

Since the variances are the same and not all of the groups are distributed normally, I will test the equality of the populations using the Kruskal-Wallis Test:

Kruskal-Wallis Test

kwallis plate, by (group)

Test: Equality of populations (Kruskal-Wallis test)

```

+-----+
| group | Obs | Rank Sum |
+-----+
| 0 | 67 | 7027.50 |
| 1 | 30 | 2828.50 |
| 2 | 54 | 4514.00 |
| 3 | 27 | 1561.00 |
+-----+
  
```

chi-squared = 17.152 with 3 d.f.
 probability = 0.0007

chi-squared with ties = 17.156 with 3 d.f.
 probability = 0.0007

Hypothesis test for the Kruskal-Wallis Test:

H₀: $\mu_0 = \mu_1 = \mu_2 = \mu_3$: Median platelet counts of the different gangrene groups are the same

H_a: At least one of the median platelet counts of the different gangrene groups is different

Since the p-value for the model and the group = 0.0007 $\leq \alpha = 0.05$, then this indicates that we reject H₀ and conclude that the population median platelet counts differ in some way across the 4 gangrene groups. Because this test indicates some difference between the groups, then I will do pairwise comparisons of the 4 gangrene groups using the ranksum method.

Multiple Comparisons Using Ranksum Method

ranksum plate if group == 0 | group == 1, by(group)
 Two-sample Wilcoxon rank-sum (Mann-Whitney) test

```

      group |      obs      rank sum      expected
-----+-----
          0 |         67         3408         3283
          1 |         30         1345         1470
-----+-----
    combined |         97         4753         4753
  
```

```

unadjusted variance      16415.00
adjustment for ties      -7.12
-----
adjusted variance      16407.88
  
```

```

Ho: plate(group==0) = plate(group==1)
      z = 0.976
      Prob > |z| = 0.3291
  
```

ranksum plate if group == 0 | group == 2, by(group)
 Two-sample Wilcoxon rank-sum (Mann-Whitney) test

group	obs	rank sum	expected
0	67	4512.5	4087
2	54	2868.5	3294
combined	121	7381	7381

unadjusted variance 36783.00
 adjustment for ties -8.47

 adjusted variance 36774.53

Ho: plate(group==0) = plate(group==2)
 z = 2.219
 Prob > |z| = 0.0265

ranksum plate if group == 0 | group == 3, by(group)
 Two-sample Wilcoxon rank-sum (Mann-Whitney) test

group	obs	rank sum	expected
0	67	3663	3182.5
3	27	802	1282.5
combined	94	4465	4465

unadjusted variance 14321.25
 adjustment for ties -4.45

 adjusted variance 14316.80

Ho: plate(group==0) = plate(group==3)
 z = 4.016
 Prob > |z| = 0.0001

ranksum plate if group == 1 | group == 2, by(group)
 Two-sample Wilcoxon rank-sum (Mann-Whitney) test

group	obs	rank sum	expected
1	30	1372.5	1275
2	54	2197.5	2295
combined	84	3570	3570

unadjusted variance 11475.00
 adjustment for ties -3.25

 adjusted variance 11471.75

```
Ho: plate(group==1) = plate(group==2)
      z = 0.910
      Prob > |z| = 0.3627
```

```
ranksum plate if group == 1 | group == 3, by(group)
```

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

group	obs	rank sum	expected
1	30	1041	870
3	27	612	783
combined	57	1653	1653

```
unadjusted variance    3915.00
adjustment for ties    -0.89
-----
adjusted variance      3914.11
```

```
Ho: plate(group==1) = plate(group==3)
      z = 2.733
      Prob > |z| = 0.0063
```

```
ranksum plate if group == 2 | group == 3, by(group)
```

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

group	obs	rank sum	expected
2	54	2418	2214
3	27	903	1107
combined	81	3321	3321

```
unadjusted variance    9963.00
adjustment for ties    -4.39
-----
adjusted variance      9958.61
```

```
Ho: plate(group==2) = plate(group==3)
      z = 2.044
      Prob > |z| = 0.0409
```

The tabulated p-values resulting from the ranksum method are:

Gangrene Group	0	1	2
1	0.329		
2	0.027	0.363	
3	0.000	0.006	0.041

Hypothesis test for the Multiple Comparisons:

$H_0: \mu_i = \mu_j$: Median platelet counts of gangrene group **i** is same as gangrene group **j**- where **i** and **j** represent gangrene groups 0,1,2,3 and $i \neq j$.

$H_a: \mu_i \neq \mu_j$: Median platelet counts of gangrene group **i** is not the same as gangrene group **j**- where **i** and **j** represent gangrene groups 0,1,2,3 and $i \neq j$.

The results of the Ranksum test show that the following groups are significantly different from each other a Bonferroni adjustment level ($\alpha = 0.05$) of $0.05/(4*3/2) = 0.008$, and we reject H_0 for the following pairs:

0 and 3

1 and 3

Discussion

While I was able to verify that the gangrene group variances were the same using the robvar test, the residuals analysis and the Shapiro-Wilks tests showed that the data were not all normally distributed. As a result, I used the Kruskal-Willis test instead of ANOVA which indicated that there was least one difference in platelet counts between the gangrene groups. The results of the ranksum test further confirmed that groups 0 and 3 and 1 and 3 were different from each other at the Bonferroni adjusted $\alpha = 0.05/(4*3/2) = 0.008$ level.

Group 3 included patients who had the majority of small and large intestines removed, while group 0 was a control group with babies who didn't have gangrene and group 1 included babies with limited gangrene. Since I don't have a clinical background, I cannot offer a medical explanation for these platelet count differences; however, upon initial inspection, the results seem reasonable and I would consult medical expertise to review these conclusions.