Evaluation of the ICU-Physicians

Data 6600: Application of Data Science

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Summer 2022

Abstract

We tried to review 360 feedback model and PCP model for evaluation competency ICU Physicians. Our findings show that traditional model could not correctly evaluate an individual physician with p-value=0.6 and CI =(0.036, 1.028), meanwhile Q-Q plot shows that our dataset for this model have normal distribution. The result reveals that there is significant relation between SOFA_mean and doctors with P-value = 0.011 and CI= (4.589, 9.564). Meanwhile logistic regression model could predict outcome patient (A or D) with accuracy = 0.65 on basis of APACHE II, SOFA and other features of patient status.

Background

Traditionally 360 feed back model used to assess physician's clinical performance at ICU. Although, it is useful, but it fails to consider some features as patient outcomes, length of stay, etc. We tried to evaluate traditional model and PCP model which includes multiple factors as skills, knowledge, and behavioral competence. Our question of interest is evaluation competency these two models. We use the data set from Case Study #1: Developing a physician performance model in critical care – Assessing quality and value by the Statistical Society of Canada[1] . The missing values have type NA at our dataset, we changed them to zero. Features of physician participants are quantitative which encompass medical expert, communicator, leader, advocate, professional, scholar, and collaborator. Features of patient status

and outcome scores are SOFA (organ failure assessment) and APACHE II(ICU acuity of illness) which are quantitative variables.

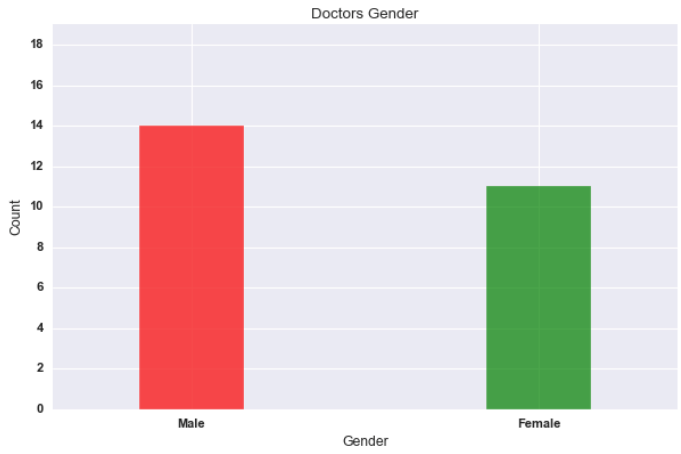
Methods

We have used descriptive statistics to draw graphs to find trends in our data sets. the other hand, we used from ANOVA test to compare mean scores different physicians.

Result

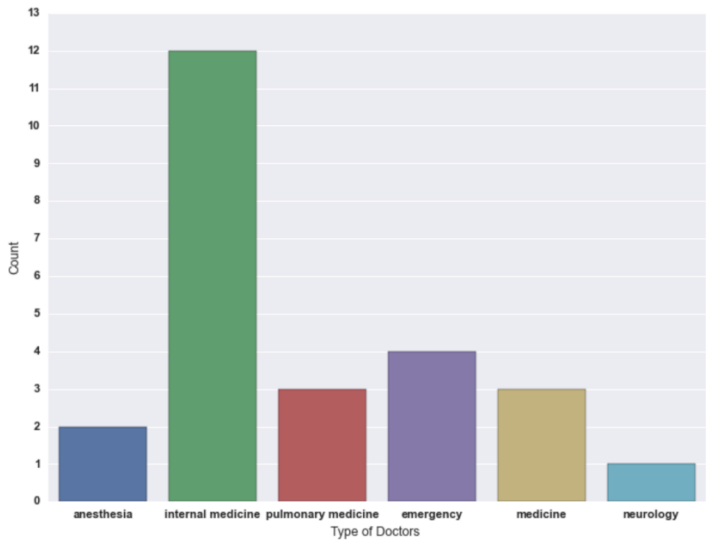
a. Descriptive statistics

Figure1.



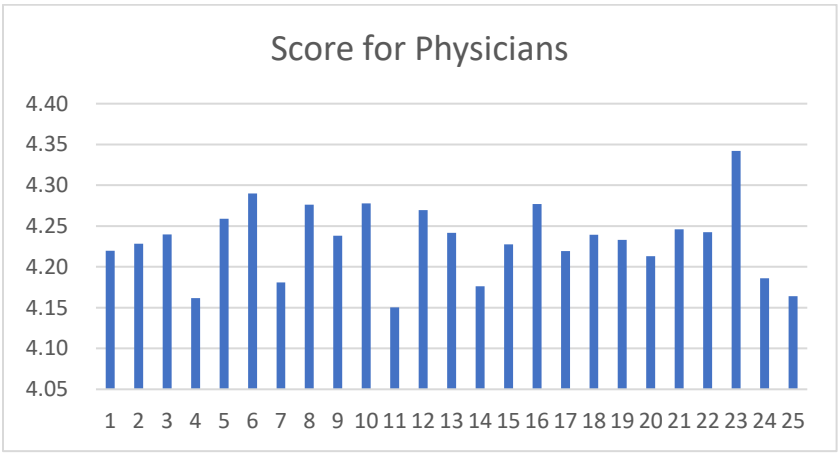
56 percent of doctors are men and 44 percent are women.

Figure2.



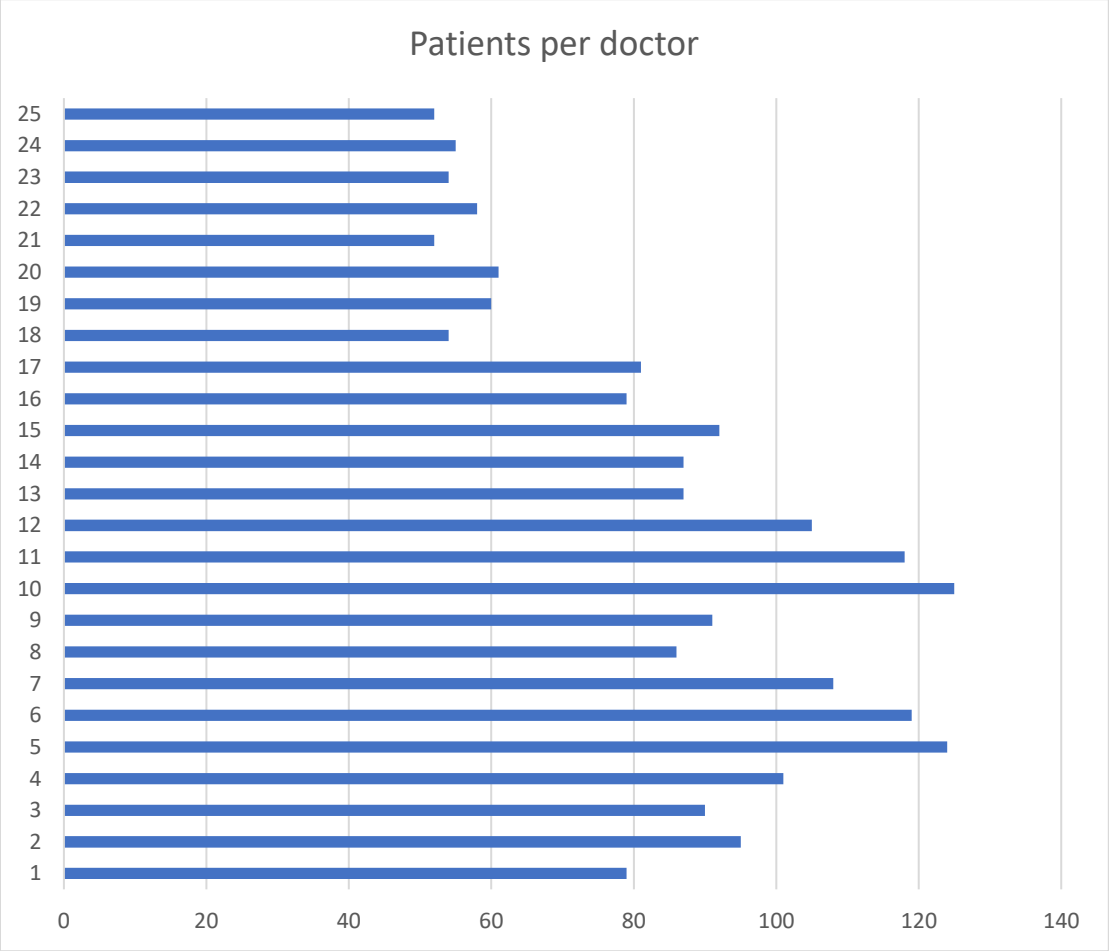
Majority of Doctors are Internal medicine and minority are neurology.

Figure3.



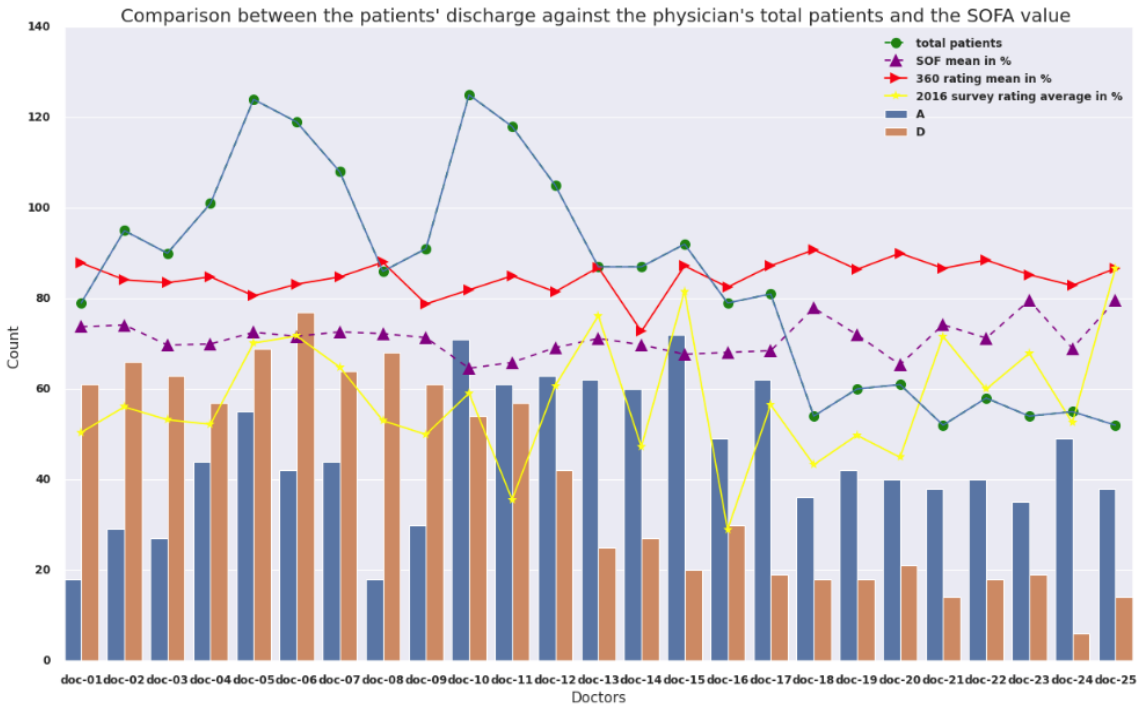
Doctors 23,6,16 and 10 have the highest Score , repectively and Doctors 11,4 and 25 have the least Score.

Figure4.



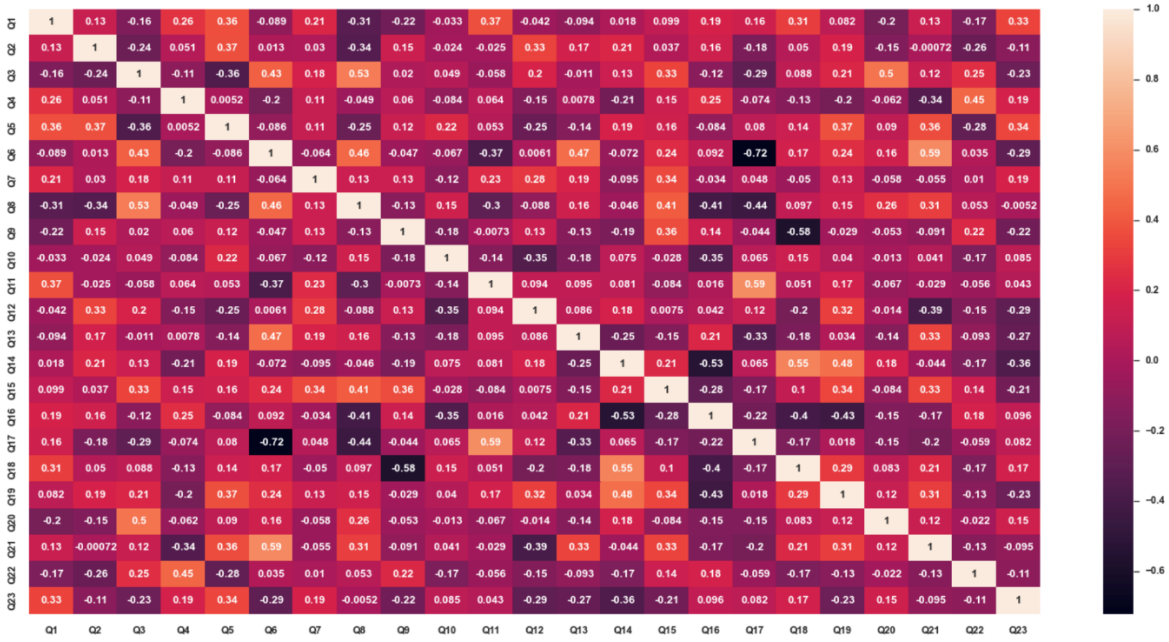
Doctors 10,11 and 12 have the most patients and 18 and 21 have the least patients.

Figure5.



Doc-06 ,doc-05 and doc-02 have the most dead patients,respectively and doc-24, doc-21 and doc-25 have the least,respectively.

Figure6.



We could see that Q6 and Q17, Q9 and Q16, Q14 and Q16 have strong correlation that makes multicolinearity problem. We should drop some of them to receive better results.

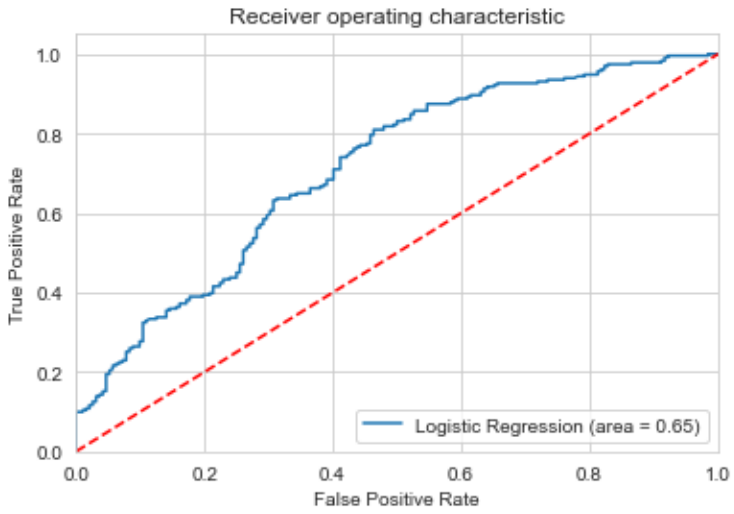
b. Statistical inference

Model 1: Overal Score and other variables, We have done Anova , p-value=0.6 and CI =(0.036, 1.028) shows that we could see that 360 feedback model is not a good model for evaluation performance.

Model 2:Overal Score and position patient , we consider that p-value =0.08662 and CI=(2.994, 5.250) shows that there is not any significant relation.

Model 3: Logistic regression between ICU outcome and other variables of Patient Status, we consider that accuracy =0.65 shows that model has enough competency in prediction ICU outcome.

Figure7.

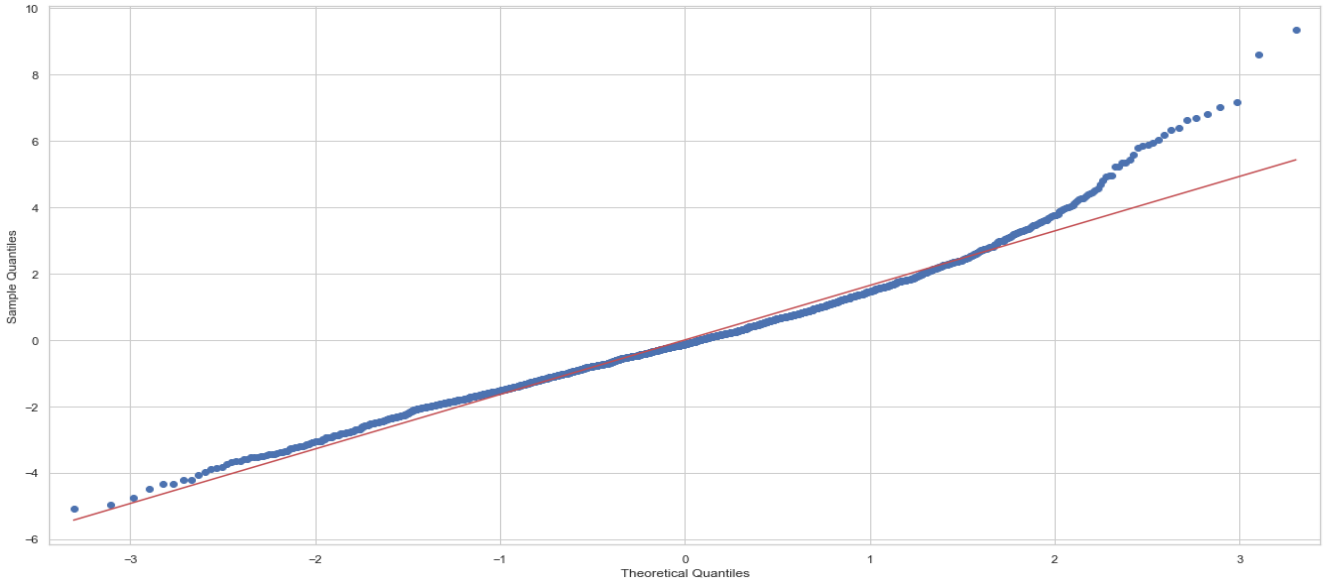


Model 4: SOFA_mean and doctors, Anova test show that there is significant relation

between them with P-value = 0.011 and CI= (4.589, 9.564)

Model 5:Q-Q plot shows that data set of 360 feedback is normal.

Figure8.



Conclusion

Our result shows that PCP assessment is useful to provide great medical care and could improve quality works of physians.Although, 360 model could not provide a good assessment of physians but could help to predict outcome of a patient at ICU.

Ethics Impact Statement

We must be so careful about interpretation of results of this research.Although , It could help to improve performance physiacians at ICU but we should not forget that there are other factors that could increase or decrease performance a physicans and future research could use from clustering methods to find better results about PCP model.

Reference

1. https://ssc.ca/en/meetings/annual/2022-annual-meeting/case-studies-competition