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## Appendix 1: Search strategies

### RAPID RESPONSE SCHEMES

The search strategies were modified versions of those used by NICE in CG50 (2007). The searches were run on 21 October 2014 in Embase and MEDLINE, and limited to records added to the databases from December 2006 onwards.

#### Medline

1. exp Critical care/
2. Critical care\$.tw.
3. exp \*Intensive Care Units/
4. intensive care\$.tw.
5. ((critical\$ or acute\$ or sever\$ or sudden\$ or unexpected\$) adj2 ill\$).tw.
6. (patient\$ adj2 deterior\$).tw.
7. (risk\$ adj2 deterior\$).tw.
8. critical illness/
9. (clinical\$ adj2 deterior\$).tw.
10. Heart Arrest/ep, mo, pc [Epidemiology, Mortality, Prevention & Control]
11. 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10
12. exp patient care team/
13. outreach.tw.
14. patient at risk\$.tw.
15. patient care team\$.tw.
16. hospital emergency team\$.tw.
17. 12 or 13 or 14 or 15 or 16
18. 11 and 17
19. rapid response team\$.tw.
20. medical emergency team\$.tw.
21. Hospital Rapid Response Team/
22. rapid response system\$.tw.
23. (outreach adj (service\$ or team\$)).tw.
24. 19 or 20 or 21 or 22 or 23
25. 18 or 24
26. 200612\$.ed.
27. 2007\$.ed.

28. 2008\$.ed.
29. 2009\$.ed.
30. 2010\$.ed.
31. 2011\$.ed.
32. 2012\$.ed.
33. 2013\$.ed.
34. 2014\$.ed.
35. or/26-34
36. 25 and 35
37. limit 36 to english language

### **EARLY WARNING SCORES**

The search strategies were modified versions of those used by NICE in CG50 (2007). The searches were run on 21 October 2014 in Embase and MEDLINE and limited to records added to the databases from 31 October 2006 onwards.

#### **Medline**

1. \*Health Status Indicators/
2. exp \*Severity of Illness Index/
3. \*Risk Assessment/
4. severity of illness ind\$.tw.
5. health status ind\$.tw.
6. risk assess\$.tw.
7. early warning.tw.
8. (warning adj2 (scor\$ or system\$)).tw.
9. (track and trigger).tw.
10. ((trigger or calling) adj5 criteria).tw.
11. \*Point-of-care Systems/
12. point of care system\$.tw.
13. serious\$ ill\$.tw.
14. or/1-13
15. exp \*Critical Care/
16. critical care.tw.
17. intensive care.tw.

18. exp \*Intensive Care Units/
19. Hospital Rapid Response Team/
20. rapid response system\$.tw.
21. rapid response team\$.tw.
22. medical emergency team\$.tw.
23. hospital emergency team\$.tw.
24. exp \*Patient Care team/
25. patient care team\$.tw.
26. patient at risk\$.tw.
27. (outreach adj (service\$ or team\$)).tw.
28. shock team\$.tw.
29. \*critical illness/
30. ((critical\$ or acute\$ or sever\$ or sudden\$ or unexpected\$) adj2 ill\$).tw.
31. (patient\$ adj2 deterior\$).tw.
32. (risk\$ adj2 deterior\$).tw.
33. Heart arrest/ep, mo, pc
34. or/15-33
35. 14 and 34
36. 200611\$.ed.
37. 200612\$.ed.
38. 2007\$.ed.
39. 2008\$.ed.
40. 2009\$.ed.
41. 2010\$.ed.
42. 2011\$.ed.
43. 2012\$.ed.
44. 2013\$.ed.
45. 2014\$.ed.
46. or/36-45
47. 35 and 46
48. limit 47 to english language

## **STANDARDISED HANDOVER TOOLS**

### **Search strategy**

The search strategies were modified versions of those used by Robertson et al (2014). The searches were run on 21 October 2014 and limited to records added to the databases from July 2012 onwards.

### **Medline**

1. patient handoff/
2. handover?.tw.
3. hand-over?.tw.
4. handoff?.tw.
5. hand-off?.tw.
6. signout?.tw.
7. sign-out?.tw.
8. patient transfer/
9. patient transfer\$.tw.
10. intrahospital transfer\$.tw.
11. intra-hospital transfer\$.tw.
12. intrahospital transport\$.tw.
13. intra-hospital transport\$.tw.
14. shift to shift.tw.
15. intershift.tw.
16. inter-shift.tw.
17. or/1-16
18. quality improvement/
19. intervention\*.tw.
20. (improv\* and quality).tw.
21. (improv\* and safety).tw.
22. strateg\*.tw.
23. tool\$.tw.
24. training.tw.
25. instrument\$.tw.
26. standardi\*.tw.
27. mnemonic\$.tw.

28. or/18-27
29. 17 and 28
30. SBAR.tw.
31. ISBAR.tw.
32. 30 or 31
33. 29 or 32
34. 201207\$.ed.
35. 201208\$.ed.
36. 201209\$.ed.
37. 201210\$.ed.
38. 201211\$.ed.
39. 201212\$.ed.
40. 2013\$.ed.
41. 2014\$.ed.
42. or/34-41
43. 33 and 42
44. limit 43 to english language

## **CONTINUING EDUCATION**

The searches were run on 21 October 2014 and limited to records added to the databases from 1990 onwards.

### **Medline**

1. exp Critical care/
2. Critical care\$.tw.
3. ((critical\$ or acute\$ or sever\$ or sudden\$ or unexpected\$) adj2 ill\$).tw.
4. (patient\$ adj2 deterior\$).tw.
5. (risk\$ adj2 deterior\$).tw.
6. (clinical\$ adj2 deterior\$).tw.
7. critical illness/
8. or/1-7
9. \*education, continuing/ or \*education, medical, continuing/ or \*education, nursing, continuing/ or \*education, professional, retraining/ or \*education, medical/ or \*education, nursing/
10. medical education.tw.

11. nurs\$ education.tw.
12. exp \*teaching/
13. exp \*inservice training/
14. or/9-13
15. immediate life support\$.tw.
16. Life Support Care/ed
17. Advanced Cardiac Life Support/ed
18. or/15-17
19. Heart arrest/ep, mo, pc
20. 8 or 19
21. 20 and 14
22. 21 or 18
23. limit 22 to yr="1990 -Current"
24. limit 23 to english language

**Appendix 2: High quality review papers used as foundation for the search strategy**

| <b>Topic</b>                      | <b>Original systematic review</b> | <b>Original search start/end</b> | <b>Our search start date</b> | <b>Our search end date</b> |
|-----------------------------------|-----------------------------------|----------------------------------|------------------------------|----------------------------|
| <b>Rapid response schemes</b>     | NICE Clinical Guideline 50        | Jan 2004-Dec 2006                | December 2006                | October 21 2014            |
| <b>Early warning scores</b>       | NICE Clinical Guideline 50        | Nov 2004-October 2006            | October 2006                 | October 21 2014            |
| <b>Standardised handover tool</b> | Robertson et al 2014              | January 2002-July 2012           | July 2012                    | October 21 2014            |
| <b>Continuing education</b>       | None found                        |                                  | January 1990                 | October 21 2014            |



### Appendix 3: NICE CG50 quality levels of evidence

|     |   |
|-----|---|
| 1++ | High-quality meta-analyses, systematic reviews of RCTs, or RCTs with a very low risk of bias  |
| 1+  | Well-conducted meta-analyses, systematic reviews of RCTs, or RCTs with a low risk of bias   |
| 1-  | Meta-analyses, systematic reviews of RCTs, or RCTs with a high risk of bias   |
| 2++ | High-quality systematic reviews of case-control or cohort studies<br>High-quality case-control or cohort studies with a very low risk of confounding, bias or chance and a high probability that the relationship is causal |
| 2+  | Well-conducted case-control or cohort studies with a low risk of confounding, bias or chance and a moderate probability that the relationship is causal   |
| 2-  | Case-control or cohort studies with a high risk of confounding, bias, or chance and a significant risk that the relationship is not causal  |
| 3   | Non-analytic studies (for example, case reports, case series)   |
| 4   | Expert opinion, formal consensus  |

## Appendix 4: Data items extracted from papers

### Study Type

- Study design
- Data collection method
- Study duration (observation, intervention and follow-up)

### ▶ Population

- Number of participants
- Setting
- Age
- Gender
- Inclusion and exclusion criteria

### ▶ Risk of bias

- Selection bias
- Performance bias
- Attrition bias
- Detection bias
- Other concerns about bias

### ▶ Intervention type

- Aim, intervention and control details

### ▶ Outcomes

### ▶ Funding source

## Appendix 5: Exclusion criteria

| Rapid response schemes   | Early warning scores  | Standardised handover tools   | Continuing education   |
|--|---|---|--|
| <ul style="list-style-type: none"> <li>▶ 50% or more of patients included were: under 18; dying patients receiving palliative care; not on general adult wards (e.g. primary care, CCU, ICU, A&amp;E, catheterization labs, theatre).</li> <li>▶ Non-systematic reviews</li> </ul> | <ul style="list-style-type: none"> <li>▶ 50% or more of patients included were: under 18; dying patients receiving palliative care; not on general adult wards (e.g. primary care, CCU, ICU, A&amp;E, catheterization labs, theatre).</li> <li>▶ Non-systematic reviews</li> <li>▶ Limited to single parameter systems</li> </ul> | <ul style="list-style-type: none"> <li>▶ Handover setting focused outside of general adult wards (e.g. primary care, paediatric, mental health, CCU, ICU, A&amp;E, catheterization labs, theatre).</li> <li>▶ Non-systematic reviews</li> </ul> | <ul style="list-style-type: none"> <li>▶ Fewer than 50% of the subjects were practicing doctors or nurses working on adult general in-patient wards.</li> <li>▶ Intervention targets continuing medical education in a specialty specific context (e.g. paediatrics or critical care).</li> <li>▶ Intervention focused on teaching response to full arrest scenarios</li> <li>▶ Asked participants after the intervention, to state how they <i>thought</i> their pre/post intervention knowledge compared.</li> </ul> |

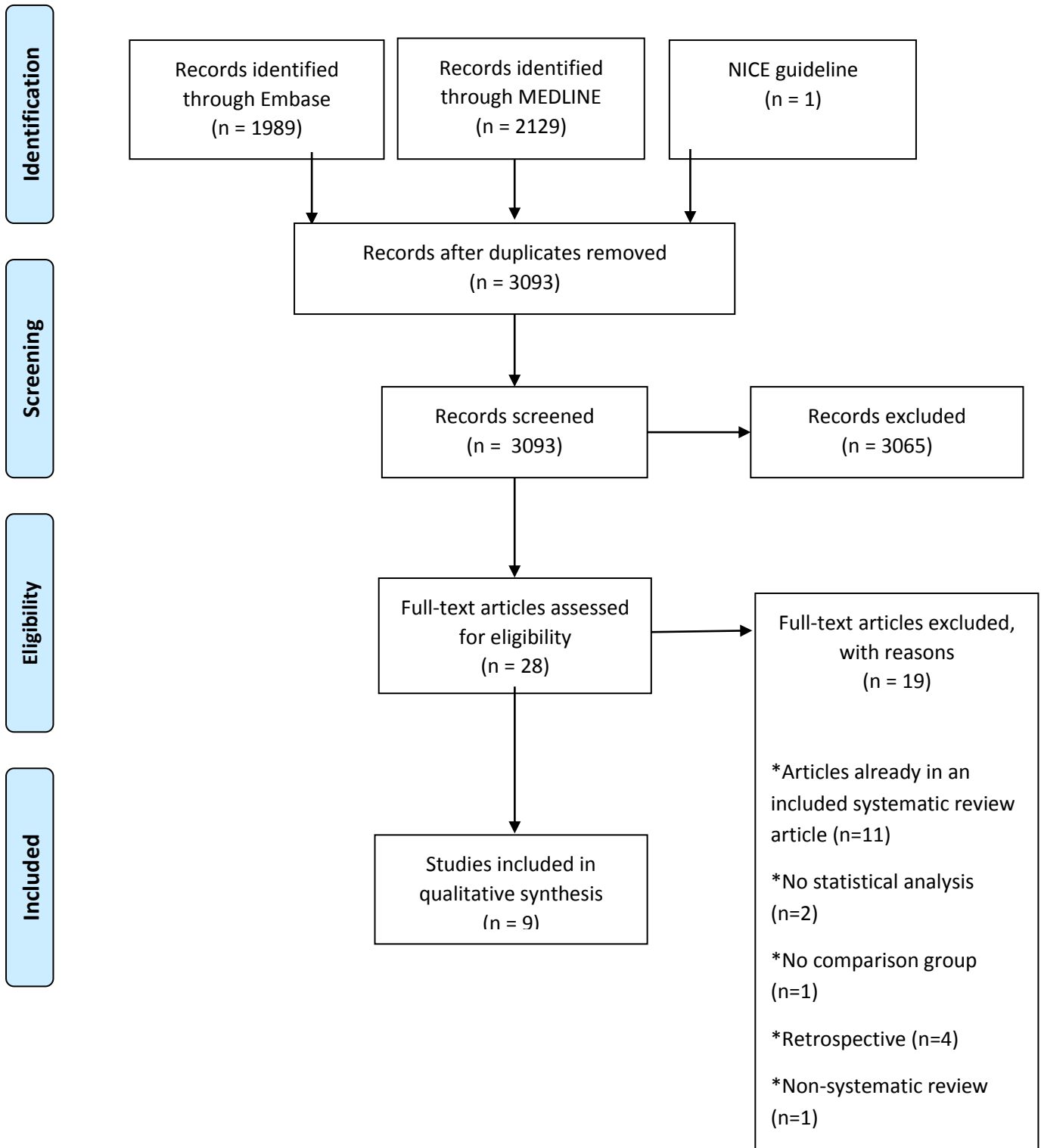
## Appendix 6: Population, Intervention, Comparison, Outcome

| Topic                             | Population  | Intervention   | Comparison                              | Outcome  |
|-----------------------------------|---|--|---|--|
| <b>Rapid response schemes</b>     | ▶ Adult in-patients on general medical or surgical wards.                                       | ▶ Introduction of a rapid response scheme (team that responds to calls for help managing deteriorating patients).  | ▶ Current or historic comparison group. | ▶ Any that evaluate effectiveness of the intervention. |
| <b>Early warning scores</b>       | ▶ Adult in-patients on general medical or surgical wards.                                       | ▶ Introduction of a track and trigger system (recording of patient observations with a defined threshold which triggers a response).   | ▶ Current or historic comparison group. | ▶ Any that evaluate effectiveness of the intervention. |
| <b>Standardised handover tool</b> | ▶ Qualified doctors and nurses working on adult general medical or surgical wards in hospitals. | ▶ Introduction of a standardised tool to structure communication during intra-hospital handover of patient information e.g. standardised handover sheets.                                  | ▶ Current or historic comparison group. | ▶ Any that evaluate effectiveness of the intervention. |
| <b>Continuing education</b>       | ▶ Qualified doctors and nurses working on adult general medical or surgical wards in hospitals. | ▶ Implementation of an educational intervention aimed at improving the subject's identification and management of deteriorating adult inpatients not being managed in critical care areas. | ▶ Current or historic comparison group. | ▶ Any that evaluate effectiveness of the intervention. |

## Appendix 7: PRISMA flow diagrams

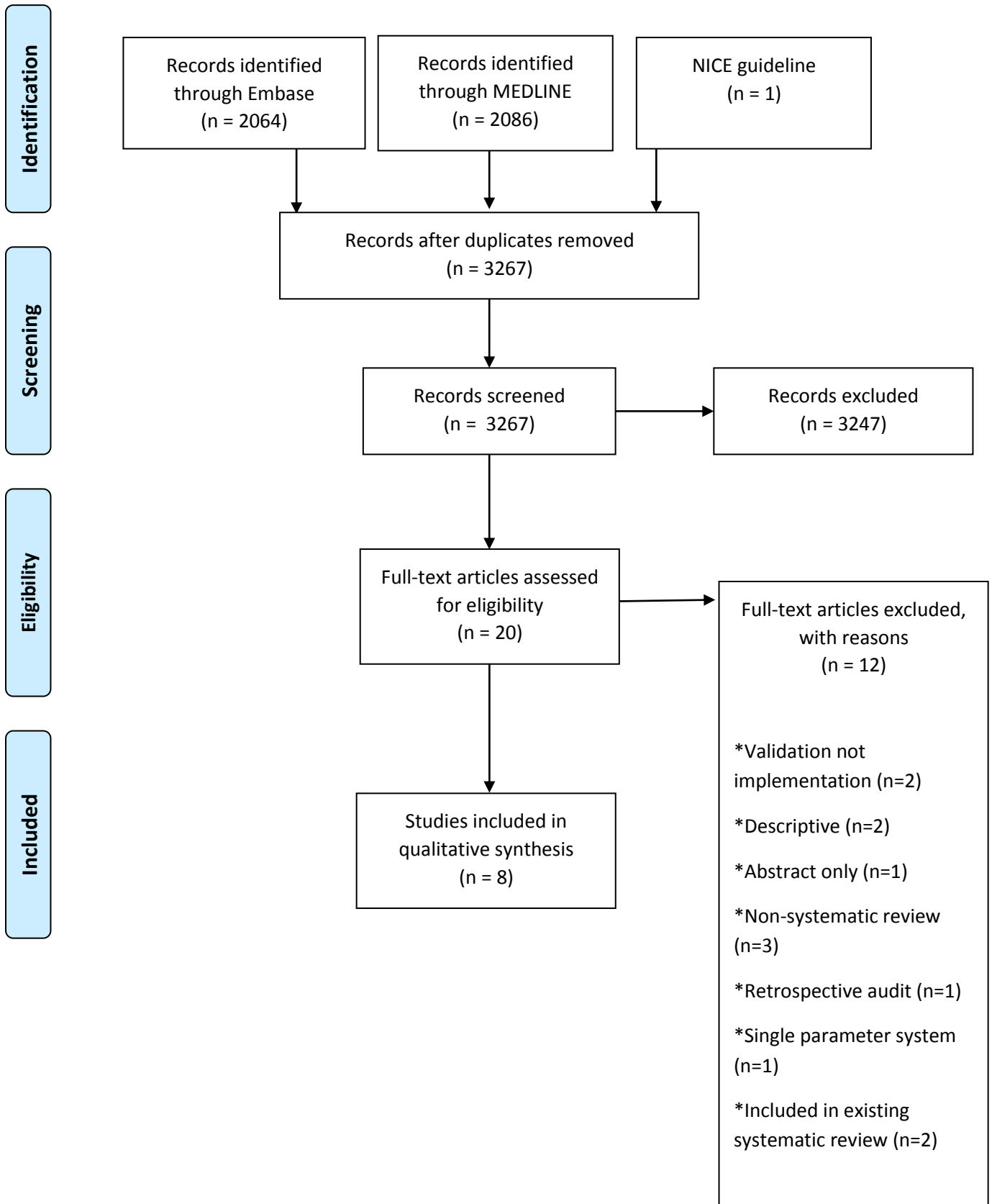


### Rapid response schemes



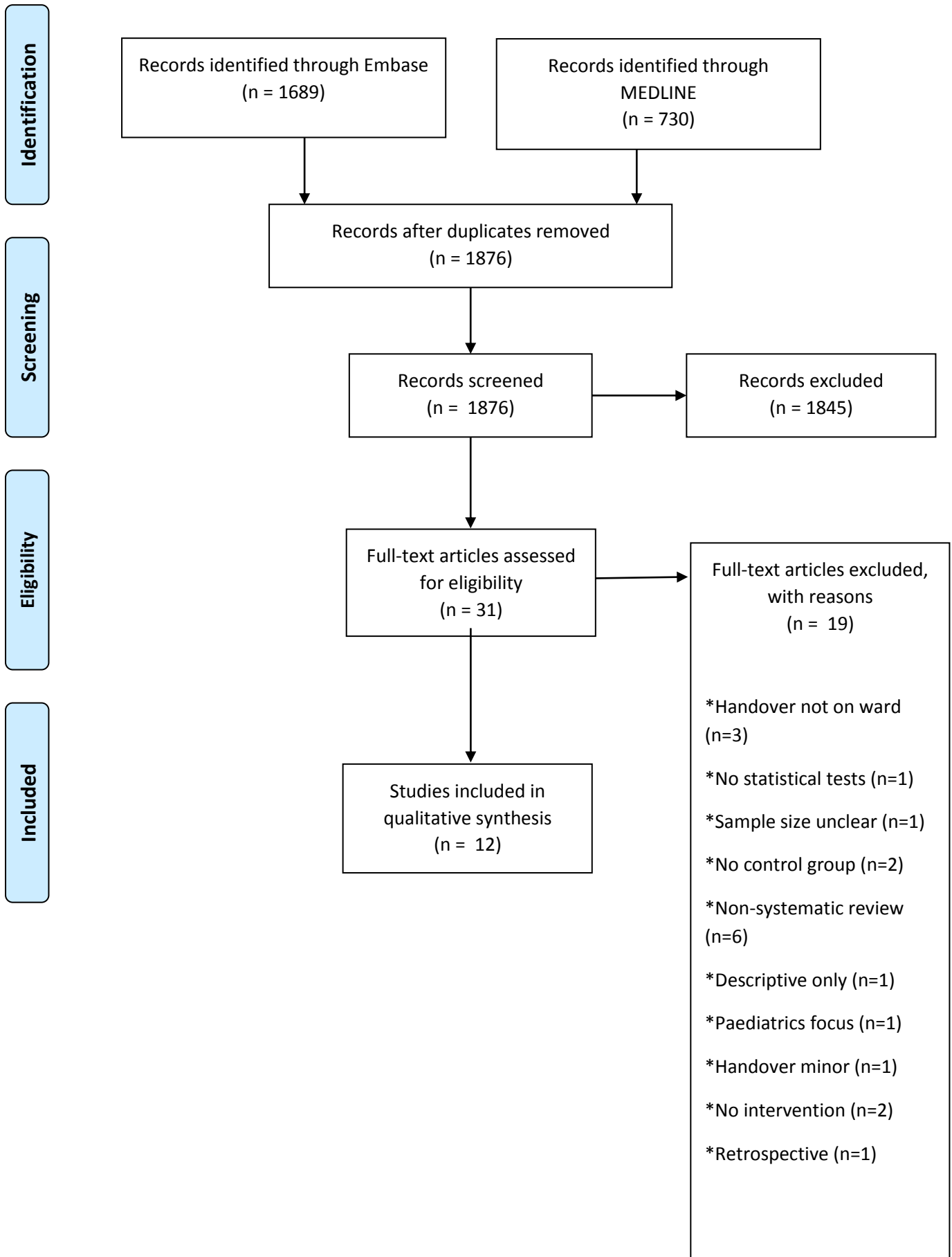


## Early warning scores





## Standardised handover tools





## Continuing education

Identification

Screening

Eligibility

Included

