Outcomes Research Analysis of Cardiac Surgery Patients

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1. Overview

This analysis was conducted to summarize demographic characteristics, surgical procedures, and mortality outcomes among patients treated by a cardiothoracic surgical team during the study period of January 1st 2003 to December 31st 2003. Using SAS, multiple clinical datasets were cleaned, merged, and transformed to create an analysis-ready dataset suitable for outcomes research.

Key analytic challenges included reconstruction of time-varying age at each event date, identification of multiple surgical procedures occurring on the same day, and integration of smoking history across patient records. Results were prepared for presentation to a principal investigator.

2. Study Population Characteristics

Demographic characteristics of the study population were summarized using data from each patient's first recorded surgical event. Variables of interest included race/ethnicity and age at first surgery. Table 1 presents the distribution of patients by race and age category at the time of their first surgical procedure.

Table 1. Demographic characteristics of patients at first surgery, by race and age category.

	Age at first surgery							
	under 1	1 -under 5	5 -under 18	18 -under 30	30 -under 50	50 -under 65	65 -under 75	75 and older
	N	N	N	N	N	N	N	N
RACE								
Native American	0	0	0	0	0	11	3	1
Afr Amer (non-Hisp)	22	7	32	304	1902	1464	377	132
Hispanic	0	0	0	6	247	275	62	16
Asian	0	0	0	0	0	5	43	34
White(non-Hisp)	0	0	0	3	529	1508	821	288
All	22	7	32	313	2678	3263	1306	471

3. Surgical Procedures and Same-Day Combinations

Each surgical record represented a single procedure performed on a given day; however, some patients underwent more than one procedure on the same event date. To accurately capture this, same-day procedures were identified using BY-group processing and a retained counter variable.

Results confirmed that no patient underwent more than two surgical procedures on any given day. On a per patient basis there were 8426 single surgeries performed and 635 instances where two surgeries were performed on the same day. Combination of procedures are summarized in Table 2.

Table 2. A summary of same day procedures for patients undergoing multiple surgeries in the same day.

Table of CONDX by CONDX2									
CONDX(CONDX)- First procedure	CONDX2(CONDX2) –Second procedure								
Frequency		ASD	Echo only	MI/BYPASS	MI/PERC	ToF	VALVE	VSD	Total
ASD	25	0	0	1	4	0	1	0	31
CoA	1	0	0	0	0	0	0	0	1
Echo only	30	0	0	0	0	0	0	0	30
Fontan	4	0	0	0	0	0	1	0	5
MI/BYPASS	2894	0	2	0	247	0	35	0	3178
MI/PERC	3972	1	0	238	0	0	37	1	4249
PDA	4	0	0	1	0	1	0	1	7
TGA	8	0	0	0	0	0	0	0	8
ToF	6	0	0	0	1	0	0	0	7
VALVE	827	0	0	25	25	0	10	0	887
VSD	20	0	0	1	2	0	0	0	23
Total	7791	1	2	266	279	1	84	2	8426

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4. Mortality Outcomes: Age at Death

Mortality outcomes were assessed using age dynamically recalculated to reflect the patient's age at the time of death, rather than age at first surgery. Mean age at death was summarized by race and smoking history to evaluate potential differences across subgroups. Table 3 presents descriptive statistics for age at death stratified by race and smoking status.

Table 3. Mean age at death by race and smoking history.

Analysis Variable : AGE						
RACE	HOSMKG	N Obs	Mean	Median	Minimum	Maximum
Native American	0	3	72.66	72.99	65.56	79.42
African American non-Hispanic	0	7	54.51	53.48	31.79	75.82
	1	10	42.21	40.08	22.20	84.48
Hispanic	0	20	57.33	53.43	42.16	87.09
	1	21	48.06	43.80	34.69	71.14
Asian	0	45	74.71	75.34	63.09	87.88
	1	9	72.68	70.09	62.44	84.05
White non-Hispanic	0	72	64.11	64.94	36.33	86.40
	1	48	59.87	60.13	38.52	83.78

5. Smoking History and Age at Death

To visually assess differences in age at death between patients with and without a history of smoking, a box plot was generated comparing the two groups. The distribution of ages at death suggests a clear shift toward younger mortality among patients with a history of smoking. Figure 1 displays the distribution of age at death by smoking status

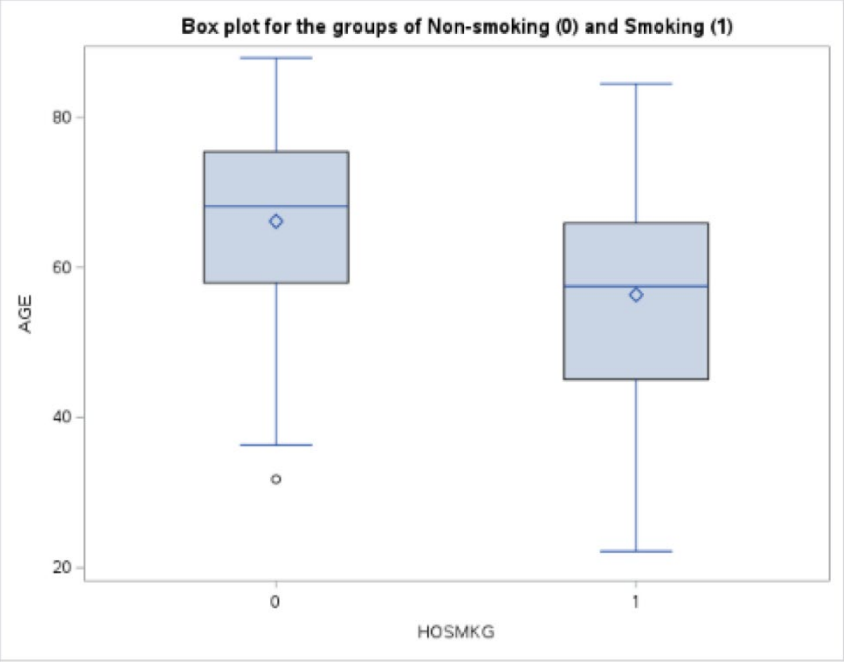

Figure 1. A box plot comparing age of death with smoking status.

There is sufficient evidence to suggest that smoking influences mortality among these patients with nonsmoking patients outliving smoking patients by just under ten years. (Two sample t-test, $p < 0.001$)

6. Summary

This analysis demonstrates a complete outcomes research workflow using SAS, including data cleaning, dataset integration, quality control, descriptive analysis, and inferential testing. The results highlight important demographic patterns, surgical procedure characteristics, and a significant association between smoking history and mortality outcomes.