
GYNECOLOGY

The Retention of Accuracy of Visual Estimation of Blood Loss by Qualified Nurses at 1 and 3 Months following Education Program.

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ABSTRACT

Objective: To assess the retention of accuracy of estimation of blood loss at 1 and 3 months following education program.

Study design: Clinical trial.

Subjects: Sixty qualified nurses from operative and delivery wards during January – June 2008.

Intervention: The nurses were recruited for blood loss estimation education program. Gauzes and swabs soaked with fixed amount of pack red cells were used for estimation of blood loss at 6 stations. Follow up tests was performed by all of the participants with the same 6 stations at 1 and 3 months later. The accuracy of estimation was defined as within twenty percents of actual blood volume used.

Main outcomes: Percentage of nurses who estimated accurately at least 3 in 6 stations (proficient nurses) at 1 and 3 months after education program.

Results: There were no significant decrease in accuracy of visual estimation of blood loss at 1 and 3 months following education program ($p= 0.13$). The accuracy of estimation was not associated with years of experience ($p= 0.62$) and working wards ($p= 0.19$).

Conclusion: The accuracy of visual estimation of blood loss still retained at 3 months which was not different from 1 month.

Keywords: visual estimation of blood loss, education program, retention of learning

Introduction

Visual estimation of blood loss has long been known to be imprecise, inaccurate, and often underestimated, which may lead to delayed diagnosis and treatment.

The educational process may assist clinicians in everyday practice to more accurately estimate blood loss and recognize patients at risk for hemorrhage-related complications.

However, a number of studies have shown the

effectiveness of education program for blood loss estimation.^(1,2) In general, the retaining skills always decrease by time.^(5,6) In this way, the impact of a relatively simple change in the organization of training could be substantial.

This research was to assess the retention of accuracy of estimation of blood loss following education program. The speed at which the retention of accuracy deteriorate has been reinforced, a need for reeducation in visual blood loss estimation may identified.

Materials and Methods

The study was conducted at operative and delivery wards at the Department of Obstetrics and Gynaecology, Ramathibodi Hospital. The protocol was approved by Documentary Proof of Ethical Clearance Committee on Human Rights Related to Researches Involving Human Subjects Faculty of Medicine, Ramathibodi Hospital, Mahidol University.

In summarized the initial study, we recruited 60 qualified nurses in delivery and operative wards who involved with operative procedures during the study period of January – June 2008. The nurses who previously educated by this program or who didn't want to participate were excluded.

The education program was mimic the program conducted by previous research in Ramathibodi Hospital in 2006.⁽²⁾ The hospital blood bank provided packed red cell (PRC) for this study. We applied precisely measured volumes of blood in increasing increments to the following surgical materials: abdominal swabs, rolled gauzes, surgical sponges and half-sheets. All materials were photographed and weighed before and after blood application. Wet abdominal swabs and rolled gauzes were saturated with normal saline and hand wrung.

One designated researcher performed all of the lectures to ensure equivalent content between groups. A 15 minute Power Point presentation as the didactic tool for visual estimation of blood loss. The slides illustrated the following 3 teaching tools for visually assessment of blood volume.

1. A mathematical formula to calculate the

volume of simple objects. For example: The volume of box is calculated as length x width x height. For a box with dimensions of 10x20x4 cm. the volume is 800 ml.

2. The volumes of familiar objects were demonstrated to the participants. The metric volume of a standard 1-L intravenous fluid bag is of course 1,000 ml.

3. The simple rules of visual estimation of blood volume contained in common surgical materials which used in daily practice. A standard dry 30 x 30 cm abdominal swab (Topline®) containing 25 , 50 , 75 and 100 ml of blood will appear 50%, 75% and 100% saturated with excess blood dripping respectively (Fig. 1).

A dry 45 cm x 10 cm rolled gauze (Topline®) containing 20 and 40 ml of blood will appear 50% and 100% saturated respectively (Fig. 2).

A dry 4 in x 4 in surgical sponge (Medigauz®) containing 10 ml of blood will appear completely saturated (Fig. 3).

The participants were presented by 15 minutes didactic session then evaluated 6 stations after the briefing. Stations were photographed for future tests. The total time of introduction, didactic session and evaluation was approximately 40 minutes. The participants were not allowed to know the answer or copy of the test. Follow-up tests were performed by all of the participants with the same 6 stations approximately 1 and 3 months later after the education program.

The main outcome of this study was percentage of nurses who accurately estimated at 1 and 3 months after blood loss estimation education program.

The accurate estimation in this study referred to participants that had accurate estimation at least 3 out of 6 stations (The accurate estimation of blood volume was defined as within 20 percents of the actual blood volume used in each station). All statistical tests were carried out in program Stata. Characteristics, ages and experience were presented in median (range). The type of work was presented in frequency and percentage.

The retention was measured within group by comparing the percentage of participants at posttest to

their follow-up test and then using logistic regression analysis method. The p value < 0.05 was considered statistically significant. Clinical experience was defined as the number of years since graduation from nursing school.

Results

There were 60 participated nurses attended the education program, with no drop out at three months. The demographic characteristics of age, experiences and type of work were shown in Table 1. The median age of participants was 31 years and had median

working experience of 7 years. Fifty seven percent were delivery ward nurses.

The main outcome of this study, comparing the proficient nurses (eg. nurses who had accurate estimation of blood) after attending the education program was show in Table 2, the percentage of proficient nurses decreased at one and three months, but was not statistically significant (p-value= 0.13). The percentage of proficient nurses were not different by working wards. (Table 3) and years of working experience (Table 4).

Table 1. Demographic Characteristics

| Characteristics | n = 60 |
|------------------|-----------|
| Age (y)* | 31(22-57) |
| Experience (y)* | 7 (2-36) |
| Type of work** | |
| - Delivery ward | 34(57%) |
| - Operative ward | 26(43%) |

* Data presented as median (range)** Data presented as frequency (percent)

Table 2. The correlation between time after training program (month)

| | Time after training program | | | p-value |
|------------------------|-----------------------------|---------|----------|---------|
| | 0 month | 1 month | 3 months | |
| Proficient nurses *(%) | 85 | 78 | 70 | 0.13 |

* Proficient nurse was the nurse who had accurate estimation

Table 3. The correlation between working place

| | Ward | | p-value |
|------------------------|----------|-----------|---------|
| | Delivery | Operative | |
| Proficient nurses *(%) | 81 | 73 | 0.19 |

* Proficient nurse was the nurse who had accurate estimation

Table 4. The correlation between working experience

| | Years of experience | | | p-value |
|------------------------|---------------------|------|-----|---------|
| | < 5 | 5-10 | >10 | |
| Proficient nurses *(%) | 71 | 79 | 79 | 0.62 |

* Proficient nurse was the nurse who had accurate estimation



Fig. 1. Blood absorption characteristics of a dry 30´30 cm abdominal swab. For this particular type, 25 ml of blood saturates about 50% of the surface area, 50 ml of blood saturates about 75% of the surface area, 75 ml. of blood saturates the entire surface, and 100 ml of blood will saturate and drip from the sponge

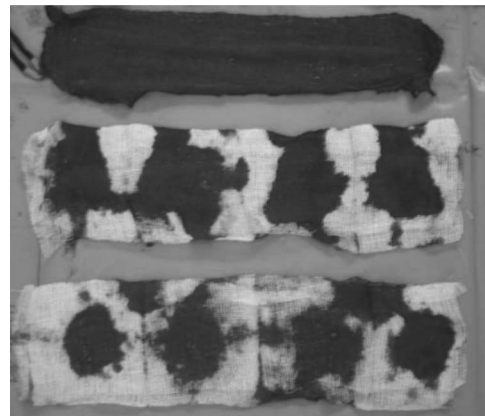


Fig. 3. Blood absorption characteristics of a dry 4 in´4 in surgical sponge, 10 ml of blood saturates the entire surface, 5 ml of blood saturates about 50% of the surface area, 2 ml of blood saturates scantily on surface area.

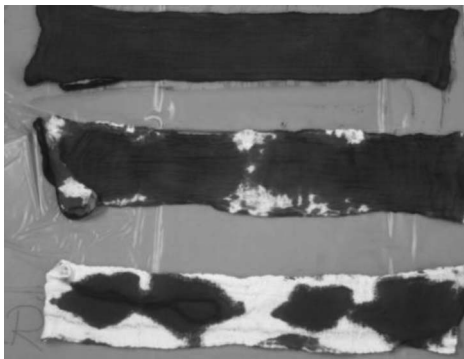


Fig. 2. Blood absorption characteristics of a dry 45´10 cm rolled gauze. For this particular type, 10 ml of blood saturates about 25% of the surface area, 30 ml of blood saturates about 50% of the surface area and 50 ml of blood saturates the entire surface.

Discussion

Blood loss is the important cause of postoperative complication and maternal death. The delay diagnosis and replacement of blood products can lead to serious consequences.⁽³⁾ Visual estimation of blood loss is more practical and less time consuming.⁽²⁾ Many studies showed that an educational program can improve the accuracy of blood loss estimation. They found significant reductions in error for all scenarios. In every day practice, blood loss is usually estimated by subjective visual quantitation, which is generally based upon prior clinical experience.⁽⁴⁾ However, there was no previous research to investigate the retention of the accuracy of visual estimation of blood loss following an education program.

According to Broomfield et al in 1996, who studied the retention of basic cardiopulmonary

resuscitation following the training course and found that the skills and knowledge quickly deteriorated in twelve weeks if not used or updated regularly. In this study, the authors found that the skills of visual estimation of blood loss at one and three months after training program were not significant different but there were some decreasing trends in the accuracy. One possibility for this disagreement may be the participants in this study often estimated blood loss during daily work, so they had repeated learning experience. This research may not be applied to other working jobs such as gynecology ward nurses.

This research had six stations of clinical scenarios to reduce recall bias of the nurse at one and three months. The limitations of our study may be the assumption that using pack red cell blood got the same of outcomes as using the whole blood in the real bleeding situation. Now, it's difficult to find the whole blood from blood bank because usually whole blood was separated to fraction components to use for specific medical conditions. Finally, the blood absorption characteristics of various surgical materials need to be further defined. The appearance of blood stained wet versus dry laparotomy sponges or swabs may be difference.

The period after the education program training of one and three months may be too short to evaluate the retention of the learning experience of blood loss estimation.

Future study is needed to find the effect of periodically reeducation program with long term follow up period. A randomize control trial should be conducted to compare between control and an re-educated group. The comparative study between visual estimation of blood loss and the gravimetric method which is routinely used in many institutes should be conducted.

Conclusion

The retention of accuracy of visual estimation of blood after the education program at one and three month periods were not different. Gravimetric method which is routinely used in many institutes should be conducted.

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**การคงอยู่ของความแม่นยำในการประเมินด้วยตาของการเสียเลือด(ปริมาณเลือดในผ้าซับเลือด)
หลังจากได้รับ การอบรมเป็นระยะเวลา 1 และ 3 เดือนในกลุ่มพยาบาลวิชาชีพ**

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วัตถุประสงค์ : เพื่อศึกษาถึงการคงอยู่ของความแม่นยำในการประเมินการเสียเลือด (ปริมาณเลือดในผ้าซับเลือด) ด้วยตา ในระยะเวลา 1 และ 3 เดือนหลังจากได้รับการอบรม

วัตถุประสงค์และวิธีการ : อาสาสมัคร 60 คนเข้าร่วมการอบรมด้วยโปรแกรมการสอนการประเมินเลือดด้วยตา จากนั้นเข้าทดสอบโดยประเมินปริมาณเลือดก่อนประเมินจริงในสถานีจำลอง 6 สถานี ซึ่งประกอบด้วยผ้าซับเลือดที่ชุ่มด้วย pack red cell ในปริมาณที่กำหนด อาสาสมัครกลับมาประเมินปริมาณเลือดอีกครั้งเมื่อเวลาผ่านไป 1 และ 3 เดือนหลังจากได้รับการอบรม ความถูกต้องในการประเมินการเสียเลือดหมายถึง การประเมินคลาดเคลื่อนไม่เกิน 20% ของปริมาตรเลือดที่ใช้ทดสอบ ตัวชี้วัดหลักคือจำนวนพยาบาลเป็นเปอร์เซ็นต์ที่ประเมินการเสียเลือดได้อย่างถูกต้องอย่างน้อย 3 ใน 6 สถานี.

ผลการศึกษา : ความคงอยู่ของความแม่นยำในการประเมินการเสียเลือดด้วยตาลดลงที่ระยะเวลา 1 และ 3 เดือนหลังได้รับการอบรมอย่างไม่มีนัยสำคัญทางสถิติ ($p = 0.13$) ไม่พบความสัมพันธ์การคงอยู่ ของความแม่นยำกับสถานที่ทำงาน ($p = 0.19$) และ ประสบการณ์การทำงาน ($p = 0.62$)

สรุป : การคงอยู่ของความแม่นยำในการประเมินการเสียเลือด (ปริมาณเลือดในผ้าซับเลือด) ด้วยตา ที่ระยะเวลา 1 และ 3 เดือนหลังได้รับการอบรมไม่แตกต่างกัน
