

## การรับรู้ความรู้สึกปวดต่อการเจาะเลือดด้วยระบบสุญญากาศ และระบบหลอดดูด

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## Pain Perception of Subjects to Evacuated and Syringe Blood Collection Systems

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**วัตถุประสงค์:** เพื่อศึกษาการรับรู้ความรู้สึกปวด ต่อการเจาะเลือด ด้วยระบบสุญญากาศและวิธีแบบใช้กระบอกดูด

**รูปแบบการศึกษา:** การศึกษาที่ทดลองชนิดสองกลุ่มเชิงข้าม (การศึกษา นำร่อง)

**สถานที่ทำการศึกษา:** ภาควิชาเวชศาสตร์ชั้นสูง คณะแพทย- ศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย

**กลุ่มที่ทำการศึกษา:** อาสาสมัครจำนวน 30 ราย

**วิธีการศึกษา:** ได้แบ่งอาสาสมัครเป็น 2 กลุ่มเท่ากันโดยการสุ่ม กลุ่มแรกทำการเจาะเลือดด้วยวิธีแบบใช้กระบอกดูดก่อนตามด้วย วิธีระบบสุญญากาศ กลุ่มที่สองทำการเจาะเลือดด้วยวิธีแบบ ระบบสุญญากาศก่อนตามด้วยวิธีแบบใช้กระบอกดูด ทั้งนี้ได้ทำ การสำรวจโดยใช้แบบสอบถามเกี่ยวกับการรับรู้ในประเด็นความรู้สึก ปวด (ในรูปแบบดัชนีความรู้สึกปวดที่ใช้มาตรฐานเทียบเคียง) ที่ได้รับ ทั้งสองกลุ่ม ในขั้นตอนก่อนและหลังการเจาะเลือดแต่ละวิธี นำค่า ดัชนีความเจ็บปวดทั้งหมดที่ได้ทำการทดสอบหาความแตกต่าง ทางสถิติ

**ผลการศึกษา:** ไม่พบความแตกต่างระหว่างดัชนีความรู้สึกปวดจาก การเจาะเลือดทั้งสองวิธี

**บทสรุป:** การเจาะเลือดด้วยระบบสุญญากาศเป็นการเจาะเลือด แบบใหม่ที่ให้ผลด้านความรู้สึกปวดต่อผู้ถูกเจาะไม่แตกต่างกับวิธี ใช้กระบอกดูด

**คำสำคัญ:** การเจาะเลือดด้วยระบบสุญญากาศ, ความรู้สึกปวด

**Objective:** To study pain perception of subjects to evacuated and syringe blood collection system

**Study Design:** Two group crossover quasi-experimental study (pilot study)

**Setting Design:** Department of Laboratory Medicine, Faculty of Medicine, Chulalongkorn University

**Subject:** 30 volunteer subjects

**Method:** All subjects were randomized divided into two equal groups. The first group was performed venipuncture by syringe blood collection system following by evacuated blood collection system. The second group was performed venipuncture by evacuated blood collection system following by syringe blood collection system. A questionnaire survey about pain perception (visual analog scale) was introduced to all subjects before and after venipuncture by each technique. All collected pain scores were then statistically analyzed.

**Results:** There was no difference of pain score for both venipuncture technique.

**Conclusion:** Evacuated blood collection system is the new venipuncture technique that cause no difference painful sensation to the subjects comparing to syringe blood collection technique.

**Key word:** evacuated blood collection system, pain

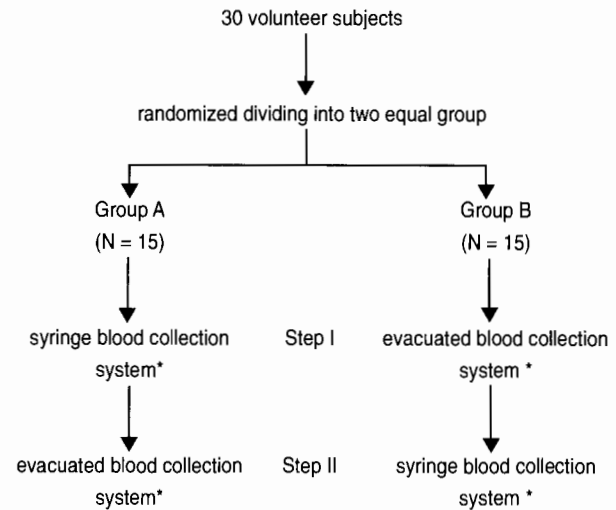
Nowadays the most common technique to obtain blood specimen is venipuncture(1). In the present day, it is an important procedure for diagnosis and treatment. There are many methods to perform venipuncture procedure but the common methods are syringe blood collection system and evacuated blood collection system. Evacuated blood collection system using basic principle of Fluid Mechanics is modern method that is used worldwide nowadays. Plastic holder, sterile special-designed blood collection needle and vacuum blood collection tube are used together as the system<sup>2-8</sup>. To perform this technique, medical personnel can practice following recommendations and universal precautions<sup>9</sup>.

Although the system is accepted for its advantage and used in many medical centers, but in Thailand it is not well known. Due to the fact that this technique is not a familiar technique, the perception of subjects to this technique is important aspects must be concerned<sup>10-11</sup>. The size of the needle used in the evacuated system is slightly larger than the syringe blood collection system, therefore, it is doubt how pain perception of the subjects to this new venipuncture technique differs from classical syringe blood collection system.

In Thailand, there is only one report about perception of the subjects to the new evacuated blood collection system but lack systematic evaluation<sup>12</sup>. Therefore this study was set. This result of this study can be basic data for improving this technique to meet the good level of quantity that most of subjects satisfy.

### Methods and materials

This study is designed as a cross-sectional study. It is designed as a pilot study, therefore, only thirty volunteers healthy subjects who did not mind replying the questionnaires were included in this study. All subjects were in the same age and socioeconomic status group. All refused for having venipuncture performed in a previous year. All subjects were randomized divided into two equal groups (n= 15). This study was designed as a two group randomized crossover semi-experimental study. The diagram of framework of the study was shown in Figure 1. The first group (group A) was performed venipuncture by syringe blood collection system following by evacuated blood collection system. The second group (group B) was performed venipuncture by evacuated blood collection system following by syringe blood collection system. Both syringe technique and evacuated blood collection procedures were performed step by step orderly according to the framework in Figure 1. The venipunctures were



\* also perform pre and post venipuncture questionnaire survey for pain perception

**Figure 1.** The diagram of framework of the study.

performed by the same phlebotomists according to the standard guideline for venipuncture and the same size of needle was used. Briefly, the blood collection was performed by antecubital venipuncture. Different arms were used in step I and step II of the framework in order to avoid the carry over effect. The protocol in this study was approved by the local laboratory management quality committee (LMQC) for the technique and ethical consideration.

A questionnaire about perception to venipuncture was sent to the subjects before and after venipuncture by each technique. It only let the subjects to rate the pain sensation from both venipuncture technique in pain score (1 = least painful to 10 = most painful) using visual analog scale (VAS). One who distributed the questionnaire to the subjects was blinded for the framework. Descriptive statistical analysis was carried out on the data where it was appropriate. ANOVA crossover test was used for comparison. P = 0.05 was accepted as significant level.

### Result

From total 30 subjects included in this study, the average pain score (mean ± SD) for the two groups in each step was shown in Table 1. There was no significant difference of painful sensation from using both venipuncture technique ( $F_{1, 28} = 4.20$ ,  $F_{\text{calculate}} = 0.02$ ). The median of pain score for the two groups in each step was shown in Table 2 .

**Table 1.** The average pain score (mean ± 2SD) for the two groups in each step

Step of study	Average pain score	
	Group A	Group B
Step I		
• Pre	0	0
• Post	5.60 ± 2.10	6.20 ± 2.14
Step II		
• Pre	0	0
• Post	4.73 ± 2.31	4.93 ± 2.02

**Table 2.** The median of pain score for the two groups in each step

Step of study	Median pain score	
	Group A	Group B
Step I		
• Pre	0	0
• Post	5	5
Step II		
• Pre	0	0
• Post	4	5

### Discussion

An important problem in performing venipuncture to the patients is the pain perception. A number of methods are introduced to cope this problem. Improvement of new venipuncture equipment should also match this concept. From this study, painful sensation from getting this venipuncture technique performed was not different from syringe technique.

Although the new two-ended needle of the evacuated blood collection system seems larger but it can provide the same level of painful. Furthermore, the evacuated blood collection system is automatically controlled by the fluid pressure via the needle holes, therefore, no problems about severe suction pressures can be expected as the syringe blood collection by the inexperienced practitioner.

In fact, this evacuated blood collection system is a closed-system, so if the equipment, patients and medical personnel are well prepared before using, there is no problem about safety. All equipment in this system (holder, needle and vacuum tube) is sterile so if they are not contaminated, no infection will occur<sup>1-9</sup>. But the major cause is that this technique is new and not familiar to the subjects. Many equipments such as the holder which is reusable and the vacuum tube with anticoagulant is the new things

that the subjects have never seen. After knowledge education, all subjects feel better about the safety<sup>13</sup>.

This study was only a cross-sectional study. Therefore, no longitudinal information could be received. And it is limited to only a small group as the nature of pilot study. Further study, as a longitudinal study, in larger group of patients is recommended. Furthermore, evaluation of medical personnel as users for perception about safety and ease to perform should be fulfilled.

With the fact medical personnel and patients are the main users of any medical technology so study about perception of them about that technology is important for improving that technology. This study can be good pilot study for improving this medical instrument technology.

### Conclusion

Evacuated blood collection system is a technique of venipuncture that should be known. It is a safe and effective way of venipuncture. Like other type of service, it still follows the principle of consumer behavior. Using this technique is still mainly according to emotional desire. So attitude to this technique depends mainly on how much it can make users feel satisfy. From this study, painful sensation from getting this venipuncture technique performed was not different from syringe technique. Therefore, this new blood collection technique does not increase the pain perception, a major complaint of the subjects who receive venipuncture.

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