Original Article

Accuracy of visual estimation of blood loss by using

Simulated learning package

Abstract:

Introduction: Hemorrhage continues to be one of the leading causes of maternal mortality around the world. Under estimation of peripartum blood loss and delayed blood component therapy seem to be common factors in many cases of avoidable hemorrhage related maternal deaths.

Objectives: Objectives were to assess the accuracy of the estimation of blood loss before administration of simulated learning package among the nursing students, to determine the accuracy of the estimation of blood loss after administration of simulated learning package among the nursing students and also to evaluate effectiveness of simulated learning package on accuracy for visual estimation of blood loss among the nursing students

Methods and Materials: The pre experimental research approach with one group pretest post test design was used for the present study. Purposive sampling technique was used to select 100 nursing students as sample. A recording sheet mentioning the video no and the estimated amount of blood loss were used for data collection. The tool and the simulated videos were validated by experts. The Pre test was conducted followed by Simulated teaching on visual estimation of blood loss was conducted on first day of data collection. 14 video scenes of various amount of blood loss were shown to the midwifery students. Post test was conducted after 7 days. Data was collected by paper and pencil method.

Results: The pretest and post test scores shows underestimation in the visual estimation of blood loss and that the underestimation is high in the higher amounts of blood loss. The data does not follow a normal distribution; hence non-parametric test (Wilcoxon-Signed rank test) was used for Pre-post comparison. Obtained p-value (0.000 for all) is less than 0.05 for all the 14 scenes, so H1 is accepted saying that the simulated learning package on visual estimation of blood loss was helpful to improve the level of accuracy among the nursing students.

Conclusion: Simulated videos are effective for improving the accuracy in visual estimation of blood loss.

Key Words: Accuracy, visual estimation of blood loss, simulated learning package, nursing students, Pune.

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Introduction

Hemorrhage continues to be one of the leading causes of maternal mortality around the world. Under estimation of peripartum blood loss and delayed blood component therapy seem to be common factors in many cases of avoidable hemorrhage related maternal deaths.[1]

Excessive blood loss during childbirth and the resultant morbidity is a problem that has occurred throughout history. Today, hemorrhage continues to be one of the leading causes of maternal mortality in the United States and around the world. Obstetric care has changed in an attempt to decrease blood loss,

yet postpartum hemorrhage (PPH) still confounds and alarms birth attendants because of the rapidity of its onset and danger it represents if uncontrolled. Most blood loss related to childbirth occurs within the first hour after birth, and the most frequent cause of hemorrhage is early postpartum uterine atony. For a vaginal birth, hemorrhage is considered a blood loss of > 500 ml. In clinical practice, the amount of blood lost during childbirth is typically visually estimated by the birth attendant.[2]

Even with repetitive studies identifying the limitations and inaccuracies of estimation, it is the easiest and most common method of quickly gauging blood loss. Research has been

focused on determining the amount of blood loss that is normal, identifying the frequency of PPH, identifying those women who require intervention for excessive blood loss, evaluating intervention strategies to ameliorate blood loss thereby preventing PPH, and evaluating treatment methods for PPH. The accurate measurement of blood loss is critical for these research purposes.[3,9]

Causes of maternal death
- ■ Severe bleeding (haemorrhage) 25%
- ■ Infections 15%
- ■ Eclampsia 12%
- ■ Obstructed labour 8%
- ■ Unsafe abortion 13%
- ■ Other direct causes 8%
- ■ Indirect causes 20%

Source: The World Health Report 2005. Make every mother and child count. Geneva, World Health Organization, 2005.
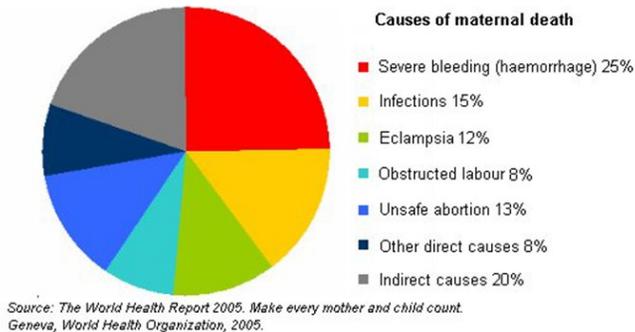
Fig 1: Pie diagram shows causes of maternal death

Figure 1 shows that major three causes of maternal death are severe bleeding (25%), Infection (15%) and Eclampsia (12%).[2]

The rate of PPH increased from 1.5% in 1999 to 4.1% in 2009, and the rate of atonic PPH rise from 1% in 1999 to 3.4% in 2009. The risk of total PPH with a morbidly adherent placenta was markedly higher. The most recent Practice Bulletin from American College of Obstetricians and Gynecologists place the estimate at 140,000 maternal deaths per year or 1 woman every 4 minutes.[4,7]

Accurate measurement of blood loss is nonetheless challenging, particularly in the practice setting. A recent observational study, using clinical reconstructions, demonstrated significant underestimation of actual blood loss in 5 of 12 clinical scenarios with no overestimations. Previously in Australia, research showed that midwives and other health professionals underestimated blood loss after birth by 30-50%. Quantifying blood loss is not only important for immediate management, it is also necessary to measure the incidence of hemorrhage such as PPH and to monitor trends. It is recognized that the incidence of PPH may be underestimated by up to 50%, due to the clinical difficulty in accurately estimating blood loss. [5,6]

Present study was done to assess the accuracy of the estimation of blood loss before administration of simulated learning package among the nursing students, to determine the accuracy of the estimation of blood loss after administration of simulated learning package among the nursing students and also to evaluate

nurses effectiveness of simulated learning package on accuracy for visual estimation of blood loss among the nursing students

Hypothesis

H1: There is significant difference in the accuracy for visual estimation of blood loss among nursing students

Conceptual Framework

The conceptual framework of this study is based on System's model. The model consists of three phases—input, process and output. The conceptual model is presented in figure 2.

Fig 2: Conceptual Framework based on System Model
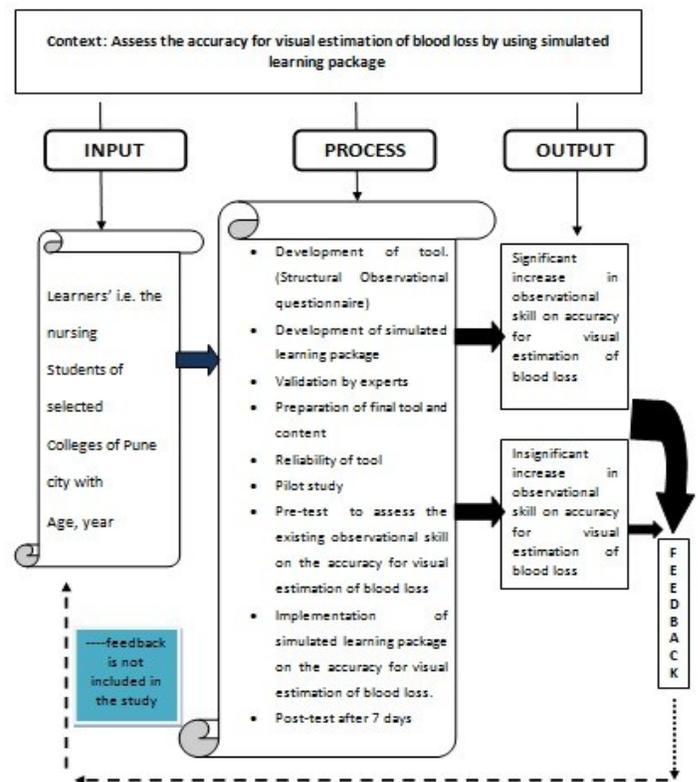
Methodology

The research method adopted for the study was Pre-experimental research approach and the design used was one group pre-test post-test design. The samples of the study were nursing students who were learning basic maternal and child health nursing. A non probability convenience sampling method was used for the selection of the representative samples for the study. Data were collected from 100 samples. The study was conducted in Bharati Vidyapeeth University College of nursing, Pune. The data collection tool comprises of two sections: section I comprises of demographic characteristics and

section II comprises of recording format for visual estimation of blood loss. The tool was validated by 10 experts. Experts were from various fields such as from obs & gynae teachers and clinical practitioners. Statistician. Necessary modification has been done as per experts' advice. Inter-rater reliability was done. With 97% agreement the tool was found to be highly reliable Pretest was conducted after proper instructions followed by simulated teaching on estimation of blood loss with the help of 14 simulated videos of clinical scenarios. Posttest was conducted after 7 days. Data gathered was analysed by using descriptive and inferential statistics. Based on the analysis interpretations were made.

Results

Table 1: Comparison of the pretest and post test results of visual estimation of blood loss   N = 100

Video No.	Situations	Blood quantity (ml)	Visual estimation of blood loss (%)					
			Underestimated		Accurate		Overestimate	
			Pre test	Post test	Pre test	Post test	Pre test	Post test
8	Blood on cotton piece, gauze piece or sanitary pad	10	20	2	11	27	69	71
11		20	23	2	3	3	74	95
3		30	83	23	11	28	6	49
6		40	53	21	13	5	34	74
5		50	49	9	11	13	40	78
7		80	79	34	13	28	8	38
4		100	95	72	3	18	2	10
2		80	99	55	1	33	0	12
1	Blood in bowl or kidney tray	150	98	92	0	1	2	7
9		300	98	82	2	7	0	11
10		500	98	69	2	24	0	7
12	Post delivery simulation	500	82	66	9	6	9	28
13		800	65	4	10	67	25	29
14		1000	55	2	17	66	28	32

The data presented in Table 1 compares the pretest and posttest findings on accuracy of visual estimation of blood loss. In pretest it is observed that most of the samples underestimated the quantity of blood loss. The underestimation is high even for large quantity of blood which could be dangerous in clinical setting. Whereas, most of the samples have overestimated the blood loss in posttest. It is though not accurate could be life saving for patients in the clinical area. So from the above data it is evident that that there is an increase in the accuracy as well as

overestimation especially for larger quantities of blood loss which could help in clinical decision making in early diagnosis and management of hemorrhages including PPH.

Table 2: Effectiveness of the simulated learning package on visual estimation of blood loss as per each video   N=100

Video no	Ranks	N	Z-value	P-value	Decision
1	Negative	16	-5.834	0.0001	Accepted H1
	Positive	74			
	Ties	10			
2	Negative	9	-7.526	0.0001	Accepted H1
	Positive	79			
	Ties	12			
3	Negative	15	-6.238	0.0001	Accepted H1
	Positive	77			
	Ties	8			
4	Negative	16	-6.411	0.0001	Accepted H1
	Positive	76			
	Ties	8			
5	Negative	14	-6.630	0.0001	Accepted H1
	Positive	71			
	Ties	15			
6	Negative	13	-7.068	0.0001	Accepted H1
	Positive	83			
	Ties	4			
7	Negative	21	-6.600	0.0001	Accepted H1
	Positive	77			
	Ties	2			
8	Negative	20	-5.860	0.0001	Accepted H1
	Positive	73			
	Ties	7			
9	Negative	14	-0.308	0.0001	Accepted H1
	Positive	78			
	Ties	8			
10	Negative	5	-7.978	0.0001	Accepted H1
	Positive	87			
	Ties	8			
11	Negative	16	-6.591	0.0001	Accepted H1
	Positive	79			
	Ties	5			
12	Negative	16	-6.127	0.0001	Accepted H1
	Positive	80			
	Ties	4			
13	Negative	26	-5.614	0.0001	Accepted H1
	Positive	71			
	Ties	3			
14	Negative	27	-4.133	0.0001	Accepted H1
	Positive	70			
	Ties	3			

Pre- test and post test data was analyzed by Wilcoxon Signed Ranks Test. The data presented in Table 2 shows that the obtained p-value for each video is less than 0.05, so the researchers accepted H1 and conclude that the accuracy of estimation of blood loss is better in posttest than pretest. Therefore it can be said that simulated videos (No. 1 - No. 14) are effective for improving the accuracy of visual estimation of blood loss.

Discussion

The findings of the study have been discussed with reference to the objectives and hypothesis. Result shows that the simulated learning package video is effective for estimation of blood loss visually.

The study is supported by Paloma Toledo, et. al (2008), where the author mentioned that Visual blood loss estimation often underestimates blood loss. The study was to determine the effect of calibrated drape markings on blood loss estimation in a simulated vaginal delivery. Subjects were randomized to estimate simulated blood loss (300, 500, 1000 and 2000 ml) in calibrated or non-calibrated vaginal delivery drapes and then cross over. The result of the study showed that vaginal blood loss estimation with non-calibrated drapes underestimated blood loss, with worsening accuracy at larger volumes (16% error at 300ml to 41% at 2000 ml). The calibrated drape error was <15% at all volumes. The study concluded by mentioning that calibrated vaginal delivery drapes improve blood loss estimation.[8]

Conclusion

Form the major findings of the study it can be concluded that the simulated learning package was significantly effective on nursing student's skill for visual estimation of blood loss. This in turn will be helpful for early identification of post partum hemorrhage and will reduce the maternal mortality and morbidity.

Recommendation

- A similar study can be done on larger samples

- A similar study can be done on professional midwives in labour room

- A study on the other health professionals working in Emergency, OT or labour room.

- A longitudinal study can be done to check the accuracy in visual estimation after a long time may be six months or one year after learning visual estimation.

- A comparative study can be done using different educational material like simulation scenario in nursing arts lab. Simulation video or information booklet.

Acknowledgement

Ethical clearance

All administrative permission from college and Institutional ethical committee was taken. Informed written consent was taken from participants before data collection. All the data were kept confidential and used for research purpose only.

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