University of Nebraska Medical Center

The UNMC Pulmonary Embolism Response Team (PERT)

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Disclosures

None

Goals

1) Review the burden of pulmonary embolism (PE)
2) Discuss methods for risk stratification
3) Describe different approaches to management of PE
4) Highlight the role of the Pulmonary Embolism Response Team (PERT)
5) Review a subset of UNMC PE Cases

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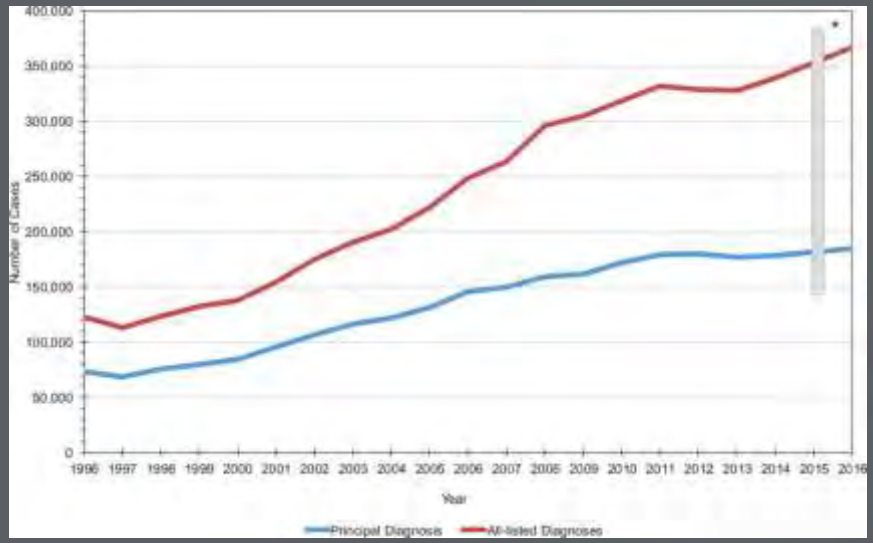
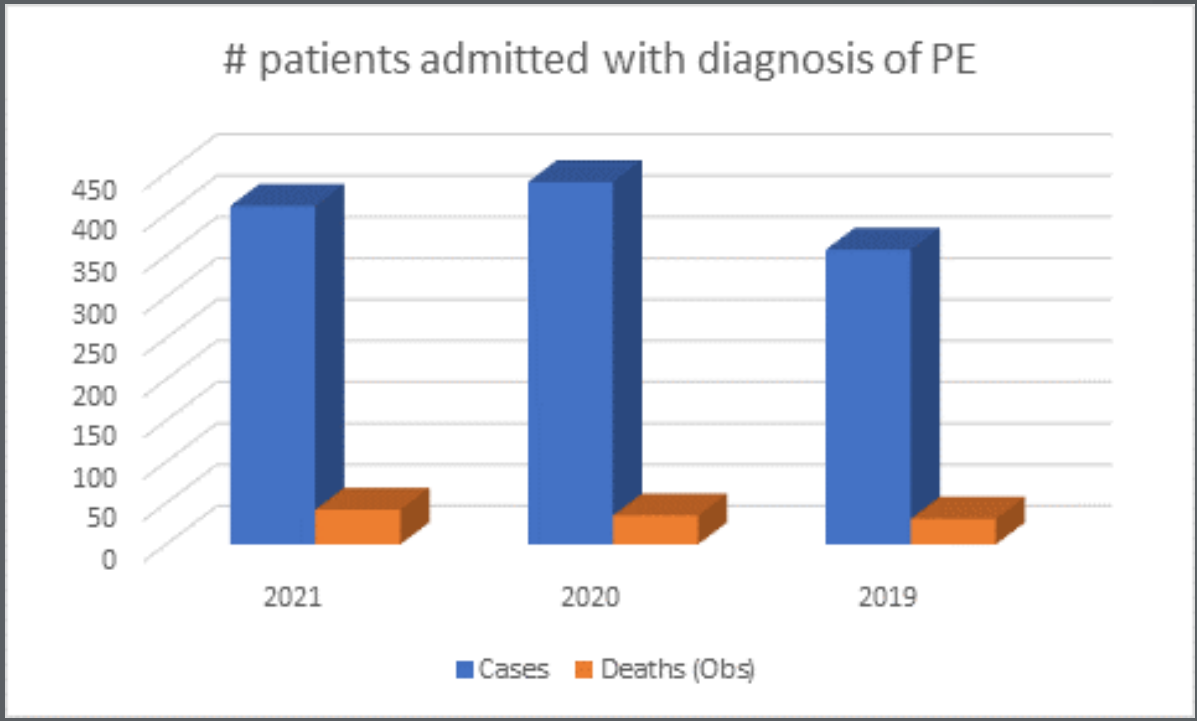
Pulmonary Embolisms

- Admissions for PE increased from 23 per 100,000 in 1993 to 65 per 100,000 in 2012
  - ~375,000 cases annually
- Incidence continues to increase
- 30 day mortality rate
  - 1999 = 12.3%
  - 2010 = 9.1%
- 6 month mortality rate
  - 1999: 23%
  - 2010 = 19.6%
- Estimated healthcare cost
  - $7-10 billion annually



Heart Disease and Stroke Statistics—2020 Update: A Report From the American Heart Association

PE Treatment at UNMC



- Average of 402 patients a year admitted to UNMC with PE
- 30-day mortality: average of 8.9% per year

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PE Risk Stratification

Table 7 Original and simplified Pulmonary Embolism Severity Index

Parameter	Original version[226]	Simplified version[229]
Age	Age in years	1 point (if age >80 years)
Male sex	+10 points	–
Cancer	+30 points	1 point
Chronic heart failure	+10 points	1 point
Chronic pulmonary disease	+10 points	
Pulse rate ≥ b.p.m.		
Systolic BP mmHg		
Respiratory >30 breath min		
Temperatu <36°C		
Altered me status		
Arterial oxy globin satur <90%		

	Risk strata[a]	
	Class I: ≤65 points very low 30 day mortality risk (0–1.6%)	**0 points** = 30 day mortality risk 1.0% (95% CI 0.0–2.1%)
	Class II: 66–85 points low mortality risk (1.7–3.5%)	
	Class III: 86–105	**≥1 point(s)** = 30

Table 8 Classification of pulmonary embolism severity and the risk of early (in-hospital or 30 day) death

Early mortality risk		Indicators of risk			
		Haemodynamic instability[a]	Clinical parameters of PE severity and/or comorbidity: PESI class III–V or sPESI ≥I	RV dysfunction on TTE or CTPA[b]	Elevated cardiac troponin levels[c]
	High	+	(+)[d]	+	(+)
Intermediate	Intermediate–high	-	+[e]	+	+
	Intermediate–low	-	+[e]	One (or none) positive	
Low		-	-	-	Assesment optional; if assessed, negative

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PE Treatment

	Risk of Bleeding	Rate of Thrombus Clearance	ICU stay	Length of Stay post-op
Systemic Heparin	Low	Low	No	N/A
Catheter Directed Thrombolysis (CDT)	Moderate (17 of 150 pts w/ bleeding in Seattle II study, 11%)	Moderate	Yes (~2 days)	1-2
Systemic TPA	High	Rapid	Yes (~ 1 day)	1-2
Mechanical aspiration	Low	Rapid	No	1-2

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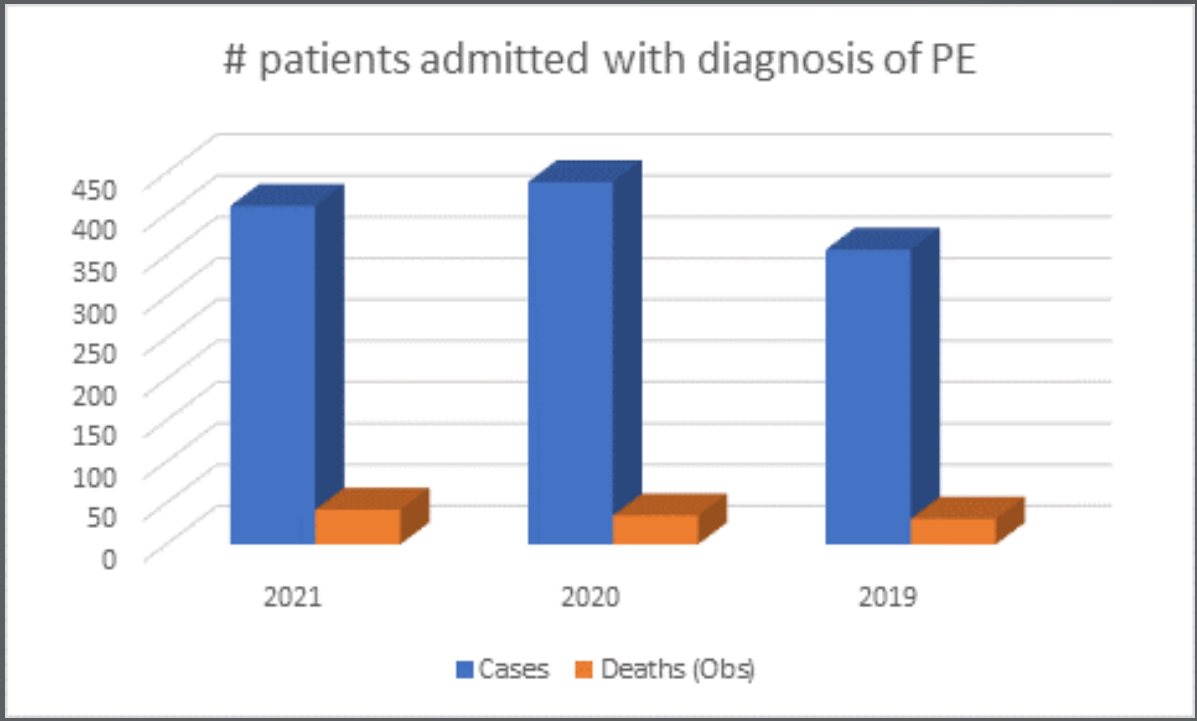
PE Treatment at UNMC

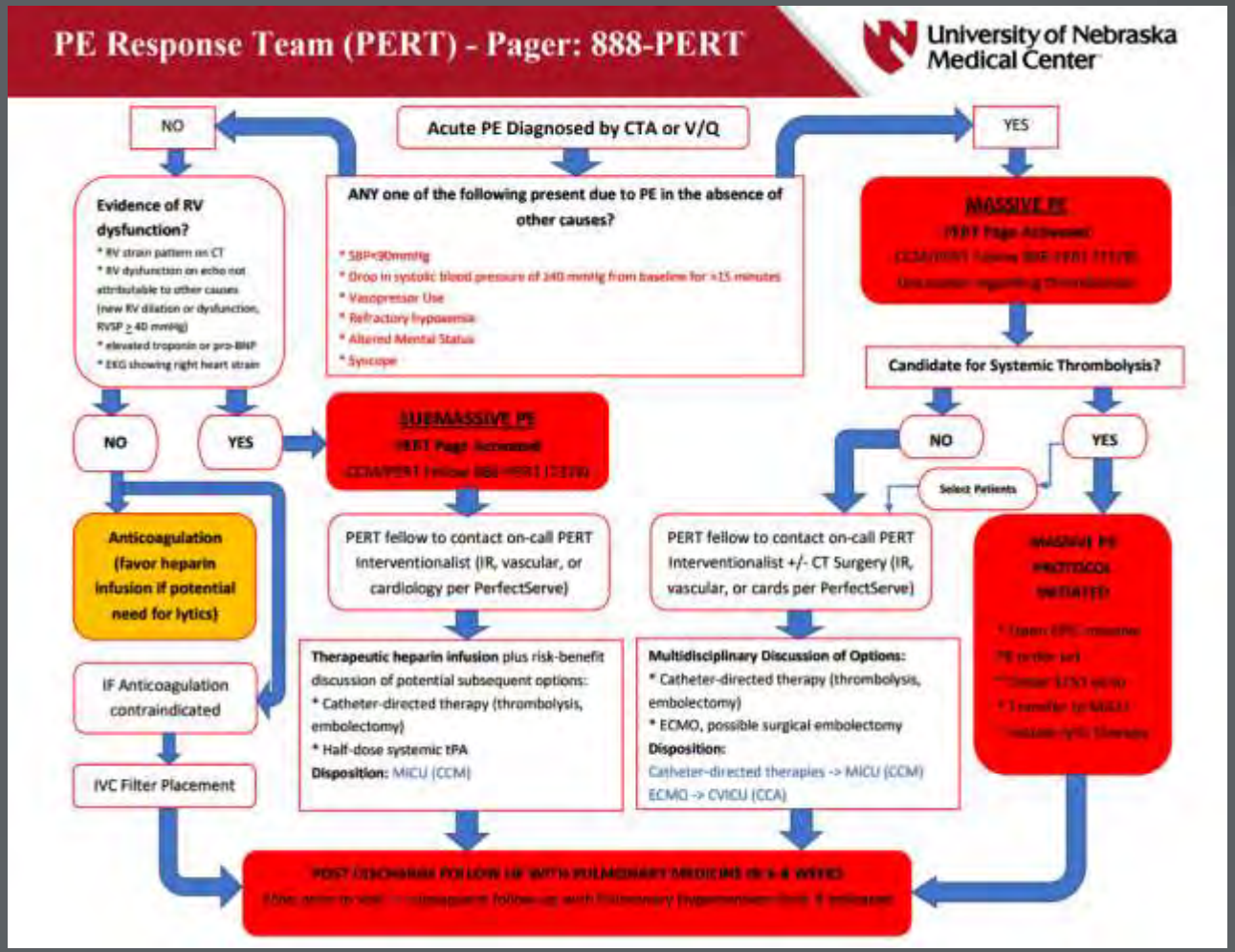
- The issue:
  - Lack of who standardization regarding the who/when/and how to treat PE's as a system
- The response:
  - Multidisciplinary Pulmonary Embolism Response Team (PERT)
    - Formally started Feb 2022
    - Continuously working to improve delivery of care
- UNMC PE Response Team:
  - Multidisciplinary approach
    - CCM/Pulmonary Medicine: Dr. Boer, Dr. El-Kersh
    - Vascular Surgery: Dr. Cook
    - Interventional Radiology: Dr. McBride, Dr. Yu
    - Cardiac Surgery/ECMO
    - Critical Care Anesthesia
    - Cardiology

PE Treatment at UNMC



- Average of 402 patients a year admitted to UNMC with PE (subsegmental through massive)
- Vizient 30-day mortality: average of 8.9% per year vs. 5.5% in PERT activated patients

PE Treatment Algorithm



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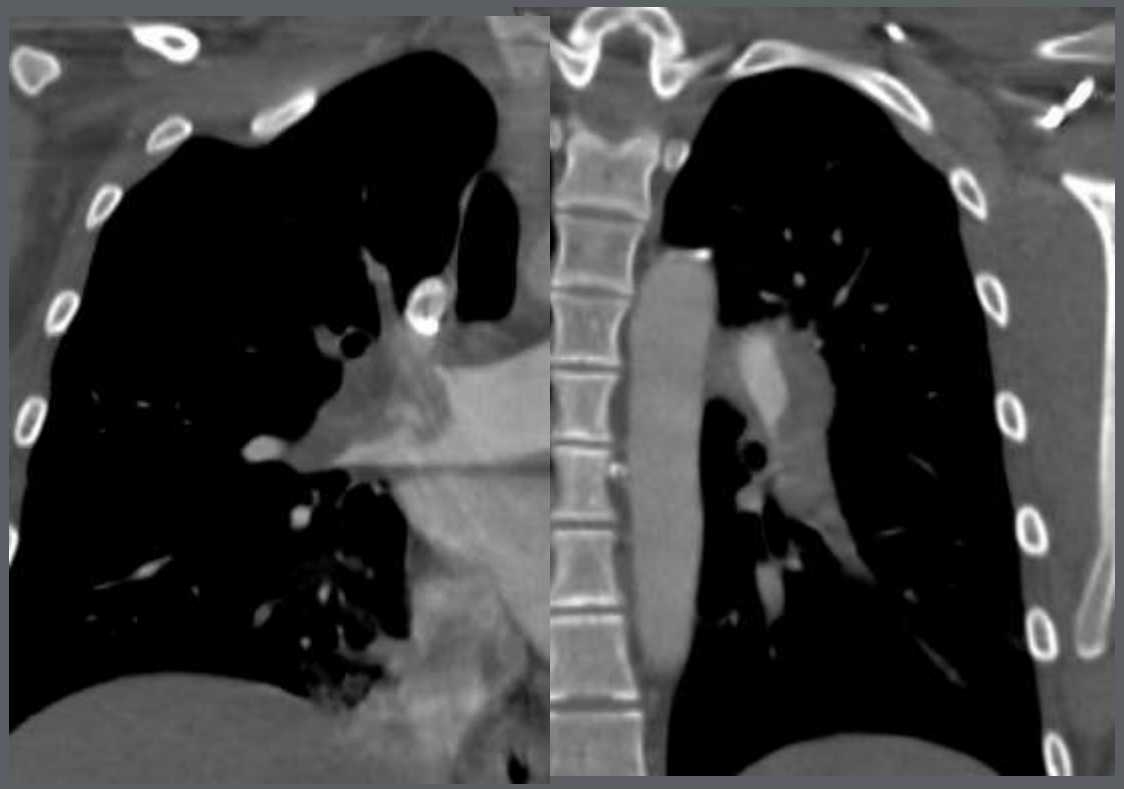
Case example #1:

16 yo F w/ no sig PMHx presented to an OSH w/ SOB x 1 wk. She was found to be hypoxic 70% on RA and quickly escalated to 35L HF. CT PE with RH strain. On exam, tachypneic to 25 on 35L HF with SPO2 of 90%. Trop I 704 and CHF peptide 619. O2 requirements increased to 60L HF.

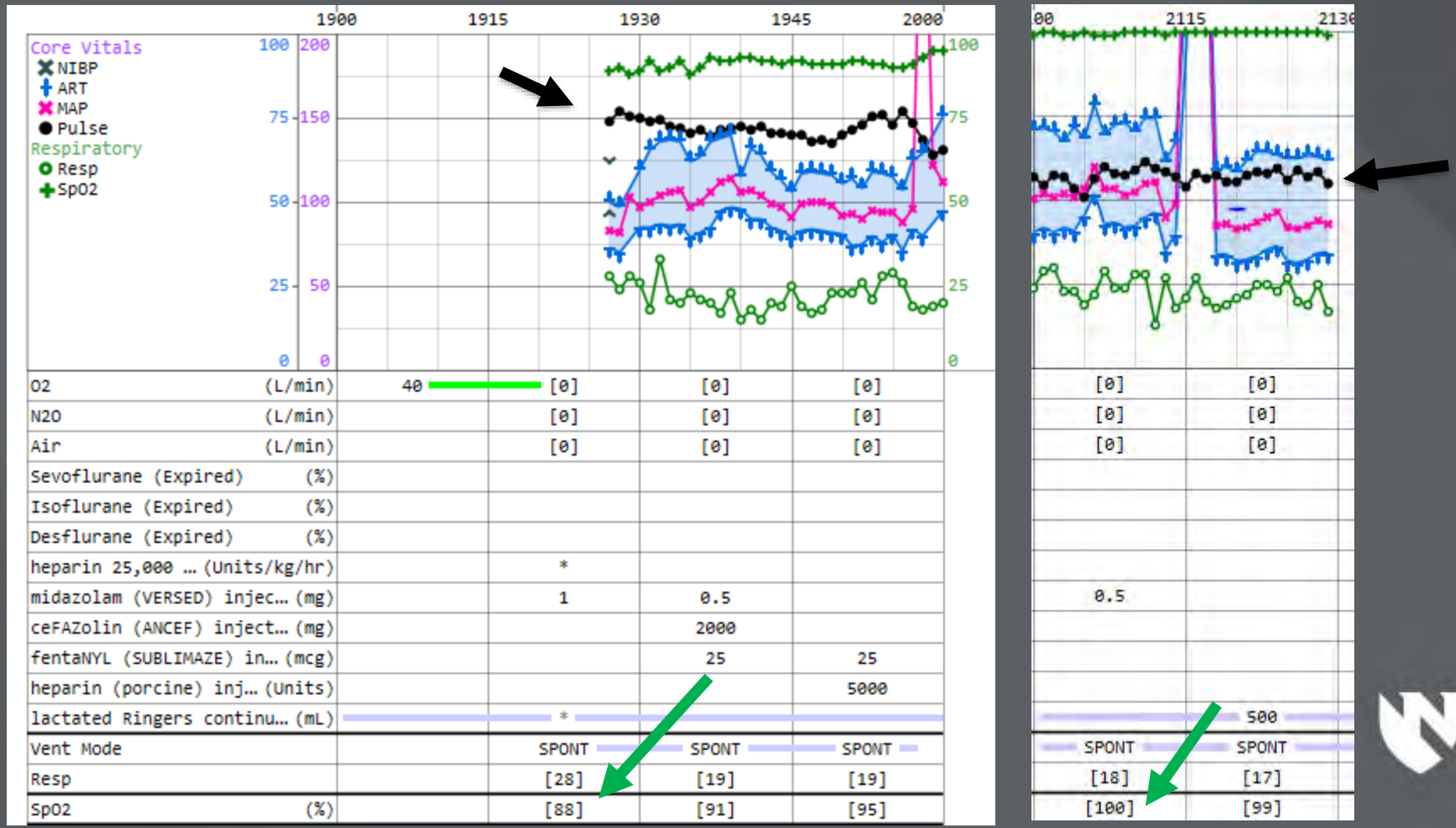
TTE with mod to severe RV systolic function.

PERT Activated on admission-> Agreement for advanced therapies with VV ecmo standby

Pre-op CT



Intra-op Summary



Totals:

- Duration 80 min
- Anesthesia: MAC + local
- EBL 150ml
- Contrast 86cc

Post-Thrombectomy Pressures:
Right PA: 26/15 (19)mmHg
Left PA: 29/15 (20)mmHg
Main PA: 17/10 (16) mmHg

Post procedure day 1: Weaned from 45L HF to no supplemental oxygen

Discharged home on POD3

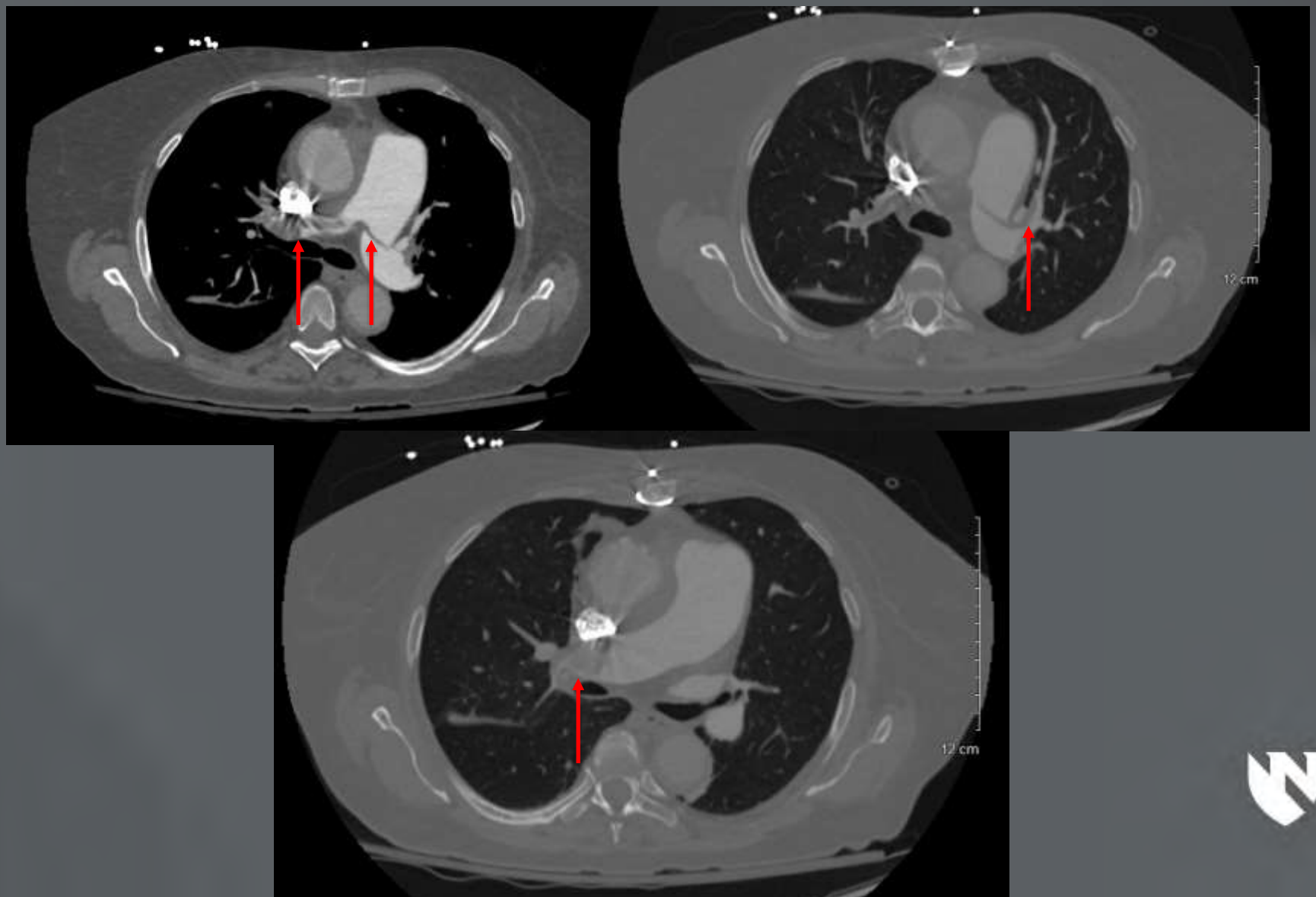
Extracted thrombus:

Case example #2:

66 yo F w/ h/o Type A dissection s/p hemiarch w/ REIV avulsion c/b ex-lap and ligation of the right iliac veins 3 months PTA with recent admission for RP hematoma on coumadin, readmitted with SOB and hypoxic to 78% on RA w/ saddle PE on CT.

TTE: RV dilated with mildly reduced function. Estimated PA pressure 55-60mmHg, 4L nasal cannula

Case example:



Procedure:

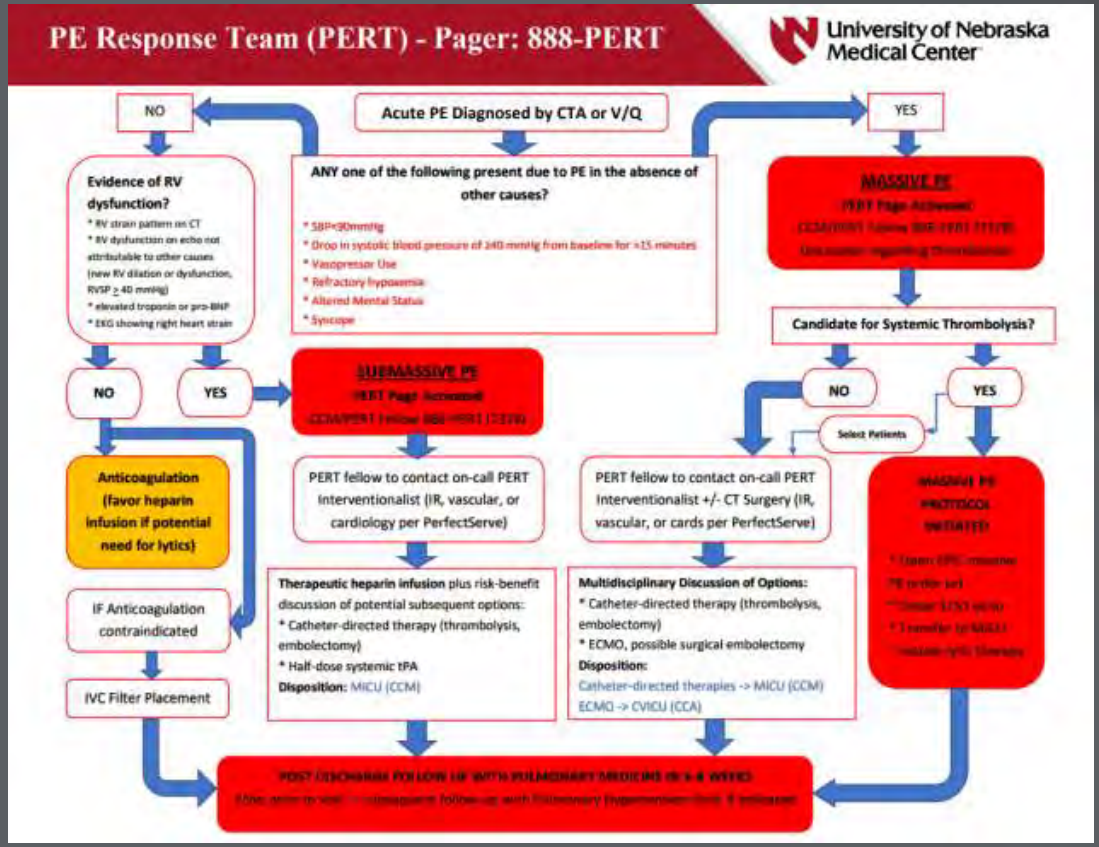
Pre-Thrombectomy PA pressures:
Main PA: 60/30mmHg, MAP 39mmHg
Left PA: 62/31mmHg, MAP 39mmHg
Right PA: 59/31mmHg, MAP 40mmHg

Post-Thrombectomy PA pressures
Main PA: 39/22mmHg, MAP 27mmHg
Left PA: 36/21mmHg, MAP 25mmHg
Right PA: 38/23mmHg, MAP 27mmHg

- 30% reduction mean PA pressure

UNMC PE Response Team

1) Patient centered approach to pulmonary embolisms
2) Multidisciplinary team approach
3) With PERT -> Reduction in mortality, length of stay, and ICU length of stay



PERT FORUM

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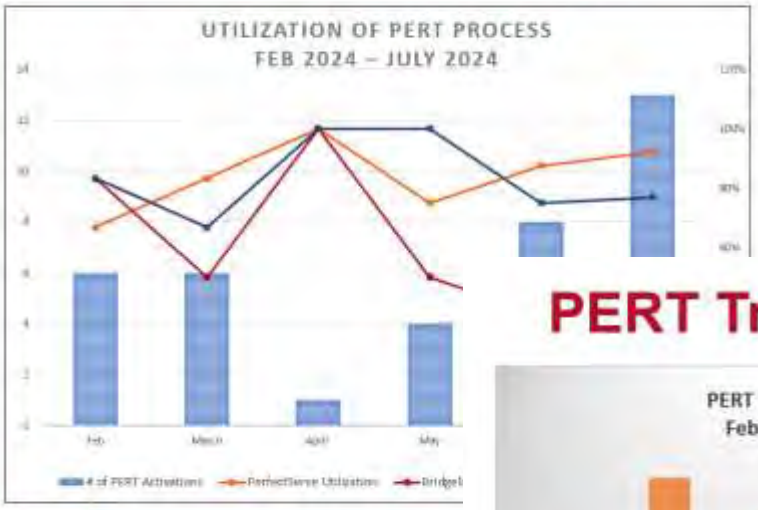
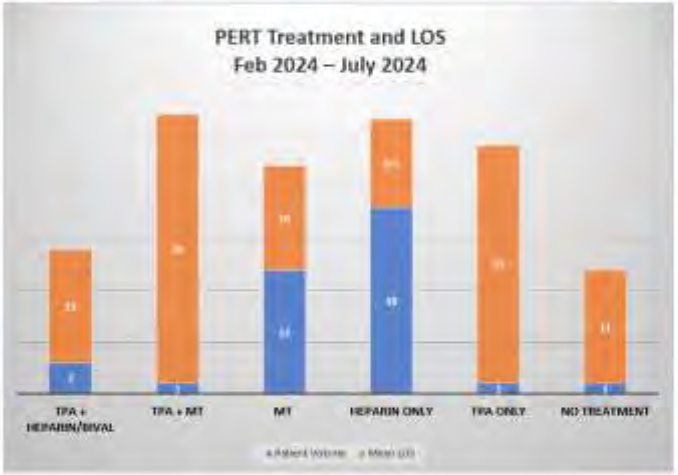
PERT Process Data



- Total PERT Activations for Feb-July 2024 = 38
- PerfectServe and PERT Note Utilization avera
- Bridgeline Utilization averaging 57% - well be

PERT Treatment Data



MT = Mechanical Thrombectomy

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Thank you