**Appendices**

***Appendix 1: Inclusion and exclusion criteria***

|  |  |  |
| --- | --- | --- |
| **Criteria type** | **Inclusion criteria** | **Exclusion criteria** |
| Study design | Any study design that describes the primary use of a method relating to the assessment of non-technical skills. Such assessments must have the potential for continuing use in UME outside of the specific context of the study. | Opinion pieces, editorial letters, commentaries, review articles which fail to describe the primary use of an assessment method relating to non-technical skills. They may also describe a limited assessment that is essentially a primary outcome measure and could not be used on a continuing basis in UME. |
| Outcome | Paper describes either an assessment tool for non-technical skills as the main focus of the study or in detail as an outcome measure of an educational activity (intervention) within a paper. | Paper describes teaching only without an assessment;  Paper gives opinion or review but does not describe the primary use of an assessment method  Paper describes an assessment method that is focussed on verifying the effectiveness of teaching in the context of research, not as a tool for learners (for either formative or summative assessment). |
| Outcome Assessment | Assessment of outcomes / impact at any level of Kirkpatrick’s hierarchy | No assessment of outcomes / impact, OR  Kirkpatrick’s outcome measures focused exclusively on teaching, rather than outcomes of an assessment |
| Participants | All study designs targeting medical students, either in isolation or as part of a multi-disciplinary team | Study does not involve medical students |
| Stage of training | Assessment forms an elective or core component of an undergraduate medical curriculum | Assessment involves post-graduate (resident or continuing medical education) activities |
| Language | Any country, any language, with translation if needed. |  |

***Appendix 2: Search syntaxes and example search strategy***

*Search Syntaxes:*

(Non-technical skills OR human factors OR safety-training OR simulation) AND (medical student OR doctor) AND (health professions education course OR teaching OR training OR assessment OR medical education)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Stage** | **Adjoining word** | **Search term** | **Field to search** | **Number of results** |
| 1 |  | Non-technical skills OR human factors OR safety-training OR simulation | Title | 89,6297 |
| 2 | AND | Non-technical skills OR human factors OR safety-training OR simulation | Title | 12,950 |
| Medical student OR doctor | Title |
| 3 | AND  AND | Non-technical skills OR human factors OR safety-training OR simulation | Title | 7,556 |
| Medical student OR doctor | Title |
| health professions education course OR teaching OR training OR assessment OR medical education | Title |

Search strategy for the PubMed database

***Appendix 3 – Data extraction form and quality assessment tool***

*Reference Number*: *Reviewer*:

**Source**

🞏Book 🞏Comment 🞏Conf. 🞏Editorial 🞏Guideline 🞏Interview 🞏Journal article 🞏Lecture

🞏Letter 🞏News 🞏Non-peer review article 🞏Official publication 🞏Report 🞏Thesis

**Citation information**

*First Author:*

*Title:*

**Search method**

🞏Electronic search 🞏Hand search 🞏Grey literature 🞏Recommendation

**Background/ question / objective [research methodology quality indicator]**

*Has a review of the literature been described?* 🞏Yes 🞏No

*Is there a clearly defined and well described objective to the study?* 🞏Yes 🞏No

**Research design [research methodology quality indicator]**

Is the design appropriate to answer the research question?

Is the study design reported?

Place an S for Stated or I for Implied in the box:

🞏Audit 🞏Action-based

🞏Survey 🞏Cross-sectional study 🞏Case-series 🞏Observational

🞏Retrospective cohort study 🞏Prospective cohort study 🞏Before-and-after study 🞏Time series

🞏Randomised trial 🞏Non-randomised trial

*Was a control group used?*  🞏Yes 🞏No

*Was there any form of randomization between groups?* 🞏Yes 🞏No

*Were the learner characteristics reported*? (If NO continue to intervention) 🞏Yes 🞏No

*Which groups were studied?* (Please tick all that apply if mixed)

🞏Doctor 🞏Midwife 🞏Nurse 🞏Other

Were the study participants undergraduate or postgraduate?

🞏Undergraduate 🞏Postgraduate

*Number of participants*:

*Demographics of participants:*

**Intervention [research methodology quality indicator]**

*Is the educational intervention clearly described?* 🞏Yes 🞏No

*Is the educational intervention described in enough detail to replicate*? 🞏Yes 🞏No

*Please record details of the intervention/assessment:*

*Is there a description of theoretical models or conceptual frameworks that underpin the choice of assessment?***[Underpinning framework quality indicator]**

**Yes** Clear and relevant description

**Yes** Some limited discussion of underpinning, with minimal interpretation in the context of the assessment choice

**No**

*Is there a description of the process and outcomes of the assessment?* **[Assessment method quality indicator]**

**Yes** Clear description of the process and outcomes of the assessment

**Yes** Some limited description that will not facilitate replication

**No**

*Are details of the educational context and learner characteristics of the study provided?* **[Background quality indicator]**

**Yes** Clear details of the educational context and learner characteristics of the study

**Yes** Some description, but not significant as to support dissemination

**No**

*Are there details of psychometrics and how they are applied to the assessment?* **[Psychometrics quality indicator]**

**Yes** Clear description of relevant psychometrics and how applied to this assessment

**Yes** Some psychometric information, but not enough to fully inform for dissemination

**No**

*Is there provision of material to allow assessment replication?* **[Content quality indicator]**

**Yes** Provision of detailed materials to allow assessment replication

**Yes** Some elements of materials presented or summary information

**No**

**Results and strength of conclusions**

*What are the key conclusions?*

*Do the conclusions match the findings of the study?* **[Strength of conclusions quality indicator]**

Low High

1 2 3 4 5

1 – No clear conclusions can be drawn. Not significant

2 – Results ambiguous, but there appears to be a trend.

3 – Conclusions can probably be based on the results.

4 – Results are clear and very likely to be true.

5 – Results are unequivocal.

*Did the research discuss limitations of the study?*

**Impact of intervention studied (target of evidence/ outcomes)**

*Do outcomes match the objectives of the study?*

*Are data collection methods described in enough detail to replicate?* 🞏Yes 🞏No

*Are statistical tests used?* 🞏Yes 🞏No

*If used, are statistical tests appropriate for the design?*

*Code the level of impact being studied in the item and summarize any results of the intervention at the appropriate level. Note: include both predetermined and unintended outcomes.*

🞏Level 1 - Participation

🞏Level 2a - Modification of attitudes/perceptions

🞏Level 2b - Modification of knowledge/skills

🞏Level 3 - Behavioural change

🞏Level 4a - Change in organizational practice

🞏Level 4b - Benefits to patient / clients

***Appendix 4 – Quality assessment of included studies***

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author / Quality** | **Farnan** | **Jansson** | **Ginsberg** | **Gallotti** | **Madigosky** | **Aboumatar** | **Müller** | **Paxton** | **Thomas** |
| Literature review described? | Yes | No | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Clear study objectives? | Yes | Yes | Yes | Yes | Yes | Yes | Yes | No | Yes |
| Appropriate study design? | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Is the study design reported? | Yes | No | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Was a control group used? | No | No | No | No | No | No | Yes | Yes | Yes |
| Randomisation between groups? | Yes | No | No | No | No | Yes | Yes | No | No |
| Learner characteristics reported? | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Educational intervention described? | Yes | No | No | Yes | No | No | No | No | No |
| Description of theoretical models? | No | No | Some | Clear | No | No | Some | Some | Clear |
| Description of the process? | Clear | Some | Clear | Clear | Clear | Some | Some | Some | Clear |
| Learner characteristics provided? | Some | Some | Some | Clear | Some | Clear | Some | Some | Some |
| Details of psychometrics? | Clear | No | No | Clear | Some | Some | Some | No | Some |
| Materials provided for replication? | Some | No | Some | Detailed | Some | No | Detailed | Some | Detailed |
| Conclusions match the findings? | 3, 4 | 3, 3 | 4, 4 | 3, 3 | 3, 3 | 3, 3 | 3 | 3 | 3 |
| Are study limitations discussed? | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Outcomes patch | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Reproducible data collection? | Yes | No | Yes | Yes | Yes | No | Yes | No | Yes |
| Appropriate statistical tests? | N/A | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Level of Kirkpatrick's hierarchy? | 2b, 2b | 2b, 2b | 2b, 2b | 4a, 4a | 3, 3 | 2b, 2b | 3 | 2b | 2b |