Prothrombin Time in Full Term & Premature Infants

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What is Prothrombin Time?

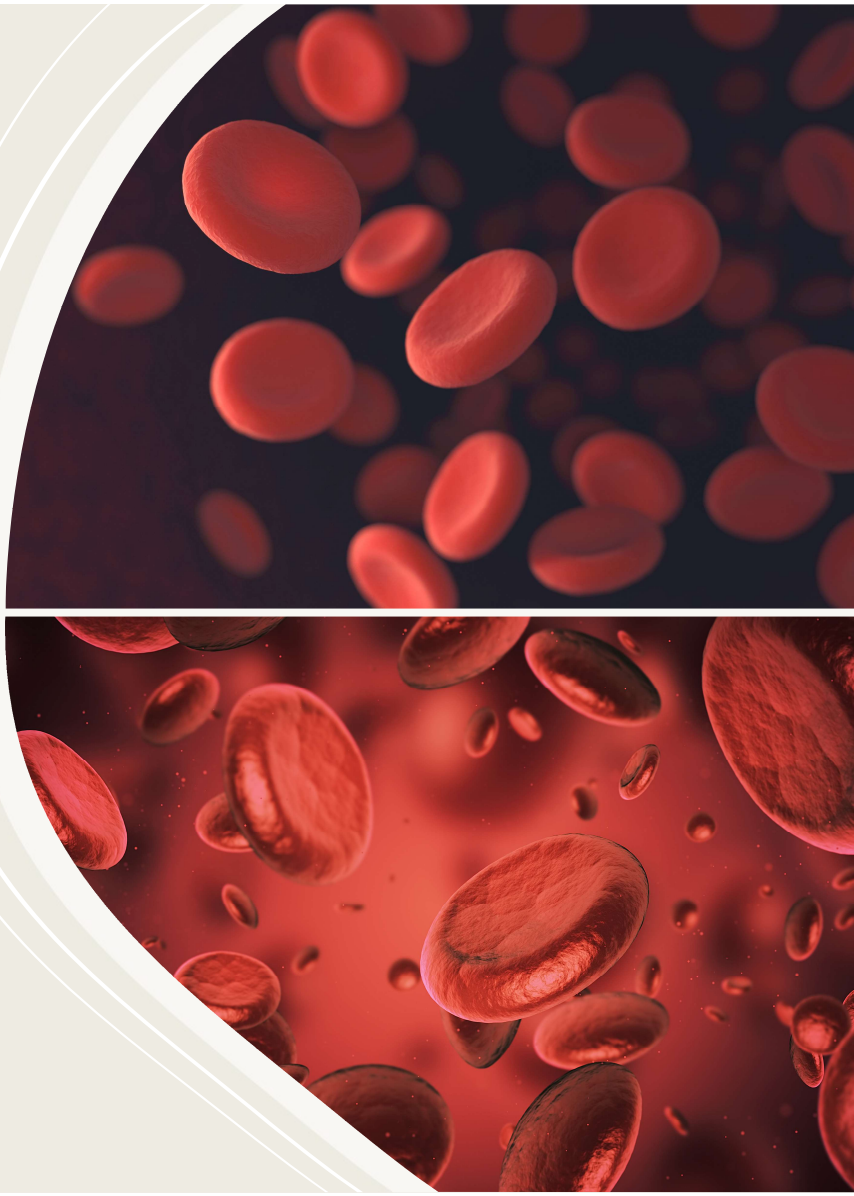
Prothrombin – protein made by the liver

- *One of many clotting factors which work together to form a blood cell*

Prothrombin time (PT) – the amount of time it takes for a clot to form within a blood sample

- *Clotting factor levels too low = excess bleeding*
- *Clotting factor levels too high = risk of causing dangerous clots to form in arteries/veins*

PT ranges between approximately 11 to 14 seconds for newborns, 10-13 seconds for adults (Lippi et al., 2007; Mayo Clinic, n.d.)



Why is PT Important for Newborns?

To understand the postnatal development of the coagulation system and detect haemostatic disorders within newborn infants

Hypothesis

There is no difference in the means of prothrombin time between full term and premature infants

Alternate Hypothesis

The means Prothrombin time between full term and premature infants is significantly different

Data Overview

Population

- 1000 infants in population
- *500 Full Term*
- *500 Premature*

Sample

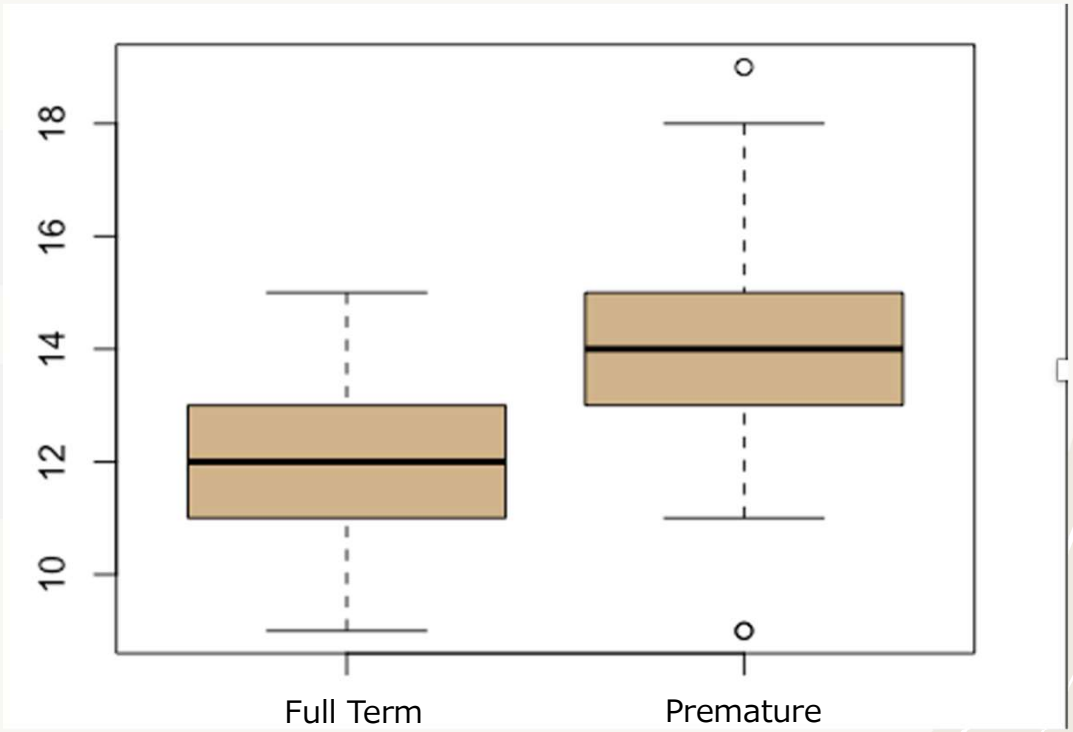
- 60 infants randomly sampled for each type
- *30 Full Term*
- *30 Premature*

Data Overview Cont'd

POPULATION DATA

Full Time Infants (sec)	Range	9-15
	Mean	11.97
	Median	12
Premature Infants (sec)	Range	9-19
	Mean	14.03
	Median	14

Boxplot of PT for Full Term and Premature Infants

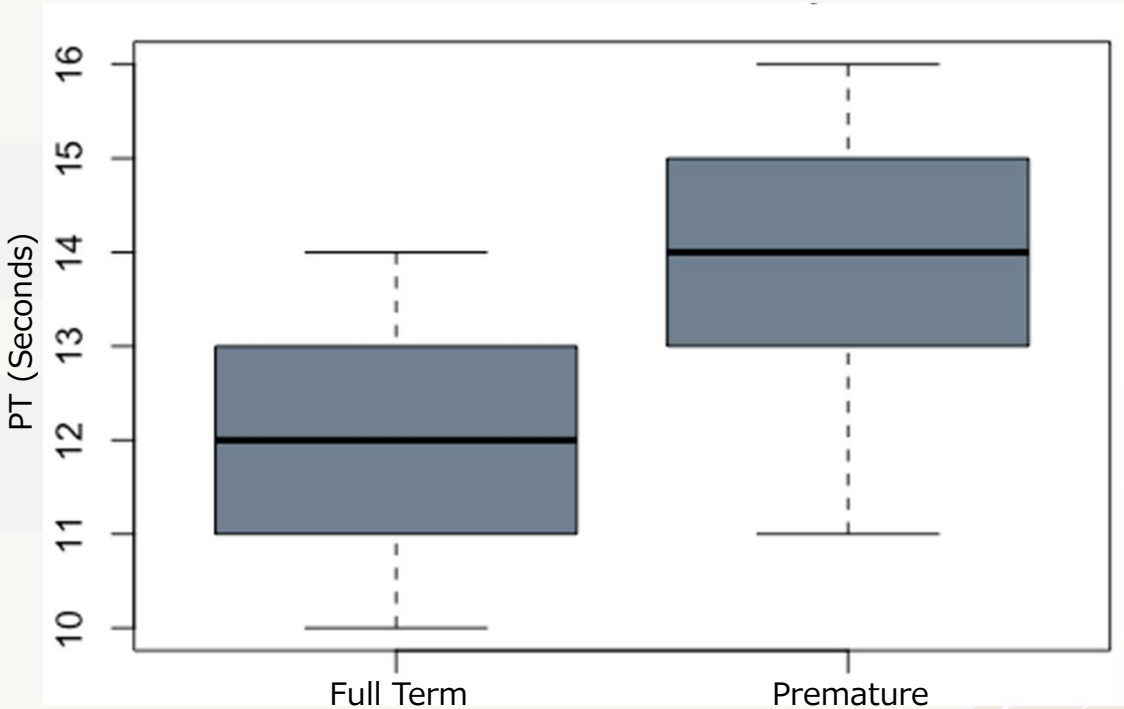


Data Overview Cont'd

SAMPLE DATA

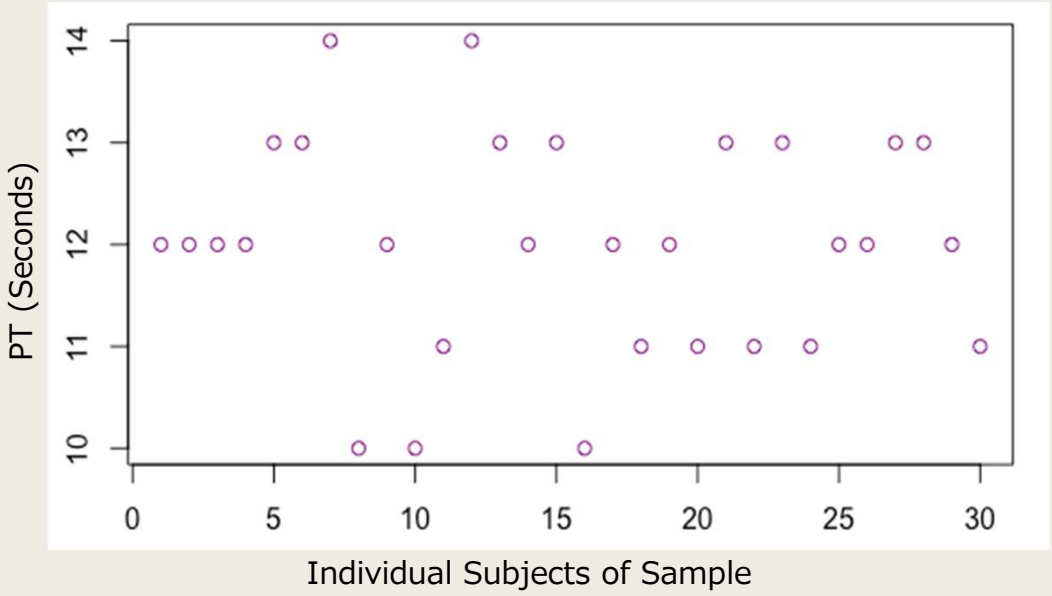
Full Time Infants (sec)	Range	10-14
	Mean	12
	Median	12
Premature Infants (sec)	Range	11-16
	Mean	13.93
	Median	14

Boxplot of PT for Full Term and Premature Infants

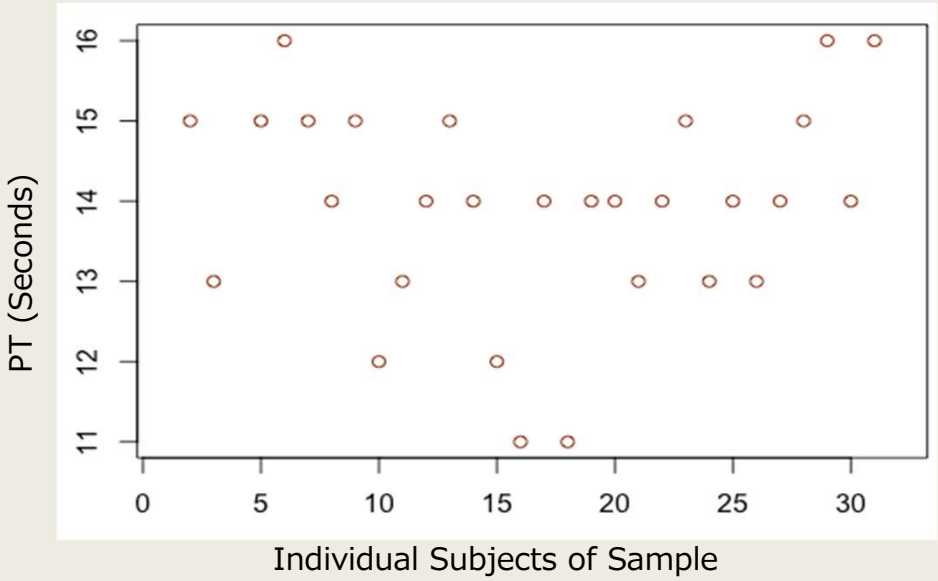


Data Overview Cont'd

Plot Graph for PT for Full Term Infants



Plot Graph for PT for Premature Infants



Methods

Grubbs Test (Sample only)

- *Outlier detection*
- *Outlier of 19 detected in sample of premature infants*
- *Outlier was removed to maintain the integrity of the data*

Student's t-Test

- 95% Confidence Level
- Accept/reject null hypothesis

10 Step Hypothesis

Results – Student's *t*-test

Welch Two Sample *t*-test (Sample)

t-value = -6.0917

Degrees of freedom = 53.902

***p*-value** = 1.223e-07

95 percent confidence interval:

-2.566601, -1.295468

Mean of Full Term

12.00000

Mean of premature

13.93103

Difference in means = -1.93

Welch Two Sample *t*-test (Population)

t-value = -26.176

Degrees of freedom = 908.2

***p*-value** < 2.2e-16

95 percent confidence interval:

-2.210149, -1.901851

Mean of Full Term

11.972

Mean of Premature

14.028

Difference in Means = -2.056

Results – 10 Step Hypothesis

1	2	3	4	5	6	7	8	9	10
Data	**Assumptions**	**Hypothesis**	**Test Statistic**	**Distribution of Test Statistic**	**Decision Rule**	**Calculation of Test Statistic**	**Statistical Decision**	**Conclusion**	***p*-value**

Key Findings

PT for full term infants is typically lower than premature infants

Premature infants experience more abnormal PT than full term infants

Premature infants may be more susceptible to experiencing complications of the coagulation system than full term infants

The randomly sampled data closely mirrors the statistical data of the populations, i.e., the boxplot slides

Next Steps

Predictive modeling for early intervention to detect clotting issues

Demographic data

- *Sex*
- *Race*
- *Mother smoke/drink*

Present diseases

Alerts in EHR system of abnormalities pertaining to the coagulation system

Based on patients' lab results

References

Lippi, G., Salvagno, G. L., Rugolotto, S., Chiaffoni, G. P., Padovani, E. M., Franchini, M., & Guidi, G. C. (2007). Routine coagulation tests in newborn and young infants. Journal of Thrombosis and Thrombolysis, 24(2), 153–155. https://doi.org/10.1007/s11239-007-0046-4

Mayo Clinic. (n.d.). Prothrombin time test. https://www.mayoclinic.org/tests-procedures/prothrombin-time/about/pac-20384661