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# TESTING PATTERNS FOR SYPHILIS AND OTHER SEXUALLY TRANSMITTED INFECTIONS IN PREGNANT WOMEN PRESENTING TO EMERGENCY DEPARTMENTS

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TESTING PATTERNS FOR SYPHILIS AND OTHER SEXUALLY TRANSMITTED  
INFECTIONS IN PREGNANT WOMEN PRESENTING TO EMERGENCY

DEPARTMENTS

by

IFEOLUWA SHOYOMBO, BS

APPROVED:

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FOLEFAC ATEM, PHD

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2019

DEDICATION

To Doyinsola Shoyombo

TESTING PATTERNS FOR SYPHILIS AND OTHER SEXUALLY TRANSMITTED  
INFECTIONS IN PREGNANT WOMEN PRESENTING TO EMERGENCY  
DEPARTMENTS

by

IFEOLUWA SHOYOMBO  
BS, University of Dallas, 2016

Presented to the Faculty of The University of Texas

School of Public Health

in Partial Fulfillment

of the Requirements

for the Degree of

MASTER OF PUBLIC HEALTH

THE UNIVERSITY OF TEXAS  
SCHOOL OF PUBLIC HEALTH  
Houston, Texas  
May, 2019

## PREFACE

The emergency room is one of the few settings in the health system of the United states, where there is a lot of interaction between healthcare services and members of the society, especially those that are socio-economically limited to accessing extensive health services. These interactions makes the emergency room an ideal setting for collecting and analyzing health-related data. Although there is a lot of parameters that can be feasibly studied and analyzed, even with basic statistics, yet, several systems of collecting data are not supplemented with suitable analyses. My primary motivation for this thesis is to contribute to the effort of bridging the gap between the knowledge that is embedded in data that have not been analyzed and the evidence basis for medical practice.

## ACKNOWLEDGEMENTS

I will like to acknowledge Dr. Folefac Atem, who has worked very closely with me on this project. A big thanks to you for all your help. I will also like to thank Dr. Baojiang who has guided me through the onset of this project. I am very grateful.

TESTING PATTERNS FOR SYPHILIS AND OTHER SEXUALLY TRANSMITTED  
INFECTIONS IN PREGNANT WOMEN PRESENTING TO EMERGENCY

DEPARTMENTS

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The University of Texas  
School of Public Health, 2019

Thesis Chair: Dr. Baojiang Chen, PHD and Dr. Folefac Atem, PHD



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**Table 1:** Demographic characteristics, hospital system, and primary diagnosis for patients' first emergency department visit resulting in testing for syphilis, chlamydia/gonorrhea and HIV in four North Texas counties (N=20,809)

Syphilis			P-Val	HIV		P-Val	Chlamydia/Gonorrhea		P-Val
	Not Tested	Tested		Not Tested	Tested		Not Tested	Tested	
	16,768 (80.6%)	4041 (19.4%)	<0.001	18,031 (86.7%)	2778 (13.3%)	<0.001	12,131 (58.3%)	8,678 (41.7%)	<0.001
<i>Age</i>			0.0166			0.074			0.0002
0-17	798 (4.8%)	159 (3.9%)		849 (4.7%)	108 (3.9%)		501 (4.1%)	456 (5.3%)	
18-44	15928 (95%)	3867 (95.7%)		17,137 (95%)	2,658 (95.7%)		11,588 (95.5%)	8,207 (94.6%)	
45-64	42 (0.25%)	14 (0.4%)		44 (0.2%)	12 (0.4%)		41 (0.3%)	15 (0.2%)	
65+	0 (0.0%)	1 (<0.1%)		1 (<0.1%)	0 (0.0%)		1 (<0.1%)	0 (0.0%)	
<i>Gender</i> (female)	16768 (80.6%)	4041 (19.4%)	1	18,031 (86.7%)	4041 (19.4%)	1	12,131 (58.3%)	8,678 (41.7%)	1
<i>Race/Ethnicity</i>			<0.001			<0.001			<0.001
Non-Hispanic White	9091 (54.22%)	2674 (66.1%)		10,034 (55.7%)	1,731 (62.3%)		7,857 (64.8%)	3,908 (45%)	
Non-Hispanic Black	5132 (30.6%)	969 (24.0%)		5,398 (29.9%)	703 (25.3%)		2,750 (22.7%)	3,351 (38.6%)	
Other	2545 (15.2%)	398 (9.9%)		2,599 (14.1%)	344 (12.4%)		1,524 (14.1%)	1,419 (16.4%)	
<i>Insurance</i>			<0.001			<0.001			<0.001
Private	2611 (15.6%)	347 (8.59%)		2,776 (15.4%)	182 (6.6%)		1,200 (9.9%)	1,758 (20.3%)	

Medicaid/Medicare	7281 (43.4%)	2283 (56.5%)		8,041 (44.6%)	1,523 (54.8%)		5,949 (49.0%)	3,615 (41.7%)	
Other	269 (1.6%)	38 (0.9%)		244 (1.4%)	63 (2.3%)		179 (1.5%)	128 (1.5%)	
Unknown (Self-pay, charity)	6607 (39.4%)	1373 (34.0%)		6,970 (38.7%)	1,010 (36.4%)		4,803 (39.6%)	3,177 (36.6%)	
<i>Patient's county of residence</i>			<0.001						<0.001
Dallas	10484 (62.5%)	3481 (86.1%)		11,749 (62.5%)	2,216 (86.1%)		9,668 (79.7%)	4,297 (49.5%)	
Denton	1067 (6.4%)	121 (3.0%)		1,134 (6.3%)	54 (1.9%)		653 (5.4%)	535 (6.2%)	
Tarrant	5217 (31%)	439 (10.9%)		5,148 (31%)	508 (18.3%)		1,810 (14.9%)	3,846 (44.3%)	
<i>Hospital county</i>			<0.001			<0.001			<0.001
Dallas	9981 (59.5%)	3455 (85.50%)		11,232 (62.3%)	2,204 (79.3%)		9,579 (79.0%)	2,204 (79.3%)	
Denton	1150 (6.8%)	96 (2.4%)		1,201 (6.8%)	45 (1.6%)		618 (5.1%)	628 (7.2%)	
Tarrant	5241 (31.3%)	442 (10.9%)		5,187 (28.8%)	496 (17.9%)		1,774 (14.6%)	3,909 (45.0%)	
Collin	163 (1%)	27 (0.7%)		179 (1%)	11 (0.4%)		90 (0.7%)	100 (1.2%)	
Other (Ellis, Erath, Grayson,	233 (1.4%)	21 (0.5%)		232 (1.3%)	22 (0.8%)		70 (0.6%)	184 (2.1%)	

Hunt, Johnson, Kaufman, Rockwall, and Wise)									
<i>Hospital system</i>			<0.001			<0.001			<0.001
County	7746 (46.2%)	3426 (84.8%)		8674 (48.1%)	2498 (89.9%)		9586 (79.0%)	1586 (18.3%)	
Safety Net									
For Profit	1617 (9.65%)	254 (6.3%)		1825 (10.1%)	46 (1.7%)		1428 (76.3%)	443 (5.1%)	
Faith Based	2337 (13.94%)	107 (2.7%)		2420 (13.4%)	24 (0.9%)		252 (2.1%)	2192 (25.3%)	
NFP									
Not for Profit	5063 (0.5%)	253 (6.3%)		5106 (28.3%)	210 (7.6%)		864 (7.1%)	4452 (51.3%)	
<i>Primary diagnosis for emergency department visit</i>			<0.001			<0.001			<0.001
Abortion	5313 (31.7%)	662(16.4%)		5,454 (30.3%)	521(18.8%)		2,773 22.9%)	3,202 (36.9%)	
	65 (0.4%)	249 (6.2%)		214 (1.2%)	100 (3.6%)		276 (2.3%)	38 (0.44%)	
Cardiovascular									

CNS	20 (0.1%)	17 (0.4%)	26 (0.1%)	11 (0.4%)	25 (0.2%)	12 (0.1%)
GI	655 (3.9%)	134 (3.3%)	675 (3.8%)	114 (4.1%)	434 (3.6%)	355 (4.1%)
Heme	5 (0.03%)	4 (0.1%)	6 (0.0%)	3 (0.1%)	6 (0.1%)	3 (<0.1%)
Infectious Disease	4 (0.02%)	6 (0.15%)	5 (0.03%)	5 (0.18%)	7 (0.06%)	3 (0.03%)
Syphi	2 (0.01%)	0 (0.00%)	2 (0.01%)	0 (0.00%)	2 (0.02%)	0 (0.00%)
lis	19 (0.11%)	0 (0.00%)	19 (0.11%)	0 (0.00%)	12 (0.10%)	7 (0.08%)
Chla	98 (0.58%)	6 (0.15%)	100 (0.55%)	4 (0.14%)	70 (0.58%)	34 (0.39%)
mydi	2829 (16.88%)	190 (4.71%)	2837 (15.74%)	182 (6.57%)	1319 (10.88%)	1700 (19.60%)
a	18 (0.11%)	0 (0%)	17 (0.09%)	1 (0.04%)	6 (0.05%)	12 (0.14%)
Gono	281 (1.68%)	37 (0.92%)	287 (1.59%)	318 (0.14%)	160 (1.32%)	158 (1.82%)
rrhea						
STI –						
Other						
s						
GU/						
UTI						
Puerp						
eral						

Other ID							
Metabolic	160 (1.0%)	138 (3.4%)	182 (1.0%)	116 (4.2%)	255 (2.1%)	43 (0.5%)	
Misc	35 (0.2%)	12 (0.3%)	38 (0.2%)	9 (0.3%)	29 (0.2%)	18 (0.2%)	
	6 (0.0%)	3 (0.1%)	7 (0.0%)	2 (0.1%)	7 (0.1%)	2 (<0.1%)	
Musculoskeletal							
1							
Pregnancy Complications	7190 (42.9%)	2553 (63.3%)	8,098 (44.9%)	1,645 (59.4%)	6,670 (55.0%)	3,073 (35.4%)	
Psychiatric	47 (0.3%)	20 (0.5%)	42 (0.2%)	25 (0.9%)	59 (0.5%)	8 (0.1%)	
Renal	7 (0.04%)	2 (0.1%)	7 (0.0%)	2 (0.1%)	6 (0.1%)	3 (<0.1%)	
Respiratory	8 (0.1%)	0 (0.0%)	8 (0.1%)	0 (0.0%)	4 (<0.1%)	0 (0.0%)	

## LIST OF FIGURES

Figure 1: Sample Figure Title (apply “Figure Title” style to each figure title)**Error! Bookmark not defined.**



FIG 1: RACE AND STI TESTING

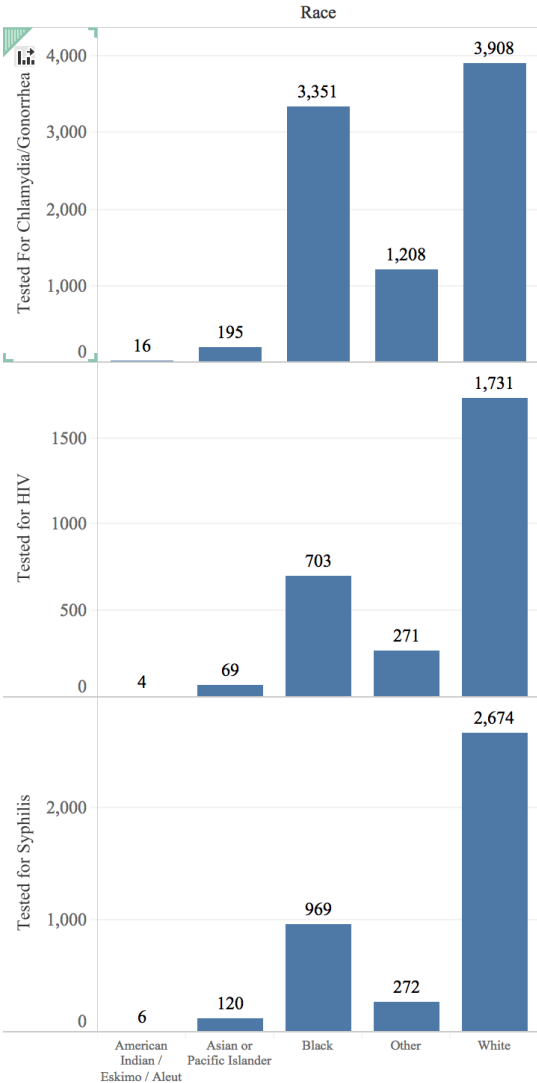


FIG3: AGE AND STI TESTING

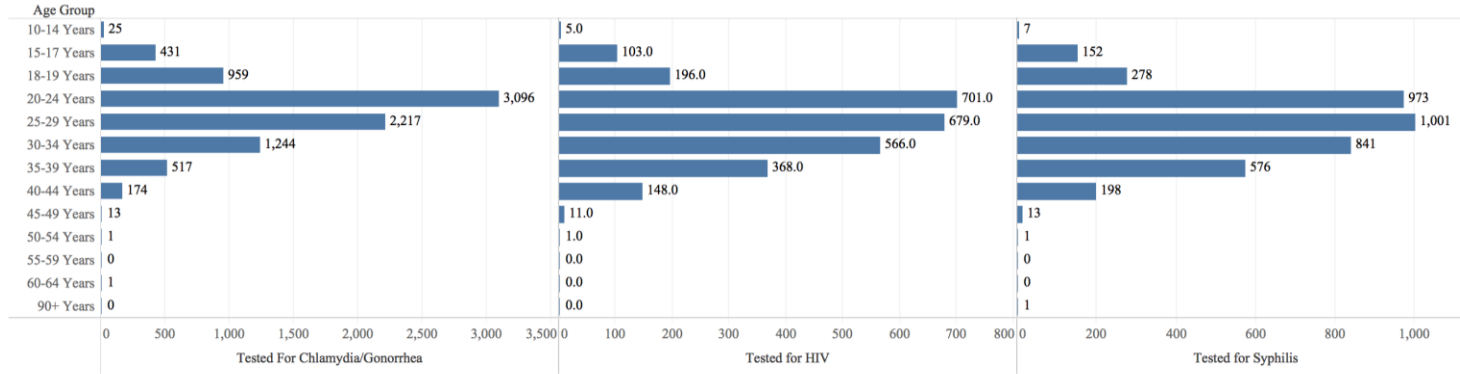


FIG 3: PRIMARY DIAGNOSIS AND STI TESTING

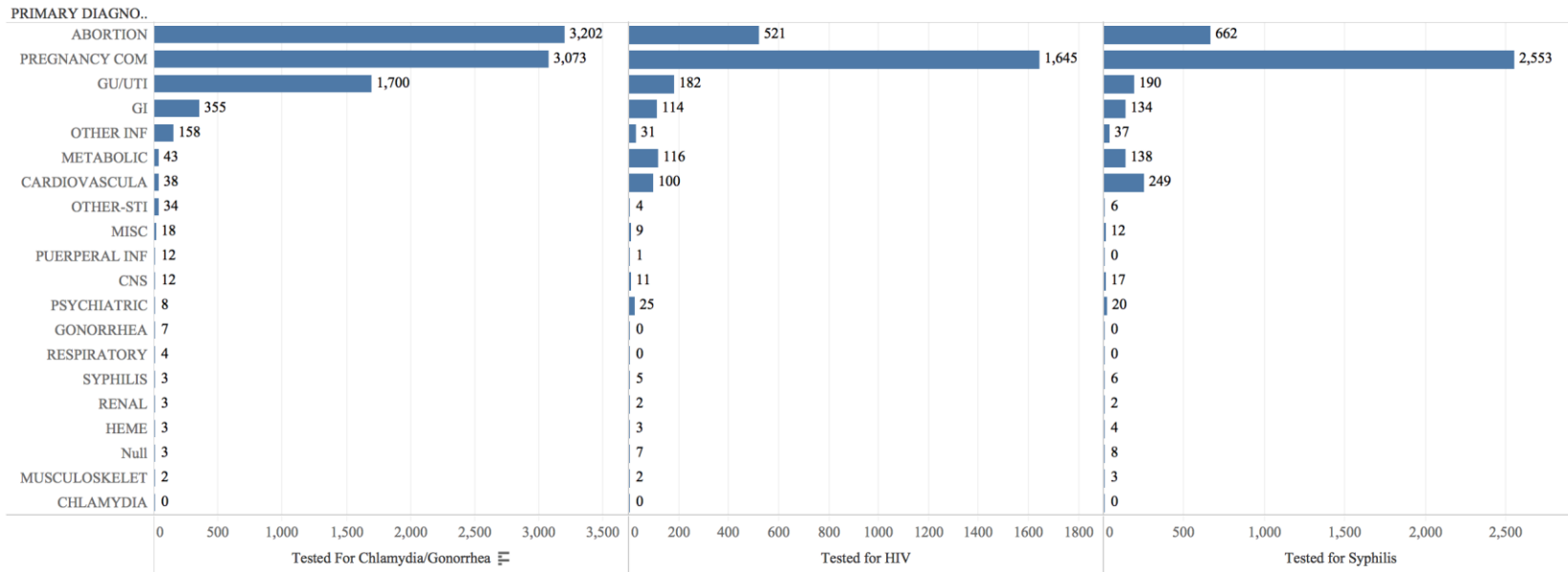
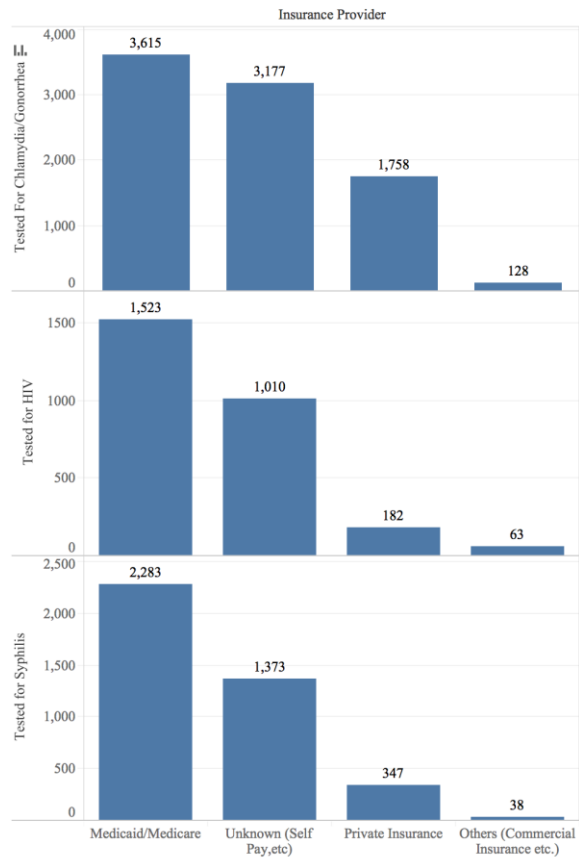


FIG 4: INSURANCE PROVIDER AND STI TESTING



X

FIG 5: HOSPITAL SYSTEM AND STI TESTING

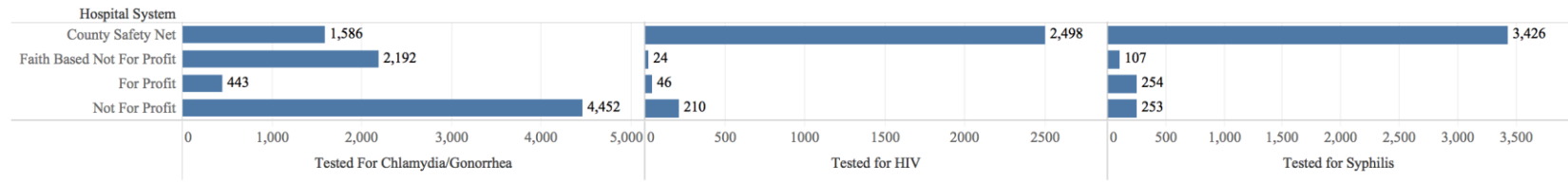


FIG 6: PATIENT'S COUNTY OF RESIDENCE AND STI TESTING

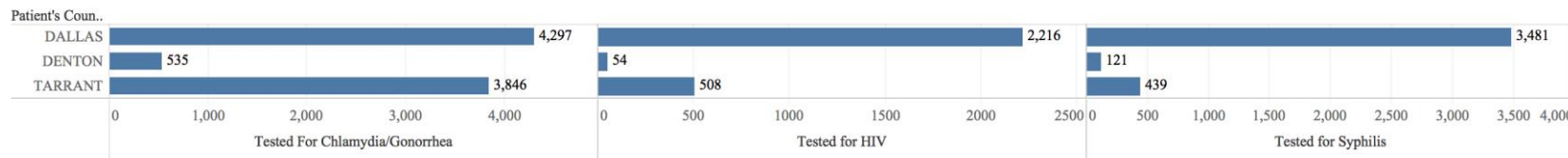
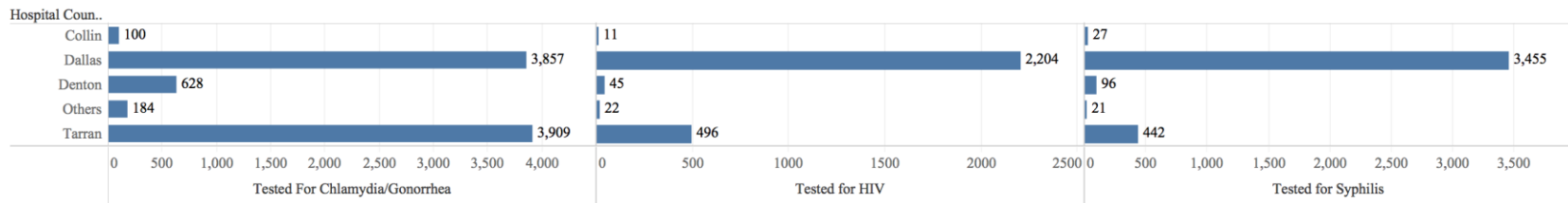


FIG 7: HOSPITAL COUNTY AND STI TESTING



## LIST OF APPENDICES

Appendix A: Sample Appendix Title (apply "Appendix Title" style)**Error! Bookmark not defined.**

## **BACKGROUND**

### **Literature Review**

Following an initial decrease in the incidence of congenital syphilis from 2008-2012, the rate of congenital syphilis rose by 38% across the United States between 2012-2014 (2). This trend followed a 22% rise in primary and secondary syphilis cases in women during the same period.(1) Vertical transmission of syphilis is a significant public health concern, contributing to stillbirth, infant mortality, and neurologic and skeletal morbidities in survivors. (2) The Centers for Disease Control and Prevention (CDC) recommends that all pregnant women be screened for sexually transmitted infections (STI) including HIV, syphilis, and hepatitis B at the first prenatal visit regardless of prior testing. The American College of Obstetricians and Gynecologists (ACOG) and the U.S. Preventive Services Task Force (USPSTF) also support similar recommendations. Yet, a CDC investigation into this epidemic revealed that 21% of women whose infants were diagnosed with congenital syphilis had no prenatal care, and of those who had at least one prenatal visit, 43% received no treatment for syphilis during pregnancy and 30% received inadequate treatment. (2, 3)

Little is understood about factors associated with low STI screening during pregnancy in the US. In a 2014 study, Cha, et al. evaluated factors affecting the likelihood of STI screening in pregnant women in Guam. They found that the biggest barrier to STI testing was lack of prenatal care and insurance. Even women with access to prenatal care were not routinely screened for syphilis before 24 weeks' gestation. Despite a 93.5% overall rate of screening for syphilis at any time during pregnancy, the authors found much lower screening

rates for other STIs, including 31% for HIV, 25.3% for chlamydia, and 25.7% for gonorrhea.

(8) This suggests potential disparity in testing practices based on risk perception by providers or patients.

### **Public Health Significance**

The emergency department (ED) presents public health opportunities to expand STI and syphilis screening. ED screening can help expand services to underinsured women, and represents a key point of entry into the health care system. (10) However, ED screening practices for STIs depend on a variety of factors, including requirements for pre and post-test counseling, ability to establish appropriate follow up, disagreement regarding appropriate screening and diagnostic testing in an emergency setting, perception of disease prevalence, and insurance coverage. (5, 10, 11) The annual National Hospital Ambulatory Medical Care Survey in 2009 from all 50 states and the District of Columbia reviewed STI screening practices in the emergency department and revealed that only 2.3% of patients who presented with symptoms of STIs, sexual abuse, or pregnancy, received any HIV testing. The survey also revealed that if ED staff perceived a low prevalence of HIV in their local population, then testing was less likely to be offered, and some practitioners questioned if HIV screening should even be performed in the emergency department where critical illnesses were a higher priority. (10) Another study found that among women with no prenatal care, 44% had visited emergency clinics and 33% of them were screened for syphilis, further demonstrating that the ED provides another potential opportunity for testing. (9) Outside the ED setting, a review of a U.S administrative claims database from 2009-2010 showed that 95% of pregnant patients with Medicaid or commercial insurance were tested for syphilis and hepatitis B. Furthermore,

prenatal HIV screening rates were higher in younger women (15-19 years of age) and in the southern United States. (6) This study suggests that testing for STIs varies between health care settings, from primary care offices to emergency departments, and is influenced by several factors including patient age and healthcare coverage. (11) Evaluating STI testing patterns in EDs located in high-prevalence areas could potentially identify opportunities for intervention.

### **Hypothesis, Research Question, Specific Aims or Objectives**

Our aim was to examine population and individual-level factors associated with STI testing patterns in a metropolitan area in the South through claims-based data from the Dallas-Fort Worth Hospital Council.

## **METHODS**

### **Data Collection**

The Dallas-Fort worth Hospital Council Education and Research Foundation (DFWHC) data warehouse is a repository of claims-based data from regional EDs in the DFW area of north Texas. Since 2000, the DFWHC data warehouse has stored healthcare data for approximately 10.7 million unique patients and 51 million hospital encounters. This warehouse collects ED claims data from 80% of the hospitals in North Texas. The DFWHC receives visit-centric data and establishes a regional enterprise master patient index (REMPI), which assigns a unique ID to all patients, allowing researchers to track patients over time. The data is submitted in a standardized format and processed through a data quality tool that ensures accuracy and normalizes the data. The average data quality measurement for



participating facilities is 93%. Critical errors require correction before the patient encounter can be entered into the database. One example of a critical error would be an encounter missing the principal diagnosis code or having an invalid diagnosis code. The primary benefit of using the DFWHC data is the large sample size of the database, which provided a robust distribution for statistical analysis.

### **Study Setting**

DFWHC data were extracted for all patients who visited an ED from July 2014 through June 2015 and who had at least one of three STI tests (HIV, syphilis or combined GC/CT test) performed at the visit. Data were analyzed for EDs in Dallas, Tarrant, Collin, and Denton counties, which include the two major population centers, Dallas and Fort Worth. We limited this dataset to include women with a pregnancy-related diagnosis as defined by ICD-9 codes 630-676 (Appendix), and excluded any diagnosis associated with a past medical history of pregnancy or family history of pregnancy-related complications to limit inclusion to active pregnancy cases. We only examined claims for sexually transmitted infections that included HIV, syphilis or gonorrhea and chlamydia. Chlamydia (CT) and gonorrhea (GC) tests were combined, as the most common test used is the combined nucleic acid amplification test. HIV and syphilis screening was determined based on CPT codes.

### **Study Design**

A cross-sectional study design. We reviewed the primary diagnoses (based on ICD-9 codes) and other factors including race, insurance coverage, and geographic location (hospital county), to determine associations with STI testing. Primary diagnoses were classified into the following categories: 1) early pregnancy loss or abortion-related, 2)

cardiovascular (including venous thrombosis and hypertension, 3) central nervous system (including headaches and seizures), 4) gastrointestinal, 5) hematologic, 6) infectious diseases (pertaining to genitourinary infections), 7) metabolic (related to glucose, thyroid, and bone disorders), 8) musculoskeletal, 9) pregnancy complications (other than early pregnancy loss or abortion-related), 10) psychiatric, 11) renal, 12) respiratory, and 13) miscellaneous.

### **Study Subjects**

This study is considered a quality improvement study. Hence IRB approval was not required to carry out this study. We evaluated claims-based data on 123,834 women who visited north Texas emergency departments from 2014 to 2015 and were tested for a sexually transmitted infection during the visit. Of these, a total of 20,809 women (16.8%) with a pregnancy-related diagnosis were screened for HIV, syphilis, or gonorrhea and chlamydia. These women had a total of 26,416 recorded visits.

### **Sample Size Calculation and/or Study Power**

This is a retrospective study that is based on available data. No power computation was performed.

### **Data Analysis**

Statistical Analysis was performed using SAS 9.4 © to conduct descriptive and inferential analyses on the data. We described the distribution of screening provided based on race, age, insurance coverage, hospital, geographic location, and primary diagnosis. The distributions and frequency were plotted using Tableau 2018.3.0© . We used the chi-square test for univariate analyses of categorical variables to test for association. Also, we performed a prevalence ratio estimation using the GENMOD procedure on SAS to model the

relationship between predictor variables: Hospital system, principal diagnosis, Hospital county, patient county, Primary payer, patient race, and patient group and response variable: Syphilis, HIV, Chlamydia and Gonorrhea testing patterns. For the models, Syphilis was used as a reference group among the principal diagnosis category, for-profit-organizations were used as the reference group for the hospital system category, Dallas was used as the reference group for the hospital county category, Tarrant county was used as the reference group for the patient's county category, "Other's insurance" which includes self-pay and commercial insurances were used as the reference group for the insurance category, "Other race", which included Asian, and pacific American were used as the reference group for race, and the patient age group 0-17 years were used as the reference group for the age category. A p value of <0.05 was considered significant for all analyses.

### **Human Subjects, Animal Subjects, or Safety Considerations**

This study was based on de-identified claims data. No human or animal subjects were involved.

### **RESULTS**

#### Testing Patterns for Syphilis

Of the total number of women meeting inclusion criteria, 19.4% were screened for syphilis. In the subset of 4036 patients screened for syphilis, 1630 women were screened for syphilis alone, 2,287 were screened for both syphilis and HIV, 32 were screened for syphilis, chlamydia and gonorrhea, and 92 were screened for syphilis, chlamydia, gonorrhea and HIV.

Univariate analysis of factors associated with syphilis testing are shown in Table 1.

The County safety prevalence ratio was 0.7103 (0.5554 0.8652), faith based not for profit

was -0.5658 (-0.8051 -0.3265) and Not for profit was -1.0423 (-1.2272 -0.8573). Patient county of residence was estimated at a prevalence ratio for Dallas 0.4316 (0.1694 0.6939), and Denton 0.4811 (0.1123 0.8500). The other parameters did not show any significant difference in the parameters for testing for syphilis.

### Testing Patterns for HIV

Of the 20,809 women who presented to north Texas emergency departments with a pregnancy-related diagnosis, 13.3% received screening tests for HIV. Univariate analysis of factors associated with HIV testing are shown in Table 1. The significant prevalence ratio were Abortion -1.2646 (-2.1486 -0.3806), and other STI -2.4227 (-3.7396 -1.1058). Faith based NFP was not significant. County safety was (2.5908 2.2524 2.9291), and NFP 0.8141 (0.4736 1.1547). For insurance, Medicaid -0.4642 (-0.7296 -0.1987), Private -0.6179 (-0.9153 -0.3205) and unknown was -0.6936 (-0.9601 -0.4270). Patient race and patient age group were not significant.

### Testing Patterns for Chlamydia and Gonorrhea

Of the 20,809 women who presented to north Texas emergency departments with a pregnancy-related diagnosis, 41.7% received screening tests for gonorrhea/chlamydia. Univariate analysis of factors associated with GC/CT testing are shown in Table 1. There was no significant prevalence ratio among the principal diagnosis group testing for chlamydia and gonorrhea. There was a prevalence ratio of -0.319 (-0.5032, -0.2789) for county safety net testing for chlamydia and gonorrhea. There was prevalence ratio of 0.9972 (0.8866 - 1.1077) for Faith based NFP, and a prevalence ratio of 1.4182 (1.3155, 1.5208) for Not for profit hospital systems. Collin 0.2924 (0.0862, 0.4985), Denton 0.1749

(0.0478 0.3019), Others 0.7652 (0.6115 0.9188) Tarrant 0.6951 (0.5743 0.8158). There were no significant difference in prevalence ratio among the patient county, primary insurance or patient age group. For patient race, black was -0.1623 (-0.2280 -0.0967) and non-Hispanic white was -0.3758 (-0.4385 -0.3130).

## **Discussion**

After reviewing visit data for 20,809 women with a pregnancy-related diagnosis who accumulated 26,416 visits to north Texas emergency departments over a 12-month period and were screened for at least one STI, we determined three main findings. First, women with a pregnancy-related diagnosis who presented with a cardiovascular, metabolic, or CNS-related complaint were more likely to be screened for syphilis compared to women who presented with symptoms of an infectious disease or potential abortion. The cardiovascular and CNS symptoms may implicate tertiary or neuro-syphilis as a risk factor and thus may have prompted testing, but metabolic symptoms are typically less associated with syphilis. In comparison, presentation with genitourinary infectious complaints and abortion can be indications of primary or secondary syphilis in the mother or congenital syphilis that can result in abortions. This paradoxical relationship with testing patterns and patient presentation warrants further exploration through in-depth chart reviews to determine what prompted providers to test for the same. It is also intriguing that pregnant women who presented with infectious complaints were more likely to receive GC/CT than HIV testing, considering that immunosuppression and consequent risk for infections is more linked with HIV than GC/CT.

Second, patient factors such as race and age appeared to affect rates of STI testing across north Texas emergency departments. White women were more likely to be screened for syphilis or HIV, which is in contrast to black women who were more likely to be screened for chlamydia and gonorrhea. Women less than 17 years were more likely to be screened for chlamydia and gonorrhea, compared to women aged 18-44 years who were more likely to be tested for syphilis, and women 45-64 years were more likely to be tested for HIV. These patterns may have been influenced by some epidemiologic profiles and guidelines that focus on gonorrhea/chlamydia testing in women under the age of 25. (4) In a review of Medicaid claims data looking at women 15-21 years of age and chlamydia screening rates, this showed that black women were screened more frequently, which is in concordance with our results. (12)

Recommendations from the CDC, ACOG, and USPSTF are published to guide testing during pregnancy in order to reduce preventable causes of morbidity and mortality related to sexually transmitted infections to both the mother and child before and after birth. (2) Of these 20,809 women who were presumably considered at risk for an STI based on the fact that they were tested for either HIV, syphilis or GC/CT, 4,041 women received a sole syphilis test and 2,287 women received both syphilis and HIV testing at the same visit, compared to only 122 women who received syphilis and GC/CT testing and 90 women who had syphilis, GC/CT, and HIV testing. A retrospective review of pregnant women in an urban hospital revealed several factors that were missed opportunities for screening that resulted in congenital syphilis, one of which was women not being screened at the recommended trimester. (9) A study of HIV-infected pregnant women who underwent STI

screening, found lower rates of HIV transmission from mother-to-child in women without gonorrhea or chlamydia compared to HIV-infected pregnant women with one or both gonorrhea or chlamydia. Untreated infections not only have maternal complications, but can lead to preterm labor, conjunctivitis, disseminated disease, and even fetal loss. (5)

A 2015 CDC review of STI surveillance in both men and women in the United States revealed that the South (including Texas) had the highest number of cases of syphilis, chlamydia, and gonorrhea. (4) When further broken down in the north Texas area, Dallas county had higher rates of gonorrhea, chlamydia, and syphilis than Tarrant and Collin counties in 2015. (4) Although there were many missed opportunities as evidenced by the low rate of STI screening in pregnant women, this review allows us to evaluate specific data points as potential areas of improvement in STI testing patterns in the ED. In our dataset, hospitals in Dallas County had higher screening rates for syphilis and HIV, compared to hospitals in the neighboring Tarrant County (which serves the city of Fort Worth) who had higher rates of testing for chlamydia and gonorrhea. Such a trend may be explained by different practice cultures in individual health settings and may warrant further exploration through interaction with practice providers in both settings.

There are some limitations to our approach. One limitation of this ED claims-based data analysis is the absence of specific diagnostic test results and treatment details outside of the ED setting, including from prenatal clinics. Laboratory testing results from ambulatory visits could be captured through in-depth electronic medical record (EMR) chart reviews. However, since the highest testing rates took place at county-funded safety net settings and utilization of routine health care is generally low for pregnant women who seek care at safety

net settings, we can capture healthcare utilization across a comprehensive geographic setting which is more challenging to do with individual hospital-based EMRs. While this data type cannot provide detailed information on the types of presenting symptoms outside of the codes used for claims, it does provide a population-level snapshot of patterns of care. Further study is needed to explore the specific trends that have emerged through provider surveys and in-depth chart reviews to identify potential causal associations driving these unique STI testing patterns in EDs.

## **CONCLUSION**

The proportion of women screened for syphilis alone or in combination with other STIs was low among those with a pregnancy-related diagnosis who presented to emergency departments in the DFW region. Patient factors including race, age, and presenting symptoms, and hospital factors such as geographic location were associated with differences in STI screening patterns.



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