

Supplementary Material

Clinical Prediction Models of Fractional Flow Reserve: An Exploration of the Current Evidence and Appraisal of Model Performance

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Search terms – PubMed

| Search | Query |
|--------|--|
| 1 | "Fractional Flow Reserve, Myocardial"[Mesh] |
| 2 | Fractional flow reserve[Title/Abstract] |
| 3 | FFR[Title/Abstract] |
| 4 | 1 OR 2 OR 3 |
| 10 | "Risk Factors"[Mesh] |
| 11 | "Models, Statistical"[Mesh] OR Model*[Title/Abstract] |
| 12 | Score*[Title/Abstract] |
| 13 | Risk score*[Title/Abstract] |
| 14 | Clinical tool*[Title/Abstract] |
| 15 | Risk prediction model*[Title/Abstract] |
| 16 | Risk analysis[Title/Abstract] |
| 17 | Risk prediction score*[Title/Abstract] |
| 18 | Prediction rule*[Title/Abstract] |
| 19 | Prediction model*[Title/Abstract] |
| 20 | Risk prediction*[Title/Abstract] |
| 21 | "Decision Support Techniques"[Mesh] OR Decision support technique*[Title/Abstract] |
| 22 | Decision support*[Title/Abstract] |
| 23 | Decision support system*[Title/Abstract] |
| 24 | "Risk Management"[Mesh] OR Risk management*[Title/Abstract] |
| 25 | "Risk Assessment"[Mesh] OR Risk assessment*[Title/Abstract] |
| 26 | 10 OR 11 OR 12 OR 13 OR 14 OR 15 OR 16 OR 17 OR 18 OR 19 OR 20 OR 21 OR 22 OR 23 OR 24 |
| 27 | 4 AND 26 |
| 28 | 27 AND Journal Article[ptyp] |

Search terms – Embase

| Search | Query |
|--------|---|
| 1 | 'Fractional flow reserve'/exp OR 'Fractional flow reserve':ab,ti OR 'FFR':ab,ti |
| 2 | 'statistical model'/exp OR 'model*':ab,ti |
| 3 | 'risk prediction*':ab,ti |
| 4 | 'clinical tool*':ab,ti |
| 5 | 'risk prediction model*':ab,ti |
| 6 | 'risk analysis':ab,ti |
| 7 | 'risk prediction score*':ab,ti |
| 8 | 'prediction rule*':ab,ti |
| 9 | 'Decision support system'/exp OR 'decision support system*' |
| 10 | 'decision support technique*':ab,ti |
| 11 | 'decision support':ab,ti |
| 12 | 'Risk factor'/exp OR 'risk factor*':ab,ti |
| 13 | 'Risk management'/exp OR 'risk management*':ab,ti |
| 14 | 'Risk assessment'/exp OR 'risk assessment*':ab,ti |
| 15 | 'Prediction model'/exp OR 'prediction model*':ab,ti |
| 16 | 'Risk score'/exp OR 'risk score*':ab,ti |
| 17 | 'Score*':ab,ti |
| 18 | 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 OR 17 |
| 19 | 1 AND 18 |
| 20 | 19 AND ('article'/it OR 'article in press'/it) |

Search terms – CENTRAL

| Search | Query |
|--------|--|
| #1 | MeSH descriptor: [Fractional Flow Reserve, Myocardial] explode all trees |
| #2 | (fractional flow reserve):ti,ab,kw |
| #3 | (FFR):ti,ab,kw |
| #4 | #1 OR #2 OR #3 |
| #5 | MeSH descriptor: [Risk Factors] explode all trees |
| #6 | MeSH descriptor: [Models, Statistical] explode all trees |
| #7 | (model*):ti,ab,kw |
| #8 | (risk score*):ti,ab,kw |
| #9 | (clinical tool*):ti,ab,kw |
| #10 | (risk prediction model*):ti,ab,kw |
| #11 | (risk analysis):ti,ab,kw |
| #12 | (risk prediction score*):ti,ab,kw |
| #13 | (prediction rule*):ti,ab,kw |
| #14 | (prediction model*):ti,ab,kw |
| #15 | (risk prediction*):ti,ab,kw |
| #16 | MeSH descriptor: [Decision Support Techniques] explode all trees |
| #17 | (decision support technique*):ti,ab,kw |
| #18 | (decision support*):ti,ab,kw |
| #19 | (decision support system*):ti,ab,kw |
| #20 | MeSH descriptor: [Risk Management] explode all trees |
| #21 | (risk management*):ti,ab,kw |
| #22 | MeSH descriptor: [Risk Assessment] explode all trees |
| #23 | (risk assessment*):ti,ab,kw |
| #24 | (score*):ti,ab,kw |
| #25 | #5 OR #6 OR #7 OR #8 OR #9 OR #10 OR #11 OR #12 OR #13 OR #14 OR #15 OR #16 OR #17 OR #18 OR #19 OR #20 OR #21 OR #22 OR #23 |
| #26 | #4 AND #24 |

Participant characteristics of included studies

| Model | Study, year | Inclusion criteria | Exclusion criteria | Age, y | Men, % |
|----------------------|-----------------|--|--|-------------------------------|--------|
| FAST | Hoole, 2011 | Patients who underwent ICA and had an intermediate lesion, 50% with hemodynamic significance and 50% with non-significance. (derivation) Consecutive intermediate lesion requiring FFR assessment. (validation) | Lesions: sequential stenoses and ostial left main disease. | 64.3 ± 10.1 and 64.0 ± 9.8 | 77.0 |
| P20-DAC ₂ | Biasco, 2015 | Patients who had at least 1 coronary lesion evaluated by FFR (50-70% prox/mid LAD lesions). | Patients: previous CABG (n = 133, 9%). | — | — |
| ASLA | Ko, 2015 | Patients who underwent CTA and nonurgent ICA with FFR assessment performed in at least one discrete lesion of intermediate severity (30-70%) as visually assessed at CTA. | Patients: left ventricular dysfunction (n = 4, 3%), interval between CTA and FFR ≥6 months (n = 2, 2%), adverse cardiac events or revascularization during interval (n = 1, 1%), ACS in the 3 months prior to CTA (n = 1, 1%), CABG (n = 1, 1%), or left main stenosis (n = 1, 1%). Lesions: severe or minor stenoses (n = 34, 17%), poor image quality (n = 17, 8%), vessel diameter <2mm (n = 11, 5%), intracoronary stent (n = 7, 3%), excessive calcification (n = 6, 3%), myocardial bridge (n = 2, 1%), incomplete data set (n = 3, 1%) | 64.2 ± 11.2 | 65.9 |
| | Munnur, 2018 | Patients who had at least one lesion >30% as visually assessed at CTA with FFR. | Patients: minimal stenosis of <30% (n = 16, 11%), poor image quality (n = 7, 5%), vessel diameter <2mm (n = 14, 10%), excessive calcification (n = 17, 12%), multiple severe tandem lesions (n = 10, 7%) | 64.7 ± 9 and 63.2 ± 7 | 64.2 |
| STABLED | Natsumeda, 2015 | Patients who underwent ICA and FFR (visual DS >50%, multivessel disease, tandem lesion or residual stenosis after | — | 66 ± 9 and 67 ± 10 | 86.2 |

| | | | | | |
|---------|-------------------|--|---|-------------|------|
| | | stent deployment). | | | |
| DILEMMA | Wong, 2015 | Patients with stable CAD who underwent ICA and FFR, and had at least 1 target vessel with >30% visual DS. | Patients: previous CABG (n = 9, 3%), significant left main stenosis (visual DS >50%) (n = 1, 0.3%), previous AMI (n = 4, 1%), CTO (n = 5, 2%), culprit vessels that collateralize other vessels (n = 15, 5%). | 64.6 ± 11 | 68.2 |
| | Beton, 2017 | Patients who underwent ICA and FFR, and had at least 1 target vessel with 50-70% DS on QCA. | Patients: bypass graft lesions (n = 2, 1%), left main stenosis (n = 1, 1%), recent STEMI (n = 2, 1%), culprit vessels that collateralize other vessels (n = 1, 1%). | 59 ± 9 | 77.3 |
| | Michail, 2019 | Patients with CAD who underwent ICA and FFR, and had at least 1 target vessel with 40-70% DS on visual assessment. | Bypass graft lesions, significant left main stenosis, culprit vessels that collateralize other vessels, tandem lesions, culprit vessels of AMI, cases in which the pressure wire failed to cross the lesion because of tight stenosis or tortuosity, and AMI within 48 hours. | 65.7 ± 11.3 | 83.2 |
| ADDED | Di Serafino, 2016 | Intermediate lesions (visual stenosis 30-70%) undergoing FFR and iFR | CTO, unstable patients, serial lesions, or localized on coronary artery by-pass grafts or supporting an infarcted area of myocardium. | 64 ± 9 | 88.0 |
| | Yu, 2018 | Patients with suspected CAD who underwent both CTA and FFR measurement at ICA and the interval within 2 weeks. | Patients: previous target vessel revascularization (n = 7, 5%), poor image quality of CTA (n = 2, 1%), severely calcified target lesions (n = 4, 3%), interval between CTA and FFR measurement >2 weeks (n = 6, 4%). | 62 ± 8.9 | 62.8 |
| | Yu, 2018 | Patients undergoing both CTA and FFR measurement. | Patients: history of attempted coronary revascularization of target lesions (n = 9, 4%), tandem lesions (n = 14, 7%), time interval between CTA and ICA >2 weeks (n = 2, 1%), poor image quality of CTA (n = 6, 3%), and diffusely calcified lesions (n = 10, 5%). | 65 ± 8.3 | 67.7 |
| FFR-SSS | Matar, 2016 | Patients undergoing both ICA and FFR measurement. | left main lesion (≥50%), CTO, sequential lesions (two or more discrete and separate lesions 30% DS in the same vessel by visual assessment), history of CABG, hemodynamically significant valvular stenosis or regurgitation, history of AMI or abnormal LVEF (<50%). | 62.6 ± 10.9 | 60.6 |

| | | | | | |
|------------------------|--------------|--|--|---|------------------|
| Model by Sareen et al. | Sareen, 2017 | Patients who had ICA and FFR evaluation. | Cardiogenic shock, significant arrhythmias, unable to tolerate adenosine, left main disease, graft lesions, in-stent restenosis, <TIMI 3 flow, unable to wire, stenosis <30% or >80%, ACS culprit artery. | 64.57 ± 9.96, 66.33 ± 9.05, 64.2 ± 11.3, and 65.3 ± 10.8 | 63.1 and 65.2 |
| Model by Dey et al. | Dey, 2018 | Patients suspected of stable CAD who underwent CTA at most 60 days prior to ICA with FFR measurement. | Prior stent implantation or CABG, contraindications to beta-blockers, nitrates or adenosine, suspicion of ACS, significant arrhythmia and BMI ≥35 kg/m ² . | 64 ± 10 | 64.0 |
| Model by Hae et al. | Hae, 2018 | Intermediate lesions (visual DS 30-80%). | Patients: tandem lesions (n = 10, 0.9%), stented lesions (n = 10, 0.9%), in-stent restenosis (n = 17, 1.5%), CTO (n = 22, 2%), side branch evaluation (n = 10, 0.9%), left main stenosis (n = 145, 13%), scarred myocardium and regional wall motion abnormality (n = 5, 0.4%). | 63.12 ± 9.81, 63.86 ± 9.56, and 59.6 ± 9 | 75.6 |
| Model by Cho et al. | Cho, 2019 | Stable and unstable angina patients who underwent ICA and FFR to assess at least 1 intermediate lesion (visual DS 40-80%). | Patients: tandem lesions (n = 25, 1.5%), stent within the target vessel (n = 20, 1.2%), side branch evaluation (n = 11, 0.6%), left main stenosis (n = 145, 8.4%), poor imaging quality (n = 4, 0.2%), CTO (n = 6, 0.3%), scarred myocardium and regional wall motion abnormality (n = 5, 0.3%). | 62.5 ± 9.7, 62.1 ±10, and 59.6 ± 9 | 76.9 |

ACS = acute coronary syndrome; AMI = acute myocardial infarction; AV = atrioventricular; BMI = body mass index; CABG = coronary artery bypass graft; CTO = chronic total occlusion; DS = diameter stenosis; LVEF = left ventricular ejection fraction; STEMI = ST-segment elevation myocardial infarction; TIMI = thrombolysis in myocardial infarction; QCA = quantitative coronary angiography; other abbreviations as in Table 2.

Predictors included in FFR prediction models

| Model | Study, year | Candidate predictors, n | Final predictors, n | Predictors included in the final model |
|----------------------|-------------------|-------------------------|---------------------|--|
| FAST | Hoole, 2011 | 11 | 4 | Lesion-specific parameters: %DS (<40%, 0 point; 40-49.9%, 1 point; 50-59.9%, 2 points; ≥60%, 3 points), LL >20mm (1 point); Angiographic features: haziness (2 points), multivessel disease (1 point) |
| P20-DAC ₂ | Biasco, 2015 | 10 | 5 | Lesion-specific parameters: proximal disease (1 point), LL >20mm (1 point); Angiographic features: distal take-off of all diagonal branches ≥2 mm diameter (1 point), apical wrap of LAD (1 point), collaterals to RCA/LCX (2 points) |
| ASLA | Ko, 2015 | 10 | 3 | Lesion-specific parameters: %AS (<31%, 0 point; 31-46%, 1 point; 47-63%, 2 points; >63%, 7 points), LL (<10.8mm, 0 point; 10.8-28mm, 1 point; >28mm, 6 points); |
| | Munnur, 2018 | | | Angiographic features: APPROACH score (<18, 0 point; 18-25, 1 point; 25.1-44, 2 points; >44, 5 points) |
| STABLED | Natsumeda, 2015 | 12 | 5 | Lesion-specific parameters: %DS >50% (2 points), LL >20mm (1 point), distance from ostium <20mm (1 point); Angiographic features: tandem lesions (1 point), bifurcation lesions (1 point) |
| DILEMMA | Wong, 2015 | 3 | 3 | Lesion-specific parameters: MLD (>1.5 mm, 0 point; 1.1-1.5 mm, 1 point; <1.1 mm, 4 points), |
| | Beton, 2017 | | | LL (<9 mm, 0 point; 9-18 mm, 1 point; >18 mm, 3 points); |
| | Michail, 2019 | | | Angiographic features: BARI MJI (<18, 0 point; 18-35, 1 point; > 35, 5 points) |
| ADDED | Di Serafino, 2016 | 2 | 2 | Lesion-specific parameters: MLD; |
| | Yu, 2018 | | | Angiographic features: DJS; |
| | Yu, 2018 | | | ADDED index =DJS/MLD |
| FFR-SSS | Matar, 2016 | 18 | 6 | Patient characteristics: male (2 points); Lesion-specific parameters: MLD <1.4mm (2 points), DS ≥50% (2 points), disease proximal to lesion (2 points), non LCX vessel (1 point); Angiographic features: LAD apical wrap (1 point) |

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|------------------------|--------------|----|----|---|
| Model by Sareen et al. | Sareen, 2017 | 12 | 5 | Lesion-specific parameters: DS ($\leq 30\%$, 0 point; 31-50%, 3 points; 51-60%, 7 points; 61-70, 9 points; $>70\%$, 11 points), LL ($\leq 10\text{mm}$, 0 point; 11-19mm, 5 points; $\geq 20\text{mm}$, 10 points), reference vessel diameter ($\leq 2.25\text{mm}$, 11 points; 2.26-3mm, 6 points; 3.1-3.5mm, 5 points; $>4\text{mm}$, 0 point); Angiographic features: calcification (none/mild, 0 point; moderate/severe, 3 points), tortuosity (none/mild, 0 point; moderate/severe, -4 points) |
| Model by Dey et al. | Dey, 2018 | 22 | 19 | Patient characteristics: age and gender; Lesion-specific parameters: %DS, MLD, CDD, LD-NCP volume, NCP volume, plaque length, total plaque volume, vessel volume, MLA, LD-NCP composition, %AS, LD-NCP burden, NCP burden, total plaque burden, NCP composition, and maximum remodeling index; Angiographic features: myocardial mass |
| Model by Hae et al. | Hae, 2018 | — | 34 | Patient characteristics: age and male; Lesion-specific parameters: MLD, %DS, LL, and features related to vessel territories; Angiographic features: features related to myocardial volume subtended to a stenotic segment |
| Model by Cho et al. | Cho, 2019 | 28 | 12 | Patient characteristics: body surface area and sex; Lesion-specific parameters: segment, distal lumen diameter, MLD, length-D $<2.0\text{mm}$, length-D $<1.5\text{mm}$, length-D $<1.25\text{mm}$, lumen diameter within the worst segment, distal 5-mm RLD, %DS, and length-DS $>70\text{mm}$ |

AS = area stenosis; AST = aspartate aminotransferase; BARI MJI = Bypass Angioplasty Revascularization Investigation Myocardial Jeopardy Index; CDD = contrast density difference; DJS = Duke Jeopardy Score; DS = diameter stenosis; HDL-C = high density lipoprotein-cholesterol; hsCRP = high-sensitivity C-reactive protein; LCX = left circumflex; LD-NCP = low-density non-calcified plaque; length-D = total length of the segment with lumen diameter; length-DS = total length of the segment with diameter stenosis; LL = lesion length; MLA = minimal lumen area; MLD = minimal lumen diameter; NCP = non-calcified plaque; RCA = right coronary artery; RLD = reference lumen diameter; other abbreviations as in Table 2.

Risk of bias assessment

| Model | Study, year | Participants | | Predictors | | |
|------------------------|-------------------|---|---|---|--|--|
| | | Were appropriate data sources used, e.g., cohort, RCT, or nested case-control study data? | Were all inclusions and exclusions of participants appropriate? | Were predictors defined and assessed in a similar way for all participants? | Were predictor assessments made without knowledge of outcome data? | Are all predictors available at the time the model is intended to be used? |
| FAST | Hoole, 2011 | Y | N | Y | Y | Y |
| P20-DAC ₂ | Biasco, 2015 | Y | Y | Y | Y | Y |
| ASLA | Ko, 2015 | Y | Y | Y | Y | Y |
| | Munnur, 2018 | Y | Y | Y | Y | Y |
| STABLED | Natsumeda, 2015 | Y | Y | Y | NI | Y |
| DILEMMA | Wong, 2015 | Y | Y | Y | Y | Y |
| | Beton, 2017 | Y | Y | Y | Y | Y |
| | Michail, 2019 | Y | Y | Y | Y | Y |
| ADDED | Di Serafino, 2016 | Y | Y | Y | Y | Y |
| | Yu, 2018 | Y | Y | Y | Y | Y |
| | Yu, 2018 | Y | Y | Y | Y | Y |
| FFR-SSS | Matar, 2016 | Y | Y | Y | NI | Y |
| Model by Sareen et al. | Sareen, 2017 | Y | Y | Y | NI | Y |
| Model by Dey et al. | Dey, 2018 | Y | Y | Y | Y | Y |
| Model by Hae, 2018 | Hae, 2018 | Y | Y | Y | NI | Y |

| | | | | | | |
|------------------------|-----------|---|---|---|----|---|
| Hae et al. | | | | | | |
| Model by Cho et al. | Cho, 2019 | Y | Y | Y | NI | Y |

N = no; NI = no information; PY = probably yes; Y = yes.

| Model | Study, year | Outcome | | | | | |
|------------------------|-------------------|---|---|---|---|--|---|
| | | Was the outcome determined appropriately? | Was a prespecified or standard outcome definition used? | Were predictors excluded from the outcome definition? | Was the outcome defined and determined in a similar way for all participants? | Was the outcome determined without knowledge of predictor information? | Was the time interval between predictor assessment and outcome determination appropriate? |
| FAST | Hoole, 2011 | Y | Y | Y | Y | Y | Y |
| P20-DAC ₂ | Biasco, 2015 | Y | Y | Y | Y | Y | Y |
| ASLA | Ko, 2015 | Y | Y | Y | Y | Y | Y |
| | Munnur, 2018 | Y | Y | Y | Y | Y | Y |
| STABLED | Natsumeda, 2015 | Y | Y | Y | Y | Y | Y |
| DILEMMA | Wong, 2015 | Y | Y | Y | Y | Y | Y |
| | Beton, 2017 | Y | Y | Y | Y | Y | Y |
| | Michail, 2019 | Y | Y | Y | Y | Y | Y |
| ADDED | Di Serafino, 2016 | Y | Y | Y | Y | Y | Y |
| | Yu, 2018 | Y | Y | Y | Y | Y | Y |
| | Yu, 2018 | Y | Y | Y | Y | Y | Y |
| FFR-SSS | Matar, 2016 | Y | Y | Y | Y | Y | Y |
| Model by Sareen et al. | Sareen, 2017 | Y | Y | Y | Y | Y | Y |
| Model by | Dey, 2018 | Y | Y | Y | Y | Y | Y |

| | | | | | | | |
|---------------------|-----------|---|---|---|---|---|---|
| Dey et al. | | | | | | | |
| Model by Hae et al. | Hae, 2018 | Y | Y | Y | Y | Y | Y |
| Model by Cho et al. | Cho, 2019 | Y | Y | Y | Y | Y | Y |

N = no; PN = probably no; Y = yes.

| Model | Study, year | Analysis | | | | | | | | |
|----------------------|-------------------|--|---|--|--|--|---|---|---|--|
| | | Were there a reasonable number of participants with the outcome? | Were continuous and categorical predictors handled appropriately? | Were all enrolled participants included in the analysis? | Were participants with missing data handled appropriately? | Was selection of predictors based on univariable analysis avoided? | Were complexities in the data (e.g., censoring, competing risks, sampling of participants) accounted for appropriately? | Were relevant model performance measures evaluated appropriately? | Were model overfitting and optimism in model performance accounted for? | Do predictor and their assigned weights in the final model correspond to the results from the reported multivariable analysis? |
| FAST | Hoole, 2011 | N | Y | Y | NI | Y | Y | N | — | Y |
| P20-DAC ₂ | Biasco, 2015 | Y | Y | Y | NI | N | Y | N | N | N |
| ASLA | Ko, 2015 | N | N | Y | NI | N | Y | N | Y | NI |
| | Munnur, 2018 | N | Y | Y | NI | — | Y | N | — | — |
| STABLED | Natsumeda, 2015 | N | Y | Y | NI | N | Y | N | N | N |
| DILEMMA | Wong, 2015 | Y | N | Y | NI | Y | Y | Y | Y | N |
| | Beton, 2017 | Y | Y | Y | NI | — | Y | N | — | — |
| | Michail, 2019 | NI | Y | Y | NI | — | Y | N | — | — |
| ADDED | Di Serafino, 2016 | Y | Y | Y | NI | Y | Y | N | N | — |

| | | | | | | | | | | |
|------------------------|--------------|---|---|---|----|---|---|----|---|---|
| | Yu, 2018 | N | Y | Y | NI | — | Y | N | — | — |
| | Yu, 2018 | N | Y | Y | NI | — | Y | N | — | — |
| FFR-SSS | Matar, 2016 | N | N | Y | NI | N | Y | N | N | N |
| Model by Sareen et al. | Sareen, 2017 | Y | N | Y | NI | Y | Y | PY | — | Y |
| Model by Dey et al. | Dey, 2018 | N | Y | Y | NI | Y | Y | N | Y | Y |
| Model by Hae et al. | Hae, 2018 | N | Y | Y | NI | Y | Y | N | — | Y |
| Model by Cho et al. | Cho, 2019 | Y | Y | Y | NI | Y | Y | N | — | Y |

N = no; NI = no information; PY = probably yes; Y = yes.

PRISMA Checklist

| Section/topic | # | Checklist item | Reported on page # |
|---------------------------|---|---|------------------------|
| TITLE | | | |
| Title | 1 | Identify the report as a systematic review, meta-analysis, or both. | 1 |
| ABSTRACT | | | |
| Structured summary | 2 | Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number. | 2 |
| INTRODUCTION | | | |
| Rationale | 3 | Describe the rationale for the review in the context of what is already known. | 4 |
| Objectives | 4 | Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS). | Table 1 |
| METHODS | | | |
| Protocol and registration | 5 | Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number. | 6 |
| Eligibility criteria | 6 | Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale. | 6 |
| Information sources | 7 | Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched. | 6 |
| Search | 8 | Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated. | Supplementary Material |

| | | | |
|------------------------------------|----|--|----------------------------|
| Study selection | 9 | State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis). | 6 |
| Data collection process | 10 | Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators. | 6 |
| Data items | 11 | List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made. | 7 |
| Risk of bias in individual studies | 12 | Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis. | 8 |
| Summary measures | 13 | State the principal summary measures (e.g., risk ratio, difference in means). | 7, 8 |
| Synthesis of results | 14 | Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I^2) for each meta-analysis. | 8 |
| Risk of bias across studies | 15 | Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies). | N/A |
| Additional analyses | 16 | Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified. | N/A |
| RESULTS | | | |
| Study selection | 17 | Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram. | 9, Figure 2 |
| Study characteristics | 18 | For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations. | 9, Table 2, Figure 2 |
| Risk of bias within studies | 19 | Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12). | 11, Supplementary Material |

| | | | |
|-------------------------------|----|--|--------------|
| Results of individual studies | 20 | For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot. | 10, Figure 3 |
| Synthesis of results | 21 | Present results of each meta-analysis done, including confidence intervals and measures of consistency. | N/A |
| Risk of bias across studies | 22 | Present results of any assessment of risk of bias across studies (see Item 15). | Table 4 |
| Additional analysis | 23 | Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]). | N/A |
| DISCUSSION | | | |
| Summary of evidence | 24 | Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers). | 12 |
| Limitations | 25 | Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias). | 15 |
| Conclusions | 26 | Provide a general interpretation of the results in the context of other evidence, and implications for future research. | 15 |
| FUNDING | | | |
| Funding | 27 | Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review. | 17 |

From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med 6(7): e1000097. doi:10.1371/journal.pmed1000097