PROSPERO International prospective register of systematic reviews

Review title and timescale

1 Review title
Give the working title of the review. This must be in English. Ideally it should state succinctly the interventions or exposures being reviewed and the associated health or social problem being addressed in the review.
Clinical decision rules for pulmonary embolism in hospitalized patients: a systematic literature review and meta-analysis

2 Original language title
For reviews in languages other than English, this field should be used to enter the title in the language of the review. This will be displayed together with the English language title.

3 Anticipated or actual start date
Give the date when the systematic review commenced, or is expected to commence.
02/11/2015

4 Anticipated completion date
Give the date by which the review is expected to be completed.
08/03/2017

5 Stage of review at time of this submission
Indicate the stage of progress of the review by ticking the relevant boxes. Reviews that have progressed beyond the point of completing data extraction at the time of initial registration are not eligible for inclusion in PROSPERO. This field should be updated when any amendments are made to a published record.

- The review has not yet started

<table>
<thead>
<tr>
<th>Review stage</th>
<th>Started</th>
<th>Completed</th>
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<tbody>
<tr>
<td>Preliminary searches</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Piloting of the study selection process</td>
<td>Yes</td>
<td>Yes</td>
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<td>Formal screening of search results against eligibility criteria</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Data extraction</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Risk of bias (quality) assessment</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Data analysis</td>
<td>Yes</td>
<td>Yes</td>
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</tbody>
</table>

Provide any other relevant information about the stage of the review here.

Review team details

6 Named contact
The named contact acts as the guarantor for the accuracy of the information presented in the register record.
Anne R Bass, MD

7 Named contact email
Enter the electronic mail address of the named contact.
bassa@hss.edu

8 Named contact address
Enter the full postal address for the named contact.
Hospital for Special Surgery 535 East 70th Street New York, NY 10021 USA

9 Named contact phone number
Enter the telephone number for the named contact, including international dialing code.
2127747043

10 Organisational affiliation of the review
Full title of the organisational affiliations for this review, and website address if available. This field may be completed as "None" if the review is not affiliated to any organisation.
11 Review team members and their organisational affiliations
Give the title, first name and last name of all members of the team working directly on the review. Give the organisational affiliations of each member of the review team.

<table>
<thead>
<tr>
<th>Title</th>
<th>First name</th>
<th>Last name</th>
<th>Affiliation</th>
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</thead>
<tbody>
<tr>
<td>Dr</td>
<td>Anne</td>
<td>Bass</td>
<td>HSS</td>
</tr>
<tr>
<td>Dr</td>
<td>Linda</td>
<td>Russell</td>
<td>HSS</td>
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<tr>
<td>Mr</td>
<td>Gregory</td>
<td>Turissini</td>
<td>HSS</td>
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<tr>
<td>Mrs</td>
<td>Rie</td>
<td>Gotto</td>
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<tr>
<td>Ms</td>
<td>Kara</td>
<td>Fields</td>
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<tr>
<td>Ms</td>
<td>Shirin</td>
<td>Dey</td>
<td>HSS</td>
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12 Funding sources/sponsors
Give details of the individuals, organizations, groups or other legal entities who take responsibility for initiating, managing, sponsoring and/or financing the review. Any unique identification numbers assigned to the review by the individuals or bodies listed should be included.
The Anne and Joel Ehrenkranz Chair in Perioperative Services provided salary support for three of the authors.

13 Conflicts of interest
List any conditions that could lead to actual or perceived undue influence on judgements concerning the main topic investigated in the review.
Are there any actual or potential conflicts of interest?
None known

14 Collaborators
Give the name, affiliation and role of any individuals or organisations who are working on the review but who are not listed as review team members.

<table>
<thead>
<tr>
<th>Title</th>
<th>First name</th>
<th>Last name</th>
<th>Organisation details</th>
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Review methods

15 Review question(s)
State the question(s) to be addressed / review objectives. Please complete a separate box for each question.
To determine the sensitivity, specificity and positive and negative predictive value of clinical diagnostic rules (CDR) such as the Wells rule in hospitalized patients suspected of having pulmonary embolism.

16 Searches
Give details of the sources to be searched, and any restrictions (e.g. language or publication period). The full search strategy is not required, but may be supplied as a link or attachment.

17 URL to search strategy
If you have one, give the link to your search strategy here. Alternatively you can e-mail this to PROSPERO and we will store and link to it.
http://www.refworks.com/refshare2?site=029731122868800000/34651355928552257/Dr.%20Bass%20TOTAL%20combined

I give permission for this file to be made publicly available
18 Condition or domain being studied
Give a short description of the disease, condition or healthcare domain being studied. This could include health and wellbeing outcomes.
Pulmonary embolism in hospitalized patients

19 Participants/population
Give summary criteria for the participants or populations being studied by the review. The preferred format includes details of both inclusion and exclusion criteria.
Hospitalized patients with symptoms of pulmonary embolism.

20 Intervention(s), exposure(s)
Give full and clear descriptions of the nature of the interventions or the exposures to be reviewed
Inclusion criteria: 1. Hospitalized patients with symptoms or signs developing > 24 hours after admission suggesting acute PE*; 2. CDR applied prospectively to determine the likelihood of PE; 3. Diagnosis of PE confirmed using one of the accepted reference standards (computerized tomographic angiography, ventilation perfusion scan, pulmonary angiography, bilateral lower extremity ultrasound in a patient with symptoms of PE, autopsy, or venous thromboembolism occurring during 30 days of follow up in low-risk patients that did not initially undergo imaging); 4. Data provided to enable calculation of sensitivity and specificity of the CDR. * We contacted the authors of studies performed in mixed populations of hospitalized patients and outpatients and requested data on the hospitalized patients only. If we were unable to obtain the needed data, then the study was excluded. Exclusion criteria: 1. CDR developed for use after an intermediate probability VQ scan; 2. Study analyzing predictors of PE outcome or severity; 3. Study of PE risk factors/epidemiology; 4. Cost effectiveness studies; 5. Study assessing performance of, or comparison between radiographic diagnostic modalities (i.e. VQ vs. CT scanning) without reference to a CDR; 6. CDR used after a diagnosis of DVT; 7. Reviews, meta-analyses, expert opinions, case reports, editorials, letters; 8. Studies of CDR utilization; 9. D-dimer assay development; 10. Not in English. 11. Retrospective studies.

21 Comparator(s)/control
Where relevant, give details of the alternatives against which the main subject/topic of the review will be compared (e.g. another intervention or a non-exposed control group).
Not applicable.

22 Types of study to be included
Give details of the study designs to be included in the review. If there are no restrictions on the types of study design eligible for inclusion, this should be stated.
Inclusion criteria: 1. Hospitalized patients with symptoms or signs developing > 24 hours after admission suggesting acute PE*; 2. CDR applied prospectively to determine the likelihood of PE; 3. Diagnosis of PE confirmed using one of the accepted reference standards (computerized tomographic angiography, ventilation perfusion scan, pulmonary angiography, bilateral lower extremity ultrasound in a patient with symptoms of PE, autopsy, or venous thromboembolism occurring during 30 days of follow up in low-risk patients that did not initially undergo imaging); 4. Data provided to enable calculation of sensitivity and specificity of the CDR. Exclusion criteria: 1. Wrong study population (i.e. emergency room, outpatient office or clinic); 2. CDR developed for use after an intermediate probability VQ scan; 3. Study analyzing predictors of PE outcome or severity; 4. Study of PE risk factors/epidemiology; 5. Cost effectiveness studies; 6. Study assessing performance of, or comparison between radiographic diagnostic modalities (i.e. VQ vs. CT scanning) with no reference to a CDR; 7. CDR used after a diagnosis of DVT; 8. Reviews, meta-analyses, expert opinions, case reports, editorials, letters; 9. Studies of CDR utilization; 10. D-dimer assay development; 11. Not in English. 12. Retrospective studies.

23 Context
Give summary details of the setting and other relevant characteristics which help define the inclusion or exclusion criteria.
A variety of clinical decision rules, such as the Wells rule, have been validated in symptomatic patients presenting to the emergency department, but their performance in hospitalized patients is less clear. D-dimer levels are often elevated in the ill and those who have undergone surgery, which lowers the specificity of the test.

24 Primary outcome(s)
Give the most important outcomes.
Sensitivity and specificity of clinical decision rule for pulmonary embolism.
Give information on timing and effect measures, as appropriate.
Clinical decision rule must be applied at the time the patient presents with symptoms compatible with pulmonary
embolism, which symptoms must have developed AFTER hospitalization.

25 Secondary outcomes
List any additional outcomes that will be addressed. If there are no secondary outcomes enter None.
Efficiency, failure rate, positive and negative predictive value of clinical decision rules (CDR) in hospitalized patients and the performance of CDR in conjunction with d-dimer testing in this setting.

Give information on timing and effect measures, as appropriate.
As above.

26 Data extraction (selection and coding)
Give the procedure for selecting studies for the review and extracting data, including the number of researchers involved and how discrepancies will be resolved. List the data to be extracted.
Two senior authors (AB, LR) reviewed all titles, abstracts and full texts. Discrepancies were reconciled by discussion/consensus. Three investigators (AB, GT, KF) abstracted data from the final articles in a standardized fashion: Author; Year; Validation; Prediction Rule; total N in the study. For some studies in mixed populations, the data on hospitalized patients was extracted by the study authors and sent to us in the form of 2x2 tables. CT scan results: TruePositives; FalsePositives; TrueNegatives; FalseNegatives.

27 Risk of bias (quality) assessment
State whether and how risk of bias will be assessed, how the quality of individual studies will be assessed, and whether and how this will influence the planned synthesis.
Conducted using appropriate techniques. The QUADAS instrument was used to assess bias in all studies.

28 Strategy for data synthesis
Give the planned general approach to be used, for example whether the data to be used will be aggregate or at the level of individual participants, and whether a quantitative or narrative (descriptive) synthesis is planned. Where appropriate a brief outline of analytic approach should be given.
A narrative analysis and meta-analysis.

29 Analysis of subgroups or subsets
Give any planned exploration of subgroups or subsets within the review. ‘None planned’ is a valid response if no subgroup analyses are planned.
Surgical patients.

Review general information

30 Type and method of review
Select the type of review and the review method from the drop down list.
Diagnostic, Systematic review

31 Language
Select the language(s) in which the review is being written and will be made available, from the drop down list. Use the control key to select more than one language.
English

Will a summary/abstract be made available in English?
Yes

32 Country
Select the country in which the review is being carried out from the drop down list. For multi-national collaborations select all the countries involved. Use the control key to select more than one country.
United States of America

33 Other registration details
Give the name of any organisation where the systematic review title or protocol is registered together with any unique identification number assigned. If extracted data will be stored and made available through a repository such as the Systematic Review Data Repository (SRDR), details and a link should be included here.

34 Reference and/or URL for published protocol
Give the citation for the published protocol, if there is one.
Give the link to the published protocol, if there is one. This may be to an external site or to a protocol deposited with CRD in pdf format.

I give permission for this file to be made publicly available
Yes

35 Dissemination plans
Give brief details of plans for communicating essential messages from the review to the appropriate audiences.
publication

Do you intend to publish the review on completion?
Yes

36 Keywords
Give words or phrases that best describe the review. (One word per box, create a new box for each term)
systematic review
pulmonary embolism
Wells rule
hospitalized patients
clinical decision rule

37 Details of any existing review of the same topic by the same authors
Give details of earlier versions of the systematic review if an update of an existing review is being registered, including full bibliographic reference if possible.

38 Current review status
Review status should be updated when the review is completed and when it is published.
Ongoing

39 Any additional information
Provide any further information the review team consider relevant to the registration of the review.

40 Details of final report/publication(s)
This field should be left empty until details of the completed review are available.
Give the full citation for the final report or publication of the systematic review.
Give the URL where available.