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CLINICAL RESEARCH
Thrombosis and antithrombotic treatment

Triaging acute pulmonary embolism for home treatment by Hestia or simplified PESI criteria: the HOME-PE randomized trial

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Background

- International guidelines suggest home treatment in patients with low risk acute pulmonary embolism (PE), when home circumstances are adequate.
- The approach proposed by the European Society of Cardiology firstly refers to a 30-day all-cause mortality risk assessment using the Pulmonary Embolism Severity Index (PESI) or the simplified PESI (sPESI).
- The Hestia rule, a checklist of medical and social criteria precluding home treatment, is proposed as an alternative.

AIM of the study

- To compare the safety and effectiveness of the Hestia rule vs. the sPESI for triaging PE patients for home treatment, in the way they are applied in routine practice, i.e. with the possibility of the physician to overrule the triaging tool result and to take into account the patient's opinion in a shared decision-making.

Methods

- International randomized open-label non-inferiority trial.
- Normotensive > 18 years old patients with confirmed acute symptomatic PE were randomized via a secure interactive web response system in a 1:1 ratio to one of the two triaging arms.
- Patients were designated for home treatment if the triaging tool was negative and if the physician-in-charge, taking into account the patient's opinion, did not consider that hospitalization was required.
- In both groups, patients designated for home treatment were to be discharged home within 24 h following randomization and followed for 90 days.
- The primary outcome of the study was the composite rate of recurrent venous thrombo-embolism (VTE), major bleeding or all-cause death within 30 days after randomization.

Table I **The simplified Pulmonary Embolism Severity Index**

sPESI criteria	Points
Age >80 years	1
History of cancer	1
Chronic cardiopulmonary disease	1
Systolic blood pressure <100 mmHg	1
Heart rate ≥110 b.p.m.	1
Arterial oxygen saturation <90%	1

The sPESI score is the sum of the assigned points for each criterion. If the sPESI score is 0 points, i.e. the patient classified as low 30-day risk of death, patient qualification is home treatment. If the sPESI score is >0, i.e. the patient classified as high 30-day risk of death, patient qualification is in-hospital treatment.
sPESI, simplified Pulmonary Embolism Severity Index.

Table 2 The Hestia rule

Checklist questions of the Hestia rule
• Is the patient haemodynamically unstable?[a]
• Is thrombolysis or embolectomy necessary?
• Active bleeding or high risk of bleeding?[b]
• More than 24 h of oxygen supply to maintain oxygen saturation >90%?
• Is pulmonary embolism diagnosed during anticoagulant treatment?
• Severe pain needing intravenous pain medication for more than 24 h?
• Medical or social reason for treatment in the hospital for more than 24 h (infection, malignancy, no support system)?
• Does the patient have a creatinine clearance of <30 mL/min? [c]
• Does the patient have severe liver impairment?[d]
• Is the patient pregnant?
• Does the patient have a documented history of heparin-induced thrombocytopenia?

If the answer to all the questions is no, i.e. the Hestia rule is negative, patient qualification is home treatment. If the answer to one of the questions is yes, i.e. the Hestia rule is positive, patient qualification is in-hospital treatment.

[a]Include the following criteria but leave these to the discretion of the clinician: systolic blood pressure <100 mmHg with heart rate >100 b.p.m.; condition requiring admission to an intensive care unit.

[b]Gastrointestinal bleeding in the preceding 14 days, recent stroke (<4 weeks ago), recent operation (<2 weeks ago), bleeding disorder or thrombocytopenia (platelet count $<75 \times 10^9$/L), uncontrolled hypertension (systolic blood pressure >180 mmHg or diastolic blood pressure >110 mmHg).

[c]Calculated creatinine clearance according to the Cockcroft–Gault formula.

[d]Left to the discretion of the physician.

Results (I)

- 1974 patients.
- The primary outcome occurred in 3.82% (34/891) in the HESTIA arm and 3.57% (32/896) in the sPESI arm (P = 0.004 for non-inferiority).
- In the intention-to-treat population, 38.4% of the HESTIA patients (378/984) were treated at home vs. 36.6% (361/986) of the sPESI patients (P = 0.41 for superiority), with a 30-day composite outcome rate of 1.33% (5/375) and 1.11% (4/359), respectively.
- No recurrent or fatal PE occurred in either home treatment arm.

Results (II)

- The applicability of the triaging tools, i.e. the proportion of patients with a negative HESTIA rule or an sPESI of 0 points, who were discharged to home in the first 24 h after randomization, was 88.4% (343/388) for the HESTIA rule and 64.8% (309/477) for the sPESI, for an adjusted absolute difference of +25.3% in favour of the HESTIA rule.

Table 4 **Outcomes in per-protocol and intention-to-treat populations**

	Hestia strategy (*N* = 984)	sPESI strategy (*N* = 986)	
Main outcome	*n° of patients with event/total n° of patients (%)*		Adjusted absolute difference[a] (90% CI)
In the per-protocol population			
Composite of recurrent VTE, major bleeding and all-cause death at Day 30	34/891 (3.82)	32/896 (3.57)	+0.20% (-1.03 to 1.43) *P* = 0.004[b]
In the intention-to-treat population			
Composite of recurrent VTE, major bleeding and all-cause death at Day 30	38/966 (3.93)	33/978 (3.37)	+0.49% (-0.71 to 1.68) *P* = 0.008[b]
Major secondary outcomes	*n° of patients with event/total n° of patients (%)*		Adjusted absolute difference[a] (95%CI)
In the intention-to-treat population			
Rate of patients actually treated at home	378/984 (38.4)	361/986 (36.6)	+1.78% (-2.40 to 5.96) *P* = 0.41[c]
Rate of patients qualified for home treatment according to the rule	388/984 (39.4)	477/986 (48.4)	-8.91% (-13.3 to -4.56) –
Applicability of the triaging strategy			
Patients treated at home among qualified patients according to the rule	343/388 (88.4)	309/477 (64.8)	+25.3 % (19.5 to 31.1)
Clinical events at Day 14			
Composite of recurrent VTE, major bleeding and all-cause death	18/974 (1.85)	24/981 (2.45)	-0.47% (-1.50 to 0.55)
Recurrent VTE	3/967 (0.31)	4/969 (0.41)	+0.07% (-0.47 to 0.32)
Major bleeding	9/967 (0.93)	8/960 (0.83)	+0.10% (-0.67 to 0.86)
All-cause death	8/974 (0.82)	13/981 (1.33)	-0.37% (-1.05 to 0.31)
Clinical events at Day 30			
Composite of recurrent VTE, major bleeding and all-cause death	38/966 (3.93)	33/978 (3.37)	+0.49% (-0.94 to 1.92)
Recurrent VTE	4/946 (0.42)	5/959 (0.52)	+0.07% (-0.50 to 0.36)
Major bleeding	15/947 (1.58)	10/960 (1.04)	+0.54% (-0.48 to 1.56)
All-cause death	22/966 (2.28)	19/978 (1.94)	+0.28% (-0.78 to 1.35)
Clinical events at Day 90			
Composite of recurrent VTE, major bleeding and all-cause death	74/959 (7.72)	61/972 (6.28)	+1.34% (-0.77 to 3.45)
Recurrent VTE	8/910 (0.88)	13/934 (1.39)	-0.49% (-1.43 to 0.44)
Major bleeding	24/912 (2.63)	15/937 (1.60)	+1.05% (-0.30 to 2.40)
All-cause death	51/959 (5.32)	38/972 (3.91)	+1.24% (-0.40 to 2.90)

Table 6 **Outcomes in patients treated at home**

	Hestia strategy (*N* = 378)	sPESI strategy (*N* = 361)	Adjusted absolute difference (95% CI)[a]
Clinical events at Day 14	*n° of patients with event/total n° of patients (%)*		
Composite of recurrent VTE, major bleeding, and all-cause death	3/376 (0.80)	2/360 (0.56)	+0.20% (-0.76 to 1.16)
Recurrent VTE	0/376 (–)	2/360 (0.56)	-0.26% (-0.62 to 0.10)
Major bleeding	3/376 (0.80)	0/360 (–)	+0.81% (-0.34 to 1.96)
All-cause death	1/376 (0.27)	0/360 (–)	+0.13% (-0.12 to 0.37)
Clinical events at Day 30			
Composite of recurrent VTE, major bleeding, and all-cause death	5/375 (1.33)	4/359 (1.11)	+0.19% (-1.15 to 1.52)
Recurrent VTE	0/374 (–)	2/358 (0.56)	-0.26% (-0.63 to 0.10)
Major bleeding	5/375 (1.33)	1/358 (0.28)	+1.07% (-0.38 to 2.53)
All-cause death	1/375 (0.27)	1/359 (0.28)	-0.01% (-0.36 to 0.35)
Clinical events at Day 90			
Composite of recurrent VTE, major bleeding, and all-cause death	11/371 (2.96)	5/357 (1.40)	+1.07% (-0.43 to 2.57)
Recurrent VTE	3/369 (0.81)	3/356 (0.84)	-0.03% (-1.38 to 1.32)
Major bleeding	9/370 (2.43)	2/356 (0.56)	+1.45% (-0.07 to 2.97)
All-cause death	2/371 (0.54)	1/357 (0.28)	+0.12% (-0.31 to 0.56)

Conclusions

- In the HOME-PE study, the HESTIA rule strategy was non-inferior to the sPESI strategy for triaging normotensive PE patients for home treatment, with respect to the 30-day composite complication rate.
- Compared with the sPESI, the HESTIA rule qualified fewer patients as eligible for home treatment but its applicability was higher, because fewer home treatment qualifications were overruled by the physician-in-charge taking into account the patient's preference.
- More than a third of PE patients were treated at home using either the HESTIA rule or the sPESI, with a low 30-day rate of complications.