MRSA project

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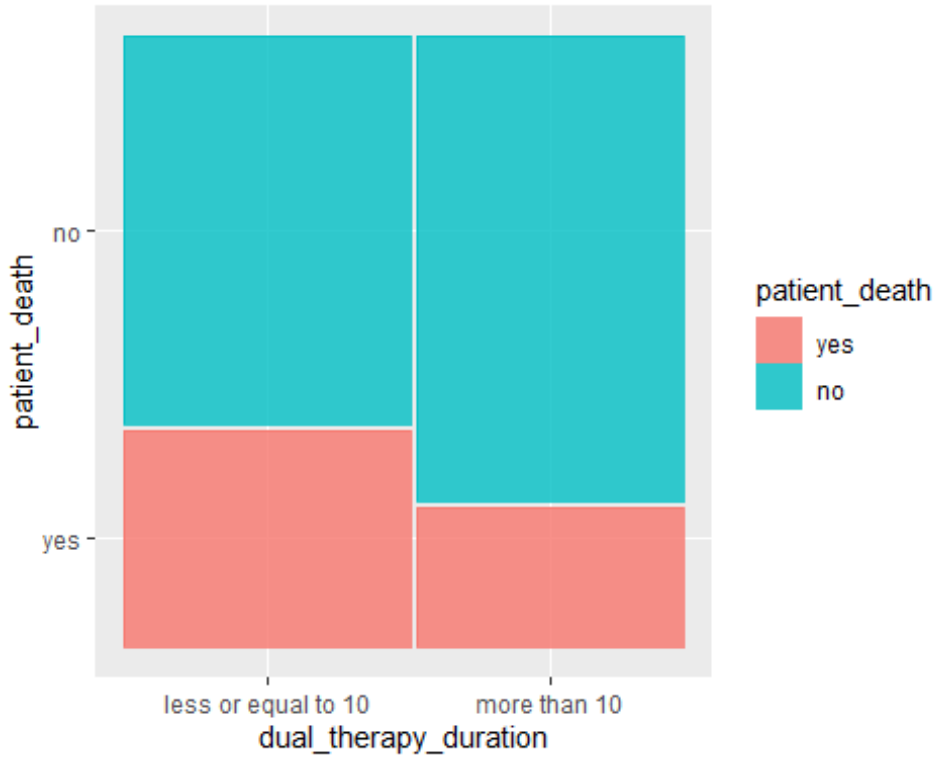
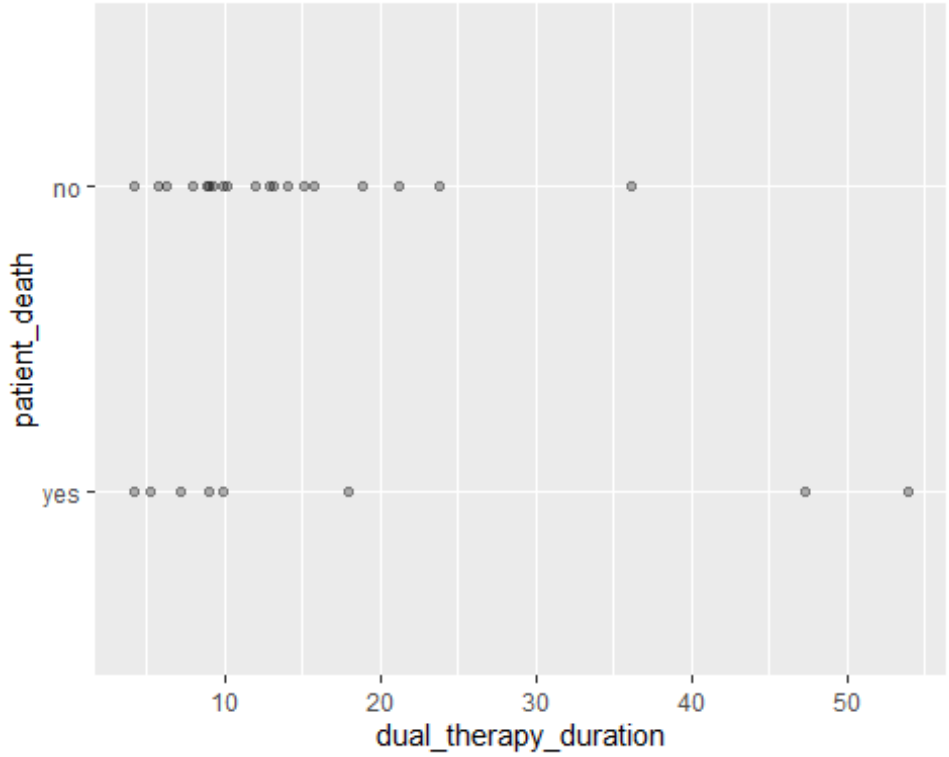
Relationship between patient mortality and dual therapy duration

First, we group the patients based on if the dual therapy duration is more than 10. The mortality in the two groups is shown below. The p-value of the Fisher's exact test for the difference in mortality is 0.6776, not significant. The odds ratio shown is between the event of patient death and a dual therapy of more than 10 days.

```
##
##  Fisher's Exact Test for Count Data
##
## data:  table(select(mutate(mrsa, patient_death = ifelse(patient_death ==
1, TRUE, FALSE), therapy_morethan_10 = ifelse(therapy_morethan_10 == 1, TRUE,
FALSE)), patient_death, therapy_morethan_10))
## p-value = 0.6776
## alternative hypothesis: true odds ratio is not equal to 1
## 95 percent confidence interval:
##  0.06599855 3.84186900
## sample estimates:
## odds ratio
##  0.5524813
```



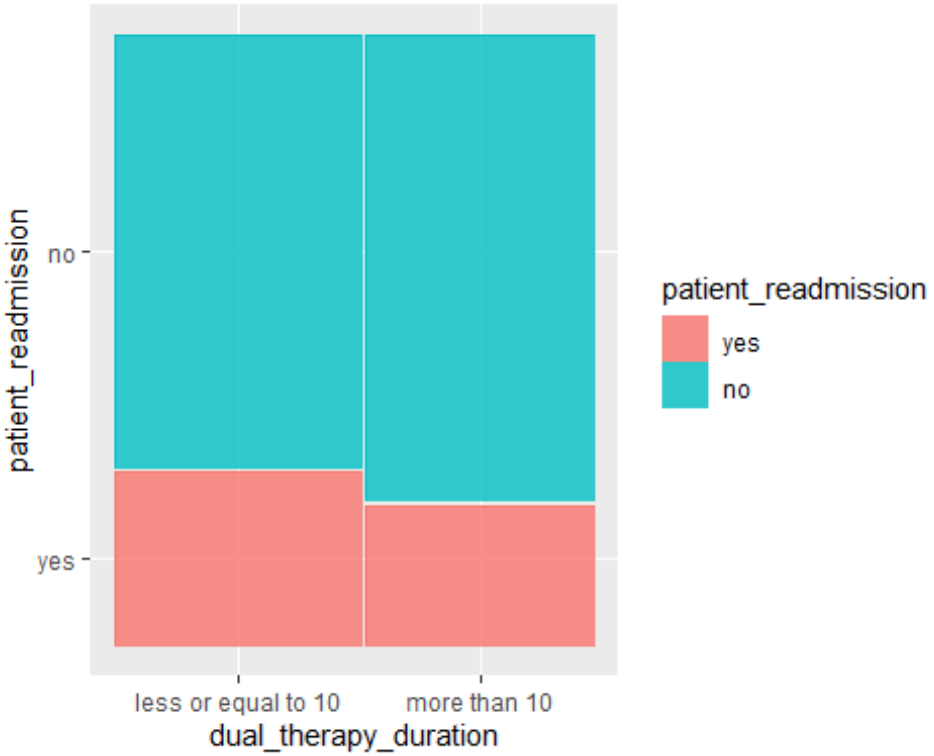
If we skip grouping and directly test if the mortality is related to the dual therapy duration. The relationship is shown as the graph below (with some jittering). Logistic regression shows the p-value to be 0.2735, not significant. Removing the three apparent outliers can only brings it down to 0.208.

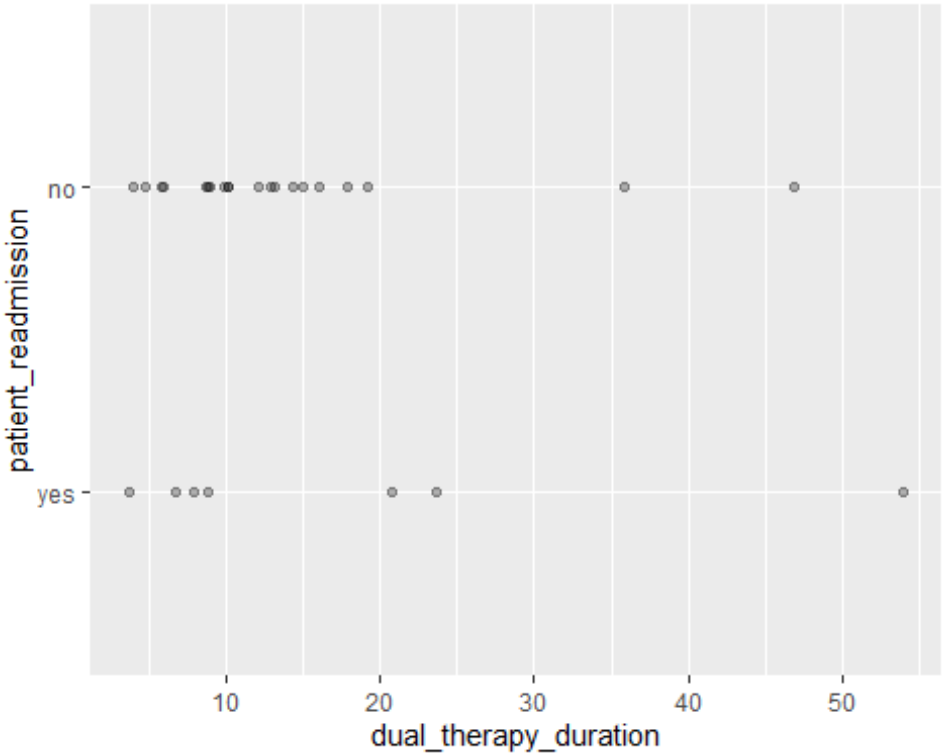


Relationship between patient readmission and dual therapy duration

The same thing above is conducted for patient readmission. The p-value for Fisher's exact test is 1, for logistic regression is 0.4532, again both not significant.

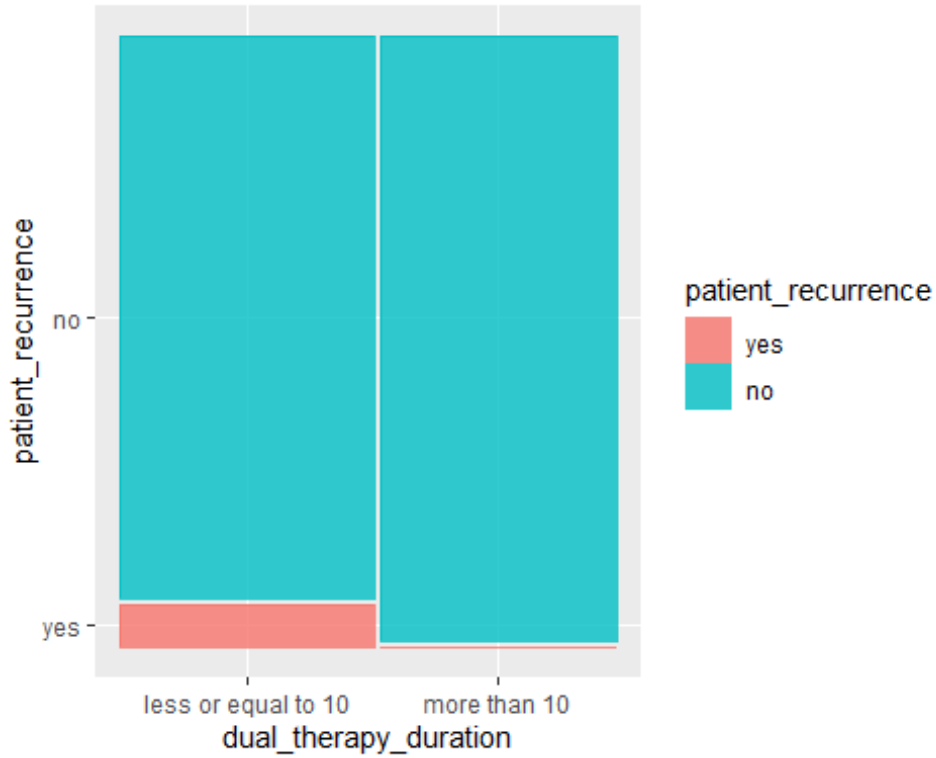
```
##
##  Fisher's Exact Test for Count Data
##
## data:  table(select(mutate(mrsa, patient_readmission =
ifelse(patient_readmission == 1, TRUE, FALSE), therapy_morethan_10 =
ifelse(therapy_morethan_10 == 1, TRUE, FALSE)), patient_readmission,
therapy_morethan_10))
## p-value = 1
## alternative hypothesis: true odds ratio is not equal to 1
## 95 percent confidence interval:
##  0.08726105 5.83275280
## sample estimates:
## odds ratio
##  0.7580239
```

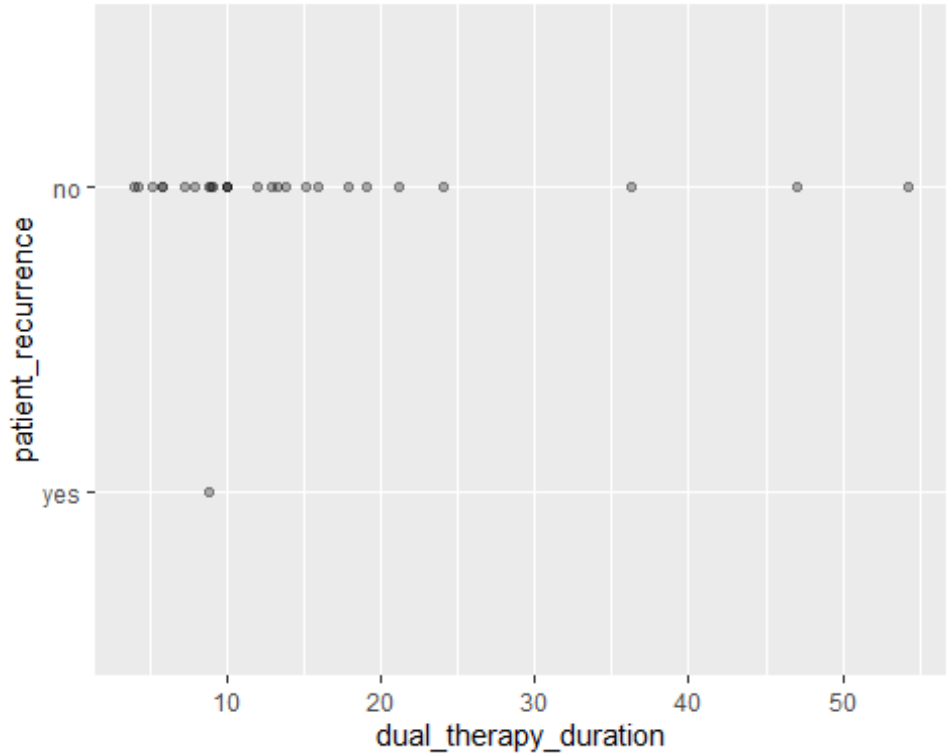

patient_readmission
no
yes
less or equal to 10
more than 10
dual_therapy_duration
patient_readmission
yes
no


patient_readmission
no
yes
10
20
30
40
50
dual_therapy_duration

Relationship between patient recurrence and dual therapy duration

Since there is only one case of recurrence, we are unable to conduct statistical analysis.

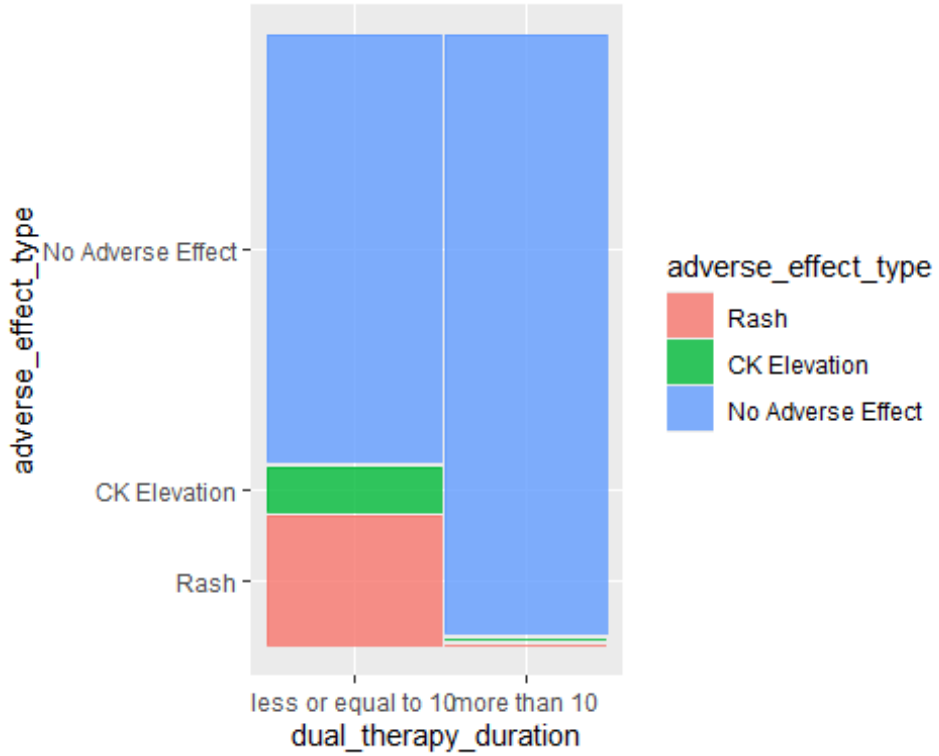


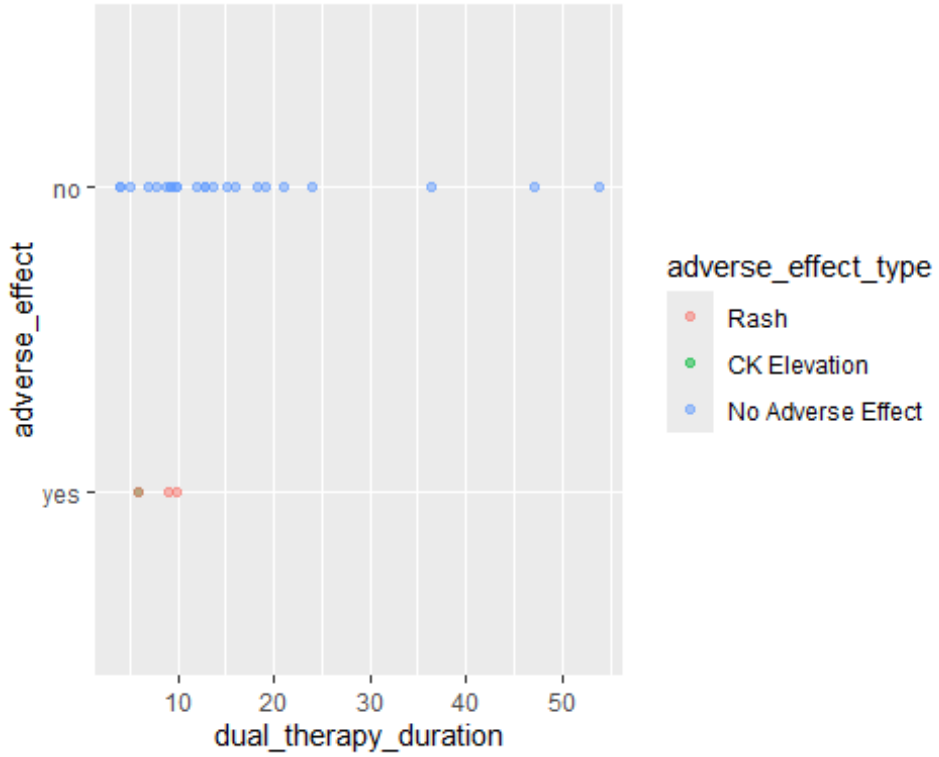


Relationship between adverse outcomes and dual therapy duration

It is clear from the graphs that there is no evidence that longer dual therapy duration leads to increased adverse outcomes, but this does not prove that the opposite (that longer dual therapy duration does not lead to increased adverse outcomes) is true, especially since our sample size is small.

```
##                therapy_morethan_10
## adverse_effect FALSE TRUE
##          FALSE    10   13
##          TRUE      4    0
```





If it is of interest to test if longer dual therapy duration leads to differences (not specified to be higher or lower) adverse outcomes, then the Fisher exact test result is shown below. A p-value of 0.09778 indicates weak evidence for decrease in adverse outcomes, however,

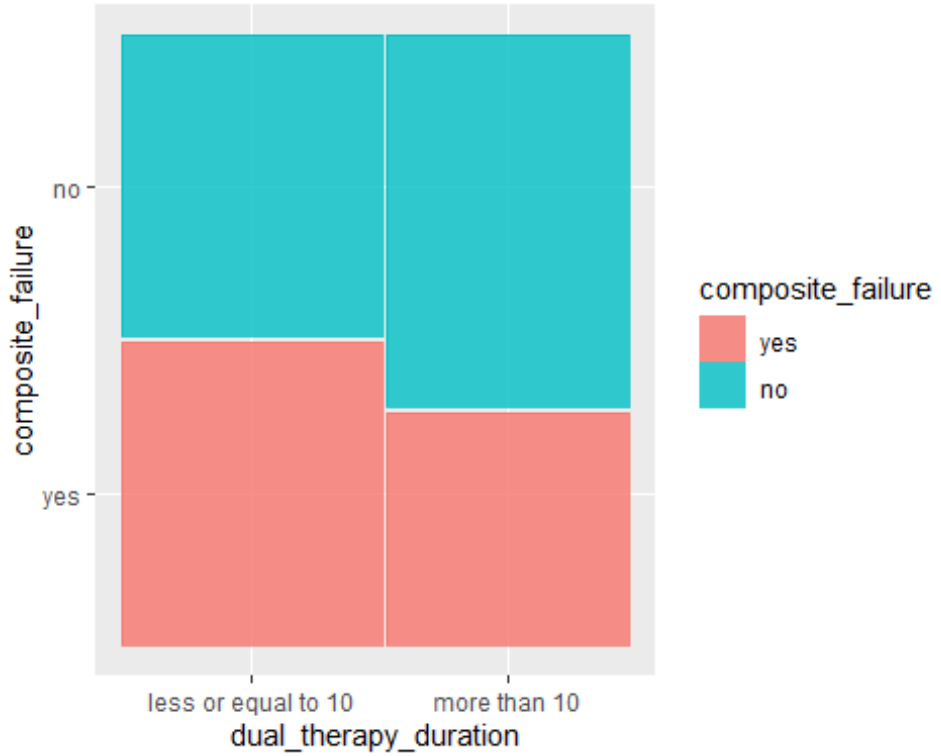
this should be taken with a grain of salt, since the cut off point in our grouping is 10 and patients experiencing adverse outcomes all have exactly or just below 10 days of dual therapy. It is better to look at the result of logistic regression, which treats dual therapy length as a continuous variable. And the p-value for that is 0.168

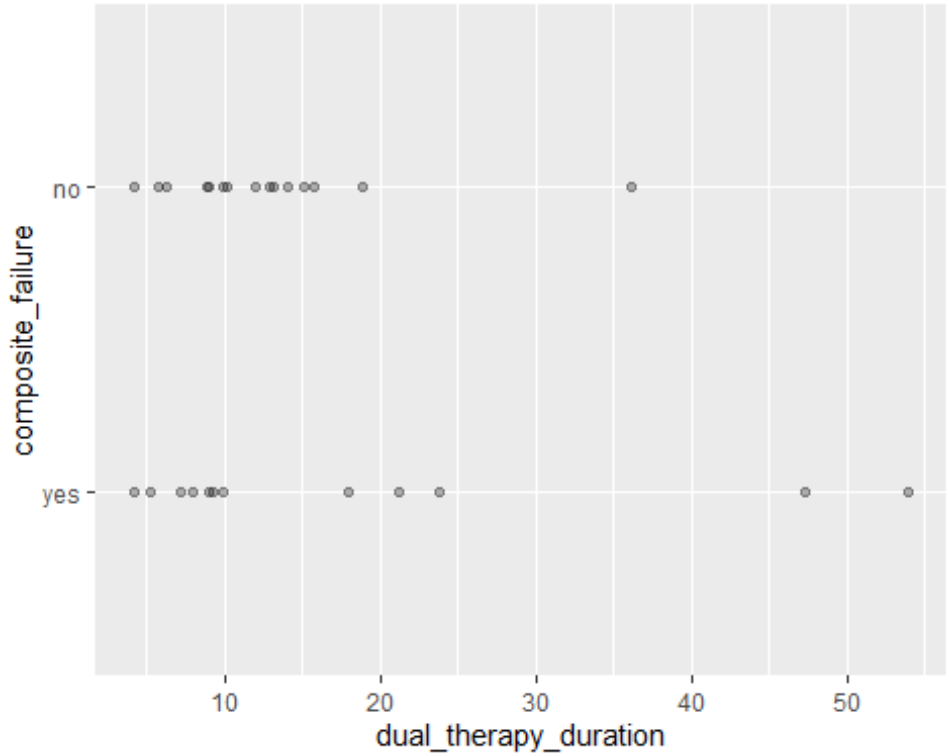
```
##
##  Fisher's Exact Test for Count Data
##
## data:  table(select(mutate(mrsa, adverse_effect = ifelse(adverse_effect ==
1, TRUE, FALSE), therapy_morethan_10 = ifelse(therapy_morethan_10 == 1, TRUE,
FALSE)), adverse_effect, therapy_morethan_10))
## p-value = 0.09778
## alternative hypothesis: true odds ratio is not equal to 1
## 95 percent confidence interval:
##  0.000000 1.481264
## sample estimates:
## odds ratio
##          0
```

Relationship between composite clinical failure and dual therapy duration

The p-value of the Fisher's exact test for the difference in composite clinical failure is 0.7036, of the logistic regression for composite clinical failure against duration is 0.292.

```
##
##  Fisher's Exact Test for Count Data
##
## data:  table(select(mutate(mrsa, composite_failure = ifelse(patient_death
== 1 | patient_readmission == 1 | patient_recurrence == 1, TRUE, FALSE),
therapy_morethan_10 = ifelse(therapy_morethan_10 == 1, TRUE, FALSE)),
composite_failure, therapy_morethan_10))
## p-value = 0.7036
## alternative hypothesis: true odds ratio is not equal to 1
## 95 percent confidence interval:
##  0.1033095 3.6736318
## sample estimates:
## odds ratio
##  0.6360771
```


composite_failure
no
yes
less or equal to 10
more than 10
dual_therapy_duration
composite_failure
yes
no


composite_failure
no
yes
10
20
30
40
50
dual_therapy_duration