Author (year) Country	Setting/ Medical discipline/ Participants	Trial Characteristics	Risk of Bias	Outcome assessed	Results
Offline computer-based digital learning *vs* Face-to-face learning					
Boet 2010 [48] Canada	Setting: University simulation center Medical discipline: Anesthesia Participants: 50 Postgraduate residents	Study design: Parallel RCT IG: Watched offline video for self-debriefing following management of simulation crisis. CG: Received instructor-debriefing following management of simulation crisis. Technology type/Duration: Video recording/ 30-min pre- intervention, 20 min debriefing, 5 min duration of the scenarios Instruments: Valid and reliable tool; Anesthetists' Non-Technical Skills (ANTS), Cronbach α (0.79 to 0.86) Source of funding: The Network of Excellence in Simulation for Clinical Teaching & Learning, Toronto, Canada. Conflict of interest: Not reported	High risk	Cognitive skill gain	Pre-intervention Mean ± SD: IG:11.36±2.18, CG:11.80±2.19 Post-intervention Mean ± SD: IG:12.44±1.93, CG:13.27±1.33 Absolute change from the baseline: IG:1.08, CG:1.47 Post-intervention Ratio of the mean (IG/CG): 0.94 P value: 0.58 Conclusion: No difference in the outcome between the two groups
D'Allessandro 1993 [43] USA	Setting: University Hospital	Study design: Parallel RCT IG: Received a multimedia textbook	High risk	Cognitive skill gain	Pre-intervention Mean ± SD: IG: 58.8, CG: 53.3

	Medical discipline: Radiology Participants: 49 Residents and faculty	imaging of diffuse lung disease (DLD). CG: Received 50-minute lecture on the same material (DLD) as in multimedia textbook. Technology type/Duration: Multimedia/ Not reported Instruments: low internal validity questionnaire to assess knowledge and cognitive skills together (10 questions; 3 of the 10 questions were on image pattern recognition (cognitive skills), and 7 questions on knowledge) Source of funding: Not reported Conflict of interest: Not reported		Knowledge gain	Post-intervention Mean ± SD: IG:83.2±29.56, CG:82.9±35.05 Absolute change from the baseline: IG:24.4, CG:29.6 Post-intervention Ratio of the mean (IG/CG): 1 P value: 0.28 Conclusion: No difference in the outcome between the two groups
Davis 2007 [55] UK	Setting: Postgraduate education and training center Medical discipline: Evidence-based medicine Participants: 55 Medical interns	Study design: Parallel RCT IG: Received computer-based (CD-ROM) sessions on evidence-based medicine (EBM) and systematic reviews. CG: Received face-to-face lecture-based sessions on EBM and systematic reviews with same content. Technology type/Duration: Software or computer-based programs/ 40	Low risk	Knowledge gain	Pre-intervention Mean ± SD: IG: 11.1±2.2, CG: 10.0±3.0 Post-intervention Mean ± SD: IG:13.2±2.54, CG: 11.9±2.54 Absolute change from the baseline: IG:2.1, CG:1.9 Post-intervention Ratio of the mean (IG/CG): 1.11 P value: 0.06

		min and 10 min for each questionnaire Instruments: Validated assessment tools, included 5 questions on knowledge. (Two structured questions and three MCQs). Source of funding: Health Education England (West Midlands Deanery Conflict of interest: No conflict of interest			Conclusion: No difference in the outcome between the two groups
Esfahani 2014 [61] Iran	Setting: University Hospital Medical discipline: Psychiatry Participants: 14 Postgraduate Residents	Study design: Parallel RCT IG: Residents were given one day workshop and videotape in communication skills. CG: Residents were given two days workshops in communication skills. Technology type/Duration: Video recording /2-day workshop Instruments: Validated and reliable tool; Jefferson's empathy scale, (measure the perception of physician empathy) AND Invalidated tool; the objective assessment of empathy rated by two certified psychiatrists independently. Source of funding: Iranian Mental Health Research Network. Conflict of interest: Not reported	High risk	Cognitive skill gain	Pre-intervention Mean ± SD: IG: 116.3 ±11.2, CG: 122.7±4.8 Post-intervention Mean ± SD: IG:114.3±14.1, CG:125±7.9 Absolute change from the baseline: IG: -2, CG:2.3 Post-intervention Ratio of the mean (IG/CG): 0.91 P value: <0.001 Conclusion: Face-to-face (control) group had better outcome
Farahmand 2016 [62] Iran	Setting: University Hospital	Study design: Parallel RCT IG: Interns received DVD consisted of 35	High risk	Cognitive skill gain	Pre-intervention Mean ± SD: NR Post-intervention Mean ± SD: IG:

	Medical discipline: ALS course (trauma life support) Participants: 120 Medical interns	minutes lecture, 15 minutes simulated scenario on initial management of trauma patients then hands on session on mannequin for 50 minutes. CG: Interns received trauma workshop composed of 35 minutes lecture, 15 minutes case simulation by the same contents and instructor followed also by hands on session on mannequin for 50 minutes. Technology type/Duration: Software or computer-based programs/ 100 min Instruments: Validated tool: OSCE Source of funding: Educational Development Center of Tehran University of Medical Sciences (TUMS) Conflict of interest: Not reported			16.5 ± 1.96, CG: 12.3 ± 2.22 Absolute change from the baseline: NR Post-intervention Ratio of the mean (IG/CG): 1.34 P value: 0.001 Conclusion: OCDE group had better outcome
Farokhi 2016 [63] Iran	Setting: Conducted in Fars Province, Iran by psychiatrists who participated in the addiction detoxification continuous training program Medical discipline: Psychiatry	Study design: Parallel RCT IG: electronic learning method on addiction detoxification designed in the interactive multimedia form (a professor's voice, related images and animations, clinical specimens) with self-assessment training at the end of each segment. the content was made available on compact disc to the research subjects. The	High risk	Knowledge gain	Pre-intervention Mean ± SD: IG: 13.15 ±1.62, CG: 13.25±1.87 Post-intervention Mean ± SD: IG: 18.84 ±1.61, CG:17.06 ±1.83 Absolute change from the baseline: IG:5.69, CG:3.81 Post-intervention Ratio of the mean (IG/CG): 1.1 P value: <0.01

	Participants: 118 Medical interns	subjects after studying the interactive content and passing all sections of the course proceeded to the posttest section of the compact disc. CG: A professor taught lessons using lectures and power point presentations along with questions and answers. Technology type/Duration: Software or computer based programs/ IG: not specified, CG: 12 hours Instruments: Validated and reliable 24 MCQs (closed and regular questions) Source of funding: None Conflict of interest: No conflict of interest			Conclusion: OCDE group had better outcome
Isaranuw-atchai 2016 [51] Canada	Setting: University simulation center Medical discipline: Anesthesia Participants: 50 Postgraduate Residents (the same sample included in the Boet 2010 [48]	Study design: Parallel RCT/Cost effectiveness analysis IG: Watched offline video for self-debriefing following management of simulation crisis. CG: Received instructor-debriefing following management of simulation crisis. Technology type/Duration: Video recording / 30-min before intervention (pre). 20 min debriefing .5 min duration of the scenarios (post) Source of funding: Ottawa Hospital	High risk	Cost-effectiveness	Pre-intervention Mean ± SD: NA Post-intervention Mean ± SD: NA Absolute change from the baseline: NA Post-intervention Ratio of the mean (IG/CG): NA P value: NA Conclusion: OCDE was cost-effective when compared to face-to-face learning if the cost of the intervention was ≤ Can$ 200

		Anesthesia Alternate Funds Association Conflict of interest: No conflict of interest			
Farrar 2008 [41] Australia	Setting: University Hospital Medical discipline: Pediatrics Participants: 66 Practicing doctors	Study design: Quasi-RCT IG: Participant worked individually on interactive teaching module presented on CD-ROM (Computerized tutorial) to learn about childhood epilepsy (i.e. diagnostic approach to a paroxysmal event). CG: Facilitated case discussion tutorial with same content. Technology type/Duration: Software or computer-based programs/ IG:20-30 min, CG:45 min Instruments: Invalidated anonymous scoring by the authors compared with a gold standard prepared by 3 neurologists Source of funding: Sydney Children's Hospital Foundation. Conflict of interest: Not reported	High risk	Knowledge gain	Pre-intervention Mean ± SD: IG: 49.39±NR, CG: 50.30±NR Post-intervention Mean ± SD: IG:63.91± NR, CG:54.82± NR Absolute change from the baseline: IG:14.52, CG:4.52 Post-intervention Ratio of the mean (IG/CG): 1.17 P value: <0.01 Conclusion: OCDE group had better outcome
Garcia-Rodriguez 2016 [49] Canada	Setting: University Hospital Medical discipline: General Practice/Family Medicine Participants: 39 Postgraduate Residents	Study design: Parallel RCT IG: 10 min video-module to teach the IUD insertion procedure. CG: Face-to-Face traditional approach to IUD instruction with same content and instructions.	Unclear risk	Knowledge gain	Pre-intervention Mean ± SD: IG: 9.0±2.33, CG: 8.0±2.52 Post-intervention Mean ± SD: IG:12.3±1.87, CG:11.3 ± 1.70 Absolute change from the baseline: IG: 3.3, CG:3.3

		Technology type/Duration: Video recording/ 10 min Instruments: Invalidated seven questions with one to three items each that required to provide short written responses. The answers for these questions were scored on a scale from 0 to 2 (0=incomplete answer, 1=partial answer, 2=complete answer. Maximum score: 14). Source of funding: None Conflict of interest: Not reported			Post-intervention Ratio of the mean (IG/CG): 1.0 P value: > 0.05 Conclusion: No difference in the outcome between the two groups
Pelayo 2000 [60] Spain	Setting: Family and community medicine teaching unit Medical discipline: General Practice /Family Medicine Participants: 40 Postgraduate Residents	Study design: Parallel RCT IG: Computer interactive program on clinical research methodology and hand out material CG: Face-to-Face on clinical research methodology and written material with same content and distribution as IG. Technology type/Duration: Software or computer based programs / 2-3 hours Instruments: Invalidated tests contained true/false responses, with some simple exercises. Source of funding: Fondo- de Invstigacion Sanitaria [57] of Spain`s Ministry of Health and Consumer Affairs	High risk	Knowledge gain	Pre-intervention Mean ± SD: NR Post-intervention Mean ± SD: IG:99.60±9.67, CG:88.17±8.45 Absolute change from the baseline: NR Post-intervention Ratio of the mean (IG/CG): 1.13 P value: 0.0003 Conclusion: OCDE group had better outcome

		Conflict of interest: Not reported			
Welke 2009 [54] Canada	Setting: University Hospital Medical discipline: Anesthesia Participants: 30 Postgraduate Residents	Study design: Parallel RCT IG: Computer-based multimedia program (a standardized computer-based multimedia debriefing on crisis management of three cardiac arrest scenarios) CG: Face-to-Face (traditional personalized video-assisted oral debriefing on crisis management of three cardiac arrest scenarios). Technology type/Duration: Multimedia/ 10 min each scenario followed by debriefing Instruments: Reliable and validated tool (ANTS), Cronbach α (0.79 to 0.86) Source of funding: The Physician Services Incorporated Foundation, North York, Ontario, Canada. Conflict of interest: Not reported	Low risk	Cognitive skill gain	Pre-intervention Mean ± SD: IG:10.27±2.10, CG:9.00±2.45 Post-intervention Mean ± SD : IG:12.22±2.19, CG:11.3±2.08 Absolute change from the baseline: IG:1.95, CG:2.3 Post-intervention Ratio of the mean (IG/CG): 1.08 P value: 0.97 Conclusion: No difference in the outcome between the two groups
Platz 2011 [47] USA	Setting: Teaching hospital Medical discipline: Surgery Participants: 44 Postgraduate Residents	Study design: Parallel RCT IG: Computer based lecture on image recognition and interpretation (i.e. basic ultrasound and the extended focused assessment with sonography for trauma (EFAST)). the Computer group listened to narrated lectures on desktop computers ends with	High risk	Cognitive skill gain Knowledge gain	Pre-intervention Mean ± SD: IG:63.2 ±, CG:58.0 Post-intervention Mean ± SD: IG:81.6 ± 20.75, CG:85.9 ± 31.38 Absolute change from the baseline: IG:18.4, CG:28.0 Post-intervention Ratio of the mean (IG/CG): 0.95 P value: <0.05

		question-and-answer session. CG: Face-to-Face lectures on image recognition and interpretation with same content, and the same instructor who narrated the computer-based lectures. Technology type/Duration: Software or computer based programs/ One hour Instruments: Invalidated 20 items MCQs (knowledge and cognitive) Source of funding: Department of Emergency Medicine, Birmingham and Women's Hospital, Boston, Massachusetts. Conflict of interest: Not reported			Conclusion: Face-to-face (control) group had better outcome
Hards 2012 [50] Canada	Setting: University Hospital Medical discipline: Anesthesia Participants: 20 Postgraduate Residents	Study design: Parallel RCT IG: The participants were pre-tested using high-fidelity simulation on management of maternal cardiac arrest, followed by computerized digital learning session, Posttest was done by simulation after one month. CG: The participants were tested using high-fidelity simulation, then 30-minute narrative-based power point-based teaching session followed by discussion. Posttest was done by	High risk	Cognitive skill gain	Pre-intervention Mean ± SD: IG: 2.7±0.8, CG: 2.1±0.8 Post-intervention Mean ± SD: IG:3.4±0.6, CG:2.9±0.5 Absolute change from the baseline: IG:0.70, CG:0.80 Post-intervention Ratio of the mean (IG/CG): 1.17 P value: 0.97 Conclusion: No difference in the outcome between the two groups

		simulation after one month. Technology type/Duration: Software or computer based programs / IG: own pace and convenience. CG: a 30-min, narrated Power-Point-based teaching session Instruments: Reliable and validated tool (ANTS), Cronbach α (0.79 to 0.86) Source of funding: Ontario Ministry of Health and Long-term Care, Ontario, Canada. Conflict of interest: No conflict of interest			
Khoshbaten 2014 [64] Iran	Setting: University Hospital Medical discipline: ALS course (cardio-pulmonary resuscitation) Participants: 84 Medical interns	Study design: Parallel RCT IG: interns Received pretest, then blended learning (CD and traditional face-to-face) then a posttest. The eLearning composed of electronic software on indications, contraindications, drug dosage, and precautionary principles of 45 Cardio-pulmonary resuscitation (CPR) drugs, plus an 11-minute educational clip on ACLS including usage of drugs. CG: Received a pretest, then a six-hour lecture-based educational course for the use of 45 CPR) drugs, followed by posttest.	High risk	Knowledge gain	Pre-intervention Mean ± SD: IG:7.58±2.5, CG:6.97±2.25 Post-intervention Mean ± SD: IG:11.87±3.66, CG:10.44±3.68 Absolute change from the baseline: IG:4.29, CG:3.47 Post-intervention Ratio of the mean (IG/CG): 1.13 P value: 0.49 Conclusion: No difference in the outcome between the two groups

		Technology type/Duration: Software or computer based programs/ IG: one month, CG: six-hour Instruments: Validated and reliable tool of 21 MCQs Source of funding: Medical Education Research Center, Tabriz University of Medical Sciences, Iran Conflict of interest: No conflict of interest			
Tulsky 2011 [53] Canada	Setting: University Hospital Medical discipline: Oncology Participants: 48 Practicing doctors	Study design: Parallel stratified RCT IG: The oncologists received a CD-ROM training program on communication skills also received complete audio recordings of each of their recorded patient visits. CG: The oncologists received no training beyond the 1-hour lecture. Technology type/Duration: Software or computer-based programs/ One month Instruments: Reliable Tool: Empathy assessment count using NURSE (name, understand, respect, support and explore) by review audiotape recording. (Cognitive skills). Reliable tool: Patient perceptions were measured during patient interview. (Patient outcome)	High risk	Cognitive skill gain	Pre-intervention Mean ± SD: NR Post-intervention Mean ± SD: IG: RR, 0.7 95% CI (0.5 to 1.0), CG: RR, 0.495% CI (0.3 to 0.5) Absolute change from the baseline: NR Post-intervention Ratio of the mean (IG/CG): NR P value: 0.024 Conclusion: OCDE group had better outcome

		Source of funding: National Cancer Institute. Conflict of interest: No conflict of interest		Patient's outcome	Pre-intervention Mean ± SD: NR Post-intervention Mean ± SD: IG: 4.7 95% CI (4.6 to 4.8), CG: 4.6 95% CI (4.5 to 4.7) Absolute change from the baseline: NR Post-intervention Ratio of the mean (IG/CG): NR P value: 0.036 Conclusion: No difference in the outcome between the two groups
Millard 2008 [40] Australia	Setting: University Hospital Medical discipline: General Practice /Family Medicine Participants: 14 doctors	Study design: Factorial RCT, only two arms were included in this review IG: Received education (workshop) on dementia diagnoses documentation in addition to audit on their dementia risk factors recognition and diagnosis documentation during the 2 year prior to the intervention. CG: Received education only. Technology type/Duration: Software or computer-based programs/ 2 hours Instruments: Invalidated auditing generated by computer (improvement of dementia diagnosis and screening documentation) Source of funding: Not reported	High risk	Patient's outcome	Pre-intervention Mean ± SD: NR Post-intervention Mean ± SD: IG:13.25 (ranked mean), CG: 6.13 (ranked mean) Absolute change from the baseline: IG: 6.1 (mean difference)a, CG: 1.0 (mean difference)a Post-intervention Ratio of the mean (IG/CG): NR P value: 0.018 Conclusion: OCDE group had better outcome

		Conflict of interest: Not reported			
Offline computer-based digital learning vs No intervention					
Garrett 1990 [44] USA	Setting: University Hospital Medical discipline: Internal Medicine Participants: 57 Postgraduate Residents	Study design: Parallel RCT IG: computerized assistant instruction on AIDS Infection control. CG: Routine training on AIDS Infection control. Technology type/Duration: Software or computer-based programs/ Not reported Instruments: Invalidated 48 test of True/False questions Source of funding: Not reported Conflict of interest: Not reported	High risk	Knowledge gain	Pre-intervention Mean ± SD: NR Post-intervention Mean ± SD: IG:42.4±4.6, CG:35.9±3.9 Absolute change from the baseline: NR Post-intervention Ratio of the mean (IG/CG): 1.2 P value: 0.001 Conclusion: OCDE group had better outcome
Hsieh 2006 [45] USA	Setting: University Hospital Medical discipline: Dentistry Participants: 174 Practicing doctors	Study design: Parallel RCT IG: Received pretest, then interactive multimedia computer-based tutorial tailored to dental professionals on DV and associated oral trauma, then posttest. CG: Received pretest, posttest then completed the computer-based tutorial. Instruments: Invalidated modified version of Jefferson Scale for Physicians (Cognitive). Invalidated domestic violence assessment instrument included 24 questions (Knowledge). Technology type/Duration: Multimedia/ Not reported Source of funding: National Institute of Dental and Craniofacial Research, National Institutes of Health	High risk	Cognitive skill gain	Pre-intervention Mean ± SD: IG: 115.18±12.29, CG: 115.83±11.49 Post-intervention Mean ± SD: NR Absolute change from the baseline: NR Post-intervention Ratio of the mean (IG/CG): NR P value: > 0.05 Conclusion: No difference in the outcome between the two groups

		Conflict of interest: Not reported			
Jensen 2009 [59] Denmark	Setting: University Hospital Medical discipline: ALS course (cardio-pulmonary resuscitation) Participants: 103 Postgraduate Residents	Study design: Parallel RCT IG: Received ALS course then after 6 months received an digital learning software as a booster for ALS skills and knowledge. The software was a self-directed learning program that included a 10–20 min tutorial on how to use the program and 40 individual patient cases, 5 from each of 8 ALS themes. One case per Month. Total 12 individual cases. CG: Received ALS (ALS) course and had baseline assessment. Technology type/Duration: Software or computer based programs/ 12 months Instruments: Validated MCQs questions Source of funding: Laerdal Norway Conflict of interest: No conflict of interest	High risk	Knowledge gain	Pre-intervention Mean ± SD: IG:81.7±6.0, CG:82.6±5.8 Post-intervention Mean ± SD: IG:80.3±6.6, CG:81.8±6.6 Absolute change from the baseline: IG: -1.4, CG: -0.8 Post-intervention Ratio of the mean (IG/CG): 0.98 P value: 0.16 Conclusion: No difference in the outcome between the two groups
Kay 2001 [39] UK	Setting: University Hospital Medical discipline: Dentistry Participants: 95 Practicing doctors	Study design: Solomon three-group design IG-1: Dentists read the radiographs and made treatment decisions then they participated in the computer-aided learning (CAL) package (educational intervention), then re-read (second reading) the graphs. IG-2: Dentists participate in CAL (intervention) then read the radiographs (one reading only). IG-3: Dentists read radiographs (first) and then re-read them (second), then afterwards utilize the CAL. Technology type/Duration: Software or computer-based programs/ Not reported Instruments: Assessed by calculating sensitivity and	High risk	Cognitive skill gain	Pre-intervention Mean ± SD: NR Post-intervention Mean ± SD: NR Absolute change from the baseline: NR Post-intervention Ratio of the mean (IG/CG): NR P value: NR Conclusion: No difference in the outcome between the two groups

		specificity of decision making within and between the study groups. Source of funding: Not reported Conflict of interest: Not reported			
Chao 2010 [42] USA	Setting: University Hospital Medical discipline: Obstetrics and Gynecology Participants: 67 Postgraduate Residents	Study design: Parallel RCT IG: Residents completed a pretest of third- and fourth-degree lacerations. After 1 year they received instructional DVD. Intervention group watched DVD within 7 days CG: Residents went through standard clinical experience and training in obstetrics. Technology type/Duration: Video recording/ 7 days Instruments: Validated 18 MCQs Source of funding: None Conflict of interest: No conflict of interest	Unclear risk	Knowledge gain	Pre-intervention Mean ± SD: IG: 69.57±101, CG: 72.70±62.59 Post-intervention Mean ± SD: IG:82.18±69.66, CG:73.64±79.97 Absolute change from the baseline: IG:12.61, CG:0.94 Post-intervention Ratio of the mean (IG/CG): 1.11 P value: <0.001 Conclusion: OCDE group had better outcome
Gordon 2011 [56] UK	Setting: Postgraduate education and training center Medical discipline: Pediatrics Participants: 162 Practicing doctors	Study design: Parallel non-blinded RCT IG: Participants were given baseline prescribing assessments, then completed the digital learning course designed for the study on pediatric drug prescribing skills, which took 1–2 h. and given 4 weeks to complete it. Followed by second assessment. A final assessment was sent to all participants 8 weeks later. CG: No intervention. Participants were given baseline, 2nd and final prescribing assessments. Technology type/Duration: Software or computer-based programs / 1-2 hours	High risk	Cognitive skill gain	Pre-intervention Mean ± SD: IG: 66±12.6, CG: 67±11.9 Post-intervention Mean ± SD: IG:79±12.1, CG:63±13.5 Absolute change from the baseline: IG:13, CG: -4 Post-intervention Ratio of the mean (IG/CG): 1.25 P value: <0.001

		Instruments: Invalidated 10 structured questions. Source of funding: Not reported Conflict of interest: No conflict of interest			Conclusion: OCDE group had better outcome
Nagile 1993 [52] Canada	Setting: University Hospital Medical discipline: Psychiatry Participants: 64 Postgraduate Residents	Study design: Parallel RCT IG: Used decisional aid (videotape) for mental capacity assessment. CG: Performed mental assessment without decisional aid. Technology type/Duration: Software or computer based programs/ Not reported Instruments: Invalidated thematic analysis to assess skills acquisition (The assessment was based on the proportion of agreement between the expert and the participants on the judgement of mental capacity.) Source of funding: Ontario Ministry of Health Research Personnel Development Program Fellowship and by National Health Research Scholar Awards from Health and Welfare Canada Conflict of interest: Not reported	High risk	Cognitive skill gain	Pre-intervention Mean ± SD: NR Post-intervention Mean ± SD: IG:0.87 ± 0.01, CG:0.86 ± 0.01 Absolute change from the baseline: NR Post-intervention Ratio of the mean (IG/CG): 1.01 P value: 0.81 Conclusion: No difference in the outcome between the two groups
Lavigne 2011[38] USA	Setting: Teaching hospital Medical discipline: Pediatrics Participants: 24 Pediatrics practices (clinics) - 270 child with ADHD (Practicing doctors)	Study design: Cluster RCT IG: 12 practices (clinics): 137 child received specialized care. Physicians received 2 hours of didactic training on medication management of ADHD in addition to an ADHD specialist provided 1 hour of training to office staff in the use of software which focuses on ADHD Medication Management Program designed for monitoring and guiding medication titration. CG: 12 practices (clinics): 133 child treatment as usual (no intervention).	High risk	Patient's outcome	Pre-intervention Mean ± SD: NR Post-intervention Mean ± SD: NR Absolute change from the baseline: NR Post-intervention Ratio of the mean (IG/CG): NR P value: > 0.05 Conclusion: No difference in the outcome

		Technology type/Duration: Software or computer based programs/ 12 months Instrument: validated tool; The ADHD Rating Scales-IV and the SNAP-IV. Source of funding: National Institutes of Health [34]. Conflict of interest: No conflict of interest.			between the two groups
Offline computer-based digital learning vs Text-based learning					
Ottolini 1998 [46] USA	Setting: University Hospital Medical discipline: Pediatrics Participants: 24 Postgraduate Residents	Study design: Parallel RCT IG: Computer program (CD-ROM simulated calls) to teach residents an approach to management of telephone complaints CG: Text reading on management of telephone complaints. Technology type/Duration: Software or computer-based programs/ 180 min Instruments: Assessment comparison of pre- and post-test for responses to 2	High risk	Cognitive skill gain	Pre-intervention Mean ± SD: IG:70.33±8.33, CG:68.46±6.73 Post-intervention Mean ± SD: IG:79.08±8.17, CG:69±13.3 Absolute change from the baseline: IG:8.75, CG:0.54 Post-intervention Ratio of the mean (IG/CG): 1.14 P value: <0.03 Conclusion: OCDE group had better outcome

		emergency pediatrics calls using validated checklist plus patient perception questionnaire from 7 items on Likert scale. Source of funding: Bayer Institute for Health Care Communication Conflict of interest: Not reported			
Balslev 2005 [58] Denmark	Setting: University Hospital Medical discipline: Pediatrics Participants: 12 Postgraduate Residents	Study design: Parallel RCT IG: Watched a brief (2.5-minute) video recording of the patient on problem-based learning (data exploration, theory building, theory evaluation and meta-reasoning) CG: Read a written description of the video recording without watching the video. Technology type/Duration:	High risk	Cognitive skill gain	Pre-intervention Mean ± SD: IG: 307 ±NR, CG: 354±NR Post-intervention Mean ± SD: IG:446 ±NR, CG:305±NR Absolute change from the baseline: IG:139, CG: -49 Post-intervention Ratio of the mean (IG/CG): 1.46 P value: Significant for each category separately Conclusion: OCDE group had better outcome

		Video recording/ 2.5 min Instruments: Validated tool that used thematic analysis to assess the thinking process. Source of funding: Epilepsy and Education Foundation, Department of Pediatrics, Arhus University Hospital Conflict of interest: No conflict of interest			
Rae 2015 [37] UK	Setting: Teaching hospital Medical discipline: Surgery Participants: 32 Postgraduate Residents	Study design: Four arms RCT IG-1: Interactive Simulation IG-2: Non-interactive Simulation (offline computer-based) IG-3: Video Tutorial (offline computer-based) CG: Control Group (written text) Technology type/Duration:	High risk	Cognitive skill gain	Pre-intervention Mean ± SD: IG-2 (non-interactive simulation): IG:8.43±0.79 Post-intervention Mean ± SD: IG-2 (non-interactive simulation): IG:40.57±4.07 Absolute change from the baseline: NR (different tests) Post-intervention Ratio of the mean (IG/CG): IG-2: 1.36 P value: <0.001 Conclusion: OCDE group had better outcome

		Software or computer-based programs AND video recording/ Not reported Instruments: non-validated tool of 12 items MCQs for the pretest (Cognitive skills). 36 items checklist for the posttest Source of funding: Not reported Conflict of interest: No conflict of interest			Pre-intervention Mean ± SD: IG-3 (Video tutorial): IG:6.27±2.15, CG: 6.14±2.19 Post-intervention Mean ± SD: IG-3 (Video tutorial): IG:27.20± 6.12, CG:29.87±4.70 Absolute change from the baseline: NR (different tests) Post-intervention Ratio of the mean (IG/CG): IG-3: 0.91, P value: 0.396 Conclusion: No difference between in the outcome between the two groups

Offline computer-based digital learning vs Another method of offline digital learning

Bonevski 1999 [57] Australia	Setting: Primary health care centers Medical discipline: General Practice /Family Medicine Participants: 19 Practicing doctors	Study design: Parallel RCT IG: Received computer-based CME on six preventive topics (i.e. screening behaviors and for identifying risk behaviors) and follow-up with an additional feedback on further information on global estimates on the six specific conditions over a period of 2 to 6 weeks. CG: Received the computer-based CME but did not receive any performance feedback until after the completion of the trial. Technology type/Duration: Software or computer-based programs/ 2 to 6 weeks Instruments: Reliable self-reported patient health survey and validated practitioner checklist. Source of funding: The e Commonwealth General Practice Evaluation Program and the NSW Cancer Council. Conflict of interest: Not reported	High risk	Patient's outcome	Pre-intervention Mean ± SD: NR Post-intervention Mean ± SD: Outcomes could not be merged Absolute change from the baseline: NR Post-intervention Ratio of the mean (IG/CG): NR P value: NR Conclusion: OCDE group had better outcome

Davids 2014 [65] South Africa	Setting: University Medical discipline: Internal medicine and anesthesiology Participants: 90 Postgraduate Residents	Study design: Parallel RCT IG: Exposed to the revised version of an application for diagnosis and treatment of electrolyte and acid-base disorders. The application consists of case-based tutorials, each consisting of a series of slides, with the navigation controlled by the user. CG: Exposed to the original version of the application. Technology type/Duration: Software or computer-based programs/ 1-38 min Instruments: Invalidated eight open end questions questionnaire (knowledge). Invalidated thematic analysis: task completion rate (cognitive). Source of funding: Supported by a Doctoral Fellowship Award from Stellenbosch University's Faculty of Medicine and Health Sciences. Conflict of interest: No conflict of interest	Low risk	Knowledge gain	Pre-intervention Mean ± SD: NR Post-intervention Mean ± SD: IG:6.9 ±2.5, CG: 7.0±3.1 Absolute change from the baseline: NR Post-intervention Ratio of the mean (IG/CG): 0.98 P value: 0.91 Conclusion: No difference in the outcome between the two groups
				Cognitive skill gain	Pre-intervention Mean ± SD: NR Post-intervention Mean ± SD: IG:12.98±2.97, CG: 13.18±3.6 Absolute change from the baseline: NR Post-intervention Ratio of the mean (IG/CG): 0.98 P value: 0.77 Conclusion: No difference in the outcome between the two groups

Footnote: ACLS : Advanced Cardiac Life support, ADHD: Attention Deficit Hyperactivity Disorder, ALS: Advanced Life Support , ANTS : Anaesthetists' Non-Technical Skills , CG: Control group, CE: Cost-effectiveness, CI: Confidence Interval, , IG: Intervention group, IUD: intrauterine device, MCQs: Multiple choice questions , NA: Not applicable, NR: Not reported, OSCE: The objective structured clinical examination, RCT: Randomized Control Trial , RR: Relative Risk, SD: Standard deviation

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