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A mixed-methods study to determine the optimal method for combat medics to train warm fresh whole blood (WFWB) transfusion skills for field application

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Introduction

Hemorrhage is the primary cause of death following trauma and blood transfusions and are routinely used to stabilize patients.

The skills required to obtain a unit of warm fresh whole blood (WFWB) and transfuse it in a timely fashion are challenging skills to obtain and sustain.

Autologous blood transfusion training is currently used by the U.S. military to develop WFWB.

Objectives

The objective is to establish a baseline skill level for WFWB transfusions through an autologous blood collection and transfusion model and to obtain operator feedback based on the assigned method.

Methods

Enlisted medical personnel were randomly assigned a live partner or mannequin. After 3-6 months, all performed an autologous transfusion model.

Standardized training video and procedure checklist was provided to participants.

A physician was present during the procedure to answer questions but did not aid in performance.

Data collected by case report form, procedural feedback data, and collated end-user interview data.

Results

Figure 1: Consort diagram of participation and session attendance

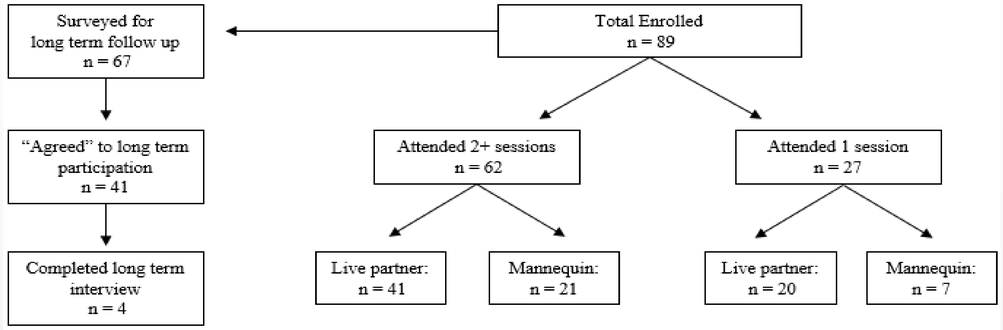

Table 1: Participant Characteristics

Variable	Autologous-first (n=41)	Manikin-first (n=21)	All (n=62)
Sex			
Female	10 (24%)	4 (19%)	14 (23%)
Male	31 (76%)	17 (81%)	48 (77%)
Age, years	23 [22-27]	23 [21-27]	23 [21-27]
Deployed to a combat zone	4 (10%)	3 (14%)	7 (11%)
Combat casualty care experience	2 (5%)	3 (14%)	5 (8%)
Formal IV access training			
Not collected	8 (19%)	7 (33%)	15 (24%)
No	1 (2%)	0 (0%)	1 (2%)
Yes	33 (79%)	14 (67%)	47 (75%)
Autologous blood collection & training in humans	37 (90%)	9 (43%)	46 (74%)
Autologous blood collection & training in simulation/ manikin	17 (42%)	13 (62%)	30 (48%)

Values are frequency (column percentage) or median [interquartile range].

Table 2: Outcomes from second trial (autologous blood collection) – all participants

Outcome	Autologous-first (n=41)	Manikin-first (n=21)	p-value
Time to successful donation access, seconds	6 [2-15]	7 [2-56]	0.237
Time to 1 unit collected in bag, seconds	669 [434-987]	784 [455-1243]	0.298
Time to removal of donation needle, seconds	22 [11-47]	16 [6-30]	0.241
Time to successful donation completion, seconds	74 [37-465]	76 [23-189]	0.451
Weight of bag, g	586 [574-591]	582 [520-588]	0.333
Time to bag tied and cut, seconds	70 [21-139]	62 [10-145]	0.534
Time to completion of Eldon card, seconds	251 [153-309]	201 [160-233]	0.039
Time to successful IV transfusion access, seconds	75 [28-290]	118 [47-231]	0.501
Time to vein decannulation, seconds	60 [27-128]	27 [9-59]	0.069
Time to completion of 1 unit transfusion, seconds	**852 [621-1169]**	**792 [455-1163]**	**0.592**
Successful procedure	**31/41 (76%)**	**16/21 (76%)**	**0.837**

Values are median [interquartile range] or proportion (column percentage).
P-values are for nonparametric Wilcoxon test.

Qualitative Feedback

Overall, qualitative findings suggest repeated exposure to autologous transfusion trainings improve confidence.

For deployment readiness, participants stated monthly, bi-monthly and quarterly trainings.

Lack of long-term follow-up among majority of participants highlights the challenges in accessing these populations for longitudinal-type studies.

Conclusions

In this pilot study, we did not identify any differences among participants based on initial training modality.

However, the effect of most participants having prior model training may have been a factor.

The lack of participation in long-term interviews highlights the inability to obtain data within this population without command directives.

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