	South	45.6%	34.4%	37.3%
	West	18.0%	22.4%	23.5%
Age Group	18-44	43.5%	35.9%	36.0%
Race/Ethnicity	White	70.0%	71.9%	63.2%
	African American	9.7%	9.4%	12.0%
	Hispanic	10.6%	11.0%	17.0%
	Asian	5.1%	5.2%	5.0%
	Other	4.7%	2.5%	2.9%
Income <\$40k		12.8%	18.6%	33.6%

Table S3. Comparison of OLDW data for livebirth deliveries with U.S. data, 2014

VARIABLE	US DATA	OLDW CLAIMS DATA, 2014
General population aged 15-44, 2014	128,119,504	14,546,878 unique persons [11.4% of US pop within age range] (from c.91 million covered lives)
# unique women of reproductive age (15-44), 2014	62,885,470	7,353,294 (11.7%)
# of unique women with one livebirth, 2014	3,999,386	214,323 (c. 5.4% of US births)

Table S4. Continuously enrolled GDM women with known vs. unknown demographic and hospital systems data

Variable		% known demographics N=15,996	% unknown N=7,185	% Total N=23,181	P- value	% with known demographics &AHA data* (N=12,622)	P-value* *compared to unknown
Age: Mean (s.d.)		33.4(4.9)	33.5(4.9)	33.4(4.9)	0.21	33.3(4.8)	0.02
Race/ethnicity	Asian	13.4	0.0	9.2	<0.01	12.3	<0.01
	Black	7.3	0.0	5.1		7.4	
	Hispanic	13.2	0.0	9.1		12.9	
	White	66.1	0.0	45.6		67.4	
	Unknown	0.0	100.0	31.0		0.0	
Insurance type	EPO/IND/OTH	19.3	15.7	18.2	<0.01	19.4	<.01
(Missing=7)	HMO/POS/PPO	80.7	84.4	81.8		80.6	
Geographic region (Missing=25)	MW	25.8	27.5	26.3	<0.01	27.2	<.01
	NE	12.6	17.4	14.1		10.8	
	SO	44.5	37.2	42.2		44.1	
	WE	17.2	17.7	17.3		17.8	
Co-existing chronic illness							
Charlson Index: mean (s.d.)		0.20(0.60)	0.20(0.58)	0.20(0.59)	0.91	0.20(0.59)	0.76
Any SUD prior to delivery*		1.1	1.2	1.1	0.22	1.0	0.19
Any non-SUD mental health disorder		9.2	8.5	9.0	0.09	9.3	0.05
Polycystic ovary syndrome		6.5	6.1	6.4	0.25	6.6	0.17
Prevention-related behaviors prior to pregnancy							
Flu shot in year prior to pregnancy		22.7	22.9	22.8	0.80	22.8	0.98
1st trimester initiation of prenatal care		65.5	63.2	64.8	<0.01	65.5	0.01
2 nd trimester initiation		12.7	13.8	13.0		12.7	
3 rd trimester initiation		9.5	10.2	9.8		9.4	
no or insufficient documentation		12.3	12.8	12.4		12.4	
Inter-conception Primary Care visit		17.7	17.4	17.6	0.69	17.5	0.90
Pregnancy/postpartum-related conditions							
Preterm birth		9.3	9.1	9.2	0.67	9.4	0.56
C-Section		13.2	13.9	13.5	0.15	13.2	0.14
Gestational hypertension		8.1	7.8	8.0	0.32	8.2	0.27
Pre- or eclampsia		7.2	7.0	7.1	0.57	7.4	0.29
Excess gestational weight gain		2.7	2.4	2.6	0.20	2.7	0.15
Obstructed labor		3.7	3.4	3.6	0.21	3.9	0.10
Postpartum hemorrhage		0.2	0.3	0.2	0.14	0.2	0.19
GDM therapy: medication required		20.8	1.8	14.9	<0.01	20.8	<0.01
Postpartum depression (incident case)		1.1	1.5	1.2	0.04	1.2	0.10
Postpartum visit		38.9	38.8	38.9	0.90	39.6	0.26
Outcomes							
PC visit post-delivery	6 months	5.8	6.3	5.9	0.11	5.7	0.08
(V codes)	3 years	40.6	41.9	41.0	0.05	40.5	0.04
Glucose test (recommended period)		6.0	6.0	6.0	0.99	5.8	0.56
Any glucose test within 1 year		21.6	21.6	21.6	0.95	21.8	0.73
Glucose test within 3 years		51.0	50.0	51.0	0.19	51.0	0.17
# glucose tests per person (s.d.)		2.6(2.1)	2.6(2.1)	2.6(2.1)	0.47	2.6(2.1)	0.83
Test type, recommended period	FBG	37.1	35.3	36.5	0.52	38.7	0.14
(not exclusive)	AIC	37.8	35.9	37.2	0.51	36.0	0.09
	GTT	60.7	60.4	60.6	0.92	60.2	0.89
Test Type, yrs, 2-3 post-delivery	FBG	37.1	35.8	36.7	0.16	37.6	0.10
(not exclusive)	AIC	63.3	62.5	63.0	0.43	63.2	0.69
	GTT	48.5	47.0	48.0	0.13	48.1	0.13
% Repeat GDM:	post-index pregnancy	17.3	16.4	17.0		17.3	
	repeat GDM	52.4	52.0	52.2	0.78	52.2	0.87
T2DM onset 3 years post delivery		7.8	7.9	7.8	0.75	7.6	0.48

*Excluded: women with known demographic characteristics who did not have available AHA data (n=3,374)

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characteristics and known vs. unknown hospital systems data