Bijlagen bij de richtlijn Thoracale letsels na trauma

Inhoudsopgave

Module 1: Het voorspellen van complicaties

Evidence tabel

Study reference	Study characteristics	Patient characteristics	Candidate predictors	Model development, performance and evaluation	Outcome measures and results	Comments Interpretation of model
Battle (2014)	Source of data[1] and date: Data were collected retrospectively from the medical notes of each patient. Setting/ number of centres and country: The ED of a large regional trauma centre in South Wales between 2009 and 2011. Funding and conflicts of interest: No funding was received for this study.	Recruitment method[2]: Data were collected retrospectively from the medical notes of each patient. If there was no record in the patient's notes of chronic lung disease, cardiovascular disease, use of pre- injury anticoagulants or current smoking status, then it was assumed that these predictors were absent. The number of rib fractures was determined from	Describe candidate predictors[3] and method and timing of measurement: Predictor 1: Age Predictor 2: Number of rib fractures Predictor 3: Chronic lung disease Predictor 4: Cardiovascular disease Predictor 5: Use of pre-injury anti-coagulants Predictor 6: smoking status Predictor 7: oxygen saturations	**Development** Modelling method[6]: Logistic regression. **Performance** Calibration measures[7] and 95%CI: Calibration was assessed graphically and with the Hosmer-Lemeshow test. Discrimination measures[8] and 95%CI: Discrimination was assessed with the c-statistic (equivalent to the area under the receiver operator curve) Classification measures[9]: Sensitivity, specificity, positive and negative predictive values were	Type of outcome: single/combined? Single Definition and method for measurement of outcome: Endpoint or duration of follow-up: No information. Number of events/outcomes: **RESULTS** Multivariable model[11]: Age[a]: OR 1.0 (95% CI 1.0 to 1.0) Z-score 1.80 Number of rib fractures[b]: OR 1.5 (95% CI 1.3 to 1.9) Z-score 4.21	Interpretation: As a result the reliability and applicability is sufficient that the model could be safely and effectively used in the clinical setting. The external validation results also confirm the clinical usefulness of the model in blunt chest-wall trauma management throughout England and Wales. It is important to emphasise, however, that the validation model c-statistic is a very unusual result and should be interpreted with caution. It is more common for the c-statistic to decrease in the validation study, rather than to increase as we found.

	The authors declare that they have no competing interests.	the chest radiograph if not documented in the medical notes. Inclusion criteria: • Patients who presented to the emergency department with a primary diagnosis of blunt chest-wall trauma. Exclusion criteria: • Patients under 18 years of age; • Patients who sustained any immediate life-threatening injury. Participants: N = 274	Predictor 8: respiratory rate on initial assessment in the ED. Number of participants with any missing value[4]? N (%): 0 (0%) How were missing data handled[5]? Not applicable.	calculated for the final model. **Evaluation** Method for testing model performance[10]: external	Chronic lung disease: OR 2.2 (95% CI 1.2 to 4.1) Z-score 2.50 Pre-injury anticoagulants: OR 1.9 (95% CI 1.0 to 3.7) Z-score 1.91 Oxygen saturations[c]: OR 0.9 (95% CI 0.9 to 1.0) Z-score -1.55 [a]: per one year increase [b]: per one fracture increase [c]: per 1% decrease of oxygen satursations Alternative presentation of final model[12]:	Comparison with other studies? No. Generalizability? The overall results of this study suggest that the final validation model could be safely and effectively used in the clinical setting in England and Wales for assisting in the management of blunt chest-wall trauma patients.

		<u>Mean age ± SD:</u> No information. <u>Sex: % M / % F</u> 64% was male. <u>Most common injury</u> • Fall (72%) • Road traffic accident (14%) • Sporting injury (9%) • Assault (3%) <u>Other important characteristics:</u> None.				

[1] Cohort, case-control, randomised trial participants, registry data
[2] Consecutive participants?
[3] Or describe number and type of candidate predictors, e.g. demographics, patient history, physical examination, additional testing, disease characteristics.
[4] Include predictors and outcome
[5] Complete-case analysis, imputation, other method
[6] Logistic, survival, neural networks, machine learning technique
[7] Calibration plot, calibration slope, Hosmer-Lemeshow test
[8] C-statistic, D-statistic, log-rank
[9] Sensitivity, specificity, predictive values, net reclassification improvement and a priori cut points
[10] Development dataset only (internal) or separate external validation
[11] Including predictor weights or regression coefficients, intercept, baseline survival, model performance measures
[12] E.g. sum score, nomogram, score chart, predictions of specific risk subgroups

Risk of bias tabel

Study reference (first author, year of publication) Classification[1]	**Participant selection** 1) Appropriate data sources?[2] 2) Appropriate in- and exclusion? Risk of bias: low/high/unclear	**Predictors** 1) Assessed similar for all participants? 2) Assessed without knowledge of outcome? 3) Available at time the model is intended to be used? Risk of bias: low/high/unclear	**Outcome** 1) Pre-specified or standard outcome definition? 2) Predictors excluded from definition? 3) Assessed similar for all participants? 4) Assessed without knowledge of predictors? 5) Time interval between predictor and outcome measurement appropriate? Risk of bias: low/high/unclear	**Analysis** 1) Reasonable number of participants with event/outcome? 2) All enrolled participants included in analysis? 3) Missing data handled appropriately? 4) No selection of predictors based on univariate analysis? 5) Relevant model performance measures evaluated appropriately?[3] 6) Accounted for model overfitting[4] and optimism? 7) Predictors and weights correspond to results from multivariate analysis? Risk of bias: low/high/unclear	**Overall judgment** *High risk of bias: at least one domain judged to be at high risk of bias.* *Model development only: high risk of bias.* Risk of bias: low/high/unclear
Battle (2014) Development and external validation of model	Low (Retrospective study with data of patients who presented to the ED of a large regional trauma centre in South Wales between 2009 and 2011, with a primary diagnosis of blunt chest-wall trauma with clear in- and exclusion criteria.)	Low (Data were collected retrospectively from the medical notes of each patient. If there was no record in the patient's notes of chronic lung disease, cardiovascular disease, use of preinjury anticoagulants or current smoking status, then it was assumed that these predictors were absent. The number of rib fractures was determined from the chest radiograph if not documented in the medical notes).	Low (Methods were clearly defined).	High (relatively low number of patients with event/outcome).	Low risk of bias

Exclusie tabel

Author and year	Reason for exclusion
Buchholz (2022)	No prognostic study.
Casas (2016)	The study investigated the prognostic value of the Thorax Trauma Severity Score.
Chen (2014)	The study compared outcomes for CTS-scores <5 or >5.
Pressley (2012)	The study compared outcomes for CTS-scores <5 or >5.

Zoekverantwoording

Algemene informatie

Richtlijn: NVvH Thoracale letsels na trauma	
Uitgangsvraag: Welke factoren zijn voorspellend voor het optreden van complicaties bij patiënten met een bewezen thoraxtrauma/ wanneer kan een patiënt veilig naar huis na een bewezen thoraxtrauma?	
Database(s): Medline (OVID), Embase	Datum: 04-05-2023
Periode: >2000	Talen: Geen beperking
Literatuurspecialist: Linda Niesink	
BMI zoekblokken: voor verschillende opdrachten wordt (deels) gebruik gemaakt van de zoekblokken van BMI-Online https://blocks.bmi-online.nl/ Bij gebruikmaking van een volledig zoekblok zal naar de betreffende link op de website worden verwezen.	
Toelichting en opmerkingen: → Voor deze vraag is gezocht op de elementen **thorax trauma** (in het blauw) en een **prognostisch zoekfilter** (in het groen). → Alle genoemde sleutelartikelen van Martinez Casas (2016), Battle (2013), Giamello (2023), Battle (2014), Hardin (2019), Brasel (2006), Bergeron (2003) en Moon (2017) zitten in de zoekopbrengst. → Resultaten staan in Rayyan.	
Te gebruiken voor richtlijnen tekst: In de databases Embase (via embase.com) en Medline (via OVID) is op 04-05-2023 met relevante zoektermen gezocht vanaf 2000 naar systematische reviews, RCT's en observationele studiedesigns over predictiemodellen voor patiënten met een thorax trauma. De literatuurzoekactie leverde 1.183 unieke treffers op.	

Zoekopbrengst

	EMBASE	OVID/MEDLINE	Ontdubbeld
SRs	19	35	36
RCTs	154	185	256
Observationele studies	518	725	891
Totaal	691	945	**1183**

Zoekstrategie

Database	Zoektermen		
Embase	*No.*	*Query*	*Results*
	#1	'thorax blunt trauma'/exp OR 'rib fracture'/exp/mj OR (((blunt OR severity) NEAR/3 (chest OR thorax OR thoracic OR cardiac OR pericardial) NEAR/3 (trauma* OR injur*)):ti,ab,kw) OR ((pulmonary NEAR/2 (contusion* OR laceration*)):ti,ab,kw) OR 'broken rib*':ti,ab,kw OR 'costa fracture*':ti,ab,kw OR 'costal fracture*':ti,ab,kw OR 'fractured rib*':ti,ab,kw OR 'fractured ribcage':ti,ab,kw OR 'rib cage fracture':ti,ab,kw OR 'rib fracture*':ti,ab,kw OR 'ribcage fracture*':ti,ab,kw	13712
	#2	'area under the curve'/exp OR 'brier score'/exp OR 'computer prediction'/exp OR 'c statistic'/exp OR 'c statistics'/exp OR 'integrated discrimination improvement'/exp OR 'net reclassification improvement'/exp OR 'net reclassification index'/exp OR 'prediction'/exp OR 'predictive model'/exp OR 'predictive modeling'/exp OR 'predictive validity'/exp OR 'predictive value'/exp OR 'regression analysis'/exp OR 'statistical model'/exp OR 'area under the curve':ti,ab,kw OR 'brier score*':ti,ab,kw OR 'c statistic*' OR 'computer prediction':ti,ab,kw OR 'decision curve anal*':ti,ab,kw OR (('net reclassification' NEAR/2 (improvement OR index)):ti,ab,kw) OR (((predict* OR statistical*) NEAR/3 (model* OR validity OR value)):ti,ab,kw) OR 'proportional hazards model*':ti,ab,kw OR 'r square*':ti,ab,kw OR regression:ti,ab,kw OR predict*:ti OR multivariate:ti,ab,kw OR multivariab*:ti,ab,kw	3196680
	#3	#1 AND #2 AND [2000-2023]/py NOT (('animal'/exp OR 'animal experiment'/exp OR 'animal model'/exp OR 'nonhuman'/exp) NOT 'human'/exp) NOT ('conference abstract'/it OR 'conference review'/it OR 'editorial'/it OR 'letter'/it OR 'note'/it)	802
	#4	'meta analysis'/exp OR 'meta analysis (topic)'/exp OR metaanaly*:ti,ab OR 'meta analy*':ti,ab OR metanaly*:ti,ab OR 'systematic review'/de OR 'cochrane database of systematic reviews'/jt OR prisma:ti,ab OR prospero:ti,ab OR (((systemati* OR scoping OR umbrella OR 'structured literature') NEAR/3 (review* OR overview*)):ti,ab) OR ((systemic* NEAR/1 review*):ti,ab) OR (((systemati* OR literature OR database* OR 'data base*') NEAR/10 search*):ti,ab) OR (((structured OR comprehensive* OR systemic*) NEAR/3 search*):ti,ab) OR (((literature NEAR/3 review*):ti,ab) AND (search*:ti,ab OR database*:ti,ab OR 'data base*':ti,ab)) OR (('data extraction':ti,ab OR 'data source*':ti,ab) AND 'study selection':ti,ab) OR ('search strategy':ti,ab AND 'selection criteria':ti,ab) OR ('data source*':ti,ab AND 'data synthesis':ti,ab) OR medline:ab OR pubmed:ab OR embase:ab OR cochrane:ab OR (((critical OR rapid) NEAR/2 (review* OR overview* OR synthes*)):ti) OR ((((critical* OR rapid*) NEAR/3 (review* OR overview* OR synthes*)):ab) AND (search*:ab OR database*:ab OR 'data base*':ab)) OR metasynthes*:ti,ab OR 'meta synthes*':ti,ab	910066
	#5	'clinical trial'/exp OR 'randomization'/exp OR 'single blind procedure'/exp OR 'double blind procedure'/exp OR 'crossover procedure'/exp OR 'placebo'/exp OR 'prospective study'/exp OR rct:ab,ti OR random*:ab,ti OR 'single blind':ab,ti OR 'randomised controlled trial':ab,ti OR 'randomized controlled trial'/exp OR placebo*:ab,ti	3747433
	#6	'major clinical study'/exp OR 'case control study'/de OR 'comparative study'/exp OR 'control group'/de OR 'controlled study'/de OR 'controlled clinical trial'/de OR 'crossover procedure'/de OR 'double blind procedure'/de OR 'phase 2 clinical	15122389

	trial'/de OR 'phase 3 clinical trial'/de OR 'phase 4 clinical trial'/de OR 'pretest posttest design'/de OR 'pretest posttest control group design'/de OR 'quasi experimental study'/de OR 'single blind procedure'/de OR 'triple blind procedure'/de OR (((control OR controlled) NEAR/6 trial):ti,ab,kw) OR (((control OR controlled) NEAR/6 (study OR studies)):ti,ab,kw) OR (((control OR controlled) NEAR/1 active):ti,ab,kw) OR 'open label*':ti,ab,kw OR (((double OR two OR three OR multi OR trial) NEAR/1 (arm OR arms)):ti,ab,kw) OR ((allocat* NEAR/10 (arm OR arms)):ti,ab,kw) OR placebo*:ti,ab,kw OR 'sham-control*':ti,ab,kw OR (((single OR double OR triple OR assessor) NEAR/1 (blind* OR masked)):ti,ab,kw) OR nonrandom*:ti,ab,kw OR 'non-random*':ti,ab,kw OR 'quasi-experiment*':ti,ab,kw OR crossover:ti,ab,kw OR 'cross over':ti,ab,kw OR 'parallel group*':ti,ab,kw OR 'factorial trial':ti,ab,kw OR ((phase NEAR/5 (study OR trial)):ti,ab,kw) OR ((case* NEAR/6 (matched OR control*)):ti,ab,kw) OR ((match* NEAR/6 (pair OR pairs OR cohort* OR control* OR group* OR healthy OR age OR sex OR gender OR patient* OR subject* OR participant*)):ti,ab,kw) OR ((propensity NEAR/6 (scor* OR match*)):ti,ab,kw) OR versus:ti OR vs:ti OR compar*:ti OR ((compar* NEAR/1 study):ti,ab,kw) OR (('major clinical study'/de OR 'clinical study'/de OR 'cohort analysis'/de OR 'observational study'/de OR 'cross-sectional study'/de OR 'multicenter study'/de OR 'correlational study'/de OR 'follow up'/de OR cohort*:ti,ab,kw OR 'follow up':ti,ab,kw OR followup:ti,ab,kw OR longitudinal*:ti,ab,kw OR prospective*:ti,ab,kw OR retrospective*:ti,ab,kw OR observational*:ti,ab,kw OR 'cross sectional*':ti,ab,kw OR cross?ectional*:ti,ab,kw OR multicent*:ti,ab,kw OR 'multi-cent*':ti,ab,kw OR consecutive*:ti,ab,kw) AND (group:ti,ab,kw OR groups:ti,ab,kw OR subgroup*:ti,ab,kw OR versus:ti,ab,kw OR vs:ti,ab,kw OR compar*:ti,ab,kw OR 'odds ratio*':ab OR 'relative odds':ab OR 'risk ratio*':ab OR 'relative risk*':ab OR 'rate ratio':ab OR aor:ab OR arr:ab OR rrr:ab OR (('or' OR 'rr') NEAR/6 ci):ab))) OR 'observational study':ti,ab,kw	
	#7	#3 AND #4 **– SR's**	19
	#8	#3 AND #5 NOT #7 **– RCT's**	154
	#9	#3 AND #6 NOT (#7 OR #8) **– observationele studies**	518
	#10	#7 OR #8 OR #9	691
Medline (OVID)	1 exp *Thoracic Injuries/ or "Sternum"/in or (((blunt OR severity) adj3 (chest OR thorax OR thoracic OR cardiac OR pericardial) adj3 (trauma* OR injur*)).ti,ab,kf.) OR ((pulmonary adj2 (contusion* OR laceration*)).ti,ab,kf.) OR 'broken rib*'.ti,ab,kf. OR 'costa fracture*'.ti,ab,kf. OR 'costal fracture*'.ti,ab,kf. OR 'fractured rib*'.ti,ab,kf. OR 'fractured ribcage'.ti,ab,kf. OR 'rib cage fracture'.ti,ab,kf. OR 'rib fracture*'.ti,ab,kf. OR 'ribcage fracture*'.ti,ab,kf. (28767) 2 Area Under Curve/ or exp Forecasting/ or "Predictive Value of Tests"/ or exp Multivariate Analysis/ or exp Regression Analysis/ or exp Models, Statistical/ or area under the curve.ti,ab,kf. or brier score*.ti,ab,kf. or c statistic*.ti,ab,kf. or computer prediction.ti,ab,kf. or decision curve anal*.ti,ab,kf. or (net reclassification adj2 (improvement or index)).ti,ab,kf. or ((predict* or statistical*) adj3 (model* or validity or value)).ti,ab,kf. or proportional hazards model*.ti,ab,kf. or r square*.ti,ab,kf. or regression.ti,ab,kf. or predict*.ti. or multivaria*.ti,ab,kf. (2395950) 3 1 and 2 (1666) 4 limit 3 to yr="2000 -Current" (1509) 5 4 not (comment/ or editorial/ or letter/ or ((exp animals/ or exp models, animal/) not humans/)) (1417)		

	6 meta-analysis/ or meta-analysis as topic/ or (metaanaly* or meta-analy* or metanaly*).ti,ab,kf. or systematic review/ or cochrane.jw. or (prisma or prospero).ti,ab,kf. or ((systemati* or scoping or umbrella or "structured literature") adj3 (review* or overview*)).ti,ab,kf. or (systemic* adj1 review*).ti,ab,kf. or ((systemati* or literature or database* or data-base*) adj10 search*).ti,ab,kf. or ((structured or comprehensive* or systemic*) adj3 search*).ti,ab,kf. or ((literature adj3 review*) and (search* or database* or data-base*)).ti,ab,kf. or (("data extraction" or "data source*") and "study selection").ti,ab,kf. or ("search strategy" and "selection criteria").ti,ab,kf. or ("data source*" and "data synthesis").ti,ab,kf. or (medline or pubmed or embase or cochrane).ab. or ((critical or rapid) adj2 (review* or overview* or synthes*)).ti. or (((critical* or rapid*) adj3 (review* or overview* or synthes*)) and (search* or database* or data-base*)).ab. or (metasynthes* or meta-synthes*).ti,ab,kf. (665635) 7 exp clinical trial/ or randomized controlled trial/ or exp clinical trials as topic/ or randomized controlled trials as topic/ or Random Allocation/ or Double-Blind Method/ or Single-Blind Method/ or (clinical trial, phase i or clinical trial, phase ii or clinical trial, phase iii or clinical trial, phase iv or controlled clinical trial or randomized controlled trial or multicenter study or clinical trial).pt. or random*.ti,ab. or (clinic* adj trial*).tw. or ((singl* or doubl* or treb* or tripl*) adj (blind$3 or mask$3)).tw. or Placebos/ or placebo*.tw. (2583455) 8 Case-control Studies/ or clinical trial, phase ii/ or clinical trial, phase iii/ or clinical trial, phase iv/ or comparative study/ or control groups/ or controlled before-after studies/ or controlled clinical trial/ or double-blind method/ or historically controlled study/ or matched-pair analysis/ or single-blind method/ or (((control or controlled) adj6 (study or studies or trial)) or (compar* adj (study or studies)) or ((control or controlled) adj1 active) or "open label*" or ((double or two or three or multi or trial) adj (arm or arms)) or (allocat* adj10 (arm or arms)) or placebo* or "sham-control*" or ((single or double or triple or assessor) adj1 (blind* or masked)) or nonrandom* or "non-random*" or "quasi-experiment*" or "parallel group*" or "factorial trial" or "pretest posttest" or (phase adj5 (study or trial)) or (case* adj6 (matched or control*)) or (match* adj6 (pair or pairs or cohort* or control* or group* or healthy or age or sex or gender or patient* or subject* or participant*)) or (propensity adj6 (scor* or match*))).ti,ab,kf. or (confounding adj6 adjust*).ti,ab. or (versus or vs or compar*).ti. or ((exp cohort studies/ or epidemiologic studies/ or multicenter study/ or observational study/ or seroepidemiologic studies/ or (cohort* or 'follow up' or followup or longitudinal* or prospective* or retrospective* or observational* or multicent* or 'multi-cent*' or consecutive*).ti,ab,kf.) and ((group or groups or subgroup* or versus or vs or compar*).ti,ab,kf. or ('odds ratio*' or 'relative odds' or 'risk ratio*' or 'relative risk*' or aor or arr or rrr).ab. or (("OR" or "RR") adj6 CI).ab.)) (5414257) 9 5 and 6 (35) **– SRs** 10 (5 and 7) not 9 (185) **- RCTs** 11 (5 and 8) not (9 or 10) (725) **– observationele studies** 12 9 or 10 or 11 (945)

Module 2: Fysiotherapie

Evidence tabel

Niet van toepassing.

Risk of bias tabel

Niet van toepassing.

Exclusie tabel

Author and year	Reason for exclusion
Alar (2020)	No comparison between physiotherapeutic treatment and no physiotherapeutic treatment.
Barker (2002)	No comparison between physiotherapeutic treatment and no physiotherapeutic treatment.
Battle (2022)	Study protocol.
Battle (2021)	Feasibility study. No clinical outcomes reported.
Curtis (2016)	Wrong study design. Pre-post study.
Curtis (2021)	Wrong study design. Pre-post study.
Dote (2020)	No comparison between physiotherapeutic treatment and no physiotherapeutic treatment.
Gunjiganvi (2021)	No comparison between physiotherapeutic treatment and no physiotherapeutic treatment.
Higgins (2005)	No comparison between physiotherapeutic treatment and no physiotherapeutic treatment.
Kollef (2000)	No comparison between physiotherapeutic treatment and no physiotherapeutic treatment.
Pelo (2020)	No comparison between physiotherapeutic treatment and no physiotherapeutic treatment.
Saliba (2022)	Wrong study population. The study included patients who underwent surgical treatments due to cardic problems. No traumatic patients with thoracic injuries were included.
Störmann (2017)	No comparison between physiotherapeutic treatment and no physiotherapeutic treatment.
Unsworth (2015)	No comparison between physiotherapeutic treatment and no physiotherapeutic treatment.
Van Aswegen (2020)	Wrong study design.
Vines (2022)	No comparison between physiotherapeutic treatment and no physiotherapeutic treatment.
Weinberg (2018)	Wrong study design.
Weinberg (2022)	Wrong study design.
Wutzler (2017)	No comparison between physiotherapeutic treatment and no physiotherapeutic treatment.

Zoekverantwoording

Algemene informatie

Richtlijn: NVvH Thoracale letsels na trauma	
Uitgangsvraag: Wat is de waarde van fysiotherapeutische behandeling bij patiënten met een thoraxletsel in de klinische setting?	
Database(s): Medline (OVID), Embase	Datum: 06-04-2023
Periode: >2000	Talen: Geen beperking
Literatuurspecialist: Linda Niesink	
BMI zoekblokken: voor verschillende opdrachten wordt (deels) gebruik gemaakt van de zoekblokken van BMI-Online https://blocks.bmi-online.nl/ Bij gebruikmaking van een volledig zoekblok zal naar de betreffende link op de website worden verwezen.	
Toelichting en opmerkingen: → Voor deze vraag is gezocht op de elementen **thoraxletsel** (in het blauw) en **fysiotherapie** (in het groen). → De genoemde sleutelartikelen van Van Aswegen (2020), Engels (2013), Weinberg (2022) en Akca (2020) zitten in de zoekopbrengst. Simon (2019) valt er buiten op studiedesign, dit is een overview. → Vanwege de lage aantallen zijn ook de overige studiedesigns meegenomen. → Resultaten staan in Rayyan.	
Te gebruiken voor richtlijnen tekst: In de databases Embase (via embase.com) en Medline (via OVID) is op 06-04-2023 met relevante zoektermen gezocht vanaf 2000 naar systematische reviews, RCT's en observationele studiedesigns over fysiotherapeutische behandeling bij patiënten met een thoraxletsel. De literatuurzoekactie leverde 414 unieke treffers op.	

Zoekopbrengst

	EMBASE	**OVID/MEDLINE**	**Ontdubbeld**
SRs	51	39	65
RCTs	125	77	163
Observationele studies	160	77	186
Totaal	336	193	**414**

Zoekstrategie

Database	**Zoektermen**		
Embase	*No.*	*Query*	*Results*
	#1	'thorax injury'/exp/mj OR 'thorax blunt trauma'/exp OR 'thoracic fracture'/exp OR 'pneumothorax'/exp OR 'flail chest'/exp OR (((chest OR thora*) NEAR/2 flail):ti,ab,kw) OR (((cardiac OR myocardial OR heart) NEAR/3 (bruis* OR contusion*)):ti,ab,kw) OR 'contusio cordis':ti,ab,kw OR 'commotio cordis':ti,ab,kw OR (((chest OR thorax OR thoracic OR cardiac OR pericardial) NEAR/3 (trauma* OR injur*)):ti,ab,kw) OR (((rib OR sternal) NEAR/3 fracture*):ti,ab,kw) OR pneumothora*:ti,ab,kw OR (((pulmonary OR lung) NEAR/2 (contusion* OR laceration*)):ti,ab,kw) OR (((cardial OR myocardial) NEAR/3 contusion*):ti,ab,kw) OR (((lung OR pulmonary) NEAR/3 (collapse OR deflation)):ti,ab,kw) OR lungcontusion*:ti,ab,kw	142962

	#2	'physiotherapy'/exp/mj OR 'breathing exercise'/exp OR 'pursed lip breathing'/exp OR 'kinesio taping'/exp OR 'physiotherap*':ti,ab,kw OR ((physical NEAR/3 (therap* OR treatment* OR rehabilitation)):ti,ab,kw) OR 'physio therap*':ti,ab,kw OR (((breathing OR respiratory OR respiration) NEAR/3 (exercise* OR therap* OR technique* OR 'pursed lip')):ti,ab,kw) OR kinesiotaping:ti,ab,kw OR 'kinesio taping':ti,ab,kw	165906
	#3	#1 AND #2 AND #3 AND [2000-2023]/py NOT (('animal'/exp OR 'animal experiment'/exp OR 'animal model'/exp OR 'nonhuman'/exp) NOT 'human'/exp) NOT ('conference abstract'/it OR 'conference review'/it OR 'editorial'/it OR 'letter'/it OR 'note'/it)	710
	#4	'meta analysis'/exp OR 'meta analysis (topic)'/exp OR metaanaly*:ti,ab OR 'meta analy*':ti,ab OR metanaly*:ti,ab OR 'systematic review'/de OR 'cochrane database of systematic reviews'/jt OR prisma:ti,ab OR prospero:ti,ab OR (((systemati* OR scoping OR umbrella OR 'structured literature') NEAR/3 (review* OR overview*)):ti,ab) OR ((systemic* NEAR/1 review*):ti,ab) OR (((systemati* OR literature OR database* OR 'data base*') NEAR/10 search*):ti,ab) OR (((structured OR comprehensive* OR systemic*) NEAR/3 search*):ti,ab) OR (((literature NEAR/3 review*):ti,ab) AND (search*:ti,ab OR database*:ti,ab OR 'data base*':ti,ab)) OR (('data extraction':ti,ab OR 'data source*':ti,ab) AND 'study selection':ti,ab) OR ('search strategy':ti,ab AND 'selection criteria':ti,ab) OR ('data source*':ti,ab AND 'data synthesis':ti,ab) OR medline:ab OR pubmed:ab OR embase:ab OR cochrane:ab OR (((critical OR rapid) NEAR/2 (review* OR overview* OR synthes*)):ti) OR ((((critical* OR rapid*) NEAR/3 (review* OR overview* OR synthes*)):ab) AND (search*:ab OR database*:ab OR 'data base*':ab)) OR metasynthes*:ti,ab OR 'meta synthes*':ti,ab	914840
	#5	'clinical trial'/exp OR 'randomization'/exp OR 'single blind procedure'/exp OR 'double blind procedure'/exp OR 'crossover procedure'/exp OR 'placebo'/exp OR 'prospective study'/exp OR rct:ab,ti OR random*:ab,ti OR 'single blind':ab,ti OR 'randomised controlled trial':ab,ti OR 'randomized controlled trial'/exp OR placebo*:ab,ti	3758772
	#6	'major clinical study'/exp OR 'case control study'/de OR 'comparative study'/exp OR 'control group'/de OR 'controlled study'/de OR 'controlled clinical trial'/de OR 'crossover procedure'/de OR 'double blind procedure'/de OR 'phase 2 clinical trial'/de OR 'phase 3 clinical trial'/de OR 'phase 4 clinical trial'/de OR 'pretest posttest design'/de OR 'pretest posttest control group design'/de OR 'quasi experimental study'/de OR 'single blind procedure'/de OR 'triple blind procedure'/de OR (((control OR controlled) NEAR/6 trial):ti,ab,kw) OR (((control OR controlled) NEAR/6 (study OR studies)):ti,ab,kw) OR (((control OR controlled) NEAR/1 active):ti,ab,kw) OR 'open label*':ti,ab,kw OR (((double OR two OR three OR multi OR trial) NEAR/1 (arm OR arms)):ti,ab,kw) OR ((allocat* NEAR/10 (arm OR arms)):ti,ab,kw) OR placebo*:ti,ab,kw OR 'sham-control*':ti,ab,kw OR (((single OR double OR triple OR assessor) NEAR/1 (blind* OR masked)):ti,ab,kw) OR nonrandom*:ti,ab,kw OR 'non-random*':ti,ab,kw OR 'quasi-experiment*':ti,ab,kw OR crossover:ti,ab,kw OR 'cross over':ti,ab,kw OR 'parallel group*':ti,ab,kw OR 'factorial trial':ti,ab,kw OR ((phase NEAR/5 (study OR trial)):ti,ab,kw) OR ((case* NEAR/6 (matched OR control*)):ti,ab,kw) OR ((match* NEAR/6 (pair OR pairs OR cohort* OR control* OR group* OR healthy OR age OR sex OR gender OR	15164295

	patient* OR subject* OR participant*)):ti,ab,kw) OR ((propensity NEAR/6 (scor* OR match*)):ti,ab,kw) OR versus:ti OR vs:ti OR compar*:ti OR ((compar* NEAR/1 study):ti,ab,kw) OR (('major clinical study'/de OR 'clinical study'/de OR 'cohort analysis'/de OR 'observational study'/de OR 'cross-sectional study'/de OR 'multicenter study'/de OR 'correlational study'/de OR 'follow up'/de OR cohort*:ti,ab,kw OR 'follow up':ti,ab,kw OR followup:ti,ab,kw OR longitudinal*:ti,ab,kw OR prospective*:ti,ab,kw OR retrospective*:ti,ab,kw OR observational*:ti,ab,kw OR 'cross sectional*':ti,ab,kw OR cross?ectional*:ti,ab,kw OR multicent*:ti,ab,kw OR 'multi-cent*':ti,ab,kw OR consecutive*:ti,ab,kw) AND (group:ti,ab,kw OR groups:ti,ab,kw OR subgroup*:ti,ab,kw OR versus:ti,ab,kw OR vs:ti,ab,kw OR compar*:ti,ab,kw OR 'odds ratio*':ab OR 'relative odds':ab OR 'risk ratio*':ab OR 'relative risk*':ab OR 'rate ratio':ab OR aor:ab OR arr:ab OR rrr:ab OR (('or' OR 'rr') NEAR/6 ci):ab))) OR 'observational study':ti,ab,kw #7 #3 AND #4 **– SR's** 51 #8 #3 AND #5 NOT #7 **– RCT's** 125 #9 #3 AND #6 NOT (#7 OR #8) **– observationele studies** 160 #10 #7 OR #8 OR #9 336
Medline (OVID)	1 exp Thoracic Injuries/ or exp Rib Fractures/ or exp Pneumothorax/ or "Sternum"/in or exp Flail Chest/ or ((chest or thora*) adj2 flail).ti,ab,kf. or ((cardiac or myocardial or heart) adj3 (bruis* or contusion*)).ti,ab,kf. or 'contusio cordis'.ti,ab,kf. or 'commotio cordis'.ti,ab,kf. or ((chest or thorax or thoracic or cardiac or pericardial) adj3 (trauma* or injur*)).ti,ab,kf. or ((rib or sternal) adj3 fracture*).ti,ab,kf. or pneumothora*.ti,ab,kf. or ((pulmonary or lung) adj2 (contusion* or laceration*)).ti,ab,kf. or ((cardial or myocardial) adj3 contusion*).ti,ab,kf. or ((lung or pulmonary) adj3 (collapse or deflation)).ti,ab,kf. or lungcontusion*.ti,ab,kf. (82756) 2 exp Physical Therapy Modalities/ or exp Breathing Exercises/ or 'physiotherap*'.ti,ab,kf. or ((physical adj3 (therap* or treatment* or rehabilitation)).ti,ab,kf.) or 'physio therap*'.ti,ab,kf. or (((breathing or respiratory or respiration) adj3 (exercise* or therap* or technique* or 'pursed lip')).ti,ab,kf.) or kinesiotaping.ti,ab,kf. or 'kinesio taping'.ti,ab,kf. (239353) 3 1 and 2 (894) 4 limit 3 to yr="2000 -Current" (551) 5 4 not (comment/ or editorial/ or letter/ or ((exp animals/ or exp models, animal/) not humans/)) (474) 6 meta-analysis/ or meta-analysis as topic/ or (metaanaly* or meta-analy* or metanaly*).ti,ab,kf. or systematic review/ or cochrane.jw. or (prisma or prospero).ti,ab,kf. or ((systemati* or scoping or umbrella or "structured literature") adj3 (review* or overview*)).ti,ab,kf. or (systemic* adj1 review*).ti,ab,kf. or ((systemati* or literature or database* or data-base*) adj10 search*).ti,ab,kf. or ((structured or comprehensive* or systemic*) adj3 search*).ti,ab,kf. or ((literature adj3 review*) and (search* or database* or data-base*)).ti,ab,kf. or (("data extraction" or "data source*") and "study selection").ti,ab,kf. or ("search strategy" and "selection criteria").ti,ab,kf. or ("data source*" and "data synthesis").ti,ab,kf. or (medline or pubmed or embase or cochrane).ab. or ((critical or rapid) adj2 (review* or overview* or synthes*)).ti. or (((critical* or rapid*) adj3 (review* or overview* or synthes*)) and (search* or database* or data-base*)).ab. or (metasynthes* or meta-synthes*).ti,ab,kf. (660248) 7 exp clinical trial/ or randomized controlled trial/ or exp clinical trials as topic/ or randomized controlled trials as topic/ or Random Allocation/ or Double-Blind Method/ or Single-Blind Method/ or (clinical trial, phase i or clinical trial, phase ii or clinical trial, phase iii or clinical trial, phase iv or controlled clinical trial or randomized controlled trial or multicenter study or clinical trial).pt. or random*.ti,ab. or (clinic* adj trial*).tw. or

	((singl* or doubl* or treb* or tripl*) adj (blind$3 or mask$3)).tw. or Placebos/ or placebo*.tw. (2574022) 8 Case-control Studies/ or clinical trial, phase ii/ or clinical trial, phase iii/ or clinical trial, phase iv/ or comparative study/ or control groups/ or controlled before-after studies/ or controlled clinical trial/ or double-blind method/ or historically controlled study/ or matched-pair analysis/ or single-blind method/ or (((control or controlled) adj6 (study or studies or trial)) or (compar* adj (study or studies)) or ((control or controlled) adj1 active) or "open label*" or ((double or two or three or multi or trial) adj (arm or arms)) or (allocat* adj10 (arm or arms)) or placebo* or "sham-control*" or ((single or double or triple or assessor) adj1 (blind* or masked)) or nonrandom* or "non-random*" or "quasi-experiment*" or "parallel group*" or "factorial trial" or "pretest posttest" or (phase adj5 (study or trial)) or (case* adj6 (matched or control*)) or (match* adj6 (pair or pairs or cohort* or control* or group* or healthy or age or sex or gender or patient* or subject* or participant*)) or (propensity adj6 (scor* or match*))).ti,ab,kf. or (confounding adj6 adjust*).ti,ab. or (versus or vs or compar*).ti. or ((exp cohort studies/ or epidemiologic studies/ or multicenter study/ or observational study/ or seroepidemiologic studies/ or (cohort* or 'follow up' or followup or longitudinal* or prospective* or retrospective* or observational* or multicent* or 'multi-cent*' or consecutive*).ti,ab,kf.) and ((group or groups or subgroup* or versus or vs or compar*).ti,ab,kf. or ('odds ratio*' or 'relative odds' or 'risk ratio*' or 'relative risk*' or aor or arr or rrr).ab. or (("OR" or "RR") adj6 CI).ab.)) (5396081) 9 5 and 6 (39) **– SRs** 10 (5 and 7) not 9 (77) **- RCTs** 11 (5 and 8) not (9 or 10) (77) **– observationele studies** 12 9 or 10 or 11 (193)

Module 3: Trachea-, bronchus- en oesophagusletsel

Evidence tabel

Niet van toepassing.

Risk of bias tabel

Niet van toepassing.

Exclusie tabel

Niet van toepassing.

Zoekverantwoording

Algemene informatie

Cluster/richtlijn: Thoracale letsels na trauma – UV4 Trachea, bronchus en oesofagus letsel	
Uitgangsvraag/modules: What is the value of a wait and see policy in comparison with scopy and/or CT with oral contrast regarding the diagnostic accuracy of trachea, main bronchus and/or oesophageal injuries in patients with suspected tracheal, broncheal and/or oesophageal injury based on unexplained mediastinal emphysema or persistent air leak despite chest drain?	
Database(s): Embase.com, Ovid/Medline	Datum: 29-11-2023
Periode: geen restrictie	Talen: geen restrictie
Literatuurspecialist: Esther van der Bijl	Rayyan review: https://rayyan.ai/reviews/858428
BMI-zoekblokken: voor verschillende opdrachten wordt (deels) gebruik gemaakt van de zoekblokken van BMI-Online https://blocks.bmi-online.nl/ Bij gebruikmaking van een volledig zoekblok zal naar de betreffende link op de website worden verwezen.	
Toelichting: Voor deze vraag is gezocht op de elementen: - trachea, hoofdbronchus of oesofagus letsels - afwachtend beleid - sensitiviteit/ specificiteit filter → Zoals besproken vallen de sleutelartikelen PMID16782296, PMID11312194 , PMID31164915 en PMID26680145 met deze search uit, omdat deze over CT/ scopie gaan en niet over afwachtend beleid.	
Te gebruiken voor richtlijntekst: In de databases Embase.com en Ovid/Medline is op 29-11-2023 systematisch gezocht naar systematische reviews, RCTs en observationele studies over afwachtend beleid bij trachea, bronchus en oesofagus letsel. De literatuurzoekactie leverde 462 unieke treffers op.	

Zoekopbrengst

	EMBASE	**OVID/MEDLINE**	**Ontdubbeld**
SR	26	23	49
RCT	62	27	85

Observationeel	112	235	328
Totaal	200	285	**462***

in Rayyan

Zoekstrategie Embase.com 29-11-2023

No.	Query	Results
#1	'trachea injury'/exp OR 'bronchus perforation'/exp OR 'bronchus injury'/exp OR 'esophagus injury'/exp OR 'bronchus rupture'/exp OR (('trachea'/exp OR 'esophagus'/exp OR 'upper gastrointestinal tract'/exp OR 'tracheobronchial tree'/exp OR 'bronchus'/exp OR 'airway'/exp) AND 'injury'/exp) OR (((('trachea*' OR 'esophag*' OR 'oesophag*' OR 'upper gastrointestinal tract' OR 'airway tree' OR 'bronch* tree' OR 'pulmonary tree' OR 'tracheobronchial system' OR 'tracheobronchial tree' OR 'bronch*' OR 'airway') NEAR/3 ('injur*' OR 'rupture' OR 'laceration*' OR 'perforation*' OR 'damage' OR 'trauma' OR 'infiltration')):ti,ab,kw)	58391
#2	'conservative treatment'/exp OR 'watchful waiting'/exp OR 'active surveillance'/exp OR (((conservative OR observative) NEAR/2 (management OR treatment*)):ti,ab,kw) OR expectative*:ti,ab,kw OR expectantly:ti,ab,kw OR 'watchful waiting':ti,ab,kw OR 'wait and see':ti,ab,kw OR 'wait & see':ti,ab,kw OR 'no treatment':ti,ab,kw OR 'natural course':ti,ab,kw OR observation*:ti,ab,kw OR 'no intervention':ti,ab,kw OR 'active surveillance':ti,ab,kw	2232282
#3	'sensitivity and specificity'/de OR sensitivity:ab,ti OR specificity:ab,ti OR predict*:ab,ti OR 'roc curve':ab,ti OR 'receiver operator':ab,ti OR 'receiver operators':ab,ti OR likelihood:ab,ti OR 'diagnostic error'/exp OR 'diagnostic accuracy'/exp OR 'diagnostic test accuracy study'/exp OR 'inter observer':ab,ti OR 'intra observer':ab,ti OR interobserver:ab,ti OR intraobserver:ab,ti OR validity:ab,ti OR kappa:ab,ti OR reliability:ab,ti OR reproducibility:ab,ti OR ((test NEAR/2 're-test'):ab,ti) OR ((test NEAR/2 'retest'):ab,ti) OR 'reproducibility'/exp OR accuracy:ab,ti OR 'differential diagnosis'/exp OR 'validation study'/de OR 'measurement precision'/exp OR 'diagnostic value'/exp OR 'reliability'/exp OR 'predictive value'/exp OR ppv:ti,ab,kw OR npv:ti,ab,kw OR (((false OR true) NEAR/3 (negative OR positive)):ti,ab)	6248993
#4	#1 AND #2 AND #3	689
#5	#4 NOT ('conference abstract'/it OR 'editorial'/it OR 'letter'/it OR 'note'/it) NOT (('animal'/exp OR 'animal experiment'/exp OR 'animal model'/exp OR 'nonhuman'/exp) NOT 'human'/exp)	358

#6	'meta analysis'/exp OR 'meta analysis (topic)'/exp OR metaanaly*:ti,ab OR 'meta analy*':ti,ab OR metanaly*:ti,ab OR 'systematic review'/de OR 'cochrane database of systematic reviews'/jt OR prisma:ti,ab OR prospero:ti,ab OR (((systemati* OR scoping OR umbrella OR 'structured literature') NEAR/3 (review* OR overview*)):ti,ab) OR ((systemic* NEAR/1 review*):ti,ab) OR (((systemati* OR literature OR database* OR 'data base*') NEAR/10 search*):ti,ab) OR (((structured OR comprehensive* OR systemic*) NEAR/3 search*):ti,ab) OR (((literature NEAR/3 review*):ti,ab) AND (search*:ti,ab OR database*:ti,ab OR 'data base*':ti,ab)) OR (('data extraction':ti,ab OR 'data source*':ti,ab) AND 'study selection':ti,ab) OR ('search strategy':ti,ab AND 'selection criteria':ti,ab) OR ('data source*':ti,ab AND 'data synthesis':ti,ab) OR medline:ab OR pubmed:ab OR embase:ab OR cochrane:ab OR (((critical OR rapid) NEAR/2 (review* OR overview* OR synthes*)):ti) OR ((((critical* OR rapid*) NEAR/3 (review* OR overview* OR synthes*)):ab) AND (search*:ab OR database*:ab OR 'data base*':ab)) OR metasynthes*:ti,ab OR 'meta synthes*':ti,ab	982665
#7	'clinical trial'/exp OR 'randomization'/exp OR 'single blind procedure'/exp OR 'double blind procedure'/exp OR 'crossover procedure'/exp OR 'placebo'/exp OR 'prospective study'/exp OR rct:ab,ti OR random*:ab,ti OR 'single blind':ab,ti OR 'randomised controlled trial':ab,ti OR 'randomized controlled trial'/exp OR placebo*:ab,ti	3928132
#8	'major clinical study'/de OR 'clinical study'/de OR 'case control study'/de OR 'family study'/de OR 'longitudinal study'/de OR 'retrospective study'/de OR 'prospective study'/de OR 'comparative study'/de OR 'cohort analysis'/de OR ((cohort NEAR/1 (study OR studies)):ab,ti) OR (('case control' NEAR/1 (study OR studies)):ab,ti) OR (('follow up' NEAR/1 (study OR studies)):ab,ti) OR (observational NEAR/1 (study OR studies)) OR ((epidemiologic NEAR/1 (study OR studies)):ab,ti) OR (('cross sectional' NEAR/1 (study OR studies)):ab,ti)	7961438

#9	'case control study'/de OR 'comparative study'/exp OR 'control group'/de OR 'controlled study'/de OR 'controlled clinical trial'/de OR 'crossover procedure'/de OR 'double blind procedure'/de OR 'phase 2 clinical trial'/de OR 'phase 3 clinical trial'/de OR 'phase 4 clinical trial'/de OR 'pretest posttest design'/de OR 'pretest posttest control group design'/de OR 'quasi experimental study'/de OR 'single blind procedure'/de OR 'triple blind procedure'/de OR (((control OR controlled) NEAR/6 trial):ti,ab,kw) OR (((control OR controlled) NEAR/6 (study OR studies)):ti,ab,kw) OR (((control OR controlled) NEAR/1 active):ti,ab,kw) OR 'open label*':ti,ab,kw OR (((double OR two OR three OR multi OR trial) NEAR/1 (arm OR arms)):ti,ab,kw) OR ((allocat* NEAR/10 (arm OR arms)):ti,ab,kw) OR placebo*:ti,ab,kw OR 'sham-control*':ti,ab,kw OR (((single OR double OR triple OR assessor) NEAR/1 (blind* OR masked)):ti,ab,kw) OR nonrandom*:ti,ab,kw OR 'non-random*':ti,ab,kw OR 'quasi-experiment*':ti,ab,kw OR crossover:ti,ab,kw OR 'cross over':ti,ab,kw OR 'parallel group*':ti,ab,kw OR 'factorial trial':ti,ab,kw OR ((phase NEAR/5 (study OR trial)):ti,ab,kw) OR ((case* NEAR/6 (matched OR control*)):ti,ab,kw) OR ((match* NEAR/6 (pair OR pairs OR cohort* OR control* OR group* OR healthy OR age OR sex OR gender OR patient* OR subject* OR participant*)):ti,ab,kw) OR ((propensity NEAR/6 (scor* OR match*)):ti,ab,kw) OR versus:ti OR vs:ti OR compar*:ti OR ((compar* NEAR/1 study):ti,ab,kw) OR (('major clinical study'/de OR 'clinical study'/de OR 'cohort analysis'/de OR 'observational study'/de OR 'cross-sectional study'/de OR 'multicenter study'/de OR 'correlational study'/de OR 'follow up'/de OR cohort*:ti,ab,kw OR 'follow up':ti,ab,kw OR followup:ti,ab,kw OR longitudinal*:ti,ab,kw OR prospective*:ti,ab,kw OR retrospective*:ti,ab,kw OR observational*:ti,ab,kw OR 'cross sectional*':ti,ab,kw OR cross?ectional*:ti,ab,kw OR multicent*:ti,ab,kw OR 'multi-cent*':ti,ab,kw OR consecutive*:ti,ab,kw) AND (group:ti,ab,kw OR groups:ti,ab,kw OR subgroup*:ti,ab,kw OR versus:ti,ab,kw OR vs:ti,ab,kw OR compar*:ti,ab,kw OR 'odds ratio*':ab OR 'relative odds':ab OR 'risk ratio*':ab OR 'relative risk*':ab OR 'rate ratio':ab OR aor:ab OR arr:ab OR rrr:ab OR ((('or' OR 'rr') NEAR/6 ci):ab)))	14630504
#10	#5 AND #6 **– SR's**	26
#11	#5 AND #7 NOT #10 **– RCT's**	62
#12	#5 AND (#8 OR #9) NOT (#10 OR #11) **– Observationeel**	112
#13	#10 OR #11 OR #12	200

Zoekstrategie Ovid/ Medline 29-11-2023

#	Searches	Results
1	exp Esophageal Perforation/ or ((exp Trachea/ or exp Esophagus/ or exp Upper Gastrointestinal Tract/ or exp Bronchi/) and exp "Wounds and Injuries"/) or ((trachea* or 'esophag*' or oesophag* or upper gastrointestinal tract or airway tree or bronch* tree or pulmonary tree or tracheobronchial system or tracheobronchial tree or bronch* or airway) adj3 (injur* or rupture or laceration* or perforation* or damage or trauma or infiltration)).ti,ab,kf.	33962

2	exp Conservative Treatment/ or exp Watchful Waiting/ or ((conservative or observative) adj2 (management or treatment)).ti,ab,kf. or expectative*.ti,ab,kf. or expectantly.ti,ab,kf. or watchful waiting.ti,ab,kf. or "wait and see".ti,ab,kf. or wait & see.ti,ab,kf. or no treatment.ti,ab,kf. or natural course.ti,ab,kf. or no intervention.ti,ab,kf. or active surveillance.ti,ab,kf.	134015
3	exp "Sensitivity and Specificity"/ or (sensitivity or specificity).ti,ab. or (predict* or ROC-curve or receiver-operator*).ti,ab. or (likelihood or LR*).ti,ab. or exp Diagnostic Errors/ or (inter-observer or intra-observer or interobserver or intraobserver or validity or kappa or reliability).ti,ab. or reproducibility.ti,ab. or (test adj2 (re-test or retest)).ti,ab. or "Reproducibility of Results"/ or accuracy.ti,ab. or Diagnosis, Differential/ or Validation Study/ or ((false or true) adj3 (negative or positive)).ti,ab.	4956366
4	1 and 2 and 3	66
5	1 and 2	815
6	5 not (comment/ or editorial/ or letter/) not ((exp animals/ or exp models, animal/) not humans/)	780
7	meta-analysis/ or meta-analysis as topic/ or (metaanaly* or meta-analy* or metanaly*).ti,ab,kf. or systematic review/ or cochrane.jw. or (prisma or prospero).ti,ab,kf. or ((systemati* or scoping or umbrella or "structured literature") adj3 (review* or overview*)).ti,ab,kf. or (systemic* adj1 review*).ti,ab,kf. or ((systemati* or literature or database* or data-base*) adj10 search*).ti,ab,kf. or ((structured or comprehensive* or systemic*) adj3 search*).ti,ab,kf. or ((literature adj3 review*) and (search* or database* or data-base*)).ti,ab,kf. or (("data extraction" or "data source*") and "study selection").ti,ab,kf. or ("search strategy" and "selection criteria").ti,ab,kf. or ("data source*" and "data synthesis").ti,ab,kf. or (medline or pubmed or embase or cochrane).ab. or ((critical or rapid) adj2 (review* or overview* or synthes*)).ti. or (((critical* or rapid*) adj3 (review* or overview* or synthes*)) and (search* or database* or data-base*)).ab. or (metasynthes* or meta-synthes*).ti,ab,kf.	711024
8	exp clinical trial/ or randomized controlled trial/ or exp clinical trials as topic/ or randomized controlled trials as topic/ or Random Allocation/ or Double-Blind Method/ or Single-Blind Method/ or (clinical trial, phase i or clinical trial, phase ii or clinical trial, phase iii or clinical trial, phase iv or controlled clinical trial or randomized controlled trial or multicenter study or clinical trial).pt. or random*.ti,ab. or (clinic* adj trial*).tw. or ((singl* or doubl* or treb* or tripl*) adj (blind$3 or mask$3)).tw. or Placebos/ or placebo*.tw.	2663888
9	Epidemiologic studies/ or case control studies/ or exp cohort studies/ or Controlled Before-After Studies/ or Case control.tw. or cohort.tw. or Cohort analy$.tw. or (Follow up adj (study or studies)).tw. or (observational adj (study or studies)).tw. or Longitudinal.tw. or Retrospective*.tw. or prospective*.tw. or consecutive*.tw. or Cross sectional.tw. or Cross-sectional studies/ or historically controlled study/ or interrupted time series analysis/ [Onder exp cohort studies vallen ook longitudinale, prospectieve en retrospectieve studies]	4596101

10	Case-control Studies/ or clinical trial, phase ii/ or clinical trial, phase iii/ or clinical trial, phase iv/ or comparative study/ or control groups/ or controlled before-after studies/ or controlled clinical trial/ or double-blind method/ or historically controlled study/ or matched-pair analysis/ or single-blind method/ or (((control or controlled) adj6 (study or studies or trial)) or (compar* adj (study or studies)) or ((control or controlled) adj1 active) or "open label*" or ((double or two or three or multi or trial) adj (arm or arms)) or (allocat* adj10 (arm or arms)) or placebo* or "sham-control*" or ((single or double or triple or assessor) adj1 (blind* or masked)) or nonrandom* or "non-random*" or "quasi-experiment*" or "parallel group*" or "factorial trial" or "pretest posttest" or (phase adj5 (study or trial)) or (case* adj6 (matched or control*)) or (match* adj6 (pair or pairs or cohort* or control* or group* or healthy or age or sex or gender or patient* or subject* or participant*)) or (propensity adj6 (scor* or match*))).ti,ab,kf. or (confounding adj6 adjust*).ti,ab. or (versus or vs or compar*).ti. or ((exp cohort studies/ or epidemiologic studies/ or multicenter study/ or observational study/ or seroepidemiologic studies/ or (cohort* or 'follow up' or followup or longitudinal* or prospective* or retrospective* or observational* or multicent* or 'multi-cent*' or consecutive*).ti,ab,kf.) and ((group or groups or subgroup* or versus or vs or compar*).ti,ab,kf. or ('odds ratio*' or 'relative odds' or 'risk ratio*' or 'relative risk*' or aor or arr or rrr).ab. or (("OR" or "RR") adj6 CI).ab.))	5570297
11	6 and 7 **– SR's**	23
12	(6 and 8) not 11 **– RCT's**	27
13	(6 and (9 or 10)) not (11 or 12) **– Observationeel**	235
14	11 or 12 or 13	285

Module 4: Longcontusie

Evidence tabel

Niet van toepassing.

Risk of bias tabel

Niet van toepassing.

Exclusie tabel

Niet van toepassing.

Zoekverantwoording

Algemene informatie

Cluster/richtlijn: Thoracale letsels na trauma - UV5 Longcontusie	
Uitgangsvraag/modules: Wat is de rol van non-invasieve beademing bij patiënten met een longcontusie (inclusief longlaceraties) en een dreigende respiratoire insufficiëntie?	
Database(s): Embase.com, Ovid/Medline	Datum: 5-2-2024
Periode: vanaf 2000	Talen: geen restrictie
Literatuurspecialist: Esther van der Bijl	Rayyan review: https://rayyan.ai/reviews/920748
BMI-zoekblokken: voor verschillende opdrachten wordt (deels) gebruik gemaakt van de zoekblokken van BMI-Online https://blocks.bmi-online.nl/ Bij gebruikmaking van een volledig zoekblok zal naar de betreffende link op de website worden verwezen.	
Toelichting: Voor deze vraag is gezocht op de elementen: - Lung contusion and/or laceration - Non-invasive positive-pressure ventilation → Zoals besproken worden de sleutelartikelen PMID 34800383 en PMID 28860265 niet gevonden met deze search. Zij vallen beide uit op het eerste zoekblok: lung contusion and/or laceration.	
Te gebruiken voor richtlijntekst: In de databases Embase.com en Ovid/Medline is op 5 februari 2024 systematisch gezocht naar systematische reviews, RCTs en observationele studies over de rol van non-invasieve beademing bij patiënten met een longcontusie. De literatuurzoekactie leverde 24 unieke treffers op.	

Zoekopbrengst 5-2-2024

	EMBASE	**OVID/MEDLINE**	**Ontdubbeld**
SR	2	1	3
RCT	4	3	6
Observationeel	13	7	15
Totaal	19	11	**24***

in Rayyan

Zoekstrategie Embase.com 5-2-2024

No.	Query	Results
#1	'lung contusion'/exp OR 'lung laceration'/exp OR ('lung'/exp AND ('contusion'/exp OR 'laceration'/exp)) OR (((lung* OR pulm*) NEAR/3 (bruis* OR contus* OR lacerat*)):ti,ab,kw)	4438

#2	'noninvasive ventilation'/exp OR 'noninvasive positive pressure ventilation'/exp OR ((('non invasive' OR 'noninvasive') NEAR/3 ('ventilat*' OR 'respirat*' OR 'support*' OR 'ppv' OR breath* OR 'positive pressur*' OR insufflat*)):ti,ab,kw) OR 'ni ppv':ti,ab,kw OR 'nippv':ti,ab,kw OR 'nppv':ti,ab,kw	39952
#3	#1 AND #2	50
#4	#3 AND [2000-2024]/py NOT ('conference abstract'/it OR 'editorial'/it OR 'letter'/it OR 'note'/it) NOT (('animal'/exp OR 'animal experiment'/exp OR 'animal model'/exp OR 'nonhuman'/exp) NOT 'human'/exp)	32
#5	'meta analysis'/exp OR 'meta analysis (topic)'/exp OR metaanaly*:ti,ab OR 'meta analy*':ti,ab OR metanaly*:ti,ab OR 'systematic review'/de OR 'cochrane database of systematic reviews'/jt OR prisma:ti,ab OR prospero:ti,ab OR (((systemati* OR scoping OR umbrella OR 'structured literature') NEAR/3 (review* OR overview*)):ti,ab) OR ((systemic* NEAR/1 review*):ti,ab) OR (((systemati* OR literature OR database* OR 'data base*') NEAR/10 search*):ti,ab) OR (((structured OR comprehensive* OR systemic*) NEAR/3 search*):ti,ab) OR (((literature NEAR/3 review*):ti,ab) AND (search*:ti,ab OR database*:ti,ab OR 'data base*':ti,ab)) OR (('data extraction':ti,ab OR 'data source*':ti,ab) AND 'study selection':ti,ab) OR ('search strategy':ti,ab AND 'selection criteria':ti,ab) OR ('data source*':ti,ab AND 'data synthesis':ti,ab) OR medline:ab OR pubmed:ab OR embase:ab OR cochrane:ab OR (((critical OR rapid) NEAR/2 (review* OR overview* OR synthes*)):ti) OR ((((critical* OR rapid*) NEAR/3 (review* OR overview* OR synthes*)):ab) AND (search*:ab OR database*:ab OR 'data base*':ab)) OR metasynthes*:ti,ab OR 'meta synthes*':ti,ab	999322
#6	'clinical trial'/exp OR 'randomization'/exp OR 'single blind procedure'/exp OR 'double blind procedure'/exp OR 'crossover procedure'/exp OR 'placebo'/exp OR 'prospective study'/exp OR rct:ab,ti OR random*:ab,ti OR 'single blind':ab,ti OR 'randomised controlled trial':ab,ti OR 'randomized controlled trial'/exp OR placebo*:ab,ti	3963755
#7	'major clinical study'/de OR 'clinical study'/de OR 'case control study'/de OR 'family study'/de OR 'longitudinal study'/de OR 'retrospective study'/de OR 'prospective study'/de OR 'comparative study'/de OR 'cohort analysis'/de OR ((cohort NEAR/1 (study OR studies)):ab,ti) OR (('case control' NEAR/1 (study OR studies)):ab,ti) OR (('follow up' NEAR/1 (study OR studies)):ab,ti) OR (observational NEAR/1 (study OR studies)) OR ((epidemiologic NEAR/1 (study OR studies)):ab,ti) OR (('cross sectional' NEAR/1 (study OR studies)):ab,ti)	8055201
#8	'case control study'/de OR 'comparative study'/exp OR 'control group'/de OR 'controlled study'/de OR 'controlled clinical trial'/de OR 'crossover procedure'/de OR 'double blind procedure'/de OR 'phase 2 clinical trial'/de OR 'phase 3 clinical trial'/de OR 'phase 4 clinical trial'/de OR 'pretest posttest design'/de OR 'pretest posttest control group design'/de OR 'quasi experimental study'/de OR 'single blind procedure'/de OR 'triple blind procedure'/de OR (((control OR controlled) NEAR/6 trial):ti,ab,kw) OR (((control OR controlled) NEAR/6 (study OR studies)):ti,ab,kw) OR (((control OR controlled) NEAR/1 active):ti,ab,kw) OR 'open label*':ti,ab,kw OR (((double OR two OR three OR multi OR trial) NEAR/1 (arm OR arms)):ti,ab,kw) OR ((allocat* NEAR/10 (arm OR arms)):ti,ab,kw) OR placebo*:ti,ab,kw OR 'sham-control*':ti,ab,kw OR (((single OR double OR triple OR assessor) NEAR/1 (blind* OR masked)):ti,ab,kw) OR nonrandom*:ti,ab,kw OR 'non-random*':ti,ab,kw OR 'quasi-experiment*':ti,ab,kw OR crossover:ti,ab,kw OR 'cross over':ti,ab,kw OR 'parallel group*':ti,ab,kw OR 'factorial trial':ti,ab,kw OR ((phase NEAR/5 (study OR trial)):ti,ab,kw) OR ((case* NEAR/6 (matched OR control*)):ti,ab,kw) OR ((match* NEAR/6 (pair OR pairs OR cohort* OR control* OR group* OR healthy OR age OR sex OR gender OR patient* OR	14795797

	subject* OR participant*)):ti,ab,kw) OR ((propensity NEAR/6 (scor* OR match*)):ti,ab,kw) OR versus:ti OR vs:ti OR compar*:ti OR ((compar* NEAR/1 study):ti,ab,kw) OR (('major clinical study'/de OR 'clinical study'/de OR 'cohort analysis'/de OR 'observational study'/de OR 'cross-sectional study'/de OR 'multicenter study'/de OR 'correlational study'/de OR 'follow up'/de OR cohort*:ti,ab,kw OR 'follow up':ti,ab,kw OR followup:ti,ab,kw OR longitudinal*:ti,ab,kw OR prospective*:ti,ab,kw OR retrospective*:ti,ab,kw OR observational*:ti,ab,kw OR 'cross sectional*':ti,ab,kw OR cross?ectional*:ti,ab,kw OR multicent*:ti,ab,kw OR 'multi-cent*':ti,ab,kw OR consecutive*:ti,ab,kw) AND (group:ti,ab,kw OR groups:ti,ab,kw OR subgroup*:ti,ab,kw OR versus:ti,ab,kw OR vs:ti,ab,kw OR compar*:ti,ab,kw OR 'odds ratio*':ab OR 'relative odds':ab OR 'risk ratio*':ab OR 'relative risk*':ab OR 'rate ratio':ab OR aor:ab OR arr:ab OR rrr:ab OR ((('or' OR 'rr') NEAR/6 ci):ab)))	
#9	#4 AND #5 **– SR's**	2
#10	#4 AND #6 NOT #9 **– RCT's**	4
#11	#4 AND (#7 OR #8) NOT (#9 OR #10) **– Observationele studies**	13
#12	#9 OR #10 OR #11	19

Zoekstrategie Ovid/Medline 5-2-2024

#	Searches	Results
1	(exp Lung/ and (exp Contusions/ or exp Lacerations/)) or ((lung* or pulm*) adj3 (bruis* or contus* or lacerat*)).ti,ab,kf.	1904
2	exp Noninvasive Ventilation/ or ((non invasive or noninvasive) adj3 (ventilat* or respirat* or support* or ppv or breath* or positive pressur* or insufflat*)).ti,ab,kf. or ni ppv.ti,ab,kf. or nippv.ti,ab,kf. or nppv.ti,ab,kf.	14862
3	1 and 2	17
4	limit 3 to yr="2000 -Current"	15
5	4 not (comment/ or editorial/ or letter/) not ((exp animals/ or exp models, animal/) not humans/)	15
6	meta-analysis/ or meta-analysis as topic/ or (metaanaly* or meta-analy* or metanaly*).ti,ab,kf. or systematic review/ or cochrane.jw. or (prisma or prospero).ti,ab,kf. or ((systemati* or scoping or umbrella or "structured literature") adj3 (review* or overview*)).ti,ab,kf. or (systemic* adj1 review*).ti,ab,kf. or ((systemati* or literature or database* or data-base*) adj10 search*).ti,ab,kf. or ((structured or comprehensive* or systemic*) adj3 search*).ti,ab,kf. or ((literature adj3 review*) and (search* or database* or data-base*)).ti,ab,kf. or (("data extraction" or "data source*") and "study selection").ti,ab,kf. or ("search strategy" and "selection criteria").ti,ab,kf. or ("data source*" and "data synthesis").ti,ab,kf. or (medline or pubmed or embase or cochrane).ab. or ((critical or rapid) adj2 (review* or overview* or synthes*)).ti. or (((critical* or rapid*) adj3 (review* or overview* or synthes*)) and (search* or database* or data-base*)).ab. or (metasynthes* or meta-synthes*).ti,ab,kf.	724011
7	exp clinical trial/ or randomized controlled trial/ or exp clinical trials as topic/ or randomized controlled trials as topic/ or Random Allocation/ or Double-Blind Method/ or Single-Blind Method/ or (clinical trial, phase i or clinical trial, phase ii or clinical trial, phase iii or clinical trial, phase iv or controlled clinical trial or randomized controlled trial or multicenter study or clinical trial).pt. or random*.ti,ab. or (clinic* adj trial*).tw. or ((singl* or doubl* or treb* or tripl*) adj (blind$3 or mask$3)).tw. or Placebos/ or placebo*.tw.	2686679
8	Epidemiologic studies/ or case control studies/ or exp cohort studies/ or Controlled Before-After Studies/ or Case control.tw. or cohort.tw. or Cohort analy$.tw. or (Follow up adj (study or studies)).tw. or (observational adj (study or studies)).tw. or Longitudinal.tw. or Retrospective*.tw. or prospective*.tw. or consecutive*.tw. or Cross sectional.tw. or Cross-sectional studies/ or historically	4643628

	controlled study/ or interrupted time series analysis/ [Onder exp cohort studies vallen ook longitudinale, prospectieve en retrospectieve studies]	
9	Case-control Studies/ or clinical trial, phase ii/ or clinical trial, phase iii/ or clinical trial, phase iv/ or comparative study/ or control groups/ or controlled before-after studies/ or controlled clinical trial/ or double-blind method/ or historically controlled study/ or matched-pair analysis/ or single-blind method/ or (((control or controlled) adj6 (study or studies or trial)) or (compar* adj (study or studies)) or ((control or controlled) adj1 active) or "open label*" or ((double or two or three or multi or trial) adj (arm or arms)) or (allocat* adj10 (arm or arms)) or placebo* or "sham-control*" or ((single or double or triple or assessor) adj1 (blind* or masked)) or nonrandom* or "non-random*" or "quasi-experiment*" or "parallel group*" or "factorial trial" or "pretest posttest" or (phase adj5 (study or trial)) or (case* adj6 (matched or control*)) or (match* adj6 (pair or pairs or cohort* or control* or group* or healthy or age or sex or gender or patient* or subject* or participant*)) or (propensity adj6 (scor* or match*))).ti,ab,kf. or (confounding adj6 adjust*).ti,ab. or (versus or vs or compar*).ti. or ((exp cohort studies/ or epidemiologic studies/ or multicenter study/ or observational study/ or seroepidemiologic studies/ or (cohort* or 'follow up' or followup or longitudinal* or prospective* or retrospective* or observational* or multicent* or 'multi-cent*' or consecutive*).ti,ab,kf.) and ((group or groups or subgroup* or versus or vs or compar*).ti,ab,kf. or ('odds ratio*' or 'relative odds' or 'risk ratio*' or 'relative risk*' or aor or arr or rrr).ab. or (("OR" or "RR") adj6 CI).ab.))	5614416
10	5 and 6 **– SR's**	1
11	(5 and 7) not 10 **– RCT's**	3
12	(5 and (8 or 9)) not (10 or 11) **– Observationele studies**	7
13	10 or 11 or 12	11

Module 5: Hematothorax

Evidence tabel

Study reference	Study characteristics	Patient characteristics	Intervention (I)	Comparison / control (C)	Follow-up	Outcome measures and effect size	Comments
Gilbert (2020)	SR and meta-analysis of cohort studies *Literature search from January 1946 up to October 2019.* A: Bilello (2005) B: Demetri (2018) C: Stafford (2006) D: Mahmood (2013) E: Mahmood (2015) F: Wells (2015) Study design: A: Retrospective cohort study.	Inclusion criteria SR: - Studies evaluating adult patients (15 years or older) with penetrating or blunt trauma who had an occult hemothorax. • Exclusion criteria SR: - Studies describing overt (non-occult) hemothorax or isolated pneumothorax. *Six studies included* Important patient characteristics at baseline: *Number of patients; characteristics important to the research question and/or for statistical adjustment (confounding in cohort studies); for example, age, sex, bmi, …* N, mean age A: N = 99, age not reported. B: N = 340, age not reported. C: N = 73, age not reported. D: N = 56, age not reported.	Describe intervention: A: Expectant management B: Expectant management C: Expectant management D: Expectant management E: Expectant management F: Expectant management	Describe control: A: Tube thoracostomy B: Tube thoracostomy C: Tube thoracostomy D: Tube thoracostomy E: Tube thoracostomy F: Tube thoracostomy	End-point of follow-up: A: No information. B: No information. C: No information. D: No information. E: No information. F: No information.	**Tube thoracostomy rate (failure rate of initial expectant management)** A: 16/76 B: 53/184 C: 13/73 D: 15/56 E: 5/45 F: 110/368 **Mortality** *B (Demetri, 2018)* I: 11/113 C: 17/209 *D (Mahmood, 2013)* I: 1/60 C: 0/13 *E (Mahmood, 2015)* I: 2/41	Author's conclusion Conservative treatment of occult hemothorax fails in 23.1% of patients. The presence of hemothorax greater than 300 mL and the need for mechanical ventilation predicted failure of conservative treatment and the need for TT. There was no difference in mortality between EM and TT cohorts. These data suggest that it may be possible

	B: Retrospective cohort study. C: Retrospective cohort study. D: Retrospective cohort study. E: Prospective cohort study F: Retrospective cohort study. <u>Setting and Country</u>: A: North America B: North America C: North America D: Middle East E: Middle East F: North America <u>Source of funding and conflicts of interest:</u> The authors declare no conflicts of interest.	E: N = 88, age not reported. F: N = 749, age not reported. <u>*Sex*</u>*:* A: No information. B: No information. C: No information. D: No information. E: No information. F: No information. <u>Groups comparable at baseline?</u> Probably yes.				C: 2/15 *F (Wells, 2015)* I: 3/258 C: 17/419 **Pneumonia** *C (Stafford, 2006)* I: 3/47 C: 6/41	to safely observe patients with occult hemothoraces less than 300 mL (1.5 cm pleural stripe) secondary to blunt trauma without upfront TT insertion.

Risk of bias tabel

Author, year	Selection of participants Was selection of exposed and non-exposed cohorts drawn from the same population?	Exposure Can we be confident in the assessment of exposure?	Outcome of interest Can we be confident that the outcome of interest was not present at start of study?	Confounding-assessment Can we be confident in the assessment of confounding factors?	Confounding-analysis Did the study match exposed and unexposed for all variables that are associated with the outcome of interest or did the statistical analysis adjust for these confounding variables?	Assessment of outcome Can we be confident in the assessment of outcome?	Follow up Was the follow up of cohorts adequate? In particular, was outcome data complete or imputed?	Co-interventions Were co-interventions similar between groups?	Overall Risk of bias
	Definitely yes, probably yes, probably no, definitely no	Definitely yes, probably yes, probably no, definitely no	Definitely yes, probably yes, probably no, definitely no	Definitely yes, probably yes, probably no, definitely no	Definitely yes, probably yes, probably no, definitely no	Definitely yes, probably yes, probably no, definitely no	Definitely yes, probably yes, probably no, definitely no	Definitely yes, probably yes, probably no, definitely no	Low, Some concerns, High
Bilello (2005)	Definitely yes Reason: All blunt-trauma patients presenting with hemothorax at a level I trauma	Probably yes Reason: Patients with occult hemothoraces on CAT of the chest	Probably yes Reason: Patients with premorbid conditions (pleural effusions,	Probably yes Reason: questionnaire data with ascertainment rules was used.	**Probably no** Reason: No information reported.	**Probably no** Reason: No information reported.	**Probably no** Reason: No information reported. For the other outcomes, it was enough.	**Probably no** Reason: No information reported.	**Some concerns**

	center from January 1998 through June 2004, a 6.5-year period, were retrospectively reviewed	and/or abdomen were included in the study.	congestive heart failure, etc.), hemopneumothorax, and previously placed chest tubes were excluded.						
Demetri (2018)	Definitely yes Reason: All trauma patients in a tertiary care Level I trauma center from January 2000 through December 2014 were retrospectively reviewed in this Institutional Review Board-approved study. To identify patients with traumatic hemothorax, an electronic health record query was placed with our institutional	Probably yes Reason: The Research Patient Data Regis- try is a centralized data warehouse that extracts clinical information from the electronic health records of hospital systems within the Partners Healthcare Network	Probably yes Reason: Patients who did not receive a chest computed tomography (CT) scan or received TT prior to CT were excluded	Probably yes Reason: Given the possibility that bilateral hemothoraces may be correlated and may cause confounding in a per-hemothorax analysis, we have only reported the per- patient analysis	Probably yes Reason: Furthermore, a variable denoting year of the injury was included to adjust for the possible confounding effect of changes in trauma care practice over the study period	No information. Reason: -	No information. Reason: -	No information. Reason: -	**Some concerns**

	clinical data registry								
Mahmood (2013)	Probably yes Reason: The study group consisted of all trauma patients admitted from July 2008 through July 2010 who had concurrent hemopnemothorax on chest CT that was not evident on initial supine chest X-ray.	Probably yes Reason: Hemothorax was quantified on CT by measuring the deepest lamellar fluid stripe at the most dependent portion of the fluid collection	No information. Reason: -	No information. Reason: -	No information. Reason: -	No information. Reason: -	No information. Reason: -	No information. Reason: -	**High**
Mahmood (2015)	Probably yes Reason: It is a prospective observational study which included all blunt chest trauma patients who required PPV or venti- latory support for surgical procedure and presented with	Probably yes Reason: HPTX was confirmed by CT evaluation and follow-up chest radiographs were obtained to monitor the progression of HPTX during hospital stay.	No information. Reason: -	No information. Reason: -	No information. Reason: -	No information. Reason: -	No information. Reason: -	No information. Reason: -	**High**

	concurrent HPTX by chest CT (not evident on initial supine chest radiograph) from 2011 through 2013. The presence of								
Stafford (2006)	Probably yes Reason: Emergency and radiology department databases were re-viewed and cross-referenced with the trauma registry data- base at a level I trauma center to identify all blunt trauma patients admitted to the trauma service who had concurrent chest radiograph and TCT as part of their initial	Probably yes Reason: The medical records were reviewed to confirm the registry data and the presence or absence of an occult hemothorax.	Definitely yes Reason: An occult hemothorax was defined as a hemothorax that was not identified on the initial chest radiograph but was identified on the concurrent TCT as noted on the offi- cial radiology department reading of the studies. Only those patients with occult hemothorax and who were admitted to the hospital were included in the	No information. Reason: -	No information. Reason: -	No information. Reason: -	No information. Reason: -	No information. Reason: -	**High**

	trauma evaluation from 1996 through 2001.		study. Those patients not admitted to the hospital, who died in the emergency room or operating room, or had charts unavailable for review were excluded from the study.						
Wells (2015)	Probably yes Reason: A retrospective cohort study of all adults (age >15 years) admitted to the Foothills Medical Centre (FMC) with a traumatic HTX was conducted.	Probably yes Reason: All available thoracic CT images were reviewed to confirm the presence of blood in the pleural space using Hounsfield unit (HU) measurements (where 35–70 HU indicate a HTX). Measurement of HTX size was completed	No information Reason: -	No information Reason: Model covariates for adjusted mortality analyses included age and ISS; those for adjusted empyema analyses included age, ISS, concomitant thoracic injury, requirement for multiple thoracic interventions, and ventilation days; and those for	Probably no Reason: Unfortunately, without being able to quantify the size of ipsilateral PTX or severity of the flail segment, and therefore not having adjusted for such disparities in the statistical analyses, it is difficult to determine the degree to which these	No information Reason: -	No information Reason: -	No information Reason: -	**Some concerns**

		using a previously validated formula: V = d2 ⍰ X ⍰ L, where V is volume in cubic centimetres (cc), d is the greatest depth of HTX from the chest wall to lung on any CT image in centimetres, X the thickness of CT slice in centimetres, and L the total craniocaudal length occupied by pleural fluid in centimetres.		adjusted hospital and ICU length of stay analyses included age, ISS, concomitant thoracic injury, develop- ment of a hospital-acquired pneumonia, empyema, or bacteremia, and requirement for multiple thoracic interventions.	other predictors may have confounded the need for TT.				
Author, year	**Selection of participants** **Was selection of exposed and non-exposed cohorts drawn**	**Exposure** **Can we be confident in the assessment of exposure?**	**Outcome of interest** **Can we be confident that the outcome of interest was**	**Confounding-assessment** **Can we be confident in the assessment of**	**Confounding-analysis** **Did the study match exposed and unexposed for all**	**Assessment of outcome** **Can we be confident in the assessment of outcome?**	**Follow up** **Was the follow up of cohorts adequate? In particular,**	**Co-interventions** **Were co-interventions similar between groups?**	**Overall Risk of bias**

	from the same population?		**not present at start of study?**	**confounding factors?**	**variables that are associated with the outcome of interest or did the statistical analysis adjust for these confounding variables?**		**was outcome data complete or imputed?**		

Exclusie tabel

Author and year	Reason for exclusion
Chung (2018)	Wrong comparison of interventions.
Demetri (2018)	Already included in Gilbert (2020).
De Lesquen (2015)	Wrong study design.
Patel (2021)	Wrong comparison of interventions.
Wells (2015)	Already included in Gilbert (2020).

Zoekverantwoording

Algemene informatie

Richtlijn: NVvH Thoracale letsels na trauma	
Uitgangsvraag: Wat is de plaats van observatie (afwachtend beleid) bij een hematothorax?	
Database(s): Medline (OVID), Embase	Datum: 01-08-2023
Periode: Geen beperking	Talen: Geen beperking
Literatuurspecialist: Linda Niesink	
BMI zoekblokken: voor verschillende opdrachten wordt (deels) gebruik gemaakt van de zoekblokken van BMI-Online https://blocks.bmi-online.nl/ Bij gebruikmaking van een volledig zoekblok zal naar de betreffende link op de website worden verwezen.	
Toelichting en opmerkingen: → Voor deze vraag is gezocht op de elementen **hematothorax** (in het blauw) en **observatie (afwachtend beleid etc.)** (in het groen). → De genoemde sleutelartikelen van Wells (2015), Demetri (2018) en Chung (2018) zitten in de zoekopbrengst. Het artikel van Hernandez (2018) valt er buiten op zowel hematothorax als observatie/afwachtend beleid, dit artikel lijkt alleen over thoracostomy te gaan. → Resultaten staan in Rayyan.	
Te gebruiken voor richtlijnen tekst: In de databases Embase (via embase.com) en Medline (via OVID) is op 01-08-2023 met relevante zoektermen gezocht naar systematische reviews, RCT's en observationele studiedesigns over observatie bij patiënten met een hematothorax. De literatuurzoekactie leverde 241 unieke treffers op.	

Zoekopbrengst

	EMBASE	OVID/MEDLINE	Ontdubbeld
SRs	25	4	26
RCTs	54	15	56
Observationele studies	155	25	159
Totaal	234	44	**241**

Zoekstrategie

Database	Zoektermen		
Embase	*No.*	*Query*	*Results*
	#1	'hematothorax'/exp OR hematothora*:ti,ab,kw OR haematothora*:ti,ab,kw OR haemothora*:ti,ab,kw OR hemathora*:ti,ab,kw OR haemathora*:ti,ab,kw OR hemothora*:ti,ab,kw OR 'blood in the pleural cavity':ti,ab,kw OR 'blood-stained pleural effusion':ti,ab,kw OR 'blood-stained pleural	13803

		fluid':ti,ab,kw OR 'bloody pleural effusion':ti,ab,kw OR 'bloody pleural fluid':ti,ab,kw OR 'hemopleura':ti,ab,kw OR 'hemorrhage pleural':ti,ab,kw OR 'hemorrhagic pleurisy':ti,ab,kw OR 'pleural hemorrhage':ti,ab,kw	
	#2	'conservative treatment'/exp/mj OR (((conservative OR observative) NEAR/2 (management OR treatment)):ti,ab,kw) OR noninvasive:ti,ab,kw OR 'non invasive':ti,ab,kw OR expectative*:ti,ab,kw OR expectantly:ti,ab,kw OR 'watchful waiting':ti,ab,kw OR 'wait and see':ti,ab,kw OR 'no treatment':ti,ab,kw OR 'no intervention':ti,ab,kw OR 'natural course':ti,ab,kw OR observation:ti,ab,kw	1146468
	#3	#1 AND #2 NOT (('animal'/exp OR 'animal experiment'/exp OR 'animal model'/exp OR 'nonhuman'/exp) NOT 'human'/exp) NOT ('conference abstract'/it OR 'conference review'/it OR 'editorial'/it OR 'letter'/it OR 'note'/it)	469
	#4	'meta analysis'/exp OR 'meta analysis (topic)'/exp OR metaanaly*:ti,ab OR 'meta analy*':ti,ab OR metanaly*:ti,ab OR 'systematic review'/de OR 'cochrane database of systematic reviews'/jt OR prisma:ti,ab OR prospero:ti,ab OR (((systemati* OR scoping OR umbrella OR 'structured literature') NEAR/3 (review* OR overview*)):ti,ab) OR ((systemic* NEAR/1 review*):ti,ab) OR (((systemati* OR literature OR database* OR 'data base*') NEAR/10 search*):ti,ab) OR (((structured OR comprehensive* OR systemic*) NEAR/3 search*):ti,ab) OR (((literature NEAR/3 review*):ti,ab) AND (search*:ti,ab OR database*:ti,ab OR 'data base*':ti,ab)) OR (('data extraction':ti,ab OR 'data source*':ti,ab) AND 'study selection':ti,ab) OR ('search strategy':ti,ab AND 'selection criteria':ti,ab) OR ('data source*':ti,ab AND 'data synthesis':ti,ab) OR medline:ab OR pubmed:ab OR embase:ab OR cochrane:ab OR (((critical OR rapid) NEAR/2 (review* OR overview* OR synthes*)):ti) OR ((((critical* OR rapid*) NEAR/3 (review* OR overview* OR synthes*)):ab) AND (search*:ab OR database*:ab OR 'data base*':ab)) OR metasynthes*:ti,ab OR 'meta synthes*':ti,ab	942687
	#5	'clinical trial'/exp OR 'randomization'/exp OR 'single blind procedure'/exp OR 'double blind procedure'/exp OR 'crossover procedure'/exp OR 'placebo'/exp OR 'prospective study'/exp OR rct:ab,ti OR random*:ab,ti OR 'single blind':ab,ti OR 'randomised controlled trial':ab,ti OR 'randomized controlled trial'/exp OR placebo*:ab,ti	3827018
	#6	'major clinical study'/exp OR 'case control study'/de OR 'comparative study'/exp OR 'control group'/de OR 'controlled study'/de OR 'controlled clinical trial'/de OR 'crossover procedure'/de OR 'double blind procedure'/de OR 'phase 2 clinical trial'/de OR 'phase 3 clinical trial'/de OR 'phase 4 clinical trial'/de OR 'pretest posttest design'/de OR 'pretest posttest control group design'/de OR 'quasi experimental study'/de OR 'single blind procedure'/de OR 'triple blind procedure'/de OR (((control OR controlled) NEAR/6 trial):ti,ab,kw) OR (((control OR controlled) NEAR/6 (study OR studies)):ti,ab,kw) OR (((control OR controlled) NEAR/1 active):ti,ab,kw) OR 'open label*':ti,ab,kw OR (((double OR two OR three OR multi OR trial) NEAR/1 (arm OR arms)):ti,ab,kw) OR ((allocat* NEAR/10 (arm OR arms)):ti,ab,kw) OR placebo*:ti,ab,kw OR 'sham-control*':ti,ab,kw OR (((single OR double OR triple OR assessor) NEAR/1 (blind* OR masked)):ti,ab,kw) OR nonrandom*:ti,ab,kw OR 'non-random*':ti,ab,kw OR 'quasi-experiment*':ti,ab,kw OR crossover:ti,ab,kw OR 'cross over':ti,ab,kw OR 'parallel	15445173

	group*':ti,ab,kw OR 'factorial trial':ti,ab,kw OR ((phase NEAR/5 (study OR trial)):ti,ab,kw) OR ((case* NEAR/6 (matched OR control*)):ti,ab,kw) OR ((match* NEAR/6 (pair OR pairs OR cohort* OR control* OR group* OR healthy OR age OR sex OR gender OR patient* OR subject* OR participant*)):ti,ab,kw) OR ((propensity NEAR/6 (scor* OR match*)):ti,ab,kw) OR versus:ti OR vs:ti OR compar*:ti OR ((compar* NEAR/1 study):ti,ab,kw) OR (('major clinical study'/de OR 'clinical study'/de OR 'cohort analysis'/de OR 'observational study'/de OR 'cross-sectional study'/de OR 'multicenter study'/de OR 'correlational study'/de OR 'follow up'/de OR cohort*:ti,ab,kw OR 'follow up':ti,ab,kw OR followup:ti,ab,kw OR longitudinal*:ti,ab,kw OR prospective*:ti,ab,kw OR retrospective*:ti,ab,kw OR observational*:ti,ab,kw OR 'cross sectional*':ti,ab,kw OR cross?ectional*:ti,ab,kw OR multicent*:ti,ab,kw OR 'multi-cent*':ti,ab,kw OR consecutive*:ti,ab,kw) AND (group:ti,ab,kw OR groups:ti,ab,kw OR subgroup*:ti,ab,kw OR versus:ti,ab,kw OR vs:ti,ab,kw OR compar*:ti,ab,kw OR 'odds ratio*':ab OR 'relative odds':ab OR 'risk ratio*':ab OR 'relative risk*':ab OR 'rate ratio':ab OR aor:ab OR arr:ab OR rrr:ab OR (('or' OR 'rr') NEAR/6 ci):ab))) OR 'observational study':ti,ab,kw #7 #3 AND #4 **– SR's** 25 #8 #3 AND #5 NOT #7 **– RCT's** 54 #9 #3 AND #6 NOT (#7 OR #8) **– observationele studies** 155 #10 #7 OR #8 OR #9 234
Medline (OVID)	1 exp Hemothorax/ or hematothora*.ti,ab,kf. OR haematothora*.ti,ab,kf. OR haemothora*.ti,ab,kf. OR hemathora*.ti,ab,kf. OR haemathora*.ti,ab,kf. OR hemothora*.ti,ab,kf. OR 'blood in the pleural cavity'.ti,ab,kf. OR 'blood-stained pleural effusion'.ti,ab,kf. OR 'blood-stained pleural fluid'.ti,ab,kf. OR 'bloody pleural effusion'.ti,ab,kf. OR 'bloody pleural fluid'.ti,ab,kf. OR 'hemopleura'.ti,ab,kf. OR 'hemorrhage pleural'.ti,ab,kf. OR 'hemorrhagic pleurisy'.ti,ab,kf. OR 'pleural hemorrhage'.ti,ab,kf. (6471) 2 exp Conservative Treatment/ or exp Watchful Waiting/ or ((observative or conservative) adj2 (management OR treatment)).ti,ab,kf. or (manage* adj3 expectant*).ti,ab,kf. or noninvasive.ti,ab,kf. OR 'non invasive'.ti,ab,kf. OR expectative*.ti,ab,kf. OR expectantly.ti,ab,kf. OR 'watchful waiting'.ti,ab,kf. OR 'wait and see'.ti,ab,kf. OR 'no treatment'.ti,ab,kf. OR 'no intervention'.ti,ab,kf. OR 'natural course'.ti,ab,kf. OR observation.ti,ab,kf. (410992) 3 1 and 2 (129) 4 3 not (comment/ or editorial/ or letter/ or ((exp animals/ or exp models, animal/) not humans/)) (125) 6 meta-analysis/ or meta-analysis as topic/ or (metaanaly* or meta-analy* or metanaly*).ti,ab,kf. or systematic review/ or cochrane.jw. or (prisma or prospero).ti,ab,kf. or ((systemati* or scoping or umbrella or "structured literature") adj3 (review* or overview*)).ti,ab,kf. or (systemic* adj1 review*).ti,ab,kf. or ((systemati* or literature or database* or data-base*) adj10 search*).ti,ab,kf. or ((structured or comprehensive* or systemic*) adj3 search*).ti,ab,kf. or ((literature adj3 review*) and (search* or database* or data-base*)).ti,ab,kf. or (("data extraction" or "data source*") and "study selection").ti,ab,kf. or ("search strategy" and "selection criteria").ti,ab,kf. or ("data source*" and "data synthesis").ti,ab,kf. or (medline or pubmed or embase or cochrane).ab. or ((critical or rapid) adj2 (review* or overview* or synthes*)).ti. or (((critical* or rapid*) adj3 (review* or overview* or synthes*)) and (search* or database* or data-base*)).ab. or (metasynthes* or meta-synthes*).ti,ab,kf. (684473) 7 exp clinical trial/ or randomized controlled trial/ or exp clinical trials as topic/ or randomized controlled trials as topic/ or Random Allocation/ or Double-Blind Method/ or Single-Blind Method/ or (clinical trial, phase i or clinical trial, phase ii or clinical trial,

	phase iii or clinical trial, phase iv or controlled clinical trial or randomized controlled trial or multicenter study or clinical trial).pt. or random*.ti,ab. or (clinic* adj trial*).tw. or ((singl* or doubl* or treb* or tripl*) adj (blind$3 or mask$3)).tw. or Placebos/ or placebo*.tw. (2616982) 8 Case-control Studies/ or clinical trial, phase ii/ or clinical trial, phase iii/ or clinical trial, phase iv/ or comparative study/ or control groups/ or controlled before-after studies/ or controlled clinical trial/ or double-blind method/ or historically controlled study/ or matched-pair analysis/ or single-blind method/ or (((control or controlled) adj6 (study or studies or trial)) or (compar* adj (study or studies)) or ((control or controlled) adj1 active) or "open label*" or ((double or two or three or multi or trial) adj (arm or arms)) or (allocat* adj10 (arm or arms)) or placebo* or "sham-control*" or ((single or double or triple or assessor) adj1 (blind* or masked)) or nonrandom* or "non-random*" or "quasi-experiment*" or "parallel group*" or "factorial trial" or "pretest posttest" or (phase adj5 (study or trial)) or (case* adj6 (matched or control*)) or (match* adj6 (pair or pairs or cohort* or control* or group* or healthy or age or sex or gender or patient* or subject* or participant*)) or (propensity adj6 (scor* or match*))).ti,ab,kf. or (confounding adj6 adjust*).ti,ab. or (versus or vs or compar*).ti. or ((exp cohort studies/ or epidemiologic studies/ or multicenter study/ or observational study/ or seroepidemiologic studies/ or (cohort* or 'follow up' or followup or longitudinal* or prospective* or retrospective* or observational* or multicent* or 'multi-cent*' or consecutive*).ti,ab,kf.) and ((group or groups or subgroup* or versus or vs or compar*).ti,ab,kf. or ('odds ratio*' or 'relative odds' or 'risk ratio*' or 'relative risk*' or aor or arr or rrr).ab. or (("OR" or "RR") adj6 CI).ab.)) (5479971) 9 4 and 6 (4) **– SRs** 10 (4 and 7) not 9 (15) **- RCTs** 11 (4 and 8) not (9 or 10) (25) **– observationele studies** 12 9 or 10 or 11 (44)

Module 6: Pneumothorax

Evidence tabel

Study reference	Study characteristics	Patient characteristics [2]	Intervention (I)	Comparison / control (C) [3]	Follow-up	Outcome measures and effect size [4]	Comments
Banks, 2023	Retrospective cohort study Setting and country: Level 1 trauma center, Department of Surgery, UCSF East Bay, Oakland, USA. Source of funding: No specific grant from any funding agencies in the public, commercial or not-for-profit sectors. Conflicts of interest: None.	Inclusion criteria: Blunt and penetrating trauma patients with small traumatic pneumothoraces. Exclusion criteria: Patients with ISS ≥25, operative requirement due to initial traumatic injury, hemothorax, tension physiology, bilateral pneumothoraces, ventilator requirement, and intensive care unit admission. N total at baseline: Intervention: 39 Control: 34	Intervention: observation	Control: tube thoracostomy	Length of follow-up: At least one day (admission of patients). Loss-to-follow-up: Intervention: N= 1 (2.6%) Reason: required TT due to worsening subcutaneous emphysema. Control: N= 1 (2.9%) Reason: developed empyema requiring thoracoscopic decortication.	Mortality: Intervention: 0 Control: 0 Empyema: Intervention: 0 (0%) Control: 1 (3%) P=0.47 Length of stay (days, SE): Intervention: 3.6 (0.33) Control: 5.8 (0.81) P<0.01	

		Important prognostic factors: Age (SEM): Intervention: 48 (3.1) Control: 39 (2.5) Sex (female): Intervention: 11 (28%) Control: 7 (21%) Mean pneumothorax size on CT, mm (SEM): Intervention: 25 (2.1) Control: 37 (3.9) Groups were comparable at baseline.			Incomplete outcome data: Not reported.		
Gerhardy, 2022	Retrospective cohort study Setting and country: Cairns Hospital, Cairns, Queensland, Australia. Source of funding: Not reported. Conflicts of interest:	Inclusion criteria: Presenting to the ED with a traumatic pneumothorax (both blunt and penetrating trauma) of size sufficient to be visualised on an erect or supine chest X-ray prior to any attempted intervention. Exclusion criteria: Pneumothoraces of questionable origin (possibly secondary	Intervention: conservative management.	Control: intercostal catheter.	Length of follow-up: Not reported. Loss-to-follow-up: Not reported. Incomplete outcome data: Not reported.	Complications: Intervention: 0 Control: 2 (one soft tissue infection and one haemothorax) Length of stay (median, IQR): Intervention: 3 (4) Control: 6 (7) P<0.05	

	None declared.	spontaneous) and iatrogenic pneumothoraces were excluded. N total at baseline: Intervention: 65 Control: 79 Important prognostic factors: Age (median, IQR): Intervention: 49 (27) Control: 44 (25.5) Sex (male, %): Intervention: 45 (69%) Control: 56 (71%) Concurrent haemothorax: Intervention: 12 Control: 20 Groups were comparable at baseline, except for pneumothorax size.					
Zhang, 2016	Retrospective cohort study Setting and country: Tan Tock Seng Hospital,	Inclusion criteria: All patients with occult pneumothorax and any CT scan visualizing the thorax partially or fully.	Intervention: observation.	Control: tube thoracostomy.	Length of follow-up: Until hospital discharge. Loss-to-follow-up: Not reported.	Complications (defined as: wound infection at the area surrounding the chest tube, hemothorax, pleural effusion,	

	Singapore, Singapore. Source of funding: Not reported. Conflicts of interest: The authors declare that there are no conflicts of interest.	Exclusion criteria: All patients who had incomplete clinical notes, failure to follow-up, penetrating wounds, CXR showing pneumothorax, hemothorax or hemopneumothorax, prophylactic ,chest tube insertion before CT scan and patients without CT diagnosis of pneumothorax. N total at baseline: Intervention: 48 Control: 35 Important prognostic factors[2]: Age (median): Intervention: 25 Control: 34 Sex (male, %): Intervention: 37 (77.08%) Control: 31 (88.57%) IPPV Intervention: 5 (10.42%) Control: 7 (20.0%)			Incomplete outcome data: Not reported.	empyema, expanding pneumothorax, and subsequent requirement of tube thoracostomy): Intervention: 3/43 (no IPPV) Control: 6/28 (no IPPV)	

		Groups were comparable at baseline, except for age.					

Risk of bias tabel

Author, year	Selection of participants Was selection of exposed and non-exposed cohorts drawn from the same population?	Exposure Can we be confident in the assessment of exposure?	Outcome of interest Can we be confident that the outcome of interest was not present at start of study?	Confounding-assessment Can we be confident in the assessment of confounding factors?	Confounding-analysis Did the study match exposed and unexposed for all variables that are associated with the outcome of interest or did the statistical analysis adjust for these confounding variables?	Assessment of outcome Can we be confident in the assessment of outcome?	Follow up Was the follow up of cohorts adequate? In particular, was outcome data complete or imputed?	Co-interventions Were co-interventions similar between groups?	Overall Risk of bias
	Definitely yes, probably yes, probably no, definitely no	Definitely yes, probably yes, probably no, definitely no	Definitely yes, probably yes, probably no, definitely no	Definitely yes, probably yes, probably no, definitely no	Definitely yes, probably yes, probably no, definitely no	Definitely yes, probably yes, probably no, definitely no	Definitely yes, probably yes, probably no, definitely no	Definitely yes, probably yes, probably no, definitely no	Low, Some concerns, High

Banks, 2023	Definitely yes Reason: Participants were selected from patients with similar baseline characteristics	Definitely yes Reason: Prospectively collected trauma database was used to determine exposure.	Probably yes Reason: Patients are admitted to the hospital after trauma.	Definitely yes Reason: Prospectively collected trauma database was used to determine patient characteristics.	**Probably no** Reason: Only multivariable analysis was performed for outcome measure length of stay.	Probably yes Reason: Outcome data were retrieved from medical records. No missing data were reported.	Probably yes Reason: No missing outcome data reported.	Definitely yes Reason: There were no co-interventions.	**Some concerns (complications, length of stay)**
Gerhardy, 2022	Definitely yes Reason: Participants drawn from same administrative database of patients presenting at same points of care over the same time frame,	Definitely yes Reason: Secure records were reviewed.	Probably yes Reason: Patients are admitted to the hospital after trauma.	Definitely yes Reason: Medical records were used to determine patient characteristics.	**Probably no** Reason: No comprehensive matching or confounding analysis reported. ISS was statistically significanty different between groups	Probably yes Reason: Outcome data were retrieved from medical records. No missing data were reported.	Probably yes Reason: No missing outcome data reported.	Definitely yes Reason: There were no co-interventions.	**Some concerns (complications, length of stay)**
Zhang, 2016	Definitely yes Reason: Participants drawn from same administrative database of patients presenting at	Definitely yes Reason: Secure records were reviewed.	Probably yes Reason: Patients are admitted to the hospital after trauma.	Definitely yes Reason: Medical records were used to determine patient characteristics.	Probably yes Reason: separate analysis performed: no IPPV vs IPPV (complications), not possible for mortality.	Probably yes Reason: Outcome data were retrieved from medical records. No missing data	Probably yes Reason: No missing outcome data reported.	Definitely yes Reason: There were no co-interventions.	**LOW (complications)**

	same points of care over the same time frame.					were reported.			

Exclusie tabel

Reference	Reason for exclusion
Figueroa JF, Karam BS, Gomez J, Milia D, Morris RS, Dodgion C, Carver T, Murphy P, Elegbede A, Schroeder M, de Moya MA. The 35-mm rule to guide pneumothorax management: Increases appropriate observation and decreases unnecessary chest tubes. J Trauma Acute Care Surg. 2022 Jun 1;92(6):951-957. doi: 10.1097/TA.0000000000003573. Epub 2022 Feb 4. PMID: 35125448.	Not conform PICO: wrong comparison (before and after implementation of guideline)
Mahmood I, Younis B, Ahmed K, Mustafa F, El-Menyar A, Alabdallat M, Parchani A, Peralta R, Nabir S, Ahmed N, Al-Thani H. Occult Pneumothorax in Patients Presenting with Blunt Chest Trauma: An Observational Analysis. Qatar Med J. 2020 Mar 16;2020(1):10. doi: 10.5339/qmj.2020.10. PMID: 32206592; PMCID: PMC7075257.	Not conform PICO: no comparison (study reports factors associated with failure of conservative management)
SARIÇAM, M., Özkan, B., & Yaşar, T. Ü. R. K. (2019). Management of traumatic pneumothorax in isolated blunt chest trauma. The European Research Journal, 5(2), 306-310.	Wrong study design: niet vergelijkend onderzoek (no comparison)
Walker SP, Barratt SL, Thompson J, Maskell NA. Conservative Management in Traumatic Pneumothoraces: An Observational Study. Chest. 2018 Apr;153(4):946-953. doi: 10.1016/j.chest.2017.10.015. Epub 2017 Nov 15. PMID: 29080710.	Not conform PICO: wrong comparison (successfully observed patients vs patients who failed observation)
Wilson H, Ellsmere J, Tallon J, Kirkpatrick A. Occult pneumothorax in the blunt trauma patient: tube thoracostomy or observation? Injury. 2009 Sep;40(9):928-31. doi: 10.1016/j.injury.2009.04.005. Epub 2009 Jun 17. PMID: 19539280.	Not conform PICO: wrong population (patients who require mechanical ventilation) and data from unventilated patients could not be extracted
Yadav K, Jalili M, Zehtabchi S. Management of traumatic occult pneumothorax. Resuscitation. 2010 Sep;81(9):1063-8. doi: 10.1016/j.resuscitation.2010.04.030. PMID: 20619952.	Not conform PICO: wrong population (patients who require mechanical ventilation)

Zoekverantwoording

Algemene informatie

Richtlijn: NVvH Thoracale letsels na trauma	
Uitgangsvraag: Wat is de plaats van observatie (afwachtend beleid) na een door stomp letsel veroorzaakte traumatische pneumothorax en wat is dan de follow up?	
Database(s): Medline (OVID), Embase	Datum: 21-02-2023
Periode: >2000	Talen: Geen beperking
Literatuurspecialist: Linda Niesink	
BMI zoekblokken: voor verschillende opdrachten wordt (deels) gebruik gemaakt van de zoekblokken van BMI-Online https://blocks.bmi-online.nl/ Bij gebruikmaking van een volledig zoekblok zal naar de betreffende link op de website worden verwezen.	
Toelichting en opmerkingen: → Voor deze vraag is gezocht op de elementen **(stomp) traumatische** (in het blauw) **pneumothorax** (in het groen) en **observatie (afwachtend beleid)** (in het oranje). → De genoemde sleutelartikelen van Moore (2011), Walker (2018) en Hefny (2018) zitten in de zoekopbrengst. → Resultaten staan in Rayyan.	

Te gebruiken voor richtlijnen tekst: In de databases Embase (via embase.com) en Medline (via OVID) is op 21-02-2023 met relevante zoektermen gezocht vanaf 2000 naar systematische reviews, RCT's en observationele studiedesigns over observatie (afwachtend beleid) na een traumatische pneumothorax. De literatuurzoekactie leverde 190 unieke treffers op.

Zoekopbrengst

	EMBASE	**OVID/MEDLINE**	**Ontdubbeld**
SRs	14	11	14
RCTs	55	21	58
Observationele studies	112	69	118
Totaal	181	101	**190**

Zoekstrategie

Database	**Zoektermen**		
Embase	*No.*	*Query*	*Results*
	#1	'thorax blunt trauma'/exp OR ((blunt NEAR/3 (trauma* OR injur*)):ti,ab,kw) OR ((trauma* NEAR/3 pneumothora*):ti,ab,kw)	32133
	#2	'pneumothorax'/exp OR pneumothora*:ti,ab,kw OR 'atelectasis'/exp OR atelectasis:ti,ab,kw OR (((lung OR pulmonary) NEAR/3 (collapse OR deflation)):ti,ab,kw) OR ((pulmonary NEAR/2 (contusion* OR laceration*)):ti,ab,kw)	88709
	#3	'conservative treatment'/exp OR 'watchful waiting'/exp OR observat*:ti,ab,kw OR conservative*:ti,ab,kw OR 'watchful waiting':ti,ab,kw OR ((manage* NEAR/3 expectant*):ti,ab,kw)	2137747
	#4	#1 AND #2 AND #3 AND [2000-2023]/py NOT (('animal'/exp OR 'animal experiment'/exp OR 'animal model'/exp OR 'nonhuman'/exp) NOT 'human'/exp) NOT ('conference abstract'/it OR 'conference review'/it OR 'editorial'/it OR 'letter'/it OR 'note'/it)	316
	#5	'meta analysis'/exp OR 'meta analysis (topic)'/exp OR metaanaly*:ti,ab OR 'meta analy*':ti,ab OR metanaly*:ti,ab OR 'systematic review'/de OR 'cochrane database of systematic reviews'/jt OR prisma:ti,ab OR prospero:ti,ab OR (((systemati* OR scoping OR umbrella OR 'structured literature') NEAR/3 (review* OR overview*)):ti,ab) OR ((systemic* NEAR/1 review*):ti,ab) OR (((systemati* OR literature OR database* OR 'data base*') NEAR/10 search*):ti,ab) OR (((structured OR comprehensive* OR systemic*) NEAR/3 search*):ti,ab) OR (((literature NEAR/3 review*):ti,ab) AND (search*:ti,ab OR database*:ti,ab OR 'data base*':ti,ab)) OR (('data extraction':ti,ab OR 'data source*':ti,ab) AND 'study selection':ti,ab) OR ('search strategy':ti,ab AND 'selection criteria':ti,ab) OR ('data source*':ti,ab AND 'data synthesis':ti,ab) OR medline:ab OR pubmed:ab OR embase:ab OR cochrane:ab OR (((critical OR rapid) NEAR/2 (review* OR overview* OR synthes*)):ti) OR ((((critical* OR rapid*) NEAR/3 (review* OR overview* OR synthes*)):ab) AND (search*:ab OR database*:ab OR 'data base*':ab)) OR metasynthes*:ti,ab OR 'meta synthes*':ti,ab	902552
	#6	'clinical trial'/exp OR 'randomization'/exp OR 'single blind procedure'/exp OR 'double blind procedure'/exp OR 'crossover procedure'/exp OR 'placebo'/exp OR 'prospective study'/exp OR rct:ab,ti OR random*:ab,ti OR 'single blind':ab,ti OR 'randomised	3716780

		controlled trial':ab,ti OR 'randomized controlled trial'/exp OR placebo*:ab,ti	
	#7	'major clinical study'/exp OR 'case control study'/de OR 'comparative study'/exp OR 'control group'/de OR 'controlled study'/de OR 'controlled clinical trial'/de OR 'crossover procedure'/de OR 'double blind procedure'/de OR 'phase 2 clinical trial'/de OR 'phase 3 clinical trial'/de OR 'phase 4 clinical trial'/de OR 'pretest posttest design'/de OR 'pretest posttest control group design'/de OR 'quasi experimental study'/de OR 'single blind procedure'/de OR 'triple blind procedure'/de OR (((control OR controlled) NEAR/6 trial):ti,ab,kw) OR (((control OR controlled) NEAR/6 (study OR studies)):ti,ab,kw) OR (((control OR controlled) NEAR/1 active):ti,ab,kw) OR 'open label*':ti,ab,kw OR (((double OR two OR three OR multi OR trial) NEAR/1 (arm OR arms)):ti,ab,kw) OR ((allocat* NEAR/10 (arm OR arms)):ti,ab,kw) OR placebo*:ti,ab,kw OR 'sham-control*':ti,ab,kw OR (((single OR double OR triple OR assessor) NEAR/1 (blind* OR masked)):ti,ab,kw) OR nonrandom*:ti,ab,kw OR 'non-random*':ti,ab,kw OR 'quasi-experiment*':ti,ab,kw OR crossover:ti,ab,kw OR 'cross over':ti,ab,kw OR 'parallel group*':ti,ab,kw OR 'factorial trial':ti,ab,kw OR ((phase NEAR/5 (study OR trial)):ti,ab,kw) OR ((case* NEAR/6 (matched OR control*)):ti,ab,kw) OR ((match* NEAR/6 (pair OR pairs OR cohort* OR control* OR group* OR healthy OR age OR sex OR gender OR patient* OR subject* OR participant*)):ti,ab,kw) OR ((propensity NEAR/6 (scor* OR match*)):ti,ab,kw) OR versus:ti OR vs:ti OR compar*:ti OR ((compar* NEAR/1 study):ti,ab,kw) OR (('major clinical study'/de OR 'clinical study'/de OR 'cohort analysis'/de OR 'observational study'/de OR 'cross-sectional study'/de OR 'multicenter study'/de OR 'correlational study'/de OR 'follow up'/de OR cohort*:ti,ab,kw OR 'follow up':ti,ab,kw OR followup:ti,ab,kw OR longitudinal*:ti,ab,kw OR prospective*:ti,ab,kw OR retrospective*:ti,ab,kw OR observational*:ti,ab,kw OR 'cross sectional*':ti,ab,kw OR cross?ectional*:ti,ab,kw OR multicent*:ti,ab,kw OR 'multi-cent*':ti,ab,kw OR consecutive*:ti,ab,kw) AND (group:ti,ab,kw OR groups:ti,ab,kw OR subgroup*:ti,ab,kw OR versus:ti,ab,kw OR vs:ti,ab,kw OR compar*:ti,ab,kw OR 'odds ratio*':ab OR 'relative odds':ab OR 'risk ratio*':ab OR 'relative risk*':ab OR 'rate ratio':ab OR aor:ab OR arr:ab OR rrr:ab OR (((‘or' OR 'rr') NEAR/6 ci):ab))) OR 'observational study':ti,ab,kw	14998289
	#8	#4 AND #5 **– SR's**	14
	#9	#4 AND #6 NOT #8 **– RCT's**	55
	#10	#4 AND #7 NOT (#8 OR #9) **– observationele studies**	112
	#11	#8 OR #9 OR #10	181
Medline (OVID)	1 exp Wounds, Nonpenetrating/ or (blunt adj2 (trauma* or injur*)).ti,ab,kf. or (trauma* adj3 pneumothora*).ti,ab,kf. (52212) 2 exp Pneumothorax/ or (pneumothora* or atelectasis or ((lung or pulmonary) adj3 (collapse or deflation)) or (pulmonary adj2 (contusion* or laceration*))).ti,ab,kf. (41496) 3 exp Conservative Treatment/ or exp Watchful Waiting/ or (observat* or conservative* or 'watchful waiting').ti,ab,kf. or (manage* adj3 expectant*).ti,ab,kf. (1160537) 4 1 and 2 and 3 (251) 5 limit 4 to yr="2000 -Current" (204) 6 5 not (comment/ or editorial/ or letter/ or ((exp animals/ or exp models, animal/) not humans/)) (200)		

	7 meta-analysis/ or meta-analysis as topic/ or (metaanaly* or meta-analy* or metanaly*).ti,ab,kf. or systematic review/ or cochrane.jw. or (prisma or prospero).ti,ab,kf. or ((systemati* or scoping or umbrella or "structured literature") adj3 (review* or overview*)).ti,ab,kf. or (systemic* adj1 review*).ti,ab,kf. or ((systemati* or literature or database* or data-base*) adj10 search*).ti,ab,kf. or ((structured or comprehensive* or systemic*) adj3 search*).ti,ab,kf. or ((literature adj3 review*) and (search* or database* or data-base*)).ti,ab,kf. or (("data extraction" or "data source*") and "study selection").ti,ab,kf. or ("search strategy" and "selection criteria").ti,ab,kf. or ("data source*" and "data synthesis").ti,ab,kf. or (medline or pubmed or embase or cochrane).ab. or ((critical or rapid) adj2 (review* or overview* or synthes*)).ti. or (((critical* or rapid*) adj3 (review* or overview* or synthes*)) and (search* or database* or data-base*)).ab. or (metasynthes* or meta-synthes*).ti,ab,kf. (649927) 8 exp clinical trial/ or randomized controlled trial/ or exp clinical trials as topic/ or randomized controlled trials as topic/ or Random Allocation/ or Double-Blind Method/ or Single-Blind Method/ or (clinical trial, phase i or clinical trial, phase ii or clinical trial, phase iii or clinical trial, phase iv or controlled clinical trial or randomized controlled trial or multicenter study or clinical trial).pt. or random*.ti,ab. or (clinic* adj trial*).tw. or ((singl* or doubl* or treb* or tripl*) adj (blind$3 or mask$3)).tw. or Placebos/ or placebo*.tw. (2555895) 9 Case-control Studies/ or clinical trial, phase ii/ or clinical trial, phase iii/ or clinical trial, phase iv/ or comparative study/ or control groups/ or controlled before-after studies/ or controlled clinical trial/ or double-blind method/ or historically controlled study/ or matched-pair analysis/ or single-blind method/ or (((control or controlled) adj6 (study or studies or trial)) or (compar* adj (study or studies)) or ((control or controlled) adj1 active) or "open label*" or ((double or two or three or multi or trial) adj (arm or arms)) or (allocat* adj10 (arm or arms)) or placebo* or "sham-control*" or ((single or double or triple or assessor) adj1 (blind* or masked)) or nonrandom* or "non-random*" or "quasi-experiment*" or "parallel group*" or "factorial trial" or "pretest posttest" or (phase adj5 (study or trial)) or (case* adj6 (matched or control*)) or (match* adj6 (pair or pairs or cohort* or control* or group* or healthy or age or sex or gender or patient* or subject* or participant*)) or (propensity adj6 (scor* or match*))).ti,ab,kf. or (confounding adj6 adjust*).ti,ab. or (versus or vs or compar*).ti. or ((exp cohort studies/ or epidemiologic studies/ or multicenter study/ or observational study/ or seroepidemiologic studies/ or (cohort* or 'follow up' or followup or longitudinal* or prospective* or retrospective* or observational* or multicent* or 'multi-cent*' or consecutive*).ti,ab,kf.) and ((group or groups or subgroup* or versus or vs or compar*).ti,ab,kf. or ('odds ratio*' or 'relative odds' or 'risk ratio*' or 'relative risk*' or aor or arr or rrr).ab. or (("OR" or "RR") adj6 CI).ab.)) (5360234) 10 6 and 7 (11) **– SRs** 11 (6 and 8) not 10 (21) **- RCTs** 12 (6 and 9) not (10 or 11) (69) **– observationele studies** 13 10 or 11 or 12 (101)

Module 7: Corcontusie

Evidence tabel

Niet van toepassing.

Risk of bias tabel

Niet van toepassing.

Exclusie tabel

Author and year	Reason for exclusion
Collins (2001)	Wrong study design (non-comparative study)
Dou (2022)	Wrong study design and wrong comparison.
Edouard (2004)	Wrong study design and wrong comparison.
Genrich (2015)	Wrong study design and wrong comparison.
Guild (2014)	Wrong study design (non-comparative study)
Gürmen (2022)	Wrong study design (non-comparative study)
Joseph (2016)	Wrong study design (non-comparative study)
Keskpaik (2020)	Wrong study design (non-comparative study)
Lindstaedt (2002)	Wrong study design (non-comparative study)
Litmathe (2003)	Wrong study design (non-comparative study)
Mahmood (2016)	Wrong study design and wrong comparison.
Nagy (2001)	Wrong study design (non-comparative study)
Sade (2017)	Wrong study design (non-comparative study)
Salim (2001)	Wrong study design (non-comparative study)
Splechtna (2003)	Wrong study design (non-comparative study)
Van Lieshout (2021)	Wrong study design (non-comparative study)

Zoekverantwoording

Algemene informatie

Richtlijn: NVvH Thoracale letsels na trauma	
Uitgangsvraag: Wat is de waarde van aanvullende diagnostiek van het hart voor het diagnosticeren van een corcontusie na een stomp thoraxletsel?	
Database(s): Medline (OVID), Embase	Datum: 31-01-2023
Periode: >2000	Talen: Geen beperking
Literatuurspecialist: Linda Niesink	
BMI zoekblokken: voor verschillende opdrachten wordt (deels) gebruik gemaakt van de zoekblokken van BMI-Online https://blocks.bmi-online.nl/ Bij gebruikmaking van een volledig zoekblok zal naar de betreffende link op de website worden verwezen.	
Toelichting en opmerkingen: → Voor deze vraag is gezocht op de elementen **stomp thoraxletsel** (in het blauw), **aanvullende diagnostiek** (in het groen) en een **diagnostisch** zoekfilter (in het oranje). → De genoemde sleutelartikelen van Tang (2022), Velmahos (2003), Ishida (2022) en Van Lieshout (2021) zitten in de zoekopbrengst. → Resultaten staan in Rayyan.	

Te gebruiken voor richtlijnen tekst:
In de databases Embase (via embase.com) en Medline (via OVID) is op 31-01-2023 met relevante zoektermen gezocht vanaf 2000 naar systematische reviews, RCT's en observationele studiedesigns over aanvullende diagnostiek van het hart na een stomp thoraxletsel. De literatuurzoekactie leverde 485 unieke treffers op.

Zoekopbrengst

	EMBASE	**OVID/MEDLINE**	**Ontdubbeld**
SRs	41	13	45
RCTs	74	47	111
Observationele studies	247	135	329
Totaal	362	195	**485**

Zoekstrategie

Database	**Zoektermen**		
Embase	*No.*	*Query*	*Results*
	#1	'heart contusion'/exp OR 'thorax blunt trauma'/exp OR (((cardiac OR myocardial OR heart) NEAR/3 (bruis* OR contusion*)):ti,ab,kw) OR 'contusio cordis':ti,ab,kw OR 'commotio cordis':ti,ab,kw OR ((blunt NEAR/3 (chest OR thorax OR thoracic OR cardiac OR pericardial) NEAR/3 (trauma* OR injur*)):ti,ab,kw) OR haemothorax:ti,ab,kw OR hemothorax:ti,ab,kw OR (((aortic OR vascular OR diaphragm OR mediastinal) NEAR/1 injur*):ti,ab,kw) OR 'rib fracture*':ti,ab,kw OR pneumothorax:ti,ab,kw OR ((pulmonary NEAR/2 (contusion* OR laceration*)):ti,ab,kw)	74403
	#2	'electrocardiography'/exp/mj OR electrocardiograph*:ti,ab,kw OR 'electro cardiograph*':ti,ab,kw OR 'electromyocardiograph*':ti,ab,kw OR 'polycardiograph*':ti,ab,kw OR 'troponin'/exp OR troponin*:ti,ab,kw OR 'cardiac enzyme'/exp OR 'echocardiography'/exp/mj OR echocardiograph*:ti,ab,kw OR (((cardiac OR heart OR myocardium) NEAR/3 scanning):ti,ab,kw) OR 'cardioechograph*':ti,ab,kw OR 'echo cardiogram':ti,ab,kw OR 'echo cardiograph*':ti,ab,kw OR 'echocardiogram':ti,ab,kw OR ((echography NEAR/3 (cardial OR cardiac OR heart)):ti,ab,kw) OR 'ultrasound cardiograph*':ti,ab,kw OR (((cardial OR cardiac OR heart) NEAR/3 sonograph*):ti,ab,kw) OR ((rhythm NEAR/3 (cardiac OR monitoring OR observation*)):ti,ab,kw) OR 'telemetry'/exp OR telemetry:ti,ab,kw OR 'biotelemetry':ti,ab,kw OR 'radiotelemetry':ti,ab,kw OR 'teleradiometry':ti,ab,kw OR 'diagnostic criteria':ti,ab,kw	622513
	#3	'diagnostic procedure'/exp OR 'sensitivity and specificity'/de OR sensitiv*:ab,ti OR specific*:ab,ti OR predict*:ab,ti OR 'roc curve':ab,ti OR 'receiver operator':ab,ti OR 'receiver operators':ab,ti OR likelihood:ab,ti OR 'diagnostic error'/exp OR 'diagnostic accuracy'/exp OR 'diagnostic test accuracy study'/exp OR 'inter observer':ab,ti OR 'intra observer':ab,ti OR interobserver:ab,ti OR intraobserver:ab,ti OR validity:ab,ti OR kappa:ab,ti OR reliability:ab,ti OR reproducibility:ab,ti OR ((test NEAR/2 're-test'):ab,ti) OR ((test NEAR/2 'retest'):ab,ti) OR 'reproducibility'/exp OR accuracy:ab,ti OR 'differential diagnosis'/exp OR 'validation study'/de OR 'measurement precision'/exp OR 'diagnostic value'/exp OR 'reliability'/exp OR 'predictive value'/exp OR ppv:ti,ab,kw OR npv:ti,ab,kw OR diagnos*:ti,ab	24933772

	#4	#1 AND #2 AND #3 AND [2000-2023]/py NOT (('animal'/exp OR 'animal experiment'/exp OR 'animal model'/exp OR 'nonhuman'/exp) NOT 'human'/exp) NOT ('conference abstract'/it OR 'conference review'/it OR 'editorial'/it OR 'letter'/it OR 'note'/it)	1214
	#5	'meta analysis'/exp OR 'meta analysis (topic)'/exp OR metaanaly*:ti,ab OR 'meta analy*':ti,ab OR metanaly*:ti,ab OR 'systematic review'/de OR 'cochrane database of systematic reviews'/jt OR prisma:ti,ab OR prospero:ti,ab OR (((systemati* OR scoping OR umbrella OR 'structured literature') NEAR/3 (review* OR overview*)):ti,ab) OR ((systemic* NEAR/1 review*):ti,ab) OR (((systemati* OR literature OR database* OR 'data base*') NEAR/10 search*):ti,ab) OR (((structured OR comprehensive* OR systemic*) NEAR/3 search*):ti,ab) OR (((literature NEAR/3 review*):ti,ab) AND (search*:ti,ab OR database*:ti,ab OR 'data base*':ti,ab)) OR (('data extraction':ti,ab OR 'data source*':ti,ab) AND 'study selection':ti,ab) OR ('search strategy':ti,ab AND 'selection criteria':ti,ab) OR ('data source*':ti,ab AND 'data synthesis':ti,ab) OR medline:ab OR pubmed:ab OR embase:ab OR cochrane:ab OR (((critical OR rapid) NEAR/2 (review* OR overview* OR synthes*)):ti) OR ((((critical* OR rapid*) NEAR/3 (review* OR overview* OR synthes*)):ab) AND (search*:ab OR database*:ab OR 'data base*':ab)) OR metasynthes*:ti,ab OR 'meta synthes*':ti,ab	897034
	#6	'clinical trial'/exp OR 'randomization'/exp OR 'single blind procedure'/exp OR 'double blind procedure'/exp OR 'crossover procedure'/exp OR 'placebo'/exp OR 'prospective study'/exp OR rct:ab,ti OR random*:ab,ti OR 'single blind':ab,ti OR 'randomised controlled trial':ab,ti OR 'randomized controlled trial'/exp OR placebo*:ab,ti	3716780
	#7	'major clinical study'/exp OR 'case control study'/de OR 'comparative study'/exp OR 'control group'/de OR 'controlled study'/de OR 'controlled clinical trial'/de OR 'crossover procedure'/de OR 'double blind procedure'/de OR 'phase 2 clinical trial'/de OR 'phase 3 clinical trial'/de OR 'phase 4 clinical trial'/de OR 'pretest posttest design'/de OR 'pretest posttest control group design'/de OR 'quasi experimental study'/de OR 'single blind procedure'/de OR 'triple blind procedure'/de OR (((control OR controlled) NEAR/6 trial):ti,ab,kw) OR (((control OR controlled) NEAR/6 (study OR studies)):ti,ab,kw) OR (((control OR controlled) NEAR/1 active):ti,ab,kw) OR 'open label*':ti,ab,kw OR (((double OR two OR three OR multi OR trial) NEAR/1 (arm OR arms)):ti,ab,kw) OR ((allocat* NEAR/10 (arm OR arms)):ti,ab,kw) OR placebo*:ti,ab,kw OR 'sham-control*':ti,ab,kw OR (((single OR double OR triple OR assessor) NEAR/1 (blind* OR masked)):ti,ab,kw) OR nonrandom*:ti,ab,kw OR 'non-random*':ti,ab,kw OR 'quasi-experiment*':ti,ab,kw OR crossover:ti,ab,kw OR 'cross over':ti,ab,kw OR 'parallel group*':ti,ab,kw OR 'factorial trial':ti,ab,kw OR ((phase NEAR/5 (study OR trial)):ti,ab,kw) OR ((case* NEAR/6 (matched OR control*)):ti,ab,kw) OR ((match* NEAR/6 (pair OR pairs OR cohort* OR control* OR group* OR healthy OR age OR sex OR gender OR patient* OR subject* OR participant*)):ti,ab,kw) OR ((propensity NEAR/6 (scor* OR match*)):ti,ab,kw) OR versus:ti OR vs:ti OR compar*:ti OR ((compar* NEAR/1 study):ti,ab,kw) OR (('major clinical study'/de OR 'clinical study'/de OR 'cohort analysis'/de OR 'observational study'/de OR 'cross-sectional study'/de OR 'multicenter study'/de OR 'correlational study'/de OR 'follow up'/de OR cohort*:ti,ab,kw OR 'follow up':ti,ab,kw OR followup:ti,ab,kw	14998289

	OR longitudinal*:ti,ab,kw OR prospective*:ti,ab,kw OR retrospective*:ti,ab,kw OR observational*:ti,ab,kw OR 'cross sectional*':ti,ab,kw OR cross?ectional*:ti,ab,kw OR multicent*:ti,ab,kw OR 'multi-cent*':ti,ab,kw OR consecutive*:ti,ab,kw) AND (group:ti,ab,kw OR groups:ti,ab,kw OR subgroup*:ti,ab,kw OR versus:ti,ab,kw OR vs:ti,ab,kw OR compar*:ti,ab,kw OR 'odds ratio*':ab OR 'relative odds':ab OR 'risk ratio*':ab OR 'relative risk*':ab OR 'rate ratio':ab OR aor:ab OR arr:ab OR rrr:ab OR (('or' OR 'rr') NEAR/6 ci):ab))) OR 'observational study':ti,ab,kw #8 #4 AND #5 **– SR's** 41 #9 #4 AND #6 NOT #8 **– RCT's** 74 #10 #4 AND #7 NOT (#8 OR #9) **– observationele studies** 247 #11 #8 OR #9 OR #10 362
Medline (OVID)	1 exp Myocardial Contusions/ or exp Thoracic Injuries/ or commotio cordis/ or exp Pneumothorax/ or ((cardiac or myocardial or heart) adj3 (bruis* or contusion*)).ti,ab,kf. or 'contusio cordis'.ti,ab,kf. or 'commotio cordis'.ti,ab,kf. or (blunt adj3 (chest or thorax or thoracic or cardiac or pericardial) adj3 (trauma* or injur*)).ti,ab,kf. or (haemothorax or hemothorax or pneumothorax).ti,ab,kf. or ((aortic or vascular or diaphragm or mediastinal) adj1 injur*).ti,ab,kf. or 'rib fracture*'.ti,ab,kf. or (pulmonary adj2 (contusion* or laceration*)).ti,ab,kf. (80341) 2 exp Electrocardiography/ or exp Troponin/ or exp Echocardiography/ or exp Telemetry/ or (electrocardiograph* or 'electro cardiograph*' or 'electromyocardiograph*' or 'polycardiograph*').ti,ab,kf. or troponin*OR echocardiograph*.ti,ab,kf. or ((cardiac or heart or myocardium) adj3 scanning).ti,ab,kf. or ('cardioechograph*' or 'echo cardiogram' or 'echo cardiograph*' or 'echocardiogram').ti,ab,kf. or (echography adj3 (cardial or cardiac or heart)).ti,ab,kf. or 'ultrasound cardiograph*'.ti,ab,kf. or ((cardial or cardiac or heart) adj3 sonograph*).ti,ab,kf. or (rhythm adj3 (cardiac or monitoring or observation*)).ti,ab,kf. or telemetry.ti,ab,kf. or 'biotelemetry'.ti,ab,kf. or 'radiotelemetry'.ti,ab,kf. or 'teleradiometry'.ti,ab,kf. or 'diagnostic criteria'.ti,ab,kf. (460960) 3 exp "Sensitivity and Specificity"/ or (Sensitiv* or Specific*).ti,ab. or (predict* or ROC-curve or receiver-operator*).ti,ab. or (likelihood or LR*).ti,ab. or exp Diagnostic Errors/ or (inter-observer or intra-observer or interobserver or intraobserver or validity or kappa or reliability).ti,ab. or reproducibility.ti,ab. or (test adj2 (re-test or retest)).ti,ab. or "Reproducibility of Results"/ or accuracy.ti,ab. or Diagnosis, Differential/ or Validation Study/ (7709701) 4 1 and 2 and 3 (832) 5 limit 4 to yr="2000 -Current" (602) 6 5 not (comment/ or editorial/ or letter/ or ((exp animals/ or exp models, animal/) not humans/)) (552) 7 meta-analysis/ or meta-analysis as topic/ or (metaanaly* or meta-analy* or metanaly*).ti,ab,kf. or systematic review/ or cochrane.jw. or (prisma or prospero).ti,ab,kf. or ((systemati* or scoping or umbrella or "structured literature") adj3 (review* or overview*)).ti,ab,kf. or (systemic* adj1 review*).ti,ab,kf. or ((systemati* or literature or database* or data-base*) adj10 search*).ti,ab,kf. or ((structured or comprehensive* or systemic*) adj3 search*).ti,ab,kf. or ((literature adj3 review*) and (search* or database* or data-base*)).ti,ab,kf. or (("data extraction" or "data source*") and "study selection").ti,ab,kf. or ("search strategy" and "selection criteria").ti,ab,kf. or ("data source*" and "data synthesis").ti,ab,kf. or (medline or pubmed or embase or cochrane).ab. or ((critical or rapid) adj2 (review* or overview* or synthes*)).ti. or (((critical* or rapid*) adj3 (review* or overview* or synthes*)) and (search* or database* or data-base*)).ab. or (metasynthes* or meta-synthes*).ti,ab,kf. (648757) 8 exp clinical trial/ or randomized controlled trial/ or exp clinical trials as topic/ or randomized controlled trials as topic/ or Random Allocation/ or Double-Blind Method/ or Single-Blind Method/ or (clinical trial, phase i or clinical trial, phase ii or clinical trial,

	phase iii or clinical trial, phase iv or controlled clinical trial or randomized controlled trial or multicenter study or clinical trial).pt. or random*.ti,ab. or (clinic* adj trial*).tw. or ((singl* or doubl* or treb* or tripl*) adj (blind$3 or mask$3)).tw. or Placebos/ or placebo*.tw. (2552428) 9 Case-control Studies/ or clinical trial, phase ii/ or clinical trial, phase iii/ or clinical trial, phase iv/ or comparative study/ or control groups/ or controlled before-after studies/ or controlled clinical trial/ or double-blind method/ or historically controlled study/ or matched-pair analysis/ or single-blind method/ or (((control or controlled) adj6 (study or studies or trial)) or (compar* adj (study or studies)) or ((control or controlled) adj1 active) or "open label*" or ((double or two or three or multi or trial) adj (arm or arms)) or (allocat* adj10 (arm or arms)) or placebo* or "sham-control*" or ((single or double or triple or assessor) adj1 (blind* or masked)) or nonrandom* or "non-random*" or "quasi-experiment*" or "parallel group*" or "factorial trial" or "pretest posttest" or (phase adj5 (study or trial)) or (case* adj6 (matched or control*)) or (match* adj6 (pair or pairs or cohort* or control* or group* or healthy or age or sex or gender or patient* or subject* or participant*)) or (propensity adj6 (scor* or match*))).ti,ab,kf. or (confounding adj6 adjust*).ti,ab. or (versus or vs or compar*).ti. or ((exp cohort studies/ or epidemiologic studies/ or multicenter study/ or observational study/ or seroepidemiologic studies/ or (cohort* or 'follow up' or followup or longitudinal* or prospective* or retrospective* or observational* or multicent* or 'multi-cent*' or consecutive*).ti,ab,kf.) and ((group or groups or subgroup* or versus or vs or compar*).ti,ab,kf. or ('odds ratio*' or 'relative odds' or 'risk ratio*' or 'relative risk*' or aor or arr or rrr).ab. or (("OR" or "RR") adj6 CI).ab.)) (5354598) 10 6 and 7 (13) **– SRs** 11 (6 and 8) not 10 (47) **- RCTs** 12 (6 and 9) not (10 or 11) (135) **– observationele studies** 13 10 or 11 or 12 (195)

Module 8: Minimal aortic injury

Evidence tabel

Study reference	Study characteristics	Patient characteristics [2]	Intervention (I)	Comparison / control (C) [3]	Follow-up	Outcome measures and effect size [4]	Comments
Dubose (2021)	Type of study: Retrospective study. Setting and country: Level 1 trauma centers. Funding and conflicts of interest: The authors declare no conflicts of interest.	Inclusion criteria: • BTAI patients treated at the respective facilities from January 2008 to December 2013 were identified using trauma registries, with retrospective imaging and chart review used to complete data collection. Exclusion criteria: • Patients dying before imaging or transferred from outside hospitals were excluded. N total at baseline: Intervention: N = 61 Control: N = 91	Describe intervention (treatment/procedure/test): Thoracic endovascular aortic repair	Describe control (treatment/procedure/test): Non-operative management.	Length of follow-up: No information. Loss-to-follow-up: No information.	**Progression of minimal aortic injury on control scan** Not reported. **Aortic-related mortality** I: 2/61 (3.3%) C: 0/91 (0%) **Hospital length of stay (median; IQR)** I: 16.0 (22.0) days C: 12.0 (12.0) days **Complications** I: 51/61 (83.6%) C: 70/91 (76.9%)	Author's conclusion: Our study is the largest contemporary examination of BTAI in the literature. Our findings suggest that optimal BTAI care remains an ongoing challenge of trauma care in the endovascular era. In the context of contemporary practice, NOM failures for SVS Grade I to III injuries are rare, but TEVAR use seems independently protective against aortic-related mortality. TEVAR-specific complication rates have declined compared with previous reports. There remains a persistent need to examine the

		Important prognostic factors[2]: *age ± SD:* *I: 40.6 (IQR: 15.9) years* *C: 42.3 (IQR: 16.5) years* *Sex:* *I: 41/61 (67.2%) M* *C: 64/91 (66.7%) M* Groups comparable at baseline? Yes.					optimal treatment of BTAI, particularly lower-grade injuries. Long-term studies are required to determine the natural history of both untreated and treated BTAI.
Dubose (2021)	Type of study: Retrospective cohort study. Setting and country: 28 international centers. Funding and conflicts of interest: The authors declare no conflicts of interest.	Inclusion criteria: • No information. Exclusion criteria: • No information. N total at baseline: Intervention: N = 48 Control: N = 71 Important prognostic factors[2]: *age ± SD:* *I: 52.0 (IQR: 26) years* *C: 41.0 (IQR: 29) years* *Sex:* *I: 35/48 (72.9%) M* *C: 49/71 (69.0%) M*	Describe intervention (treatment/procedure/test): Thoracic endovascular aortic repair	Describe control (treatment/procedure/test): Non-operative management.	Length of follow-up: No information. Loss-to-follow-up: No information.	**Progression of minimal aortic injury on control scan** Not reported. **Aortic-related mortality** I: 2/48 (4.2%) C: 0/71 (0%) **Hospital length of stay (median; IQR)** I: 11.0 (16.0) days C: 13.0 (12.0) days **Complications** I: 26*/48 (54.2%) C: 45**/71 (63.4%)	Author's conclusion: Minimal aortic injuries (SVS Grade 1 and 2) undergo TEVAR in 40% of patients. When compared with those patients managed medically, however, there appear to be no difference in subsequent outcomes except an increase in complications related to the conduct of TEVAR itself. These findings suggest that the current SVS guidelines for BTAI management warrant revision and greater emphasis should be

		Groups comparable at baseline? Yes.				*Complications were: - Delayed stroke – ischemic N = 1; - Acute renal failure N = 2 - Pulmonary embolism N = 3; - Mechanical ventilation > 48h N = 10; - Ventilator associated pneumonia N = 4; - Acute lung injury/acute respiratory distress syndrome N = 3; - Sepsis N = 3 ** Complications were: - Delayed stroke – ischemic N = 1; - Acute renal failure N = 5 - Pulmonary embolism N = 3; - Mechanical ventilation > 48h N = 22; - Ventilator associated pneumonia N = 5; - Acute lung injury/acute	used to highlight the safety of an MM first strategy for MAIs.

						respiratory distress syndrome N = 2; - Sepsis N = 7.	
Sandhu (2018)	Type of study: Retrospective study. Setting and country: Prospective institutional trauma registry. Funding and conflicts of interest: The authors declare no conflicts of interest and no funding.	Inclusion criteria: • All patients from 2004 to 2015 in the analysis to remove any bias introduced by the open era (before introduction of TEVAR) and kept all analysis limited to the endovascular era Exclusion criteria: • Grade IV injuries. N total at baseline: Intervention: N = 22 Control: N = 23 Important prognostic factors[2]: *age ± SD:* *I: 38.5 (15.8) years* *C: 40.2 (14.3) years* *Sex:* *I: 16/22 (72.7%) M* *C: 19/23 (82.6%) M*	Describe intervention (treatment/procedure/test): Thoracic endovascular aortic repair	Describe control (treatment/procedure/test): Non-operative management	Length of follow-up: No information. Loss-to-follow-up: None.	**Hospital length of stay** I: 5.5 (3 to 15) days C: 4 (3 to 12) days	Author's conclusion: Based on these limited data, it appears that patients with minimal aortic injuries (grades I and II) may be managed medically, with the majority resolving within 8 weeks. Minimal aortic injury is associated with low mortality and excellent intermediate-term outcomes. Further prospective studies are required to validate these findings.

		Groups comparable at baseline? Yes.					
Spencer (2018)	Type of study: Retrospective cohort study. Setting and country: Level 1 trauma center. Funding and conflicts of interest: The authors declare no conflicts of interest. The present work did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.	• Inclusion criteria:Patients with BTAI from 2004 to 2015 at a Level I trauma center. Patients with MAI (grade I–II) on CT according to blinded, independent readings of a single "investigator" and verification by a second "investigator". Exclusion criteria: • No information. N total at baseline: Intervention: N = 14 Control: N = 16 Important prognostic factors[2]: *age ± SD:* *I: 52 (32 to 65) years* *C: 43 (37 to 66) years* *Sex:*	Describe intervention (treatment/procedure/test): Thoracic endovascular aortic repair	Describe control (treatment/procedure/test): Non-operative management with short-acting intravenous beta-blocker infusion titrated to maintain systolic blood pressure less than 140 mmHg and heart rate less than 80 bpm. Additional agents such as calcium channel blockers or vasodilators were added as needed.	Length of follow-up: No information. Loss-to-follow-up: None.	**Mortality (related to their aortic lesion)** I: 0/14 (0%) C: 0/16 (0%) **Mortality (due to devastating thoracic blunt injury)** I: 2/14 (14.3%) C: 1/16 (6.3%) **Hospital length of stay** I: 20 (9 to 33) days C: 11 (5 to 24) days **Complications** I: 2*/14 (14.3%) C: 2**/16 (12.5%) *Atrial fibrillation (n=1) and a collapsing stent (n=1) **Pulmonary embolism (n=1) and myocardial infarction (n=1).	Author's conclusion: Although the SVS guidelines suggest TEVAR for grade II–IV and NOM for grade I BTAI, NOM may be safely used in grade II BTAI.

		I: 11/14 (79%) M *C: 8/16 (50%) M* Groups comparable at baseline? Yes.					

Risk of bias tabel

Author, year	Selection of participants Was selection of exposed and non-exposed cohorts drawn from the same population?	Exposure Can we be confident in the assessment of exposure?	Outcome of interest Can we be confident that the outcome of interest was not present at start of study?	Confounding-assessment Can we be confident in the assessment of confounding factors?	Confounding-analysis Did the study match exposed and unexposed for all variables that are associated with the outcome of interest or did the statistical analysis adjust for these	Assessment of outcome Can we be confident in the assessment of outcome?	Follow up Was the follow up of cohorts adequate? In particular, was outcome data complete or imputed?	Co-interventions Were co-interventions similar between groups?	Overall Risk of bias

					confounding variables?				
Dubose (2021)	Definitely yes Reason: Participants were selected from a registry.	Definitely yes After institutional review board approval, the American Association for the Surgery of Trauma/Aortic Trauma Founda- tion (ATF) BTAI registry was used to identify patients enrolled from December 2016 to November 2019. Managemen	No information. Reason: -	No information. Reason: -	No information. Reason: -	Probably yes. Reason: no missing data.	No information. Reason: length of follow-up not reported.	No information. Reason: -	**Some concerns**

		t and outcomes were recorded and compared. Patients with MAI, defined as SVS Grades I and II injury types, were then isolated for comparison. Demographics, admission physiology, severity of associated injuries, complications and outcomes were compared between MAI patients treated with							

		TEVAR versus MM. A priori definitions established for use in the ATF registry were used for comparison. Among these, aortic-related mortality (ARM) was defined as death directly contributed to by either aortic injury itself or subsequent treatment of BTAI as determined by the individual							

		site primary investigator.							
DuBose (2015)	Definitely yes Reason: Participants were selected from a registry.	Probably yes BTAI patients treated at the respective facilities from January 2008 to December 2013 were identified using trauma registries, with retrospective imaging and chart review used to complete data collection. Patients dying before imaging or	No information. Reason: -	No information. Reason: -	No information. Reason: -	Probably yes. Reason: no missing data.	No information. Reason: length of follow-up not reported.	No information. Reason: -	**Some concerns**

		transferred from outside hospitals were excluded. Demographic variables examined included age, sex, mechanism of injury, and admission physiologic data. Trauma registry data provided Injury Severity Scores (ISSs), body region specific Abbreviated Injury Scale (AIS) scores, and Glasgow Coma Scale (GCS)							

		scores on arrival.							
Sandhu (2018)	Definitely yes Reason: Participants were selected from a registry	Probably yes	No information. Reason: -	No information. Reason: -	No information. Reason: -	Probably yes. Reason: no missing data.	No information. Reason: length of follow-up not reported.	No information. Reason: -	**Some concerns**
Spencer (2018)	Definitely yes Reason: Participants were selected from a registry	Probably yes Reason: All patients with BTAI were evaluated in a multidisciplinary approach with the initial evaluation completed by the trauma team.	No information. Reason: -	No information. Reason: -	No information. Reason: -	Probably yes. Reason: no missing data.	No information. Reason: length of follow-up not reported.	No information. Reason: -	**Some concerns**

Exclusie tabel

Author and year	Reason for exclusion
Al-Thani	Only included patients with Grade I or II who underwent non-operative management. The study did not include patients with Grade I or II who were treated with TEVAR. Therefore, it was not possible to compare both groups for the predefined outcomes.
Arbabi (2022)	Compared non-operative management with a mixed group of patients who underwent open repair and endovascular treatment. This did not meet the PICO-criteria of this guideline.
Gaffey (2020)	Wrong comparison of interventions.
Jacob-Brassard (2019)	Compared non-operative management with a mixed group of patients who underwent open repair and endovascular treatment. This did not meet the PICO-criteria of this guideline.
Madigan (2022)	The study reported patients with Grade II BTAI but did not report the predefined outcomes for this specific patient category.
Mosquera (2018)	Wrong study population. The study included Grade III and IV BTAI patients.
Shackford (2017)	Wrong study population. The study included Grade III and IV BTAI patients.
Soong (2019	Non-comparative study.

Zoekverantwoording

Algemene informatie

Richtlijn: NVvH Thoracale letsels na trauma	
Uitgangsvraag: Wat is de plaats van observatie ten opzichte van een endovasculaire stent plaatsing bij patiënten met een minimal aortic injury?	
Database(s): Medline (OVID), Embase	Datum: 19-09-2023
Periode: Geen beperking	Talen: Geen beperking
Literatuurspecialist: Linda Niesink en Esther van der Bijl	
BMI zoekblokken: voor verschillende opdrachten wordt (deels) gebruik gemaakt van de zoekblokken van BMI-Online https://blocks.bmi-online.nl/ Bij gebruikmaking van een volledig zoekblok zal naar de betreffende link op de website worden verwezen.	
Toelichting en opmerkingen: → Voor deze vraag is gezocht op de elementen **minimal aortic injury** (in het blauw) en **observatie (afwachtend beleid / bloeddrukregulatie etc.)** (in het groen) en **minimaal invasieve ingreep (stent)** (in het oranje). → De genoemde sleutelartikelen van Stephen (2018), Shackford (2017), Sandhu (2018) en ook de richtlijn van Isselbacher (2002) zitten in de zoekopbrengst. → Resultaten staan in Rayyan.	
Te gebruiken voor richtlijnen tekst: In de databases Embase (via embase.com) en Medline (via OVID) is op 19-09-2023 met relevante zoektermen gezocht naar systematische reviews, RCT's en observationele studiedesigns over observatie en minimaal invasieve ingreep (stent) bij patiënten met een minimal aortic inury. De literatuurzoekactie leverde 157 unieke treffers op.	

Zoekopbrengst

	EMBASE	OVID/MEDLINE	Ontdubbeld
SRs	18	11	21
RCTs	13	5	18

Observationele studies	97	82	118
Totaal	**128**	**98**	**157**

Zoekstrategie Embase

Database	Zoektermen		
Embase	*No.*	*Query*	*Results*
	#1	'aortic trauma'/exp OR ((aortic NEAR/3 (trauma* OR injur*)):ti,ab,kw)	6678
	#2	'conservative treatment'/exp OR 'blood pressure regulation'/exp OR (((conservative OR observative) NEAR/2 (management OR treatment)):ti,ab,kw) OR noninvasive:ti,ab,kw OR 'non invasive':ti,ab,kw OR expectative*:ti,ab,kw OR expectantly:ti,ab,kw OR 'watchful waiting':ti,ab,kw OR 'wait and see':ti,ab,kw OR 'no treatment':ti,ab,kw OR 'no intervention':ti,ab,kw OR 'natural course':ti,ab,kw OR observation:ti,ab,kw OR nonoperative:ti,ab,kw OR 'non operative':ti,ab,kw OR (('blood pressure' NEAR/3 (control OR regulation)):ti,ab,kw) OR 'repetitive radiology':ti,ab,kw	1715 285
	#3	'vascular stent'/exp OR 'endovascular surgery'/exp OR endovascular:ti,ab,kw OR stent*:ti,ab,kw OR 'aortic device*':ti,ab,kw OR 'open repair':ti,ab,kw OR surgery:ti,ab,kw	2317275
	#4	#1 AND #2 AND #3 NOT (('animal'/exp OR 'animal experiment'/exp OR 'animal model'/exp OR 'nonhuman'/exp) NOT 'human'/exp) NOT ('conference abstract'/it OR 'conference review'/it OR 'editorial'/it OR 'letter'/it OR 'note'/it)	271
	#5	'meta analysis'/exp OR 'meta analysis (topic)'/exp OR metaanaly*:ti,ab OR 'meta analy*':ti,ab OR metanaly*:ti,ab OR 'systematic review'/de OR 'cochrane database of systematic reviews'/jt OR prisma:ti,ab OR prospero:ti,ab OR (((systemati* OR scoping OR umbrella OR 'structured literature') NEAR/3 (review* OR overview*)):ti,ab) OR ((systemic* NEAR/1 review*):ti,ab) OR (((systemati* OR literature OR database* OR 'data base*') NEAR/10 search*):ti,ab) OR (((structured OR comprehensive* OR systemic*) NEAR/3 search*):ti,ab) OR (((literature NEAR/3 review*):ti,ab) AND (search*:ti,ab OR database*:ti,ab OR 'data base*':ti,ab)) OR (('data extraction':ti,ab OR 'data source*':ti,ab) AND 'study selection':ti,ab) OR ('search strategy':ti,ab AND 'selection criteria':ti,ab) OR ('data source*':ti,ab AND 'data synthesis':ti,ab) OR medline:ab OR pubmed:ab OR embase:ab OR cochrane:ab OR (((critical OR rapid) NEAR/2 (review* OR overview* OR synthes*)):ti) OR ((((critical* OR rapid*) NEAR/3 (review* OR overview* OR synthes*)):ab) AND (search*:ab OR database*:ab OR 'data base*':ab)) OR metasynthes*:ti,ab OR 'meta synthes*':ti,ab	962380
	#6	'clinical trial'/exp OR 'randomization'/exp OR 'single blind procedure'/exp OR 'double blind procedure'/exp OR 'crossover procedure'/exp OR 'placebo'/exp OR 'prospective study'/exp OR rct:ab,ti OR random*:ab,ti OR 'single blind':ab,ti OR 'randomised controlled trial':ab,ti OR 'randomized controlled trial'/exp OR placebo*:ab,ti	3874874
	#7	'major clinical study'/exp OR 'case control study'/de OR 'comparative study'/exp OR 'control group'/de OR 'controlled study'/de OR 'controlled clinical trial'/de OR 'crossover procedure'/de OR 'double blind procedure'/de OR 'phase 2 clinical trial'/de OR 'phase 3 clinical trial'/de OR 'phase 4 clinical trial'/de OR 'pretest posttest design'/de OR 'pretest posttest control group design'/de OR 'quasi experimental study'/de OR 'single blind procedure'/de OR 'triple blind procedure'/de OR (((control OR controlled) NEAR/6 trial):ti,ab,kw) OR (((control OR controlled) NEAR/6 (study OR studies)):ti,ab,kw) OR (((control OR controlled) NEAR/1 active):ti,ab,kw) OR 'open label*':ti,ab,kw OR (((double OR two OR three OR multi OR trial) NEAR/1 (arm OR arms)):ti,ab,kw)	15640800

		OR ((allocat* NEAR/10 (arm OR arms)):ti,ab,kw) OR placebo*:ti,ab,kw OR 'sham-control*':ti,ab,kw OR (((single OR double OR triple OR assessor) NEAR/1 (blind* OR masked)):ti,ab,kw) OR nonrandom*:ti,ab,kw OR 'non-random*':ti,ab,kw OR 'quasi-experiment*':ti,ab,kw OR crossover:ti,ab,kw OR 'cross over':ti,ab,kw OR 'parallel group*':ti,ab,kw OR 'factorial trial':ti,ab,kw OR ((phase NEAR/5 (study OR trial)):ti,ab,kw) OR ((case* NEAR/6 (matched OR control*)):ti,ab,kw) OR ((match* NEAR/6 (pair OR pairs OR cohort* OR control* OR group* OR healthy OR age OR sex OR gender OR patient* OR subject* OR participant*)):ti,ab,kw) OR ((propensity NEAR/6 (scor* OR match*)):ti,ab,kw) OR versus:ti OR vs:ti OR compar*:ti OR ((compar* NEAR/1 study):ti,ab,kw) OR (('major clinical study'/de OR 'clinical study'/de OR 'cohort analysis'/de OR 'observational study'/de OR 'cross-sectional study'/de OR 'multicenter study'/de OR 'correlational study'/de OR 'follow up'/de OR cohort*:ti,ab,kw OR 'follow up':ti,ab,kw OR followup:ti,ab,kw OR longitudinal*:ti,ab,kw OR prospective*:ti,ab,kw OR retrospective*:ti,ab,kw OR observational*:ti,ab,kw OR 'cross sectional*':ti,ab,kw OR cross?ectional*:ti,ab,kw OR multicent*:ti,ab,kw OR 'multi-cent*':ti,ab,kw OR consecutive*:ti,ab,kw) AND (group:ti,ab,kw OR groups:ti,ab,kw OR subgroup*:ti,ab,kw OR versus:ti,ab,kw OR vs:ti,ab,kw OR compar*:ti,ab,kw OR 'odds ratio*':ab OR 'relative odds':ab OR 'risk ratio*':ab OR 'relative risk*':ab OR 'rate ratio':ab OR aor:ab OR arr:ab OR rrr:ab OR (('or' OR 'rr') NEAR/6 ci):ab))) OR 'observational study':ti,ab,kw	
	#8	#4 AND #5 **– SR's**	18
	#9	#4 AND #6 NOT #8 **– RCT's**	13
	#10	#4 AND #7 NOT (#8 OR #9) **– observationele studies**	97
	#11	#8 OR #9 OR #10	128

Zoekstrategie Medline (OVID)

#	Searches	Results
1	((Aorta, Thoracic/ or Aorta, Abdominal/) and (Wounds, Nonpenetrating/ or blunt.ti,ab,kf. or nonpenetrat*.ti,ab,kf. or non-penetrat*.ti,ab,kf. or trauma.ti,ab,kf. or injur*.ti,ab,kf.)) or (aort* adj3 (trauma* or injur*)).ti,ab,kf.	7990
2	exp Conservative Treatment/ or exp Watchful Waiting/ or nonoperative*.ti,ab,kf. or non-operative*.ti,ab,kf. or non operative.ti,ab,kf. or ((conservative or observative) adj2 (management or treatment)).ti,ab,kf. or noninvasive.ti,ab,kf. or non-invasive.ti,ab,kf. or expectative*.ti,ab,kf. or expectantly.ti,ab,kf. or 'watchful waiting'.ti,ab,kf. or (wait adj2 see).ti,ab,kf. or 'no treatment'.ti,ab,kf. or 'no intervention'.ti,ab,kf. or 'natural course'.ti,ab,kf. or observation.ti,ab,kf. or (blood pressure adj3 (control or regulation)).ti,ab,kf. or repetitive radiology.ti,ab,kf.	744544
3	exp Stents/ or stent*.ti,ab,kf. or Endovascular Procedures/ or endovascular.ti,ab,kf. or 'aortic device*'.ti,ab,kf. or 'open repair'.ti,ab,kf. or surgery.ti,ab,kf.	1654605
4	1 and 2 and 3	234
5	4 not (comment/ or editorial/ or letter/ or ((exp animals/ or exp models, animal/) not humans/))	221
6	meta-analysis/ or meta-analysis as topic/ or (metaanaly* or meta-analy* or metanaly*).ti,ab,kf. or systematic review/ or cochrane.jw. or (prisma or prospero).ti,ab,kf. or ((systemati* or scoping or umbrella or "structured literature") adj3 (review* or overview*)).ti,ab,kf. or (systemic* adj1 review*).ti,ab,kf. or ((systemati* or	694486

	literature or database* or data-base*) adj10 search*).ti,ab,kf. or ((structured or comprehensive* or systemic*) adj3 search*).ti,ab,kf. or ((literature adj3 review*) and (search* or database* or data-base*)).ti,ab,kf. or (("data extraction" or "data source*") and "study selection").ti,ab,kf. or ("search strategy" and "selection criteria").ti,ab,kf. or ("data source*" and "data synthesis").ti,ab,kf. or (medline or pubmed or embase or cochrane).ab. or ((critical or rapid) adj2 (review* or overview* or synthes*)).ti. or (((critical* or rapid*) adj3 (review* or overview* or synthes*)) and (search* or database* or data-base*)).ab. or (metasynthes* or meta-synthes*).ti,ab,kf.	
7	exp randomized controlled trial/ or randomized controlled trials as topic/ or random*.ti,ab. or rct?.ti,ab. or ((pragmatic or practical) adj "clinical trial*").ti,ab,kf. or ((non-inferiority or noninferiority or superiority or equivalence) adj3 trial*).ti,ab,kf.	1646768
8	Case-control Studies/ or clinical trial, phase ii/ or clinical trial, phase iii/ or clinical trial, phase iv/ or comparative study/ or control groups/ or controlled before-after studies/ or controlled clinical trial/ or double-blind method/ or historically controlled study/ or matched-pair analysis/ or single-blind method/ or (((control or controlled) adj6 (study or studies or trial)) or (compar* adj (study or studies)) or ((control or controlled) adj1 active) or "open label*" or ((double or two or three or multi or trial) adj (arm or arms)) or (allocat* adj10 (arm or arms)) or placebo* or "sham-control*" or ((single or double or triple or assessor) adj1 (blind* or masked)) or nonrandom* or "non-random*" or "quasi-experiment*" or "parallel group*" or "factorial trial" or "pretest posttest" or (phase adj5 (study or trial)) or (case* adj6 (matched or control*)) or (match* adj6 (pair or pairs or cohort* or control* or group* or healthy or age or sex or gender or patient* or subject* or participant*)) or (propensity adj6 (scor* or match*))).ti,ab,kf. or (confounding adj6 adjust*).ti,ab. or (versus or vs or compar*).ti. or ((exp cohort studies/ or epidemiologic studies/ or multicenter study/ or observational study/ or seroepidemiologic studies/ or (cohort* or 'follow up' or followup or longitudinal* or prospective* or retrospective* or observational* or multicent* or 'multi-cent*' or consecutive*).ti,ab,kf.) and ((group or groups or subgroup* or versus or vs or compar*).ti,ab,kf. or ('odds ratio*' or 'relative odds' or 'risk ratio*' or 'relative risk*' or aor or arr or rrr).ab. or (("OR" or "RR") adj6 CI).ab.))	5513717
9	5 and 6 **– SR's**	11
10	(5 and 7) not 9 **– RCT'S**	5
11	(5 and 8) not (9 or 10) **– observationele studies**	82
12	9 or 10 or 11	98

Module 9: Fixatie na een ribfractuur

Evidence tabel

Systematic review(s)

Study reference	Study characteristics	Patient characteristics	Intervention (I)	Comparison / control (C)	Follow-up	Outcome measures and effect size	Comments
Cataneo (2015)	SR and meta-analysis of RCTs *Literature search up to the 12th of May 2014.* A: Granetzny (2005) B: Marasco (2013) C: Tanaka (2002) Study design: A: RCT (parallel) B: RCT (parallel) C: RCT (parallel) Setting and Country: A: B: C: Source of funding and conflicts of interest: Frederico HS de Oliveira: none known. Daniele C Cataneo: none known.	Inclusion criteria SR: • RCTs using a parallel design, comparing surgical stabilization (any type) with clinical management; • Adults or children with flail chest; • Any type of surgical intervention to stabilize flail chest compared with clinical	Describe intervention: A: surgical fixation of fractured ribs with stainless steel wire or Kirschner wires, or both after 24-36 hours of ICU admission. Until the participants were operated upon, they were treated conservatively as if they were in Group I B: only rib fractures between the levels of ribs 3 and 10 were fixed. Ribs fractured more than once were usually addressed by fixing 1 fracture per rib, converting a flail segment to simple	Describe control: A: conservative treatment using strapping and packing in the form of dressing and fixing with an adhesive bandage, which was put adhesively to the flail segment within 5 cm anterior and posterior to the flail segment and 1 rib above and below it. This adhesive plaster was put in place for at least 7-10 days, during this period of follow-up ABGs and chest X-rays were obtained	End-point of follow-up: A: 2 months. B: 6 months. C: 12 months.	**Mortality** *A (Granetzny, 2005)* I: 2/20 C: 3/20 *B (Marasco, 2013)* I: 0/23 C: 1/23 *C (Tanaka, 2002)* I: 0/18 C: 0/19 **Chest deformity** *A (Granetzny, 2005)* I: 1/20 C: 9/20 *B (Marasco, 2013)* I: 0/23 C: 2/23 **Wound infection** *A (Granetzny, 2005)* I: 2/20 C: 0/20	Author's conclusion There was some evidence from three small studies that showed surgical treatment was preferable to nonsurgical management in reducing pneumonia, chest deformity, tracheostomy, duration of mechanical ventilation, and length of ICU stay. Further well-designed studies with a sufficient sample size are required to confirm these results and to

	Karine A Arruda: none known. Antonio José Maria Cataneo: none known. Regina El Dib: none known. Paulo Eduardo de Olivira Carvalho: none known.	management. Clinical management included any type of chest wall stabilization without surgical intervention such as straps or bags and any type of ventilatory assistance. *Three studies included* <u>Important patient characteristics at baseline</u>: <u>N</u> A: N = 40 B: N = 46 C: N = 37 <u>*Sex*</u>*:* A: 31 males B: 40 males C: 26 males	fractured ribs. Ribs with a single fracture were not fixed unless there was gross deformity mandating intervention. Anterior and lateral rib fractures were preferentially fixed over posterior rib fractures C: surgical stabilization	B: Nonsurgical management: mechanical ventilation C: Internal pneumatic stabilization.		**<u>Pneumonia</u>** *A (Granetzny, 2005)* I: 2/20 C: 10/20 *B (Marasco, 2013)* I: 11/23 C: 17/23 *C (Tanaka, 2002)* I: 4/18 C: 17/19 **<u>Tracheostomy</u>** *B (Marasco, 2013)* I: 9/23 C: 16/23 *C (Tanaka, 2002)* I: 3/18 C: 15/19 **<u>Duration of mechanical ventilation</u>** *A (Granetzny, 2005)* I: 2.0 (0.72) days (N=20) C: 12.0 (0.45) days (N=20) *B (Marasco, 2013)* I: 6.33 (3.46) days (N=23) C: 7.54 (5.43) days (N=23)	detect possible surgical effects on mortality.

		Groups comparable at baseline?				*C (Tanaka, 2002)* I: 10.8 (3.4) days (N=18) C: 18.3 (7.4) days (N=19) **<u>Length of intensive care unit stay</u>** *A (Granetzny, 2005)* I: 9.6 (0.72) days (N=20) C: 14.6 (2.7) days (N=20) *C (Tanaka, 2002)* I: 6.5 (7.4) days (N=18) C: 26.8 (3.2) days (N=19)	

Randomized controlled trial(s)

Study reference	Study characteristics	Patient characteristics [2]	Intervention (I)	Comparison / control (C) [3]	Follow-up	Outcome measures and effect size [4]	Comments
Liu (2019)	Type of study: RCT Setting and country: Trauma center. Funding and conflicts of interest: None of the authors have any conflict of interest to declare about this article.	Inclusion criteria: • Patients with ISS score of 16 or more; • Patients admitted to the trauma center; • Flail chest identified. Exclusion criteria: • Younger than 18 years; • Death within 48 hours; • Cervical spinal cord injury with paralysis; • Severe head injury; • Uncorrected coagulopathy; • Pre-existing cardiac or pulmonary conditions.	Describe intervention (treatment/procedure/test): Operative rib fixation.	Describe control (treatment/procedure/test): Non-surgical management.	Length of follow-up: No information. Loss-to-follow-up: One in each group.	**Mechanical ventilation days (IQR)** I: 7 (6 to 10) days C: 9 (7 to 12) days **ICU length of stay** I: 10 (7 to 12) days C: 12 (9 to 15) days **Hospital length of stay** I: 21 (17 to 25) days C: 22 (17 to 26) days **In-hospital mortality** I: 4/25 (16%) C: 2/25 (8%) **Pneumonia** I: 12/25 (48%) C: 20/25 (80%) **Tracheostomy** I: 10/25 (40%) C: 7/25 (28%) **Mechanical ventilation required** I: 18/25 (72%) C: 20/25 (80%)	Author's conclusion: This study reveals that surgical rib fixation may provide some critical care benefits for severe polytrauma patients with FC, including less medical resource use and lower risk of complications. Further studies should be designed to

		N total at baseline: Intervention: N = 25 Control: N = 25 Important prognostic factors[2]: *age ± IQR:* *I: 42 (25-58)* *C: 39 (24-56)* *Sex:* *I: 21/25 M* *C: 20/25 M* Groups comparable at baseline? Yes.				**Pain (rest)** I: 6 (4 to 7) points C: 7 (4 to 8) points **Thoracic deformity** I: 2/25 (8%) C: 9/25 (36%)	optimally identify patients who are most likely to benefit from this surgery.
Marasco (2022)	Type of study: RCT Setting and country: 12 USA trauma centers. Funding and conflicts of interest: S.F.M. reports personal fees (consulting/lectures from Johnson & Johnson;	Inclusion criteria: • Previously functionally independent patients with multiple consecutive fractures (≥3); • Closed fractured ribs between the level of	Describe intervention (treatment/procedure/test): Rib fixation.	Describe control (treatment/procedure/test): Non-operative management	Length of follow-up: Maximum of 6 months. Loss-to-follow-up: I: 15 patients at 3 months and 17 patients at 6 months follow-up.	**Hospital length of stay** I: 10 (7 to 13.5) days C: 9 (6 to 13) **ICU length of stay** I: 1 (0 to 2) days C: 0 (0 to 2) days **Mortality** I: 0/61 (0%) C: 2/63 (3.3%) **Pain (number of patients with no pain reported)**	Author's conclusion: In this study, no improvements in pain or QoL at 3 and 6 months in patients undergoing rib fixation for non-

	consulting/lectures from Zimmer Biomet) outside the submitted work. M.B. reports fees for statistical consulting. J.H. reports personal fees (advi- sory board, Acumed; educational support and producing educational material, DePuy Synthes). For the remaining authors, no conflicts were declared.	ribs 3 and 10 confirmed on chest x-ray; • Computed tomography of the chest. • Patients also had to have either ongoing pain or displaced fractured ribs. <u>Exclusion criteria</u>: • Preinjury dependency requiring acts of daily living support; • Invasive ventilator support at the time of enrollment (patients were not excluded if they deteriorated and required invasive ventilator			C: 11 patients at 3 months and 16 at 6 months follow-up.	I: 14/44 (32.0%) C: 25/47 (53.0%) **Quality of life (SF 12 at 6 months)** *Physical component* I: 44.4 (11.5) points C: 47.6 (9.5) points *Mental component* I: 51.6 (10.1) points C: 50.5 (11.9) points	flail, non–ventilator-dependent rib fractures have been demonstrated.

		support after that time); • Spinal injuries that precluded placement of the patient in a lateral decubitus position; • Open rib fractures with soiling or infection; • Severe head injury; • Uncorrected coagulopathy; • Adult respiratory distress syndrome; • Uncorrected sepsis; • Pregnancy; • Known opiate dependency; • Age younger than 18 years or older than 85 years; • Inability to provide					

		informed consent. <u>N total at baseline</u>: Intervention: N = 61 Control: N = 63 <u>Important prognostic factors</u>[2]: *age ± SD:* *I: 59.1 (15.1)* *C: 55.0 (15.1)* *Sex:* *I: 48/61 (77.4%) M* *C: 51/63 (83.6%) M* Groups comparable at baseline? Yes.					
Meyer (2023)	<u>Type of study:</u> RCT <u>Setting and country:</u> <u>Funding and conflicts of interest:</u>	<u>Inclusion criteria</u>: • Patients (aged 16 years or older) who were admitted to the study	<u>Describe intervention (treatment/procedure/test):</u> Surgical stabilization of rib fractures.	<u>Describe control (treatment/procedure/test):</u> Usual care.	<u>Length of follow-up</u>: 6 months. <u>Loss-to-follow-up</u>: I: N = 6 C: N = 10	**Hospital length of stay** I: 14.5 (10.7) days C: 9.9 (9.8) days **Mortality** I: 0/42 ()%) C: 0/42 (0%) **Seroma**	<u>Author's conclusion:</u> In this clinical trial, SSRF performed within 72 hours

	The authors report no conflicts of interest.	institution with a severe chest wall injury sustained secondary to a blunt trauma mechanism. <u>Exclusion criteria</u>: • Patients younger than 16 years of age; • Patients with a clinical flail chest injury; • Patients with severe traumatic brain injury; • Spinal cord injuries; • Pre-existing congestive heart failure or oxygen-dependent pulmonary disease; • Lacked equipoise for enrolment;				I: 1/42 (2.4%) C: 0/42 (0%) **Infections** I: 1/42 (2.4%) C: 0/42 (0%) **Pain (6 months) (VAS)** I: 74 (23) points C: 77 (20) points	improved the primary outcome of NPS at two week follow up among patients with ≥ 3 displaced fractures in the absence of flail chest. These data support a role for SSRF in patients without flail chest.

		• Patients who were so severely injured that they were not expected to be able to undergo surgical rib fixation; • COVID-infection. <u>N total at baseline</u>: Intervention: N = 42 Control: N = 42 <u>Important prognostic factors</u>[2]: *age ± SD:* *I: 50 (15)* *C: 49 (15)* *Sex:* *I: 28/42 (67%) M* *C: 31/42/ (74%) M* Groups comparable at baseline? Yes.					

Pieracci (2020)	Type of study: RCT Setting and country: Funding and conflicts of interest: This work was funded in part by an investigator-initiated research grant from DePuy Synthes, Inc. (Raynham, MA), awarded to Denver Health Medical Center, Denver, CO. - Fredric M. Pieracci MD: paid educator (past) and research funding (current) for DePuy Synthes, Inc. - Kiara Leasia MD: nothing to disclose. - Zach Bauman DO: nothing to disclose. - Evert Eriksson MD: paid educator (current) for DePuy Synthes, Inc. - Lawrence Lottenberg MD: paid consultant (current) for Acute Innovations, Inc,	Inclusion criteria: • ≥3 ipsilateral, bicortical, severely displaced, acute fractures of ribs 3-10; Exclusion criteria: • Flail chest defined as either clinical or radiographic. • Age younger than 18; • Moderate or severe traumatic brain injury; • Acute ventilator-dependent respiratory failure; • Severe pulmonary contusion; • Prior or expected emergency	Describe intervention (treatment/procedure/test): Operative fixation.	Describe control (treatment/procedure/test): Non-operative treatment.	Length of follow-up: 8 weeks. Loss-to-follow-up: None.	**Quality of life (1-11)** I: 10 points C: 7 points **Pain** I: 1.5 points (N=26) C: 3.3 points (N=19)	Author's conclusion: In this clinical trial, SSRF performed within 72 hours improved the primary outcome of NPS at two week follow up among patients with ≥ 3 displaced fractures in the absence of flail chest. These data support a role for SSRF in patients without flail chest.

	KLS Martin, Inc., and DePuy Synthes, Inc. - Sarah Majercik MD: nothing to disclose. - Ledford Powell MD: paid educator (current) for DePuy Synthes, Inc. - Babak Sarani MD: paid educator (current) for Acute Innovations, Inc. - Gregory Semon MD: nothing to disclose. - Bradley Thomas MD: paid educator (current) for Zimmer Biomet, Inc. - Frank Zhao MD: nothing to disclose. - Cornelius Dyke MD: nothing to disclose.	exploratory laparotomy, thoracotomy, or craniotomy during the index admission; • Spinal cord injury; • Pelvic fractures that had required, or was expected to require, operative intervention; • Inability to accomplish activities of daily living independently prior to injury; • Life expectancy < 6 months; • Pregnancy; • Incarceration; • Enrollment >72 hours from injury.					

		N total at baseline: Intervention: N = 51 Control: N = 59 Important prognostic factors[2]: *age ± SD:* *I: 54.6* *C: 55.3* *Sex:* *I: 39/51 (76.5%) M* *C: 43/59 (74.1%) M* Groups comparable at baseline? Yes.					

Risk of bias tabel

Study reference (first author, publication year)	**Was the allocation sequence adequately generated?**	**Was the allocation adequately concealed?**	**Blinding: Was knowledge of the allocated interventions adequately prevented?** **Were patients/healthcare providers/data collectors/assessors/data analysts blinded?**	**Was loss to follow-up (missing outcome data) infrequent?**	**Are reports of the study free of selective outcome reporting?**	**Was the study apparently free of other problems that could put it at a risk of bias?**	**Overall risk of bias** **If applicable/necessary, per outcome measure**

	Definitely yes Probably yes Probably no Definitely no	Definitely yes Probably yes Probably no Definitely no	Definitely yes Probably yes Probably no Definitely no	Definitely yes Probably yes Probably no Definitely no	Definitely yes Probably yes Probably no Definitely no	Definitely yes Probably yes Probably no Definitely no	**LOW** **Some concerns** **HIGH**
Liu (2019)	Definitely yes. Reason: The enrolled patients were randomly assigned to the surgical or nonsurgical group.	Probably yes. Reason: Patients were randomized either to surgical or conservative treatment for FC by using random numbers balanced with block size of 10.	Definitely no. Reason: Blinding not possible.	Probably yes. Reason: One patient lost to follow-up in each group.	Probably yes. Reason: All pre-defined outcomes were reported.	Probably yes. Reason: No other biases reported.	Some concerns.
Marasco (2022)	Definitely yes. Reason: Patients were randomized	Probably yes. Reason: Randomization was by computer allocation in a four-block design over all enrollments, irrespective of site.	Definitely no. Reason: Blinding not possible.	Probably yes Reason: Lost to follow-up almost equal in both groups.	Probably yes. Reason: All pre-defined outcomes were reported.	Probably yes. Reason: No other biases reported.	Some concerns.
Meyer (2023)	Definitely yes. Reason: Patients were randomized with a 1:1 ratio.	Definitely yes. Reason: Allocation ratio using permuted blocks of 4 or 6 to	Definitely no. Reason: Given the nature of the intervention, the patients and treating	Probably no. Reason: Few cross-overs.	Probably yes. Reason: All pre-defined outcomes were reported.	Probably yes. Reason: No other biases reported.	Some concerns.

		ensure an equal number of patients in each group.	physicians were not blinded to the allocation group.				
Pieracci (2020)	Definitely yes. Reason: The trial consisted of both randomized and observational arms.	Probably yes. Reason: Each study center followed an independent, block randomization schema.	Definitely no. Reason: Blinding not possible.	Definitely yes. Reason: No lost to follow-up reported.	Probably yes. Reason: All pre-defined outcomes were reported.	Definitely no. Reason: Unequal enrollment across centers may have resulted in unmeasured institutional bias	Some concerns.

Exclusie tabel

Author and year	Reason for exclusion
Beks (2019)	Includes the same studies as Cataneo (2015).
Coughlin (2016)	Includes the same studies as Cataneo (2015).
Craxford (2022)	Includes the same studies as Cataneo (2015).
Granetzny (2005)	Already included in SR of Cataneo (2015).
Hoepelman (2023)	Only includes observational studies, no RCTs.
Ingoe (2019)	Wrong study design.
Leinicke (2013)	Includes the same studies as Cataneo (2015).
Liang (2019)	Includes the same studies as Cataneo (2015).
Liu (2019)	Includes the same studies as Cataneo (2015).
Long (2020)	Includes the same studies as Cataneo (2015).
Marasco (2022)	Already included in SR of Cataneo (2015).
Schuurmans (2017)	Includes the same studies as Cataneo (2015).
Sawyer (2022)	Includes the same studies as Cataneo (2015).
Schuurmans (2017)	Includes the same studies as Cataneo (2015).
Slobogean (2013)	Includes the same studies as Cataneo (2015).
Swart (2017)	Includes the same studies as Cataneo (2015).

Zoekverantwoording

Algemene informatie

Richtlijn: NVvH Thoracale letsels na trauma	
Uitgangsvraag: Wat is de plaats van fixatie van de ribben na een ribfractuur?	
Database(s): Medline (OVID), Embase	Datum: 31-07-2023
Periode: >2000	Talen: Geen beperking
Literatuurspecialist: Linda Niesink	
BMI zoekblokken: voor verschillende opdrachten wordt (deels) gebruik gemaakt van de zoekblokken van BMI-Online https://blocks.bmi-online.nl/ Bij gebruikmaking van een volledig zoekblok zal naar de betreffende link op de website worden verwezen.	
Toelichting en opmerkingen: → Voor deze vraag is gezocht op de elementen **ribfractuur** (in het blauw) en **fixatie (van de ribben)** (in het groen). → De genoemde sleutelartikelen van Beks (2019), Long (2020), Apampa (2022), Majeed (2018), Liu (2019) en Cataneo (2015) zitten in de zoekopbrengst. → Resultaten staan in Rayyan.	
Te gebruiken voor richtlijnen tekst: In de databases Embase (via embase.com) en Medline (via OVID) is op 31-07-2023 met relevante zoektermen gezocht vanaf 2000 naar systematische reviews, RCT's en observationele studiedesigns over fixatie na een ribfractuur. De literatuurzoekactie leverde 361 unieke treffers op.	

Zoekopbrengst

	EMBASE	OVID/MEDLINE	Ontdubbeld
SRs	40	35	44
RCTs	73	64	89
Observationele studies	203	165	228

Totaal	316	264	**361**

Zoekstrategie

Database	**Zoektermen**		
Embase	*No.*	*Query*	*Results*
	#1	'rib fracture'/exp/mj OR 'flail chest'/exp OR 'broken rib*':ti,ab,kw OR (((rib OR ribs OR ribcage OR 'rib cage' OR costa OR costal) NEAR/3 fracture*):ti,ab,kw) OR 'flail chest':ti,ab,kw	8475
	#2	'fracture fixation'/exp OR (((rib* OR operative OR surgical OR internal) NEAR/3 fixation*):ti,ab,kw) OR ((fix* NEAR/3 fracture*):ti,ab,kw) OR ((rib NEAR/3 (plate OR stent OR osteosynthesis)):ti,ab,kw)	120527
	#3	#1 AND #2 AND [2000-2023]/py NOT (('animal'/exp OR 'animal experiment'/exp OR 'animal model'/exp OR 'nonhuman'/exp) NOT 'human'/exp) NOT ('conference abstract'/it OR 'conference review'/it OR 'editorial'/it OR 'letter'/it OR 'note'/it)	646
	#4	'meta analysis'/exp OR 'meta analysis (topic)'/exp OR metaanaly*:ti,ab OR 'meta analy*':ti,ab OR metanaly*:ti,ab OR 'systematic review'/de OR 'cochrane database of systematic reviews'/jt OR prisma:ti,ab OR prospero:ti,ab OR (((systemati* OR scoping OR umbrella OR 'structured literature') NEAR/3 (review* OR overview*)):ti,ab) OR ((systemic* NEAR/1 review*):ti,ab) OR (((systemati* OR literature OR database* OR 'data base*') NEAR/10 search*):ti,ab) OR (((structured OR comprehensive* OR systemic*) NEAR/3 search*):ti,ab) OR (((literature NEAR/3 review*):ti,ab) AND (search*:ti,ab OR database*:ti,ab OR 'data base*':ti,ab)) OR (('data extraction':ti,ab OR 'data source*':ti,ab) AND 'study selection':ti,ab) OR ('search strategy':ti,ab AND 'selection criteria':ti,ab) OR ('data source*':ti,ab AND 'data synthesis':ti,ab) OR medline:ab OR pubmed:ab OR embase:ab OR cochrane:ab OR (((critical OR rapid) NEAR/2 (review* OR overview* OR synthes*)):ti) OR ((((critical* OR rapid*) NEAR/3 (review* OR overview* OR synthes*)):ab) AND (search*:ab OR database*:ab OR 'data base*':ab)) OR metasynthes*:ti,ab OR 'meta synthes*':ti,ab	910066
	#5	'clinical trial'/exp OR 'randomization'/exp OR 'single blind procedure'/exp OR 'double blind procedure'/exp OR 'crossover procedure'/exp OR 'placebo'/exp OR 'prospective study'/exp OR rct:ab,ti OR random*:ab,ti OR 'single blind':ab,ti OR 'randomised controlled trial':ab,ti OR 'randomized controlled trial'/exp OR placebo*:ab,ti	3747433
	#6	'major clinical study'/exp OR 'case control study'/de OR 'comparative study'/exp OR 'control group'/de OR 'controlled study'/de OR 'controlled clinical trial'/de OR 'crossover procedure'/de OR 'double blind procedure'/de OR 'phase 2 clinical trial'/de OR 'phase 3 clinical trial'/de OR 'phase 4 clinical trial'/de OR 'pretest posttest design'/de OR 'pretest posttest control group design'/de OR 'quasi experimental study'/de OR 'single blind procedure'/de OR 'triple blind procedure'/de OR (((control OR controlled) NEAR/6 trial):ti,ab,kw) OR (((control OR controlled) NEAR/6 (study OR studies)):ti,ab,kw) OR (((control OR controlled) NEAR/1 active):ti,ab,kw) OR 'open label*':ti,ab,kw OR (((double OR two OR three OR multi OR trial) NEAR/1 (arm OR arms)):ti,ab,kw) OR ((allocat* NEAR/10 (arm OR arms)):ti,ab,kw) OR placebo*:ti,ab,kw OR 'sham-control*':ti,ab,kw OR (((single OR double OR triple OR assessor) NEAR/1 (blind* OR	15122389

	masked)):ti,ab,kw) OR nonrandom*:ti,ab,kw OR 'non-random*':ti,ab,kw OR 'quasi-experiment*':ti,ab,kw OR crossover:ti,ab,kw OR 'cross over':ti,ab,kw OR 'parallel group*':ti,ab,kw OR 'factorial trial':ti,ab,kw OR ((phase NEAR/5 (study OR trial)):ti,ab,kw) OR ((case* NEAR/6 (matched OR control*)):ti,ab,kw) OR ((match* NEAR/6 (pair OR pairs OR cohort* OR control* OR group* OR healthy OR age OR sex OR gender OR patient* OR subject* OR participant*)):ti,ab,kw) OR ((propensity NEAR/6 (scor* OR match*)):ti,ab,kw) OR versus:ti OR vs:ti OR compar*:ti OR ((compar* NEAR/1 study):ti,ab,kw) OR (('major clinical study'/de OR 'clinical study'/de OR 'cohort analysis'/de OR 'observational study'/de OR 'cross-sectional study'/de OR 'multicenter study'/de OR 'correlational study'/de OR 'follow up'/de OR cohort*:ti,ab,kw OR 'follow up':ti,ab,kw OR followup:ti,ab,kw OR longitudinal*:ti,ab,kw OR prospective*:ti,ab,kw OR retrospective*:ti,ab,kw OR observational*:ti,ab,kw OR 'cross sectional*':ti,ab,kw OR cross?ectional*:ti,ab,kw OR multicent*:ti,ab,kw OR 'multi-cent*':ti,ab,kw OR consecutive*:ti,ab,kw) AND (group:ti,ab,kw OR groups:ti,ab,kw OR subgroup*:ti,ab,kw OR versus:ti,ab,kw OR vs:ti,ab,kw OR compar*:ti,ab,kw OR 'odds ratio*':ab OR 'relative odds':ab OR 'risk ratio*':ab OR 'relative risk*':ab OR 'rate ratio':ab OR aor:ab OR arr:ab OR rrr:ab OR (('or' OR 'rr') NEAR/6 ci):ab))) OR 'observational study':ti,ab,kw #7 #3 AND #4 **– SR's** 40 #8 #3 AND #5 NOT #7 **– RCT's** 73 #9 #3 AND #6 NOT (#7 OR #8) **– observationele studies** 203 #10 #7 OR #8 OR #9 316
Medline (OVID)	1 exp Rib Fractures/ or exp Flail Chest/ or 'broken rib*'.ti,ab,kf. or ((rib or ribs or ribcage or 'rib cage' or costa or costal) adj3 fracture*).ti,ab,kf. or 'flail chest'.ti,ab,kf. (6595) 2 exp Fracture Fixation/ or ((rib* OR operative OR surgical OR internal) adj3 fixation*).ti,ab,kf. OR (fix* adj3 fracture*).ti,ab,kf. OR (rib adj3 (plate OR stent OR osteosynthesis)).ti,ab,kf. (87679) 3 1 and 2 (790) 4 limit 3 to yr="2000 -Current" (618) 5 4 not (comment/ or editorial/ or letter/ or ((exp animals/ or exp models, animal/) not humans/)) (589) 6 meta-analysis/ or meta-analysis as topic/ or (metaanaly* or meta-analy* or metanaly*).ti,ab,kf. or systematic review/ or cochrane.jw. or (prisma or prospero).ti,ab,kf. or ((systemati* or scoping or umbrella or "structured literature") adj3 (review* or overview*)).ti,ab,kf. or (systemic* adj1 review*).ti,ab,kf. or ((systemati* or literature or database* or data-base*) adj10 search*).ti,ab,kf. or ((structured or comprehensive* or systemic*) adj3 search*).ti,ab,kf. or ((literature adj3 review*) and (search* or database* or data-base*)).ti,ab,kf. or (("data extraction" or "data source*") and "study selection").ti,ab,kf. or ("search strategy" and "selection criteria").ti,ab,kf. or ("data source*" and "data synthesis").ti,ab,kf. or (medline or pubmed or embase or cochrane).ab. or ((critical or rapid) adj2 (review* or overview* or synthes*)).ti. or (((critical* or rapid*) adj3 (review* or overview* or synthes*)) and (search* or database* or data-base*)).ab. or (metasynthes* or meta-synthes*).ti,ab,kf. (683534) 7 exp clinical trial/ or randomized controlled trial/ or exp clinical trials as topic/ or randomized controlled trials as topic/ or Random Allocation/ or Double-Blind Method/ or Single-Blind Method/ or (clinical trial, phase i or clinical trial, phase ii or clinical trial, phase iii or clinical trial, phase iv or controlled clinical trial or randomized controlled trial or multicenter study or clinical trial).pt. or random*.ti,ab. or (clinic* adj trial*).tw. or ((singl* or doubl* or treb* or tripl*) adj (blind$3 or mask$3)).tw. or Placebos/ or placebo*.tw. (2615479)

	8 Case-control Studies/ or clinical trial, phase ii/ or clinical trial, phase iii/ or clinical trial, phase iv/ or comparative study/ or control groups/ or controlled before-after studies/ or controlled clinical trial/ or double-blind method/ or historically controlled study/ or matched-pair analysis/ or single-blind method/ or (((control or controlled) adj6 (study or studies or trial)) or (compar* adj (study or studies)) or ((control or controlled) adj1 active) or "open label*" or ((double or two or three or multi or trial) adj (arm or arms)) or (allocat* adj10 (arm or arms)) or placebo* or "sham-control*" or ((single or double or triple or assessor) adj1 (blind* or masked)) or nonrandom* or "non-random*" or "quasi-experiment*" or "parallel group*" or "factorial trial" or "pretest posttest" or (phase adj5 (study or trial)) or (case* adj6 (matched or control*)) or (match* adj6 (pair or pairs or cohort* or control* or group* or healthy or age or sex or gender or patient* or subject* or participant*)) or (propensity adj6 (scor* or match*))).ti,ab,kf. or (confounding adj6 adjust*).ti,ab. or (versus or vs or compar*).ti. or ((exp cohort studies/ or epidemiologic studies/ or multicenter study/ or observational study/ or seroepidemiologic studies/ or (cohort* or 'follow up' or followup or longitudinal* or prospective* or retrospective* or observational* or multicent* or 'multi-cent*' or consecutive*).ti,ab,kf.) and ((group or groups or subgroup* or versus or vs or compar*).ti,ab,kf. or ('odds ratio*' or 'relative odds' or 'risk ratio*' or 'relative risk*' or aor or arr or rrr).ab. or (("OR" or "RR") adj6 CI).ab.)) (5476978) 9 5 and 6 (35) **– SRs** 10 (5 and 7) not 9 (64) **- RCTs** 11 (5 and 8) not (9 or 10) (165) **– observationele studies** 12 9 or 10 or 11 (264)

Module 10: Fixatie na een sternumfractuur

Evidence tabel

Study reference	Study characteristics	Patient characteristics [2]	Intervention (I)	Comparison / control (C) [3]	Follow-up	Outcome measures and effect size [4]	Comments
Christian (2022)	Type of study: Retrospective analysis. Setting and country: 850 trauma centers across the United States. Funding and conflicts of interest: The authors did not receive any funding for this research. The authors have no conflicts of interest or competing interests.	Inclusion criteria: • Patients 18 years and older with traumatic sternal fractures. Exclusion criteria: • Not reported. N total at baseline: Intervention: N = 112 Control: N = 224 Important prognostic factors[2]: *Median age ± IQR:* *I: 50 (33)* *C: 49 (28)* *Sex:* *I: 84/112 (75%) M* *C: 179/224 (79.9%) M* Groups comparable at baseline?	Describe intervention (treatment/procedure/test): Surgical stabilization of sternum fracture.	Describe control (treatment/procedure/test): Non-operative management.	Length of follow-up: Not reported. Loss-to-follow-up: None.	**Length of hospital admission in days, median (IQR)** I: 16 (12) days C: 7 (12) days **Length of ICU admission in days, median (IQR)** I: 9.5 (11) days C: 5.5 (9) days **Mechanical ventilation in days, median (IQR)** I: 8 (9) days	Author's conclusion: To our knowledge, this is the first large national analysis comparing outcomes of sternum fracture patients under- going SSSF to a similarly matched group who underwent NOM. We found that SSSF patients had a decreased mortality rate, whereas a similar rate of complications

		Yes.				C: 5 (8) days **<u>Mortality, n/N (%)</u>** I: 3/112 (2.7%) C: 25/224 (11.2%) **<u>Pneumonia, n/N (%)</u>** I: 2/112 (1.8%) C: 2/224 (0.9%) **<u>Re-intervention, n/N (%) (unplanned return to operating room)</u>** I: 3/112 (2.7%) C: 4/224 (1.8%)	compared to NOM patients. However, SSSF patients had a longer hospital LOS and days on the ventilator. Due to a lack of guidelines pertaining to patient selection for SSSF and no RCTs in the literature, a concerted effort is needed to develop an algorithmic approach and define which patients will benefit from SSSF.
Xu (2021)	<u>Type of study:</u> Observational study. <u>Setting and country:</u> Hospital, China.	<u>Inclusion criteria</u>: • Patients who received sternal fracture treatment in the hospital. <u>Exclusion criteria</u>:	<u>Describe intervention (treatment/procedure/test):</u> Sternum fixation (steel wire fixation + internal fixation)	<u>Describe control (treatment/procedure/test):</u> Conservative treatment.	<u>Length of follow-up</u>: 12 (range 10-15) months. <u>Loss-to-follow-up</u>: None.	**<u>Pain (VAS-score), mean (SD)</u>** I1: 2.53 (1.51) points I2: 4.12 (1.54) points C: 2.40 (1.35) points	<u>Author's conclusion:</u> The early and accurate diagnosis of suspected sternal fracture following

	<u>Funding and conflicts of interest:</u> This work was supported by the open fund of the State Key Laboratory of Trauma, Burn and Compound injury of Army Military Medical University. All authors have completed the ICMJE uniform disclosure form (available at http://dx.doi.org/10.21037/jtd-20-3603). All authors report grants from the State Key Laboratory of Trauma, Burn and Compound injury of Army Military Medical University, during the conduct of the study.	• Patients with either undisplaced sternal fracture, internal bleeding, or multiple severe injuries. <u>N total at baseline</u>: Intervention1: N = 15 Intervention 2: N = 10 Control: N = 17 <u>Important prognostic factors</u>[2]: *age >60* *I1: 2/15* *I2: 4/10* *C: 7/17* *Sex:* *I1: 6/15 M* *I2: 4/10 M* *C: 7/17 M* Groups comparable at baseline? Yes.				**<u>Patients' satisfaction, mean (SD) 3 months follow-up</u>** I1: 88.40 (5.95) I2: 88.30 (4.90) C: 86.41 (5.32) **<u>Patients' satisfaction, mean (SD) 6 months follow-up</u>** I1: 92.73 (4.59) I2: 92.40 (4.20) C: 90.24 (4.32) **<u>Patients' satisfaction, mean (SD) 12 months follow-up</u>** I1: 95.53 (3.85) I2: 91.40 (4.35) C: 91.8 (4.41)	trauma is very important, and the application of timely and correct clinical treatment is the key requirement for obtaining successful outcomes (29). Conservative therapy is also an acceptable treatment for undisplaced sternum fracture patients and is especially useful in patients who do not wish to undergo internal fixation (30). Our research used a nickel-titanium memory alloy fixator for 15 patients with displaced sternal fractures and achieved a

							good therapeutic effect. The Ni-Ti memory ally fixator is an ideal internal fixation material that can relieve pain effectively after surgery, mobilizes patients more quickly, and reduces pulmonary complications. However, in the future, a more absorbable material with stronger plasticity which can provide a more precise fit is needed better to suit individual patients' needs (31). The successful use of autologous stem cells for

							sternal reconstruction has also been reported and may hold future promise in treating sternal fracture (32). The limitations to this study are its small sample size and limited follow-up period. Studies with larger sample size and longer follow-up periods are required to confirm the results.

Risk of bias tabel

Author, year	Selection of participants Was selection of exposed and non-exposed cohorts drawn from the same population? Definitely yes, probably yes, probably no, definitely no	Exposure Can we be confident in the assessment of exposure? Definitely yes, probably yes, probably no, definitely no	Outcome of interest Can we be confident that the outcome of interest was not present at start of study? Definitely yes, probably yes, probably no, definitely no	Confounding-assessment Can we be confident in the assessment of confounding factors? Definitely yes, probably yes, probably no, definitely no	Confounding-analysis Did the study match exposed and unexposed for all variables that are associated with the outcome of interest or did the statistical analysis adjust for these confounding variables? Definitely yes, probably yes, probably no, definitely no	Assessment of outcome Can we be confident in the assessment of outcome? Definitely yes, probably yes, probably no, definitely no	Follow up Was the follow up of cohorts adequate? In particular, was outcome data complete or imputed? Definitely yes, probably yes, probably no, definitely no	Co-interventions Were co-interventions similar between groups? Definitely yes, probably yes, probably no, definitely no	Overall Risk of bias Low, Some concerns, High
Christian (2022)	Definitely no Reason: Two groups were compared: trauma patients under- going	No information. Reason: -	Probably yes Reason: -	No information. Reason: -	No information. Reason: -	No information. Reason: -	No information. Reason: -	No information. Reason: -	**Some concerns**

	SSSF and patients undergoing NOM for traumatic sternum fractures. Propensity scores were calculated to match patients undergoing SSSF to patients managed with NOM in a 1:2 ratio using age, sex, comorbidities, trauma Injury Severity Score (ISS) and severe grade (> 3) for the Abbreviated Injury Scale (AIS) of the head, thorax and abdomen.								

Xu (2021)	*Definitely yes* Reason: We collected the detailed clinical data of 81 patients who received sternal fracture treatment in our hospital between August 2016 to July 2019. Thirty-nine patients with either undisplaced sternal fracture, internal bleeding, or multiple severe injuries were excluded from the study. The remaining 42 patients with fracture and displacement were included, and of these, 25 patients	No information. Reason: -	*Probably yes* Reason: Thirty-nine patients with either undisplaced sternal fracture, internal bleeding, or multiple severe injuries were excluded from the study.	No information. Reason: -	No information. Reason: -	No information. Reason: -	No information. Reason: -	No information. Reason: -	**Some concerns**

	received internal fixation treatment, and 17 were selected for non-operative treatment (non-operative treatment group). In patients receiving surgery, 10 were treated with fixed steel wire (steel wire fixed treatment group), and 15 were fixed with memory alloy (memory alloy fixed treatment group).								

Exclusie tabel

Author and year	Reason for exclusion
Klei (2021)	Included studies in the SR did not meet the PICO or had the wrong study design (case series or studies with one intervention arm)
Klei (2019)	Included studies in the SR did not meet the PICO or had the wrong study design (case series or studies with one intervention arm)

Zoekverantwoording

Algemene informatie

Richtlijn: NVvH Thoracale letsels na trauma	
Uitgangsvraag: Wat is de plaats van fixatie van de ribben na een sternumfractuur?	
Database(s): Medline (OVID), Embase	Datum: 21-03-2023
Periode: >2000	Talen: Geen beperking
Literatuurspecialist: Linda Niesink	
BMI zoekblokken: voor verschillende opdrachten wordt (deels) gebruik gemaakt van de zoekblokken van BMI-Online https://blocks.bmi-online.nl/ Bij gebruikmaking van een volledig zoekblok zal naar de betreffende link op de website worden verwezen.	
Toelichting en opmerkingen: → Voor deze vraag is gezocht op de elementen **sternumfractuur** (in het blauw) en **fixatie (van het sternum)** (in het groen). → De genoemde sleutelartikelen van Klei (2019) en Klei (2021) zitten in de zoekopbrengst. Recinos (2009) noemt niets over fixatie. → Vanwege de lage aantallen zijn ook de overige studiedesigns meegenomen. → Resultaten staan in Rayyan.	
Te gebruiken voor richtlijnen tekst: In de databases Embase (via embase.com) en Medline (via OVID) is op 21-03-2023 met relevante zoektermen gezocht vanaf 2000 naar systematische reviews, RCT's, observationele en overige studiedesigns over fixatie na een sternumfractuur. De literatuurzoekactie leverde 184 unieke treffers op.	

Zoekopbrengst

	EMBASE	**OVID/MEDLINE**	**Ontdubbeld**
SRs	4	5	5
RCTs	1	6	4
Observationele studies	37	19	40
Overige studiedesigns	93	96	135
Totaal	135	126	**184**

Zoekstrategie

Database	Zoektermen		
Embase	*No.*	*Query*	*Results*
	#1	'sternum fracture'/exp OR 'sternum fracture*':ti,ab,kw OR 'breastbone fracture*':ti,ab,kw OR 'broken sternum':ti,ab,kw OR 'fractured manubrium sterni':ti,ab,kw OR 'fractured sternal edge':ti,ab,kw OR 'fractured sternal manubrium':ti,ab,kw OR 'fractured sternum':ti,ab,kw OR 'fractured xiphoid process':ti,ab,kw OR 'manubrial fracture*':ti,ab,kw OR 'manubriosternal fracture*':ti,ab,kw OR 'manubrium fracture*':ti,ab,kw OR 'manubrium sterni fracture*':ti,ab,kw OR 'sternovertebral fracture*':ti,ab,kw OR 'sternal body fracture*':ti,ab,kw OR 'sternal bone fracture*':ti,ab,kw OR 'sternal fracture*':ti,ab,kw OR 'sternal plate fracture*':ti,ab,kw OR 'xiphoid fracture*':ti,ab,kw	1131
	#2	'fracture fixation'/exp OR 'sternal closure system'/exp OR (((fracture OR bone OR sternal OR operative OR surgical) NEAR/3 fixation*):ti,ab,kw) OR 'arix':ti,ab,kw OR 'sternal system bone plate*':ti,ab,kw OR 'sternal system bone screw*':ti,ab,kw OR 'sternal closure':ti,ab,kw OR 'sternal plate*':ti,ab,kw	114737
	#3	#1 AND #2 AND #3 AND [2000-2023]/py NOT (('animal'/exp OR 'animal experiment'/exp OR 'animal model'/exp OR 'nonhuman'/exp) NOT 'human'/exp) NOT ('conference abstract'/it OR 'conference review'/it OR 'editorial'/it OR 'letter'/it OR 'note'/it)	135
	#4	'meta analysis'/exp OR 'meta analysis (topic)'/exp OR metaanaly*:ti,ab OR 'meta analy*':ti,ab OR metanaly*:ti,ab OR 'systematic review'/de OR 'cochrane database of systematic reviews'/jt OR prisma:ti,ab OR prospero:ti,ab OR (((systemati* OR scoping OR umbrella OR 'structured literature') NEAR/3 (review* OR overview*)):ti,ab) OR ((systemic* NEAR/1 review*):ti,ab) OR (((systemati* OR literature OR database* OR 'data base*') NEAR/10 search*):ti,ab) OR (((structured OR comprehensive* OR systemic*) NEAR/3 search*):ti,ab) OR (((literature NEAR/3 review*):ti,ab) AND (search*:ti,ab OR database*:ti,ab OR 'data base*':ti,ab)) OR (('data extraction':ti,ab OR 'data source*':ti,ab) AND 'study selection':ti,ab) OR ('search strategy':ti,ab AND 'selection criteria':ti,ab) OR ('data source*':ti,ab AND 'data synthesis':ti,ab) OR medline:ab OR pubmed:ab OR embase:ab OR cochrane:ab OR (((critical OR rapid) NEAR/2 (review* OR overview* OR synthes*)):ti) OR ((((critical* OR rapid*) NEAR/3 (review* OR overview* OR synthes*)):ab) AND (search*:ab OR database*:ab OR 'data base*':ab)) OR metasynthes*:ti,ab OR 'meta synthes*':ti,ab	910066
	#5	'clinical trial'/exp OR 'randomization'/exp OR 'single blind procedure'/exp OR 'double blind procedure'/exp OR 'crossover procedure'/exp OR 'placebo'/exp OR 'prospective study'/exp OR rct:ab,ti OR random*:ab,ti OR 'single blind':ab,ti OR 'randomised controlled trial':ab,ti OR 'randomized controlled trial'/exp OR placebo*:ab,ti	3747433
	#6	'major clinical study'/exp OR 'case control study'/de OR 'comparative study'/exp OR 'control group'/de OR 'controlled study'/de OR 'controlled clinical trial'/de OR 'crossover procedure'/de OR 'double blind procedure'/de OR 'phase 2 clinical trial'/de OR 'phase 3 clinical trial'/de OR 'phase 4 clinical trial'/de OR 'pretest posttest design'/de OR 'pretest posttest control group design'/de OR 'quasi experimental study'/de OR 'single blind procedure'/de OR 'triple blind procedure'/de OR (((control OR controlled) NEAR/6 trial):ti,ab,kw) OR (((control OR controlled) NEAR/6 (study OR studies)):ti,ab,kw) OR (((control OR controlled)	15122389

	NEAR/1 active):ti,ab,kw) OR 'open label*':ti,ab,kw OR (((double OR two OR three OR multi OR trial) NEAR/1 (arm OR arms)):ti,ab,kw) OR ((allocat* NEAR/10 (arm OR arms)):ti,ab,kw) OR placebo*:ti,ab,kw OR 'sham-control*':ti,ab,kw OR (((single OR double OR triple OR assessor) NEAR/1 (blind* OR masked)):ti,ab,kw) OR nonrandom*:ti,ab,kw OR 'non-random*':ti,ab,kw OR 'quasi-experiment*':ti,ab,kw OR crossover:ti,ab,kw OR 'cross over':ti,ab,kw OR 'parallel group*':ti,ab,kw OR 'factorial trial':ti,ab,kw OR ((phase NEAR/5 (study OR trial)):ti,ab,kw) OR ((case* NEAR/6 (matched OR control*)):ti,ab,kw) OR ((match* NEAR/6 (pair OR pairs OR cohort* OR control* OR group* OR healthy OR age OR sex OR gender OR patient* OR subject* OR participant*)):ti,ab,kw) OR ((propensity NEAR/6 (scor* OR match*)):ti,ab,kw) OR versus:ti OR vs:ti OR compar*:ti OR ((compar* NEAR/1 study):ti,ab,kw) OR (('major clinical study'/de OR 'clinical study'/de OR 'cohort analysis'/de OR 'observational study'/de OR 'cross-sectional study'/de OR 'multicenter study'/de OR 'correlational study'/de OR 'follow up'/de OR cohort*:ti,ab,kw OR 'follow up':ti,ab,kw OR followup:ti,ab,kw OR longitudinal*:ti,ab,kw OR prospective*:ti,ab,kw OR retrospective*:ti,ab,kw OR observational*:ti,ab,kw OR 'cross sectional*':ti,ab,kw OR cross?ectional*:ti,ab,kw OR multicent*:ti,ab,kw OR 'multi-cent*':ti,ab,kw OR consecutive*:ti,ab,kw) AND (group:ti,ab,kw OR groups:ti,ab,kw OR subgroup*:ti,ab,kw OR versus:ti,ab,kw OR vs:ti,ab,kw OR compar*:ti,ab,kw OR 'odds ratio*':ab OR 'relative odds':ab OR 'risk ratio*':ab OR 'relative risk*':ab OR 'rate ratio':ab OR aor:ab OR arr:ab OR rrr:ab OR (('or' OR 'rr') NEAR/6 ci):ab))) OR 'observational study':ti,ab,kw #7 #3 AND #4 **– SR's** 4 #8 #3 AND #5 NOT #7 **– RCT's** 1 #9 #3 AND #6 NOT (#7 OR #8) **– observationele studies** 37 #10 #7 OR #8 OR #9 42 #11 #3 NOT #10 **– overige studiedesigns** 93
Medline (OVID)	1 "Sternum"/in or ('sternum fracture*' or 'breastbone fracture*' or 'broken sternum' or 'fractured manubrium sterni' or 'fractured sternal edge' or 'fractured sternal manubrium' or 'fractured sternum' or 'fractured xiphoid process' or 'manubrial fracture*' or 'manubriosternal fracture*' or 'manubrium fracture*' or 'manubrium sterni fracture*' or 'sternovertebral fracture*' or 'sternal body fracture*' or 'sternal bone fracture*' or 'sternal fracture*' or 'sternal plate fracture*' or 'xiphoid fracture*').ti,ab,kf. (1137) 2 exp Fracture Fixation/ or ((fracture or bone or sternal or operative or surgical) adj3 fixation*).ti,ab,kf. or (arix or 'sternal system bone plate*' or 'sternal system bone screw*' or 'sternal closure' or 'sternal plate*').ti,ab,kf. (79596) 3 1 and 2 (174) 4 limit 3 to yr="2000 -Current" (127) 5 4 not (comment/ or editorial/ or letter/ or ((exp animals/ or exp models, animal/) not humans/)) (126) 6 meta-analysis/ or meta-analysis as topic/ or (metaanaly* or meta-analy* or metanaly*).ti,ab,kf. or systematic review/ or cochrane.jw. or (prisma or prospero).ti,ab,kf. or ((systemati* or scoping or umbrella or "structured literature") adj3 (review* or overview*)).ti,ab,kf. or (systemic* adj1 review*).ti,ab,kf. or ((systemati* or literature or database* or data-base*) adj10 search*).ti,ab,kf. or ((structured or comprehensive* or systemic*) adj3 search*).ti,ab,kf. or ((literature adj3 review*) and (search* or database* or data-base*)).ti,ab,kf. or (("data extraction" or "data source*") and "study selection").ti,ab,kf. or ("search strategy" and "selection criteria").ti,ab,kf. or ("data source*" and "data synthesis").ti,ab,kf. or (medline or pubmed or embase or

	cochrane).ab. or ((critical or rapid) adj2 (review* or overview* or synthes*)).ti. or (((critical* or rapid*) adj3 (review* or overview* or synthes*)) and (search* or database* or data-base*)).ab. or (metasynthes* or meta-synthes*).ti,ab,kf. (656938) 7 exp clinical trial/ or randomized controlled trial/ or exp clinical trials as topic/ or randomized controlled trials as topic/ or Random Allocation/ or Double-Blind Method/ or Single-Blind Method/ or (clinical trial, phase i or clinical trial, phase ii or clinical trial, phase iii or clinical trial, phase iv or controlled clinical trial or randomized controlled trial or multicenter study or clinical trial).pt. or random*.ti,ab. or (clinic* adj trial*).tw. or ((singl* or doubl* or treb* or tripl*) adj (blind$3 or mask$3)).tw. or Placebos/ or placebo*.tw. (2568292) 8 Case-control Studies/ or clinical trial, phase ii/ or clinical trial, phase iii/ or clinical trial, phase iv/ or comparative study/ or control groups/ or controlled before-after studies/ or controlled clinical trial/ or double-blind method/ or historically controlled study/ or matched-pair analysis/ or single-blind method/ or (((control or controlled) adj6 (study or studies or trial)) or (compar* adj (study or studies)) or ((control or controlled) adj1 active) or "open label*" or ((double or two or three or multi or trial) adj (arm or arms)) or (allocat* adj10 (arm or arms)) or placebo* or "sham-control*" or ((single or double or triple or assessor) adj1 (blind* or masked)) or nonrandom* or "non-random*" or "quasi-experiment*" or "parallel group*" or "factorial trial" or "pretest posttest" or (phase adj5 (study or trial)) or (case* adj6 (matched or control*)) or (match* adj6 (pair or pairs or cohort* or control* or group* or healthy or age or sex or gender or patient* or subject* or participant*)) or (propensity adj6 (scor* or match*))).ti,ab,kf. or (confounding adj6 adjust*).ti,ab. or (versus or vs or compar*).ti. or ((exp cohort studies/ or epidemiologic studies/ or multicenter study/ or observational study/ or seroepidemiologic studies/ or (cohort* or 'follow up' or followup or longitudinal* or prospective* or retrospective* or observational* or multicent* or 'multi-cent*' or consecutive*).ti,ab,kf.) and ((group or groups or subgroup* or versus or vs or compar*).ti,ab,kf. or ('odds ratio*' or 'relative odds' or 'risk ratio*' or 'relative risk*' or aor or arr or rrr).ab. or (("OR" or "RR") adj6 CI).ab.)) (5384889) 9 5 and 6 (5) **– SRs** 10 (5 and 7) not 9 (6) **- RCTs** 11 (5 and 8) not (9 or 10) (19) **– observationele studies** 12 9 or 10 or 11 (30) 13 5 not 12 (96) **– overige studiedesigns**

Module 11: Pijnstilling

Evidence tabel

Study reference	Study characteristics	Patient characteristics [2]	Intervention (I)	Comparison / control (C) [3]	Follow-up	Outcome measures and effect size [4]	Comments
Beard (2020)	Type of study: Obervational study. Setting and country: Hospital in two tertiary referral major trauma centers, UK. Funding and conflicts of interest: EB is funded by Cancer Research UK. FGS is	Inclusion criteria: • Adults with multiple rib fractures who received SAP, TEA or PA catheters. Exclusion criteria: • Patients who had more than one type of regional anesthesia or who died within 24 hours of admission to hospital. N total at baseline: • Thoracic epidural (TEA): N = 169 • Serratus anterior plane (SAP): N = 117 • Paravertebral catheter (PA): N = 68 Important prognostic factors[2]: *age ± SD:* *Overall: 61.3 (18.4) years*	Describe intervention (treatment/procedure/test): Thoracic epidural analgesia or Serratur anterior plane or Paravertebral catheter	Describe control (treatment/procedure/test): -	Length of follow-up: No information. Loss-to-follow-up: No information.	**Pain** TEA: - No pain: n = 11 (13.4%) - Mild pain: n = 48 (58.5%) - Moderate pain n = 23 (28.1%) - Severe pain: n = 0 (0%) SAP: - No pain: n = 7 (11.5%) - Mild pain: n = 27 (44.3%) - Moderate pain n = 25 (41.0%) - Severe pain: n = 2 (3.3%) PA: - No pain: n = 2 (3.6%) - Mild pain: n = 36 (64.3%)	Author's conclusion: SAP, TEA and PA all appear to offer the ability to reduce pain scores and improve respiratory function.

	supported by the National Institute for Health Research (NIHR) Senior Investigator Award. TV is supported by NIHR, CRN Research Scholar and Queen Elizabeth hospital charities. C Hillerman n, L Beard, S Millerchip have had conferenc e travel fees funded by Pajunk. E Beard has received unrestrict ed	*Sex:* *Overall, 98 females and 253 males*. <u>Groups comparable at baseline?</u> Partly yes. The PA group had a significantly lower proportion of patients with multiple injuries (polytrauma), endotracheal intubation and significant head injuries. The PA group also had significantly lower rib fracture (RFS) scores representing less severe chest trauma. The patient characteristics in the SAP and TEA groups were more comparable. However, the SAP group did have signifi-cantly more patients with severe head injuries compared with TEA and PA. The adjusted models selected aimed to account for these differences.				- Moderate pain n = 18 (32.1%) - Severe pain: n = 0 (0%) **Mortality** TEA: n = 12 (7.56%) SAP: n = 5 (4.59%) PA: n = 3 (4.55%) **Length of hospital stay** TEA: 18.3 (15.6) days SAP: 22.1 (1.69) days PA: 14.3 (19.7) days	

	research funding from Pfizer for the Smoking Toolkit study (www.smokinginengland.info) outside of the period of this study. E Beard has no conflicts of interest to declare for this study.						
Britt (2015)	Type of study: Retrospective review Setting and country: Level 2 trauma center in Grand Blanc, MI, USA.	Inclusion criteria: • Patients 18 years and older with two or more traumatic rib fractures following blunt thoracic trauma. Exclusion criteria: • No information. N total at baseline: • Epidural catheter: N = 45	Describe intervention (treatment/procedure/test): Epidurals	Describe control (treatment/procedure/test): On-Q pump (subcutaneously for continuous intercostal nerve blocked).	Length of follow-up: No information. Loss-to-follow-up: None.	**Pneumonia or respiratory failure** I: n = 7 (16.3%) C: n = 8 (12.5%)	Author's conclusion: This study did not show a difference in the rate of pneumonia or ventilator-dependent respiratory failure in the CINB vs epidural groups. It was not sufficiently powered. Our data supports a

	Funding and conflicts of interest: The authors report no conflicts of interest in this work.	• Subcutaneously placed catheter for continuous intercostal nerve blockade: N = 64 Important prognostic factors[2]: *age ± SD:* *I: 60.9 (17.3)* *C: 70.5 (6.9)* *Sex:* *I: 31/45 (68.9%) M* *C: 38/64 (58.5%) M* Groups comparable at baseline? Yes, except for age and bilateral fractures.					reduction in hospital days when CINB is used vs epidural. CINB may have advantages over epidurals such as fewer complications, fewer contraindications, and a shorter time to placement. Further studies are needed to confirm these statements.
Hashemzadeh (2011)	Type of study: Observational study. Setting and country: Tabriz Imam Khomeini hospital Funding and	Inclusion criteria: • Patients over 18 years old with more than one rib fractures, GCS>14, absence of recognized epidural catheter insertion contraindication. Exclusion criteria: • One and two rib fractures, patients under conservative treatment of liver or blunt splenic trauma,	Describe intervention (treatment/procedure/test): Thoracic epidural with bupivacaine 0.125% + 1 mg/5ml morphine	Describe control (treatment/procedure/test): Intercostal block	Length of follow-up: No information. Loss-to-follow-up: None.	**Pain** *Cough* I: 3.05 (0.88) C: 4.95 (0.99) *Rest* I: 2.2 (0.74) C: 3.3 (1.005) **ICU length of stay** I: 1.58 (0.95) days C: 1.9 (1.35) days **Ward length of stay** I: 5.7 (1.97) days	Author's conclusion: Thoracic epidural analgesia is superior to intercostals block regarding pain relief of rib fractures. Patients who received epidural analgesia had significantly lower pain scores at all studied times.

	conflicts of interest: No conflict of interest to be declared.	patients with decreased consciousness, patients who suffer from cerebral injury or other injuries and are under mechanical ventilation, patients with coagulopathy, fever and systemic or epidural infection. N total at baseline: • Thoracic epidural with bupivacaine 0.125% + 1 mg/5ml morphine: N = 30 • Intercostal block: N = 30 Important prognostic factors[2]: *age ± SD:* *I: 45.5 (15.4)* *C: 65.4 (7.15)* *Sex:* *I: 95% M* *C: 90% M* Groups comparable at baseline? Yes.				C: 7.65 (3.72) days	
Lynch (2019)	Type of study:	Inclusion criteria: • MRF (≥3 fractures) with no other severe injuries.	Describe intervention (treatment/procedure/test):	Describe control (treatment/procedure/test):	Length of follow-up: No information.	**Pain** *Average pain score on treatment, unadjusted (SE)*	Author's conclusion: In patients requiring regional analgesia,

	Retrospective cohort study. Setting and country: Four non-academic trauma centers, USA. Funding and conflicts of interest: Internal funding was provided by Swedish Medical Center, St. Anthony Hospital, Penrose Hospital, Medical City Plano, Research Medical Center (Kansas	Exclusion criteria: • multi- trauma, defined as an AIS score ≥3 for body regions out- side the chest. N total at baseline: • Epidural analgesia: N = 44 • Continuous intercostal nerve block: N = 41 Important prognostic factors[2]: *Age >65, n (%):* *I: 31 (70.5%)* *C: 28 (68.3%)* *Sex:* *I: 27 (61.4%)M* *C: 27 (65.8%)* Groups comparable at baseline? Yes, apart from baseline incentive spirometry and hours on definitive analgesia.	Epidural analgesia.	Continuous intercostal nerve block.	Loss-to-follow-up: No information.	I: 3.83 (0.25) C: 4.02 (0.42) *Average pain score on treatment, adjusted (SE)* I: 3.85 (0.21) C: 4.37 (0.38) *Mean change in pain from pretreatment, unadjusted (SE)* I: -1.15 (95% CI -1.83 to -0.47) C: -0.95 (95% CI -1.80 to -0.10) *Mean change in pain from pretreatment, adjusted (SE)* I: -1.43 (95% CI -2.09 to -0.78) C: -1.01 (95% CI -1.81) to 0.22) **Mortality** I: 0/44 (0%) C: 0/41 (0%) **Complications** *Any complication* I: 9/44 (20.5%) C: 4/41 (9.8%) **ICU admission** I: 38/44 (86.4%) C: 19/41 (46.3%)	pain management was equivalent with CINB and EPI, but CINB was associated with significantly better clinical outcomes. CINB might offer an efficient alternative for pain control in patients with MRF.

	City, MO), and Wesley Medical Center (Wichita, KS). The authors report no conflicts of interest in this work.					**ICU length of stay** I: 3.5 (6.5) days C: 4.3 (4.0) days **Hospital length of stay** I: 4.3 (10.1) days C: 3.8 (6.6) days	
Malekpour (2017)	Type of study: Prospective propensity score-matched study. Setting and country: Funding and conflicts of interest: No funding	Inclusion criteria: • patients above 18 years of age with an International Classification of Diseases, Ninth Revision (ICD- 9) code of 807 to include rib fractures. Exclusion criteria: • Patients with sternum, larynx, and trachea fractures; • patients with missing data. N total at baseline: • Epidural analgesia: N = 1073	Describe intervention (treatment/procedure/test): Epidural analgesia	Describe control (treatment/procedure/test): Paravertebral block	Length of follow-up: No information. Loss-to-follow-up: None.	**Mortality (after propensity score matching)** I: 8/557 (1.4%) C: 12/557 (2.2%) **Complications (after propensity score matching)** *Any complication* I: 247/557 (44.3%) C: 230/557 (41.3%) *Pneumonia* I: 40/557 (7.2%) C: 40/447 (7.2%) **ICU admission (after propensity score matching)** I: 354/557 (63.6%)	Author's conclusion: Using the NTDB, EA and PVB were not found to be significantly different in management of rib fractures. There was an association between use of a block and improved outcome, but this could be explained by selection of healthier patients to receive a block. Prospective study of this association is recommended.

	The authors declare no conflicts of interest.	• Paravertebral block: N = 1110 <u>Important prognostic factors</u>[2]: *age ± SD:* *I: 58 (48-70)* *C: 54.5 (43-67)* *Sex:* *I: 15 (15-15)* *C: 15 (15-15)* <u>Groups comparable at baseline?</u> Yes				C: 333/557 (59.8%) **Length of hospital stay (after propensity score matching)** I: 8 (6-12) days C: 8 (5-13) days **ICU length of stay (after propensity score matching)** I: 5 (3-8) C: 4 (2-8) **Days of ventilation** I: 4 (2-8) C: 5 (2-11)	
Mohta (2009)	<u>Type of study:</u> Prospective randomized study. <u>Setting and country:</u> Hospital. <u>Funding and conflicts of interest:</u>	<u>Inclusion criteria</u>: • adult patients of either sex, having three or more unilateral fractured ribs. <u>Exclusion criteria</u>: • Unconscious patients; patients with unstable cardiac status or severely altered mental status; those having known liver or kidney disease; and contraindi- cations to TEA or TPVB e.g., known allergy to local anes- thetic drugs, infection at site of	<u>Describe intervention (treatment/procedure/test):</u> Thoracic epidural analgesia	<u>Describe control (treatment/procedure/test):</u> Thoracic paravertebral block	<u>Length of follow-up</u>: No information. <u>Loss-to-follow-up</u>: None.	**Length of ICU stay** I: 6.3 (1.6) days C: 6.8 (4.2) days **Complications** *Pneumonia* I: 2/15 (13.3%) C: 1/15 (6.7%) *Hypotension* I: 1/15 (6.7%) C: 6/15 (40.0%)	<u>Author's conclusion:</u> Continuous bupiva- caine infusion through TPVB is as effec- tive as through TEA for pain management in patients with unilateral fractured ribs and the outcome after two techniques is comparable.

	No information.	needle injection, preexisting spinal deformity, patients on anticoagulants or having abnormal coagulation profile N total at baseline: • Thoracic epidural analgesia: N = 15 • Thoracic paravertebral block: N = 15 Important prognostic factors[2]: *age ± SD:* *I: 38.9 (14.9)* *C: 40.4 (14.8)* *Sex:* *I: 12 M* *C: 12 M* Groups comparable at baseline? Yes.					
Shapiro (2017)	Type of study: Retrospective study. Setting and country:	Inclusion criteria: • Patients with multiple rib fractures admitted to our trauma service between 2008 and 2014. Rib fractures were identified by chest X-ray, CT scan, or both.	Describe intervention (treatment/procedure/test): Epidural analgesia.	Describe control (treatment/procedure/test): Paravertebral analgesic pump	Length of follow-up: No information. Loss-to-follow-up: None.	**Pain** *Mean change in pain* I: 3.0 (6.4 before to 3.4 after, 46% relative improvement) C: 4.0 (before 6.0 to 1.9 after; 68% relative improvement)	Author's conclusion: The use of a paravertebral analgesic pump catheter is a safe and useful treatment for controlling pain in

	Level 2 trauma center. Funding and conflicts of interest: No information.	Exclusion criteria: • Patients with traumatic brain injury or ventilator support N total at baseline: Epidural analgesia: N = 31 Paravertebral analgesic pump: N = 79 Important prognostic factors[2]: *age ± SD:* *I: 61.4 (18.1)* *C: 68.7 (18.1)* *Sex:* *I: 63% M* *C: 63.3% M* Groups comparable at baseline? Yes				**ICU length of stay** I: 2.13 (1.9) days C: 3.14 (2.8) days **Total length of stay** I: 6.77 (2.6) days C: 6.08 (3.69) days	patients with trauma having multiple rib fractures. It compares well with epidural analgesic treatment in such patients. It appears to be particularly useful in older patients for whom there are multiple challenges to pain management and for which treatment that is well tolerated and easily inserted is a benefit.
Sheets (2020)	Type of study: Retrospective chart review. Setting and country: Level 1 trauma	Inclusion criteria: • 18 years or older, blunt mech- anism of trauma, presence of 3 or more rib fractures, and use of epidural analgesia or intercostal nerve block using liposomal bupivacaine. Exclusion criteria:	Describe intervention (treatment/procedure/test): Epidural analgesia.	Describe control (treatment/procedure/test): Rib block	Length of follow-up: No information. Loss-to-follow-up: None.	**Mortality** I: 1/58 (2%) C: 2/58 (3%) **Hospital length of stay** I: 11 (9.0) days C: 8 (6.0) days **ICU length of stay** I: 5 (6.0) days C: 2 (5.0) days	Author's conclusion: Patients who received intercostal nerve blocks with liposomal bupivacaine required intubation less frequently and had shorter ICU and hospital LOS compared with

	center, USA. Funding and conflicts of interest: No information.	• Patients with a Glasgow Coma • Scale score <14 on arrival and those intubated before arrival or during their initial resuscitation N total at baseline: Epidural: N = 58 Rib block: N = 58 Important prognostic factors[2]: *age ± SD:* *I: 60 (19) years* *C: 60 (19) years* *Sex:* *I: 39/58 (67%)* *C: 39/58 (67%)* Groups comparable at baseline? Yes					epidural analgesia patients. These results suggest that intercostal nerve blocks with liposomal bupivacaine might be equal or superior to epidural analgesia.
Singh (2017)	Type of study: Pilot RCT. Setting and country: Tertiary emergency	Inclusion criteria: • Trauma patients with rib fractures; • Patients aged 18 to 60 years • Rib fractures that induced any respiratory symptoms (pain in breathing, coughing, and moving, shortness	Describe intervention (treatment/procedure/test): Epidural analgesia.	Describe control (treatment/procedure/test): Erector spinae plane block	Length of follow-up: 48 hours. Loss-to-follow-up: None.	**Opioid consumption** I: 5.22 (2.11) mg C: 5.38 (2.6) mg	Author's conclusion: Total morphine consumption was not statistically different in this pilot trial among the two groups. ESP block may provide similar analgesia with

	departme nt. <u>Funding and conflicts of interest:</u> There are no conflicts of interest and no funding.	of breath, or pain in taking a deep breath) • Having a history of trauma not older than one week with multiple, unilateral, or bilateral rib fractures. <u>Exclusion criteria</u>: • Patients with long-standing analgesic therapy • Opioid dependence • Communication difficulty • Those on antiplatelets or anticoagulants (low molecular weight heparin or oral anticoagulant) • Diagnosed with any bleeding disorder. • Haemodynamically unstable patients (patients with systolic blood pressure below 90 mmHg or on any inotropic infusion) • Intubated patients • Those on mechanical ventilation. <u>N total at baseline</u>: Epidural: N = 20 Rib block: N = 20					better haemodynamic stability compared to TEA in patients with multiple traumatic rib fractures.

		Important prognostic factors[2]: *age ± SD:* *I: 35.4 (10.1) years* *C: 34.9 (9.5) years* *Sex:* *I: 14/20 M* *C: 15/20 M* Groups comparable at baseline? Yes					
Shelley (2016)	Type of study: Prospective study. Setting and country: Level 1 trauma center, Kansas USA. Funding and conflicts of interest: The authors have none to declare.	Inclusion criteria: • registry participants 18 years of age or older presenting with three or more acute rib fractures occurring either unilaterally or bilaterally and who were able to assess their pain severity using a pain intensity scale. Exclusion criteria: • Patients who were pregnant, sustained rib fractures greater than 24 hours prior to presentation, were unable to provide informed consent, reported allergies to local anesthetics	Describe intervention (treatment/procedure/test): Thoracic epidural analgesia	Describe control (treatment/procedure/test): Posterior paramedian subrhomboidal analgesia	Length of follow-up: No information. Loss-to-follow-up: None.	**ICU length of stay** I: median 2.0 (mean 3.1 SD 2.7) C: median 3.0 (mean 4.9 SD 4.7) **Length of stay** I: median 8.0 (mean 9.8 SD 6.1) C: median 11.0 (mean 14.8 SD 10.0) **Hypotension** I: 6/19 (32%) C: 2/11 (18%)	Author's conclusion: In patients with rib fractures, PoPS analgesia may provide pain control equivalent to TEA while being less invasive and more readily placed by a variety of hospital staff. This pilot study is limited by its small sample size, and therefore additional studies are needed to prove equivalence of PoPS compared to TEA.

		typically used for the procedures, had chronic pain requiring 20mg of oral morphine equivalent or greater, or whose pain in other anatomical areas limited rib fracture pain self assessment <u>N total at baseline</u>: Thoracic epidural analgesia: N = 19 Posterior paramedian subrhomboidal analgesia: N = 11 <u>Important prognostic factors</u>[2]: *age ± SD:* *I: 55 (13.0) years* *C: 63 (14.0) years* *Sex:* *I: 11/19 M* *C: 10/11 M* <u>Groups comparable at baseline?</u> Yes					

Risk of bias tabel

Randomized controlled trial(s)

Study reference	Was the allocation sequence	Was the allocation	Blinding: Was knowledge of the allocated	Was loss to follow-up (missing	Are reports of the study free of	Was the study apparently	Overall risk of bias

(first author, publication year)	**adequately generated?** Definitely yes Probably yes Probably no Definitely no	**adequately concealed?** Definitely yes Probably yes Probably no Definitely no	**interventions adequately prevented?** **Were patients/healthcare providers/data collectors/assessors/data analysts blinded?** Definitely yes Probably yes Probably no Definitely no	**outcome data) infrequent?** Definitely yes Probably yes Probably no Definitely no	**selective outcome reporting?** Definitely yes Probably yes Probably no Definitely no	**free of other problems that could put it at a risk of bias?** Definitely yes Probably yes Probably no Definitely no	**If applicable/necessary, per outcome measure** **LOW** **Some concerns** **HIGH**
Mohta (2009)	Definitely yes Reason: Thirty adult patients of either sex, having three or more unilateral fractured ribs, were randomized to receive continuous bupivacaine infusion through either thoracic epidural or thoracic paravertebral catheter.	Definitely yes Reason: After taking written informed consent from the patients, they were randomly allocated, using sealed envelope technique, to one of the two groups of 15 patients each.	Definitely no. Reason: This study has certain limitations. The study could not be double blinded as the bolus dose requirement and strength of local anesthetic required for infusion were different in the two groups.	Definitely yes. Reason: No lost to follow-up reported.	Probably yes. Reason: -	Probably yes. Reason: -	Some concerns.
Singh (2017)	Definitely yes.	Definitely yes.	Probably yes.		Probably yes.	Probably yes.	Low.

	Reason: Simple randomisation was done in two groups using computer-generated random numbers	Reason: Group allocation was concealed in an opaque envelope with a sequence written on the top of the envelope. The envelopes were kept in a sequence and locked, accessible only to the trial coordinator. The trial coordinator was instructed to open the envelope and convey the group allocation once a patient was enrolled on the study.	Reason: To blind the observer to the origin of the catheter, a sham dressing was put on the upper back. Patients were not blinded.	Reason: No lost to follow-up reported.	Reason: -	Reason: -	

Observational studies

Author, year	**Selection of participants** **Was selection**	**Exposure** **Can we be confident in the**	**Outcome of interest** **Can we be confident**	**Confounding-assessment** **Can we be confident in the assessment of**	**Confounding-analysis** **Did the study match exposed and unexposed for all variables**	**Assessment of outcome** **Can we be confident in the**	**Follow up** **Was the follow up of cohorts adequate? In particular, was**	**Co-interventions** **Were co-interventions similar**	**Overall Risk of bias**

	of exposed and non-exposed cohorts drawn from the same population?	**assessment of exposure?**	**that the outcome of interest was not present at start of study?**	**confounding factors?**	**that are associated with the outcome of interest or did the statistical analysis adjust for these confounding variables?**	**assessment of outcome?**	**outcome data complete or imputed?**	**between groups?**	
	Definitely yes, probably yes, probably no, definitely no	Definitely yes, probably yes, probably no, definitely no	Definitely yes, probably yes, probably no, definitely no	Definitely yes, probably yes, probably no, definitely no	Definitely yes, probably yes, probably no, definitely no	Definitely yes, probably yes, probably no, definitely no	Definitely yes, probably yes, probably no, definitely no	Definitely yes, probably yes, probably no, definitely no	Low, Some concerns, High
Beard (2020)	*Probably yes* Reason: 354 patients who received either SAP, TEA	*Probably yes* Reason: We included all consecutive adults with MRFs who received SAP, TEA or PA catheters and	*Definitely yes* Reason: -	*Definitely yes* Reason: Unadjusted and adjusted models are reported for each outcome. We adjusted for confounders	*No information.* Reason: -	*Probably yes* Reason: Missing data were handled using a pairwise deletion approach. Missing data	*No information.* Reason: -	*No information.* Reason: -	**Low**

	or PA at two tertiary referral major trauma centers in the UK were included (2016–2018)	were admitted to hospital between 2016 and 2018 in two tertiary referral major trauma centers in the UK.		that were chosen a priori, based on their expected associations with MRFs. For pain and inspiratory volumes, the following covariates were adjusted for: age, gender, ISS and RFS score. For in-hospital mortality and LOS, the following covariates were adjusted for: age, gender, ISS, RFS score, CCI, most severely injured body region (head, chest and other), surgical rib fixation and isolated chest injury versus polytrauma.		were as follows for the sample overall who had either a PA, TEA or SAP catheter (n=354): age: n=3, ISS: n=8, RFS: n=31, CCI score: n=2, sex: n=3, isolated or polytrauma: n=3, mechanism: n=20, mechanism type: n=20, most severely injured body region: n=20, AIS score for the head, face, thorax, abdomen, spine, pelvis, limbs and other: n=20, preinspiratory and postinspiratory volume: n=231 and pre and post pain scores: n=155.			

						Missing pain scores and inspiratory volumes were a result of patient inability to perform the tests due to intubation (n=50), confusion/reduced conscious level (n=8) and patient refusal (n=2). The remaining missing data had no reason provided.			
Britt (2015)	*Probably yes* Reason: All subjects studied were admitted to the hospital and had	*Probably yes* Reason: We searched the trauma registry data from 2008 to 2013 for all patients 18 years and older that presented to our trauma center with two	Definitely yes Reason: -	*Probably yes* Reason: The confounding factors between groups were controlled for by comparing the demographic data for each	*Definitely yes* Reason: A multiple regression analysis was calculated to control for potential confounding factors (age, sex, ISS, and	*No information*. Reason: -	*No information*. Reason: -	*No information*. Reason: -	**Some concerns**

	their pain treated with either an epidural or a subcutaneously placed CINB.	or more traumatic rib fractures following blunt thoracic trauma.		group, which included age, sex, smoker versus nonsmoker, and injury severity score (ISS). Pre-existing comorbidities of conges- tive heart failure, anticoagulant use, and the presence of a primary respiratory disorder were noted.	number of fractures).				
Hashemzadeh (2011)	*Definitely yes* Reason: All the patients referring to Imam Hospital who were admitted in ICU and had the necessary inclusion criteria (in the case	*Definitely yes* Reason: 60 patients with multiple and severe rib fractures were compared in this clinical trial study.	*Definitely yes* Reason: -	*Definitely yes* Reason: -	*Definitely yes* Reason: -	*Definitely yes* Reason: No missing data.	*No information.* Reason: -	*No information.* Reason: -	**Low**

	of interest and consent) were enrolled in the study and divided randomly into one of the A, B groups.								
Lynch (2019)	*Probably yes* Reason: The study included adult (≥18 years) trauma patients admitted for MRF (≥3 fractures) at four participating trauma centers, from 07/1/2015 to 06/30/2016 (hospitals	*Probably yes* Reason: Injury inclusion criteria were defined by ICD9 (807.09, 807.19) and ICD10 (S22.41-S22.43, S22.49) codes along with an abbreviated injury scale (AIS) score of 3 for the chest region.	*Definitely yes* Reason: -	*No information.* Reason: -	*No information.* Reason: -	*No information.* Reason: -	*No information.* Reason: -	*No information.* Reason: -	**Some concerns**

	A, B, C) and from 07/1/2014 to 06/30/2016 (hospital D).								
Malekpour (2017)	*Probably yes*. Reason: We included all patients above 18 years of age with an International Classification of Diseases, Ninth Revision (ICD- 9) code of 807 to include rib fractures.	*Definitely yes* *Reason: Patients with sternum, larynx, and trachea fractures were excluded using ICD-9 807.2, 807.3, 807.5, and 807.6 codes. We also excluded patients with missing data. Finally, EA and PVBs were identified using ICD-9 procedure codes 03.91 and 04.81, respectively*.	*Definitely yes* Reason: -	*Probably yes* Reason: The goal of propensity score matching is to gain marginal balance on available potential confounding variables	*No information* Reason: -	*Definitely yes* Reason: The primary outcome of interest was in-hospital mortal- ity. Mortality was assessed using χ2 tests in the 2 matched data sets. Secondary outcomes of interest were LOS, ICU admission, ICU LOS, mechanical ventilation, duration of mechanical ventilation, development of pneumonia, and	*No information.* Reason: -	*No information.* Reason: -	**Low**

						development of any other complication. Nonnormalized outcomes, such as LOS, ICU LOS, duration of mechanical ventilation, were analyzed using Mann-Whitney U test. Categorical outcomes such as ICU admission, mechanical ventilation, development of pneumonia, and development of any other complication were analyzed using $\chi 2$ tests. These outcomes were compared between EA/PVB and			

						also Proc/NoProc. The primary outcome was considered significant with a P value of <.05. Bonferroni correction was used to maintain an overall α-level of .05 for the secondary outcomes. These outcomes were considered statistically significant where P < .007.			
Shapiro (2017)	*Probably yes* Reason: 625 consecutive patients with multiple rib	*Probably yes* Reason: Inclusion criteria were with multiple rib fractures admitted to our trauma service between 2008 and 2014. Rib	*Definitely yes* Reason: -	*Definitely yes* Reason: Comorbid conditions controlled for in the analysis included chronic conditions that were diagnosed	*Definitely yes / Probably yes / Probably no / Definitely no* Reason: All outcome analyses were adjusted for age, presence of comorbidity,	*No information* Reason: -	*No information* Reason: -	*No information* Reason: -	**Low**

	fractures who were seen and managed by the trauma service at this 400 bed community teaching hospital between 2008 and 2014. All patients were initially managed with narcotics for pain control (IV, oral, or patch) in one form or a combination. Patients with two or more rib fractures who showed no	fractures were identified by chest X-ray, CT scan, or both. Patients with traumatic brain injury or ventilator support were excluded from the study.		and charted for diabetes, chronic obstructive pulmonary disease, and coronary vascular disease.	and trauma score.				

	improvement in their pain were offered epidural analgesic (EPI).								
Sheets (2020)	*Probably yes* Reason: Patients with rib fractures from December 2014 to March 2019 were identified through the trauma registry.	*Probably yes* Reason: Patient inclusion criteria included 18 years or older, blunt mechanism of trauma, presence of 3 or more rib fractures, and use of epidural analgesia or intercostal nerve block using liposomal bupivacaine.	*Definitely yes* Reason: -	*No information* Reason: -	*No information* Reason: -	*No information* Reason: -	*No information* Reason: -	*No information* Reason: -	**Some concerns**
Shelley (2016)	*Probably yes* Reason: This prospectiv	*Definitely yes* Reason: Acute rib fractures were defined as resulting	*Definitely yes* Reason: -	*No information* Reason: -	*No information* Reason: -	*No information* Reason: -	*No information* Reason: -	*No information* Reason: -	**Some concerns**

	e study included 30 patients with ≥3 acute rib fractures admitted to a level I trauma center.	from a trauma occurring less than 24 hours prior to presentation and were identified on CT scan or Chest X-ray.							

Exclusie tabel

Author and year	Reason for exclusion
Piennette (2022)	Wrong study design.
Galvagno (2016)	Included studies did not meet the PICO-criteria of this guideline.
Singh (2017)	Wrong outcomes.

Zoekverantwoording

Algemene informatie

Richtlijn: NVvH Thoracale letsels na trauma	
Uitgangsvraag: Pijnstilling na thoracale letsels	
Database(s): Medline (OVID), Embase	Datum: 11-07-2023
Periode: >2000	Talen: Geen beperking
Literatuurspecialist: Linda Niesink	
BMI zoekblokken: voor verschillende opdrachten wordt (deels) gebruik gemaakt van de zoekblokken van BMI-Online https://blocks.bmi-online.nl/ Bij gebruikmaking van een volledig zoekblok zal naar de betreffende link op de website worden verwezen.	
Toelichting en opmerkingen: → Voor deze vraag is gezocht op de elementen **thoraxletsel** (in het blauw) en **pijnstilling (neuraxis)** (in het groen). → De genoemde sleutelartikelen van Galvagno (2016), Peek (2018) en Piennette (2022) zitten in de zoekopbrengst. → Vanwege de lage aantallen zijn ook de overige studiedesigns meegenomen. → Resultaten staan in Rayyan.	
Te gebruiken voor richtlijnen tekst: In de databases Embase (via embase.com) en Medline (via OVID) is op 11-07-2023 met relevante zoektermen gezocht vanaf 2000 naar systematische reviews, RCT's, observationele en overige studiedesigns over epidurale pijnstilling bij patiënten met een thoraxletsel. De literatuurzoekactie leverde 140 unieke treffers op.	

Zoekopbrengst

	EMBASE	OVID/MEDLINE	Ontdubbeld
SRs	13	9	13
RCTs	23	17	25
Observationele studies	40	35	43
Overige studies	49	42	59
Totaal	125	103	**140**

Zoekstrategie

Database	Zoektermen		
Embase	*No.*	*Query*	*Results*
	#1	'thorax injury'/exp/mj OR 'thoracic fracture'/exp OR 'thorax blunt trauma'/exp OR 'rib fracture'/exp OR 'sternum fracture'/exp OR 'flail chest'/exp OR (((chest OR thora*) NEAR/2 flail):ti,ab,kw) OR (((rib OR sternal) NEAR/3 fracture*):ti,ab,kw) OR 'broken rib*':ti,ab,kw OR 'costa fracture*':ti,ab,kw OR 'costal fracture*':ti,ab,kw OR 'fractured rib*':ti,ab,kw OR 'fractured ribcage':ti,ab,kw OR 'rib cage fracture':ti,ab,kw OR 'rib fracture*':ti,ab,kw OR 'ribcage fracture*':ti,ab,kw OR 'sternum fracture*':ti,ab,kw OR 'breastbone fracture*':ti,ab,kw OR 'broken sternum':ti,ab,kw OR 'fractured manubrium sterni':ti,ab,kw OR 'fractured sternal edge':ti,ab,kw OR 'fractured sternal manubrium':ti,ab,kw OR 'fractured sternum':ti,ab,kw OR 'fractured xiphoid process':ti,ab,kw OR 'manubrial fracture*':ti,ab,kw OR 'manubriosternal fracture*':ti,ab,kw OR 'manubrium fracture*':ti,ab,kw OR 'manubrium sterni fracture*':ti,ab,kw OR 'sternovertebral fracture*':ti,ab,kw OR 'sternal body fracture*':ti,ab,kw OR 'sternal bone fracture*':ti,ab,kw OR 'sternal fracture*':ti,ab,kw OR 'sternal plate fracture*':ti,ab,kw OR 'xiphoid fracture*':ti,ab,kw	57650
	#2	'epidural analgesia'/exp OR 'neuraxial anesthesia'/exp OR 'neuraxial analgesia'/exp OR (((epidural OR extradural OR peridural OR neuraxial) NEAR/3 analgesia):ti,ab,kw)	16623
	#3	#1 AND #2 AND #3 AND [2000-2023]/py NOT (('animal'/exp OR 'animal experiment'/exp OR 'animal model'/exp OR 'nonhuman'/exp) NOT 'human'/exp) NOT ('conference abstract'/it OR 'conference review'/it OR 'editorial'/it OR 'letter'/it OR 'note'/it)	125
	#4	'meta analysis'/exp OR 'meta analysis (topic)'/exp OR metaanaly*:ti,ab OR 'meta analy*':ti,ab OR metanaly*:ti,ab OR 'systematic review'/de OR 'cochrane database of systematic reviews'/jt OR prisma:ti,ab OR prospero:ti,ab OR (((systemati* OR scoping OR umbrella OR 'structured literature') NEAR/3 (review* OR overview*)):ti,ab) OR ((systemic* NEAR/1 review*):ti,ab) OR (((systemati* OR literature OR database* OR 'data base*') NEAR/10 search*):ti,ab) OR (((structured OR comprehensive* OR systemic*) NEAR/3 search*):ti,ab) OR (((literature NEAR/3 review*):ti,ab) AND (search*:ti,ab OR database*:ti,ab OR 'data base*':ti,ab)) OR (('data extraction':ti,ab OR 'data source*':ti,ab) AND 'study selection':ti,ab) OR ('search strategy':ti,ab AND 'selection criteria':ti,ab) OR ('data source*':ti,ab AND 'data synthesis':ti,ab) OR medline:ab OR pubmed:ab OR embase:ab OR cochrane:ab OR (((critical OR rapid) NEAR/2 (review* OR overview* OR synthes*)):ti) OR ((((critical* OR rapid*) NEAR/3 (review* OR overview* OR synthes*)):ab) AND (search*:ab OR database*:ab OR 'data base*':ab)) OR metasynthes*:ti,ab OR 'meta synthes*':ti,ab	942687
	#5	'clinical trial'/exp OR 'randomization'/exp OR 'single blind procedure'/exp OR 'double blind procedure'/exp OR 'crossover procedure'/exp OR 'placebo'/exp OR 'prospective study'/exp OR rct:ab,ti OR random*:ab,ti OR 'single blind':ab,ti OR 'randomised controlled trial':ab,ti OR 'randomized controlled trial'/exp OR placebo*:ab,ti	3827018
	#6	'major clinical study'/exp OR 'case control study'/de OR 'comparative study'/exp OR 'control group'/de OR 'controlled study'/de OR 'controlled clinical trial'/de OR 'crossover procedure'/de OR 'double blind procedure'/de OR 'phase 2 clinical trial'/de OR 'phase 3 clinical trial'/de OR 'phase 4 clinical trial'/de	15445173

	OR 'pretest posttest design'/de OR 'pretest posttest control group design'/de OR 'quasi experimental study'/de OR 'single blind procedure'/de OR 'triple blind procedure'/de OR (((control OR controlled) NEAR/6 trial):ti,ab,kw) OR (((control OR controlled) NEAR/6 (study OR studies)):ti,ab,kw) OR (((control OR controlled) NEAR/1 active):ti,ab,kw) OR 'open label*':ti,ab,kw OR (((double OR two OR three OR multi OR trial) NEAR/1 (arm OR arms)):ti,ab,kw) OR ((allocat* NEAR/10 (arm OR arms)):ti,ab,kw) OR placebo*:ti,ab,kw OR 'sham-control*':ti,ab,kw OR (((single OR double OR triple OR assessor) NEAR/1 (blind* OR masked)):ti,ab,kw) OR nonrandom*:ti,ab,kw OR 'non-random*':ti,ab,kw OR 'quasi-experiment*':ti,ab,kw OR crossover:ti,ab,kw OR 'cross over':ti,ab,kw OR 'parallel group*':ti,ab,kw OR 'factorial trial':ti,ab,kw OR ((phase NEAR/5 (study OR trial)):ti,ab,kw) OR ((case* NEAR/6 (matched OR control*)):ti,ab,kw) OR ((match* NEAR/6 (pair OR pairs OR cohort* OR control* OR group* OR healthy OR age OR sex OR gender OR patient* OR subject* OR participant*)):ti,ab,kw) OR ((propensity NEAR/6 (scor* OR match*)):ti,ab,kw) OR versus:ti OR vs:ti OR compar*:ti OR ((compar* NEAR/1 study):ti,ab,kw) OR (('major clinical study'/de OR 'clinical study'/de OR 'cohort analysis'/de OR 'observational study'/de OR 'cross-sectional study'/de OR 'multicenter study'/de OR 'correlational study'/de OR 'follow up'/de OR cohort*:ti,ab,kw OR 'follow up':ti,ab,kw OR followup:ti,ab,kw OR longitudinal*:ti,ab,kw OR prospective*:ti,ab,kw OR retrospective*:ti,ab,kw OR observational*:ti,ab,kw OR 'cross sectional*':ti,ab,kw OR cross?ectional*:ti,ab,kw OR multicent*:ti,ab,kw OR 'multi-cent*':ti,ab,kw OR consecutive*:ti,ab,kw) AND (group:ti,ab,kw OR groups:ti,ab,kw OR subgroup*:ti,ab,kw OR versus:ti,ab,kw OR vs:ti,ab,kw OR compar*:ti,ab,kw OR 'odds ratio*':ab OR 'relative odds':ab OR 'risk ratio*':ab OR 'relative risk*':ab OR 'rate ratio':ab OR aor:ab OR arr:ab OR rrr:ab OR (('or' OR 'rr') NEAR/6 ci):ab))) OR 'observational study':ti,ab,kw #7 #3 AND #4 **– SR's** 13 #8 #3 AND #5 NOT #7 **– RCT's** 23 #9 #3 AND #6 NOT (#7 OR #8) **– observationele studies** 40 #10 #7 OR #8 OR #9 76 #11 #3 NOT #10 **– overige studies** 49
Medline (OVID)	1 exp Thoracic Injuries/ or exp Rib Fractures/ or exp Flail Chest/ or ((chest or thora*) adj2 flail).ti,ab,kf. or ((rib or sternal) adj3 fracture*).ti,ab,kf. or 'broken rib*'.ti,ab,kf. or 'costa fracture*'.ti,ab,kf. or 'costal fracture*'.ti,ab,kf. or 'fractured rib*'.ti,ab,kf. or 'fractured ribcage'.ti,ab,kf. or 'rib cage fracture'.ti,ab,kf. or 'rib fracture*'.ti,ab,kf. or 'ribcage fracture*'.ti,ab,kf. or 'sternum fracture*'.ti,ab,kf. or 'breastbone fracture*'.ti,ab,kf. or 'broken sternum'.ti,ab,kf. or 'fractured manubrium sterni'.ti,ab,kf. or 'fractured sternal edge'.ti,ab,kf. or 'fractured sternal manubrium'.ti,ab,kf. or 'fractured sternum'.ti,ab,kf. or 'fractured xiphoid process'.ti,ab,kf. or 'manubrial fracture*'.ti,ab,kf. or 'manubriosternal fracture*'.ti,ab,kf. or 'manubrium fracture*'.ti,ab,kf. or 'manubrium sterni fracture*'.ti,ab,kf. or 'sternovertebral fracture*'.ti,ab,kf. or 'sternal body fracture*'.ti,ab,kf. or 'sternal bone fracture*'.ti,ab,kf. or 'sternal fracture*'.ti,ab,kf. or 'sternal plate fracture*'.ti,ab,kf. or 'xiphoid fracture*'.ti,ab,kf. (33301) 2 exp Analgesia, Epidural/ or ((epidural or extradural or peridural or neuraxial) adj3 analgesia).ti,ab,kf. (14216) 3 1 and 2 (169) 4 limit 3 to yr="2000 -Current" (110)	

	5 4 not (comment/ or editorial/ or letter/ or ((exp animals/ or exp models, animal/) not humans/)) (103) 6 meta-analysis/ or meta-analysis as topic/ or (metaanaly* or meta-analy* or metanaly*).ti,ab,kf. or systematic review/ or cochrane.jw. or (prisma or prospero).ti,ab,kf. or ((systemati* or scoping or umbrella or "structured literature") adj3 (review* or overview*)).ti,ab,kf. or (systemic* adj1 review*).ti,ab,kf. or ((systemati* or literature or database* or data-base*) adj10 search*).ti,ab,kf. or ((structured or comprehensive* or systemic*) adj3 search*).ti,ab,kf. or ((literature adj3 review*) and (search* or database* or data-base*)).ti,ab,kf. or (("data extraction" or "data source*") and "study selection").ti,ab,kf. or ("search strategy" and "selection criteria").ti,ab,kf. or ("data source*" and "data synthesis").ti,ab,kf. or (medline or pubmed or embase or cochrane).ab. or ((critical or rapid) adj2 (review* or overview* or synthes*)).ti. or (((critical* or rapid*) adj3 (review* or overview* or synthes*)) and (search* or database* or data-base*)).ab. or (metasynthes* or meta-synthes*).ti,ab,kf. (679718) 7 exp clinical trial/ or randomized controlled trial/ or exp clinical trials as topic/ or randomized controlled trials as topic/ or Random Allocation/ or Double-Blind Method/ or Single-Blind Method/ or (clinical trial, phase i or clinical trial, phase ii or clinical trial, phase iii or clinical trial, phase iv or controlled clinical trial or randomized controlled trial or multicenter study or clinical trial).pt. or random*.ti,ab. or (clinic* adj trial*).tw. or ((singl* or doubl* or treb* or tripl*) adj (blind$3 or mask$3)).tw. or Placebos/ or placebo*.tw. (2608812) 8 Case-control Studies/ or clinical trial, phase ii/ or clinical trial, phase iii/ or clinical trial, phase iv/ or comparative study/ or control groups/ or controlled before-after studies/ or controlled clinical trial/ or double-blind method/ or historically controlled study/ or matched-pair analysis/ or single-blind method/ or (((control or controlled) adj6 (study or studies or trial)) or (compar* adj (study or studies)) or ((control or controlled) adj1 active) or "open label*" or ((double or two or three or multi or trial) adj (arm or arms)) or (allocat* adj10 (arm or arms)) or placebo* or "sham-control*" or ((single or double or triple or assessor) adj1 (blind* or masked)) or nonrandom* or "non-random*" or "quasi-experiment*" or "parallel group*" or "factorial trial" or "pretest posttest" or (phase adj5 (study or trial)) or (case* adj6 (matched or control*)) or (match* adj6 (pair or pairs or cohort* or control* or group* or healthy or age or sex or gender or patient* or subject* or participant*)) or (propensity adj6 (scor* or match*))).ti,ab,kf. or (confounding adj6 adjust*).ti,ab. or (versus or vs or compar*).ti. or ((exp cohort studies/ or epidemiologic studies/ or multicenter study/ or observational study/ or seroepidemiologic studies/ or (cohort* or 'follow up' or followup or longitudinal* or prospective* or retrospective* or observational* or multicent* or 'multi-cent*' or consecutive*).ti,ab,kf.) and ((group or groups or subgroup* or versus or vs or compar*).ti,ab,kf. or ('odds ratio*' or 'relative odds' or 'risk ratio*' or 'relative risk*' or aor or arr or rrr).ab. or (("OR" or "RR") adj6 CI).ab.)) (5464031) 9 5 and 6 (9) **– SRs** 10 (5 and 7) not 9 (17) **- RCTs** 11 (5 and 8) not (9 or 10) (35) **– observationele studies** 12 9 or 10 or 11 (61) 13 5 not 12 (42) **– overige studies**

Zoekverantwoording (update)

Algemene informatie

Richtlijn: NVvH Thoracale letsels na trauma	
Uitgangsvraag: Pijnstilling na thoracale letsels	
Database(s): Medline (OVID), Embase	Datum: 09-11-2023
Periode: >2000	Talen: Geen beperking
Literatuurspecialist: Linda Niesink en Esther van der Bijl	

BMI zoekblokken: voor verschillende opdrachten wordt (deels) gebruik gemaakt van de zoekblokken van BMI-Online https://blocks.bmi-online.nl/ Bij gebruikmaking van een volledig zoekblok zal naar de betreffende link op de website worden verwezen.
Toelichting en opmerkingen: → Voor deze vraag is gezocht op de elementen **thoraxletsel** (in het blauw) en **pijnstilling (neuraxis)** (in het groen). → De genoemde sleutelartikelen van Galvagno (2016), Peek (2018) en Piennette (2022) zitten in de zoekopbrengst. → Resultaten staan in Rayyan: https://rayyan.ai/reviews/839326
Te gebruiken voor richtlijnen tekst: In de databases Embase (via embase.com) en Medline (via OVID) is op 11-07-2023 met relevante zoektermen gezocht vanaf 2000 naar systematische reviews, RCT's, observationele en overige studiedesigns over epidurale pijnstilling bij patiënten met een thoraxletsel. De literatuurzoekactie leverde 140 unieke treffers op. Update: In de databases Embase (via embase.com) en Medline (via OVID) is op 09-11-2023 met relevante zoektermen gezocht vanaf 2000 naar systematische reviews, RCT's, observationele en overige studiedesigns over epidurale pijnstilling bij patiënten met een thoraxletsel. De literatuurzoekactie leverde ten opzichte van de literatuurzoekactie van 11-07-2023 19 nieuwe treffers op.

Zoekopbrengst 09-11-2023

	EMBASE	**OVID/MEDLINE**	**Ontdubbeld ten opzichte van zoekopbrengst 11-07-2023**
SRs	13	10	13
RCTs	25	20	3
Observationele studies	41	35	1
Overige studies	51	43	2
Totaal	130	108	**19**

Zoekopbrengst 11-07-2023

	EMBASE	**OVID/MEDLINE**	**Ontdubbeld**
SRs	13	9	13
RCTs	23	17	25
Observationele studies	40	35	43
Overige studies	49	42	59
Totaal	125	103	**140**

Zoekstrategie 09-11-2023

No.	Query	Results
#1	'thorax injury'/exp/mj OR 'thoracic fracture'/exp OR 'thorax blunt trauma'/exp OR 'rib fracture'/exp OR 'sternum fracture'/exp OR 'flail chest'/exp OR (((chest OR thora*) NEAR/2 flail):ti,ab,kw) OR (((rib OR sternal) NEAR/3 fracture*):ti,ab,kw) OR 'broken rib*':ti,ab,kw OR 'costa fracture*':ti,ab,kw OR 'costal fracture*':ti,ab,kw OR 'fractured rib*':ti,ab,kw OR 'fractured ribcage':ti,ab,kw OR 'rib cage fracture':ti,ab,kw OR 'rib fracture*':ti,ab,kw OR 'ribcage fracture*':ti,ab,kw OR 'sternum fracture*':ti,ab,kw OR 'breastbone fracture*':ti,ab,kw OR 'broken sternum':ti,ab,kw OR 'fractured manubrium sterni':ti,ab,kw OR 'fractured sternal edge':ti,ab,kw OR 'fractured sternal manubrium':ti,ab,kw OR 'fractured sternum':ti,ab,kw OR 'fractured xiphoid process':ti,ab,kw OR 'manubrial fracture*':ti,ab,kw OR 'manubriosternal fracture*':ti,ab,kw OR 'manubrium fracture*':ti,ab,kw OR 'manubrium sterni fracture*':ti,ab,kw OR 'sternovertebral fracture*':ti,ab,kw OR 'sternal body fracture*':ti,ab,kw OR 'sternal bone fracture*':ti,ab,kw OR 'sternal fracture*':ti,ab,kw OR 'sternal plate fracture*':ti,ab,kw OR 'xiphoid fracture*':ti,ab,kw	58733
#2	'epidural analgesia'/exp OR 'neuraxial anesthesia'/exp OR 'neuraxial analgesia'/exp OR (((epidural OR extradural OR peridural OR neuraxial) NEAR/3 analgesia):ti,ab,kw)	16902
#3	#1 AND #2 AND [2000-2023]/py NOT (('animal'/exp OR 'animal experiment'/exp OR 'animal model'/exp OR 'nonhuman'/exp) NOT 'human'/exp) NOT ('conference abstract'/it OR 'conference review'/it OR 'editorial'/it OR 'letter'/it OR 'note'/it)	130
#4	'meta analysis'/exp OR 'meta analysis (topic)'/exp OR metaanaly*:ti,ab OR 'meta analy*':ti,ab OR metanaly*:ti,ab OR 'systematic review'/de OR 'cochrane database of systematic reviews'/jt OR prisma:ti,ab OR prospero:ti,ab OR (((systemati* OR scoping OR umbrella OR 'structured literature') NEAR/3 (review* OR overview*)):ti,ab) OR ((systemic* NEAR/1 review*):ti,ab) OR (((systemati* OR literature OR database* OR 'data base*') NEAR/10 search*):ti,ab) OR (((structured OR comprehensive* OR systemic*) NEAR/3 search*):ti,ab) OR (((literature NEAR/3 review*):ti,ab) AND (search*:ti,ab OR database*:ti,ab OR 'data base*':ti,ab)) OR (('data extraction':ti,ab OR 'data source*':ti,ab) AND 'study selection':ti,ab) OR ('search strategy':ti,ab AND 'selection criteria':ti,ab) OR ('data source*':ti,ab AND 'data synthesis':ti,ab) OR medline:ab OR pubmed:ab OR embase:ab OR cochrane:ab OR (((critical OR rapid) NEAR/2 (review* OR overview* OR synthes*)):ti) OR ((((critical* OR rapid*) NEAR/3 (review* OR overview* OR synthes*)):ab) AND (search*:ab OR database*:ab OR 'data base*':ab)) OR metasynthes*:ti,ab OR 'meta synthes*':ti,ab	976016
#5	'clinical trial'/exp OR 'randomization'/exp OR 'single blind procedure'/exp OR 'double blind procedure'/exp OR 'crossover procedure'/exp OR 'placebo'/exp OR 'prospective study'/exp OR rct:ab,ti OR random*:ab,ti OR 'single blind':ab,ti OR 'randomised controlled trial':ab,ti OR 'randomized controlled trial'/exp OR placebo*:ab,ti	3910009
#6	'major clinical study'/exp OR 'case control study'/de OR 'comparative study'/exp OR 'control group'/de OR 'controlled study'/de OR 'controlled clinical trial'/de OR 'crossover procedure'/de OR 'double blind procedure'/de OR 'phase 2 clinical trial'/de OR 'phase 3 clinical trial'/de OR 'phase 4 clinical trial'/de OR 'pretest posttest design'/de OR 'pretest posttest control group design'/de OR 'quasi experimental study'/de OR 'single blind procedure'/de OR 'triple blind procedure'/de OR (((control OR controlled) NEAR/6 trial):ti,ab,kw) OR (((control OR controlled) NEAR/6 (study OR studies)):ti,ab,kw) OR (((control OR controlled) NEAR/1 active):ti,ab,kw) OR 'open label*':ti,ab,kw OR (((double OR two OR three OR multi OR trial) NEAR/1 (arm OR arms)):ti,ab,kw) OR ((allocat* NEAR/10 (arm OR arms)):ti,ab,kw) OR placebo*:ti,ab,kw OR 'sham-control*':ti,ab,kw OR (((single OR double OR triple OR assessor) NEAR/1 (blind* OR masked)):ti,ab,kw) OR nonrandom*:ti,ab,kw OR 'non-random*':ti,ab,kw OR 'quasi-experiment*':ti,ab,kw	15785837

	OR crossover:ti,ab,kw OR 'cross over':ti,ab,kw OR 'parallel group*':ti,ab,kw OR 'factorial trial':ti,ab,kw OR ((phase NEAR/5 (study OR trial)):ti,ab,kw) OR ((case* NEAR/6 (matched OR control*)):ti,ab,kw) OR ((match* NEAR/6 (pair OR pairs OR cohort* OR control* OR group* OR healthy OR age OR sex OR gender OR patient* OR subject* OR participant*)):ti,ab,kw) OR ((propensity NEAR/6 (scor* OR match*)):ti,ab,kw) OR versus:ti OR vs:ti OR compar*:ti OR ((compar* NEAR/1 study):ti,ab,kw) OR (('major clinical study'/de OR 'clinical study'/de OR 'cohort analysis'/de OR 'observational study'/de OR 'cross-sectional study'/de OR 'multicenter study'/de OR 'correlational study'/de OR 'follow up'/de OR cohort*:ti,ab,kw OR 'follow up':ti,ab,kw OR followup:ti,ab,kw OR longitudinal*:ti,ab,kw OR prospective*:ti,ab,kw OR retrospective*:ti,ab,kw OR observational*:ti,ab,kw OR 'cross sectional*':ti,ab,kw OR cross?ectional*:ti,ab,kw OR multicent*:ti,ab,kw OR 'multi-cent*':ti,ab,kw OR consecutive*:ti,ab,kw) AND (group:ti,ab,kw OR groups:ti,ab,kw OR subgroup*:ti,ab,kw OR versus:ti,ab,kw OR vs:ti,ab,kw OR compar*:ti,ab,kw OR 'odds ratio*':ab OR 'relative odds':ab OR 'risk ratio*':ab OR 'relative risk*':ab OR 'rate ratio':ab OR aor:ab OR arr:ab OR rrr:ab OR ((('or' OR 'rr') NEAR/6 ci):ab))) OR 'observational study':ti,ab,kw	
#7	#3 AND #4 **– SR's**	13
#8	#3 AND #5 NOT #7 **– RCT's**	25
#9	#3 AND #6 NOT (#7 OR #8) **- observationele studies**	41
#10	#7 OR #8 OR #9	79
#11	#3 NOT #10 **- overige studies**	51

#	Searches	Results
1	exp Thoracic Injuries/ or exp Rib Fractures/ or exp Flail Chest/ or ((chest or thora*) adj2 flail).ti,ab,kf. or ((rib or sternal) adj3 fracture*).ti,ab,kf. or 'broken rib*'.ti,ab,kf. or 'costa fracture*'.ti,ab,kf. or 'costal fracture*'.ti,ab,kf. or 'fractured rib*'.ti,ab,kf. or 'fractured ribcage'.ti,ab,kf. or 'rib cage fracture'.ti,ab,kf. or 'rib fracture*'.ti,ab,kf. or 'ribcage fracture*'.ti,ab,kf. or 'sternum fracture*'.ti,ab,kf. or 'breastbone fracture*'.ti,ab,kf. or 'broken sternum'.ti,ab,kf. or 'fractured manubrium sterni'.ti,ab,kf. or 'fractured sternal edge'.ti,ab,kf. or 'fractured sternal manubrium'.ti,ab,kf. or 'fractured sternum'.ti,ab,kf. or 'fractured xiphoid process'.ti,ab,kf. or 'manubrial fracture*'.ti,ab,kf. or 'manubriosternal fracture*'.ti,ab,kf. or 'manubrium fracture*'.ti,ab,kf. or 'manubrium sterni fracture*'.ti,ab,kf. or 'sternovertebral fracture*'.ti,ab,kf. or 'sternal body fracture*'.ti,ab,kf. or 'sternal bone fracture*'.ti,ab,kf. or 'sternal fracture*'.ti,ab,kf. or 'sternal plate fracture*'.ti,ab,kf. or 'xiphoid fracture*'.ti,ab,kf.	33741
2	exp Analgesia, Epidural/ or ((epidural or extradural or peridural or neuraxial) adj3 analgesia).ti,ab,kf.	14383
3	1 and 2	175
4	limit 3 to yr="2000 -Current"	116
5	4 not (comment/ or editorial/ or letter/ or ((exp animals/ or exp models, animal/) not humans/))	108
6	meta-analysis/ or meta-analysis as topic/ or (metaanaly* or meta-analy* or metanaly*).ti,ab,kf. or systematic review/ or cochrane.jw. or (prisma or prospero).ti,ab,kf. or ((systemati* or scoping or umbrella or "structured literature") adj3 (review* or overview*)).ti,ab,kf. or (systemic* adj1 review*).ti,ab,kf. or ((systemati* or literature or database* or data-base*) adj10 search*).ti,ab,kf. or ((structured or comprehensive* or systemic*) adj3 search*).ti,ab,kf. or ((literature adj3 review*) and (search* or database* or data-base*)).ti,ab,kf. or (("data extraction" or "data source*") and "study selection").ti,ab,kf. or ("search strategy" and "selection criteria").ti,ab,kf. or ("data source*" and "data synthesis").ti,ab,kf. or (medline or pubmed or embase or cochrane).ab. or ((critical or rapid) adj2 (review* or overview* or synthes*)).ti. or (((critical* or rapid*) adj3 (review* or overview* or synthes*)) and (search* or database* or data-base*)).ab. or (metasynthes* or meta-synthes*).ti,ab,kf.	705518

7	exp clinical trial/ or randomized controlled trial/ or exp clinical trials as topic/ or randomized controlled trials as topic/ or Random Allocation/ or Double-Blind Method/ or Single-Blind Method/ or (clinical trial, phase i or clinical trial, phase ii or clinical trial, phase iii or clinical trial, phase iv or controlled clinical trial or randomized controlled trial or multicenter study or clinical trial).pt. or random*.ti,ab. or (clinic* adj trial*).tw. or ((singl* or doubl* or treb* or tripl*) adj (blind$3 or mask$3)).tw. or Placebos/ or placebo*.tw.	2653649
8	Case-control Studies/ or clinical trial, phase ii/ or clinical trial, phase iii/ or clinical trial, phase iv/ or comparative study/ or control groups/ or controlled before-after studies/ or controlled clinical trial/ or double-blind method/ or historically controlled study/ or matched-pair analysis/ or single-blind method/ or (((control or controlled) adj6 (study or studies or trial)) or (compar* adj (study or studies)) or ((control or controlled) adj1 active) or "open label*" or ((double or two or three or multi or trial) adj (arm or arms)) or (allocat* adj10 (arm or arms)) or placebo* or "sham-control*" or ((single or double or triple or assessor) adj1 (blind* or masked)) or nonrandom* or "non-random*" or "quasi-experiment*" or "parallel group*" or "factorial trial" or "pretest posttest" or (phase adj5 (study or trial)) or (case* adj6 (matched or control*)) or (match* adj6 (pair or pairs or cohort* or control* or group* or healthy or age or sex or gender or patient* or subject* or participant*)) or (propensity adj6 (scor* or match*))).ti,ab,kf. or (confounding adj6 adjust*).ti,ab. or (versus or vs or compar*).ti. or ((exp cohort studies/ or epidemiologic studies/ or multicenter study/ or observational study/ or seroepidemiologic studies/ or (cohort* or 'follow up' or followup or longitudinal* or prospective* or retrospective* or observational* or multicent* or 'multi-cent*' or consecutive*).ti,ab,kf.) and ((group or groups or subgroup* or versus or vs or compar*).ti,ab,kf. or ('odds ratio*' or 'relative odds' or 'risk ratio*' or 'relative risk*' or aor or arr or rrr).ab. or (("OR" or "RR") adj6 CI).ab.))	5551228
9	5 and 6 **– SR's**	10
10	(5 and 7) not 9 **– RCT's**	20
11	(5 and 8) not (9 or 10) **– observationele studies**	35
12	9 or 10 or 11	65
13	5 not 12 - **overige studies**	43

Zoekstrategie 11-07-2023

Database	**Zoektermen**		
Embase	*No.*	*Query*	*Results*
	#1	'thorax injury'/exp/mj OR 'thoracic fracture'/exp OR 'thorax blunt trauma'/exp OR 'rib fracture'/exp OR 'sternum fracture'/exp OR 'flail chest'/exp OR (((chest OR thora*) NEAR/2 flail):ti,ab,kw) OR (((rib OR sternal) NEAR/3 fracture*):ti,ab,kw) OR 'broken rib*':ti,ab,kw OR 'costa fracture*':ti,ab,kw OR 'costal fracture*':ti,ab,kw OR 'fractured rib*':ti,ab,kw OR 'fractured ribcage':ti,ab,kw OR 'rib cage fracture':ti,ab,kw OR 'rib fracture*':ti,ab,kw OR 'ribcage fracture*':ti,ab,kw OR 'sternum fracture*':ti,ab,kw OR 'breastbone fracture*':ti,ab,kw OR 'broken sternum':ti,ab,kw OR 'fractured manubrium sterni':ti,ab,kw OR 'fractured sternal edge':ti,ab,kw OR 'fractured sternal manubrium':ti,ab,kw OR 'fractured sternum':ti,ab,kw OR 'fractured xiphoid process':ti,ab,kw OR 'manubrial fracture*':ti,ab,kw OR 'manubriosternal fracture*':ti,ab,kw OR 'manubrium fracture*':ti,ab,kw OR 'manubrium sterni fracture*':ti,ab,kw OR 'sternovertebral fracture*':ti,ab,kw OR 'sternal body fracture*':ti,ab,kw OR 'sternal bone fracture*':ti,ab,kw OR 'sternal fracture*':ti,ab,kw OR 'sternal plate fracture*':ti,ab,kw OR 'xiphoid fracture*':ti,ab,kw	57650

	#2	'epidural analgesia'/exp OR 'neuraxial anesthesia'/exp OR 'neuraxial analgesia'/exp OR (((epidural OR extradural OR peridural OR neuraxial) NEAR/3 analgesia):ti,ab,kw)	16623
	#3	#1 AND #2 AND #3 AND [2000-2023]/py NOT (('animal'/exp OR 'animal experiment'/exp OR 'animal model'/exp OR 'nonhuman'/exp) NOT 'human'/exp) NOT ('conference abstract'/it OR 'conference review'/it OR 'editorial'/it OR 'letter'/it OR 'note'/it)	125
	#4	'meta analysis'/exp OR 'meta analysis (topic)'/exp OR metaanaly*:ti,ab OR 'meta analy*':ti,ab OR metanaly*:ti,ab OR 'systematic review'/de OR 'cochrane database of systematic reviews'/jt OR prisma:ti,ab OR prospero:ti,ab OR (((systemati* OR scoping OR umbrella OR 'structured literature') NEAR/3 (review* OR overview*)):ti,ab) OR ((systemic* NEAR/1 review*):ti,ab) OR (((systemati* OR literature OR database* OR 'data base*') NEAR/10 search*):ti,ab) OR (((structured OR comprehensive* OR systemic*) NEAR/3 search*):ti,ab) OR (((literature NEAR/3 review*):ti,ab) AND (search*:ti,ab OR database*:ti,ab OR 'data base*':ti,ab)) OR (('data extraction':ti,ab OR 'data source*':ti,ab) AND 'study selection':ti,ab) OR ('search strategy':ti,ab AND 'selection criteria':ti,ab) OR ('data source*':ti,ab AND 'data synthesis':ti,ab) OR medline:ab OR pubmed:ab OR embase:ab OR cochrane:ab OR (((critical OR rapid) NEAR/2 (review* OR overview* OR synthes*)):ti) OR ((((critical* OR rapid*) NEAR/3 (review* OR overview* OR synthes*)):ab) AND (search*:ab OR database*:ab OR 'data base*':ab)) OR metasynthes*:ti,ab OR 'meta synthes*':ti,ab	942687
	#5	'clinical trial'/exp OR 'randomization'/exp OR 'single blind procedure'/exp OR 'double blind procedure'/exp OR 'crossover procedure'/exp OR 'placebo'/exp OR 'prospective study'/exp OR rct:ab,ti OR random*:ab,ti OR 'single blind':ab,ti OR 'randomised controlled trial':ab,ti OR 'randomized controlled trial'/exp OR placebo*:ab,ti	3827018
	#6	'major clinical study'/exp OR 'case control study'/de OR 'comparative study'/exp OR 'control group'/de OR 'controlled study'/de OR 'controlled clinical trial'/de OR 'crossover procedure'/de OR 'double blind procedure'/de OR 'phase 2 clinical trial'/de OR 'phase 3 clinical trial'/de OR 'phase 4 clinical trial'/de OR 'pretest posttest design'/de OR 'pretest posttest control group design'/de OR 'quasi experimental study'/de OR 'single blind procedure'/de OR 'triple blind procedure'/de OR (((control OR controlled) NEAR/6 trial):ti,ab,kw) OR (((control OR controlled) NEAR/6 (study OR studies)):ti,ab,kw) OR (((control OR controlled) NEAR/1 active):ti,ab,kw) OR 'open label*':ti,ab,kw OR (((double OR two OR three OR multi OR trial) NEAR/1 (arm OR arms)):ti,ab,kw) OR ((allocat* NEAR/10 (arm OR arms)):ti,ab,kw) OR placebo*:ti,ab,kw OR 'sham-control*':ti,ab,kw OR (((single OR double OR triple OR assessor) NEAR/1 (blind* OR masked)):ti,ab,kw) OR nonrandom*:ti,ab,kw OR 'non-random*':ti,ab,kw OR 'quasi-experiment*':ti,ab,kw OR crossover:ti,ab,kw OR 'cross over':ti,ab,kw OR 'parallel group*':ti,ab,kw OR 'factorial trial':ti,ab,kw OR ((phase NEAR/5 (study OR trial)):ti,ab,kw) OR ((case* NEAR/6 (matched OR control*)):ti,ab,kw) OR ((match* NEAR/6 (pair OR pairs OR cohort* OR control* OR group* OR healthy OR age OR sex OR gender OR patient* OR subject* OR participant*)):ti,ab,kw) OR ((propensity NEAR/6 (scor* OR match*)):ti,ab,kw) OR versus:ti OR vs:ti OR compar*:ti OR ((compar* NEAR/1 study):ti,ab,kw) OR (('major clinical study'/de OR 'clinical study'/de OR 'cohort analysis'/de OR	15445173

	'observational study'/de OR 'cross-sectional study'/de OR 'multicenter study'/de OR 'correlational study'/de OR 'follow up'/de OR cohort*:ti,ab,kw OR 'follow up':ti,ab,kw OR followup:ti,ab,kw OR longitudinal*:ti,ab,kw OR prospective*:ti,ab,kw OR retrospective*:ti,ab,kw OR observational*:ti,ab,kw OR 'cross sectional*':ti,ab,kw OR cross?ectional*:ti,ab,kw OR multicent*:ti,ab,kw OR 'multi-cent*':ti,ab,kw OR consecutive*:ti,ab,kw) AND (group:ti,ab,kw OR groups:ti,ab,kw OR subgroup*:ti,ab,kw OR versus:ti,ab,kw OR vs:ti,ab,kw OR compar*:ti,ab,kw OR 'odds ratio*':ab OR 'relative odds':ab OR 'risk ratio*':ab OR 'relative risk*':ab OR 'rate ratio':ab OR aor:ab OR arr:ab OR rrr:ab OR (('or' OR 'rr') NEAR/6 ci):ab))) OR 'observational study':ti,ab,kw #7 #3 AND #4 **– SR's** 13 #8 #3 AND #5 NOT #7 **– RCT's** 23 #9 #3 AND #6 NOT (#7 OR #8) **– observationele studies** 40 #10 #7 OR #8 OR #9 76 #11 #3 NOT #10 **– overige studies** 49
Medline (OVID)	1 exp Thoracic Injuries/ or exp Rib Fractures/ or exp Flail Chest/ or ((chest or thora*) adj2 flail).ti,ab,kf. or ((rib or sternal) adj3 fracture*).ti,ab,kf. or 'broken rib*'.ti,ab,kf. or 'costa fracture*'.ti,ab,kf. or 'costal fracture*'.ti,ab,kf. or 'fractured rib*'.ti,ab,kf. or 'fractured ribcage'.ti,ab,kf. or 'rib cage fracture'.ti,ab,kf. or 'rib fracture*'.ti,ab,kf. or 'ribcage fracture*'.ti,ab,kf. or 'sternum fracture*'.ti,ab,kf. or 'breastbone fracture*'.ti,ab,kf. or 'broken sternum'.ti,ab,kf. or 'fractured manubrium sterni'.ti,ab,kf. or 'fractured sternal edge'.ti,ab,kf. or 'fractured sternal manubrium'.ti,ab,kf. or 'fractured sternum'.ti,ab,kf. or 'fractured xiphoid process'.ti,ab,kf. or 'manubrial fracture*'.ti,ab,kf. or 'manubriosternal fracture*'.ti,ab,kf. or 'manubrium fracture*'.ti,ab,kf. or 'manubrium sterni fracture*'.ti,ab,kf. or 'sternovertebral fracture*'.ti,ab,kf. or 'sternal body fracture*'.ti,ab,kf. or 'sternal bone fracture*'.ti,ab,kf. or 'sternal fracture*'.ti,ab,kf. or 'sternal plate fracture*'.ti,ab,kf. or 'xiphoid fracture*'.ti,ab,kf. (33301) 2 exp Analgesia, Epidural/ or ((epidural or extradural or peridural or neuraxial) adj3 analgesia).ti,ab,kf. (14216) 3 1 and 2 (169) 4 limit 3 to yr="2000 -Current" (110) 5 4 not (comment/ or editorial/ or letter/ or ((exp animals/ or exp models, animal/) not humans/)) (103) 6 meta-analysis/ or meta-analysis as topic/ or (metaanaly* or meta-analy* or metanaly*).ti,ab,kf. or systematic review/ or cochrane.jw. or (prisma or prospero).ti,ab,kf. or ((systemati* or scoping or umbrella or "structured literature") adj3 (review* or overview*)).ti,ab,kf. or (systemic* adj1 review*).ti,ab,kf. or ((systemati* or literature or database* or data-base*) adj10 search*).ti,ab,kf. or ((structured or comprehensive* or systemic*) adj3 search*).ti,ab,kf. or ((literature adj3 review*) and (search* or database* or data-base*)).ti,ab,kf. or (("data extraction" or "data source*") and "study selection").ti,ab,kf. or ("search strategy" and "selection criteria").ti,ab,kf. or ("data source*" and "data synthesis").ti,ab,kf. or (medline or pubmed or embase or cochrane).ab. or ((critical or rapid) adj2 (review* or overview* or synthes*)).ti. or (((critical* or rapid*) adj3 (review* or overview* or synthes*)) and (search* or database* or data-base*)).ab. or (metasynthes* or meta-synthes*).ti,ab,kf. (679718) 7 exp clinical trial/ or randomized controlled trial/ or exp clinical trials as topic/ or randomized controlled trials as topic/ or Random Allocation/ or Double-Blind Method/ or Single-Blind Method/ or (clinical trial, phase i or clinical trial, phase ii or clinical trial, phase iii or clinical trial, phase iv or controlled clinical trial or randomized controlled trial or multicenter study or clinical trial).pt. or random*.ti,ab. or (clinic* adj trial*).tw. or ((singl* or doubl* or treb* or tripl*) adj (blind$3 or mask$3)).tw. or Placebos/ or placebo*.tw. (2608812)

	8 Case-control Studies/ or clinical trial, phase ii/ or clinical trial, phase iii/ or clinical trial, phase iv/ or comparative study/ or control groups/ or controlled before-after studies/ or controlled clinical trial/ or double-blind method/ or historically controlled study/ or matched-pair analysis/ or single-blind method/ or (((control or controlled) adj6 (study or studies or trial)) or (compar* adj (study or studies)) or ((control or controlled) adj1 active) or "open label*" or ((double or two or three or multi or trial) adj (arm or arms)) or (allocat* adj10 (arm or arms)) or placebo* or "sham-control*" or ((single or double or triple or assessor) adj1 (blind* or masked)) or nonrandom* or "non-random*" or "quasi-experiment*" or "parallel group*" or "factorial trial" or "pretest posttest" or (phase adj5 (study or trial)) or (case* adj6 (matched or control*)) or (match* adj6 (pair or pairs or cohort* or control* or group* or healthy or age or sex or gender or patient* or subject* or participant*)) or (propensity adj6 (scor* or match*))).ti,ab,kf. or (confounding adj6 adjust*).ti,ab. or (versus or vs or compar*).ti. or ((exp cohort studies/ or epidemiologic studies/ or multicenter study/ or observational study/ or seroepidemiologic studies/ or (cohort* or 'follow up' or followup or longitudinal* or prospective* or retrospective* or observational* or multicent* or 'multi-cent*' or consecutive*).ti,ab,kf.) and ((group or groups or subgroup* or versus or vs or compar*).ti,ab,kf. or ('odds ratio*' or 'relative odds' or 'risk ratio*' or 'relative risk*' or aor or arr or rrr).ab. or (("OR" or "RR") adj6 CI).ab.)) (5464031) 9 5 and 6 (9) **– SRs** 10 (5 and 7) not 9 (17) **- RCTs** 11 (5 and 8) not (9 or 10) (35) **– observationele studies** 12 9 or 10 or 11 (61) 13 5 not 12 (42) **– overige studies**

Module 12: Evaluatie van thoraxletsel

Evidence tabel

Niet van toepassing.

Risk of bias tabel

Niet van toepassing.

Exclusie tabel

Niet van toepassing.

Zoekverantwoording

Niet van toepassing.