USE OF A NOVEL TWO-LAYER COMPRESSION BANDAGE SYSTEM* TO ACHIEVE THE DESIRED PRESSURE IN HUMAN SUBJECTS

INTRODUCTION

The application of compression bandages (Fig. 1) is inherently variable based on **technique**, experience of the operator, overlap, applied tension and properties of the bandage.



Fig. 1 Nurse applying a compression bandage

PURPOSE

This study assessed the nurse's ability to reach a target compression of 40 mmHg by applying two different compression bandages. The first a wellknown Two Layer Bandage (TLB*) compression system and a novel Dual Compression System, DCS* incorporating a **PresSure guide**.

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METHODS

Three skilled nurses applied the compression **bandages** to the lower legs of **six healthy** volunteers five times per product. Training for all nurses happened online due to COVID restrictions. Then, one of the nurses was retrained in person, and the study was repeated. The pressure generated by the bandage was measured) at **rest** and **standing** by a pressure sensor (Fig. 2), 10 cm above the medial malleolus of the ankle.

The consistency and proximity to target pressure (40 mmHg) were calculated with comparisons between nurses, subjects, position, and compression system. Analysis of variance (ANOVA) was used for statistical analysis (p<0.05). Also, T-statistic was used to estimate the closeness to the target pressure of 40mmHg.



Fig. 2 Application of pressure sensor on leg

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RESULTS

After **re-training**, DCS^{*} had an average value of 40±2 mmHg and TLB* had 36±2 mmHg for resting and standing position combined. The average value for DCS^{*} was not significantly different from the target pressure of 40 mmHg with a p-value of 0.89, on the contrary the average for TLB^{*} was significantly different from the target of 40 mm (p<0.05).

Resting and standing combined								
TLB	DCS*							
Average (mmHg)		P-Value	Average (mmHg)	P-Value				
All nurses (online training during COVID, N=180)	37	<0.05	46	<0.05				
All nurses (Nurse A in- person training, N=180) ^A	36	<0.05	40	0.898				

Table 1. Comparison TLB* and DCS* (Resting and Standing combined)

After Nurse A retrained **DCS* obtained 38%** of the values in the ranges of 40±5 mmHg, and **TLB* obtained 31%** in the target range.

Table 2. Number of trials in the range of 35-45 mmHg

Number of trials that reached 35-45 mmHg ((Resting and Standing combined)									
	Nurse A* retrained in person (N=60)	Nurse A Online training (N=60)	Nurse B Online training (N=60)	Nurse C Online training (N=60)	Total (online training, N=180)	Total (Nurse A in-person training*, N=180)			
TLB*	25(42%)	26(43%)	5(8%)	25(42%)	56(31%)	55(31%)			
DCS*	21(35%)	4(7%)	22(37%)	25(42%)	51(28%)	68(38%)			

^AData were calculated with Nurse A^{*} retrained in person.

DISCUSSION

Successful bandaging is operator dependent in the sense that the operator has likely taken the training properly. With successful training it was easier for Nurse A to apply the DCS^{*} and obtain the correct level of therapeutic pressure. Furthermore, considering results from Nurse A after retraining and the other two nurses with online training, DCS^{*} was closer to the target pressure than TLB*.

Counterintuitively, as we saw with Nurse A, it could be the case that a new bandage system such as DCS* that require attention paid to application technique for both layers, must be accompanied by training particularly to those clinicians who are familiar with a different system. For example, Nurse A was very familiar with TLB^{*}, but still required a higher level of training (in person) to achieve the **correct compression** level with DCS* compared to the other two nurses less familiar with the TLB*. Additional sampling should be conducted to further **confirm** the observations we found in this study.

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