	Bibliographic citation	Study type	Ev lev	Number of patients	Patient characteristics	Intervention	Comparison	Length of follow up	Outcome measures	Effect size	Source of funding	General Comments
1	Home treatment in pulmonary embolism. Otero R. Thrombosis Res 2010	Multicentre RCT - excluded from review as time to discharge more than 3 days	1-	132 randomised to early discharge n=72 or standard hospitalisation n=60.	Used Otero's clinical prediction rule for suitablity for discharge. Exclusion: clinical score >2 points, haemodynamic instability at enrolment, Troponin elevations, O2 <93%, hospitalisation for other co-morbidities, NYHA dyspneoa III/IV, high risk of bleeding, pregnancy, obesity, RV dysfunction assessed by echo.	Early discharge at day 3 after TTE excluded RHS or day 5 if TTE could not be performed. LMWH and vit K antagonist.	Recurrent VTE 2.8% in early discharge v 3.3% hospitalised. Major bleeding 1.4% early discharge v 1.6% hospitalised. No difference in rate of mortality but because of a higher than expected number of deaths study was stopped after only 132 randomised	3 month				Small numbers and study stopped early because of concerns about higher than anticipated death rate. Definition of early discharge questionable as discharged after 3 days or 5 days. Unclear how this compares to those who were hospitalised. Different centres used different anticoagulation regimes.
6	Home treatment of patients with small to medium sized acute pulmonary embolism Elf et al 2014	retrospective cohort	2+	416, 307 discharged	haemadynamocally stable, not on oxygen, iv analgesia, no contrindications to anticoag treatment or V/P SPECT showing an extention of the PE of more than 40%	treated at home post diagnosis by either self injection, home nurse or anticoag clinic	0 PE related mortality other mortality 2% v 13.6% . Clinically relevant bleeding 1.6% vs 2.6%	3 months			research grant	
7	Early discharge of patients with pulmonary embolism: a two-phase observational study. Davies CWH. ERJ 2007	Multicentre cohort study	2+	157 received OP anticoagulation therapy	Excluded: admission for another medical reason, additional monitoring or needing O2, bleeding disorders, previous PE, co-existing DVT, likelihood poor compliance, sig immobility and pregnancy.	Confirmed PE within 72 hrs of the initial assessment and discharged on LMWH and warfarin.	Median time to diagnosis was 1.0 days. LOS was 1.0 days (range 0-3). Median bed days saved was 5.0 (1-42) bed days per patient. No deaths during the acute phase or readmissions due to complications of PE. 3/157 deaths. Satisfaction scores 96.6% indicated that they would have treatment again as	3 months				another cohort study showing safety of ambulatory PE treatment in selected low risk cohort with high levels of patient satisfaction and median saving of 5.0 bed days per patient
8	Aujesky, D.;Roy, P. M.;Verschuren, F et al. Outpatient versus inpatient treatment for patients with acute pulmonary embolism: an international, open-label, randomised, non-inferiority trial. 2011 Lancet.	RCT	++	344 - 172 each arm of study	Confirmed PE and with PESI scoes of 1 or 2. Matched ages 47 v 49 yrs, and matched for all other variables. Patients also excluded if other adverse clinical factors (below)	Out-patient discharge without admission or hospital; admission. All given LMWH follwoed by VKA. Outpatients were contacted each day first week and hospital patients when appropriate by normal standard	Out-patient v in-patient managment	90 days	Primary outcome: Recurrent VTE at 90 days. Secondary outcome: Major bleeding days 14 and 90	1. Only 1 patient had a recurrent VTE in study (in OP group - 0.6%). 2. Three patients (1.8%) had major bleeding (2 in 14 day period). Non inferiority both criteria. 1 death each group (0.6%) at 90 days. No	Swiss National Science Foundation, Programme Hospitalier de Recherche Clinique, and the US National Heart,Lung, and Blood Institute. Sanofi -Aventis provided free drug supply in the participating	
9	Uresandi F, Otero R, Cayuela A, et al. A clinical prediction rule for identifying short-term risk of adverse events in patients with pulmonary thromboembolism. Archivos De Bronconeumologia 2007;43(11):617-22.	Prospective observational cohort	2-	681	Age >17 with confirmed PE	MV logistic regression to derive and validate a decision rule in same cohort.	-	10 days	Composite 10 day outcome - death, major or minor bleeding and recurrent thrombosembolism	AUC 0.75 for new rule	Public body	General comments: derivation study for a new prediction rule for short term events. Includes cancer. Includes bleeding. Irrelevant to protocol as patients not risk stratified, no investigations performed, 10 day outcomes only and no validation cohort.
10	Outpatient versus inpatient treatment in patients with pulmonary embolism: a meta analysis. Zondag W. 2013	Meta-analysis	1+	1657 (discharge <24hrs), 256 (discharge <72 h) and 383 (low risk inpatients)	Low risk according to various scoring methods. Varying numbers of patients with malignancy. Later corrected for in study where mortality re-analysed in those with <15% malignancy in cohort.	Discharge within 24 hrs, early discharge <72 hrs or low risk inpatient treatment	Recurrent VTE: 33/1657 patients. No fatal events. No difference in the pooled recurrent VTE risk in those treated as OP v IP. Major Bleeding: 15/1657 had major bleeding (3 fatal). Pooled incidences did not differ between groups. All cause mortality: Pooled mortality of discharged early was 2.3% v	3 months	Mortality, recurrent VTE, bleeding			No evidence of adverse bleeding rates (most studies excluded patients with higher bleeding rates). Authors conclude study confirms safe to treat PE as OP in low risk groups but some doubt based on this study about mortality, given the inclusion of studies with very high levels of malignancy in the cohort. need uniform studies to compare properly. Note small numbers in low risk IP treatment arm and early discharge (<72hrs).

	Bibliographic citation	Study type	Ev lev	Number of patients	Patient characteristics	Intervention	Comparison	Length of follow up	Outcome measures	Effect size	Source of funding	General Comments
11	Piran, S.;Gal, G.;Wells, P. S.;Gandara, E.;Righini, M.;Rodger, M. A.;Carrier, M. Outpatient treatment of symptomatic pulmonary embolism: a systematic review and meta-analysis	Meta-analysis	1+	1564 citations, 16 articles selected but 5 excluded leaving 11 studies. 8 prospective cohort studies and 3 RCTs. 1258 patients. 8 studies of patients entirely treated as outpatients, 2 were eraly discharge studies and 1 reproted these separately.	Acute symptomatic PE, prospective studies, 3 months treatment, relevant outcomes.			short term (14 day) and 3 months outcomes.	Rec VTE (1.4%), fatal PE (0.47%), maj bleeding (0.81%), fatal ICH (0.29%), mortality (1.58%). Low rate of adverse events.			Acceptable in terms of quality: Low rate of adverse events for outpatient management
12	Investigating and managing suspected PE in an OP setting: the Leicester experience. Vali et al Thorax 2014	Cohort study - prospective	2+	905 assessed - 96 PEs diagnosed (34 admitted). 871 treated as an OP over 2 year period.	Suspected PE: P<110, SBP >100, Oxygen sats >92%, RR<30, no history of collapse, no features of RHS on CT scan. Able to comply with treatment, low risk of bleeding, no co-morbidity requiring admission.	Ambulatory management during investigations and treatment. 308 negative D-dimers and discharged. 871 discharged, 95 FU in respiratory clinic.	14 deaths (1.6%) - none related to PE. 692 bed days saved per year in 1 million catchment population.(Previous pilot work estimated mean LOS 1.59 days). Estimated saving based on £250 per bed day =£173,000 per annum.	Minimum 5 months	Deaths. Bed days saved. Health economics.		None	significant and transferrable UK study looking at ambulatory management in suspected PE. Demonstrates safety (low mortality) and reduction in hospital admissions. Cost calculations shown.
13	Out of hospital treatment of acute pulmonary embolism in patients with a low NT-proBNP level. Agterof MJ. J of Thrombosis and Haemostasis. 2010.	Multicentre prospective cohort	2+	351 consecutive patients of which 152 included. 105 (69.1%) discharged from ED and 47 hospitalised for between 6-24hrs.	Inclusion: PE in >18. All patients confirmed within 24 hrs of admission. NT-proBNP <500ng/ml. Excluded haemodynamically unstable, risk of bleeding, iv analgesia, requiring admission for co-morbidity, pregnancy, renal failure.	Discharge home with LMWH as a bridge to OAT or LMWH alone if malignancy.	No serious adverse events or death, recurent Vte or major bleeding in first 10 days or during 3 month FU period. 43% could be treated in OP setting. Home treatment considered convenient, with high satisfaction scores and no increase in anxiety scores.	3 months				
14	Aujesky D, Obrosky DS, Stone RA, et al. Derivation and validation of a prognostic model for pulmonary embolism. American Journal of Respiratory and Critical Care Medicine 2005;172(8):1041-46.	Cohort	+	Derivation- 10354; internal validation 5177, external validation 221	Confirmed PE	N/A	N/A	30 days	All cause mortallity at 30 days; in-hospital adverse outcome (shock/ cardiac arrest)		Grant from National Heart, Lung and Blood Institute	Derivation of the PESI score with internal validation and external validation using patients from France and Switzerland. Area under to ROC curve for derivation, internal and external validation were 0.78, 0.77, and 0.79 repectively.
15	Aujesky, D.;Roy, P. M.;Le Manach, C. et al. Validation of a model to predict adverse outcomes in patients with pulmonary embolism. 2006 European Heart Journal	Cohort	++	367 patients with confirmed PE	PE diagnosed at admission - exzcluded if made before admitted or >2 days after admission	N/A	N/A	90 days	1. mortality all causes at 90 days, 2. non-fatal VTE and/or bleeding	Risk class mortality derivation v validation: Class1 1.1 v 0% Class2 3.1v1.1% Class3 6.5v3.1% Class4 10.4 v12.9% Class 5 25.5 v 24.4%	Not disclosed (no conflicts listed)	
16	Aujesky D, Perrier PM, Stone RA et al. Validation of a clinical prognostic model to identify low-risk patients with pulmonary embolism. 2007 Journal of Internal Medicine	Cohort (validation study using prospectively collected data- PESI)	+	899 patients (from 119 European hospitals)- pooled data from 4 European studies	Confirmed PE- either symptoms in keeping with PE and confirmed DVT, High probability VQ, positive CT or pulmonary angiography	N/A	N/A	3 months	Overall and PE-specific mortality at 3 months	N/A	Not disclosed (no conflicts listed)	External validation of PESI score. Discriminarory power for overal mortality with ROC of 0.8 (0.75-0.86) and PE-specific mortality of 0.77 (0.68-0.86). Based on 58 deaths (21 definite or possible PE 4 major bleeding, 33 of comorbid illnesses (mostly cancer)).

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17	Donze J, Le Gal G, Fine M, et al. Prospective validation of the pulmonary Embolism Severity Index: A clnical prognostic model for pulmonary embolism. 2008 Thrombosis and Haemostasis	Cohort validation study	+	357 patients with confirmed PE	Confirmed PE from 6 centres- consecutive adult outpatients	Outpatient management	N/A	90 days	90 day mortality	N/A	Not disclosed (no conflicts listed)	Validation study of PESI in European cohort.
18	Jiminez D, Aujesky D, Moores L, et al. Simplification of the pulmonary embolism severity index for prognostication in patients with acute symptomatic pulmonary embolism. 2010 Archives of Internal Medicine	Retropective cohort- simplified version of PESI	+	983 patients from single centre in Spain (as above) and 7106 patients from RIETE database	Confirmed PE on VQ, CTPA, proximal doppler with symptoms	N/A	N/A	30 days	All cause 30 day mortality	N/A	Institutional grants in addition to educational grants from Sanofi Aventis and Bayer Schering Pharma.	Derived from original PESI dataset and using logistic regression to look for features associated with 30 day mortality leading to creaton of the sPESi score. Internal and external validation. PESI and sPESI have very similar ROC values for 30 day mortality.
19	Wicki J, Perrier A, Perneger T et al. Predicting adverse outcome in patients with acute pulmonary embolism: a risk score. 2000 Thrombosis and Haemostasis	Derivation of Geneva score prospective cohort	+	296 patients from single center in Geneva with confirmed PE	Confirmed PE	N/A	N/A	90 days	Mortality, bleeding, recurrent VTE	N/A	Not disclosed (no conflicts listed)	
20	Nendaz M, Bandelier P, Aujesky D et al. Validation of a risk score identifying patients with acute pulmonary embolism, who are at low risk of clinical adverse outcome.2004 Thrombosis & Haemostasis	Retrospective cohort validation of Geneva score	+	3 centres- x 2 Swiss & x1 French- 199 patients. 2000-2002	Confirmed PE on angiogram, CTPA, VQ or DVT on doppler	N/A	N/A	3 months	All cause mortality, recurrent VTE and major bleed at 3 months	N/A	Not disclosed (no conflicts listed)	80% classified as low risk. Inthat group, 8 adverse events (1 fatal bleed, 4 non-fatal bleeds, 1 recurrent DVT and 2 cancer deaths). ROC = 0.77
21	Aujesky, D.; Obrosky, D. S.;Stone, R et al. A prediction rule to identify low-risk patients with pulmonary embolism. 2006 Archives of Internal Medicine	Cohort study	+	10354 for derivation score and 5177 for internal validation.	Patients with confirmed PE including all with major episides including arrest, thronmblysis, RF etc	N/A	N/A	30 days	Death all causes 30 days	Prediction score classified 33% of patients in external model as low risk score. None died or had serious complications at at 7 days or 30 days	Not disclosed (no conflicts listed)	Possible selection bias in identifying patients via hospital coding systems.
22	Agterof MJ, Schutgens REG, Moumli N et al.A prognostic model for short term adverse events in normotensive patients with pulmonary embolism. 2011 American Journal of Hematology	Cohort	+	210 outpatients (165 used for the prognostic model due to missing data and 6 lost to follow-up)	Normotensive, confirmed PE	N/A	N/A	10 days	Recurrent VTE, death, major bleeding, need for: CPR, thrombolysis, vasopressors, mechanical ventilation, catheter fragmentation, surgical embolectomy	N/A	Not disclosed (no conflicts reported)	Predictive score derived from cohort of 165 patients. Only 10 adverse events. Score was not externally validated in this paper

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23	Agterof, M. J.;van Bladel, E. R.;Schutgens et al. Risk stratification of patients with pulmonary embolism based on pulse rate and D-dimer concentration 2009 Thrombosis & Hemostasis.	Retrospective case study	+	440	Confirmed PE .	N/A	N/A	10 days and 3 months	SAE - death, major bleeding, VTE	HR ≥ 100 and DD ≥ 3000 were most predictive of SAE, both single and multi variate analysis (OR 8.09/6.85 and 8.91/5.51)	Not disclosed (no conflicts listed)	Potential bias - almost 50% of data for those with SAE was missing and only 70% had all data recorded.
24	Barra S, Paiva L, Providencia R et al. LR-PED rule: low risk pulmonary embolism decision rule - a new decision score for low risk pulmonary embolism. 2012 Thrombosis Research	Retrospective cohort study (derivation of predictive score)	+	142 patients with confirmed PE who were considered low risk (clinical & ECHO parameters)	Low risk- confirmed PE and asymptomatic/ mildle symtomatic after 6 hours, haemodynamically stable (SBP >100mmHg, HR <100/min, SaO2 >94%) and no clinical or ECHO features of acute RV dysfunction	N/A	N/A	Primary end-point 1 month mortality (6 months total for secondary end-point)	In-hospital, 1 month and 6 month mortality	N/A	Not disclosed (no conflicts listed)	Derivation of LR-PED rule and comparison with Geneva score and sPESI. Non inferiority study with no significant difference in ROC curve values for the three scores.
25	Jakobsson C, Jiminez D, Gomez V et al. Validation of a clinical algorithm to identify low-risk patients with pulmonary embolism.2010 Journal of Thrombosis and Haemostasis	Cohort- validation study PESI	+	983 patients at single centre in Spain 2003-2008	Confirmed PE on CTPA, VQ or pos proximal doppler with symptoms	N/A	N/A	30 days	Primary- 30 day all cause mortality, secondary: 7 day all causePE and bleeding related 7 and 30 day mortality	N/A	Not disclosed (no conflicts listed)	110 deaths during follow-up with 55 due to definite/possible PE, 6 due to bleeding and 49 due to other causes.
26	Maestre A et al. Ann Am Thorac Soc 2015; 12: 1122-1129	Retrospective cohort - RIETE database	3	18,707 cases of objectively confirmed acute PE		None - composite outcome of all-cause mortality, recurrent PE and major bleed within 19 days. Factors associated with composite outcome were: chronic heart failure, cancer, SBP <100, HR ≥110bpm, SpO2 <90%, renal impairment, recent major bleed, recent immobility ≥4d, plt count <100 or >450.	compared their new 9-item score with sPESI (<1) and PESI (≤65)	10 days - 46 (0.25%) rec PE, 203 (1.09%) bleed, 471 (2.51%) died - 244 died of PE, 35 died of bleeding	When comparing 10-day composite outcome: new RIETE score appeared more specific and sensitive than sPESI and more specific than PESI. However no difference in NPV (RIETE 99.4%, 99.1-99.6; PESI 99.1, 98.7-99.4). In relation to 10-day bleed rates, again low RIETE		RIETE Registry is at least in part multi-Pharma supported	
27	Erkens P, Gandara E, Wells P, et al. Does the pulmonary embolisn severity index accurately identify low risk patients eligible for outpatient treatment? 2012 Thrombosis Research	Retrospective cohort	+/- (slightly unclear how relevant it is)	243 patients in Canadian centre with confirmed PE (CTPA/ VQ)	Confirmed PE on VQ/ CTPA	Outpatient management	N/A	3 months	Death, bleeding, recurrent VTE	N/A	Not disclosed (no conflicts listed)	Low risk group; no deaths and no adverse events at 14 days.

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28	Jimenez D, Yusen R, Otero R,et al. Prognostic models for selecting patients with acute pulmonary embolism for initial outpatient therapy. 2007 Chest	Retrospective cohort	+	Single centre in Spain 2003-2006. 599 patients with confirmed PE.	Confirmed PE on CTPA, VQ or pos proximal doppler with symptoms	N/A	N/A	30 days	30 day mortality primary and non-fatal recurrent VTE/ bleeding secondary.	N/A	Not disclosed (no conflicts listed)	PESi cohort 41% classified as low risk. Geneva cohort 67% classified as low risk. 30 day motality in low risk groups; PESI 0.9% with ROC = 0.78 and Geneva 5.6% with ROC = 0.61. Geneva score initially derived to look at 3 month mortality not 30 day mortality.
29	Kabrhel et al., Thorax 2014, 69, 835-842	prospective observational study of consecutve PE	**3**	298 patients with PE: mean age 59 (SD±17) years; 152 (51%) male and 268 (90%) white race.	mostly inpatient management		observational to determine predictors of early clinical deterioration (which included maj bleeds)	5d and 30d	maj bleed in 7 within 5d (2%), but this is small fraction of the 101 who has any from of deterioration			Early bleed rate of 2.3%, but no analysis on risk factors
30	Zondag W, Mos I, Creemers-Schild D et al. Outpatient treatment in patients with acute pulmonary embolism: the Hestia Study. 2011 Journal of Thrombosis and Haemostasis	Prospective cohort study	+	Netherlands 12 centres 2008-2010. 297 patients included	Confirmed PE	N/A	N/A	90 days	Recurrent VTE primary and bleeding/ mortality	N/A	Study partly supported by unrestricted grant from GlaxoSmithKline. Statements of interest are declared.	
31	den Exter PL, Zondag W, Klok FA, et al. Efficacy and Safety of Outpatient Treatment Based on the Hestia Clinical Decision Rule With or Without NT-proBNP Testing in Patients With Acute Pulmonary Embolism: A Randomized Clinical Trial. American journal of respiratory and critical care medicine 2016	randomised trial (non-inferiority)	1+	550	Confirmed PE without any Hestia criteria and suitable for home management of PE	Patients randomised to have their NT-proBNP divulged who had an elevated NT-proBNP were managed as inpatients. All others were managed as outpatients	Patients who had NT-proBNP divulged versus those who did not	30 days	PE or bleeding related mortality, cardiopulmonary resuscitation or ICU admission	Given the low number of patients with an elevated NT-proBNP, the study was deemed to be underpowered	None declared	No patient who had an elevated NT-proBNP either in the group who were admitted or in the non-divulged group suffered an endpoint supporting the concept that the Hestia criteria on their own identify a low risk group.
32	Zondag, W.;Hiddinga, B. I.;Crobach, M. J et al. Hestia criteria can discriminate high- from low-risk patients with pulmonary embolism. 2013 European Respiratory Journal.	Comparison - cross sectional study?	+	530	297 patients treated as OP, and 233 treated as IP (excluded from OP tretament in previous Hestia study)	Outpatient management	N/A	3 months	Compared VTE, bleeding and mortlaity between the 2 groups	IP were: older 62 v 52 yrs; greater levels of immobility or surgery, HF, COPD and cancer. Mortality higher in the IP group - 9.6% v 1% and higher rate of major bleeding	Unresticted grant from GlaxoSmithKline, the Netherlands BV. Conflicts declared.	
33	A prospective study of the management of non-massive PE in the home Rodriguez-Cerrillo et al 2009	prospectice cohort study	2+	286 diagnosed PE, 61 patients met criteria, 30 treated as outpatients	injection by home hospitalisation unit	0 death rate for both arms, 1 minor bleed in each arm and 3 infections in hospital arm . Mean legnth of stay in hospital arm=10.6 days home treatment arm was 8.9 days	3 months				this is a small study but does compare similar cohorts of patients treated at home and in hospital - safety demonstrated and a reduction in legnth of stay	

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34	Kovacs 2000;83:209-11 Thromb Haemos	Prospective cohort, single centre Canada	3	158 patients: 81 treated as outpatients, 27 early discharge (2.5 days)	Dalteparin 5/7, Warfarin 3/12	Inpatient but results not compared to IP population	3 months	recurrent VTE (5.6%), minor bleeding (4.6%), major bleeding (1.9%), death (3.7%). No deaths attributed to PE or bleeding		None declared		
35	262 Erkens, P. M.;Gandara, E.;Wells, P.;Shen, A. Y.;Bose, G.;Le Gal, G.;Rodger, M.;Prins, M. H.;Carrier, M. Safety of outpatient treatment in acute pulmonary embolism	Retrospective cohort- check list done	3	473	260 outpatients	213 inpatients	3 months	lower incidence of mortality in out patient. (5% vs 26.7%) VTE Recurrence rates the same.			the 2 groups are not comparable and this really represents a retrospective case series of event rates.	
36	Zondag W, den Exter P, Crobach M,et al. Comparison of two methods for selection of out of hospital treatment in patients with acute pulmonary embolism. 2013 Journal of Thrombosis and Hemostasis	Cohort study- comparison of Hestia and s-PESI	2+	468	Patients with confirmed PE.	N/A	N/A	30 days	30 day mortality, recurrent VTE, bleeding		Not disclosed (no conflicts listed)	Hestia score applied prospectively. sPESI score applied retrospectively as post-hoc analysis. Scores had comparable outcomes with similar ROC characteristics, sensitivity and specificity.
37	Zondag W, Vingerhoets L, Durian M et al.. Hestia criteria can safely select patients with pulmonary embolism for outpatient treatment irrespective of right ventricular function.2013 Journal of Thrombosis and Hemostasis	Cohort study- comparison of Hestia with ESC criteria	+	Netherlands- post hoc analysis for ESC score- 496 patients (275 at home and 221 in hospital)	Confirmed PE, CTPA needed for RV/LV ratios	N/A	N/A	90 days	PE-specific mortality, resuscitation after cario-resp arrest, mechanical ventilation or inotopic use, thrombolysis or embolectomy	N/A	Study partly supported by unrestricted grant from GlaxoSmithKline. Statements of interest are declared.	
38	Squizzato A, Donadini M, Galli L,et al. Clinical prediction rules to identify a low-risk pulmonary embolism: a systematic review and meta-analysis. 2012 Journal of Thrombosis and Haemostasis	Systematic review and meta-analysis	++	33 studies included- 35518 patients. Comparison of clinical prediction tools for complications following treatment of low-risk PE.	Confirmed PE	N/A	N/A	90 days	Mortality/ recurrent VTE/ bleeding	N/A	Not disclosed (no conflicts listed)	Pooled mortality at 30 days 1.7%, 14 days 0.7%, 90 days 2.2%. Clinical prediction tools can be used to safely identify patients with acute PE at low risk of complications.

	Bibliographic citation	Study type	Ev lev	Number of patients	Patient characteristics	Intervention	Comparison	Length of follow up	Outcome measures	Effect size	Source of funding	General Comments
39	Nieto JA, Solano R, Ruiz-Ribo MD, et al. Fatal bleeding in patients receiving anticoagulant therapy for venous thromboembolism: findings from the RIETE registry. Journal of thrombosis and haemostasis : JTH 2010;8(6):1216-22.	Retrospective cohort - RIETE database	**3**	24395 consecutive patients with DVT or PE	patients from Spain, France, Italy, Israel and Brazil with objectively confirmed acute DVT and/or PE	None - assessed incidence and risk factors for major and fatal bleeding within 1st 3 months of treatment		3months	fatal or major bleeding (ISTH like definition) withn 1st 90 days. Major bleed in 2.24% including fatal bleed in 0.55% [40% GI tract and 25% ICH]. Fatal bleeding was independently associated with the following factors at the time of VTE diagnosis: age >75 years (OR, 2.16), metastatic cancer (OR, 3.80), immobility ‡ 4 days (OR, 1.99), a major bleed within the past 30 days (OR, 2.64), an abnormal prothrombin time (OR, 2.09), a platelet count < 100 · 109 L)1 (OR, 2.23), creatinine clearance < 30 mL min)1 (OR, 2.27), anemia (OR, 1.54), and distal deep vein thrombosis (OR, 0.39).		RIETE Registry is at least in part multi-Pharma supported	Useful evidence for real life bleed rate for VTE in first 90 days
40	Ruiz-Gimenez N, Suarez C, Gonzalez R, et al. Predictive variables for major bleeding events in patients presenting with documented acute venous thromboembolism. Findings from the RIETE Registry. Thrombosis and haemostasis 2008;100(1):26-31.	derivation and validation cohorts from RIETE Registry	**3**	13,057 deriv; 6572 valid.	mean age 66y, ~50% male. 47% with PE. Most treated with LMWH (91%), with 70% transit to VKA and 29% staying on LMWH	On multivariate analysis, age >75 years, recent bleeding <15d (2pts), cancer, creatinine levels >1.2 mg/dl (1.5pts), anemia [Hb<13 men, <12 women] (1.5pts), or pulmonary embolism at baseline were independently associated with an increased risk for major bleeding. Score range 0-8. see table 3 below.		3m, with 2.4% having major bleed (including 0.6% fatal)	In the derivation sample 2,654 (20%) patients scored 0 points (low risk); 9,645 (74%) 1–4 points (intermediate); 758 (5.8%) >4 points (high risk). The incidences of major bleeding were: 0.3% (95% confidence interval [CI]: 0.1–0.6), 2.6% (95% CI: 2.3–2.9), and 7.3% (95%			Applicable to all VTE, managed mainly as IP with LMWH/VKA. Interestingly initial PE was a risk factor for 90d maj bleed rate.
41	Shopp et al 2015	Meta-analysis	1+	3007	ECG		30 days haemodynamic collapse and all-cause mortality		6 ecg paramaters associated with worse outcome. Lower Daniel score associated with better outcome.		***General comments: meta-analysis of 10 studies looking at ECG parameters. Authors suggest that a low Daniels score (21-point ECG scoring system) could be useful in identifying low-risk patients suitable for discharge but no comparison in this***	388 of the patients has missing variable(s) on the HAS-BLED score and were scored as normal. DOACs were not used
42	F. A. Klok, C. Niemann, C. Dellas, G. Hasenfuß, S. Konstantinides, M. Lankeit. Performance of five different bleeding-prediction scores in patients with acute pulmonary embolism. Journal of Thrombosis and Thrombolysis 20 June 2015;pp 1-9.	Cohort study with prospective and post hoc calcaulation of bleeding scores	**3**	448 with PE			The baseline Kuijer, RIETE, HEMORR2HAGES, HAS-BLED and ATRIA scores.	30 days	The accuracies of both the overall, original 3-level and newly defined optimal 2-level outcome of the scores were evaluated and compared, both for the 30-day period as well as for bleeding occurring in versus after the first week of treatment. 20 of 448 patients suffered major bleeding resulting in a cumulative incidence			

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43	Klok FA, Mos IC, Huisman MV. Brain-type natriuretic peptide levels in the prediction of adverse outcome in patients with pulmonary embolism: a systematic review and meta-analysis. American journal of respiratory and critical care medicine 2008;178(4):425-30.	Meta-analysis	1+	1132	13 studies of prognostic importance of bnp/NT-proBNP	N/A	N/A	Various	Overall mortality and predefined composite outcome of adverse clinical events	Elevated levels of BNP or NT-pro-BNP were significantly associated with right ventricular dysfunction (P < 0.001). Patients with high BNP or NT-pro-BNP concentration		High concentrations of BNP distinguish patients with pulmonary embolism at higher risk of complicated in-hospital course and death from those with low BNP levels. Increased BNP or NT-pro-BNP concentrations alone, however, do not justify more invasive treatment regimens.
44	Jimenez D, Diaz G, Molina J, et al. Troponin I and risk stratification of patients with acute nonmassive pulmonary embolism. The European respiratory journal 2008	Prospective cohort study	2+	318	318 non-high risk acute PE	N/A	Non-high sensitivity TropI	30 days	All-cause and PE-related PE	An age .65 yrs, systolic blood pressure ,120 mmHg and severity of illness assessed using the PE severity index (PESI) were significantly associated with an increased risk		In haemodynamically stable patients with acute pulmonary embolism, non-high sensitive cardiac troponin I was not an independent predictor of 30-day all-cause mortality, although it did predict fatal pulmonary embolism.
45	Jimenez D, Uresandi F, Otero R, et al. Troponin-based risk stratification of patients with acute nonmassive pulmonary embolism: systematic review and metaanalysis. Chest 2009;	Meta-analysis	1+	1366	Pooled data from 9 studies	N/A	Overall mortality by non-high sensitivity troponin		Pooled results showed that elevated troponin levels were associated with a 4.26-fold increased odds of overall mortality (95% CI, 2.13 to 8.50; heterogeneity chi(2) = 12.64; degrees of freedom = 8; p = 0.125). Summary receiver operating characteristic curve analysis showed a relationship between the			Non-high sensitivity troponin not useful at identifying low-risk patients
46	Moores L, Aujesky D, Jimenez D, et al. Pulmonary Embolism Severity Index and troponin testing for the selection of low-risk patients with acute symptomatic pulmonary embolism.2009 Journal of Thrombosis and Haemostasis	Prospective cohort study	+	Single centre in Spain 2003-2008 with confirmed PE. 567 patients.	Confirmed PE on CTPA, VQ or pos proximal doppler with symptoms	N/A	N/A	30 days	All cause 30 day mortality	N/A	Not disclosed (no conflicts listed)	
47	Lankeit M, Jimenez D, Kostrubiec M, et al. Predictive value of the high-sensitivity troponin T assay and the simplified Pulmonary Embolism Severity Index in hemodynamically stable patients with acute pulmonary embolism: a prospective validation study. Circulation 2011;124(24):2716-24.	Cohort	2+	526	Adult pts with Peconsecutively diagnosed in 12 centres - massive pE excluded	sPESI and hsTropT		6 months	30 day death or complications	2 patients with SPESI 0 (1%) and 4 pts with HStropI<14 (2%) had complicated outcomebut 0 pts with bothe sPESI 0 and HStropI<14		General comments: Authors suggest that combination of both sPESI and low high sensitivity tropI may increase identification of truly low-risk pts, although none of the deaths in the sPESI or trop alone groups were PE-related

	Bibliographic citation	Study type	Ev lev	Number of patients	Patient characteristics	Intervention	Comparison	Length of follow up	Outcome measures	Effect size	Source of funding	General Comments
48	Ozsu S, Abul Y, Oztuna et al. Predictive value of troponins and simplified pulmonary embolism severity index in patients with normotensive pulmonary embolism. 2013 Multidisciplinary Respiratory Medicine	Prospective cohort study	+	121 patients - exclued if haemodynamically unstable	PE on CTPA	N/A	N/A	6 months	Primary- 30 day all cause mortality, second: non-fatal VTE, bleeding within 3 months and death at 6 months	N/A	Not disclosed (no conflicts listed)	sPESI alone has a higher sensitivity which drops slightly with addiiton of troponin to the algorithm though with an increase in specificity.
49	Hakemi EU, Alyousef T, Dang G, et al. The prognostic value of undetectable highly sensitive cardiac troponin I in patients with acute pulmonary embolism. Chest 2015;147(3):685-94.	Retrospective cohort study	2+	298	Consecutive in patients with retrospective chart review	hsTropI, RV on echo and CT, ECG	PSI I/II v PESI III-V	30 days	Primary endpoint death, CPR or thrombolysis. Secondary endpoints "hard" and "soft" ICU admissions	No deaths in -ve hsTNI, prognostic power even in PESI I/II and also incremental prognostic powerin addition to ECG and RV function		General comments: Demonstrated prognostic importance of hsTropI even in low risk PESI scores. No deaths in -ve hsTropI however 9% with -ve hsTropI were admitted to ICU. Issues re missing data.
50	Jimenez DE, C.;Marti, D.;Diaz, G.;Vidal, R.;Taboada, D.;Ortega, J.;Moya, J. L.;Barrios, V.;Sueiro, A. [Prognostic value of transthoracic echocardiography in hemodynamically stable patients with acute symptomatic pulmonary embolism]. Arch Bronconeumol 2007;43(9):490-4.	prospective cohort study	2+	214	Consecutively diagnosed acute PE non-high-risk, single centre	N/A	RV dysfunction on echo	30 days	30 day all-cause and PE-related mortality	In the first month of follow-up, 7 patients died—4 with positive echocardiographic findings and 3 with negative findings (odds ratio, 2.0; 95% confidence interval, 0.4-9.3;		Transthoracic echocardiography is not useful for prognostic stratification of hemodynamically stable patients with pulmonary embolism
51	Coutance G, Cauderlier E, Ehtisham J, et al. The prognostic value of markers of right ventricular dysfunction in pulmonary embolism: a meta-analysis. Critical care 2011;15(2):R103.	Meta-analysis	1-	1249 echo, 503 CT, 7 BNP/NT-Pro BNP	echo, CT and BNP/NTproBNP			30 days	30 day PE-related mortality	echo OR 4.44 (1.75-11.3), NPV 99% (98-100) but NLR 0.36 (0.2-0.8). CT OR 2.17 (0.06-0.79), NPV 99 (96-100) but NLR 0.51 (0.0007-0.36). BNP/pro-BNP OR 6.4 (2-		General comments: Small sample sizes compared with other specific metanalayses and so not helpful
52	Becattini C, Agnelli G, Germini F, et al. Computed tomography to assess risk of death in acute pulmonary embolism: a meta-analysis. The European respiratory journal 2014;43(6):1678-90.	Meta-analysis	1+	4767	RV:LV on CTPA		none	1 and 3 months	Death at 30 days and 3 months	OR of increased RV:LV 2.11 (1.6-2.8) at 30 days and 4.65 (1.8-12.1) at 3 months. NPV for mortality of 95% and of PE-related mortality of 99% at 30 days.		General comments: Confirms poor prognosis associated with RV:LV dilataion and suggests that using a threshold of RV:LV of 0.9 may safely identify patients safe for discharge. No comparison with BNP or trop possible.
53	Jimenez D, Lobo JL, Monreal M, et al. Prognostic significance of multidetector CT in normotensive patients with pulmonary embolism: results of the protect study. Thorax 2014;69(2):109-15.	Prospective cohort study	2+	848	Multi-centre consecutive non-high risk PE		Outcome by RV:LV < or > 0.9	30 days	30-day mortality and complications	MDCT detected RVD in 533 (63%) of the 848 enrolled patients. Those with RVD on MDCT more frequently had echocardiographic RVD (31%) than those without RVD on MDCT (9.2%)		This study did not support the use of RV:LK on CT to risk stratify

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54	Jimenez DA, D.;Diaz, G.;Monreal, M.;Otero, R.;Marti, D.;Marin, E.;Aracil, E.;Sueiro, A.;Yusen, R. D.;Riete Investigators. Prognostic significance of deep vein thrombosis in patients presenting with acute symptomatic pulmonary embolism. American Journal of Respiratory & Critical Care Medicine 2010;181(9):983-91.	Prospective cohort study	2+	707	Single-centre consecutive PE diagnoses		Outcome by presence of DVT on ultrasonography	90 days	90 day mortality and VTE recurrence	The primary study outcome, all-cause mortality, and the secondary outcome of PE-specific mortality were assessed during the 3 months of follow-up after PE diagnosis. Multivariate Cox proportional hazards regression was		In patients with a first episode of acute symptomatic PE, the presence of concomitant DVT is an independent predictor of death in the ensuing 3 months after diagnosis
55	Aujesky DR, P. M.;Guy, M.;Cornuz, J.;Sanchez, O.;Perrier, A. Prognostic value of D-dimer in patients with pulmonary embolism. Thrombosis & Haemostasis 2006;96(4):478-82.	Prospective cohort study	2+	366	4-centre prospectivel diagnosed PE		Outcome by D-Dimer level	90 days	90-day overall mortality	Patients who died had higher median D-dimer levels than patients who survived (4578 versus 2946 microg/l; p = 0.005). Mortality increased with increasing D-dimer levels,		Patients with PE who have D-dimer levels below 1500 microg/l have a very low mortality. Not clear how can be used to identify patients at low-risk of early PE-related mortality suitable for early discharge
56	Vanni SJ, D.;Nazerian, P.;Gigli, C.;Parisi, M.;Morello, F.;Giachino, F.;Viviani, G.;Pratesi, M.;Grifoni, S. Prognostic value of plasma lactate in acute pulmonary embolism: The multicentre Thrombo-Embolism Lactate Outcome study. European Heart Journal 2013;34:153.	Prospective observational cohort	2-	270	Adults with PE	Lactate >2 stratification to predict adverse events	-	3 months	Composite to include shock, hypotension, mechanical ventilation, CPR, vasopressor infusion.	OR 10.56 (4.4-25.87) for lactate >2 to predict composite outcome	not declared	General comments: Not applicable to guideline - If patients were risk scored by sPESI then those low risk had 0% outcome prior to lactate assessment anyway. This seems to be more a predictor of need for earlY aggressive care rather than a rule out tool prior to discharge.
57	Jimenez D, Kopecna D, Tapson V, et al. Derivation and validation of multimarker prognostication for normotensive patients with acute symptomatic pulmonary embolism. 2014 American Journal of Respiratory and Critical Care Medicine	Prospective cohort-derivation and external validation study	+	PROTECT dataset (848 patients)- 12 Spanish hospitals 2009-2011 and PREP (529 patients)	PE on CTPA	N/A	N/A	30 days	Complicated course-death, haemodynamic instability and recurrent VTE within 30 days	N/A	Not disclosed (no conflicts listed)	Derivation cohort - 216 ptients low risk (25%) with sPESI score of 0 and BNP <100; 2 patients had a complicated course and there were no deaths. ROC score 0.75. Externally validated; 193 (36%) low risk with the same exclusion criteria. None had complicated course compared with 7% that did in the high risk group.
58	Vuilleumier et al 2015	Prospective multicentre observational national cohort	2+	230	Non-high risk patients >65yrs enrolled in national swiss study	PESI, Geneva prognosis score, NT-ProBNP, hscTnT	comarison of prognostic score and biomarkers	30 days	Primary endpoint combined PE-related death, recurrent VTE and major bleeding			

	Bibliographic citation	Study type	Ev lev	Number of patients	Patient characteristics	Intervention	Comparison	Length of follow up	Outcome measures	Effect size	Source of funding	General Comments
59	Hogg K, Dawson D, Mackway-Jones K.2006. Outpatient diagnosis of pulmonary embolism: the MIOPED (Manchester Investigation Of Pulmonary Embolism Diagnosis) study. EMJ, 23(2) 123-7	Prospective cohort	+	408	Aim to validate algorithm for diagnosis of PE in patients presenting to one Manchester ED with pleuritic chest pain. Exclusion; Trauma, pregnancy, pneumothorax, MI, ischaemic heart disease, pericarditis, hypoxia (PO2 < 7.5), age<18, CI to contrast, weight>140 Kg	N/A	N/A	3 months	Recurrent VTE at 3 months. Deaths by 3 months.	N/A	N/A	Older comments: Q1 Is this OP imaging safe? "All pts ix as OP had an uncomplicated recovery." Q2. How long can you wait before imaging? (168 VQ scans, 44 on day of presentation, 74 as OP, 50 as IP) 274 (67.2%, two thirds) had PE diagnosed or excluded within one working day. 79 pts (20%) had OP imaging, 55 (14%) has IP imaging. All pts ix as OP had an uncomplicated recovery. Q3. What is the appropriate rx for suspected PE? They state that their patients received LMWH before imaging. This study only looks at those in ED who present with pleuritic chest pain, and does not consider those with dyspnoea or other symptoms/signs associated with PE. New comment: Selected study looking only at patients presenting to the emergency department with pleuritic chest pain. Some ambiguity about the time to imaging for those patients investigated in the outpatient cohort
60	Mcdonald A and Murphy R. A pilot audit of a protocol for ambulatory investigation of predicted low risk patients with possible pulmonary embolism. 2011 Journal of the Royal College of Physicians of Edinburgh	Audit of retrospective cohort	3	45	Patients with a clinical suspicion of PE (positive d-dimer or high risk history) who were suitable for ambulatory outpatient investigation in whom imaging was not available on day of presentation.	N/A	N/A	N/A	No readmission or presentations to regional secondary care centres at 30 days	N/A	N/A	25% of patients had PE confirmed. No adverse events noted either in those patients subsequently diagnosed with PE nor those treated empirically as suspected PE.
61	Gomez-Outes A, Terleira-Fernandez AI, Lecumberri R, et al. Direct oral anticoagulants in the treatment of acute venous thromboembolism: a systematic review and meta-analysis. Thrombosis research 2014;134(4):774-82.	systematic review and meta-analysis	++	27,127	Mean patients' age ranged between 55 and 58 years, and 9-17% of patients were 75 years or older with a predominance of male gender. Active cancer was present between 3% and 9% of patients at baseline. Moderate renal insufficiency was present in 5-8% of patients, and between 16-25% of patients had a prior history of VTE. The percentage of time that the INR was within therapeutic range (2 to 3) (TTR) varied between 57% and 63% across studies. The TTR ranged from 51% to 58% during the first month and from 62% to 73% afterwards. Under-anticoagulation was the more frequent deviation, ranging between 19% and 24% of the time across studies. Studies considered for inclusion were randomised controlled trials comparing any of the DOAC (dabigatran, rivaroxaban, apixaban and edoxaban) with standard treatment of acute VTE [e.g. vitamin k antagonist (dose-adjusted to maintain an INR between 2.0-3.0), overlapped with SC LMWH or IV UFH for at least the first 5 days].The authors did not include clinical trials with ximelagatran or idraparinux because they were withdrawn from further development due to side effects.	Dabigatran 150mg BD; apixaban 10mg BD; Rivaroxaban 15mg BD followed by 20mg OD (post-3 weeks); Edoxaban 60mg OD	Heparin/LMWH ≥ 5 days and until INR is ≥ 2.0 plus warfarin started concurrently with heparin/LMWH	Various	The pre-specified primary outcome was recurrent symptomatic VTE - that is, recurrent or new episode of symptomatic DVT or symptomatic PE. The pre-specified primary safety outcomewasmajor bleeding. The main secondary outcomes were each of the components of the primary efficacy outcome (recurrent DVT, recurrent non-fatal PE, and VTE-related death), fatal bleeding, intracranial bleeding, clinically relevant non-major bleeding, all cause death, acute coronary syndromes and a net clinical outcome of hard endpoints (recurrent symptomatic VTE, major bleeding, and	The risk of recurrent VTE was similar with the DOAC and standard treatment (relative risk 0.91, 95% confidence interval 0.79 to 1.06). The DOAC reduced the risk of major bleeding in comparison with standard treatment (0.62, 0.45 to 0.85) (absolute risk difference, −0.6%; 95% confidence interval −1.0% to −0.3%), but there was heterogeneity across trials in the relative risk of bleeding. No	The research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.	

	Bibliographic citation	Study type	Ev lev	Number of patients	Patient characteristics	Intervention	Comparison	Length of follow up	Outcome measures	Effect size	Source of funding	General Comments
62	Schulman S, Kearon C, Kakkar AK, et al. Dabigatran versus warfarin in the treatment of acute venous thromboembolism. The New England journal of medicine 2009;361(24):2342-52.	randomized, double-blind, noninferiority trial	++	2539	Patients were recruited from 228 clinical centers in 29 countries. Patients 18 years of age or older who had acute, symptomatic, objectively verified proximal deep-vein thrombosis of the legs or pulmonary embolism and for whom 6 months of anticoagulant therapy was considered to be an appropriate treatment were potentially eligible. Exclusion criteria were duration of symptoms longer than 14 days, pulmonary embolism with	oral dabigatran, administered at a dose of 150 mg twice daily	warfarin that was dose-adjusted to achieve an international normalized ratio of 2.0 to 3.0.	Patients were assessed at 7 days and then monthly until 6 months and were told to contact their study site immediately if symptoms developed that	The primary outcome was the 6-month incidence of recurrent symptomatic, objectively confirmed venous thromboembolism and related deaths. Safety end points included bleeding events, acute coronary syndromes, other adverse	A total of 30 of the 1274 patients randomly assigned to receive dabigatran (2.4%), as compared with 27 of the 1265 patients randomly assigned to warfarin (2.1%),	Boehringer Ingelheim.	
63	Investigators E-P, Buller HR, Prins MH, et al. Oral rivaroxaban for the treatment of symptomatic pulmonary embolism. The New England journal of medicine 2012;366(14):1287-97.	RCT	++	4832	The characteristics of patients in the rivaroxaban and standard therapy arms were similar at baseline. Characteristics included were: age, gender,weight, Creatinine clearance, risk factor for recurrent VTEs, initial diagnosis. Anatomical extent of PE, causes of PE, known/previous thrombophilia, admission to ICU.	Rivaroxaban group were given 15 mg twice daily for the first 3 weeks, followed by 20 mg once daily.	Patients who were assigned to the standard-therapy group received enoxaparin at a dose of 1.0 mg per kilogram of body weight twice daily and either warfarin or acenocoumarol, started within 48 hours after randomization. Enoxaparin was discontinued when the international normalized ratio (INR) was 2.0 or more for 2 consecutive days and the patient had received at least 5 days of enoxaparin treatment. The dose of the vitamin K antagonist was adjusted to maintain an INR of 2.0 to 3.0.	Active study: 12 months; During the active phase followed up at months: 3, 6 and 12	Primary efficacy outcome: symptomatic recurrent venous thromboembolism (which was defined as a composite of fatal or nonfatal pulmonary embolism or deep-vein thrombosis); Primary safety outcome: clinically relevant bleeding (which was defined as a composite of major or clinically relevant non-major bleeding)	Rivaroxaban was noninferior to standard therapy (noninferiority margin, 2.0; P = 0.003) for the primary efficacy outcome, with 50 events in the rivaroxaban group (2.1%) versus 44 events in the standard-therapy group (1.8%) (hazard ratio, 1.12; 95% confidence interval [CI], 0.75 to 1.68). The principal safety outcome occurred in 10.3% of patients in the rivaroxaban group and 11.4% of those in the	Bayer HealthCare and Janssen Pharmaceuticals	
65	Hokusai VTEI, Buller HR, Decousus H, et al. Edoxaban versus warfarin for the treatment of symptomatic venous thromboembolism. The New England journal of medicine 2013;369(15):1406-15.	randomized, double-blind, noninferiority study	++	8292	Patients 18 years of age or older were eligible if they had objectively diagnosed, acute, symptomatic deep-vein thrombosis involving the popliteal, femoral, or iliac veins or acute, symptomatic pulmonary embolism (with or without deep-vein thrombosis). Patients were excluded if they had contraindications to heparin or warfarin, had received treatment for more than 48 hours with therapeutic doses of heparin, had received more	edoxaban at a dose of 60 mg once daily, or 30 mg once daily (e.g., in the case of patients with creatinine clearance of 30 to 50 ml per minute or a body weight below 60 kg)	Warfarin (or placebo) was started concurrently with the study regimen of heparin, with adjustment of the dose to maintain the international normalized ratio (INR) between 2.0 and 3.0	Patients underwent assessment, in the clinic or by telephone, on days 5 through 12, 30, and 60 after randomization and monthly thereafter while	The primary efficacy outcome was the incidence of adjudicated symptomatic recurrent venous thromboembolism, which was defined as a composite of deep-vein thrombosis or nonfatal or fatal	Edoxaban was noninferior to warfarin with respect to the primary efficacy outcome, which occurred in 130 patients in the edoxaban group (3.2%) and 146	Daiichi-Sankyo	
74	Bookhart BK, Haskell L, Bamber L, et al. Length of stay and economic consequences with rivaroxaban vs enoxaparin/vitamin K antagonist in patients with DVT and PE: findings from the North American EINSTEIN clinical trial program. J Med Econ 2014;17(	randomized, open-label EINSTEIN trial program (RCTs)	++	812	As per the EINSTEIN PE AND DVT RCTs. **EINSTEIN Program**: For the Acute DVT Study, patients were eligible if they were of legal age for consent and had acute, symptomatic, objectively confirmed proximal DVT, without symptomatic pulmonary embolism. Patients were ineligible if they had received therapeutic doses of low-molecular-weight heparin, fondaparinux, or unfractionated heparin for more than 48 hours or if they had received more than a single dose of a vitamin K antagonist	rivaroxaban 15 mg twice daily for 3 weeks followed by 20 mg once daily	dose-adjusted subcutaneous enoxaparin overlapping with (guideline-recommended 'bridging' therapy) and followed by a vitamin K antagonist (VKA) (international normalized ratio: 2.0–3.0	As per the EINSTEIN program: patients were followed for the intended treatment duration and seen at fixed intervals that were identical for	Costs were applied to the length of stay (LOS) based on weighted mean cost per day for DVT and PE diagnoses	Of 382 patients hospitalized, 321 (84%), had acute symptomatic PE; few DVT patients required hospitalization. Similar rates of VTE patients were hospitalized in the rivaroxaban and	Janssen Scientific Affairs, LLC (a Johnson & Johnson company), Raritan, and Bayer	

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75	Matsuo H, Prins M, Lensing AW et al. Shortened length of hospital stay with rivaroxaban in patients with symptomatic venous thromboembolism in Japan: the J-EINSTEIN pulmonary embolism and deep vein thrombosis program.Curr Med Res Opin. 2015 Jun;31(6):1057-61	RCT	++	97	Rivaroxaban group were given 15 mg twice daily for the first 3 weeks, followed by 15 mg once daily.	Patients who were assigned to the standard-therapy group received Unfractionated Heparin (UFH) adjusted to maintain the activated partial thromboplastin time (aPTT) prolongation (1.5 to 2.5 times the control) then followed with Warfarin which was adjusted on the basis of prothrombin time-international normalized ratio (PT-INR) values target range	Active study: 12 months; During the active phase followed up at months: 3, 6 and 12	To examine the length of hospital stay in patients with PE and/or DVT receiving rivaroxaban compared to Japanese standard therapy in the Japanese (J)-	In the ITT population (N = 97), overall patient characteristics were similar in both treatment arms. The median length of stay in rivaroxaban patients was 10.0 days (interquartile range [IQR] 6.0 to 15.0 days) while it was 15.0 days (IQR 9.0 to 22.0) for patients on standard	Bayer HealthCare		
78	Moores, L.;Zamarro, C.;Gomez, V.;Aujesky, D.;Garcia, L.;Nieto, R.;Yusen, R.;Jimenez, D. Changes in PESI scores predict mortality in intermediate-risk patients with acute pulmonary embolism.2013. ERJ 41; 354-9	Cohort	+	304	Acute symptomatic PE confirmed by testing. 77% > 65 years. PESI class III at presentation	NA	NA	30 days	Death between 2 and 30 days, plus secondary end-point non-fatal VTE and/or major bleed	27.% of PESI class III patients fell into low risk PESI scores (class I & II) at 48 hours. Mortality in this cohort at 30 days was only 1.2% compared to 11.3% if remained PESI class III or	Grants from FIS (08/0200), SEPAR 2008, and NEUMOMADRID 2010	By recalculating the PESI score at 48 hours (PESI48) may reclassify patients who can be eligible for early discharge as opposed to those who may have been eligible at presentation with PESI 1-2 scores (low risk). Simplified PESI at 48 hours (s-PESI48) is equally good.
80	Zondag W, den Exter P, Crobach M,et al. Comparison of two methods for selection of out of hospital treatment in patients with acute pulmonary embolism. 2013 Journal of Thrombosis and Hemostasis	Cohort study-comparison of Hestia and s-PESI	+	468 patients 2008-2010.	Confirmed PE	N/A	N/A	30 days	30 day mortality, recurrent VTE, bleeding	N/A	Not disclosed (no conflicts listed)	Hestia score applied prospectively. sPESI score applied retrospectively as post-hoc analysis. Scores had comparable outcomes with similar ROC characteristics, sensitivity and specificity.
84	Piccioli A, Lensing AW, Prins MH, et al. Extensive screening for occult malignant disease in idiopathic venous thromboembolism: a prospective randomized clinical trial. Journal of thrombosis and haemostasis : JTH 2004;2(6):884-9.	Prospective randomised controlled trial	1-	201	Unprovoked acute PE with no known malignancy	Limited versus extensive malignancy screening		2 yr	Malignancy diagnosed, staging and survibval	Extensive screening group, 1 (1.0%) malignancy during follow-up v control group 10 (9.8%)[RR, 9.7 (1.3-36.8). Malignancies identified in the extensive		Underpowered as difficult recruiting
85	van Doormaal FF, Terpstra W, van der Griend R, Prins MH, Nijziel MR, van de Ree MA, Bu¨ ller HR, Dutilh JC, ten Cate-Hoek A, van den Heiligenberg SM, van der Meer J, Otten JM. Is extensive screening for cancer in idiopathic venous thromboembolism	prospective concurrently controlled cohort study	2+	630	Unprovoked acute PE with no known malignancy	Limited versus extensive malignancy screening		2.5 yrs	mortality and cancer diagnosis	In 12 of the 342 (3.5%) patients in the extensive screening group malignancy was diagnosed at baseline compared with		This study suggests that those who screen their patients with a careful history, physical examination, basic laboratory tests and a chest X-ray currently follow the most optimal strategy.
86	Carrier M, Lazo-Langner A, Shivakumar S, et al. Screening for Occult Cancer in Unprovoked Venous Thromboembolism. The New England journal of medicine 2015;373(8):697-704.	multicenter, open-label, randomized, controlled trial	1+	854	Unprovoked acute PE with no known malignancy	Limited versus extensive malignancy screening		1 yr	Cancer diagnosis and stage, Mortality	Of the 854 patients who underwent randomization, 33 (3.9%) had a new diagnosis of occult cancer between randomization and the 1-year follow-up; 14 of		The prevalence of occult cancer was low among patients with a first unprovoked venous thromboembolism. Routine screening with CT of the abdomen and pelvis did not provide a clinically significant benefit.

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88	Knight M, Ukoss. Antenatal pulmonary embolism: risk factors, management and outcomes. BJOG : an international journal of obstetrics and gynaecology 2008;115(4):453-61.	Case Control	2	143 cases; 259 controls	pregnant (antenatally only) women with pulmonary embolism		matched controls		incidence and case fatality			
89	Sultan AA, West J, Tata LJ, et al. Risk of first venous thromboembolism in and around pregnancy: a population-based cohort study. British journal of haematology 2012;156(3):366-73 doi: 10.1111/j.1365-2141.2011.08956.x[published Online First: Epub Date]|.	Population Cohort	2+	1234 cases of first PE of which 94 occurred in pregnancy (9 months prior tp delvery) and 116 postpartum (3 months post delivery). From total cohort of 972 683 women contributing 5 361 949 person years of follow up	all women aged between 15 and 44 years who were registered at a THIN general practice between April, 1987 and November, 2004.				absolute incidence of first PE			
100	Font 2014;12(3):365-373 Journal of the Comprehensive Cancer Network	Prospective Cohort, single centre, Spain	3	138 patients with cancer:	Inclusion: Cancer patients with PE diagnosed on VQ or CTPA >18 years using V/Q or CT. Exclusion from OP treatment: Pregnant, systolic BP < 100mmHg, Sats <90%, admission for other medical reason, renal failure, platelets <50, 000mm3, lack of social support, compliance issues, treating physician discretion	LMWH 3/12	inpatient	3 months-	PE sepcific mortality at 30 days(IP 18% op 3%) and 90 days (IP 34% OP 10%), major bleeding OP-4.8%/IP- 9.2%not significant, Recurrent VTE OP-1.6%/IP 5.3% not significant, All cause mortality OP 9.7%/IP-34.2% P-0.001		None declared	
101	Siragusa 2004;26(3):192-195 Experimental Oncology	Prospective Cohort, single centre Italy	3	OP 127 patients with VTE	Inclusion:patients presenting with acute DVT +/- >16 years US Doppler, V/Q or CT. Exclusion from OP treatment: haemodynamic instabilty, hypoxia requiring oxygen, admission for other medical reason, severe pain requiring parenteral analgesia, high risk of major bleeding, likelihood of poor compliance, renal insufficiency, acute anaemia, patient refusal	LMWH then warafrin	Inpatient. Results not presented separately for cancer patients.	3 months	Recurrent PE (IP O/OP - 0%)Major bleeding IP-0%,OP-0%		None declared	
102	Siragusa 2005;16(Supplement 4):136-138 Annals of Oncology	Prospective cohort, single centre, Italy	3	207 Cancer patients with VTE:127 OP/ 80 IP	Inclusion: cancer patients presenting with acute DVT +/- >16 years US Doppler, V/Q or CT. Exclusion from OP treatment: haemodynamic instabilty, hypoxia requiring oxygen, admission for other medical reason, severe pain requiring parenteral analgesia, high risk of major bleeding, likelihood of poor compliance, renal insufficiency, acute anaemia, patient refusal	LMWH alone 101, LMWH then warfarin 106	Inpatient (80)	6 months	Recurrent PE(IP 9.3%%;OP 5.5%), major bleeding(defined by International Society of thrombosis and Haemostasis) (IP 0%: OP 2.7%%), death (IP 37%:OP 30.5%		None declared	
103	Ageno 2005;90(2):220-224 Haematologica	Retrospective cohort, twin centre, Italy and Canada	3	321 patients: 197 outpatients, 124 inpatients	Inclusion: cancer patients presenting with acute DVT +/- >16 years. Exclusion from OP treatment: haemodynamic instabilty, hypoxia requiring oxygen, admission for other medical reason, severe pain requiring parenteral analgesia, high risk of major bleeding, likelihood of poor compliance.	Dalteparin alone 3/12(33%), Dalteparin 5/7 then warfarin (67%)	Inpatient (124)	3months	Recurrent VTE(IP 4.8%;OP 6.1%), major bleeding(defined by International Society of thrombosis and Haemostasis) (IP 4.8%: OP 1%), death (IP 48.4%:OP 50.7%		None declared	

	Bibliographic citation	Study type	Ev lev	Number of patients	Patient characteristics	Intervention	Comparison	Length of follow up	Outcome measures	Effect size	Source of funding	General Comments
104	Ambulatory management of PE: a pragmatic evaluation. Kovacs MJ. J of Thrombosis and Haemostasis. 2010	Retrospective single centre cohort study of consecutive patients	2+	639 patients (314 were OP=49.1%)	PE diagnosed and haemodynamically stable, did not require oxygen, no parental narcotics, not high risk for major bleeding.	Treated as IP or OP	In OP group - 3 (0.95%) thrombotic recurrences & 3 haemorraghic events. 9 deaths (2.9%) all due to underlying cancer. No comparision group.	3 months				Another paper stating that OP treatment in a low risk population is safe (low mortality, low recurrence of VTE and low risk of bleeding). Deaths due to malignancy.
99	Kline JA. Derivation and validation of a multivariate model to predict mortality from pulmonary embolism with cancer: The POMPE-C tool. 2012 Thrombosis Research.	Derivation of a multivariate score	+	408 with active cancer and PE from a database of 1880 patients with PE	PE and active cancer - excluded those where PE was detected co-incidentally at staging scans and those where care only	N/A	N/A	30 days	Mortality	Only 3/408 patients scored PESI 1 and none died. Overall mortality in all with PESI 1 was <1%. POMPE-C variables predicted death AUC 0.84 and 0.86 in a validation	National Institute for Health, Glaxo pharmaceuticals. Conflicts delcared	Only patients with PE and cancer included.
105	Syed FF, Beeching NJ. Lower-limb deep-vein thrombosis in a general hospital: risk factors, outcomes and the contribution of intravenous drug use. QJM : monthly journal of the Association of Physicians 2005;98(2):139-45	retrospective descriptive cohort - Liverpool	**3**	232 cases of DVT diagnosed in 223 patients in a DGH in 1996	6.9% had h/o IVDU [48.4% of those aged ≤40y]							General comments: confirms IVDU as common risk factor for DVT. Also such patient usually young and often have prior DVT and high rate of recurrent DVT. Paper does not state if IVDU cases were more or less likely to embolise to PE.
106	Cooke, V. A.;Fletcher, A. K. Deep vein thrombosis among injecting drug users in Sheffield. Emergency Medicine Journal 2006. 23(10; 777-779	retrospective cohort study - Sheffield	**3**	109 who completed Ix for DVT. Median age of IVDU cases was 29y v 51y for non-IVDU cases	33 injecting drug user (IDU) all confirmed to have DVT. 32/76 non-IVDU cases (58%) had DVT	outpatient Mx	Inpatient Mx	30-46m - all IVDU cases still alive.	number managed as outpatient	55% of IDU managed as outpatients vs 75% of non-IDU.	not reported	General comments: 45 % of IDU admitted while 25% of non-IDU admitted bacuse of chaotic lifestyle, difficulties with accomomdation, impaired cognitive function due to drug misuse and lack of funds to rurn for Ix or Rx. Mean inpatient LOS 6 days for IDU vs 4 days for non-IDU. 12 had LMWH only, 9 LMWH then warfarin and 1 absconded before Rx. 11 had no anticoagulant therapy. Note: duration of AC therapy in IVDU group not stated.
107	McColl MD, Tait RC, Greer IA, et al. Injecting drug use is a risk factor for deep vein thrombosis in women in Glasgow. British journal of haematology 2001;112(3):641-3.	descriptive retrospective cohort study - Glasgow	**3**	322 consecutive women with confirmed VTE: 187 DVT, 116 PE, 19 DVT+PE. [ie 42% with PE & 64% with DVT]					n/a	21.4% of DVT cases (and 52.4% of DVT cases <40y) had history of IVDU, while none of PE cases had history of IVDU		General comments: While IVDU is a common risk factor for DVT, none of 44 IVDU cases had history of PE nor suffered PE during 1-5 years follow-up [although prior and recurrent DVT was common - 9/44 and 13/44]. None of 135 cases of PE had history of PE. Management was challenging - self discharging coommon. Used heparin mainly, only 2/44 given VKA
108	Labropoulos NG, A. D.;Leon, M.;Kalodiki, E.;Wyatt, M.;Gupta, S. D.;Nicolaides, A. N. Complications after intravenous drug abuse and the diagnostic value of color flow duplex scanning. Journal of Vascular Technology 1996;20(1):27-28.	retrospective cohort	**3**	47 IVDU with ?DVT		US of leg veins		n/a	63% limbs and 57% patients had confirmed DVT.			General comments: confirms findings from other study (113) that IVDU with leg symptoms suggesting possible DVT are highly likely to have DVT. Also identified that only 3/27 cases (11%) with DVT had symptomatic PE.

	Bibliographic citation	Study type	Ev lev	Number of patients	Patient characteristics	Intervention	Comparison	Length of follow up	Outcome measures	Effect size	Source of funding	General Comments
109	Mackenzie AR, Laing RB, Douglas JG, et al. High prevalence of iliofemoral venous thrombosis with severe groin infection among injecting drug users in North East Scotland: successful use of low molecular weight heparin with antibiotics. Postgraduate medical journal 2000;76(899):561-5.	descriptive retrospective cohort study - Aberdeen	3	20 IVDU patients with DVT		anticoagulatuion with LMWH			n/a			General comments: Median duration LMWH achieved was only 7 weeks - unclear what was intended duration. Commented that while chronic leg symtoms were common, none of the patients had PE
110	Anderson, A. M.;Chane, T.;Patel, M.;Chen, S.;Xue, W.;Easley, K. A.Warfarin therapy in the HIV medical home model: low rates of therapeutic anticoagulation despite adherence and differences in dosing based on specific antiretrovirals. AIDS Patient Care & Stds 2012; 26(8); 454-62	retrospective cohort	3	73 HIV-infected patients started on anticoagulation,82.2% had DVT or PE or both 12.3% were IVDU				up to 5 years				17.8 % were on anticpagulation for PE, 47.9% for DVT, 13.7% for PE and DVT, 1.4% for DVT, PE and thrombotic stroke. Multivariate analysis showed that IVDA at baseline was an independent risk factor for subtherapeutic INR (OR 2.4, 95% CI 1.3-4.7, p=0.01). It was the main independent risk factor after adjusting for warfarin adherence and other variables.