

# CATHETER RELATED UPPER EXTREMITY VENOUS THROMBOSIS

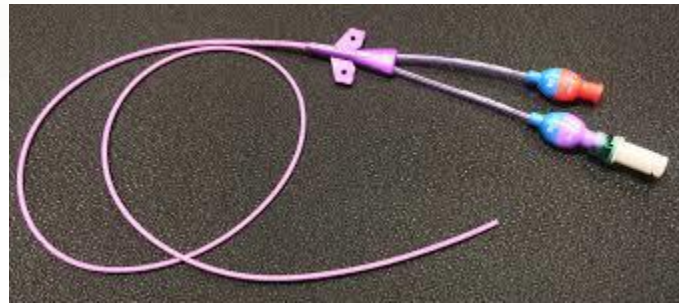


Andrew Abi-Chaker, MD

University of Miami Miller School of Medicine

AAbi-Chaker@med.miami.edu

# Background



- We noticed a large amount of UE DVTs with PICC lines in place
- PICC lines introduced in 1975 for
  - But

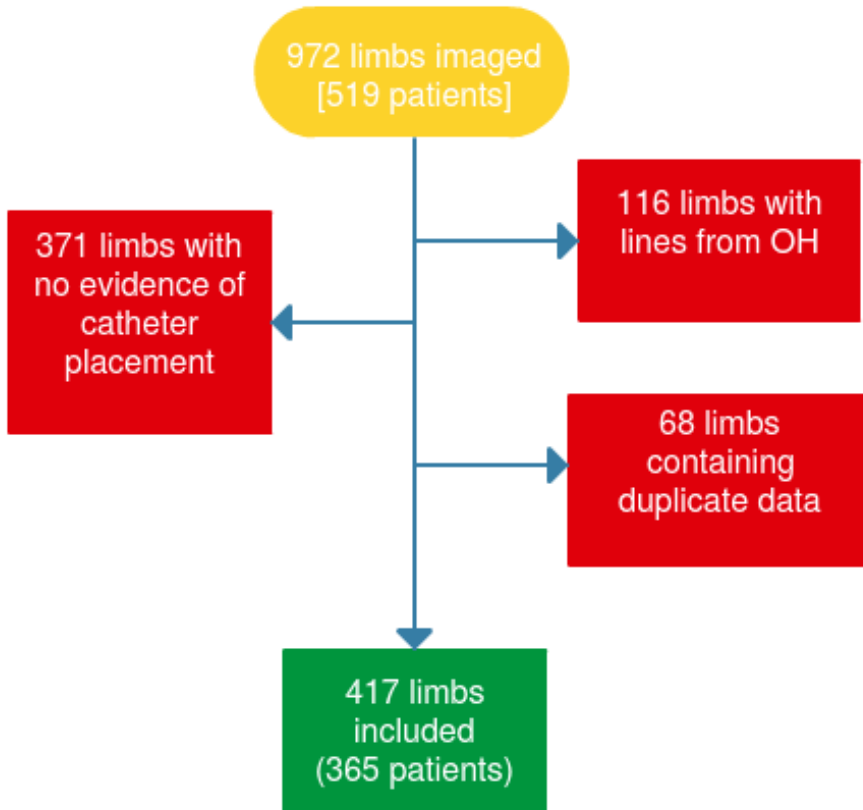
CATHETER CONFIGURATION	LUMEN SIZE	USABLE LENGTH	POWER INJECTION FLOW RATE	MAXIMUM POWER INJECTOR PRESSURE SETTING	GRAVITY FLOW RATE (ml/hr)	PRIMING VOLUME (ml)
4 Fr. Single-Lumen	18	55 cm	5 ml/sec.	300 psi	1024	0.73
5 Fr. Single-Lumen	18	55 cm	5 ml/sec.	300 psi	978	0.73
5 Fr. Dual-Lumen	18/18	55 cm	5 ml/sec.	300 psi	498/498	0.65/0.65
6 Fr. Dual-Lumen	18/18	55 cm	5 ml/sec.	300 psi	740/740	0.75/0.75
6 Fr. Triple-Lumen						
RED LUMEN	17 Ga.	55 cm	5 ml/sec	300 psi	560	0.71
GREY LUMEN	19 Ga.	55 cm	N/A - No CT	N/A - No CT	308	0.57
WHITE LUMEN	19 Ga.	55 cm	N/A - No CT	N/A - No CT	308	0.57

# Methods and Materials

- Syngo Dynamics software  
Acuson S2000 (Siemens)
- Retrospective review  
1/1/2011 to 9/15/2016
- Any patient for which PICC is mentioned in either the indication, diagnosis, or body of the report was reviewed
- Only patients who underwent catheter placement at UMH were included in the study



# Final Study numbers



Variable	Number (n)	%
Age (mean +/- sd)	65.24 +/- 18.30	
Male	194	46.5%
Female	223	53.5%
BMI (mean +/- sd)	28.01 +/- 8.90	
Diabetes	210	50.36%
Renal Dysfunction	82	19.67%
CKD 4/5	37	8.87%
ESRD	45	10.79%
Hypercoagulable state	21	5.04%
Cancer	144	34.53%
Peripheral Vascular Disease	59	14.15%
Autoimmune Disorder	22	5.28%
Previous DVT/PE	78	18.71%
On Anti-Coagulation	57	13.67%
On Anti-Platelet	125	29.98%
Ever Smoker	174	41.73%
Right Sided	280	67.15%
Left Sided	137	32.85%
Time to Exam (days)	19.57 +/- 29.44	

## Patient Demographics

- An alarming amount of patients have known severe renal dysfunction
- Majority of lines are placed on the right arm

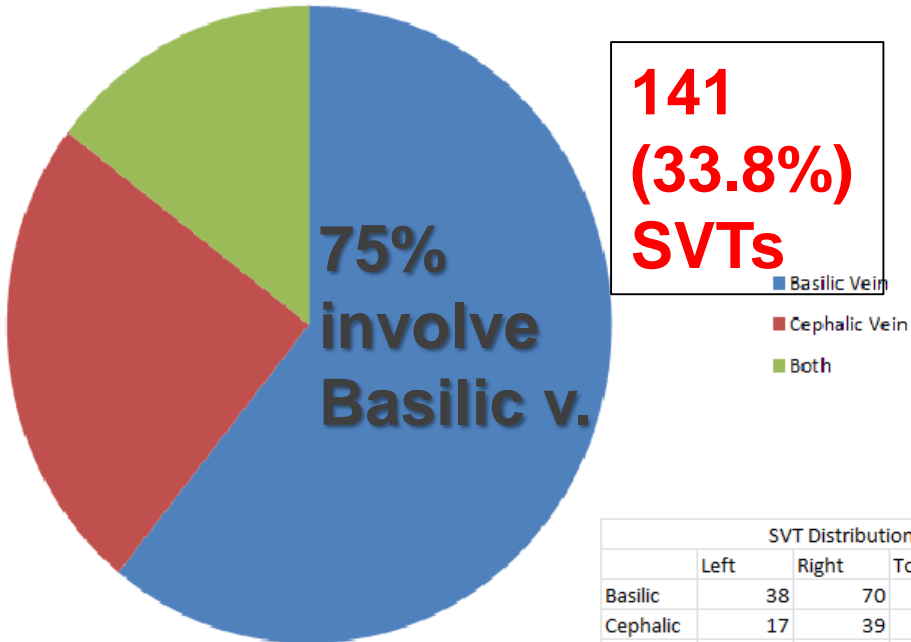
# RESULTS

## Limbs with DVT present (n=187)

## Limbs with no DVT present (n=230)

Variable	Number (n)	%	Number (n)	%	P-value
Age (mean +/- sd)	66.73	+/- 18.19	64.87	+/- 18.36	0.203
Male	99	52.94%	95	41.30%	.
Female	88	47.06%	135	58.70%	<b>0.017</b>
BMI (mean +/- sd)	27.1	+/- 8.97	28.76	+/- 8.81	0.111
Diabetes	95	50.80%	115	50.00%	0.936
Renal Dysfunction	34	18.18%	48	20.87%	0.523
CKD 4/5	18	9.63%	19	8.26%	0.705
ESRD	16	8.56%	29	12.61%	0.215
Hypercoagulable state	10	5.35%	11	4.78%	0.788
Cancer	65	34.76%	79	34.35%	0.785
PVD	28	14.97%	31	13.48%	0.921
AI	9	4.81%	13	5.65%	0.822
Previous DVT/PE	41	21.93%	37	16.09%	0.176
AC	27	14.44%	30	13.04%	0.889
AP	57	30.48%	68	29.56%	0.707
Smoker	82	43.85%	92	40.00%	0.85
PICC present	163	87.17%	191	83.04%	0.776
Time to Exam (days)	19.45	+/- 27.91	19.67	+/- 30.70	0.971

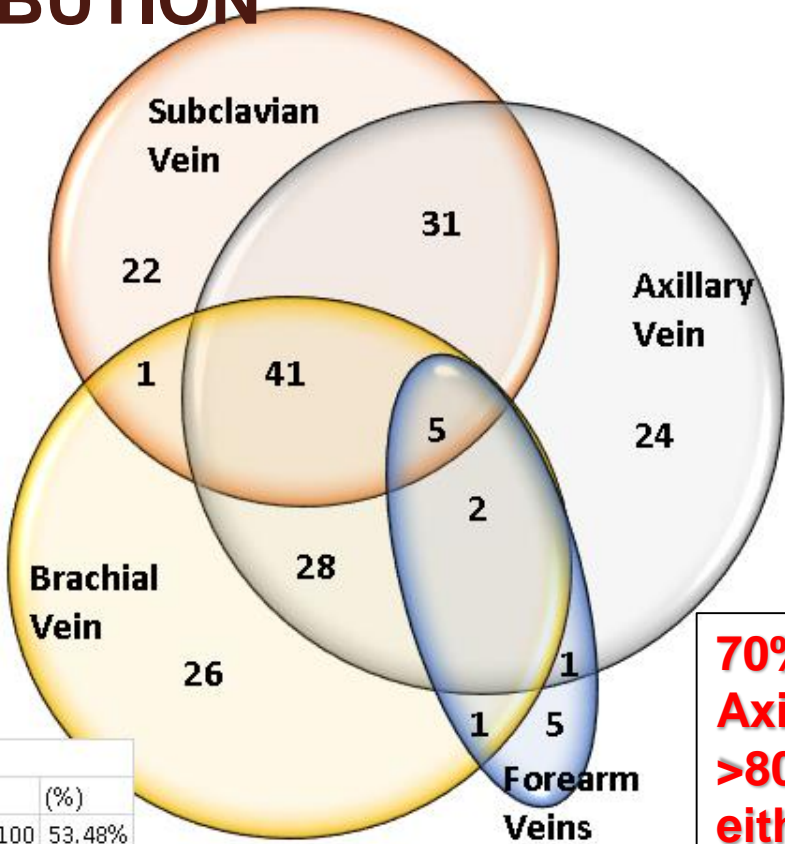
# VT DISTRIBUTION SVTs



SVT Distribution				
	Left	Right	Total	(%)
Basilic	38	70	108	75%
Cephalic	17	39	56	39.89%
	50	91	141	

# VT DISTRIBUTION

## DVTs

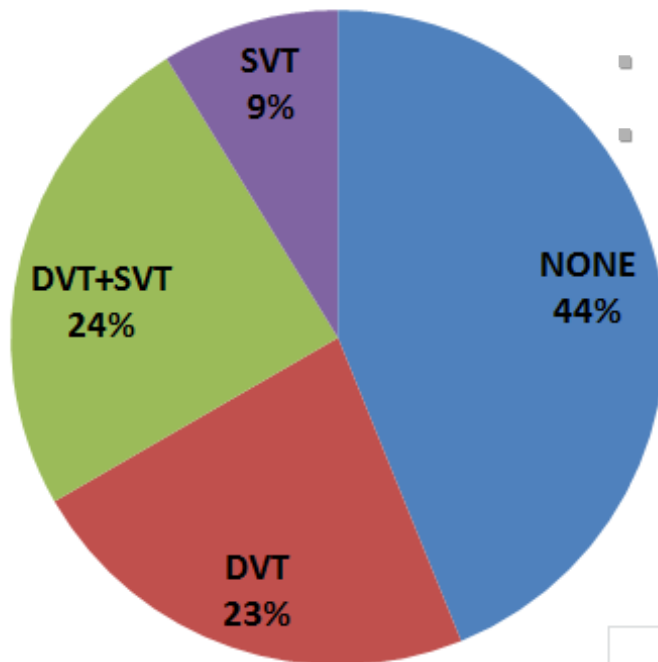


**70% involve Axillary v. and >80% involve either Axillary or Subclavian vv.**

	Left	Right	Total	(%)
Subclavian	35	65	100	53.48%
Axillary	36	96	132	70.59%
Brachial	27	77	104	55.61%
Forearm	5	9	14	7.49%
Total	59	128	187	



## Patients on Anticoagulation during PICC to US period

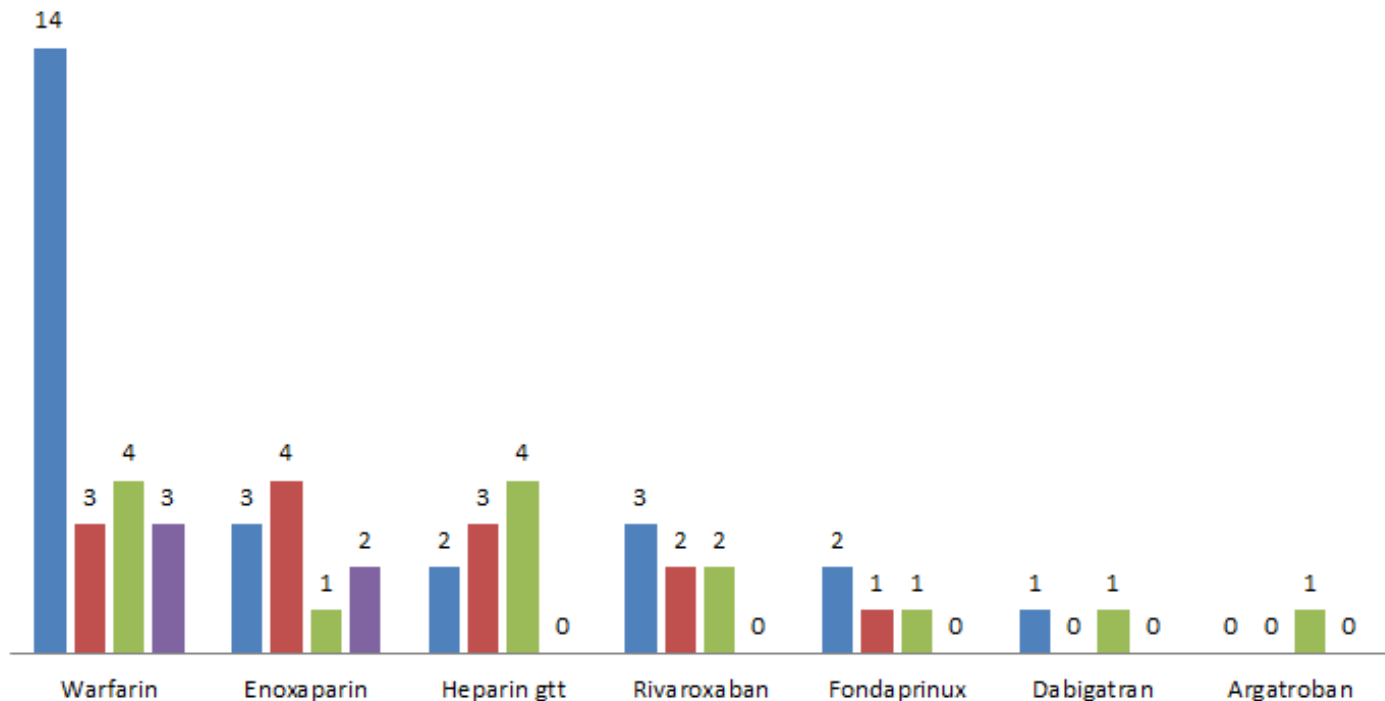


- **56.1% (32/57) had VT**
- **47.4% (27/57) DVT**

NONE	DVT	DVT+SVT	SVT
25	13	14	5
43.86%	22.81%	24.56%	8.77%

# ANTICOAGULATION TYPE AND VENOUS THROMBOSIS

■ No VT ■ DVT ■ DVT+SVT ■ SVT



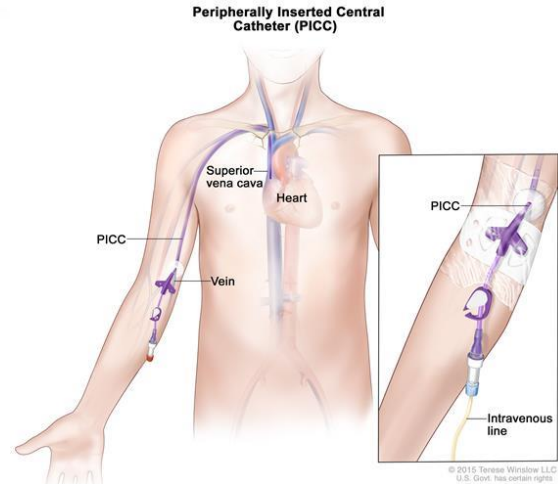


# Why does this data matter?

- 45% of patients that underwent US study were found to have a DVT
- ~20% had severe renal dysfunction and may need imminent dialysis access
  - Access site possibilities become limited
- Most of these patients are symptomatic
- Delays hospital discharge

# Discussion

- Lee et al. showed an OR of 5.5 for catheter related thrombosis if > 1 attempt is made
- Cleveland Clinic: Retrospective review showed 51/2063 pts (2.47%) had VT
  - Previous DVT, use of amphotericin B
- RIETE study:
  - 4.4% of patients with DVT had UE DVT
  - 38% of UE DVT patients had cancer
  - 45% of UE DVTs were catheter related
- It may be beneficial to increase DVT prophylaxis in these patients





# Limitations of the Study

- Retrospective study – relies heavily on chart data
  - Large portion of patients with hypercoagulable states but these are the patients that often require PICC access
- Not all patients that received PICC lines or midline catheters were imaged
- Difficult to address patients with multiple studies
- Patients did not have baseline US prior to catheter placement to show that the catheter specifically caused the VT



# References

- Chemaly et al. Venous Thrombosis Associated with Peripherally Inserted Central Catheters: A Retrospective Analysis of the Cleveland Clinic Experience. *Clinical Infectious Diseases*. 2002; 34(9): 1179-83.
- Lee et al. Incidence, Risk Factors, and Outcomes of Catheter-Related Thrombosis in Adult Patients with Cancer. *Journal of Clinical Oncology*. 2006; 24: 1404-1408.
- Baarslag et al. Diagnosis and management of deep vein thrombosis of the upper extremity: a review. *European Radiology*. 2004; 14:1263-1274.
- Munoz et al. Clinical Outcomes of Patients with Upper-Extremity Deep Vein Thrombosis Results from the RIETE Registry. *Chest*. 2008; 133: 143-148.
- Statistics performed using STATA 12 SE.