FEASIBILITY OF COMPARING PROTHROMBIN TIME DETERMINATION USING FIRST TO SECOND TUBE OF SPECIMEN BY USING THE EVACUATED BLOOD COLLECTION SYSTEM

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Abstract

The objective of this study was to compare prothrombin time (PT) determination using first and second tubes of specimen by using the evacuated blood collection system. A descriptive study to compare the methodology was performed at the Department of Laboratory Medicine, Faculty of Medicine, Chulalongkorn University Bangkok Thailand. One hundred evacuated blood collections were studied. Both the first and second tubes of blood specimen were sent to the laboratory is analytical unit for further PT determination. The average values of PT for both groups were calculated, compared and then analyzed. The average values from the first and second tubes of specimen were 15.044±4.662 and 15.369±4.660 seconds, respectively. No significant difference was revealed between the PT values determined by both groups. Therefore, it is feasible to use the first instead of second tube of specimen from the evacuated blood collection system for PT specimen collection. Furthermore, using first tube of specimen can lower the cost and biohazard waste.

Hematology laboratory investigation is an important tool in the diagnosis and follow-up of patients with bleeding disorders. A number of coagulation tests are avaliable. Prothrombin time (PT) remains the most common in monitoring patients receiving anticoagulant therapy. Pre analytical factor control is one of the most important steps in the quality control of PT determination. Blood collection error is a common pitfall in the analysis of PT. The evacuated blood collection system is a new and widely used blood collection technique. Its advantage in blood collection for a clotting assay is claimed. Specific vacuum, a blue stopper, and tube is produced for the specific purpose of collecting blood specimens for PT determination. However, the second tube specimen still serves an example for analysis and practice in the two syringe technique of syringe blood collection.

In this study, the author performed a descriptive study to determine the feasibility of using the first instead of second tube of specimen from the evacuated blood collection system for PT determination.

Materials and methods

This descriptive study was carried out in the Division of Laboratory Medicine, King Chulalongkorn Memorial Hospital. One hundred blood collections were studied. In
each collection, the evacuated blood collection system was performed according to the standard principle using standard equipment (Becton-Dickinson). Antecubital venipunctures were performed by well-trained nurses. The two vacuum tube technique was applied in collection. Both vacuum tubes in each collection used the blue stopper vacuum type containing citrate as an anticoagulant. Both first and second tubes of blood specimen were send to the laboratory’s analytical unit for further PT determination. All PT determinations were performed according to the standard hematology technique using an automated hematology analyzer Fibrintimer A, Dade Behring. All tests were carried out in the same laboratory unit at room temperature. The same lot of all reagents was used throughout the study. Average values for the PT determined by using the sample in the first and second tube groups were calculated. A descriptive statistical analysis was performed where appropriate. A comparison between both methods was performed using the two-tailed paired t-test. The p-value, which equaled 0.05, was accepted as a significant level. Correlation coefficients were also performed to assess significant differences in the determination of PT by both groups of specimens.

**Results**

The average values from the first and second tubes of specimen were 15.044±4.662 and 15.369±4.660 seconds, respectively. Average difference in value between both tubes was 0.325±0.766 seconds. This revealed that there was no significant difference between the PT values determined by both groups (p=0.061). The correlation coefficient for PT determination was 0.562 (Figure 1). Using the cut off value of 15 seconds, the correlation coefficients were

![Fig. 1. Comparison between PT determination by the first and second tubes of specimen from the evacuated blood collection system](image-url)
0.762 \,(p>0.05)\) and \(0.543 \,(p>0.05)\), for higher and lower values, respectively. From this study, the comparison-of-method plot second \((Y)\) VS first \((X)\) tube specimens gave the least square equation of \(Y=1.342 \,X + 0.084\).

**Discussion**

PT is the common coagulation screening test widely used in medicine. To perform the clotting assay, a number of steps can result in an abnormal result.\(^{(3)}\) In the pre-analytical process, a proper blood collection technique and correct anticoagulant must be considered.

The evacuated blood collection system is a new method, which is an application for the collection of specimens for a clotting assay. Due to lowering the possibility of contact with blood borne pathogens during specimen collection for clotting assays, the evacuated blood collection system is widely used.\(^{(4-5)}\) Furthermore, the cost of blood collection by the evacuated blood collection system is less expensive than that for the syringe blood collection system.\(^{(5)}\)

In this study, an evaluation of PT determination using the first and second tubes of specimen from the evacuated blood collection system was performed. It revealed that there was no significance between PT values determined by both the first and second tubes of specimen. Although the correlation coefficients for both tests were not good for both high and low levels, no statistical difference was observed. Therefore, whether or not the first or second tubes of specimen were used in the determination of the clotting assay, it seems to have no effect in the interpretation of the laboratory results according to general references.\(^{(6)}\) These results can show the feasibility of using the first tube of specimen from evacuated blood collection for clotting assay analysis, which can lower the cost of blood collection and the amount of biohazard waste to the environment.

**References**