

# Trends in Gender-affirming Surgery in Insured Patients in the United States

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**Background:** An estimated 0.6% of the U.S. population identifies as transgender and an increasing number of patients are presenting for gender-related medical and surgical services. Utilization of health care services, especially surgical services, by transgender patients is poorly understood beyond survey-based studies. In this article, our aim is 2-fold; first, we intend to demonstrate the utilization of datasets generated by insurance claims data as a means of analyzing gender-related health services, and second, we use this modality to provide basic demographic, utilization, and outcomes data about the insured transgender population.

**Methods:** The Truven MarketScan Database, containing data from 2009 to 2015, was utilized, and a sample set was created using the Gender Identity Disorder diagnosis code. Basic demographic information and utilization of gender-affirming procedures was tabulated.

**Results:** We identified 7,905 transgender patients, 1,047 of which underwent surgical procedures from 2009 to 2015. Our demographic results were consistent with previous survey-based studies, suggesting transgender patients are on average young adults (average age = 29.8), and geographically diverse. The most common procedure from 2009 to 2015 was mastectomy. Complications of all gender-affirming procedures was 5.8%, with the highest rate of complications occurring with phalloplasty. There was a marked year-by-year increase in utilization of surgical services.

**Conclusion:** Transgender care and gender confirming surgery are an increasing component of health care in the United States. The data contained in existing databases can provide demographic, utilization, and outcomes data relevant to providers caring for the transgender patient population. (*Plast Reconstr Surg Glob Open* 2018;6:e1738; doi: 10.1097/GOX.0000000000001738; Published online 16 April 2018.)

## INTRODUCTION

Identifying as transgender can have varying meanings to different individuals, but is generally understood to describe discordance between one's biologic sex assigned at birth and the gender with which one identifies. An estimated 0.6% of the U.S. population identifies as transgender or gender-nonconforming.<sup>1</sup> Transgender patients face many unique health risks, including an increased risk of suicide, mental health issues, and HIV compared with those in the general population.<sup>2,3</sup> In addition, trans pa-

tients are less likely to be insured<sup>2,3</sup> and often find health insurance coverage for transgender medical care to be lacking. The paucity of insurance coverage for hormone therapy and gender-affirming surgery, even among those who are able to secure health insurance, contributes to a high financial burden. Of the respondents in the 2015 U.S. Transgender Survey, 55% of patients who sought surgery and 25% of those on hormones reported difficulty obtaining insurance coverage for these services.<sup>3</sup> In addition to cost, transgender patients report delaying health care for urgent needs and preventative care due to discrimination and disrespect from providers.<sup>3</sup>

Although there are financial and social barriers to health care access for transgender patients in the United States, the need for medical and surgical gender-related care is increasing. The 2015 US Transgender Survey re-

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ported in a sample of over 27,000 transgender and gender-nonconforming Americans, 25% had undergone 1 or more gender-affirming surgeries.<sup>3</sup> Beyond large survey studies such as the U.S. Transgender Survey, there has been little investigation into the utilization of gender-related health services over time, which is a particularly pertinent area of investigation, given both increasing visibility of transgender issues and the ongoing debate regarding health care reform in the United States.

We aim to shed light on basic demographics and trends in utilization of gender-affirming surgeries through the use of insurance claims data available on the Truven MarketScan Database, and provide a model for future investigation into gender-related health care utilizing this study modality. The Truven MarketScan Database is composed of health information from a large cohort of patients with employer-sponsored health insurance between 2009 and 2015. Demographics, types of surgical procedures performed, and utilization over time will be described and information not easily elicited in survey-based studies such as the rates of major complications.

## METHODS

### Data Source

The Truven MarketScan Database, which includes inpatient and outpatient claims from prescriptions, procedures, and laboratory results from over 122 million unique individuals beginning in 1999, was analyzed.<sup>4</sup> Specifically, the MarketScan Commercial Claims and Encounters Database, which collects information on several million patients annually from 2009 to 2015, was used.<sup>4</sup> These data are collected from over 150 employers and 20 health plans.<sup>4</sup> The database is deidentified, and information about providers and select demographic information is withheld from the database to protect patient privacy.

### Database Analysis

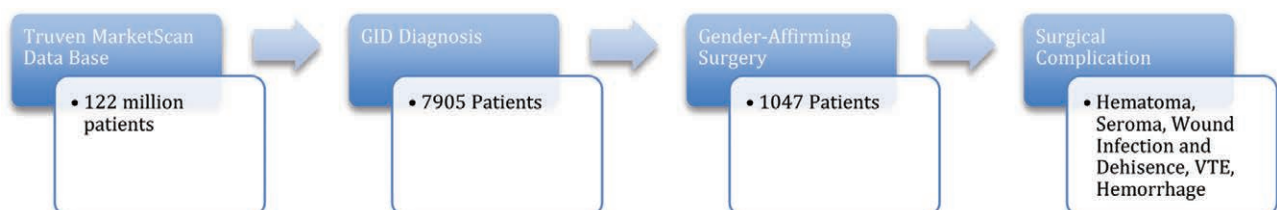
A dataset was initially created by pulling patients in the MarketScan Commercial Claims and Encounters Database with the International Code of Diseases, 9th Edition (ICD-9) diagnosis code for Gender Identity Disorder (GID, 302.85) within the 2009–2015 date range (Fig. 1). Patient information collected included age at diagnosis, date of diagnosis within the database range, gender marker, employment status, and location (see pdf, **Supplemental Digital Content 1**, which displays table of variables provided for all patients with GID ICD-9 code, <http://links.lww.com/PRSGO/A762>). Gender marker was not included in the analysis, given the ability to change gender marker on insurance plans, and is not necessarily reflective

of one’s biologic sex or gender. To isolate patients within this dataset who underwent gender-affirming surgery, patients with ICD-9 and Current Procedural Terminology, 4th Edition (CPT-4) codes associated with mastectomy, breast augmentation, vaginoplasty, free flaps (for phalloplasty), urethroplasty, orchiectomy, and hysterectomy from 2009 to 2015 in the GID dataset were pulled (Fig. 1). The date of the first instance of any code listed for each procedure was used as the date of surgery. Patients who had more than 1 surgery were only counted once in the analysis for demographic information. As there are no universal CPT codes for phalloplasty, ICD-9 procedure codes for construction of penis, the CPT code for male-to-female intersex surgery, and CPT codes for free flap were used to represent a phalloplasty in this dataset. Free flaps associated with trauma based on ICD-9 diagnosis codes were excluded. Similarly, ICD-9 procedure codes for vaginal construction, the CPT code for female-to-male intersex surgery, and any CPT code related to operations on the vagina were assumed to represent vaginoplasty in this dataset (see pdf, **Supplemental Digital Content 2**, which displays ICD-9 and CPT-4 codes utilized to determine patient procedures, <http://links.lww.com/PRSGO/A763>; see pdf, **Supplemental Digital Content 3**, which displays table of variables provided for GID patients who underwent gender-affirming surgery, <http://links.lww.com/PRSGO/A764>). All cases of possible phalloplasty and vaginoplasty were reviewed manually and, in cases of discrepant or incomplete data, a final determination of whether to include a procedure in a particular category was made based on the associated ICD-9 diagnosis codes. All other procedures were identified by their respective ICD-9 and CPT procedure codes. We did not use the ICD-9 procedure code for “sex transformation operation NEC” (645) due to its ambiguity and lack of gender-specificity, and the majority of patients in the dataset also had encounters with the CPT codes associated with genital surgery noted above. From the patients who underwent gender-affirming surgery, information about date of operation, length of stay, and venous thromboembolism (VTE) was collected (**Supplemental Digital Content 3**). Paired *t* tests were utilized to provide descriptive analysis.

## RESULTS

### Transgender Patient Demographics in the MarketScan Database

A total of 7,905 transgender patients in the Truven MarketScan Commercial Claims and Encounters Database were identified using the GID diagnosis code. The first diagnosis in the dataset is recorded on January 2, 2009, and the last is October 20, 2015 (Fig. 2).



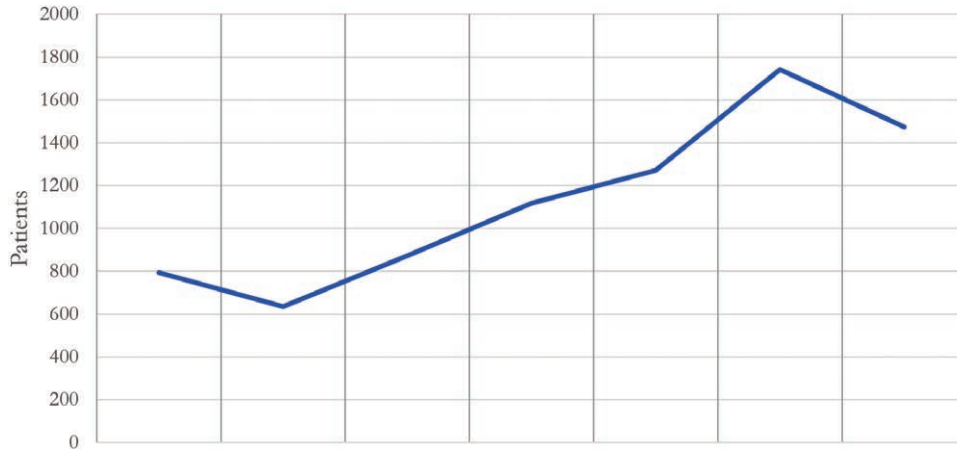
**Fig. 1.** Outline of dataset creation and isolation of surgical variables.

**Age, Income, Employment Status, and Location**

The average age of transgender patients within the database was 29.8, and the largest number of transgender patients was in the young adult age range (Fig. 3). The largest income bracket represented in this dataset earned

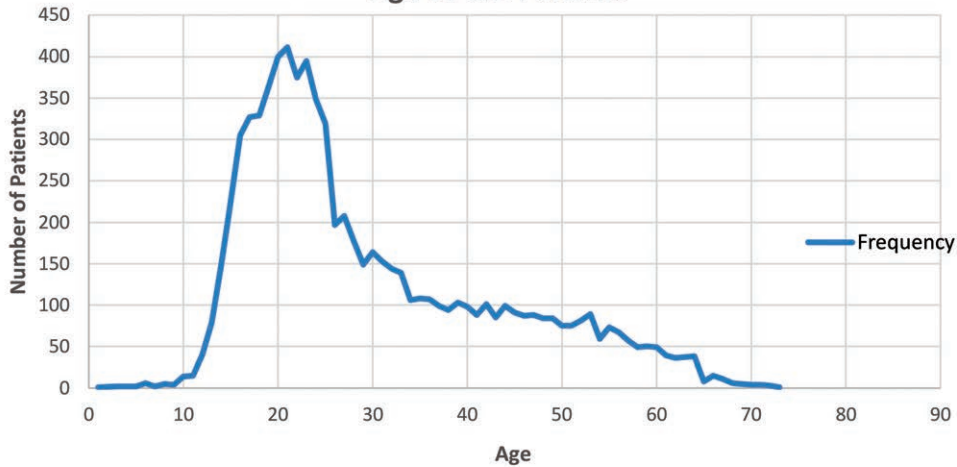
greater than \$70,000 a year (50% of patients with available income information), with only 4 patients earning less than \$40,000 a year (Table 1). Of the patients where employment data were available, 90% were listed as full-time employees (Table 2), but a variety of employment statuses,

**Incidence of GID Diagnosis, 2009-2015**

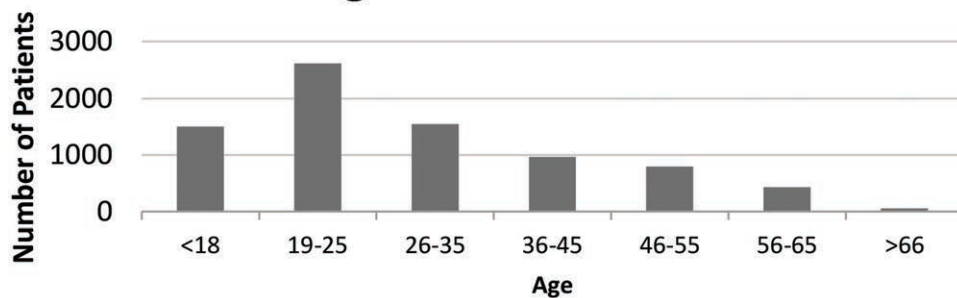


**Fig. 2.** Number of GID diagnoses from 2009 to 2015.

**Age of GID Patients**



**Age Distribution at Time of Initial Diagnosis in Database**



**Fig. 3.** Age distribution of patients at first GID diagnosis in the MarketScan Database.

including retirees, unemployed, and those relying on COBRA Consolidated Omnibus Budget Reconciliation Act (COBRA) were represented in the dataset. Patients from 49 states were represented in the sample—with the largest number of patients residing in New York, California, and Texas, with 765, 1,285, and 457 patients, respectively. There were no patients from Hawaii in the dataset.

**Insured Patients Undergoing Gender-affirming Surgery**

A total of 1,047 patients, or 13.2% of the sample, underwent 1 or more gender-affirming surgeries from 2009 to 2015, with the number of patients undergoing surger-

ies increasing over the sample period (Fig. 4). There were a total of 401 mastectomies, 62 breast augmentations, 60 phalloplasties, 193 vaginoplasties, 189 hysterectomies, and 93 orchiectomies in the sample. Mastectomy was the most common procedure represented within the sample, accounting for 11.7% of all procedures. Phalloplasty was the least common procedure, accounting for 5.7% of all surgical cases.

**Age**

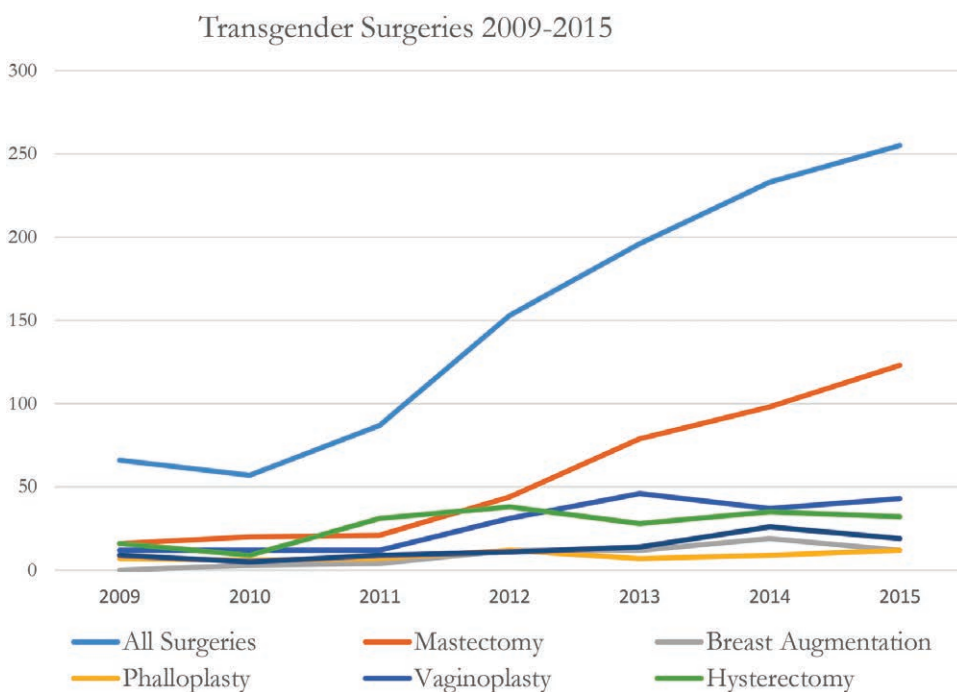
The average age for any procedure was 29.5. The youngest subset of patients were those undergoing mastectomy,

**Table 1. Income of Patients with GID Diagnosis and Patients who Underwent a Gender-affirming Procedure**

Median Income	GID Diagnosis	Percentage	GID Diagnosis and Procedure	Percentage
< 40K	4	0.1	0	0.0
40K ≤ Median Inc < 50K	46	0.6	3	0.2
50K ≤ Median Inc < 60K	867	11.0	72	6.8
60K ≤ Median Inc < 70K	2,598	32.9	255	24.4
Median Inc ≥ 70K	3,479	44.0	479	45.7
Missing Median Inc	913	11.5	238	22.7
Total	7,907	100.0	1,047	

**Table 2. Employment Status of Patients with GID Diagnosis and Patients who Underwent a Gender-affirming Procedure**

Employment Status	GID Diagnosis	Percentage	GID Diagnosis and Procedure	Percentage
Active full time	4,099	51.8	557	53.2
Active part time or seasonal	119	1.5	23	2.2
Early retiree	152	1.9	16	1.5
Medicare eligible retiree	56	0.7	8	0.7
Retiree, employment unknown	54	0.7	2	0.2
COBRA	55	0.7	9	0.9
Long-term disability	11	0.1	2	0.2
Surviving spouse/dependent	8	0.1	1	0.1
Other/unknown	3,353	42.4	429	41.0
Total	7,907	100	1,047	



**Fig. 4.** Number of gender-affirming surgeries by year.

**Table 3. List of Procedures by Average Age**

Procedure	Average Age
Mastectomy	28.1
Breast augmentation	42.4
Phalloplasty	38.1
Vaginoplasty	40.2
Hysterectomy	31.0
Orchiectomy	37.3

with an average age of 28.1, and those undergoing breast augmentation were the oldest, with an average age of 42.4. With the exception of mastectomy, the average age of patients undergoing all individual procedures were older than the average age of patients with the GID diagnosis in the dataset (Table 3). The youngest patient undergoing gender-affirming surgery in the sample was age 14 at the time of mastectomy and the oldest patient was 76 at the time of vaginoplasty.

#### Income, Employment Status, and Location

Fifty-nine percentage of individuals, undergoing gender-affirming procedures earned greater than \$70,000 a year (Table 1). Like the greater sample, the majority of patients who underwent gender-affirming surgery were employed full time ( $n = 557$ , 90% of patients with employment information; Table 2). Surgical patients were located in 45 states and were not present in Montana, Wyoming, North Dakota, Alaska, and Hawaii. California had the largest number of surgical patients ( $n = 211$ ).

#### Complications

VTE, hematoma, seroma, wound infection, and wound dehiscence were recorded as complications and found in patients who underwent gender-affirming surgery. In total, 62 complications (5.8% of all procedures) were recorded in the sample, with the most common being wound infection ( $n = 16$ ; Table 4, Fig. 5). With the exception of mastectomy and breast augmentation where hematoma and hemorrhage were the most common complications respectively, wound infection was the most common complication among all groups undergoing gender-affirming surgery. The rate of complications was the highest in phalloplasty at 0.22 and lowest in orchiectomy at 0.4 (Table 4). There were a total of 4 incidences of VTE in the sample set, 2 following mastectomy and 1 following hysterectomy and vaginoplasty. The rate of VTE in all procedures was 0.003.

## DISCUSSION

This article is intended to describe both the demographics of the transgender population in the United

States and trends in gender-affirming surgery utilizing an insurance claims database. Our results suggest the majority of patients who have a GID diagnosis are young adults with an average age of 29.8. Although the age of transgender patients in the MarketScan dataset were consistent with previous survey-based demographic results,<sup>6</sup> the economic demographics in our sample were skewed toward higher-earning employed patients. Previous survey-based studies report a 35% full-time employment rate among trans individuals with 76% of respondents earning \$50,000 or less.<sup>3</sup> Given the use of commercial and employee-based insurance plans and the absence of Medicaid within the MarketScan database, these differences in demographics are expected compared with large, survey-based studies of the general population.

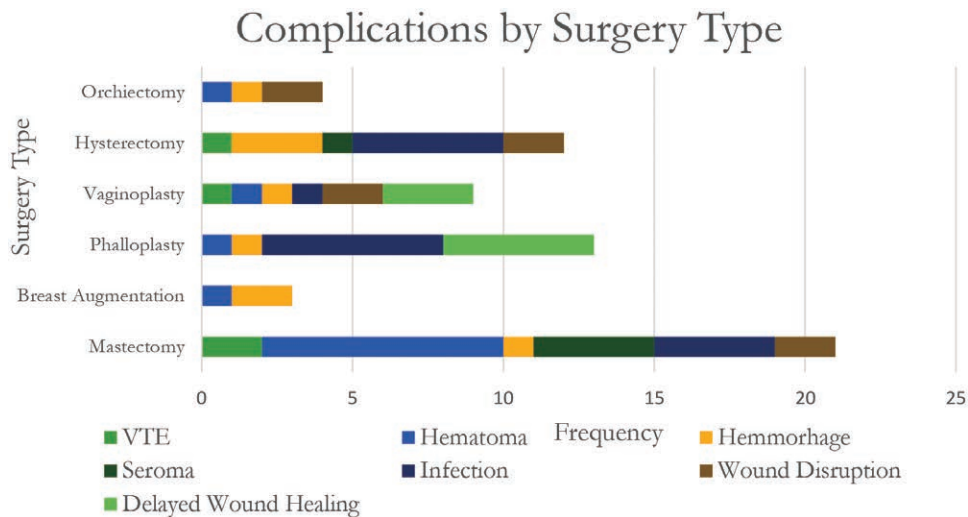
Unlike questionnaire-based studies, the use of insurance claims data allowed for the survey of specific gender-affirming surgeries and associated complication rates. In total, 13.2% of trans patients within the sample underwent gender-affirming procedures from 2009 to 2015, with an increasing number of patients seeking surgical interventions annually. Mastectomy was the most common gender-affirming surgical procedure within the sample. The demographics of patients undergoing gender-affirming surgery were consistent with those in the general transgender population in the MarketScan Database.

The use of a large database also allows for the analysis of surgical complications and outcomes. Of the patients who underwent gender-affirming surgery, 5.9% had complications, with the most common being wound infection. Phalloplasty had the highest rate of complication among gender-affirming procedures, which is consistent with the clinical experience of the authors and their institution. The rate of VTE among the study population was 0.003, which is less than the estimated VTE rate associated with other plastic surgery procedures of 0.5–2%.<sup>8</sup> Complication rates within the MarketScan database were significantly lower than those reported from single-center studies in gender mastectomy,<sup>9,10</sup> and systematic reviews in vaginoplasty<sup>11,12</sup> and phalloplasty.<sup>13</sup> This may represent variation in coding practices leading to an underestimation of complications. Many minor complications may also be treated conservatively and not be captured by diagnosis codes.

Most importantly, our results suggest that the number of patients presenting for gender-related medical and surgical care is on the rise. Because the incidence of gender dysphoria is likely stable, these increasing numbers reflect increasing access to gender-related health services, given social and political shifts. This increase in the number of patients with a GID diagnosis and those seeking medical

**Table 4. Complications by Procedure Type and Rates (in Parentheses)**

	VTE	Hematoma	Hemorrhage	Seroma	Infection	Wound Disruption	Delayed Wound Healing
Mastectomy	2 (0.005)	8 (0.012)	0	4 (0.010)	4 (0.010)	2 (0.005)	0
Breast augmentation	0	1 (0.016)	2 (0.032)	0	0	0	0
Phalloplasty	0	1 (0.017)	1 (0.017)	0	6 (0.100)	0	5 (0.08)
Vaginoplasty	1 (0.005)	1 (0.005)	1 (0.005)	0	1 (0.005)	2 (0.010)	3 (0.016)
Hysterectomy	1 (0.005)	0	3 (0.016)	1 (0.005)	5 (0.026)	2 (0.010)	0
Orchiectomy	0	1 (0.010)	1 (0.010)	0	0	2 (0.022)	0



**Fig. 5.** Complications by procedure.

and surgical intervention is in part thought to be the result of section 1557 of the Affordable Care Act, which bans gender discrimination in health care coverage and was previously interpreted to include transition-related care for transgender patients until December 2016.<sup>7</sup> This possible effect is observed in the increase in patients with the GID diagnosis and number of gender-affirming surgeries in the MarketScan dataset from 2009. With an increasing number of transgender patients presenting for care, an understanding and partnership with the transgender community at both the patient and population level is paramount.

There are multiple limitations to this study stemming from the MarketScan database. The first is the use of the formal diagnosis of GID. Patients who identify as transgender or gender-nonconforming may either not feel comfortable sharing this information with their provider, or may not agree with the concept of the transgender identity as medicalized disorder. The MarketScan database does not capture individuals on Medicaid, and only includes Medicare Advantage plans, which skews both the income and employment of the sample. The data also do not account for individuals who chose to pay for visits and procedures out of pocket. Another major limitation is the variety of CPT and ICD-9 codes that are utilized to bill for gender-affirming procedures, specifically phalloplasty and vaginoplasty. This was controlled for by both utilizing a large number of codes, including those that are non-specific such as “free-flap,” and manually confirming diagnosis by using other associated ICD-9 and CPT codes within a clinical encounter. We have attempted to capture all patients in the dataset by utilizing a broad range of billing codes (**Supplemental Digital Content 2**), but this collection may underestimate the number of surgeries in this dataset. The utilization of an insurance database may underestimate complication rates, given conservative management of minor complications and limitations, given coding variation as mentioned above. MarketScan also does not include information about conditions present on admission, which may also skew estimated complication

rates; however, our chosen complications in this analysis are acute in nature rather than chronic sequelae. The study only encompasses a 6-year period and does not allow for long-term follow-up.

This study is the first use of a large, commercially available insurance database to examine the transgender patient population and the use of surgical gender-related services. This article is intended to be a first step into a research modality that could be utilized to study multiple areas of gender-related care, including trends in hormone prescribing patterns, rates of chronic illness in transgender patients, and outcomes of surgical and medical transgender care.

## CONCLUSIONS

This study is the first use of a large, commercial database to examine demographics of insured transgender patients and trends in gender-related surgical care. Our results suggest that the number of patients interacting with health care system and those pursuing gender-affirming surgeries has steadily increased over the intended study period. Mastectomy was the most common procedure performed over the 2009–2015 period, and the rates of complication were the highest with phalloplasty. Although there are limitations, such as skewed income and employment status compared with previously surveyed transgender patient populations, database-based studies can be utilized to provide a powerful tool to observe and analyze transgender health trends and outcomes.

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