# Gender-affirming surgery in transgender and gender diverse individuals: access and outcomes

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## Research Need

Limited data are available on the number, proportion, sociodemographic characteristics, and outcomes of transgender and gender diverse (TGD) individuals seeking gender affirming surgery (GAS). Additionally, the incidence of surgical complications following GAS and indicators of better or worse outcomes has yet to be described. Characterizing the frequency and distribution of GAS among TGD individuals is the first step in defining existing patterns of utilization and uncovering potential disparities in access to, receipt of and outcomes for specific procedures.

## Approach

**50,000**
**TGD patients**

**4**
**Kaiser sites**

STRONG cohort

This project utilizes the expanded Study of Transition, Outcomes & Gender (STRONG), a cohort of nearly 50,000 TGD individuals across four Kaiser Permanente regions. Candidates are identified in the electronic medical record of each site using International Classification of Diseases (ICD) codes, keywords indicative of TGD status and Gender Identity and Sexual Orientation data. Participants' medical record numbers are linked to diagnostic data, procedure data and medical claims. Receipt of GAS is determined from Current Procedure Terminology codes and ICD-9/ICD-10 codes. Ascertainment of transmasculine/transfeminine status is achieved using a custom-written program that identifies free-text keywords reflecting biological sex anatomy (e.g., testes/ovaries), history of specific procedures (e.g., orchiectomy/hysterectomy) or evidence of hormonal therapy (e.g., estrogen/testosterone).

| Algorithm accuracy | |
|---|---|
| Sensitivity | 97.2% |
| Specificity | 95.0% |
| PPV | 94.5% |
| NPV | 97.4% |
| F-score | 0.96 |

**Table 1:** Computerized algorithm vs chart review as gold standard.

## Analysis

Determining frequency and distribution of access to GAS will be achieved with time-to-event analyses relying on date of first evidence of TGD status in the medical records and outcome of interest (receipt of surgery, disenrollment or end of follow-up). The cumulative probability of receiving surgery will be examined with Kaplan-Meier curves and log-rank tests for statistical significance. We will create directed acyclic graphs depicting our a priori understanding of the relations of the comparator variable with confounders, and outcome of interest. Primary analyses will use multivariable Cox proportional hazards models to compare rates of events across sites after controlling for confounders.

The results of the models will be expressed as adjusted hazard ratios and corresponding 95% confidence intervals. Proportional hazard assumptions will be tested by examining log minus log survival plots for each variable in the model and by performing the goodness of fit test using Schoenfeld residuals. If there is evidence that the proportional hazard assumption is violated, Stratified Cox models will be used to control for covariates, and/or extended Cox models with time-dependent HR estimates for the main independent variables of interest. This overall analytic approach will also be used when assessing outcomes of GAS.

## Summary

The project described herein outlines an approach for overcoming several challenges facing GAS research. Utilizing this approach will support the development of clinical practice guidelines, expose existing patterns of utilization and uncover potential disparities in GAS.