



ONTWERP VAN EEN PATIENT-CENTRED EDUCATIONAL EXTRA CORPORALE MEMBRAAN OXYGENATIE SIMULATOR (EDUECMO): EEN TRAINING NEEDS ANALYSIS MET INTERNATIONALE EXPERTS



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TECHNISCH GENEESKUNDIGE CARDIO-THORACALE CHIRURGIE



Cardiac Surgery
Innovations Lab



Engineering Organ
Support Technologies



DISCLOSURE

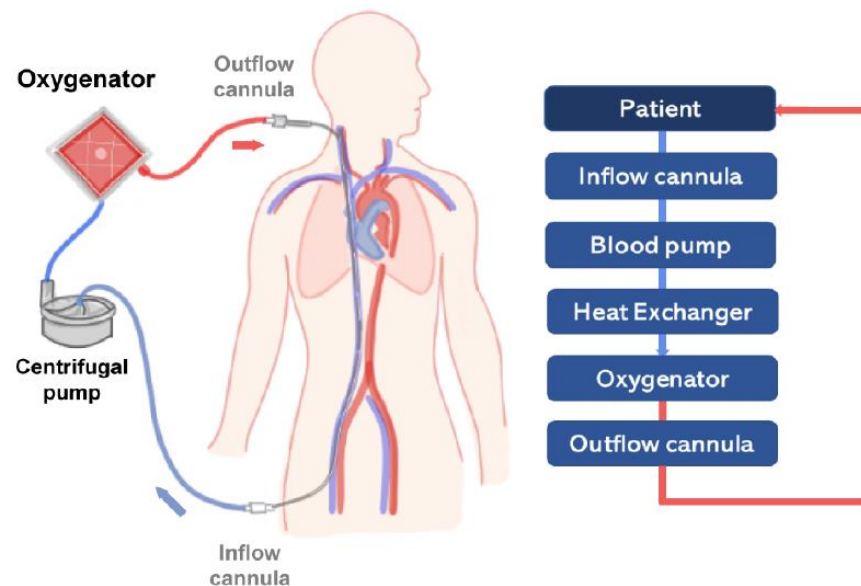
(potentiële) belangenverstrengeling	Zie hieronder
Voor bijeenkomst mogelijk relevante relaties met bedrijven	Bedrijven: Geen
<ul style="list-style-type: none">• Sponsoring of onderzoeksgeld• Honorarium of andere (financiële) vergoeding• Aandeelhouder• Andere relatie, namelijk ...	<ul style="list-style-type: none">• DfG SPP2014 “Boost your research grant” 2022• Nee• Nee• SESAM associate member Scientific Committee Associate Editor <i>Advances in Simulation</i> EuroELSO werkgroep simulatie (SAIE)

EXTRA CORPORALE MEMBRAAN OXYGENATIE (ECMO)

- Veno-veneuze ECMO (VV-ECMO)
- Veno-arteriële ECMO (VA-ECMO)

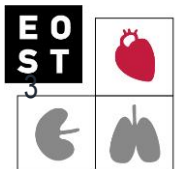
acut longfalen

acut hart-en longfalen



VV-ECMO

Bloedingen
Thrombo-embolisatie
ECMO circuit falen
Infecties
Overlijden



Ana Martins Costa^{1*}, Frank Halfwerk^{1,2}, Bettina Wiegmann^{3,4,5}, Michael Neidlin⁶ and Jutta Arens¹

 **frontiers** | Frontiers in Medical Technology

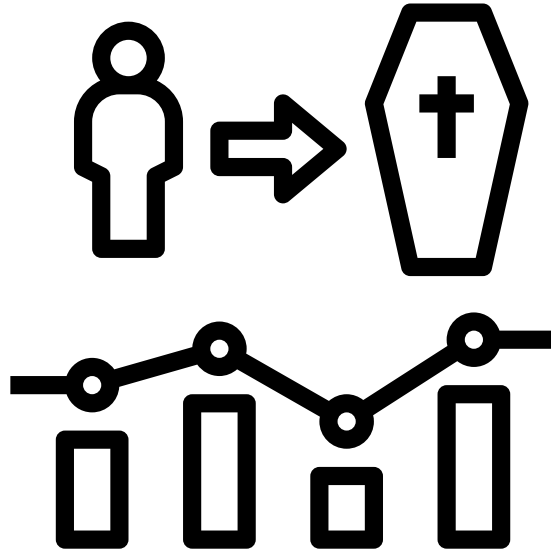
REVIEW
published: 21 June 2022
doi: 10.3389/fmedt.2022.909990

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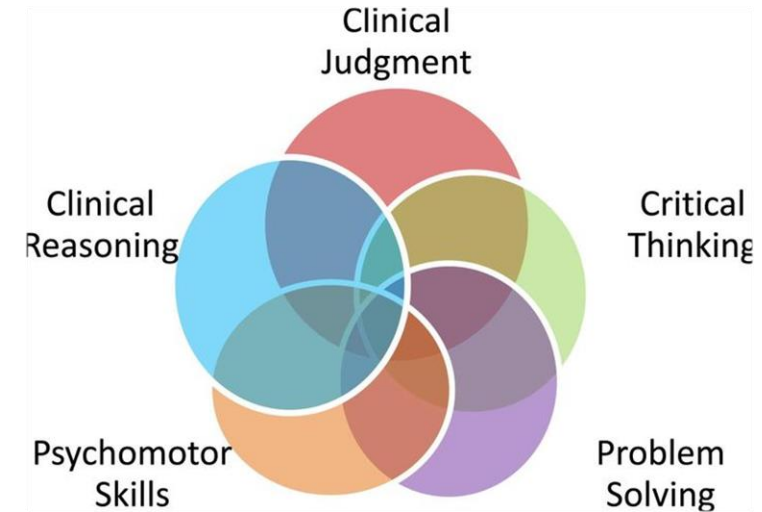
ECMO-MORTALITEIT EN MEDISCHE SIMULATIE

>30 ECMO procedures / jaar

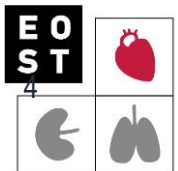


40% afname van mortaliteit

Simulatie training



ECMO-simulatoren?



Mortality by Nithinan Tatch from Noun Project

Barbaro et al., Am J Resp Crit Care Med, 2015; 191(8)

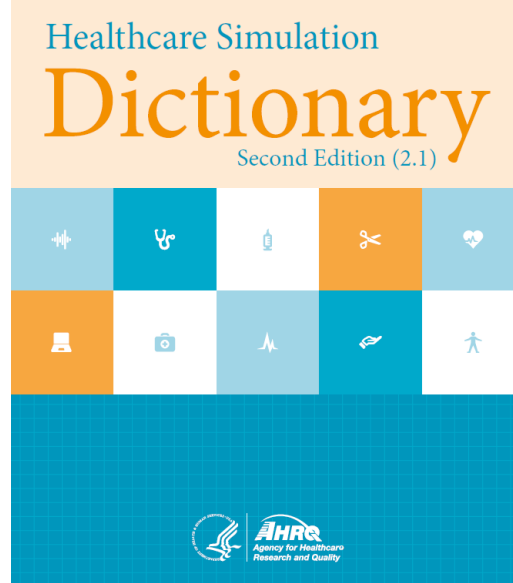
INACSL standards, Clin Sim in Nurs, 2016; 12

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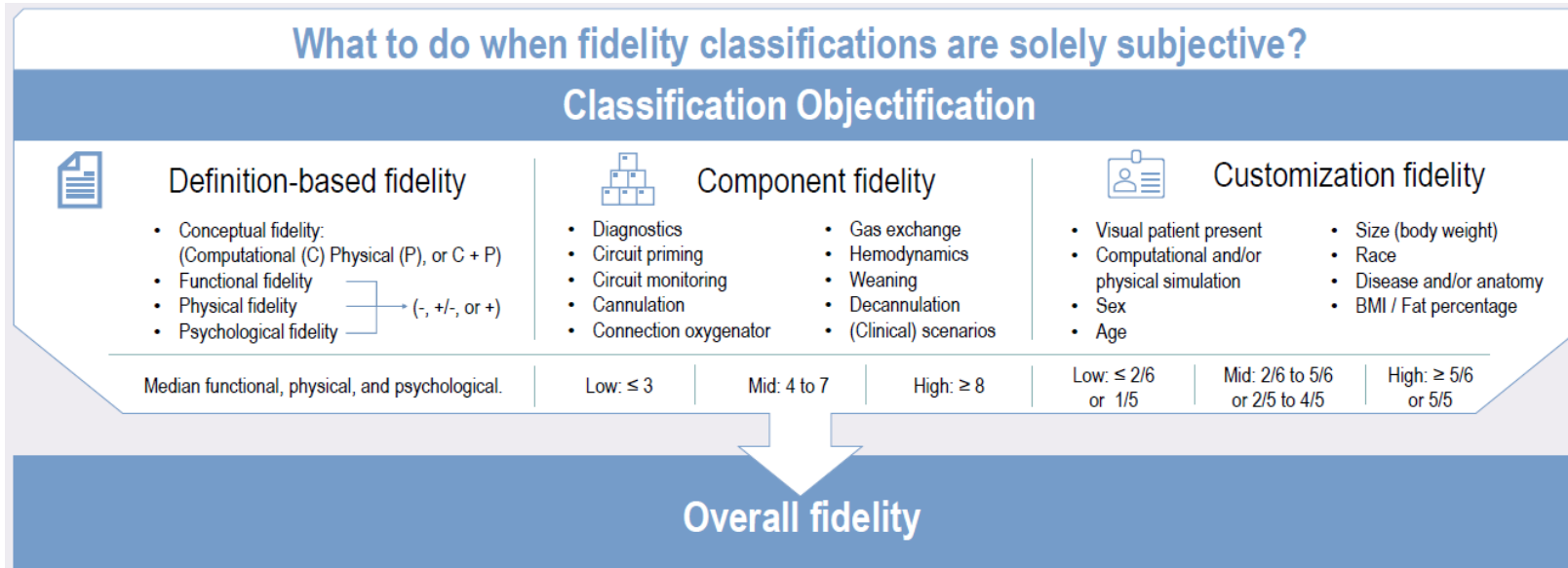
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ECMO-SIMULATOREN EN MATE VAN FIDELITY



- Wat is “fidelity”?



***Fidelity** \ fə-'de-lā-tē \ adj

Etym. (n.) early 15c., “faithfulness, devotion,” from Middle French *fidélité* (15c.), from Latin *fidelitatem* (nominative *fideltas*) “faithfulness, adherence, trustiness,” from *fidelis* “faithful, true, trusty, sincere,” from *fides* “faith.” From 1530s as “faithful adherence to truth or reality;” specifically of sound reproduction from 1878.

Definition

- The degree to which the simulation replicates the real event and/or workplace; this includes physical, psychological, and environmental elements.
- The ability of the simulation to reproduce the reactions, interactions, and responses of the real-world counterpart. It is not constrained to a certain type of simulation modality, and higher levels of fidelity are not required for a simulation to be successful.
- The level of realism associated with a particular simulation activity; fidelity can involve a variety of dimensions, including (a) physical factors such as environment, equipment, and related tools; (b) psychological factors such as emotions, beliefs, and self-awareness of participants; (c) social factors such as participant and instructor motivation and goals; (d) culture of the group; and (e) degree of openness and trust, as well as participants’ modes of thinking (INACSL, 2013);

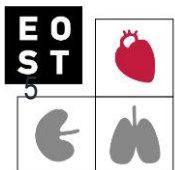
See also: ENVIRONMENTAL FIDELITY. FUNCTIONAL FIDELITY. HIGH FIDELITY. HIGH FIDELITY SIMULATION. IMMERSIVE SIMULATION. LOW FIDELITY. PHYSICAL FIDELITY. PSYCHOLOGICAL FIDELITY. REALISM. SIMULATION FIDELITY

Journal of *Clinical Medicine* | *J. Clin. Med.* 2023, 12, 1765. <https://doi.org/10.3390/jcm12051765>

Review

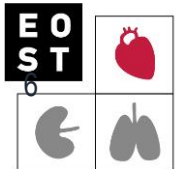
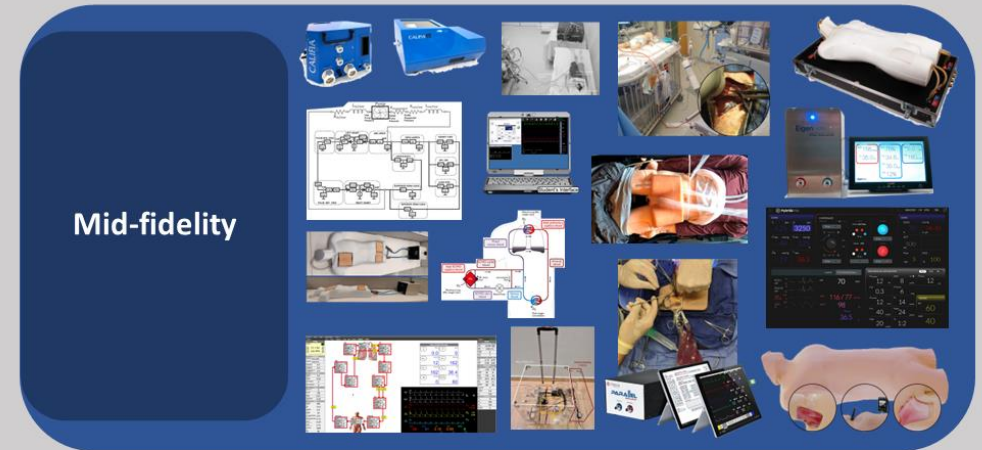
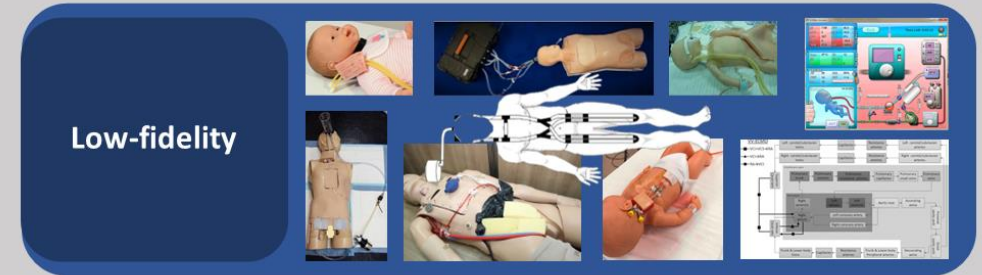
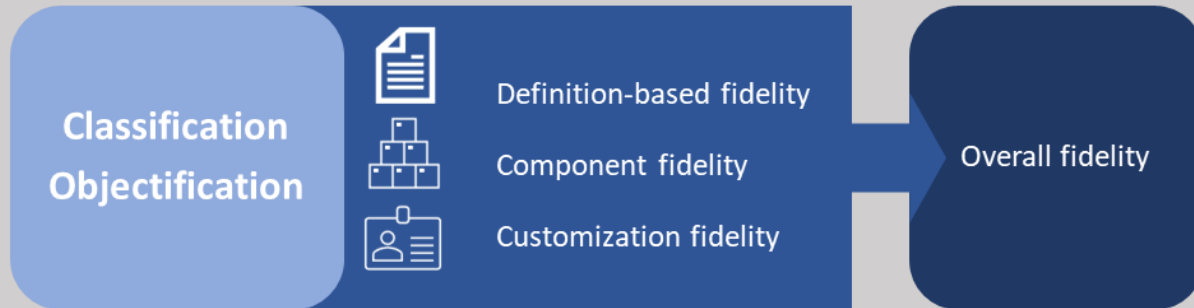
Simulators and Simulations for Extracorporeal Membrane Oxygenation: An ECMO Scoping Review

Wytze C. Duinmeijer ¹, Libera Fresiello ^{2,3}, Justyna Swol ⁴, Pau Torrella ^{5,6}, Jordi Riera ^{5,6}, Valentina Obreja ^{7,8}, Mateusz Puślecki ^{9,10,11}, Marek Dąbrowski ^{11,12}, Jutta Arens ¹ and Frank R. Halfwerk ^{1,13,*}



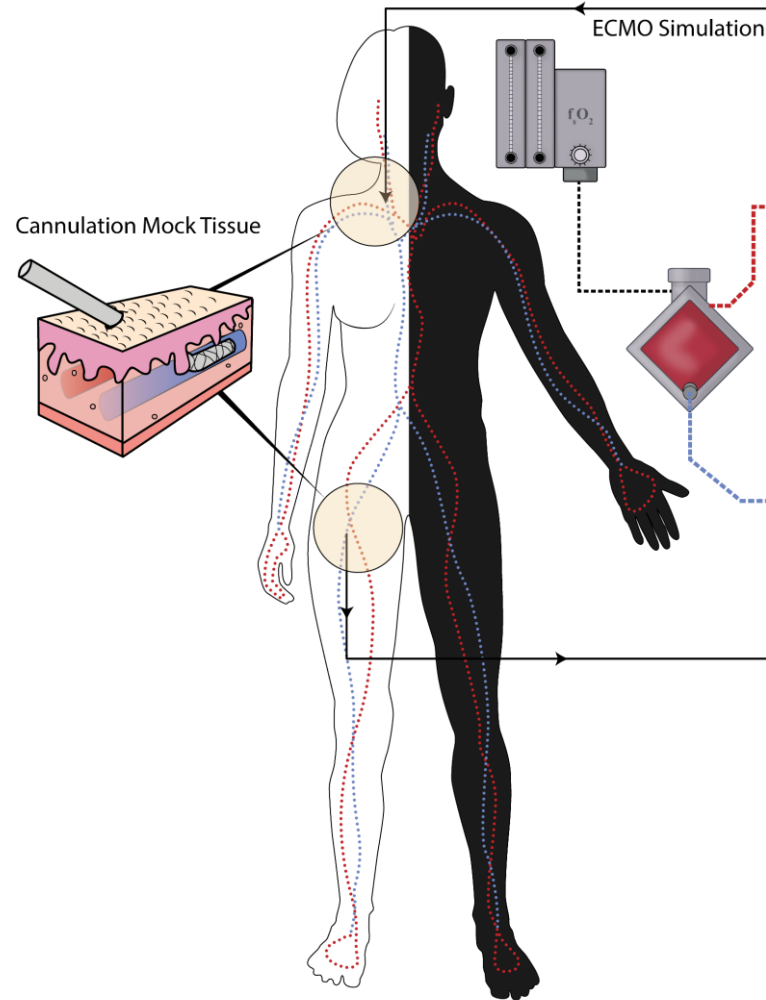
ECMO-SIMULATOREN EN MATE VAN FIDELITY

Simulators and simulations for extracorporeal membrane oxygenation: an ECMO scoping review

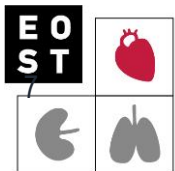


EDU-ECMO – PATIENT-CENTERED EDUCATIONAL ECMO SIMULATOR

EduECMO
simulator for training purposes



DFG Deutsche
Forschungsgemeinschaft



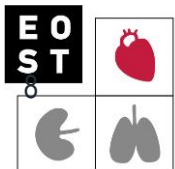
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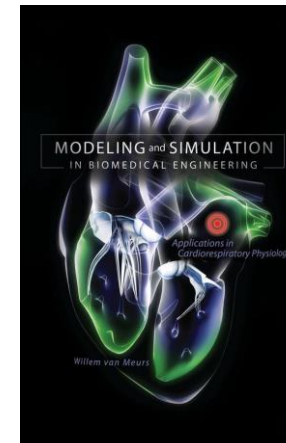
EDU-ECMO – PATIENT-CENTERED EDUCATIONAL ECMO SIMULATOR

Table 1 – Development of a real-time ECMO-simulator using the design method by Van Meurs

Training needs analysis (TNA)	Training program design (TPD)	Training media specification (TMS)	Training evaluation (TE)
Mission analysis	Specification of training activities	Simulation design	Evaluation of simulator
Task analysis	Scenario design	Hardware model creation	Evaluation of simulation
Trainee analysis	Design of instruction	Software model creation	Improvements
Training analysis			

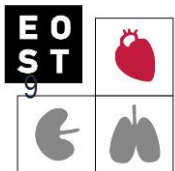
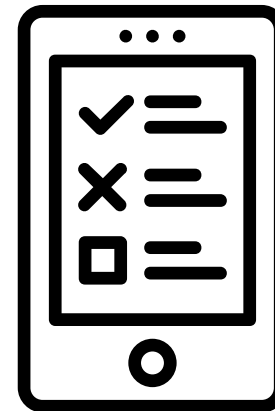
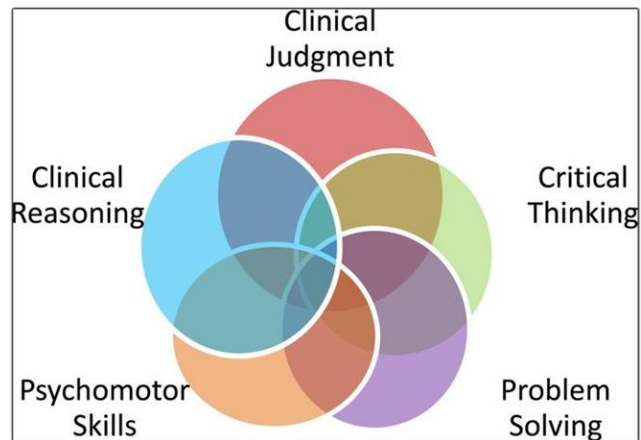


Van Meurs, Modeling and simulation in biomedical engineering, 2011



ONLINE ENQUÊTE – TRAINING NEEDS ANALYSIS

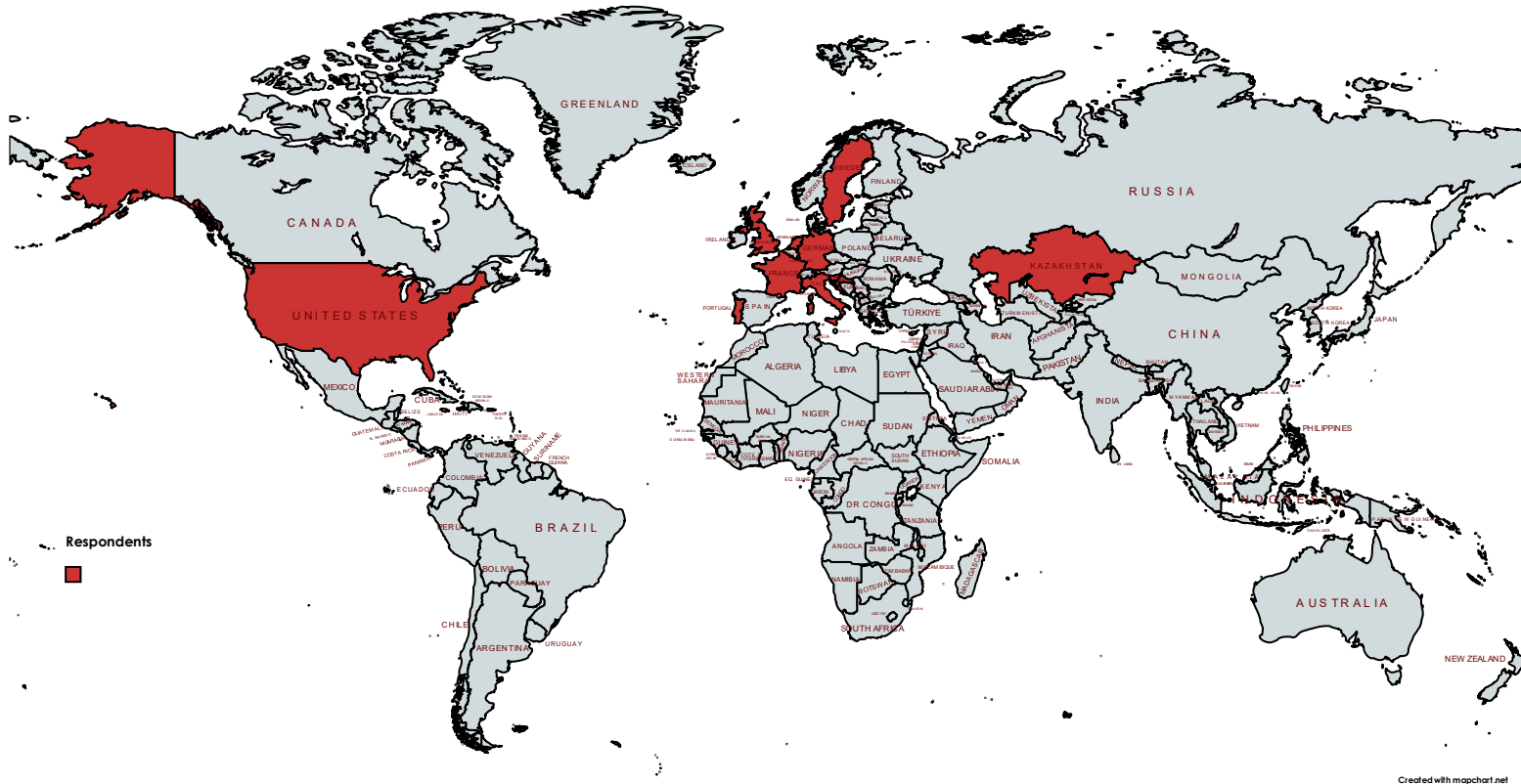
- International Nursing Association of Clinical Simulation and Learning (INACSL) Standards of Best Practice
- Experts uitgenodigd via e-mail, juli – oktober 2023
- Ethische toetsing Universiteit Twente, informed consent



INACSL standards, Clin Sim in Nurs, 2016; 12;
“online survey” door ProSymbols van the Noun Project

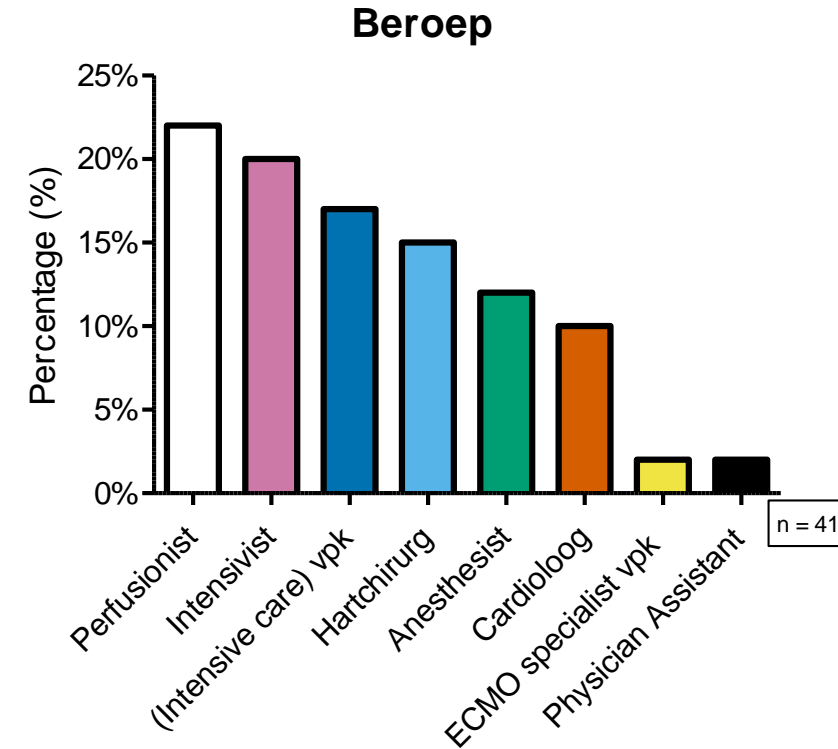
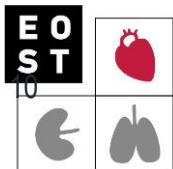


ONLINE ENQUÊTE – TRAINING NEEDS ANALYSIS



41 respondenten uit 11 landen

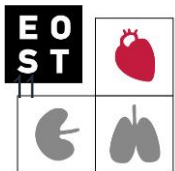
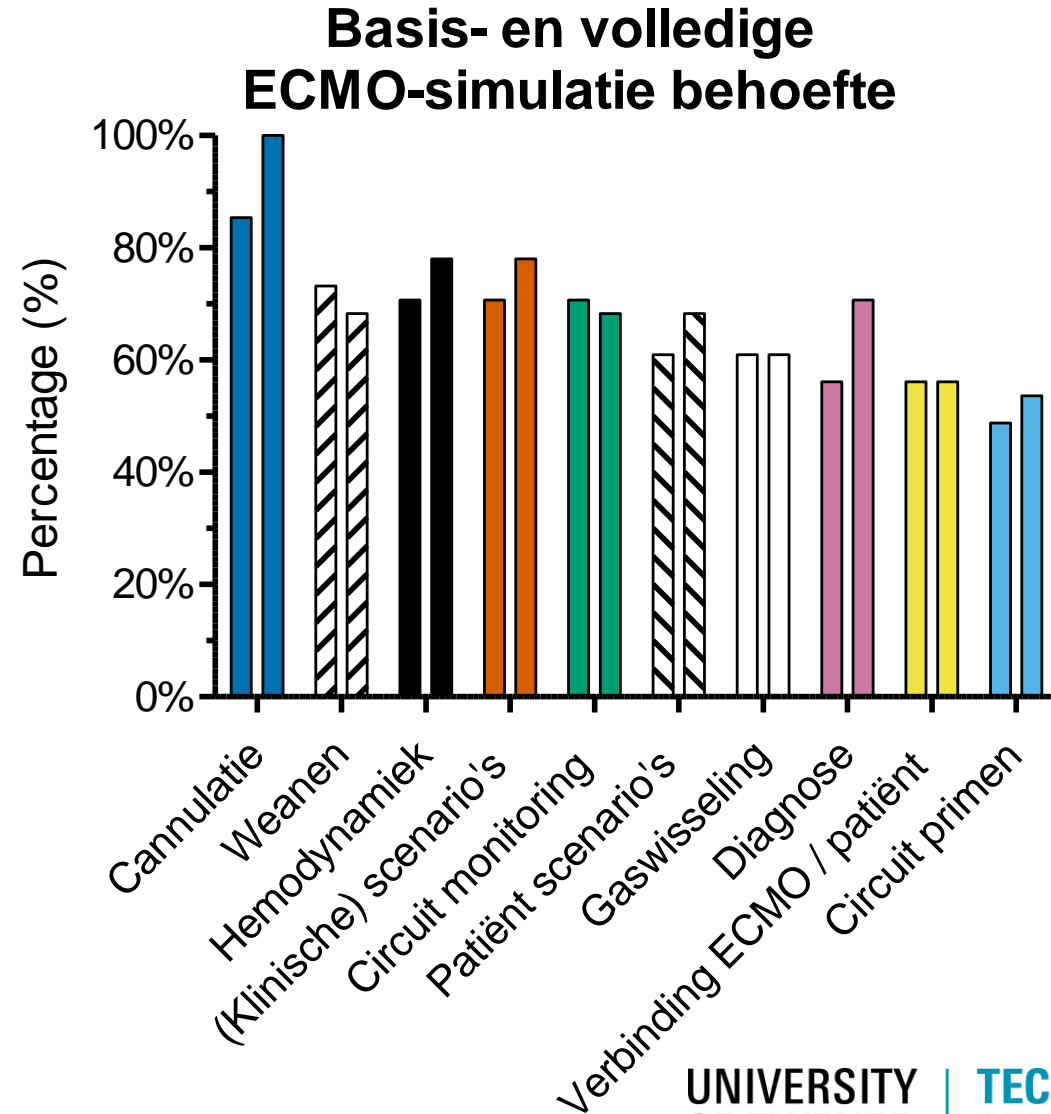
- 18% laag volume (<6 procedures / jaar)
- 18% medium volume (6 – 30 procedures / jaar)
- 42% hoog volume (>30 procedures / jaar)



ONLINE ENQUÊTE – TRAINING NEEDS ANALYSIS

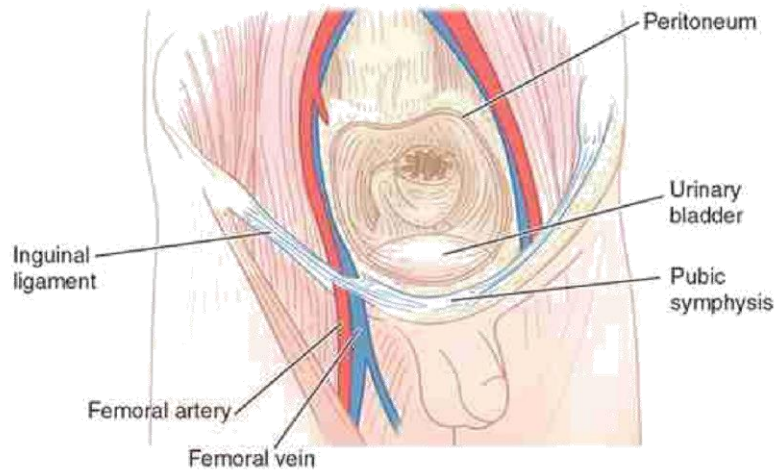
34% volgde ECMO-simulatietraining mét examen

98% wil patiënt-variatie in ECMO-simulatoren



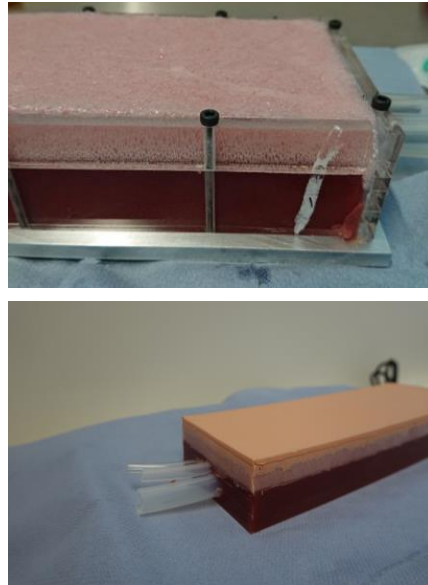
EDU ECMO – TRAINING MEDIA DESIGN

Waar praten we over?



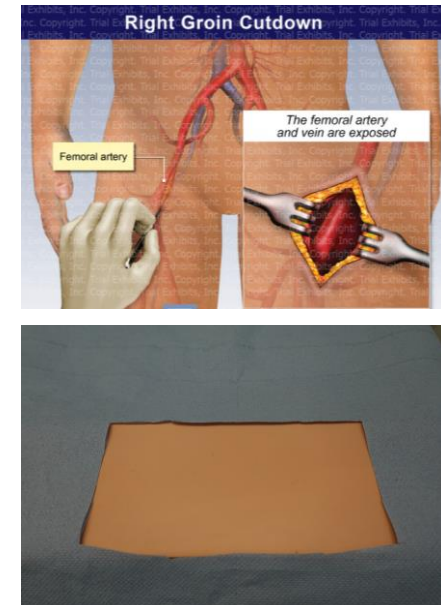
Relevante anatomische and (patho)fysiologische structuren

Synthetisch huid model

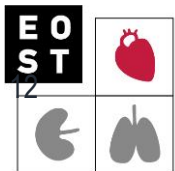


Huid, vet, spier, a./v./n. femoralis

Pilot cardio-thoracale chirurgie



Chirurgische toegang voor femorale TAVI



Reichmann, Emergency Medicine Procedures 2nd ed, 2013;
TrialExhibits right groin cutdown, Cl_C_0138

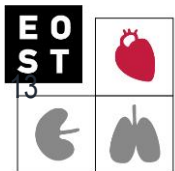
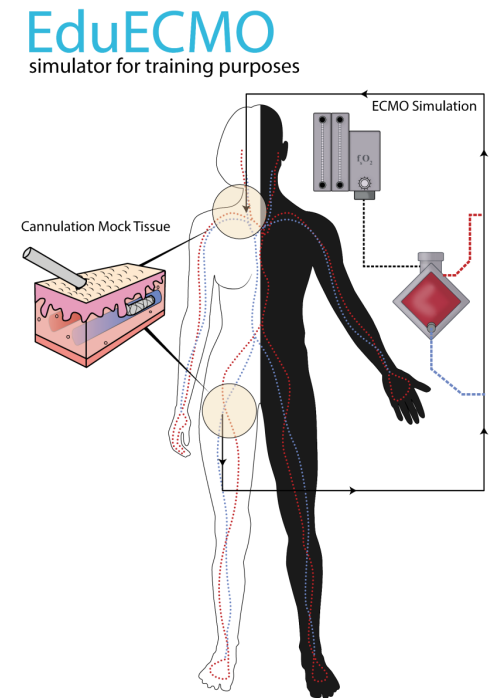
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EDU ECMO EN IMPACT



- Nieuw model voor objectieve simulator classificatie
Inzetbaar voor selectie huidige ECMO-simulators
Toe te passen op andere simulators (bijv. off-pump hartchirurgie)
- Geüpdate simulator ontwerp strategie volgens Van Meurs
- Een training needs analysis leidt tot simulators waar behoefte aan is
Er is behoefte aan één high-fidelity ECMO simulator
En die is er nog niet!



EDU-ECMO PROJECT TEAM – DANK!

