Multimedia Appendix 1. Educational and clinical applications of immersive reality in anesthesia summary tables.

Table S1. Educational interventions – Technical skills

Overview of studies using immersive reality for anesthesia-related teaching of technical skills, including key study outcomes. 3D, 3-Dimensional; AR, Augmented Reality; CPR, Cardiopulmonary Resuscitation; RCT, Randomized Controlled Trial; VR, Virtual Reality.

Study	Intervention	Educational scenario	Key Outcome(s)
Cailleau, et al., 2023 (RCT, n=86)[1]	Non-immersive VR simulator (ORSIM)	Fiberoptic intubation	VR training on simulated difficult airways provided no benefit relative to additional VR training on simulated normal airways
Chuan, et al., 2023 (validity, n=21 novice, 15 experienced)[2]	Immersive VR simulator (Oculus Rift S)	Ultrasound guided regional anesthesia	Demonstrated initial construct validity, scores for experienced participants were significantly higher than for novices
Huang, et al., 2023 (feasibility, n=40)[3]	MR simulator (Hololens)	Lumbar puncture	Improved success rate and time for participants
Kim, et al., 2023 (RCT, n=20)[4]	Immersive VR simulator (Oculus Quest 2)	Spinal anesthesia (Lumbar transforaminal epidural block)	VR group showed improved global rating score, procedural time and overall satisfaction relative to control (video/written materials)
Peek, et al., 2023 (RCT, n=31)[5]	Immersive VR simulator (headset not specified)	ACLS	Primary outcomes (time to reach specific clinical endpoints) were significantly worse in VR group.
Moll-Khosrawi, et al., 2022 (RCT, n=88)[6]	Immersive VR simulator (VIREED MED)	CPR (Basic Life Support)	Significantly improved outcomes (lower no flow time and overall performance) in VR group
Rochlen, et al., 2022 (observational, n=62)[7]	MR simulator (HoloLens 1)	Peripheral IV catheter placement	Demonstrated usability and positive user feedback.
White & Jung, 2022 (pre-post test, n=14)[8]	Non-Immersive VR simulator (SPINE Mentor)	Spinal cord stimulator placement	VR simulator led to improved confidence and performance scores compared to pre-test
Issleib, et al., 2021 (RCT, n=56 VR, 104 Control)[9]	Immersive VR simulator (+ CPR manikin) (headset not specified)	CPR (basic life support)	No flow time (primary outcome), an indicator of technical skill level, was improved in the control group relative to VR.
Lee, et al., 2021 (RCT Protocol, n=154 planned)[10]	MR simulator (HTC Vive Pro and CPR manikin)	CPR (Basic Life Support)	Primary outcome is mean compression depth

Mah, et al., 2021 (RCT, n=32)[11]	Immersive VR Video (Samsung Gear VR)	Central venous catheter insertion	No change in procedural time or scores with immersive video compared to standard video instruction.
Bube, et al., 2020 (RCT, n=32)[12]	Non-Immersive VR simulator	Cystoscopy	No difference in clinical outcomes (cystoscopy on two patients 3 weeks after training) between traditional and self-directed training (both groups used VR simulator) Only 32% of participants performed acceptable cystoscopy after training
Nas, et al., 2020 (RCT, n=381)[13]	Immersive VR simulator (Zeiss VR One Plus)	CPR	VR group had inferior performance compared to face-to-face training
Ameri, et al., 2019 (preliminary, n=5)[14]	Non-immersive 3D AR simulator	Ultrasound-guided epidural injection	AR training had a higher success rate than using ultrasound only using a phantom trainer
Sappenfield, et al., 2019 (non-randomized, n=76)[15]	MR simulator (3D printed mannequin + emulated ultrasound imaging + instruments tracked via magnetic sensors)	Supraclavicular central vein access	Following MR training, participants were able to use this new technique to access the central vein in less attempts and shorter times compared to the standard approach
Aebersold, et al., 2018 (RCT, n=69)[16]	Non-immersive AR training via mobile device	Nasogastric tube placement	AR was well received and led to improved technical skills compared to traditional didactic teaching
Casso, et al., 2019 (Validity, n=22)[17]	Non-immersive VR simulator	Bronchoscopy	Generally positive face validity results following testing by senior anesthesiologists, although some concerns were noted
Jensen, et al., 2018 (observational, n=25)[18]	Non-immersive VR simulator	Point-of-care ultrasonography	23 out of 25 novice practitioners attained mastery in a median time of 1h 46m
Jiang, et al., 2018 (RCT, n=46)[19]	Non-Immersive VR simulator vs. high-fidelity mannequin training	Fibreoptic intubation	No difference in procedure outcomes between groups

Wong, et al., 2019 (RCT, n=34)[20]	Non-Immersive VR simulator	Fibreoptic intubation	VR group showed improved skills, following training, while the control group did not.
Rochlen, et al., 2017 (feasibility, n=40)[21]	AR simulator (mannequin with projected anatomical landmarks) (Epson Moverio BT-200 Smart Glasses)	Central line insertion	Positive feedback from participants regarding usability and utility
Mahmood, et al., 2018 (feasibility)[22]	AR simulator (Hololens)	Transthoracic and transesophageal echocardiography	Design features discussed, and opportunities for improvement identified
Latif, et al., 2016 (observational, n=15)[23]	Non-Immersive VR simulator (2x)	Fibreoptic bronchoscopy and intubation	Novice learners could be trained to proficiency (relative to practicing anesthiologists) using simulator
Nilsson, et al., 2015 (RCT, n=23)[24]	Non-Immersive VR simulator	Fibreoptic intubation	Positive training effects were observed in both groups (both groups used VR simulator, no difference between partial-task and whole-task training)
Failor, et al., 2014 (feasibility, n=13)[25]	Non-immersive VR simulator	Lung isolation	Participants rated training highly and had increased procedural confidence after training
O'Sullivan, et al., 2014 (Pilot, n=10)[26]	Non-Immersive VR simulator	Ultrasound-guided axillary brachial plexus block	No difference between standard training with our without additional VR simulation training
Robinson, et al., 2014 (pre-post test, n=54)[27]	MR simulator (3D-printed model with 3D virtual model underlaid)	Subclavian venous access	Residents showed improvements in procedural skills following training
De Oliveira, et al., 2013 (RCT, n=20)[28]	Non-Immersive VR simulator (tablet-based)	Fibreoptic intubation	Fewer failed attempts and continued improvement with simulation relative to no additional training
Kulcsar, et al., 2013 (RCT, n=27)[29]	Immersive VR simulator	Spinal anesthesia/dural puncture	VR group performed better when performing supervised procedures in clinic
Grottke, et al., 2009 (feasibility, n=5)[30]	Non-immersive VR simulator	Regional anesthesia	Discussion of regional anesthesia VR simulator capable of integrating personalized patient models

Goldmann, et al., 2006 (Observational, n=11 novices, 4 experienced)[31]	Non-Immersive VR simulator	Fibreoptic intubation	Novices trained with simulator performed faster than those without (and similar to experienced anesthesiologists)
Reznek, et al., 2002 (validity, n=41)[32]	Non-immersive VR simulator	Intravenous insertion	VR simulator demonstrated adequate validity and was appealing to users

Table S2. Educational interventions – Non-technical skills

Overview of studies using immersive reality for anesthesia-related education of non-technical skills, including key outcomes. AR, Augmented Reality; CPR, Cardiopulmonary Resuscitation; IPC, Infection Prevention and Control; RCT, Randomized Controlled Trial; VR, Virtual Reality.

Study	Intervention	Educational scenario	Key Outcome(s)
Hoek, et al., 2023 (qualitative, n=10)[33]	Immersive VR video (Oculus Go)	Therapeutic communication skills	Qualitative feedback on different communication styles and participant reflection was encouraged
Hoxbro Knudsen, et al., 2023 (validity, n=61)[34]	Immersive VR simulator (Oculus Quest 1 and 2)	Emergency medicine	Construct validity established using experienced, intermediate and novice learners.
Liaw, et al., 2023 (RCT, n=120 working in teams of 4)[35]	Non-immersive VR simulator (screen-based)	Managing stress response (Clinical deterioration, sepsis)	No difference in stress response, participant confidence or performance outcomes between groups (VR vs. face-to-face conventional simulation)
Speidel, et al., 2023 (RCT, n=61)[36]	Immersive VR video (HTC Vive)	Surgical unit virtual tour	VR 360 video effectively conveys spatial orientation and factual information simultaneously in the same learning scenario
Hess, et al., 2022 (observational, n=18)[37]	AR simulator (Magic Leap One)	Communication skills (ACLS scenario)	Medical students reported the simulation was acceptable and enjoyable
Truong, et al., 2022 (Observational, n=180, including 18 anesthesiologists) [38]	Immersive VR simulator (HTC Vive)	Operating room fire	4.4% of participants responded safely to an operating room fire on the first simulation, compared to 79% after VR training
Chheang, et al., 2020 (pilot study, n=3)[39]	Multiuser immersive VR simulator (HTC Vive)	Intraoperative communication (surgeon and anesthesiologist)	System described and feedback gathered from pilot participants regarding sense of presence, accuracy, etc.
Katz, et al., 2020 (Observational, cross-over, n=23)[40]	Immersive VR simulator (non-specified Samsung and HP headsets)	Advanced cardiac life support team leadership	Control group (high-fidelity mannequin) performed better with regard to technical processes, but no difference in decision making or communication between groups.
Lerner, et al., 2020 (feasibility, n=9 groups of 2)[41]	Immersive multiuser VR simulator (HTC Vive)	Airway crisis scenario	Participants reported training as effective, small increased in post-training knowledge was observed

Masson, et al., 2020 (RCT protocol, planned n=330)[42]	Immersive VR simulator (Oculus Rift)	Operating room infection prevention measures	Primary outcome is end of term IPC exam results (VR training vs standard slide-based lecture)
Wunder, et al., 2020 (Observational, n=32)[43]	MR simulation (Magic Leap One AR)	Operating room fire	Utility and limitations of this simulation approach were established
Abbas, et al., 2019 (RCT, n=20)[44]	Immersive VR simulator (headset not specified)	Anesthesia crisis management (local anesthetic systemic toxicity)	VR group showed improvement in some metrics, but not others after training
Erlinger, et al., 2019 (RCT, n=39)[45]	Non-immersive virtual simulator (screen-based)	Recognition of clinical intraoperative events	Students using high-fidelity mannequin simulation recognized an intraoperative event faster than when using the virtual simulation
Semeraro, et al., 2019 (feasibility, n=22)[46]	Immersive VR simulator (HTC Vive and Oculus Go)	CPR (basic life support)	A blended curriculum with traditional teaching, mannequin-based simulation and VR environments was well received by both lay people and healthcare practitioners
Sankaranarayanan, et al., 2018 (RCT, n=20)[47]	Immersive VR simulator (Oculus Rift)	Operating room fire	VR group performed better in mock OR fire scenario than those with didactic teaching alone
Cordar, et al. 2017 (observational, n=53)[48]	MR simulator (Virtual humans)	Operating room communication	Communication behaviors of anesthesia residents were positively affected by positive behaviors in virtual teammates
Dorozhkin, et al., 2017 (validity, n=49)[49]	Immersive VR simulator (Oculus Rift)	Operating room fire	Face validity was successfully established, high participant rankings for usefulness and effectiveness
Real, et al., 2017 (RCT, n=45)[50]	Immersive VR simulator (Oculus Rift)	Persuasion training (pediatric influenza vaccine hesitancy)	Vaccine refusal rate was significantly lower in the 3months after training for those in the VR group.
Cordar, et al., 2015 (RCT, n=22)[51]	MR simulator (Virtual humans)	Operating room conflict resolution	Conflict resolution behaviors were positively or negatively affected by corresponding behavior in virtual teammates.

Table S3. Patient-based immersive reality interventions in anesthesia

Overview of studies using immersive reality for patient-based, clinical interventions relevant to anesthesia. HMD, Head-mounted Display; IV, Intravenous; RCT, Randomized Controlled Trial; VR, Virtual Reality.

Study	Timing	Intervention	Patient Population	Key Outcome(s)
Baytar, et al., 2023 (observational, n=40)[52]	Pre-procedure	Immersive VR video (Samsung Gear VR)	Septorhinoplasty	VR intervention reduced pre-operative anxiety
Kim, et al., 2023 (RCT, n=40)[53]	Pre-procedure	Immersive VR Video (Samsung Gear VR)	GI endoscopy	Mean pre-procedure anxiety did not differ between control and VR group
Le Du, et al., 2023 (RCT, n=126)[54]	Intra-procedure	Immersive VR environment (Samsung Gear VR)	Bone Marrow Biopsy	Pain and anxiety scores were similar between VR and Nitrous Oxide groups
Lind, et al., 2023 (RCT, n=117)[55]	Intra-procedure	Immersive 2D VR video (HappyMed)	Transcatheter aortic valve implanation	Pain and anxiety scores were similar between groups.
Lopes, et al., 2023 (observational, n= 53 VR and 46 control)[56]	Intra-procedure	Immersive VR environment (HypnoVR)	Regional anesthesia block (upper limb orthopaedic surgery)	No difference between groups in anxiety before and after block.
Pelazas-Hernandez, et al., 2023 (RCT, n=154)[57]	Intra-procedure	Immersive VR environment (Oculus Go)	Outpatient hysteroscopy	Reduced pain scores in VR group. No change in physiological outcomes.
Barry, et al., 2022 (non-randomized, n=18 VR, 2:1 with controls)[58]	Intra-procedure	Guided Relaxation (PICO G2 4K Enterprise)	Total hip or knee arthroplasty with spinal anesthesia	VR procedures used less intraoperative sedation. Postoperative outcomes were similar between groups
Boonreunya, et al., 2022 (RCT, n=96)[59]	Intra-procedure	Immersive VR video (Oculus Go)	GI Endoscopy	No difference in pain scores or physiological metrics between groups
Faruki, et al., 2022 (RCT, n=40)[60]	Intra-procedure	Immersive VR environment (Oculus Go)	Hand surgery (regional anesthesia)	Less supplemental anesthesia (propofol) was required in VR group vs. control
Fouks, et al., 2022 (RCT, n=82)[61]	Intra-procedure	Interactive VR environment (AppliedVR)	Awake, outpatient operative hysteroscopy	No change in pain scores with VR relative to standard of care

Goergen, et al., 2022 (RCT, n=159)[62]	Intra-procedure	Immersive VR video (Exos 3D VR headset)	Rigid cystoscopy under local anesthesia	VR group had reduced heart rate variability, shorter procedures and less pain in some cases.
Krish, et al., 2022 (case report, n=2)[63]	Intra-procedure	Immersive VR video (Oculus Go)	Hand surgery (awake, local anesthesia)	Positive feedback on the VR process from participants
Lame, et al., 2022 (Case report, n=1)[64]	Intra-procedure	Immersive VR video (headset not specified)	Endovascular aneurysm repair	Patient underwent a successful surgery free of complications
Rousseaux, et al., 2022 (RCT, n=100)[65]	Pre-procedure and post-procedure	Immersive VR environment +/- guided relaxation (no headset reported)	Perioperative cardiac surgery	No significant difference between groups (control, hypnosis, VR, VR + hypnosis) in pain, anxiety or opioid use
Soret, et al., 2022 (observational, n=36 – 12 VR, 24 control)[66]	Intra-procedure	Immersive VR video (Oculus Go)	Bone marrow aspiration	No difference in anxiety or pain scores between groups.
Yesilot, et al., 2022 (RCT, n=100)[67]	Intra-procedure	Immersive VR video (smartphone-based headset not specified)	Lipoma excision with local anesthesia	VR and communication intervention reduced pain during procedure
Karaman, et al., 2021 (RCT, n=60)[68]	Intra-procedure	Immersive VR video (smartphone-based headset not specified)	Fine needle aspiration breast biopsy	Post-procedure pain and average anxiety were significantly reduced in VR group.
Ledford, et al. 2021 (case report, n=1)[69]	Intra-procedure	Guided relaxation (PICO G2 4K Enterprise)	Total hip arthroplasty with neuraxial anesthesia	Patient reported positive experience
Luczak, et al., 2021 (RCT, n=100)[70]	Intra-procedure	Immersive VR environment (headset not specified)	Rigid cystoscopy under local anesthesia	VR group had lower pain scores and physiological markers, but higher levels of nausea
Peuchot, et al. 2021 (Observational study, n=20)[71]	Intra-procedure	VR hypnosis (HypnoVR)	Total knee arthroplasty with spinal anesthesia	VR patients required less sedation No change in postoperative anxiety

Roxburgh, et al. 2021 (observational, n=99)[72]	Intra-procedure	Guided breathing and music (Deepsen)	Atrial fibrillation ablation with awake sedation	Pain improved in VR group No change in morphine consumption
Tharion, et al., 2021 (RCT, n=90)[73]	Intra-procedure	Immersive video (Smartphone + PRO1 HMD)	Arthroscopic knee surgery with spinal anesthesia	Significantly higher patient satisfaction an no change in anxiety using VR vs IV midazolam
Touil, et al., 2021 (observational, n=48)[74]	Pre-procedure /Intra-procedure	Immersive VR/Guided relaxation (Gear VR)	Loco-regional (axillary plexus) anesthesia block for hand surgery	Pre-operative anxiety was significantly reduced after VR session.
Turrado, et al., 2021 (RCT, n=126)[75]	Pre-procedure	Immersive VR video (OR Tour) (BlueBee Genuine VR)	Colorectal cancer	Pre-operative anxiety was reduced using VR operative process tour
Vogt, et al., 2021 (RCT, n=84)[76]	Pre-procedure	Immersive video (OR tour) (Oculus Go)	Elective surgery with general anesthesia	No change in anxiety with VR, but high patient satisfaction
Alaterre, et al., 2020 (before-after study, n=100)[77]	Intra-procedure	Guided meditation (Oculus Go)	Upper limb surgery, peripheral nerve block	Higher patient satisfaction and lower intraoperative anxiety with VR
Chan, et al., 2020 (Observation study, n=108)[78]	Pre-procedure	Guided relaxation (Gear VR)	Minor elective gynecological surgery	Anxiety and depression were reduced post-intervention, relative to before
Huang, et al., 2020 (RCT, n=50)[79]	Intra-procedure	Immersive video (Gear VR or Oculus Rift DK2)	Total hip/knee arthroplasty, regional anesthesia	No difference in sedation requirements in VR group
Kist, et al., 2020 (Case report, n=3)[80]	Intra-procedure	Guided relaxation (Gear VR)	Epidural placement for labour	VR helpful for self-reported pain and anxiety
Sridhar, et al., 2020 (Pilot RCT, n=30)[81]	Intra-procedure	Immersive environment (unspecified device)	First trimester pregnancy termination	Decreased anxiety during and after procedure with VR
Faruki, et al., 2019 (RCT protocol,	Intra-procedure	Guided relaxation (Oculus Go)	Upper extremity orthopaedic surgery with peripheral nerve block	Study ongoing (primary outcome difference in propofol use)

planned n=40)[82]				
Hoxhallari, et al., 2019 (RCT, n=41)[83]	Intra-procedure	Immersive video (Gear VR)	Awake hand surgery under local anesthesia	Lower anxiety reported with VR, no change in pain scores
Moon, et al., 2018 (RCT, n=37)[84]	Intra-procedure	Guided relaxation (Gear VR)	Endoscopic urologic surgery with spinal anesthesia	VR distraction with no sedatives increased patient satisfaction and reduced respiratory side effects relative to midazolam.
Thomas, et al., 2018 (Case report, n=1)[85]	Intra-procedure	Interactive game (Playstation VR)	Lumbar puncture	Reduced sedative requirements, procedure time and recovery time relative to previous procedures in same patient
Chan, et al., 2017 (pilot study, n=19)[86]	Intra-procedure	Immersive video (Oculus Rift DK2)	Joint replacement with regional anesthesia	Sedative use was lower in the VR group
Mosso, et al., 2017 (RCT, n=115)[87,88]	Intra-procedure	Interactive environment (eMagin HMD)	Upper GI endoscopy	VR distraction reduced subjective pain scores and corresponding physiological responses
Pandya, et al., 2017 (retrospective, n=14)[89]	Intra-procedure	Interactive environment (Hypervision 2D VR glasses)	Preoperative adductor canal catheter insertion	VR group received less IV sedation and reported less pain
Bekelis, et al., 2016 (RCT, n=127)[90]	Pre-procedure	Immersive video (Peri-operative process) (unspecified Oculus device)	Elective cranial and spinal procedures	Higher satisfaction and lower anxiety observed with VR
Jahani Shoorab, et al., 2015 (RCT, n=30)[91]	Intra-procedure	Immersive video (Wrap 920, Vuzik)	Episiotomy repair	Reduced pain in VR + lidocaine group vs lidocaine alone
Mosso, et al., 2009 (RCT, n=21)[92]	Intra-procedure	Immersive video (Vuzik iWear AV 920)	Ambulatory surgery with local/regional anesthesia	Reduced anxiety in VR group

Table S4. Healthcare provider-focused clinical immersive reality interventions

Overview of studies using immersive reality for healthcare-provider-focused clinical interventions relevant to anesthesia. 3D, 3-Dimensional; AR, Augmented Reality; HMD, Head-mounted Display

Study	Use	Intervention	Clinical scenario	Key Outcome(s)
Bergauer, et al., 2023 (RCT, n=50 anesthesiologists)[93]	Vital Signs Monitoring	Immersive VR HMD (Visual Blood, Oculus Quest 2)	Arterial Blood Gas (ABG) monitoring	Correct perception of ABG parameters was similar between Visual Blood VR and standard printouts
Berger, et al., 2023 (case report, n=1)[94]	AR guidance	AR HMD (Medivis SurgicalAR)	Percutaneous rhizotomy	AR-assisted fluoroscopy guided percutaneous glycerol rhizotomy was successfully performed on 1 patient.
Hayasaka, et al., 2023 (RCT, n=30)[95]	AR guidance	AR HMD (HoloLens2)	Epidural anesthesia	Optimal needle placement was significantly improved in AR group vs control
Jun, et al., 2023 (proof-of-concept, n=1 anesthesiologist)[96]	AR guidance	AR HMD (HoloLens2)	Epidural injection (Lumbosacral transforaminal epidural injection)	Procedure duration was shorter in using AR, but no significant difference in needle accuracy
Reinacher, et al., 2023 (RCT, n=4, 20 attempts each (10 normal, 10 with AR)[97]	AR guidance	AR HMD (Magic Leap 1)	Epidural anesthesia	Success rate, distance from optimal placement and procedure time were improved with AR.
Iliff, et al., 2022 (case report, n=1)[98]	Pre-procedure planning	HMD (HTC Vive)	Difficult airway planning	CT and MRI imaging form 1 patient was visualized using VR, resembling virtual endoscopy
Moon & Barua, 2022 (usability, n=10, including 2 anesthetists)[99]	Pre-procedure planning	MR HMD (Magic Leap 1)	Awake craniotomy planning	Acceptable usability demonstrated for multi-disciplinary team
Seong, et al., 2022 (Case Report, n=3)[100]	Pre-procedure planning	Non-immersive virtual simulation	Regional anesthesia	Three challenging regional anesthesia blocks were successfully preformed using the simulation
Tanwani, et al., 2022 (proof-of-concept, n=7 anesthesia resident/staff)[101]	MR guidance	MR HMD (HoloLens1)	Ultrasound guided regional anesthesia (neuraxial)	Preliminary results suggest technique is easy for novice and experienced learners
Follmann, et al., 2021 (crossover trial, n=40)[102]	Technical Guideline presentation	AR glasses (Recon Jet)	Triage decisions in mass casualty event	AR took more time per assessment than tablet PC, but was reduced with practice. No difference in accuracy.

Romare, et al., 2021 (qualitative, n=7)[103]	Vital Signs Monitoring	HMD (Google Glass)	Nurse anesthetists administering anesthesia care	Feedback gathered and opportunities for improvement identified.
Schlosser, et al., 2019 (proof-of-concept, n=8)[104]	Vital Signs Monitoring	HMD (Vuzix M300 HWD)	Supervising anesthesiologist, simulated operating rooms	Significantly more patient alarms were noticed using the HMD
Hetherington, et al., 2017 (validity, n=20)[105]	Real Time Guidance	AR overlay (PicoPro Projector)	Ultrasound-guided epidural/spinal anesthesia	Successful identification of vertebral levels in real time
Kaneko, et al., 2017 (proof-of-concept, n=32)[106]	Real Time Guidance	AR HMD (Moverio BT-200)	Ultrasound guided fine-needle aspiration in neck	No difference in procedural outcomes (time, needle redirections), but potentially improved ergonomics (reduced number of head turns)
Kaneko, et al., 2016 (pilot study, n=5)[107]	Real Time Guidance	AR HMD (Moverio BT-200)	Simulated ultrasound-guided central venous catheterization	No difference in procedural outcomes (time, needle redirections), but potentially improved ergonomics (reduced number of head turns)
Przkora, et al., 2015 (validity, n=20)[108]	Real Time Guidance	AR HMD (Wrap, Vuzik)	Simulated ultrasound-guided peripheral nerve block	HMD improved procedure time and reduce head and probe movements
Ashab, et al., 2012 (validation, n=10)[109]	Real Time Guidance	AR overlay (MicronTracker SDK + 3D Slicer)	Ultrasound-guided epidural	AR was more successful in identifying vertebral levels than manual methods
Udani, et al., 2012 (Feasibility, n=2)[110]	Real Time Guidance	AR HMD (MicroOptical CV-3)	Simulated ultrasound-guided popliteal-sciatic nerve blocks	Confirmed feasibility of their approach
Liu, et al., 2009 (repeated measures, n=12)[111]	Vital Signs Monitoring	HMD (Microvision Nomad)	Simulated operating room scenarios	Participants were able to detect some clinical events faster using HMD, especially when physically constrained by another task. However, some events were detected more slowly.
Sanderson, et al., 2008 (repeated measures, n=16)[112]	Vital Signs Monitoring	HMD, vs advanced auditory monitoring (Sony U50 Palmtop PD)	Supervision of simulated junior anesthesia resident during simulated operation	Participants were able to detect more clinical events of interested using audio-based vital signs monitoring than HMD or traditional visual monitors
Ormerod, et al., 2003 (feasibility,	Vital Signs Monitoring	HMD (Microvision Nomad)	Anesthesiologists, simulated operating room scenario	Anesthesiologists had reduced shifts in attention with HMD,

n=unknown)[113]				allowing more time spent looking at patient
Block, et al., 1995 (feasibility, n=11)[114]	Vital Signs Monitoring	Data projected directly into one eye ("Private Eye, Reflection Technology)	Anesthesiologists, general surgical list	Generally favorable response, but technical issues were identified

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