NAMCS Analysis: Biopsies by year and specialties

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Abstract

The National Ambulatory Care Survey (NAMCS) is a survey of patient visits to non-federally employed physicians conducted by the Center for Disease Control (CDC) from the years 1980, 1981, 1985, and 1989 to the present. These surveys provide information on which procedures a patient recieved and the specialty of the physician they visisted, which allows for analyses on which specialties perform more of any particular procedure, such as biopsies, over the years. This is important because it provides information on how resources to conduct these procedures should be allocated across the clinics of different physician specialties. Specifically, I grouped the data by years and by specialty and ran multiple ANOVA tests to determine if there was a significant difference in the percentage of patient visits where a biopsy was performed across 1,060,000 patient visits throughout the available years between 1981-2015. I found that dermatologists are performing statistically more biopsies than any other specialty, and General Surgeons, OB/GYNs, Urologists, and Oncologists are performing statistically more biopsies than most other specailties, although significantly less than dermatologists. Throughout the years, there seems to be a general peak in biopsies performed between 2006-2011, but there is no statistical difference when the data is grouped by years. This means that biopsies are still being conducted at a relatively steady rate, mostly by dermatologists, followed by General Surgeons, OB/GYNs, Urologists, and Oncologists, so it is important to make sure that these specialties in particular have the necessary equipment and procedures to perform biopsies.

Background

The NAMCS dataset is a collection of surveys of patient visits to non-federally employed physicians in the United States. This data is from the years 1980, 1981, 1985, and 1989-2015. It includes information including:

- patient characteristics such as age, sex, race, ethnicity
- visit characteristics such as patient's reason for visit, physician's diagnosis, services ordered or provided
- treatments, including medication therapy
- physician and their practice characteristics

Research Question

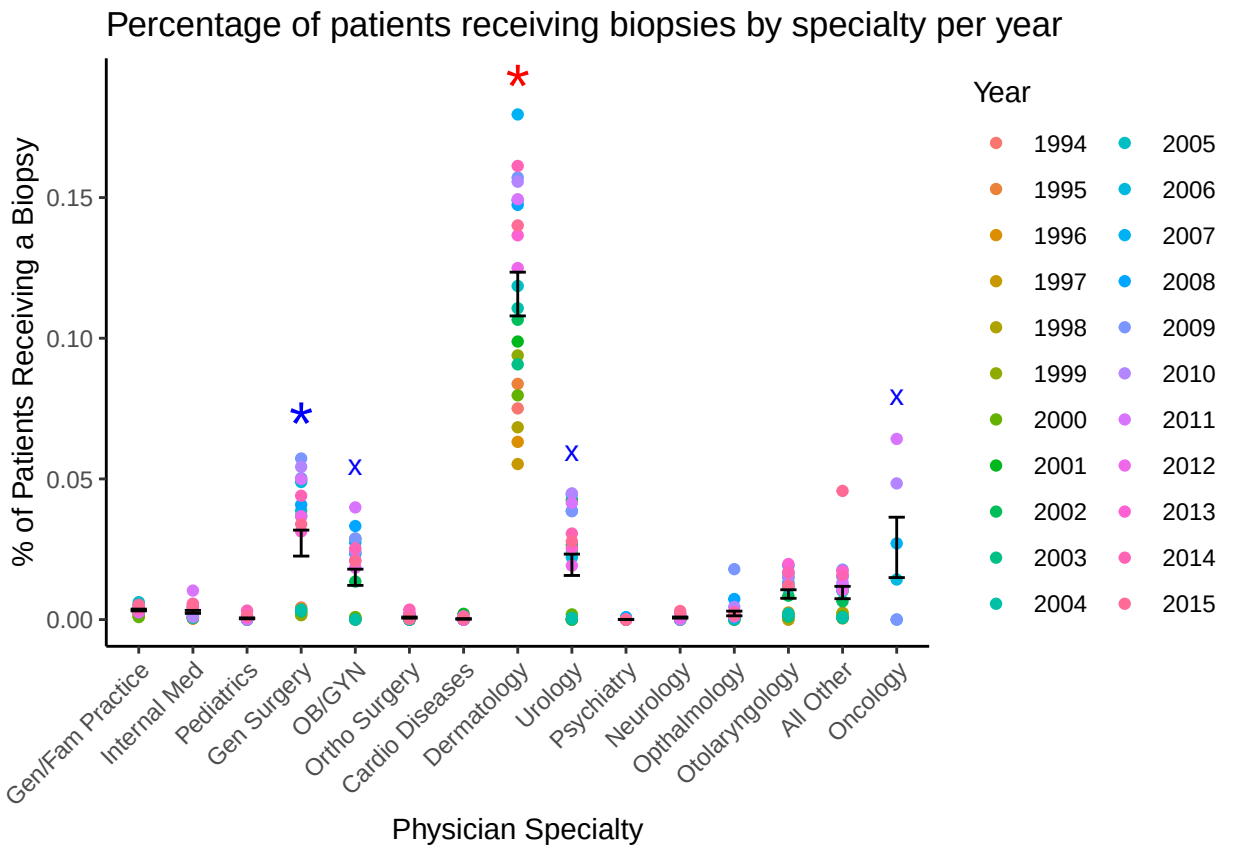
Is there one or more physician specialty that performs more biopsies than the other, and are biopsies becoming more or less common though the years?

Hypotheses

Null: There is no significant difference in the percentage of patient visits where a biopsy was performed when grouped by physician specialty and visit year between specialties and between years.

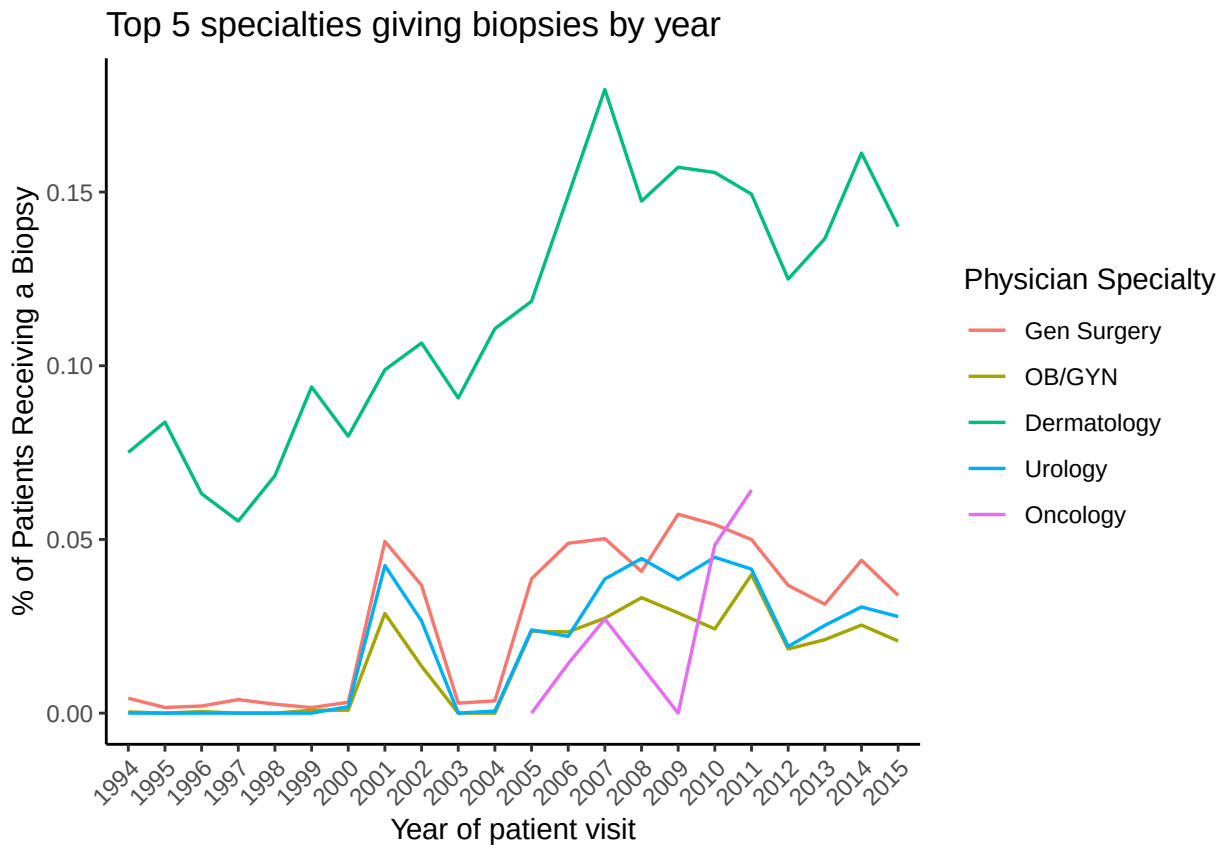
Alternate: There is a significant difference in the percentage of patient visits where a biopsy was performed in at least one specialty or year when grouped by physician specialty and visit year.

Figure 1: Percentage of Patients Receiving a Biopsy



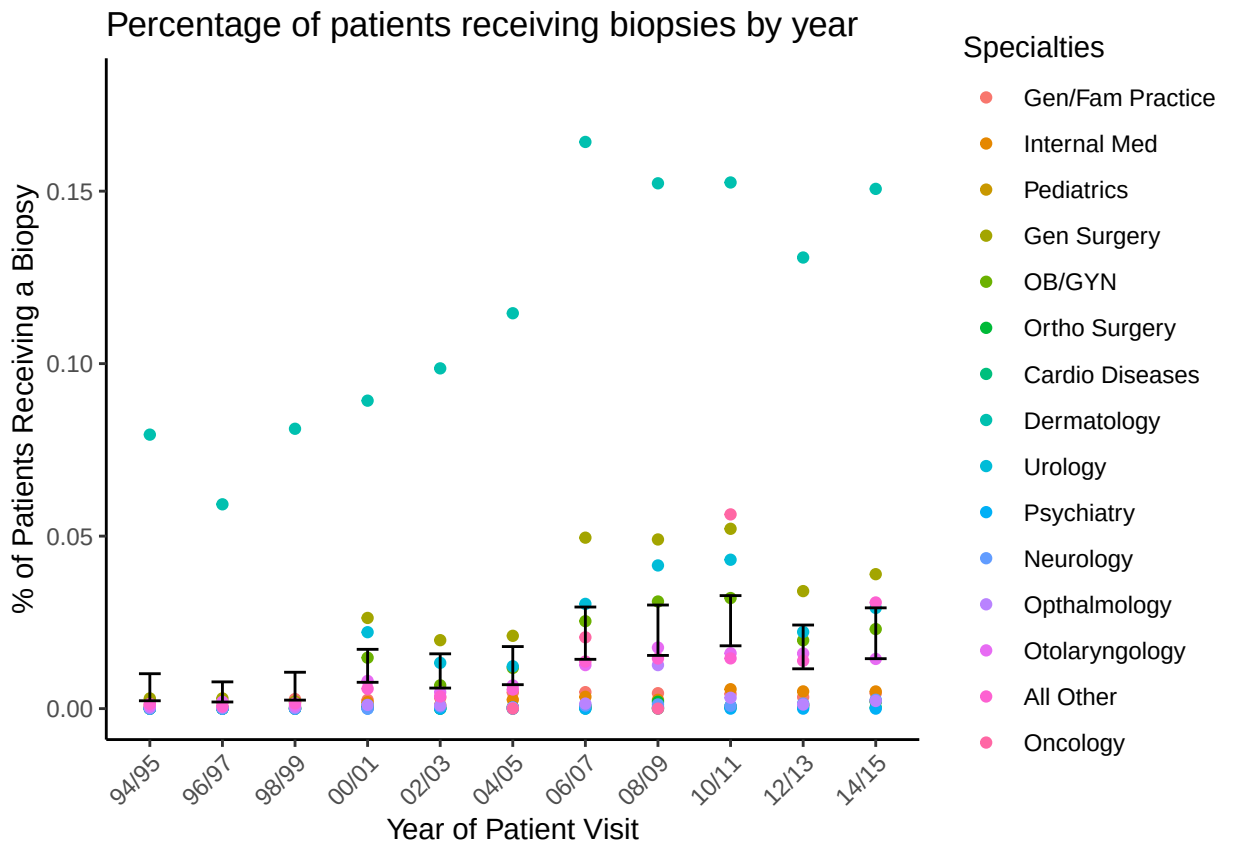
This plot shows which specialties are performing more or less biopsies than the others through the years. The error bars show the standard error centered around the mean, and each color represents a year. The dermatologists performed statistically more biopsies than every other specialty, as noted through the use of a red astrisk. The general surgeons also performed statistically more biopsies than every other specialty except dermatologists (in this case, significantly less), OB/GYNs, Urologists, and Oncologists.

Figure 2



Looking at the top 5 performing specialists and how the percentage of patients they give biopsies changes through the years, we can see that general surgery, ob/gyn, and urology all follow the same general trend. Dermatology is increasing more than the others, but it does not seem that dermatologists are replacing other specialists, as the other specialists do not decrease at a corresponding time that dermatologists increase. It's also important to note here that oncology was not introduced as a specialty in the NAMCS survey until 2005, and was removed after 2011.

Figure 3



This plot shows the general trend of the percentage of patients receiving biopsies. While there are some visable differences between years, there is no statistically significant difference between any of the year groups.

```
namcsBiop <- filter(namcsFull, BIOPSY == 1)
ggplot(namcsBiop, aes(x=SPECR, fill = VYEAR)) + geom_bar()
```

Discussion

Code Availability & Data Availability

All the code used in these analyses is in the GitHub repository Summer-Research-Project-2021. My analyses are in the `NAMCS/projects/example` folder. The R markdown file used to create this report is in that folder under the name `biopsyAnalysis.Rmd`, and includes all of the code to reproduce these plots.

The raw data used for analysis was originally downloaded from the CDC here, and R objects for each of these datasets can be found in `NAMCS/data`. The raw data was then pre-processed in order to combine years togther based on procedures they had in common. These pre-processed datasets can be found in `NAMCS/data_derived`. More information on the NAMCS datsets can be found here.