

VIRTUÁLNÍ RESISCITACE

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KARIM LFP UK a FN Plzeň

Simulační centrum (SIM/PL) - LFP UK

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SepsEast initiative



LÉKAŘSKÁ FAKULTA V PLZNI
UNIVERZITA KARLOVA









What Teachers Think About

6%

42%

Think VR will be used in the classroom within the next 5 years

77%

Believe VR enables students to see places that they would not be able to otherwise

18%

Have already experienced VR

48%

Are interested in using VR in the classroom

Arts 44-

62

74

Geography 80

Subjects that VR would be most suitable for:

For the Samsung-backed survey "VR in the Classroom," Kantar EH&D interviewed 605 teachers from schools throughout Germany in November 2016. The interviews were conducted in a personal computer-assisted procedure. In addition to focusing on the utilization of digital technologies in schools, the survey was also directed to find out more about the concrete application of virtual reality in education.



Metaverse Market

Size, by Product, 2023 - 2033 (USD Billion)

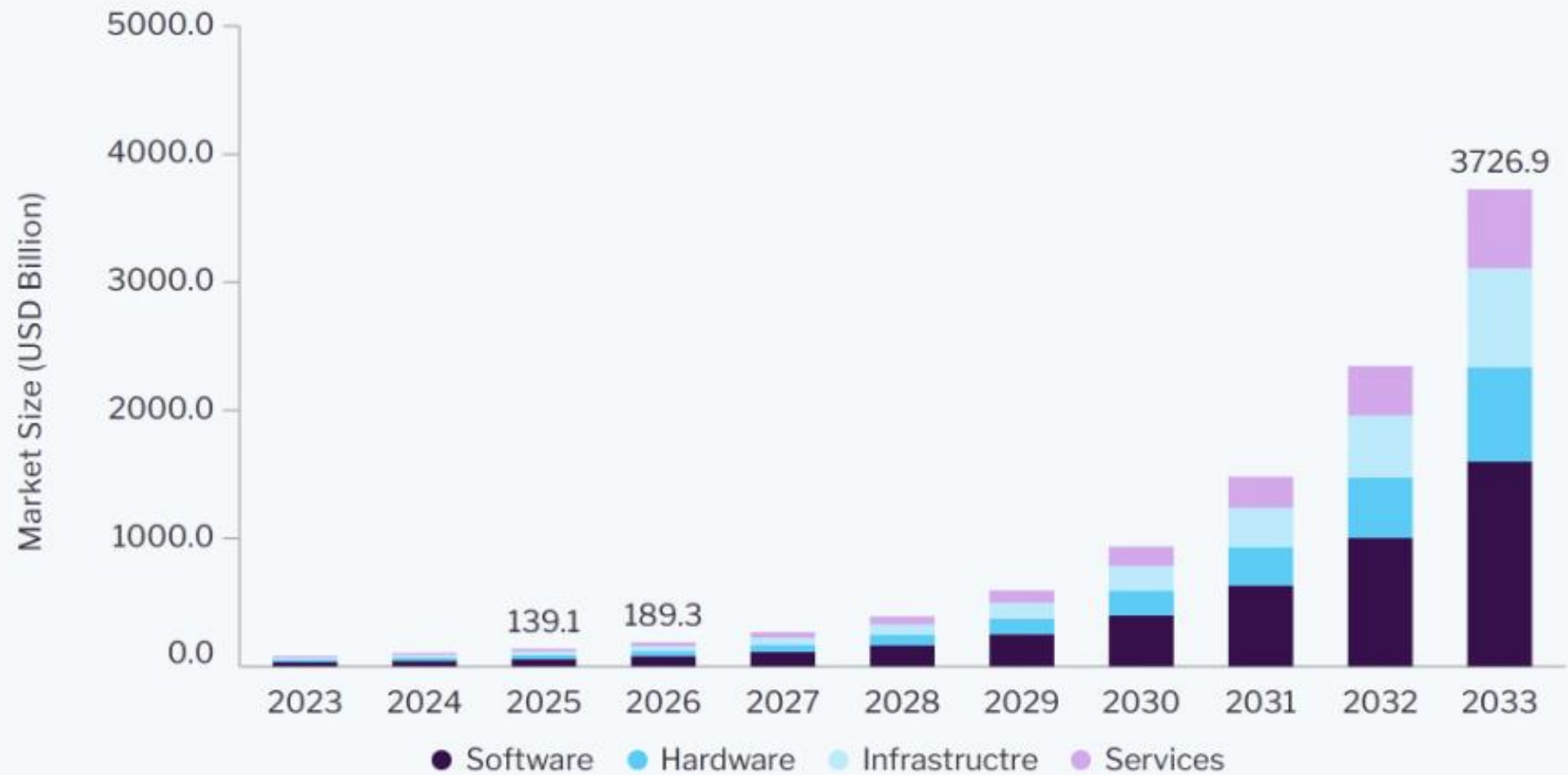
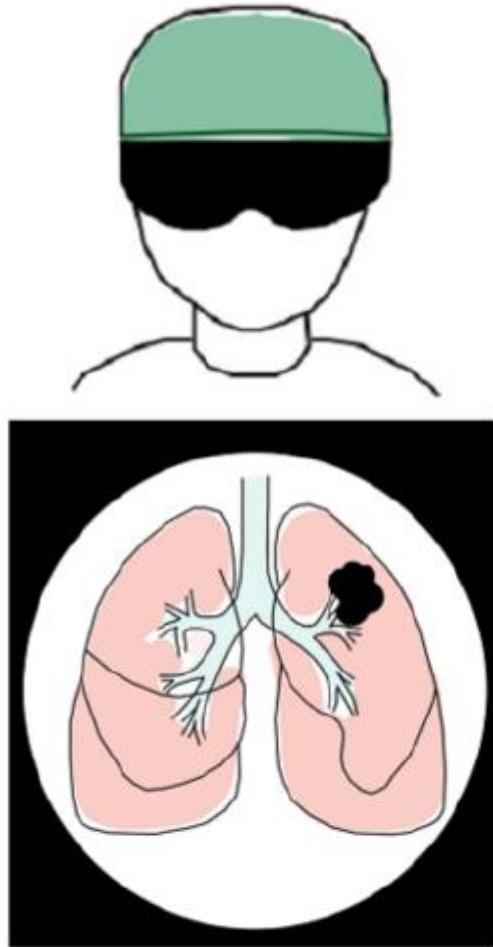


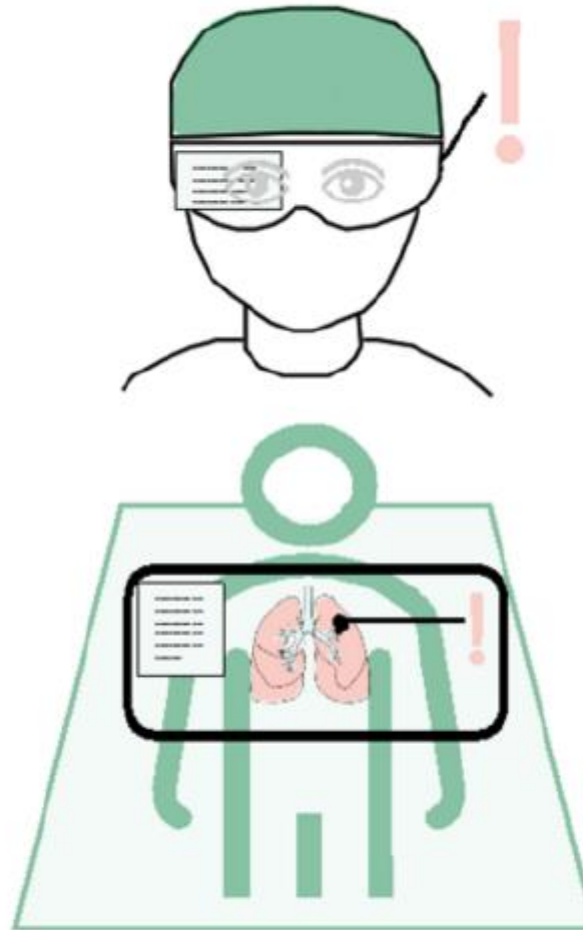
Figure 1. Graphical depiction of the differences between virtual, augmented, and mixed reality.

Virtual reality (VR)



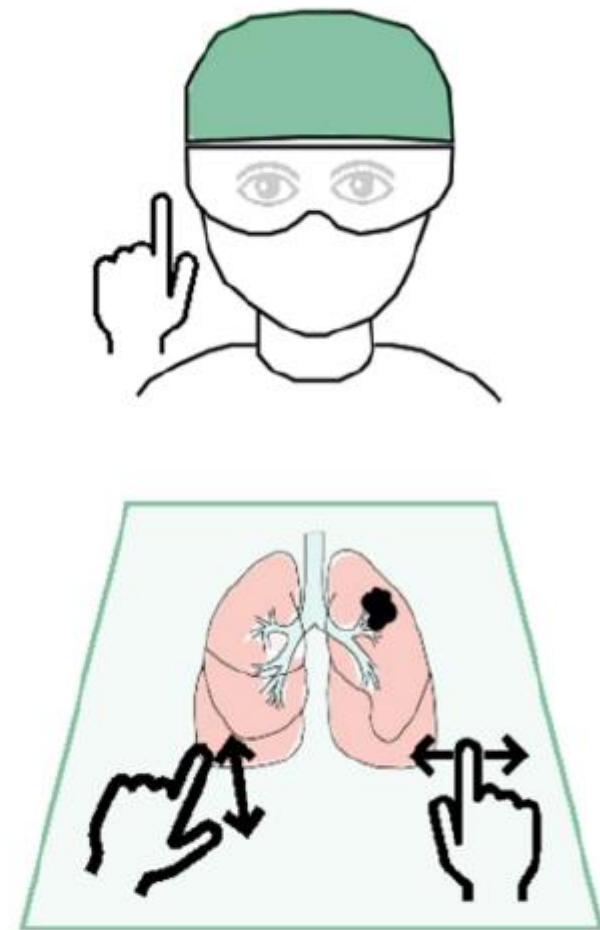
Completely virtual environment experienced through an immersive headset

Augmented reality (AR)



Real-world environment overlaid with virtual objects without the possibility of interaction

Mixed reality (MR)



Real-world environment enriched by interactive virtual data anchored independent of head movement

1. Vyšší míra zaujetí a motivace
2. Lepší zapamatování (více smyslů)
3. Vizualizace složitých konceptů
4. Standardizace vzdělání
5. Personalizace vzdělání



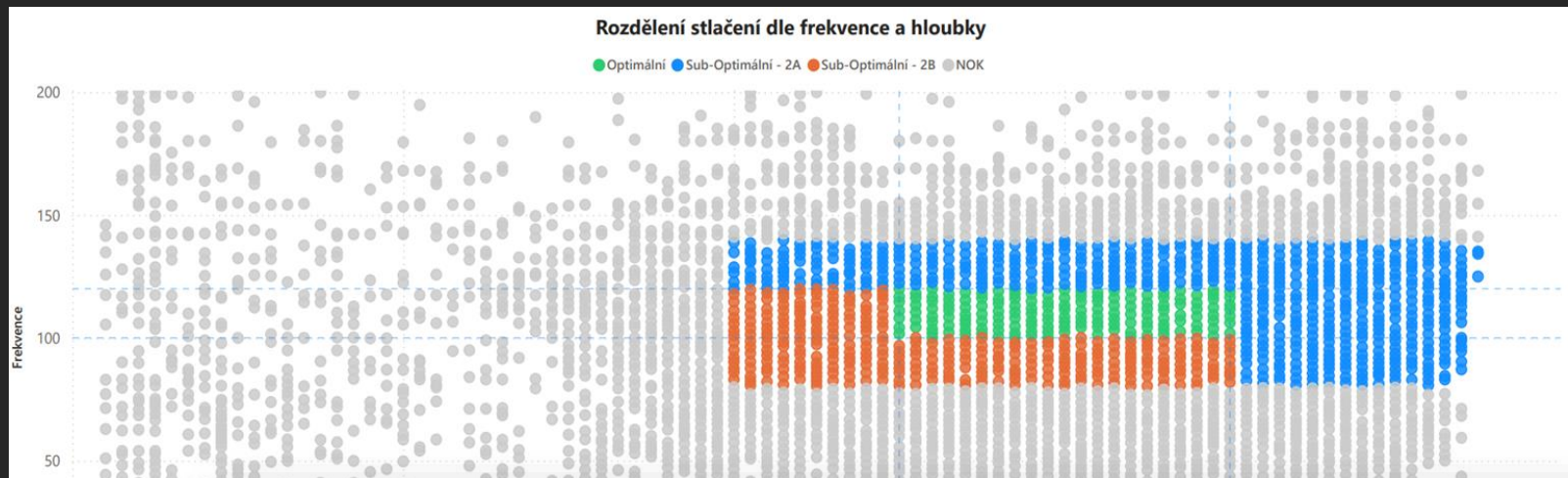
1. Vyšší náklady
2. Nižší dostupnost a škálování
3. Větší časová náročnost
4. Kognitivní zátěž a distrakce
5. Cybersickness
6. Složitější aktualizace

1. Větší realističnost a imerze
2. Situation awareness
3. Standardizace
4. Bezpečné prostředí
5. Automatický sběr dat a vyhodnocení
6. Individualizace - Teacher on hold
7. Škálovatelnost



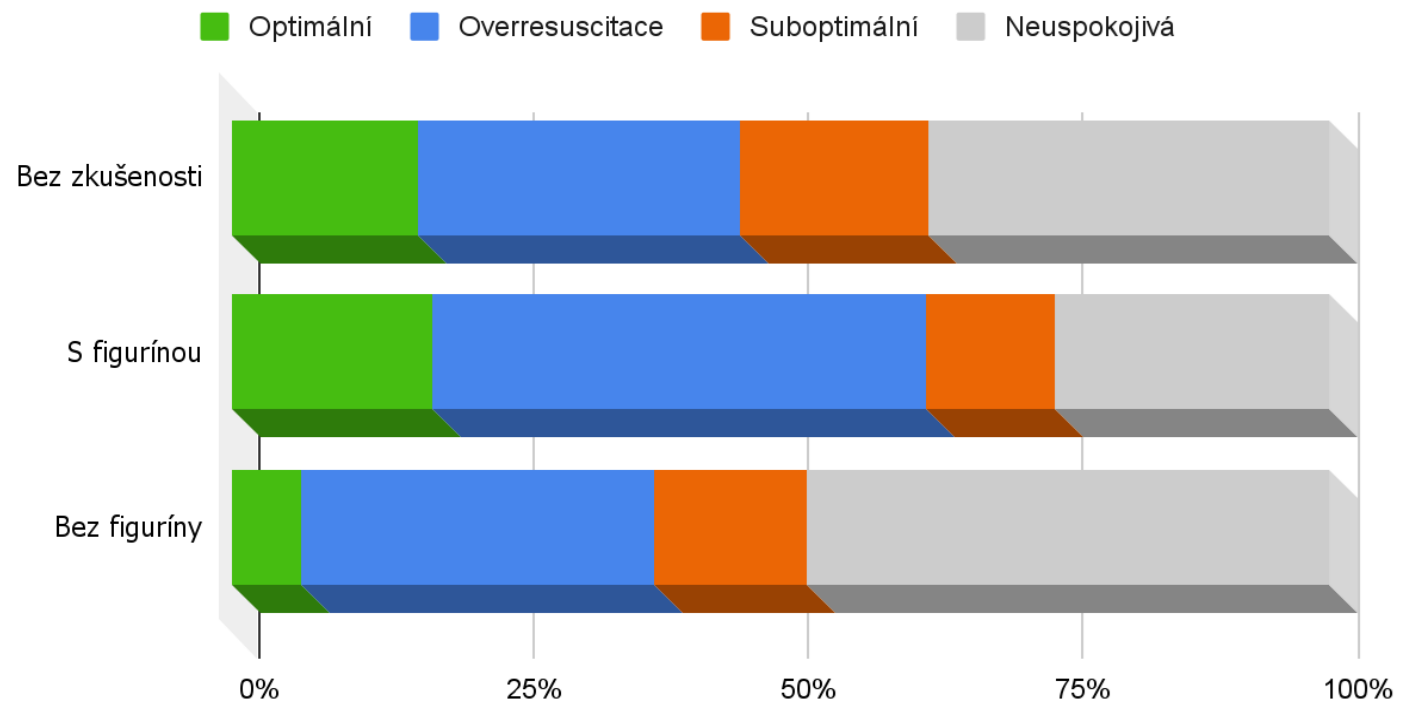
1. Potřeba napárování s figurínou
2. Technické problémy
3. Ekonomická náročnost (??)
4. Omezená zpětná vazba
5. Cybersickness
6. Složitější aktualizace





715
Počet participantů

KVALITA KOMPRESÍ DLE ZKUŠENOSTI (n=397)



RESEARCH

Open Access

The use of virtual reality and augmented reality to enhance cardio-pulmonary resuscitation: a scoping review

Katherine Kuyt¹, Sang-Hee Park², Todd P. Chang³, Timothy Jung⁴ and Ralph MacKinnon^{1,4*}

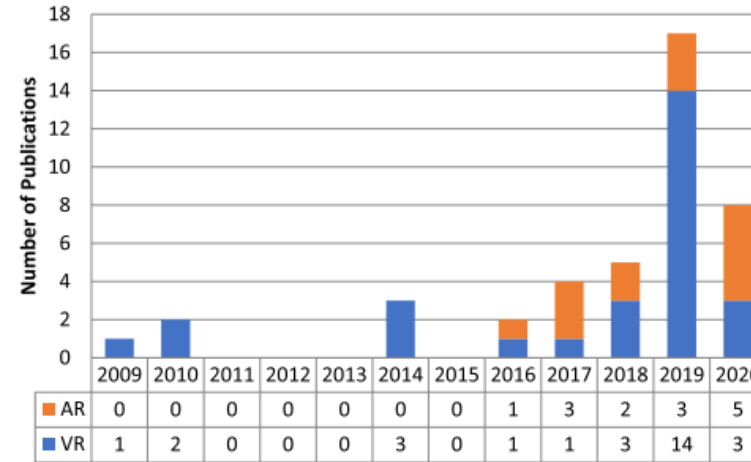


Fig. 2 Graph

PubMed®

postoperative vomiting

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RESULTS BY YEAR

Reset

2021-2026

PUBLICATION DATE

- ☐ 1 year
- ☒ 5 years
- ☐ 10 years
- ☐ Custom Range

2,426 results

Page 1 of 243

Filters applied: in the last 5 years, Controlled Clinical Trial, Meta-analysis, Observational Study, Randomized Controlled Trial, Review, Systematic Review.

Management of postoperative nausea and vomiting in the patient

1
Cite Rajan N, Joshi GP. Curr Opin Anaesthesiol. 2021 Dec 1;34(6):695-702. doi: 10.1097/ACO.0000000000001063. PMID: 34560688 Review.

PURPOSE OF REVIEW: **Postoperative nausea and vomiting (PONV)** continue to plague the surgical patient population with an adverse impact on **postoperative** outcomes. ...

2
Nonpharmacological Nursing Interventions in **Postoperative Nausea and Vomiting: A Systematic Review.**

Cite Arslan HN, Çelik SŞ.

RESEARCH

Open Access



Effectiveness of virtual and augmented reality for cardiopulmonary resuscitation training: a systematic review and meta-analysis

Rao Sun¹, Yixuan Wang², Qingya Wu¹, Shuo Wang¹, Xuan Liu¹, Pei Wang¹, Yuqin He¹ and Hua Zheng^{1,3*}

Efficiency of virtual reality for cardiopulmonary resuscitation training of adult laypersons A systematic review

Petronila Mireia Alcázar Artero, MD^{a,b}, Manuel Pardo Rios, PhD^{a,b,*}, Robert Greif, MD^{c,d}, Ana Belén Ocampo Cervantes, PhD^e, Gabriel Gijón-Nogueron, PhD^e, Roberto Barcala-Furelos, PhD^f, Silvia Aranda-García, PhD^g, Laura Ramos Petersen, PhD^g

Review

Use of augmented and virtual reality in resuscitation training: A systematic review



Adam Cheng^{a,*}, Nino Fijacko^b, Andrew Lockey^{c,d}, Robert Greif^{e,f}, Cristian Abelairas-Gomez^{g,h}, Lucija Gosakⁱ, Yiqun Linⁱ, on behalf of the Education Implementation Team Task Force of the International Liaison Committee on Resuscitation (ILCOR)¹

Conclusions Our study showed evidence that VR/AR-based training was as effective as traditional face-to-face CPR training. Nevertheless, there was substantial heterogeneity among the included studies, which reduced confidence in the findings. Future studies need to establish standardized VR/AR-based CPR training protocols, evaluate the cost-effectiveness of this approach, and assess its impact on actual CPR performance in real-life scenarios and patient outcomes.

Conclusion: VR in BLS training improves manual skills and self-efficacy of adult laypersons and may be a good teaching method in a blended learning CPR training strategy. VR may add another way to divide complex parts of resuscitation training into easier individual skills. However, the conclusion of this review suggests that VR may improve the quality of the chest compressions as compared to instructor-led face-to-face BLS training.

Conclusion

Augmented and virtual reality can be used to support resuscitation training of lay people and healthcare professionals, however current evidence does not clearly demonstrate a consistent benefit when compared to other methods of basic and advanced life support training.

Use of augmented and virtual reality in resuscitation training: A systematic review



Adam Cheng^{a,*}, Nino Fijacko^b, Andrew Lockey^{c,d}, Robert Greife^{e,f},
Cristian Abelairas-Gomez^{g,h}, Lucretia M. B. de Almeidaⁱ,
Implementation Team Task Force^j,
Resuscitation (ILCOR)¹

Table 5 – Knowledge Outcomes for Virtual Reality (VR) BLS studies.

Study	Number – Control vs. Intervention (VR)		Outcome – Control	Outcome – Intervention (VR)	P value
Knowledge acquisition					
Aksoy 2019 ²⁷	18 vs. 22; Total 40		Mean 8.9 (pre-post difference in knowledge test score)	Mean 17.6 (pre-post difference in knowledge test score)	P = 0.021
Barsom 2020 ³¹	20 vs. 20; Total 40		Median 25 (pre-post difference in knowledge score)	Median 32 (pre-post difference in knowledge score)	P = 0.035
Liu 2021 ²⁵	30 vs. 30 (video vs. VR; both without pretraining); Total 60		6.53 (score after training)	6.43 (score after training)	P = 0.66
Liu 2022 ²⁶	25 vs. 25; Total 50		2.24 (pre-post difference in knowledge score)	3.32 (pre-post difference in knowledge score)	P = 0.03
Castillo 2023 ²⁴	116 vs. 125; Total 241		8.21 (score after training)	8.44 (score after training)	P = 0.24
Chang 2023 ³⁴	23 vs. 30 vs. 22 Total 75		89.2 (control 1) and 88.2 (control 2) (score after training)	81.2 (score after training)	P < 0.05
Kim 2023 ³⁵	61 vs. 60; Total 121		12.33 (score after training)	15.33 (score after training)	P < 0.01
Knowledge retention					
Liu 2022 ²⁶	25 vs. 25; Total 50		–0.08 (pre-post difference in knowledge score at 5 weeks)	1.84 (pre-post difference in knowledge score at 5 weeks)	P = 0.02
Nas 2022 ²¹	97 vs. 91; Total 188		7 (score at 6 months)	7 (score at 6 months)	P = 0.81
Castillo 2023 ²⁴	56 vs. 64; Total 120		6.55 (score at 6 months)	6.25 (score at 6 months)	P = 0.75

Use of augmented and virtual reality in resuscitation training: A systematic review



Adam Cheng^{a,*}, Nino Fijacko^b, Andrew Lockey^{c,d}, Robert Greif^{e,f}, Cristian Abelairas-Gomez^{g,h}, Lucija Gosakⁱ, Yiqun Lin^j, on behalf of the Education Implementation Team Task Force of the International Liaison Committee on Resuscitation (ILCOR)¹

Table 6 – Skills Outcomes for Virtual Reality (VR) BLS studies.

Study	Number – Control vs. Intervention (VR)		Outcome – Control	Outcome – Intervention (VR)	P value
No Flow Time/Chest Compression Fraction					
Nas 2020 ²²	177 vs. 175; Total 352		67% (CCF)	61%	P < 0.01
Issleib 2021 ³²	104 vs. 56; Total 160		82sec (no flow time)	93sec	P < 0.01
Moll Khosrawi 2022 ³³	42 vs. 46; Total 88		8.0sec (no flow time)	5.8sec	P = 0.01
CPR Depth					
Leary 2019 ³⁰	53 vs. 52; Total 105		44.0 mm	38.0 mm	P = 0.05
Nas 2020 ²²	177 vs. 175; Total 352		56.8 mm	49.1 mm	P < 0.01
Hubail 2022 ²³	13 vs. 13; Total 26		47.2 mm	45.1 mm	P = 0.21
Castillo 2023 ²⁴	116 vs. 125; Total 241		47.1 mm	46.0 mm	P = 0.24
CPR Depth Compliance					
Nas 2020 ²²	177 vs. 175; Total 352		75%	51%	P < 0.01
Chang 2023 ³⁴	23 (CG1) vs. 30 (CG2) Total 75		99.8% (CG1) and 98.3% (CG2)	89.5%	P < 0.05
CPR Rate					
Leary 2019 ³⁰	53 vs. 52; Total 105		112 bpm	104 bpm	P = NS
Nas 2020 ²²	177 vs. 175; Total 352		108 bpm	114 bpm	P < 0.01
Hubail 2022 ²³	13 vs. 13; Total 26		114 bpm	111 bpm	P = 0.36
CPR Rate Compliance					
Nas 2020 ²²	177 vs. 175; Total 352		63%	50%	P = 0.01
Castillo 2023 ²⁴	116 vs. 125; Total 241		61.9%	60.3%	P = 0.71
Chang 2023 ³⁴	23 (CG1) vs. 30 (CG2) Total 75		93% (CG1) and 94.5% (CG2)	49.6%	P < 0.05
Chest Recoil Compliance					
Nas 2020 ²²	177 vs. 175; Total 352		88%	98%	P = 0.02
Hubail 2022 ²³	13 vs. 13; Total 26		78.2%	83.4%	P = 0.33
Castillo 2023 ²⁴	116 vs. 125; Total 241		70.5%	71.6%	P = 0.80
Chang 2023 ³⁴	23 (CG1) vs. 30 (CG2) Total 75		91.8% (CG1) and 82.8% (CG2)	83.8%	P = NS
Overall CPR Performance					
Liu 2021 ²⁵	30 vs. 30 (video vs. VR; both without pretraining); Total 60		66.9 (CPR score after training)	53.7 (CPR score after training)	P = 0.82
Hubail 2022 ²³	13 vs. 13; Total 26		9.61 (CPR Score after training)	8.53 (CPR Score after training)	P = 0.09
Chang 2023 ³⁴	23 (CG1) vs. 30 (CG2) Total 75		94.7 (CG1) and 93.6 (CG2) (CPR Score after training)	83.6 (CPR Score after training)	P < 0.05
Kim 2023 ³⁵	61 vs. 60; Total 121		76.9 (CPR Score after training)	85.9 (CPR Score after training)	P < 0.01

Use of augmented and virtual reality in resuscitation training: A systematic review



Adam Cheng^{a,*}, Nino Fijacko^b, Andrew Lockey^{c,d}, Robert Greif^{e,f}, Cristian Abelairas-Gomez^{g,h}, Lucija Gosakⁱ, Yiqun Lin^j, on behalf of the Education Implementation Team Task Force of the International Liaison Committee on Resuscitation (ILCOR)¹

Table 7 – Outcomes for Virtual Reality (VR) ALS studies.

Study	Number – Control vs. Intervention (VR)	Outcome – Control	Outcome – Intervention (VR)	P value
Knowledge				
Yang 2022 ²⁹	28 vs. 29	3.00 (pre-post difference)	5.48 (pre-post difference)	P = NS
Clinical Performance – (OSCE A test)				
Umoren 2021 ²⁸	88 vs. 91	72% (post training)	76% (post training)	P = 0.63
Umoren 2021 ²⁸	86 vs. 87	72% (retention at 6 months)	76% (retention at 6 months)	P = 0.61

Abbreviations: ALS – Advanced Life Support, OSCE – Objective Structured Clinical Exam, VR – virtual reality.

CPR Depth – Retention at 6 months				
Castillo 2023 ²⁴	56 vs. 64; Total 120	44.7 mm	42.7 mm	P = 0.33
CPR Rate Compliance – Retention at 6 months				
Castillo 2023 ²⁴	56 vs. 64 Total 120	52.2%	50.1%	P = 0.86
Chest Recoil Compliance – Retention				
Castillo 2023 ²⁴	56 vs. 64; Total 120	79.5%	77.3%	P = 0.57



Benefits of Virtual Reality Training for Cardiopulmonary Resuscitation Skill Acquisition and Maintenance

Nai Zhang, Guiying Ye, Chuang Yang, Peng Zeng, Tao Gong, Lu Tao

Table 2. Comparison of theoretical knowledge test scores between the traditional and VR groups.

Date	VR group (n = 50)	Traditional group (n = 50)	$F_{\text{Interaction}}/P_{\text{Interaction}}$ value
Immediately after training	8.52 ± 0.55	8.58 ± 0.50	424.484/0.001
1 month post-training*	7.41 ± 1.00	6.77 ± 0.81	
3 months post-training*	6.41 ± 1.06	5.67 ± 0.84	
6 months post-training*	6.18 ± 1.13	5.44 ± 0.83	
12 months post-training*	5.02 ± 0.88	4.21 ± 1.15	

Table 3. Comparison of post-training skills test scores between the traditional and VR groups.

Item	Date	VR group (n = 50)	Traditional group (n = 50)	$F_{\text{Interaction}}/P_{\text{Interaction}}$ value
Total score	Immediately after training	95.98 ± 1.80	94.35 ± 2.44	451.351/0.001
	1 month post-training*	70.93 ± 7.13	67.09 ± 6.56	
	3 months post-training*	69.61 ± 8.94	65.74 ± 8.41	
	6 months post-training*	62.66 ± 8.42	57.09 ± 10.61	
	12 months post-training*	48.02 ± 9.23	39.86 ± 9.39	
Assessment	Immediately after training	5.86 ± 0.35	5.63 ± 0.58	342.323/0.001
	1 month post-training*	5.50 ± 0.59	3.53 ± 1.30	
	3 months post-training*	5.02 ± 0.66	4.16 ± 0.75	
	6 months post-training*	4.36 ± 0.75	3.00 ± 0.87	
	12 months post-training*	4.00 ± 1.08	3.09 ± 0.89	
Chest compressions	Immediately after training	30.82 ± 0.75	30.42 ± 0.88	473.333/0.001
	1 month post-training*	28.77 ± 1.43	25.70 ± 2.20	
	3 months post-training*	26.73 ± 2.42	21.95 ± 3.88	
	6 months post-training*	23.61 ± 2.81	17.35 ± 4.20	
	12 months post-training	18.05 ± 3.46	17.19 ± 4.33	

VIRTUAL TAKE HOME

- NOVÁ POMĚRNĚ NEPROBÁDANÁ OBLAST ZDRAVOTNÍ VÝUKY
- VYPADÁ, ŽE NEPOSKYTUJE HORŠÍ VÝSLEDKY
- JE ŠKÁLOVATELNÁ – OTÁZKA CENY
- KAŽDOPÁDNĚ JE DOSTUPNÁ...

DÍKY A AŽ ŽIJÍ



MocPomoc
Tour 2026



... VIZE BUDOUCNOSTI