

# Alternative Choice of National Institute of Health Stroke Scale Training: Virtual Reality Provide Equal Training Outcomes and Enhance Learning Motivation

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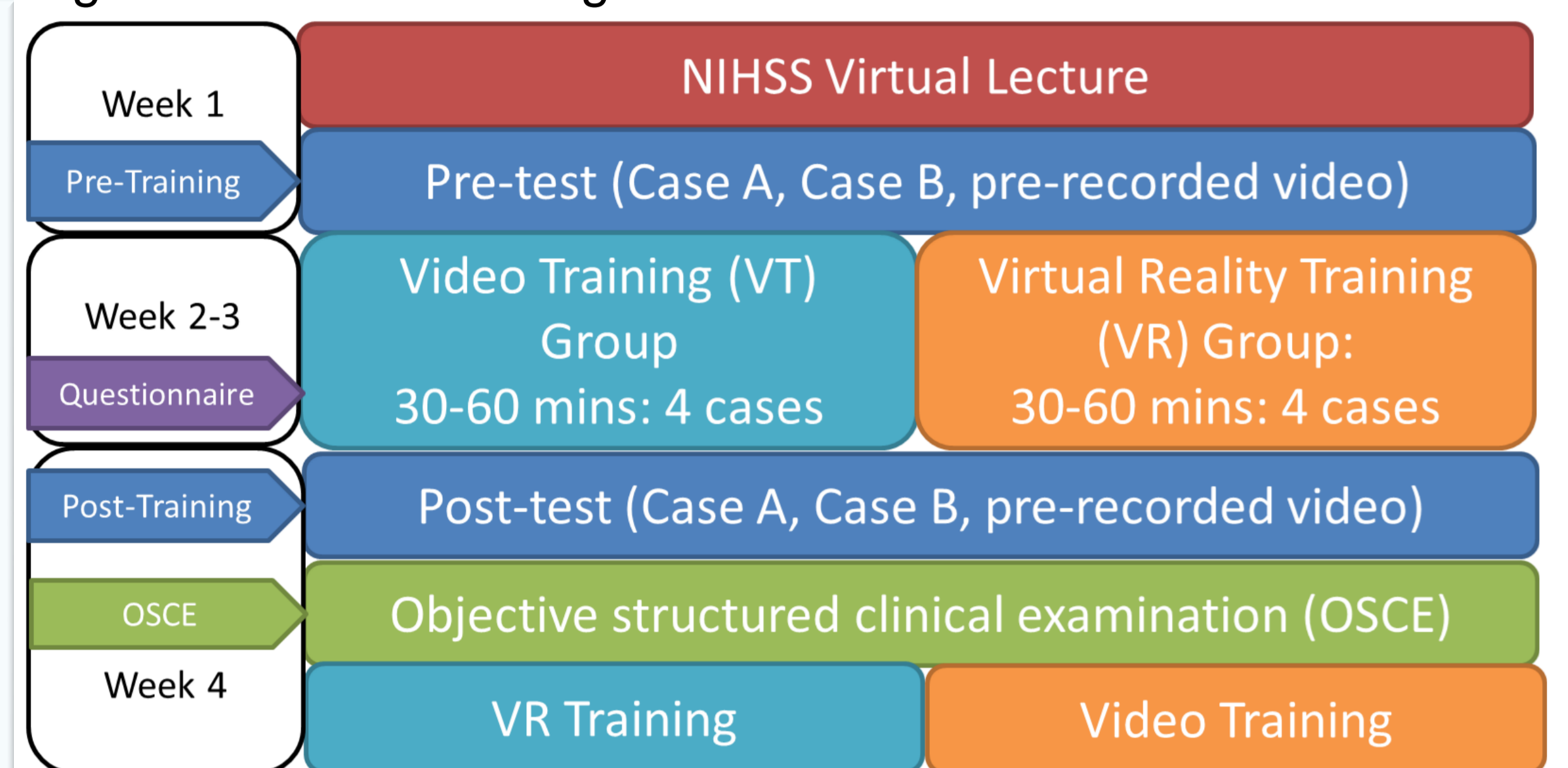
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**Background** National Institute of Health Stroke Scale (NIHSS) remains a vital stroke severity assessment in evaluating acute ischemic stroke patients. NIHSS helps selecting eligible patients in receiving thrombolytic therapy such as intravenous tissue plasminogen activator injection or endovascular thrombectomy. Traditionally, besides formal NIHSS lectures for education, all the trainees could do NIHSS practicing and self-learning via pre-recorded videos. Virtual reality (VR) had been prosperously developed in recent decades. VR had shown its strength in immerse reality that it could help simulation training in medical fields. We had developed a new NIHSS training program in National Cheng-Kung University Hospital via VR system in order to facilitate the NIHSS clinical training. This study aimed to investigate the training outcomes and learning motivation between VR training model and traditional training protocol.

**Methods** We prospectively enrolled medical students in their clerkship from Sep 2022 to May 2023. They would be randomly divided into video training (VT) group or virtual reality training (VR) group. Both of the groups would first receive common NIHSS lecture all together in week 1. In the following 2 weeks, VT group trainees would watch NIHSS training video of 4 different patients. Meanwhile, VR group trainees would do VR training of 4 different patients. All the trainees would receive pre-lecture NIHSS test via pre-recorded video on week 1 and post-lecture test of the identical video on week 4. Objective

Figure 1. NIHSS training course flow chart



structured clinical examination (OSCE) would be held on week 4 for direct assessment of their NIHSS clinical ability. Situational Motivation Scale (SIMS) was used to evaluate the scale motivation of each trainee once they had completed the training course. The testing results from pre-lecture tests, post-lecture tests, between-test difference, OSCE and SIMS were compared between two groups. The training flow chart is shown in Figure 1.

**Results** We had enrolled 61 students. There were no differences in the outcomes of pre-lecture test, post-lecture test (Table 1), between-test difference (Table 2) and OSCE performance (Table 3) between the two groups. In motivation questionnaire SIMS (Table 4 and Figure 2), VT group showed a lower score in intrinsic motivation (17.84 vs. 21.38,  $p=0.001$ ) but higher score in external regulation (18.84 vs. 16.00,  $p=0.007$ ) and amotivation (12.25 vs. 9.83,  $p=0.031$ ) in comparison with VR group. Thus, in self-determination index, VT group was lower than VR group (12.47 vs. 27.07,  $p<0.001$ ).

Table 1. NIHSS correct evaluation of sub-items: pre test and post test between VT group and VR group

	Pre test					Post test				
	VT (n=31)		VR (n=30)		p	VT (n=28)		VR (n=29)		p
	median	IQR	median	IQR		median	IQR	median	IQR	
Case 1	8	(7, 9)	8	(7, 9)	0.558	8	(7, 10)	8	(7, 9)	0.877
Case 2	11	(10, 12)	11	(10, 12)	0.947	12	(11, 13)	11	(11, 12)	0.264

Table 2. NIHSS correct evaluation of sub-items: pre test and post test differences in VT group, VR group and between groups

	VT Group (n=28)			VR Group (n=29)			VT vs VR
	median	IQR	p	median	IQR	p	
Post test – Pre test							
Case 1	1	(-1, 2)	0.232	0	(-1, 2)	0.424	0.373
Case 2	1	(0, 2)	0.065	1	(-1, 1)	0.206	0.157

Figure 2. Situational Motivation Scale between video group and VR group

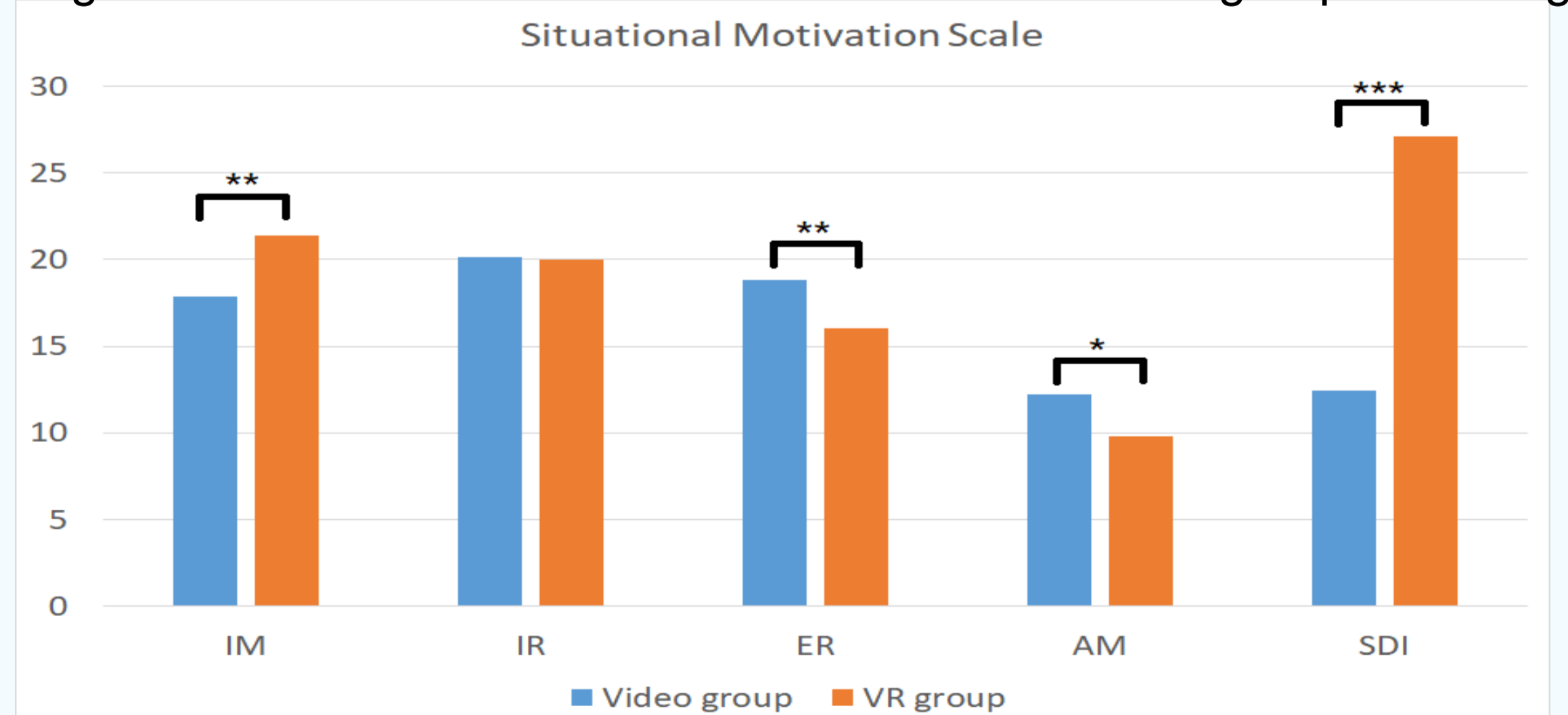


Table 3. OSCE performance between VT group and VR group

	VT (n=26)		VR (n=28)		p
	median	IQR	median	IQR	
Trainee					
Correct items	13	(12, 14)	13	(11, 14)	0.641
Trainer Evaluation					
Scores	27.5	(26, 29)	28	(26, 28.5)	0.673
Correct items	12	(10, 13)	12	(10, 13)	0.567

Table 4. Situational Motivation Scale between video group and VR group

	Video (n=32)		VR (n=29)		P
	mean	SD	mean	SD	
Intrinsic motivation (IM)	17.84	4.32	21.38	3.80	0.001
Identified regulation (IR)	20.13	3.01	19.97	3.82	0.856
External regulation (ER)	18.84	3.42	16.00	4.49	0.007
Amotivation (AM)	12.25	4.31	9.83	4.24	0.031
Self-Determination Index (SDI)	12.47	14.56	27.07	15.16	<0.001

**Conclusion** NIHSS training via virtual reality system had proven similar training effect in comparison with traditional video training, but enhanced much more motivation in learning for the trainees.