

BEME – Best Evidence Medical and Health Professional Education

1. Cover Sheet

The effectiveness, implementation and evaluation of quality improvement training programmes in surgery: a BEME systematic review protocol

Elena Pallari^{*1,2}, Zarnie Khadjesari¹, James Green³ and Nick Sevdalis¹

¹ Centre for Implementation Science, Health Service and Population Research Department, Institute of Psychiatry, Psychology & Neuroscience (IoPPN), King's College London, London, SE5 8AF, UK

² Department of Cancer Epidemiology and Population Health, Division of Cancer Studies, Guy's Hospital, Research Oncology, Great Maze Pond, King's College London, London, SE1 9RT, UK

³ Bart's NHS Trust, Whipps Cross Hospital, Urological Department, Whipps Cross Road, London, E11 1NR

Review team

Elena Pallari (EP): Research Assistant at the Centre for Implementation Science, King's College London

Zarnie Khadjesari (ZK): Senior Research Fellow at the Centre for Implementation Science, King's College London

James Green (JG): Urological Surgeon at Barts NHS Health Trust, Whipps Cross Hospital

Nick Sevdalis (NS): Professor of Implementation Science and Patient Safety at the Centre for Implementation Science, King's College London

Contact details for further information

* Ms Elena Pallari (lead reviewer): Research Assistant

King's College London, Institute of Psychiatry, Psychology & Neuroscience (IoPPN)

Centre for Implementation Science, Health Service and Population Research Department

elena.pallari@kcl.ac.uk

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King's College London, Institute of Psychiatry, Psychology & Neuroscience (IoPPN)

Centre for Implementation Science, Health Service and Population Research Department

<http://www.kcl.ac.uk/ioppn/depts/hspr/research/CIS/Centre-for-Implementation-Science.aspx>

Abstract

This protocol sets the context for the conduct of a systematic review according to the BEME standards. The aim of this protocol is to set the context to investigate the current evidence-base for educational interventions to teach quality improvement skills and competences in the surgical field. The primary objective is to evaluate the effectiveness of the included educational interventions based on their design, impact on knowledge and skills learning and organisational impact. We seek to understand how the training is assessed, through educational, clinical or other measured outcomes and what impact QI training has had on surgical trainees' performance or surgical services and patient care. Therefore, this is an effectiveness review with the participants being surgeons or surgical trainees. Further objectives include to review the implemented teaching methods and developed training material, as no rigorous systematic review has been undertaken on the topic. Finally, we also aim to identify what implementation frameworks and strategies have been used around quality improvement in surgical curricula (implementation analysis).

2. Background to the topic

Quality improvement is defined as the combined efforts to make changes that improve health, care and learning by optimising patient outcomes, system performance and professional development¹. Patient safety as defined within the context of healthcare is the prevention of harm to patients^{2,3} and is an inseparable dimension of delivering quality healthcare^{2,3}. Therefore, as patient safety (PS) and quality improvement (QI) lie on the same continuum of clinical practice, they have gained significant prominence over the past few years in the political agenda on strengthening the healthcare system performance. In England, the need to develop skills and capabilities in delivering quality and safety improvement within clinical services are clearly articulated by the National Health Service (NHS) and Clinical Commissioning Groups (CCGs) who explicitly identified the need to support leaders through education and training in quality improvement methods¹. In the US, a similar trend has appeared, with the development, for instance, of large-scale improvement programmes with standardised metrics *e.g.* National Surgical Quality Improvement Program (NSQIP)², and associated QI curricula development for residents (trainees)^{3,4}.

The priority is now shifting towards supporting clinical teams to reduce care variations through tried and tested methods of health and care quality improvement⁵. The Health Education England (HEE) goal is to ensure the healthcare workforce is equipped to deliver health improvement to patients and public⁶. As the World Health Organization added safety as part of the quality agenda, sharing experiences, learning from failure and facilitating effective evidence-based care are important elements in enhancing the quality of health care⁷. From an evidence perspective, it is important to explore the context, barriers to practice, educational tools used and training material that have been used by clinicians, educators and researchers, so these can be brought to the attention of educators and practitioners in surgery and used towards enhancing learning of quality improvement by surgical trainees. This can in turn inform the practical purposes of understanding what works and what hinders such initiatives in the current educational setting, and how different interventions lead to different outcomes, educational, service-based or patient outcomes, if relevant.

The quality and standards of care differ significantly across the UK. There are 340 NHS Hospital Trusts, effectively operating as mini fiefdoms responsible for their own budgets and delivery of care albeit operating within an overarching framework. This means that when quality and safety improvements are made in a surgical service in one NHS Trust, there are no effective means of sharing and implementing these improvements and knowledge across the service, to the detriment of surgery patients. Quality improvement implementation teams are not present in many Trusts in England and, when they are external to Trusts, they represent a costly and unsustainable resource. We hope that programmes from different countries sharing best practices on QI training and implementation within surgery will be systematically collected and evaluated.

A few systematic reviews to-date have reported on the introduction of QI interventions within the training curriculum^{8,9}. The focus of our interest here is QI skills training within surgery and we have identified a single review reporting on QI methods introduced within surgical training¹⁰. However, the review had several restrictions on keywords, language and coverage. Therefore, our review will encompass expansive search terms (details on section 3) with no restrictions on language or setting and covering any relevant surgical target group. A small scoping search was performed to explore the amount of evidence that exists, which supports the pursuit of this topic and the relevance of our developed search strategy (details in section 4).

Therefore, we conceptualise this BEME review as an Effectiveness Review, meaning that the effect of the education interventions will be assessed at its practice and theory level. According to the Agency for Healthcare Research and Quality (AHRQ) an effectiveness review or comparative effectiveness or

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comparative harms of different health care interventions is intended to inform real-world healthcare decisions for patients, providers, and policymakers based on evidence¹¹. That is, the effectiveness will be assessed on the process and outcomes of the development, implementation and impact evaluation of the educational interventions that have been studied.

3. Review Question(s), objectives and keywords

The aim of this review is to explore the development, implementation and evaluation of quality improvement in training programme for surgeons/surgery trainees from a multiple-stakeholder perspective.

The set research questions explored through this review are:

1. What impact has the QI training had on surgical trainees' performance or surgical services and patient care?
2. How is QI training evaluated, what is the evaluation process and models used and what are the educational, clinical or other measured outcomes?
3. What is the curriculum content (*e.g.* are specific implementation frameworks and strategies used?) and how is it delivered?

The set objectives are to:

1. Determine what impact the QI training has had on surgical trainees' performance or surgical services and patient care.
2. Report whether the QI training was evaluated, how the evaluation process was undertaken and which educational, clinical or other outcomes were measured.
3. Identify which implementation tools or strategies, teaching methods and strategies (online/in-class etc.), and training materials have been used to teach QI within surgical curricula.

To address the three research questions, an effectiveness systematic review will be conducted which, as defined by BEME, will aid our practical and theoretical understanding of the outcomes related to the educational intervention as well as the underpinning processes of teaching and learning aspects on QI effectively.

The systematic search strategy is based on three sets of concepts: quality improvement, education and surgery. Within each concept the various search terms have been developed and outlined below, with variations for each term through query signs and the use of Boolean operators of 'OR' between search terms within a concept and the use of 'AND' between the concepts.

Concept 1: Quality improvement, Plan-Do-Study-Act (PDSA) cycle, Model for Improvement, Statistical Process Control (SPC), Six Sigma, Lean, Theory of Constraints, Mass Customisation, Total Quality Management (TQM), Continuous Quality Improvement (CQI)

Concept 2: Education, Teaching, Learning, Skill, Competence, Training, Scheme, Simulation, Curriculum, Programme

Concept 3: Surgery

4. Search sources and strategies

The Cochrane Library, Embase, HMIIC (Health Management Information Consortium), Medline, PsycINFO through Ovid, BEI (British Education Index), CINAHL (Cumulative Index to Nursing and Allied Health Literature) and ERIC (Education Resources Information Center) through EBSCOhost, ASSIA

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(Applied Social Sciences Index and Abstracts) through ProQuest, and the Web of Science® (Thomson Reuters) – Science Citation Index (SSCI-Expanded), Social Science Citation Index (SSCI), Conference Proceedings Citation Index- Science (CPCI-S) and the Emerging Sources Citation Index (ESCI) to capture grey literature too.

The literature search will be performed in these 10 databases as part of conducting a systematic search strategy on quality improvement training in the field of surgery to collect all the available evidence in any language and translate any potential non-English language papers. No language, country of origin or time restrictions will be set. The reference lists of all the included articles will be hand-searched for additional references. For any research paper that meets inclusion criteria but is not available in full or unpublished, the corresponding author(s) will be contacted to get access.

As mentioned on section 2, a scoping search was performed to validate our developed search strategy and justify the importance of conducting a review on the topic as defined through our aim, research questions and objectives. Preliminary results indicate that there are 17,083 hits from 10 databases combined. It is estimated that about 5,000 will be duplicates, with about 12,000 studies to be screened (see section 8 on Scoping search for details on the pilot searches carried out to –date). The first reviewer (EP) will screen all studies following de-duplication, while this process will be checked by allocating a random percentage of hits to the other three reviewers to go through and check inter-reviewer agreement in study selection.

Any potential changes that may be required due to the relevance of selected evidence will form part of a protocol revision, if needed. Also, any other issues that may arise will be recorded and reported to BEME for protocol amendment.

For the full list of employed keywords across each web-platform, please see Appendix A.

5. Study selection criteria

Inclusion criteria

For studies that evaluate the impact of quality improvement training, any type of intervention related to training will be included in the review such as evaluation of surgical skills improvement using simulation, workshops or other QI modalities.

Exclusion criteria

Studies will be limited to the field of surgery and excluded if they are concerned with other training programmes or interventions aimed at patients or other healthcare professionals than surgeons or surgical trainees/residents.

Study types to be included

Any primary research study will be included in the review, such as observational studies, case reports, qualitative studies, quasi-experimental studies and randomised controlled trials. Relevant systematic reviews will be searched for eligible studies, but not included as primary evidence. Commentaries, letters or editorials will be excluded.

Appropriateness of study type to condition or domain being studied

Studies concerned with the impact, implementation and evaluation of training programmes, modules, teaching or other interventions on quality improvement within the field of surgery will be eligible.

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Research studies will only be included if they involve a training programme, educational teaching or learning simulation, training or related scheme on quality improvement elements or teaching methodologies such as 'plan do study act' cycles or other, as related to surgical practice.

Participants/ population

Studies targeting surgeons or surgical trainees from any surgical specialty/subspecialty will be included. This can be at any level of hierarchy or training, as well as the location may vary depending on the country the intervention was delivered to. The review is limited to the field of surgery as key conclusions specifically for this group of population can be drawn.

Comparator(s)/ control

If studies with a comparator(s)/control group (*e.g.* no formal QI training intervention) are identified they will be used within this review.

Context

The lack of a systematic review on this topic, highlighted the research gap that exists in the development of an educational material in quality improvement aimed at surgeons or surgical trainees based on clinical evidence. The studies included in the systematic literature review will be solely from the surgical field and not limited to specific countries or healthcare systems. Additionally, studies will be included targeting surgeons across different surgical specialties/subspecialties, as transferrable lessons can be utilised towards the development of relevant educational material targeting any surgical sub-specialty.

Outcome(s)

The primary outcomes we seek to synthesise are based on the Kirkpatrick's hierarchy of training programmes evaluation¹². This offers a solid, well-established framework for evaluating the impact of a training intervention, which has been extensively in reviewing educational interventions. Our team has published extensively using this framework. The secondary outcomes are directly relevant to the implementation and evaluation aspects of training interventions.

Primary outcomes

Teaching programme or intervention evaluation

1. Learner's satisfaction (Kirkpatrick's Level 1)
2. Learner's knowledge acquisition, skills development & attitude alteration (Kirkpatrick's Level 2)
3. Learner's behavioural change (Kirkpatrick's Level 3)
4. Impact on patient outcomes or clinical process or system performance (Kirkpatrick's Level 4 results; demonstrable value of training through acceptance, skills development and behaviour change of the quality improvement training in the surgery context)

Secondary outcomes

Teaching programme or intervention implementation

1. Implementation strategies
2. Barriers to and drivers of implementation
3. Sustainability of the programme
4. Scale-up metrics

Teaching content and methods

1. Pedagogical methods and/or frameworks
2. Teaching materials
3. Learning outcomes and assessment methods

6. Procedure for extracting data

Data extraction (screening, selection and coding)

One reviewer will conduct and save each database search (EP). The results will be imported on EndNote (EP). Upon duplicates removal (EP) three reviewers (EP and two external research fellows splitting the workload) will screen full-text and identify studies for inclusion or record reasons for exclusion of the ineligible studies. Any disagreements will be resolved through discussion including the senior reviewers of the team (JG or NS).

The selection process will be recorded and displayed through a PRISMA flow diagram and the inclusion of a 'Characteristics of excluded studies' table.

The data will be extracted into Excel and will be double-checked by comparison of the study reports and the systematic review results. The study data will be displayed in the "Characteristics of included studies" Table, which will include following:

1. Methods: study design, total duration of study, number of study sites, location, study setting, withdrawals
2. Participants: year of specialty training, mean age, age range, gender
3. Intervention: intervention, comparison groups
4. Outcomes: primary and secondary outcomes
5. Notes: funding of studies and any notable conflicts of interests.

If disagreements arise between the two review authors, this will be dissolved by group discussion or a third author will intervene (JG/NS). The data extraction will be performed using a structured data capture template constructed prior to review of the evidence provided in Appendix B.

Analysis of subgroups or subsets

The data will be presented in a narrative format, as a great degree of heterogeneity between the studies is expected. The data will be grouped according to the various:

1. Surgical specialty fields
2. Year of specialty training
3. Educational components/ methodological aspects

7. Assessment of study quality

The quality of the methodological approach and research questions under review for each study will be independently assessed by the lead author (EP), the co-author (ZK) and the two research fellows using the criteria outlined in the Cochrane Handbook for Systematic Reviews of Interventions¹³. This is related to the quality of the intervention itself and the quality of the evaluation of the intervention¹². If disagreements arise these will be resolved by group discussion.

Quality assessment

Between the two common approaches of quality assessment: checklists or scales, the former will be used. Both the Cochrane Bias Methods Group and the Centre for Dissemination and Reviews advise

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against the use of numerical scores over quality assessment. The methodological quality will be assessed based on contextual, pragmatic and methodological factors. There will be a “Quality assessment” Table on the following aspects adopted from Hothersall *et al.* (2016)¹⁴:

1. Underpinning framework
2. Assessment method
3. Setting
4. Psychometrics
5. Context
6. Conclusions

The tool for the quality assessment of studies is provided in Appendix B.

8. Synthesis of extracted evidence

Strategy for data synthesis

The narrative synthesis framework of this research study will be constructed around the four elements outlined in the Cochrane Handbook for Systematic Reviews of Interventions¹³. The first element involves developing a theory how the training intervention works, barriers and success factors towards its implementation and actors involved in this process. The second element of the narrative synthesis will be constructed based on the details of the included studies (study type, intervention, number of participants, a summary of participant characteristics, outcomes and outcome measures). We anticipate identifying a small number of heterogeneous quantitative studies, and therefore it is unlikely that we'll need to combine the results in a meta-analysis. However, quantitative studies will be combined in the form of a narrative synthesis. A “Summary of findings” Table will be developed using the BEME rating system protocol to assess the quality of the body of evidence as it relates to the included studies¹⁴. Thirdly, the relationships within each of the studies and between the studies will be explored. Another Table will be used to capture implementation elements, curriculum content and teaching delivery methods for each study and direct comparison with the other included studies. Finally, another table will also be provided on study quality (as per section 7). The conclusions of the systematic review will be based on the findings and a critical reflection of the synthesis process of the included studies, along with recommendations for future research and education strategy for surgery.

Through the BEME systematic process, all relevant published studies will be collected and analysed. It is expected that the synthesis of the findings on the effectiveness of such programmes, will inform the surgical and educational communities around best practices. This review will draw on best practices and lessons learnt from such QI training programmes within the field of surgery from different countries or healthcare systems to inform this research to practice gap. Also, it is expected that through this review, the up to date state of implementation efforts of such programmes can inform the design, implementation and evaluation of future programmes on delivering more effective quality improvement training within surgery¹⁵.

9. Scoping search

The search terms that will be used on this systematic review, have been developed through several pilot searches across the selected databases to identify the literature that is currently available. A small scoping search demonstrated that there is a rich evidence-base pool available to be explored. From the 12,671 studies we obtained using the search strategy outlined earlier in Section 4, we rapidly screened 15% of studies (n=1,953). Of those, six appear relevant for inclusion (based on title and abstract). Therefore, there is an anticipated 39 studies to be included in this review.

10. Translation into practice

Dissemination plans

The completed systematic review will be submitted for peer-review publication in a surgical or medical education journal. The findings will form the evidence-base for the development of a quality improvement training component to complement the educational material currently implemented through the Intercollegiate Surgical Curriculum Programme (ISCP, 2015)¹⁶. The effectiveness of the intervention will be evaluated through the funded “EQUIP” research programme (the Education and Quality Improvement Programme), which is targeting urology trainees in the UK in the first instance.

11. Project timeline

We estimate about five months, from the time of protocol completion and write-up to submission of full review report. During this time, we will follow the BEME requirements for the publication of this protocol and while we wait for feedback, we will run a background literature for the full report, and run the established search strategy to the selected databases. Upon feedback, we can modify any study criteria as appropriate, import the studies and follow the PRISMA flowchart all the way to results synthesis. For the proposed timeline, see Gantt chart provide in Figure 1.

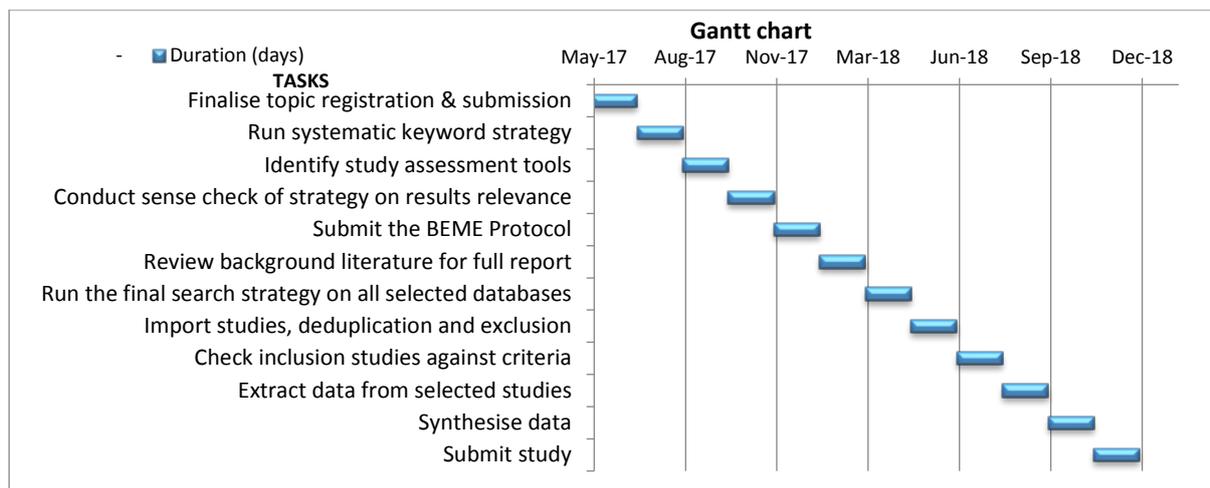


Figure 1 The Gantt chart for the BEME protocol and tasks for the conduct of the systematic literature review

12. Conflict of interest statement

NS is the Director of London Training & Safety Solutions Ltd which delivers patient safety, quality improvement, and team training to hospitals on a consultancy basis. There are no conflicts of interest identified by the rest of the authors whether academic, institutional, political, financial, personal or other.

13. Plans for updating the review

Prior to writing up the finding of the review, we will run the search strategy on the selected databases as described in this protocol and record the date or date limitations set for the study. We will set-up RSS feed to be kept informed of the latest articles as they get indexed and potentially relevant to the study. A prospective update of this review can take place within the next three to five years, as more studies are rapidly increasing in the field of medical education. We anticipate that such an update of

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review will be of value in informing the medical education and surgical community on what has changed since last undertaking this review on quality improvement.

14. Changes to the protocol

The review will be based on the published protocol. However, if any deviations from this protocol occur, they will be reported in the study findings under the section “Differences between protocol and review”. If major modifications on the review questions under study become necessary, then the suggested protocol changes will be submitted to BEME for approval.

15. Protocol checklist

This protocol has been prepared in accordance to the Best Evidence Medical Education (BEME) Collaboration using the Protocol Checklist¹⁷ to include all the identified essential elements.

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17. BEME Systematic Review Protocol Checklist. February 2015.

Appendices

Appendix A- Systematic search strategy

Appendix A1- Cochrane library

- #1 "quality improvement":ti,ab,kw (Word variations have been searched)
- #2 plan-do-study-act:ti,ab,kw (Word variations have been searched)
- #3 plan do study act:ti,ab,kw (Word variations have been searched)
- #4 PDSA:ti,ab,kw (Word variations have been searched)
- #5 improvement model:ti,ab,kw (Word variations have been searched)
- #6 model for improvement:ti,ab,kw (Word variations have been searched)
- #7 "statistical process control":ti,ab,kw (Word variations have been searched)
- #8 "SPC":ti,ab,kw (Word variations have been searched)
- #9 "six sigma":ti,ab,kw (Word variations have been searched)
- #10 lean:ti,ab,kw (Word variations have been searched)
- #11 "theory of constraints":ti,ab,kw (Word variations have been searched)
- #12 "mass customi\$ation":ti,ab,kw (Word variations have been searched)
- #13 "total quality management":ti,ab,kw (Word variations have been searched)
- #14 "TQM":ti,ab,kw (Word variations have been searched)
- #15 MeSH descriptor: [Quality Improvement] explode all trees
- #16 MeSH descriptor: [Total Quality Management] explode all trees
- #17 #1 or #2 or #3 or #4 or #5 or #6 or #7 or #8 or #9 or #10 or #11 or #12 or #13 or #14 or #15 or #16
- #18 MeSH descriptor: [Curriculum] explode all trees

- #19 "curriculum":ti,ab,kw (Word variations have been searched)
- #20 teach*:ti,ab,kw (Word variations have been searched)
- #21 learn*:ti,ab,kw (Word variations have been searched)
- #22 train*:ti,ab,kw (Word variations have been searched)
- #23 "scheme":ti,ab,kw (Word variations have been searched)
- #24 simulat*:ti,ab,kw (Word variations have been searched)
- #25 "skill":ti,ab,kw (Word variations have been searched)
- #26 "competence":ti,ab,kw (Word variations have been searched)
- #27 educat*:ti,ab,kw (Word variations have been searched)
- #28 prog*:ti,ab,kw (Word variations have been searched)
- #29 #18 or #19 or #20 or #21 or #22 or #23 or #24 or #25 or #26 or #27 or #28
- #30 surg*:ti,ab,kw (Word variations have been searched)
- #31 #17 and #29 and #30

Appendix A2- Embase; HMIC; Medline; PsycINFO through Ovid platform

- 1 quality improv*.tw.
- 2 plan do study act.tw.
- 3 plandostudyact.tw.
- 4 PDSA.tw.
- 5 improvement model.tw.
- 6 model for improvement.tw.
- 7 statistical process control.tw.
- 8 SPC.tw.
- 9 six sigma.tw.
- 10 lean.tw.
- 11 theory of constraints.tw.
- 12 mass customisation.tw.
- 13 total quality management.tw.
- 14 TQM.tw.
- 15 continuous quality improvement.tw.
- 16 CQI.tw.
- 17 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16
- 18 curriculum.tw.
- 19 teach*.tw.
- 20 learn*.tw.
- 21 train*.tw.
- 22 scheme.tw.

- 23 simulat*.tw.
- 24 skill.tw.
- 25 competence.tw.
- 26 program*.tw.
- 27 educat*.tw.
- 28 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27
- 29 surg*.tw.
- 30 17 and 28 and 29

Appendix A3- Web of Science

- # 22 #21 AND #20 AND #19
- # 21 TI=(surg*)
- # 20 TS=(simulat* or education or teach* or skill* or competence or learn* or train* or scheme or curriculum or program*)
- # 19 #18 OR #17 OR #16 OR #15 OR #14 OR #13 OR #12 OR #11 OR #10 OR #9 OR #8 OR #7 OR #6 OR #5 OR #4 OR #3 OR #2 OR #1
- # 18 TS=(PDSA)
- # 17 TS=(improv* model* or model* improv* or improv* adj3 model* or model* adj3 improv*)
- # 16 TS=(improvement model)
- # 15 TS=(model for improvement)
- # 14 TS=(plan-do-study-act)
- # 13 TS=(plan do study act)
- # 12 TS=(SPC)
- # 11 TS=(statistical process control or statistic* adj2 proces* adj2 control*)
- # 10 TS=("six sigma")
- # 9 TS=(six sigma)
- # 8 TS=(lean)
- # 7 TS=(theory of constraints)
- # 6 TS=(mass customi\$ation)
- # 5 TS=(TQM)
- # 4 TS=(total quality management)
- # 3 TS=(CQI)
- # 2 TS=(continuous quality improvement)
- # 1 TS=quality improv*

Appendix A4- Applied Social Sciences Index and Abstracts (ASSIA) through ProQuest

((quality improvement) OR (quality improv*) OR (plan do study act) OR (plan do study act cycle) OR (plan AND do AND study AND act) OR PDSA OR (improvement model) OR (model for improvement) OR (statistical process control) OR (statistical process) OR (SPC) OR (six sigma) OR lean OR (theory of constraints) OR (mass customisation) OR (total quality management') OR tqm OR (continuous quality management) OR (CQI)) AND ((curriculum) OR (teach*) OR (learn*) OR (train*) OR (scheme) OR (simulat*) OR (skill) OR (competence) OR (program*) OR (educat*)) AND (surg*)

Appendix A5- BEI; CINAHL; ERIC through EBSCOhost platform

- 1 quality improvement
- 2 plan do study act
- 3 plandostudyact
- 4 PDSA
- 5 improvement model
- 6 model for improvement
- 7 statistical process control
- 8 SPC
- 9 six sigma
- 10 lean
- 11 theory of constraints
- 12 mass customisation
- 13 total quality management
- 14 TQM
- 15 continuous quality improvement
- 16 CQI
- 17 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16
- 18 curriculum
- 19 teach*
- 20 learn*
- 21 train*
- 22 scheme
- 23 simulat*
- 24 skill
- 25 competence
- 26 program*
- 27 educat*
- 28 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27
- 29 surg*

Appendix B- Quality Assessment tools

Appendix B1- Study assessment checklist

Part A: General information

Reviewer _____

Author _____

Study no. _____

Journal _____

Publication year _____

Part B: Quality assessment

Quality indicator	Good quality	Unclear quality	Low quality
Underpinning framework	Clear and relevant description of theoretical models or conceptual frameworks that underpin the choice of assessment	Some limited discussion of underpinning, with minimal interpretation in the context of the assessment choice	No mention of underpinning
Assessment method	Clear description of the process and outcomes of the assessment	Some limited description that will not facilitate replication	No mention of assessment method in any detail
Setting	Clear details of the educational context and learner characteristics of the study	Some description, but not significant as to support dissemination	No details of learner characteristics or setting
Psychometrics	Clear description of relevant psychometrics and how applied to this assessment	Some psychometric information, but not enough to fully inform for dissemination	No details of psychometrics
Context	Provision of detailed materials (or details of access), such as mark sheets, rubrics, etc. to allow assessment replication	Some elements of materials presented or summary information	No assessment content presented
Conclusions	Conclusions of the study reflect the findings	Some mismatch between the conclusions and findings	No correlation between the findings and conclusions

Answer each question with a YES, NO or N/A (non-applicable).

Parts B will form the basis of the Table of “**Quality Assessment of Included studies**”

Adopted from Hothersall et al. (2016)¹⁴

Appendix C- Data extraction instruments

Appendix C1- Qualitative

Data extraction form	
Part A: General information	
Reviewer	_____
Author	_____
Study no.	_____
Journal	_____
Publication year	_____
Part B: Study Type	
Part C: SPIDER criteria	
Sample	_____
Phenomenon of Interest	_____
Design	_____
Evaluation	_____
Research Type	_____
Part D: Study description	
Teaching methods	_____
Educational content	_____
Learning outcomes	_____
Authors' conclusions	_____
Reviewers' conclusions	_____

Appendix C2- Quantitative

Data extraction form	
Part A: General information	
Reviewer	_____
Author	_____
Study no.	_____
Journal	_____
Publication year	_____
Part B: Study Type	
Study type:	_____
Part C: PICOS criteria	
Population/participants & sample size	_____
Intervention	_____
Comparison	_____
Outcome	_____
Setting	_____
Part D: Study description	
Teaching methods	_____
Educational content	_____
Learning outcomes	_____
Authors' conclusions	_____
Reviewers' conclusions	_____
Parts B-D will form the basis of the Table of "Characteristics of included studies"	