**Study Protocol**

**Society for Simulation in Healthcare**

**Healthcare Simulation Education Guidelines**

**Key Question Development Template**

1. ***Topic / Title:*** Physical Realism - Teams
2. ***PICO methodology: elements for key question creation:***

|  |  |
| --- | --- |
| **PICO** | **Description** *(with recommended text)* |
| **Population** | Healthcare providers and/or healthcare trainees/students engaging in simulation training for teams training |
| **Intervention** | Higher physical realism simulator/task trainer |
| **Comparison** | Lower physical realism simulator/task trainer |
| **Outcomes** | Educational (immediate and retention): participant satisfaction, knowledge, skills, attitudes  Clinical: change in healthcare practitioner behavior, patient outcomes  Process: costs |

1. ***Key Question:***

Does the degree of physical realism in simulators/task trainers make any difference to clinical, educational and process outcomes? To include, but not limited to, crew resource management (CRM) and non-technical skills (NTS) training

1. ***Study Inclusion and Exclusion Criteria***

Inclusion: RCT, comparative observational studies, prospective and retrospective

Exclusion: case reports, technical reports, trial protocols, unpublished results, commentaries, editorials, reviews

1. ***Systematic Review Team and Assignments***

|  |  |
| --- | --- |
| **Name** | **Role** |
| Theresa Hoadley | Supervisor (Expert Panel) |
| Vernon Curran | Supervisor (Expert Panel) |
| Erin Blanchard | Systematic Reviewer |
| Sally Mitchell | Systematic Reviewer |

1. ***Definitions:***

Higher physical realism simulators: those that provide physical findings, display vital signs, physiologically respond to interventions (via computer interface) and allow for procedures to be performed on them (e.g. bag mask ventilation, intubation, intravenous insertion)1

Lower physical realism simulators: static manikins that are otherwise limited in these capabilities1

Crew resource management: A family of instructional strategies designed to improve teamwork in the cockpit by applying well-tested training tools (e.g., performance measures, exercises, feedback mechanisms) and appropriate training methods (e.g., simulators, lectures, videos) targeted at specific content (i.e., teamwork knowledge, skills and attitudes)2

1. ***Outcomes:***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Kirkpatrick level | Outcome Categories | Specific Outcomes | Immediate \* | Delayed \*\* |
| I | Satisfaction | Learner confidence ratings with procedure | *critical* | *critical* |
| II | Knowledge | Learner scores on procedure associated test | *critical* | *critical* |
| Skills (Time) | Procedure completion time | *critical* | *critical* |
| Skills (Process) | Procedure learning curve | *critical* | *critical* |
| Skills (Product) | Procedure errors | *important* | *important* |
| III | Behaviors/ performance with/ on patients | Procedure completion time in real practice and errors | *critical* | *critical* |
| IV | Patient outcomes | Patient complications | *critical* | *critical* |
| IVa | System outcomes (e.g. costs) | Patient care costs associated w. procedure by learner | *important* | *important* |

\* (<24 hours post intervention)

\*\* If there are sufficient studies, groups may decide to break up delayed outcomes into additional subcategories: (a) up to 2 weeks; (b) 2 weeks to 3 months; (c) >3 months

1. ***Key Recent Studies on the topic:***
   1. Effect on team training

Aebersold, M., (2018). Simulation-based learning: No longer a novelty in undergraduate education. *OJIN: The Online Journal of Issues in Nursing,* Vol. 23, No. 2.

Truijens, S.E.M.; Banga, F.R.; Fransen, A.F.; Pop V.J.M.; Runnard Heimel P.J. van; Oei S.G. (2015). The effect of multiprofessional simulation-based obstetric team training on patient-reported quality of care: A pilot study. Simuln Healthc, **10**, 210-6.

Weaver S.J.; Dy S.M., Rosen M.A. (2014). Team-training in health care: a narrative synthesis of the literature. BMJ Qual Saf, **23**, 359-72.

Ellis D., Crofts J.F., Hunt L.P., Read M., Fox R., James M. (2008). Hospital, simulation center, and teamwork training for eclampsia management: a randomized controlled trial. Obstet Gynecol, **111**, 723-31.

Fransen A.F.; Ven J. van de; Merién A.E.R.; De Wit-Zuurendonk L.D.; Houterman S.; Mol B.W.; Oei S.G. (2012). Effect of obstetric team training on team performance and medical technical skills: a randomised controlled trial. BJOG, **119**, 1387-93.

Draycott T.; Sibanda T.; Owen L.; Akande V.; Winter C.; Reading S.; Whitelaw A. (2006). Does training in obstetric emergencies improve neonatal outcome? BJOG, **113**, 177-82.

Goffman D.; Brodman M.; Friedman A.J.; Minkoff H.; Merkatz I.R. (2014). Improved obstetric safety through programmatic collaboration. J Healthc Risk Manag, **33**, 14-22.

Truijens S.E.M.; Pommer A.M.; Runnard Heimel P.J. van; Verhoeven C.J.M.; Oei S.G.; Pop V.J.M. (2014). Development of the Pregnancy and Childbirth Questionnaire (PCQ): evaluating quality of care as perceived by women who recently gave birth. Eur J Obstet Gynecol Reprod Biol, **174**, 35-40.

Truijens S.E.M.; Banga F.R.; Fransen A.F.; Pop V.J.M.; Runnard Heimel P.J. van; Oei S.G. (2015). The effect of multiprofessional simulation-based obstetric team training on patient-reported quality of care: a pilot study. Simul Healthc, **10**, 210-6.

Fransen AF, van de Ven J, Schuit E, van Tetering A, Mol BW, Oei SG. (2017) [Simulation-based team training for multi-professional obstetric care teams to improve patient outcome: a multicentre, cluster randomised controlled trial.](https://pubmed.ncbi.nlm.nih.gov/27726304/) BJOG 2017;Mar;124(4):641-650. doi: 10.1111/1471-0528.14369.

Calvert KL, McGurgan PM, Debenham EM, Gratwick FJ, Maouris P.Aust N Z. (2013). [Emergency obstetric simulation training: How do we know where we are going, if we don't know where we have been?](https://pubmed.ncbi.nlm.nih.gov/24033002/) J Obstet Gynaecol. 2013 Dec;53(6):509-16. doi: 10.1111/ajo.12120. Epub 2013 Sep 13.PMID: 24033002 Review.

van Tetering AAC, Segers MHM, Ntuyo P, Namagambe I, van der Hout-van der Jagt MB, Byamugisha JK, Oei SG. (2021). [Evaluating the Instructional Design and Effect on Knowledge, Teamwork, and Skills of Technology-Enhanced Simulation-Based Training in Obstetrics in Uganda: Stepped-Wedge Cluster Randomized Trial.](https://pubmed.ncbi.nlm.nih.gov/33544086/) JMIR Med Educ. 7(1):e17277. doi: 10.2196/17277.PMID: 33544086.

Merriel A, Ficquet J, Barnard K, Kunutsor SK, Soar J, Lenguerrand E, Caldwell DM, Burden C, Winter C, Draycott T, Siassakos D. [The effects of interactive training of healthcare providers on the management of life-threatening emergencies in hospital.](https://pubmed.ncbi.nlm.nih.gov/31549741/) Cochrane database syst rev 2019 Sep 24; 9(9):CD012177.  doi: 10.1002/14651858.CD012177.pub2.

1. ***Recent Systematic Reviews on the topic:***
   1. Effect on team training

Cumin D, Boyd MJ, Webster CS, et al. A systematic review of simulation for multidisciplinary team training in operating rooms. Simul Healthc2013;8:171-9.

[Mohsen Adib-Hajbaghery](https://pubmed.ncbi.nlm.nih.gov/?term=Adib-Hajbaghery+M&cauthor_id=28011333), [Najmeh Sharifi](https://pubmed.ncbi.nlm.nih.gov/?term=Sharifi+N&cauthor_id=28011333). (2017), Effect of simulation training on the development of nurses and nursing students' critical thinking: A systematic literature review. Nurse Educ Today. 2017, Mar;50:17-24.  doi: 10.1016/j.nedt.2016.12.011. Epub 2016 Dec 20.

Buljac-Samardzic, M., Dekker-van Doorn, C., van Wijngaarden, J.D.H., van Wijk, K.P. (2010). Interventions to improve team effectiveness: A systematic review. Health Policy 94 (2010) 183–195.

## [Marlow](https://www.sciencedirect.com/science/article/abs/pii/S1553725016300940" \l "!), M., [Hughes, A.,](https://www.sciencedirect.com/science/article/abs/pii/S1553725016300940#!) [Sonesh, S.,](https://www.sciencedirect.com/science/article/abs/pii/S1553725016300940" \l "!) [Gregory, M.,](https://www.sciencedirect.com/science/article/abs/pii/S1553725016300940" \l "!) [Lacerenza, C.,](https://www.sciencedirect.com/science/article/abs/pii/S1553725016300940" \l "!) [Benishek, L.,](https://www.sciencedirect.com/science/article/abs/pii/S1553725016300940" \l "!) [Woods, A., Hernandez, C.,](https://www.sciencedirect.com/science/article/abs/pii/S1553725016300940#!) [Salas, E.](https://www.sciencedirect.com/science/article/abs/pii/S1553725016300940" \l "!) (2017). A Systematic Review of Team Training in Health Care: Ten Questions. [The Joint Commission Journal on Quality and Patient Safety](https://www.sciencedirect.com/science/journal/15537250). [Volume 43, Issue 4](https://www.sciencedirect.com/science/journal/15537250/43/4), 197-204.

1. ***Suggested specific search terms / keywords for literature search***

Overarching terms/keywords:

“physical realism”; “procedural skills training”; “low- and middle-income countries”; “team training”; “crew resource management”; “booster training”; “non-technical skills training”; “simulation”; “computer simulation”; “training”; “skill”; “mannequin”; “manikin”; “assessment”;

* 1. Effect on team training:

“simulation training”, “crew resource management training”, “team-based training”, “continuous quality improvement”, “group specific education”, “simulation”, “virtual reality”, “simulation standards”, “mannequins”, “patient safety”, “research”, “fidelity”, “team maintenance”, “team cohesiveness”, “team mentorship process”.

1. ***Notes:***

**References**

1. Cheng A, Lang TR, Starr SR, Pusic M, Cook DA. Technology-enhanced simulation and pediatric education: a meta-analysis. *Pediatrics.* 2014;133(5):e1313-e1323.

2. Gross B, Rusin L, Kiesewetter J, et al. Crew resource management training in healthcare: a systematic review of intervention design, training conditions and evaluation. *BMJ open.* 2019;9(2):e025247.