Oxford Hip Score(OHS) analysis for Geriatric Emergency Medicine

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Study_ID	Unique patient identifier
Arm	A= New treatment, B=Usual practice
Age_At_operation	Age at the time of the operation
Gender	Male or Female
Payor	Commercial, Self Pay, Medicare or Medicaide
BMI	Body mass index (kgm^{-2})
Pre_OHS	Oxford Hip score prior to the operation
Post_OHS	Oxford Hip score post the operation

Experimental design

Randomized control setting

Intention-to-treat analysis

Checkpoint 1. Data size and missing data

- Large data size (~10MB) for just 120 patients' test data in wide format.
- Dataset dimensions: 1048499 rows and 9 columns, with completely missing rows and column.
- Cleaning data column name.

Mission: Restore data to its original configuration of 120 rows and 8 columns through cleaning.

Checkpoint 2. Type of the data columns

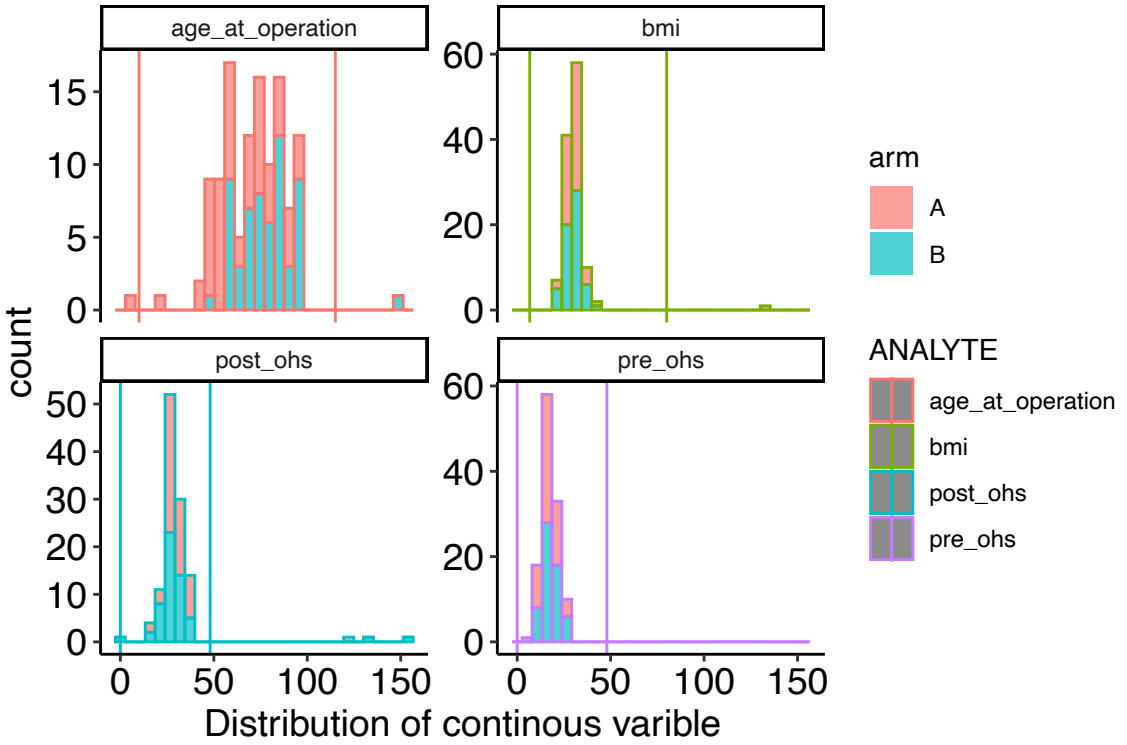
```
'data.frame':   120 obs. of  8 variables:
 $ study_id        : int  1 2 3 4 5 6 7 8 9 10 ...
 $ arm             : chr  "A" "B" "A" "A" ...
 $ age_at_operation: int  23 91 87 86 97 58 81 49 75 46 ...
 $ gender          : chr  "Female" "Male" "Female" "Male" ...
 $ payor           : chr  "Comercial" "Comercial" "Self Pay" '
 $ bmi             : num  33.4 27.8 31.6 34.9 30.9 ...
 $ pre_ohs         : int  14 9 19 13 21 21 18 21 18 18 ...
 $ post_ohs        : chr  "26" "17" "31" "25" ...
```

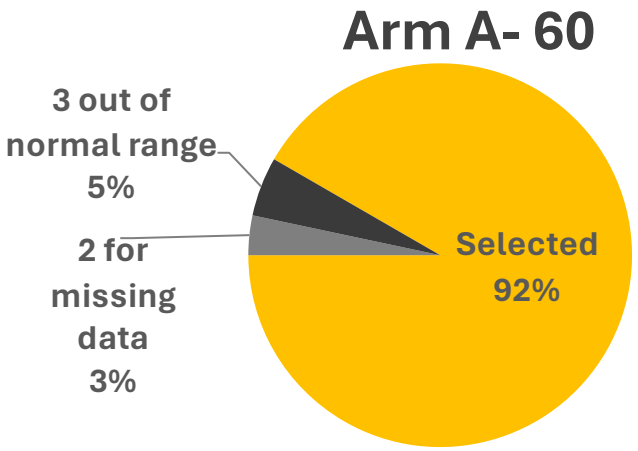
Mission: Identify reasonable data type for test data.

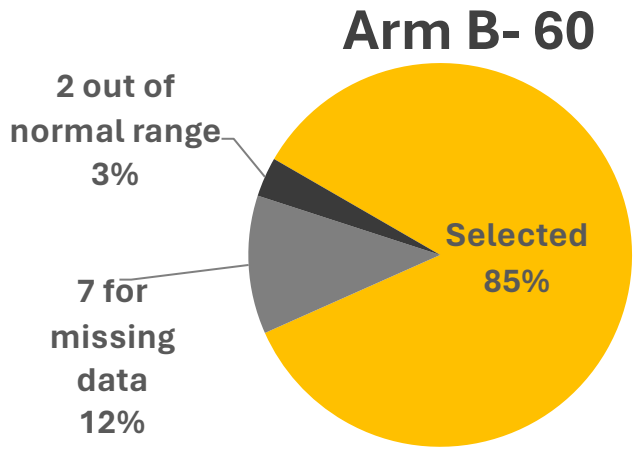
Note :
Normal range reference
10<=Age<=115: https://www.scientificamerican.com/article/how-old-can-humans-get/;
young pateint in record: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3211645/
6.7<=bmi<=80:https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5995720/;
https://pubmed.ncbi.nlm.nih.gov/35569150/
0<=ohs<=48: https://www.orthopaedicscore.com/scorepages/How%20bad.pdf

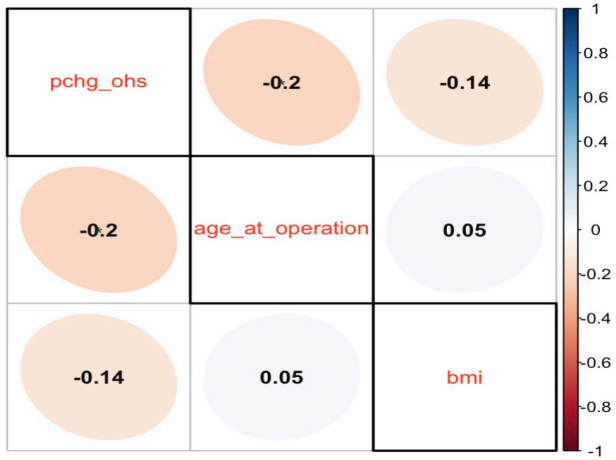
Checkpoint 3. Data authenticity - Available case analysis

- Unique identifier:
  1. Study_ID: Not unique, there is a duplicated case 27, missing case 31.
- Categorical value
  1. Gender: Misspelling, “Femal”
  2. Payor: Special character : “Self Pay”;
     Misspelling: “Comercial”, “Medicade”
- Continuous value: Find the normal range.









	A = New treatment (N=55)	B = Usual practice (N=51)	Overall (N=106)
gender			
Female	23 (41.8%)	22 (43.1%)	45 (42.5%)
Male	32 (58.2%)	29 (56.9%)	61 (57.5%)
payor			
Commercial	17 (30.9%)	13 (25.5%)	30 (28.3%)
Medicaide	17 (30.9%)	8 (15.7%)	25 (23.6%)
Medicare	8 (14.5%)	17 (33.3%)	25 (23.6%)
Self Pay	13 (23.6%)	13 (25.5%)	26 (24.5%)
age at operation **			
Mean (SD)	66.1 (16.0)	77.0 (13.3)	71.3 (15.7)
Median [Min, Max]	66.0 [23.0, 96.0]	80.0 [50.0, 98.0]	73.0 [23.0, 98.0]
body mass index, kg/m2			
Mean (SD)	30.2 (3.92)	29.3 (3.42)	29.8 (3.70)
Median [Min, Max]	31.1 [22.3, 40.3]	29.8 [22.7, 36.7]	30.0 [22.3, 40.3]
pre_ohs (before treatment)			
Mean (SD)	17.1 (4.23)	17.6 (3.94)	17.4 (4.08)
Median [Min, Max]	17.0 [7.00, 29.0]	17.0 [9.00, 25.0]	17.0 [7.00, 29.0]
post_ohs (after treatment)			
Mean (SD)	29.1 (4.73)	27.5 (6.36)	28.3 (5.60)
Median [Min, Max]	29.0 [17.0, 39.0]	28.0 [0, 38.0]	29.0 [0, 39.0]
pchg_ohs (percent change)			
Mean (SD)	0.748 (0.229)	0.589 (0.307)	0.671 (0.280)
Median [Min, Max]	0.710 [0.280, 1.43]	0.610 [-1.00, 1.53]	0.650 [-1.00, 1.53]

** : Wilcoxon, p = 0.0004; ohs: Oxford Hip score

Linear regression fitting and analysis

$$Y_{ijt} = \beta_0 + \beta_1 * t_t + \beta_2 * \text{arm}_i + \beta_3 * t_t * \text{arm}_i + u_{0i} + e_{ijt}$$

$$\text{pchg} = \beta_0 + \beta_1 * \text{arm} + \epsilon$$

$$\text{pchg} = \beta_0 + \beta_1 * \text{arm} + \beta_2 * \text{var} + \beta_3 * (\text{arm} * \text{var}) + \epsilon$$

1. Y = PCHG

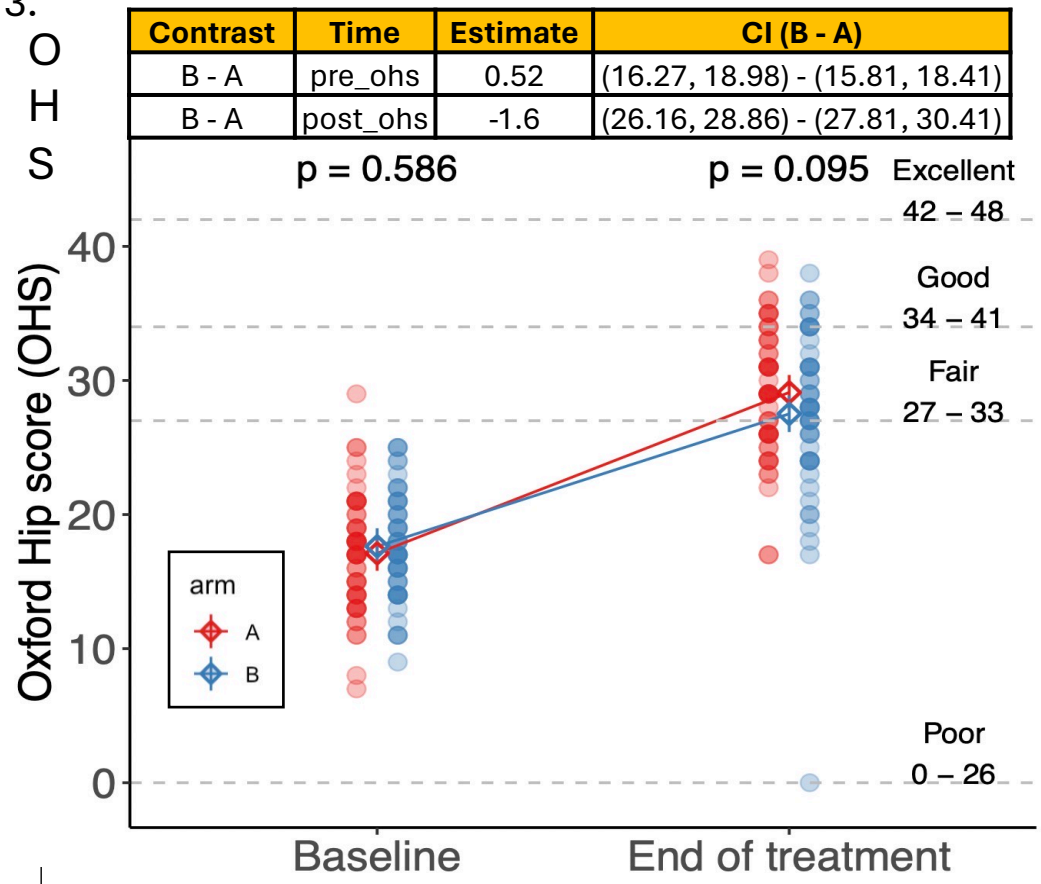
	Arm	Arm * bmi	Arm * gender	Arm * payor	Arm * age
(Intercept)	0.75 (0.04)***	0.70 (0.27)*	0.71 (0.06)***	0.74 (0.07)***	0.87 (0.16)***
armB	-0.16 (0.05)**	0.90 (0.42)*	-0.10 (0.08)	-0.11 (0.10)	-0.10 (0.27)
bmi		0.00 (0.01)			
armB:bmi		-0.04 (0.01)*			
genderMale			0.07 (0.07)		
armB:genderMale			-0.10 (0.11)		
payorMedicaide				0.04 (0.09)	
payorMedicare				-0.05 (0.12)	
payorSelf Pay				-0.01 (0.10)	
armB:payorMedicaide				-0.02 (0.15)	
armB:payorMedicare				0.03 (0.15)	
armB:payorSelf Pay				-0.14 (0.15)	
age_at_operation					-0.00 (0.00)
armB:age_at_operation					-0.00 (0.00)
R^2	0.08	0.17	0.09	0.11	0.09
Adj. R^2	0.07	0.14	0.06	0.05	0.07
Num. obs.	106	106	106	106	106

***p < 0.001; **p < 0.01; *p < 0.05

Statistical models

3.

Contrast	Time	Estimate	CI (B - A)
B - A	pre_ohs	0.52	(16.27, 18.98) - (15.81, 18.41)
B - A	post_ohs	-1.6	(26.16, 28.86) - (27.81, 30.41)



2.