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Title	The effectiveness of synthetic learning environments to develop decision-making skills in military and non-military clinical medical settings: a systematic review
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Creators	Richards, Pamela, Hynes, Celia, Spencer, Joseph and Hives, Lucy

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Citation

Pamela Richards, Celia Hynes, Joseph Spencer, Lucy Hives. The effectiveness of synthetic learning environments to develop decision-making skills in military and non-military clinical medical settings: a systematic review. PROSPERO 2022 CRD42022336969 Available from: https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42022336969

Review question

What are the specific types of synthetic learning environments being used in both a military, and non-military, clinical medical setting to train the development of effective decision-making capabilities?

Searches

Databases to be searched: MEDLINE, EMBASE, Scopus, APA PsycINFO, CINAHL Ultimate, SPORTDiscus.

Grey Literature Sources: The Defence Technical Information Center (DTIC); Google Scholar (first 200 hits); Interservice/Industry Training, Simulation and Education Conference (I/ITSEC); UK Gov (Ministry of Defence, first 200 hits); Chartered Institute of Ergonomics and Human Factors (CIEHF, first 200 hits).

Restrictions: English Language, Full Text, Date of publication 2002 - Present.

Types of study to be included

No restrictions on study design.

Condition or domain being studied

Decision-making.

Participants/population

Military medical professionals (e.g. combat medic etc.), non-military medical professionals (e.g. clinical practitioner, nurse, doctor, paramedic etc.).

Intervention(s), exposure(s)

Synthetic learning environments (e.g. Augmented Reality, Virtual Reality, Extended Reality etc.).

Comparator(s)/control

Not applicable.

Context

Any training or educational engagement involving clinical decision-making.

Main outcome(s)

1) Aspect of clinical decision-making outcomes or processes which are trained in a synthetic environment. Considering the dynamic and multidimensional nature of this construct including technical skills and non-technical decision-making capabilities. Specifically considering 1) cognitive engagement – cue and pattern recognition; 2) Cognitive structures – e.g. mental models, shared mental models, sense-making; 3) Situational factors – recognition and/or comprehension of external factors; 4) psychosocial factors – e.g. teamwork, communication.

2) Aspect of synthetic learning environment (e.g. AR, VR, XR) which can be constructed to 1) train; 2) develop or 3) prevent skill fade in either individuals or teams with the emphasis of developing either technical or non-technical decision-making skills.

Measures of effect

Decision-making effectiveness will be measured by exploring aspects of technical (cognitions) and non-technical (situational factors and psychosocial) skills. Synthetic learning environments and their

appropriateness will be measured by the mode used and the impact on developing decision-making.

Additional outcome(s)

None.

Data extraction (selection and coding)

All identified articles from the above databases will be imported and managed into Endnote (reference software). All duplicate articles will be reviewed and removed. The title and abstracts of all papers will be double screened and the inclusion criteria will be used to determine potential inclusion of the paper for the next step.

Full texts will then be reviewed by two reviewers to assess and determine suitability for inclusion in the data extraction and final analysis. Results from the grey literature search will be included during this phase of the screening process. Disagreement will be discussed within the research team and will be resolved with a joint consensus decision being made as to which papers will be included. The PRISMA guidelines and flow diagram will provide a detailed outline of the process for final article selection and excluded studies.

Data will be extracted to an Excel table that includes: author; year of publication; study type; classification of decision; context of decision-making; nature of decision-making (individual/team); domain (military/non-military); participant role(s) (nurse/doctor/paramedic); synthetic mode used (AR/VR/XR); training intended to train, develop, or prevent fade.

Risk of bias (quality) assessment

To indicate bias and study quality the Mixed Methods Appraisal Tool (MMAT) was used by two investigators in order to critically appraise the data. Any discrepancies were discussed within the whole research team.

Strategy for data synthesis

Meta-synthesis will be conducted to thematically analyse qualitative and quantitative data for decision-making and synthetic learning environments within this integrative review. In accordance with the process for a meta-synthesis approach, studies will be independently analysed by members of the team, where researchers will read and re-read studies and identify key concepts and drivers. These key concepts and drivers will be tabled and allow for a comparison of established relationships and themes to be identified. Key themes will be further examined and divided into sub-themes as necessary. This process will be explored for decision-making, synthetic environments, and the integration of how synthetic environments can train decision-making.

Analysis of subgroups or subsets

If an adequate description of decision-making is provided, sub-groupings by level of decision-making will be included which will consider cognitive processes, situational factors, and psychosocial aspects. In addition, if adequate descriptors of synthetic learning environments is established, sub-groupings by level of synthetic environments will also be included based on description of mode of synthetic engagement and context of the learning.

Contact details for further information

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Organisational affiliation of the review

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Type and method of review

Systematic review, Other

Anticipated or actual start date

05 May 2022

Anticipated completion date

31 October 2022

Funding sources/sponsors

Higher Education Innovation Fund (HEIF) (Project ref KTN005101)

Conflicts of interest

Language

English

Country

England

Stage of review

Review Ongoing

Subject index terms status

Subject indexing assigned by CRD

Subject index terms

MeSH headings have not been applied to this record

Date of registration in PROSPERO

02 August 2022

Date of first submission

01 August 2022

Stage of review at time of this submission

Stage	Started	Completed
Preliminary searches	Yes	Yes
Piloting of the study selection process	No	No
Formal screening of search results against eligibility criteria	No	No
Data extraction	No	No
Risk of bias (quality) assessment	No	No
Data analysis	No	No

The record owner confirms that the information they have supplied for this submission is accurate and complete and they understand that deliberate provision of inaccurate information or omission of data may be construed as scientific misconduct.

The record owner confirms that they will update the status of the review when it is completed and will add publication details in due course.

Versions

02 August 2022

