Project 3

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Background

The Data:

- 26,489 patients
- 6 consecutive six-month periods.
- height, weight, BMI, albumin levels, ASA, procedure code, and death within 30 days

The Objective:

- *To identify whether certain VA hospitals have an unusual death rate from heart surgeries compared to a hospital-level risk-adjusted estimate of mortality*
  - *Report observed death rate for the most recent 6 month period*
  - *Understand variation in death rates given historic data*

Missingness

1. Albumin had extremely high amounts of missingness
   - Expected due to recent utility
2. There was no pattern of missingness with regard to:
   - BMI
   - ASA
   - Procedure
   - Death at 30 days
     - 6% died with missing. 4% died with measure
3. Pattern allowed for no adjustment in modeling procedure
   - Models with and without albumin were fit for comparison

	Survived N = 25,259	Died N = 693
	N(%)	N(%)
Procedure		
0	4,951(20)	102(15)
1	20,308(80)	591(85)
Missing	0(0)	0(0)
ASA		
2	1,130(4)	13(2)
3	7,718(31)	102(15)
4	14,473(57)	485(70)
5	1,301(5)	66(10)
Missing	637(3)	27(4)
	Mean(SD)	Mean(SD)
Weight (lbs.)	165.8(36.03)	174.3(38.24)
Missing (N%)	620(2)	40(6)
Height	65.33(2.625)	65.51(2.575)
Missing (N%)	620(2)	40(6)
BMI	28.2(4.010)	29.49(4.058)
Missing (N%)	622(2)	40(6)
Albumin	4.041(0.5798)	4.031(0.5574)
Missing (N%)	12,623(50)	343(49)

Modeling

Primary model:

$$death\ rate = \beta_0 + \beta_{BMI}(BMI) + \beta_{procedure}(procedure) + \beta_{ASA}(ASA) + \beta_{albumin}(albumin)$$

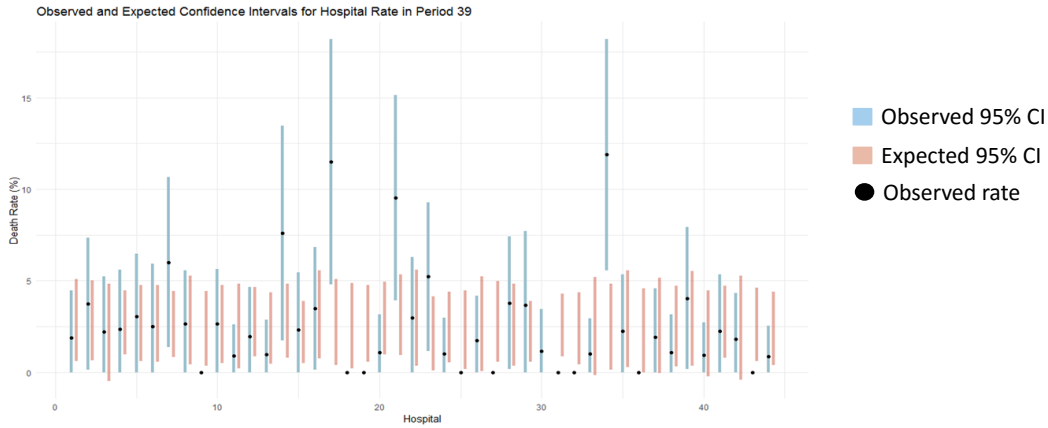
Ancillary model:

$$death\ rate = \beta_0 + \beta_{BMI}(BMI) + \beta_{procedure}(procedure) + \beta_{ASA}(ASA)$$

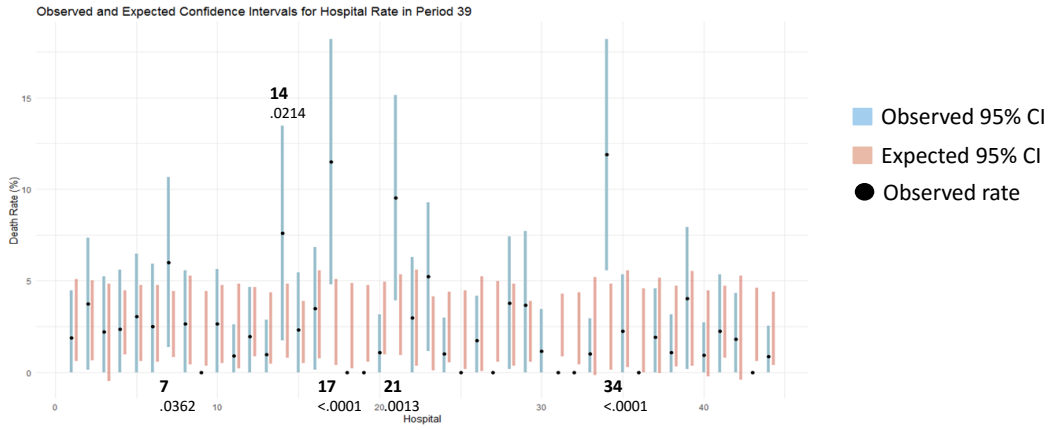
Procedure:

1. Bootstrap model from previous study periods to generate point estimate and 95% CI for death rate in Period 39
2. Use binomial theorem to generate 95% CI around observed death rate in Period 39
3. Compare intervals to determine if any hospitals deviate significantly from expected death rates

Results



Results



Main Takeaways

1. Hospitals 9, 18, 19, 25, 27, 31, 32, 36 and 43 all had no deaths in period 39!
2. Hospitals 7, 14, 17, 21, and 34 all had unusually high death rates
3. Though albumin was missing in nearly 50% of the data, its missingness was at random
   - The model that included albumin gave more realistic confidence intervals