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The Team Approach to PE Management: The National PERT Consortium

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Disclosures

Rachel P. Rosovsky, MD, MPH

- Institutional Research Support:
 - BMS, Janssen
- Advisory/Consultant:
 - Abbott, BMS, Boston Scientific, Dova, Inari, Inquis, Janssen, Penumbra
- National Lead Investigator, *Storm-PE*, Penumbra
- Immediate Past President, The PERT Consortium™

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Case

- 27 y.o. female presented with syncope.
- Week prior: LLE pain and mild swelling
- EMS: HR 140, BP 110/60, RR 32, Spo2 90% RA
- Elevated troponin (350--> 459)
- EKG: ST
- Bedside echo
- Head CT

LLE: left lower extremity
ST: ST-segment tachycardia
RA: Room air

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Saddle PE and right heart strain

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Why worry about Pulmonary Embolus?

A

Overall mortality, %

52.4% Massive PE

15% Non-massive PE

Survival Probability

12.3% Massive PE

41.3% Non-massive PE

Log-rank P=0.01

Days since presentation


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Sezemsky E, Chang Y, Jain C, Beckman J, Giri J, Jaff M, Rosenfield R, Rosovsky R, Kabirhel C, Weinberg I. *Am J Medicine*, 2018

Pulmonary Embolism: Current Treatment Options


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Lots of Options




Catheter Directed Thrombolysis

How do you decide?





Anticoagulation



Pulmonary Embolectomy

Anticoagulation Saves Lives

ANTICOAGULANT DRUGS IN THE TREATMENT OF PULMONARY EMBOLISM: A CONTROLLED TRIAL

TABLE II—RESULTS IN FIRST 35 CASES

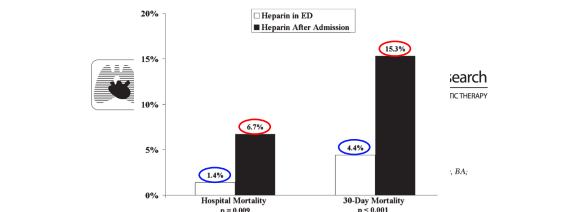
Group	Total	Deaths from pulmonary embolism	Non-fatal recurrences	Other deaths
Untreated	19	5	5	0
Treated	16	0	0	1

TABLE III—RESULTS IN COMPLETE SERIES OF 73 CASES

Group	Total	Deaths from pulmonary embolism	Non-fatal recurrences	Other deaths
Untreated	19	5	5	0
Treated	54	0	1	2

Barritt, Lancet, 1960

Early Anticoagulation SAVES lives



Mortality Type	Heparin in ED	Heparin After Admission
Hospital Mortality	1.4%	6.7%
30-Day Mortality	4.4%	16.3%

p = 0.009 (Hospital), p < 0.001 (30-Day)

IV = intravenous; ED = emergency department; UFH = unfractionated heparin.
 Smith et al. Chest, 2010

Risk Stratification for Acute PE

Early mortality risk	Hemodynamic instability*	Indicators of risk		
		Clinical parameters of PE severity and/or comorbidity: PESI class II-IV or sPESI ≥ 1	RV dysfunction on TTE or CTPE*	Elevated cardiac troponin level†
High	+	+	+	+
Intermediate	Intermediate-High	+	+	+
	Intermediate-Low	-	+	+
Low	-	-	-	-

* Primary reperfusion + anticoagulation;
 † Anticoagulation ± rescue reperfusion;
 ‡ Anticoagulation ± early discharge.

Where does our patient fit in?

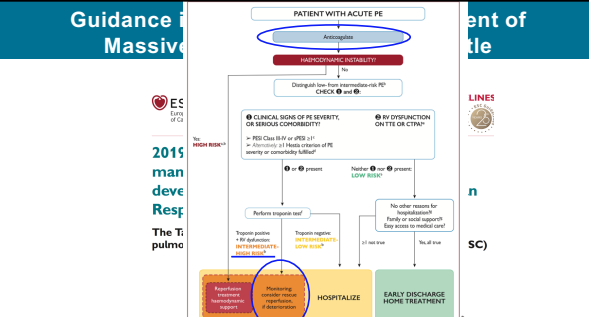
European Heart Journal 2015

Case Decision-Making

- Intermediate High-risk PE
- Reassuring head imaging
- Expeditiously started on LMWH
- Does she need advanced treatment?
- Who is making that decision?

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Guidance for Massive PE



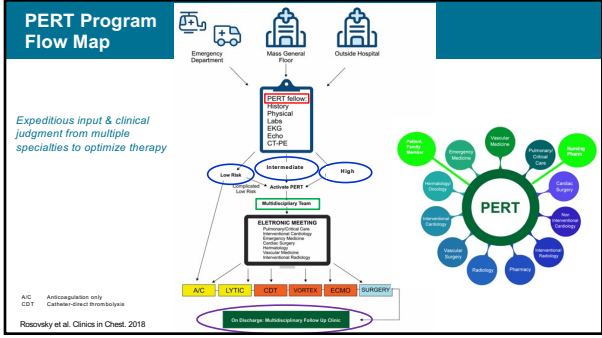
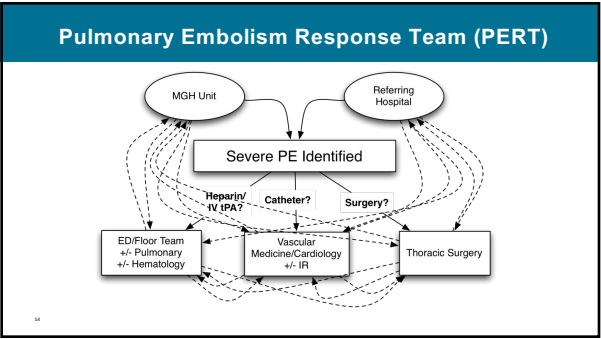
2015 ESC Guidelines for the diagnosis and management of acute pulmonary embolism.
 European Heart Journal 2015

The Challenge of PE Treatment

- Best treatment unknown - lack of high quality comparative data
- Rapid advancements in interventional tools
- Varying and conflicting guidelines

**Impetus for PERT:
Pulmonary Embolism Response Team**

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Advancing the Science of PE Care

What is the Data Behind PERT?

A chest CT scan image with red arrows pointing to filling defects in the pulmonary arteries, indicating pulmonary embolism.

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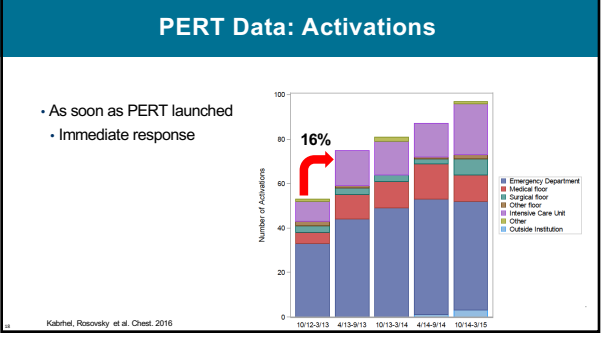
PERT at MGH

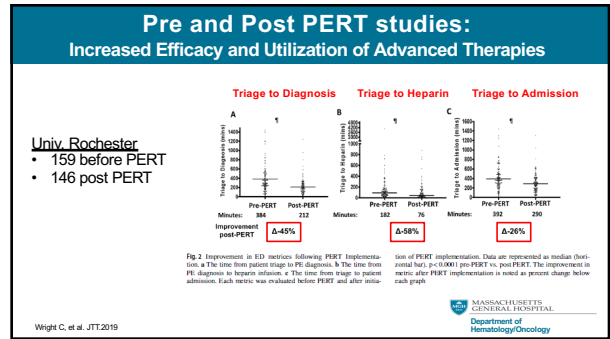
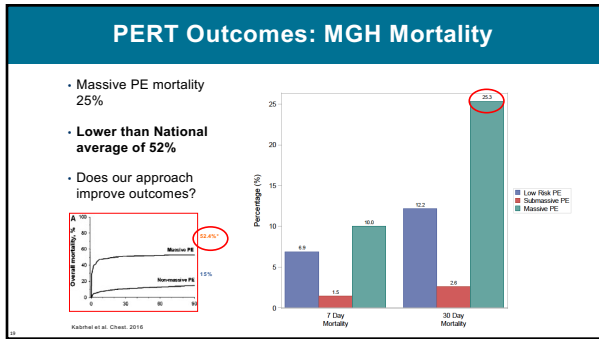
A Multidisciplinary Pulmonary Embolism Response Team

Initial 30-Month Experience With a Novel Approach to Delivery of Care to Patients With Submassive and Massive Pulmonary Embolism

Christopher Kabriel, MD, MPH; Rachel Rosovsky, MD, MPH; Richard Channick, MD; Michael R. Jaff, DO; Ido Weinberg, MD; Thoralf Sundt, MD; David M. Quinones, MD, DO; Isabella Rodriguez-Lopez, MD; Blair A. Parry, CRCR, BA; Savannah Harshbarger, BS; Yuchiao Chang, PhD; and Kenneth Rosenfeld, MD

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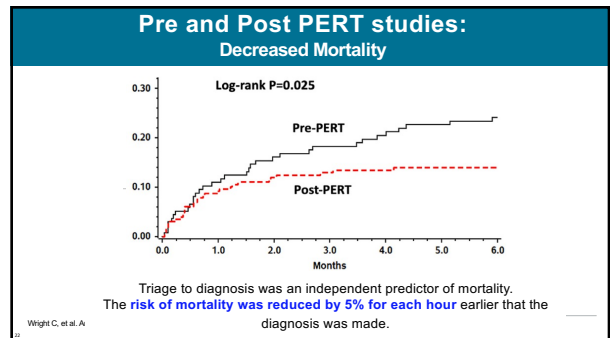




PERT Outcomes: Mortality

Variable	Pre-PERT (n=343)	PERT (n=426)	p Value
(A) Exeter cohort			
Diagnosis to triage to anticoagulation	21 (7.3%)	18 (4.2%)	0.082
Standard management	318 (92.7%)	408 (95.8%)	0.082
Anticoagulation dose	309 (97.2%)	381 (94.4%)	0.071
Advanced strategies	9 (2.8%)	21 (5.6%)	0.071
Time to therapeutic anticoagulation (hours)	16.7 ± 23.3	12.8 ± 14.9	0.099
First anticoagulant used			
Heparin	244 (83.0%)	288 (87.2%)	0.113
Enoxaparin	50 (15.7%)	49 (12.0%)	0.212
Rivaroxaban	3 (0.9%)	2 (0.5%)	0.658
Fondaparinux	1 (0.3%)	2 (0.5%)	1.000
Rivaroxaban	0 (0%)	1 (0.2%)	1.000
Infuse vena cava filter	76 (22.2%)	76 (16.9%)	0.084
Major + Clinically relevant nonmajor bleeding	54 (15.7%)	34 (8.7%)	0.002
Mortality (30-day or inpatient)	21 (6.1%)	20 (4.7%)	0.014
Variable	Pre-PERT (n=299)	PERT (n=376)	p Value
Intermediate-high-risk patients			
Diagnosis to triage to anticoagulation	24 (8.0%)	17 (4.5%)	0.051
Standard management	265 (89.7%)	361 (95.5%)	0.051
Anticoagulation dose	256 (86.0%)	338 (90.4%)	0.102
Advanced strategies	9 (3.0%)	21 (5.6%)	0.102
Time to therapeutic anticoagulation (hours)	16.8 ± 24.7	13.2 ± 15.7	0.024
First anticoagulant used			
Heparin	220 (80.0%)	311 (87.9%)	0.118
Enoxaparin	42 (15.0%)	41 (11.4%)	0.123
Rivaroxaban	2 (0.7%)	2 (0.5%)	1.000
Fondaparinux	1 (0.4%)	2 (0.5%)	1.000
Rivaroxaban	0 (0%)	1 (0.3%)	1.000
Infuse vena cava filter	71 (24.0%)	61 (16.5%)	0.008
Major + Clinically relevant nonmajor bleeding	57 (19.1%)	30 (8.0%)	<0.001
Mortality (30-day or inpatient)	21 (7.0%)	20 (5.3%)	0.008

Choudhury P et al. Am J Cardiol. 2019



Should everyone have a PERT?

6.4 Multidisciplinary pulmonary embolism teams

The concept of multidisciplinary rapid-response teams for the management of 'severe' (high-risk and selected cases of intermediate-risk) PE emerged in the USA, with increasing acceptance by the clinical community and implementation in hospitals in Europe and wide. Set-up of PE response teams (PERT) is encouraged, address the needs of modern systems-based healthcare. PERT brings together a team of specialists from different disciplines including, for example, cardiology, pulmonology, haematology, medicine, anaesthesiology/intensive care, cardiothoracic surgery (interventional) radiology. The team convenes in real time (in face or via web conference) to enhance clinical decision-making allows the formulation of a treatment plan and facilitates its site implementation. The exact composition and operating of a PERT are not fixed, depending on the resources and available in each hospital for the management of acute PE.

6.8 Recommendations for multidisciplinary pulmonary embolism teams

Recommendation	Class ^a	Level ^b
Set-up of a multidisciplinary team and a programme for the management of high- and (in selected cases) intermediate-risk PE should be considered, depending on the resources and expertise available in each hospital.	Ia	C

PE = pulmonary embolism.
^aClass of recommendation.
^bLevel of evidence.


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The PERT Consortium


OUR STORY

The PERT Consortium was established after the 2012-2013 effort of physicians at Massachusetts General Hospital. The PERT Consortium™ seeks to guide and influence pulmonary embolism (PE) care and research in collaboration across the U.S. and will be open to all hospitals that include medical oncology and the hematology/oncology.

OUR MISSION



It is the mission of the Consortium to increase awareness of treatment options available to patients with pulmonary embolism, to reduce the worldwide incidence of PE, and to further scientific discovery in the realm of PE research.

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The PERT Consortium Programs

1. Webinar series and PERTcasts
2. PERTinent Updates
3. PERT Partners
4. Awareness Programs: WTD, patient education/prevention
5. Clinical tools/decision programs (working with AI and possible PERT app)
6. Connect with other PE groups
7. Transitions of Care Project
8. Interhospital Transfer Project
9. Research Database
10. Collaborating with industry on several RCT
11. Joining with the FDA: PERC; Pulmonary Embolism Research Collaborative
12. Trainees: Fellows Bootcamp and Trainee Council
13. Newest Initiatives: Centers of Excellence and BPA Alliance
14. Programs: Annual Scientific Meeting

WTD: World Thrombosis Day
Artificial Intelligence

Improving Patient Care: Database



>13,000 patients

PERT QUALITY ASSURANCE DATABASE

The PERT Quality Assurance Database is a multi-center Registry of patient-level data from patients admitted to the hospital with PE for whom the PERT team has been consulted.

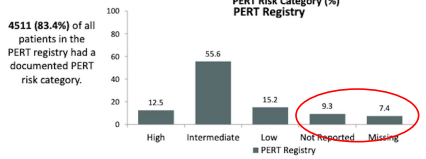
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Database

All Sites
Congratulations! The PERT Registry which currently has a total of 5410 patients.


DIAGNOSIS AND RISK STRATIFICATION

PERT Risk Category (%)
PERT Registry



4511 (83.4%) of all patients in the PERT registry had a documented PERT risk category.

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Artificial Intelligence



EXPERT PHYSICIANS:
 Cardiology/Interventional Cardiology
 Cardiothoracic Surgery/Critical Care
 Emergency Medicine, Hematology
 Hospital Medicine/Nursing/Pharmacy
 Pulmonology, Radiology/Interventional
 Radiology, Vascular Medicine
 Vascular Surgery
 Others

ORGANIZATIONS:
 Healthcare Organizations
 Professional Societies
 Patient Advocacy



INDUSTRY: Pharms, AI, Device

FDA: CDER, CDRH

Circulation | CURRENT ISSUE | ARCHIVE | JOURNAL

STANDARDIZED DATA ELEMENTS FOR PATIENTS WITH ACUTE PULMONARY EMBOLISM: A CONSENSUS REPORT FROM THE PULMONARY EMBOLISM RESEARCH COLLABORATIVE

Figure 2: Data element collection throughout the 4 stages of the PE journey

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Artificial Intelligence

The PERT Consortium Programs

PE Center of Excellence
Certified by The PERT Consortium™

PE Center of Excellence
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The PERT Consortium™ Trainee Council

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Case Decision-Making

- Intermediate High-risk PE
- Reassuring head imaging
- Expeditiously started on LMWH
- PERT called

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- Do we have the data to support Catheter Directed Therapies for intermediate risk PE?
 - *Currently, we do NOT*
 - *Equipoise*
- Call for action: ENROLL in randomized controlled trials

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Cardiac Catheterization Lab Team

Anesthesia, CT surgery, Nursing, Perfusion, Echo, Vascular Medicine, Pharmacy

Photo Courtesy of Robert Hershman
Slide not to be distributed

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Follow up

- Discharged 3 days later
- Additional work up

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PERT: Closing Reflections

- Pulmonary embolism is a major cause of morbidity and mortality
- PERT represents a paradigm shift in treating PE
 - Immediately and simultaneously engages multiple experts to determine best course of action.
 - Multidisciplinary: streamlines care
- PERTs have become prevalent across the US and the world
- PERTs improve care of PE through clinical care, education and research
 - time to diagnosis, anticoagulation, LOS, education, mortality
- The PERT Consortium:
 - Quality database
 - Platform for large scale PE trials
 - Collaboration with FDA: PERC
 - Centers of Excellence

Alone we can do so little. Together we can do so much

Join US

REGISTER NOW

11TH ANNUAL
PULMONARY EMBOLISM
SCIENTIFIC SYMPOSIUM

San Diego, California
Gaylord Pacific Resort & Convention Center
September 18–20, 2025



Thank you

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