Pulmonary embolism. Thrombolysis or discharge?

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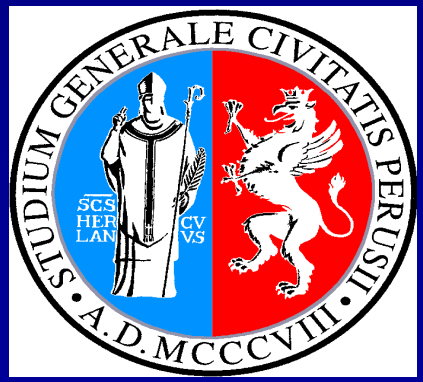


The spectrum of clinical presentation of PE

PE-related shock

Mild clinical symptoms

The spectrum of clinical outcome of PE

>30%

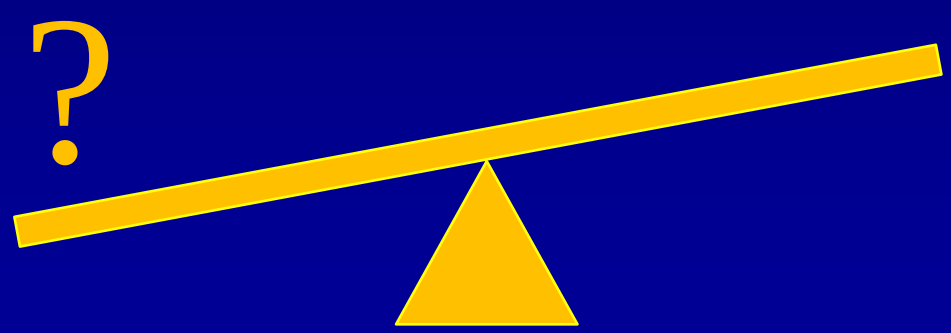
Mortality

1%

Thrombolysis - Home management

-What is an acceptable rate of death

-What is an acceptable rate of bleeding complications



Acute PE: short term mortality

	timing	Mortality	
		stable	unstable
ICOPER, 1999	14-day	15.1%	58.3%
RIETE, 2008	30-day	3.0%	9.3%
IPER, 2012	in-hosp	3.4%	31.8%

Treatment for pulmonary embolism

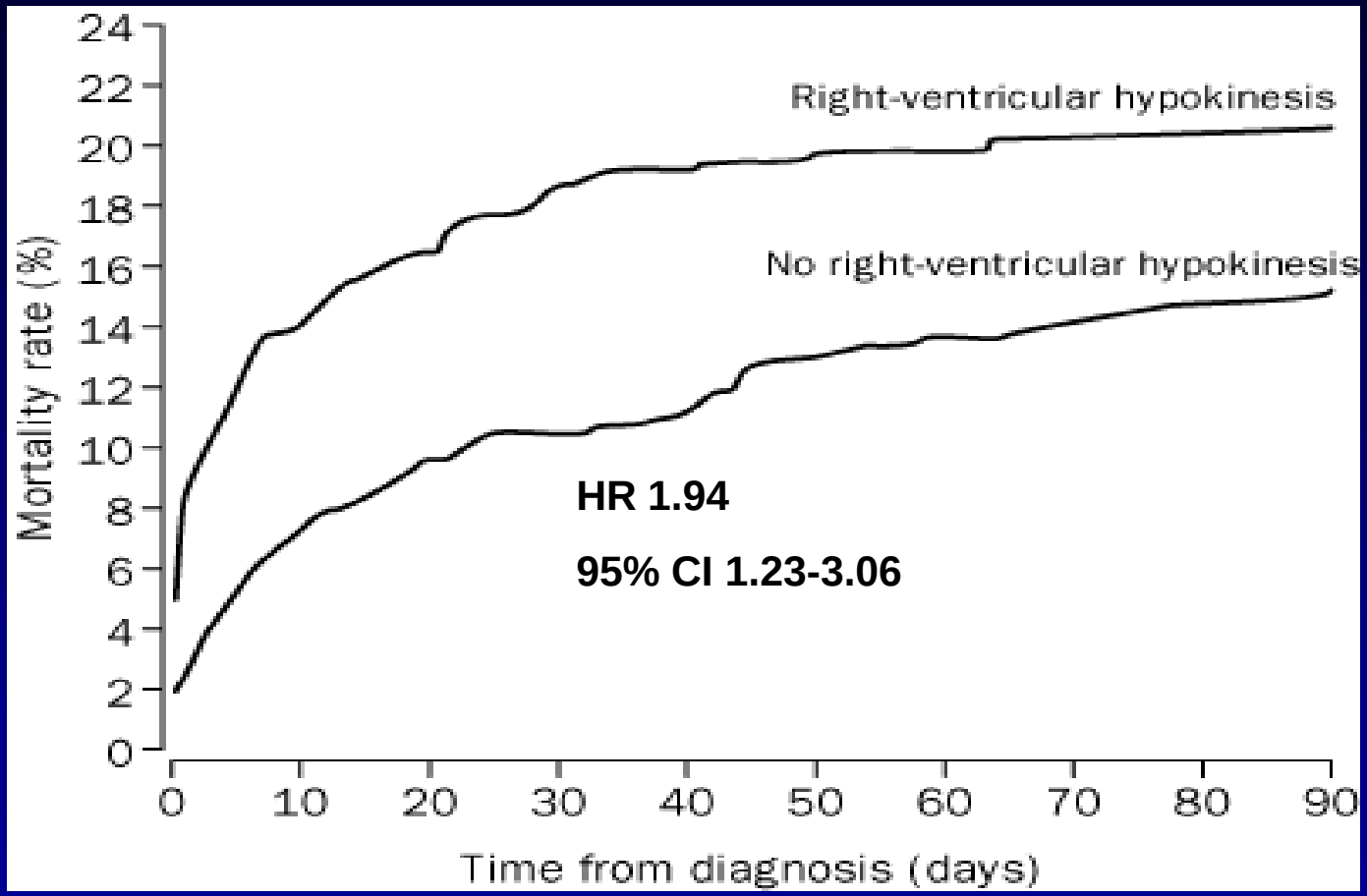
PE-related early MORTALITY RISK		RISK MARKERS			Potential treatment implications
		CLINICAL (shock or hypotension)	RV dysfunction	Myocardial injury	
HIGH >15%		+	(+)[a]	(+)[a]	Thrombolysis or embolectomy
NON HIGH	Inter mediate 3–15%	–	+	+	Hospital admission
			+	–	
			–	+	
	Low <1%	–	–	–	Early discharge or home treatment

2008

EUROPEAN SOCIETY OF CARDIOLOGY®

Adam Torbicki
Arnaud Perrier
S Konstantinides
Giancarlo Agnelli
Nazareno Galié
Piotr Pruszczyk

Markers of dysfunction: echocardiography

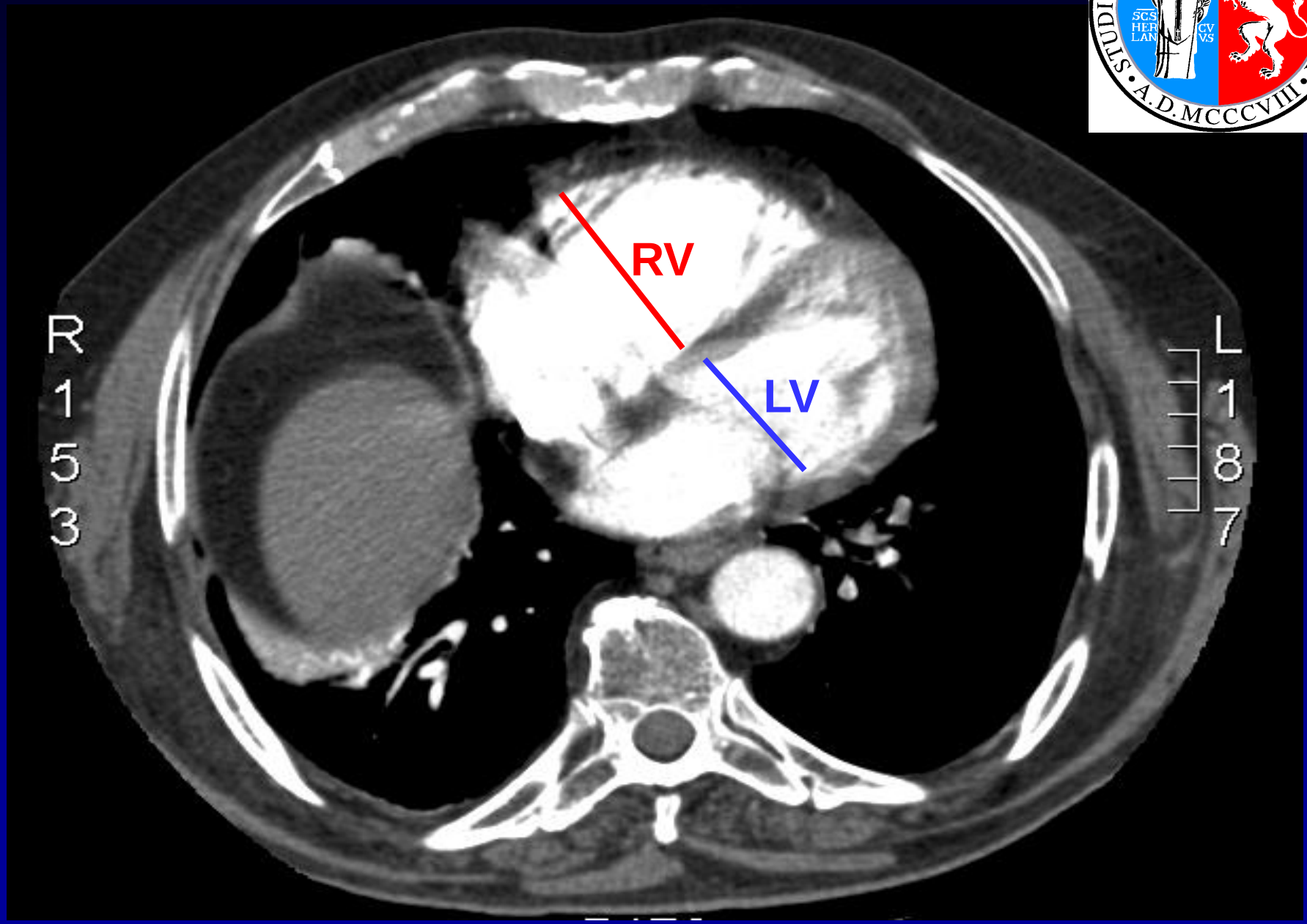


1035 pts BPs ≥90mmHg

30d. mortality 16,3%

Kucher N, Arch Intern Med. 2005

PE-MAP Study



CT-RVD and clinical course in HD stable

411 HD stable patients

262 patients **RV/LV ≥0.9** at MDCT		**149** patients **RV/LV <0.9** at MDCT
15 (5%)	Clinical deterioration	3 (2%)
14 (5%)	Death	3 (2%)
9 (3%)	Death due to PE	0
24 (9.1%)	**Death or clinical deterioration**	**4 (2.7%)**

Becattini et al, Eur Heart J 2010

Troponin and Short-term Outcome

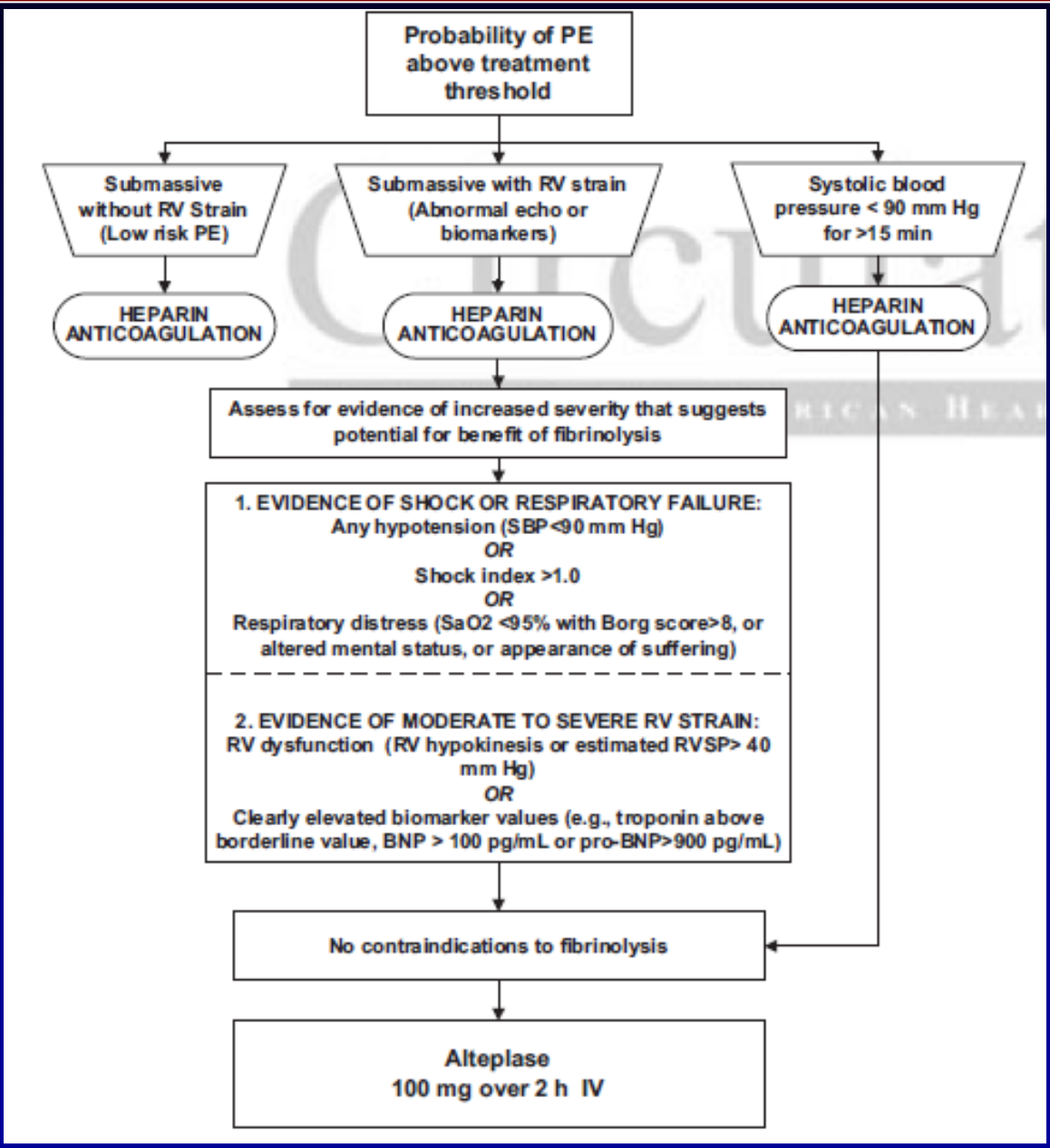
Meta-analysis of 24 studies

	OR	CI
Death in overall population	5.24	(3.28-8.38)
PE related death	9.44	(4.14-21.49)
Adverse outcome	7.03	(2.42-20.43)
Death in stable patients	5.90	(2.68-12.95)

RVD more common in patients with elevated troponin ($p < 0.05$)

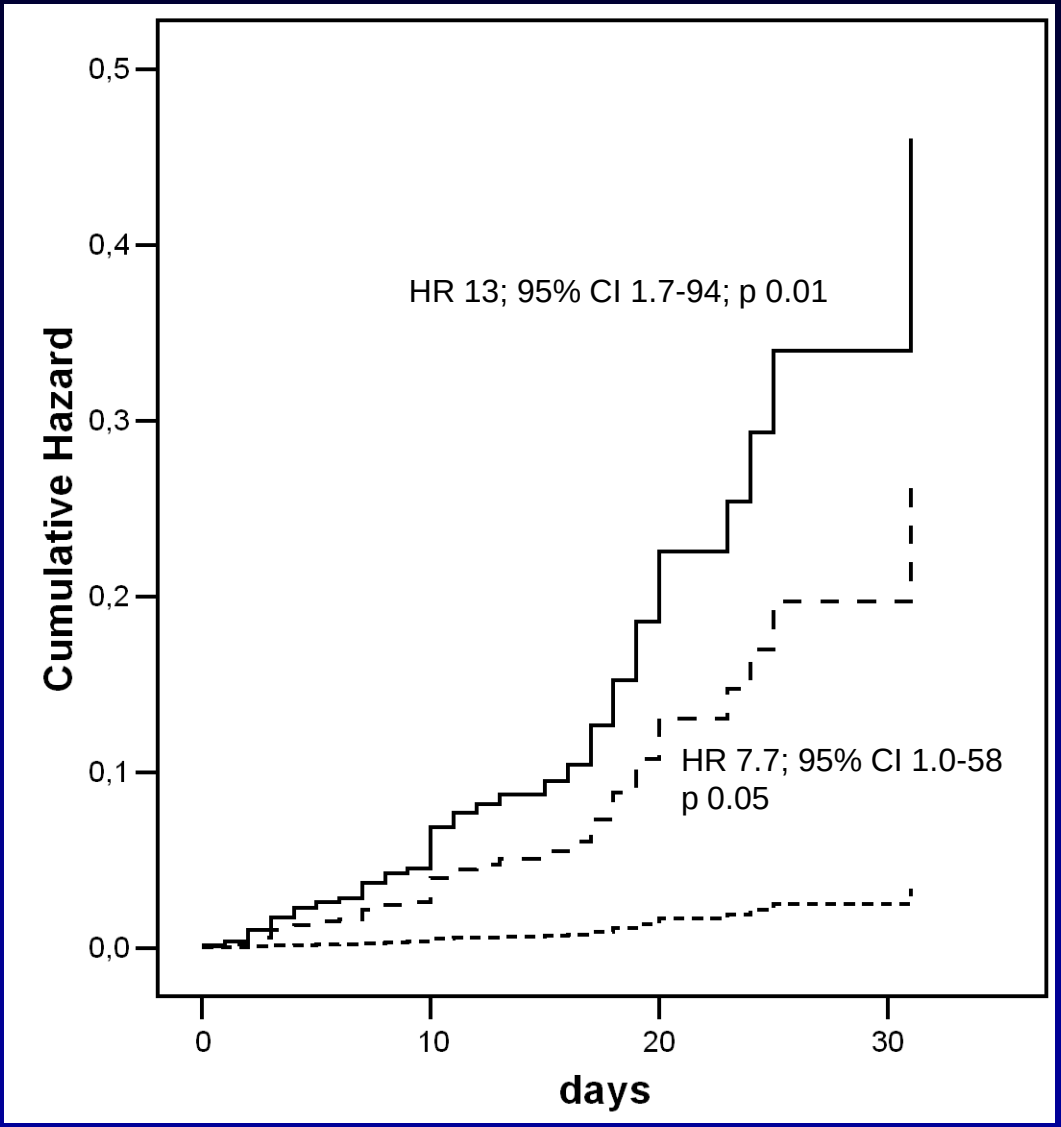
Becattini et al. Circulation, 2007

AHA consensus: Risk stratification for PE



Jaff et al,
Circulation 2011

ESC score: external validation



1515 HD stable patients included in the IPER registry

Death or clinical deterioration

Becattini et al, submitted

Thrombolysis for HD stable patients- Peitho study

International, multicenter study aimed at assessing the efficacy and safety of TNK versus placebo in patients with acute pulmonary embolism, normal blood pressure and right ventricle overload

Enrollment concluded per July 31st!

Risk stratification-driven clinical management

Clinical features

Shock or
sustained hypotension:
- systolic BP<90mmHg
- pressure drop of ≥40 mmHg >15 minutes

Hemodynamically unstable

Proceed to thrombolysis or surgery or catheter embolectomy

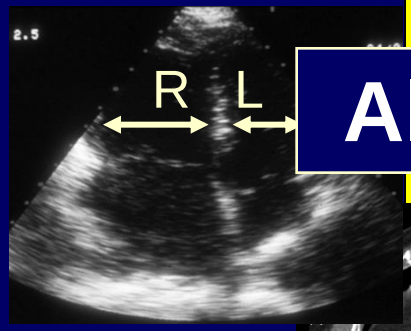
Hemodynamically stable

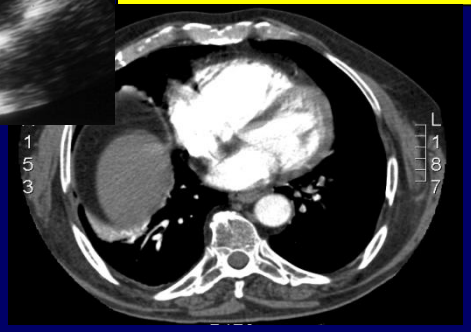
Stratify for adverse outcome

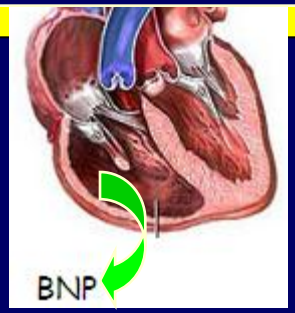
Markers of RV

Dysfunction **Injury**

All tests in all patients?



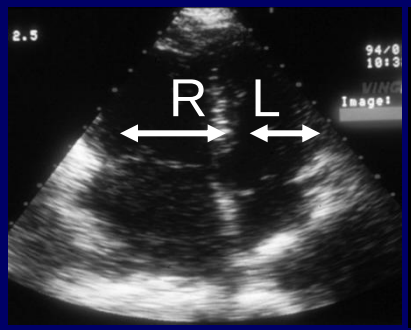


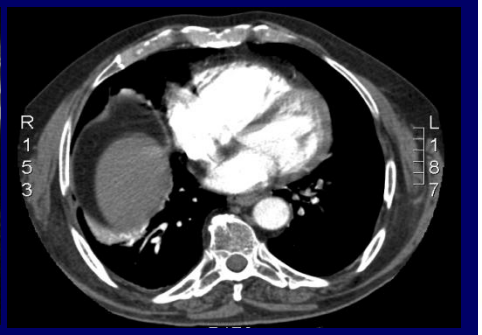


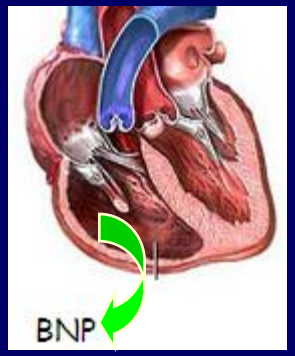
Risk stratification-driven clinical management

Clinical question	Test needed
Treatment upgrading	Highly specific test or High positive predictive value
Early discharge	Highly sensitive test or High negative predictive value

Dysfunction or injury & Death







PPV	12 (0-29)	15 (12-18)	14 (11–18) BNP		21 (17-23) NT-proBNP
NPV	97 (96-99)	96 (92-100)	87 (82-93)	95 (90–100)	71 (69-73)

Home Treatment for pulmonary embolism

	Year	Study design	Patients
Kovacs	2000	prospective cohort	108
Beer	2003	prospective cohort	43
Buller	2003	prospective inc cohort	158
Lim	2003	retrosp case-note rev	70
Siragusa	2005	prospective cohort	36
Wells	2005	prospective inc cohort	90
Ong	2005	retro database	130
Ageno	2005	retro record-based review	23
Olsson	2006	prospective cohort	102
Davies	2007	prospective cohort	157
Lui	2007	retro record-based review	21

Squizzato Eur Resp J 2009

Home Treatment for pulmonary embolism

	Exclusion criteria
Kovacs	HD unstable- Sa O_2 <90%
Beer	high or medium risk Wicki score
Buller	NR (MATISSE PE Study)
Lim	NR
Siragusa	NR (cancer patients) (i) poor clinical conditions, (ii) other reasons for hospitalisation, (iii) high risk of bleeding, (iv) renal insufficiency, (v) parenteral narcotics
Wells	hypotension hypoxia
Ong	HD unstable- Sa O_2 <90%
Ageno	HD unstable- Sa O_2 <90%
Olsson	extensive PE at V/Q lung scan
Davies	need for O_2 therapy, previous PE or iliac or femoral DVT
Lui	HD stable, no need forO_2 , no heart failure

Squizzato Eur Resp J 2009

Home Treatment for pulmonary embolism

Short term (7-10 days) outcome 6 studies,

638 patients

	Year	Study design	Death	death for PE or MB	Rec VTE
Buller	2003	early discharge	0	0	5 (3.2)
Lim	2003	early discharge	0	0	0
Ong	2005	outpatients/early discharge	0	0	2 (1.5)
Olsson	2006	outpatient	0	0	0
Davies	2007	early discharge	0	0	0
Lui	2007	outpatient	0	0	0

Squizzato Eur Resp J 2009

Home Treatment for pulmonary embolism

Randomized Open-label non-inferiority study

Acute, symptomatic PE
PESI I or II

Hospital discharge
≤ 24hours

In-patient treatment

Symptomatic recurrent VTE ≤ 90 days

Major bleeding ≤ 14 and 90 days

Death ≤ 90 days

Aujesky Lancet 2011

Clinical scores

	Original PESI
Age >80	**Age in years**
Male sex	**+10**
History of cancer	**+30**
History of heart failure	**+10**
History of chronic lung disease	**+10**
Heart rate ≥110 bpm	**+20**
Systolic blood pressure < 100mmHg	**+30**
Respiratory rate ≥30 apm	**+20**
Temperature < 36°C	**+20**
Altered mental status	**+60**
Arterial oxyhemoglobin saturation <90%	**+20**

Arch Intern Med 2006

Home Treatment for pulmonary embolism

Randomized Open-label non-inferiority study

344 Acute, symptomatic PE
PESI I or II

171 out-patients		168 In-patient
1 (0.6)	recurrent VTE ≤ 90 days	0
1	Death ≤ 90 days	1
2 (1.2)	Major bleeding ≤ 14 days	0

UCL 2.1%

Aujesky Lancet 2011

Clinical scores

	Simplified PESI
Age >80	+1
History of cancer	+1
History of heart failure	+1
History of chronic lung disease	
Heart rate ≥110 bpm	+1
Systolic blood pressure < 100mmHg	+1
Arterial oxyhemoglobin saturation <90%	+1

Derivation 995 pts

30-day mortality

Low-risk 1.1% (0.0-2.1)

High risk 10.9% (8.5-13.2)

Validation 7106 pts RIETE

30-day mortality

Low-risk 1.1% (0.7-1.5)

High risk 8.9% (8.1-9.8)

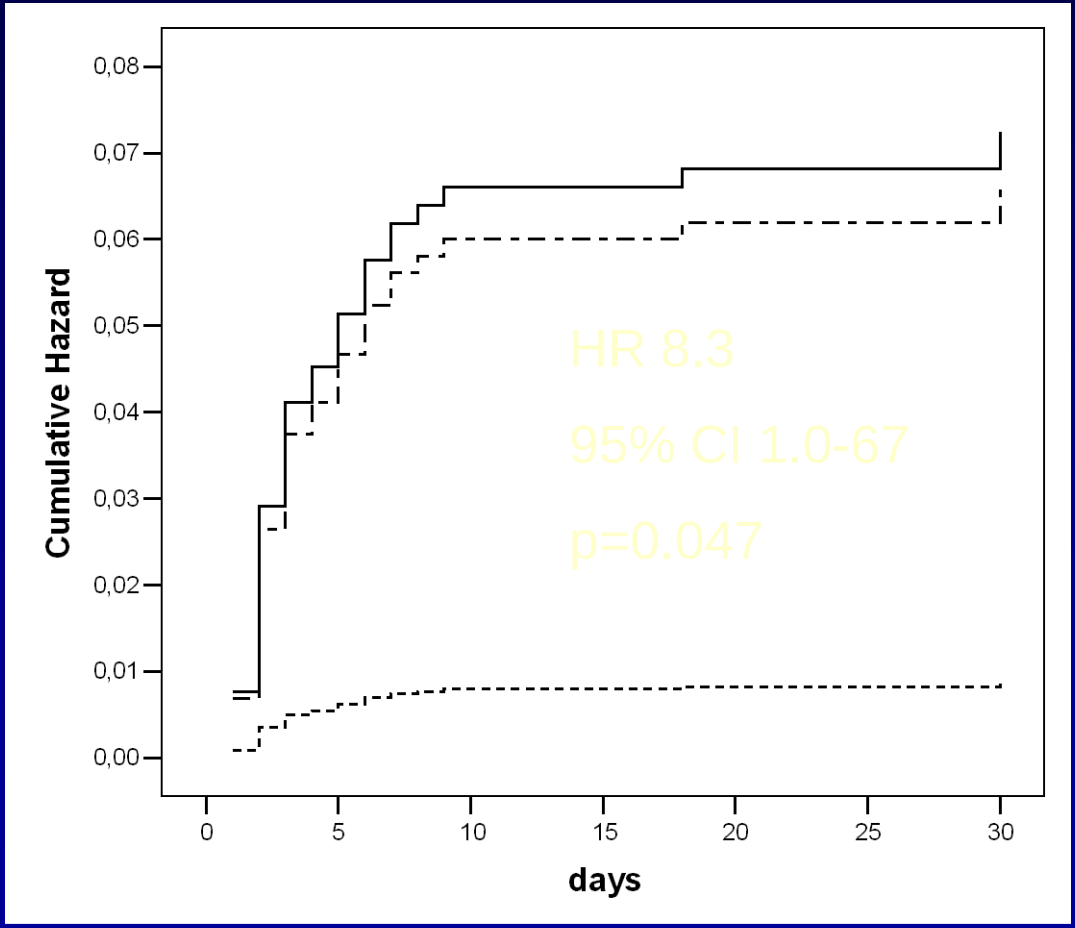
Low-risk 0 (30-36%); high risk ≥1

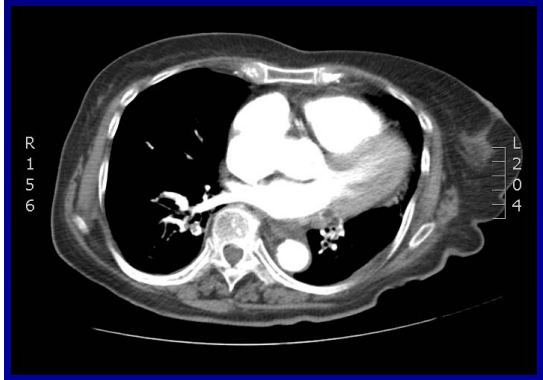
Arch Intern Med 2010

MDCT and clinical course in HD stable

579 patients with PE diagnosed at MDCT

519 HD stable patients





Vedovati et al., Chest 2012

Pulmonary Embolism in Emergency Department

Italian Registry

sPESI + CT guided PE management

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Pulmonary embolism Thrombolysis or discharge?

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