VTE Prophylaxis for Patients Undergoing Bariatric Surgery: The Michigan Bariatric Surgery Collaborative

Nancy Birkmeyer, PhD

What is the MBSC?

- Payer funded
  - Clinical outcomes registry
  - Quality improvement program
- Participants
  - Bariatric surgery programs throughout the state of Michigan
- Coordination
  - Researchers at the UM

MBSC Sites

1. Beaumont Grosse Pointe
2. Borgess Medical Center
3. Bronson Medical Center
4. Crittenton Hospital and Medical Center
5. Forest Health Medical Center
6. Gratiot Medical Center
7. Harper University Hospital
8. Henry Ford Bi-county
9. Henry Ford Hospital
10. Henry Ford Wyandotte
11. Hurley Medical Center
12. Lakeland Community Hospital
13. Marquette General Hospital
14. McLaren Regional Medical Center
15. Mercy General Health Partners
16. Metro Health in Wyoming
17. Munson Medical Center
18. Oakwood Hospital
19. Port Huron Hospital
20. Sparrow Health System
21. Spectrum Health System
22. St. John Hospital and Medical Center
23. St. John Oakland
24. St. Mary Mercy Hospital
25. St. Mary's Grand Rapids
26. University of MI Health System

Purpose of the MBSC

- To improve the quality of care for patients undergoing bariatric surgery in the State of Michigan through regional collaboration in a robust clinical outcomes registry and quality improvement program.

Introduction

- The MBSC (2007-present)
  - 30 sites
  - 30,000 patients
- VTE
  - Incidence of VTE is 0.33%
  - Accounts for more than half of the deaths among bariatric surgery patients

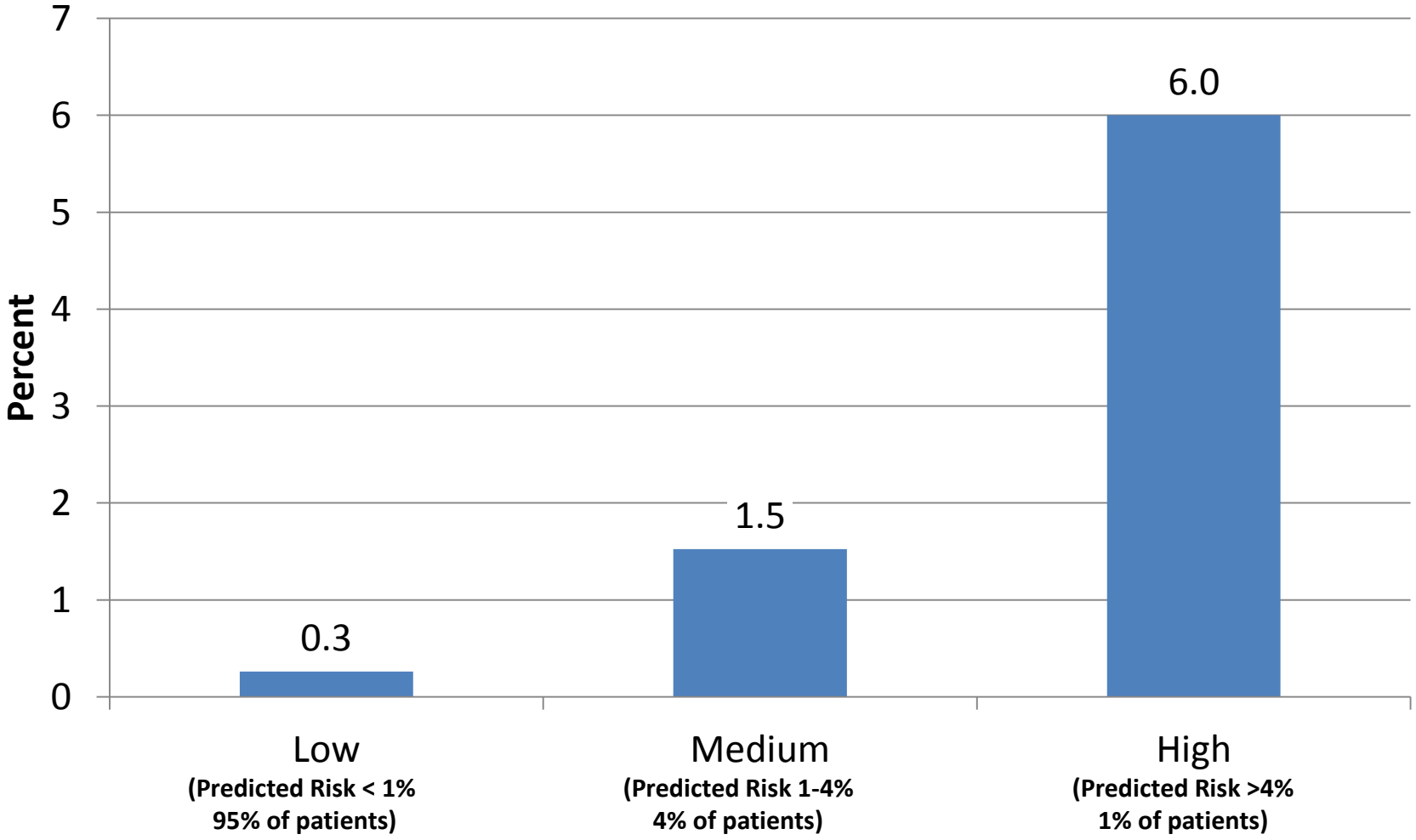
Outline

- Risk factors
- Identification of best practices
- Risk stratified treatment guideline
- Results to date

Risk Factors for VTE

Risk Factor	Odds Ratio	95% CI	P-value
Procedure (lap-band ref)			
Sleeve gastrectomy	3.15	1.22-8.15	0.018
Lap-RYGB	3.28	1.54-6.99	0.002
Open-RYGB	4.73	1.73-12.9	0.002
BPD/DS	8.54	2.50-29.2	0.001
Age category	1.27	1.04-1.56	0.017
BMI category	1.38	1.06-1.78	0.015
Male sex	2.08	1.34-3.22	0.001
Any history of smoking	1.39	0.91-2.13	0.130
OR Time > 3 hours	2.24	1.28-3.89	0.004
Prior history of VTE	4.67	2.71-8.04	<0.001

Rates of VTE According to VTE Predicted Risk Category



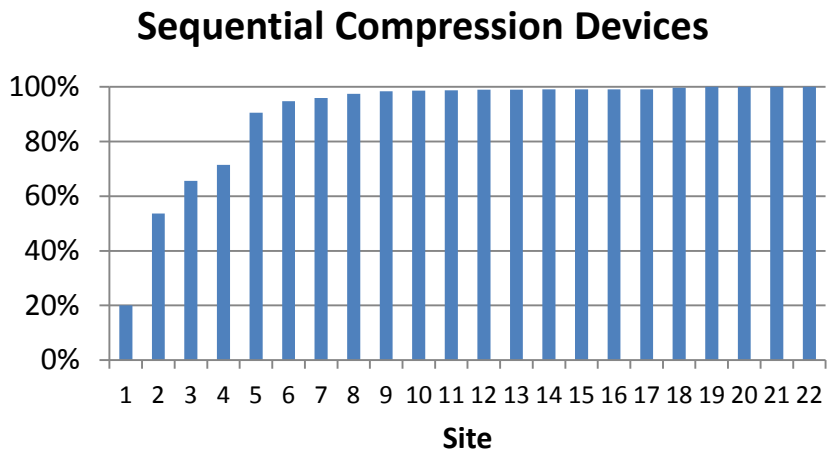
Outline

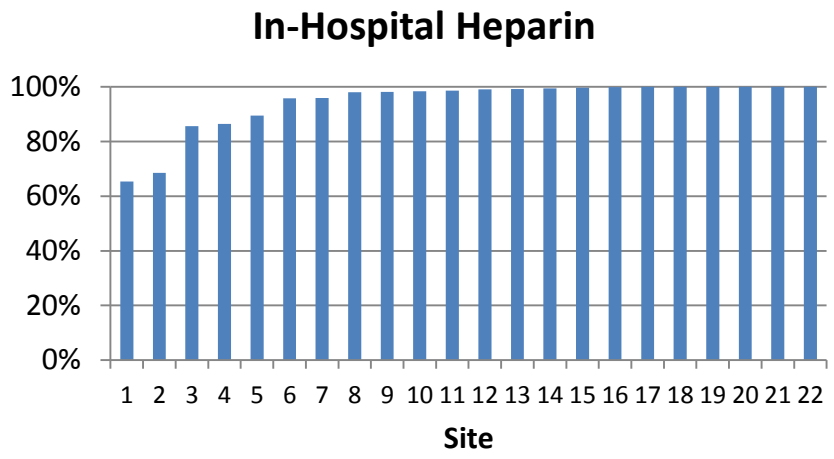
- Risk factors
- Identification of best practices
- Risk stratified treatment guideline
- Results to date

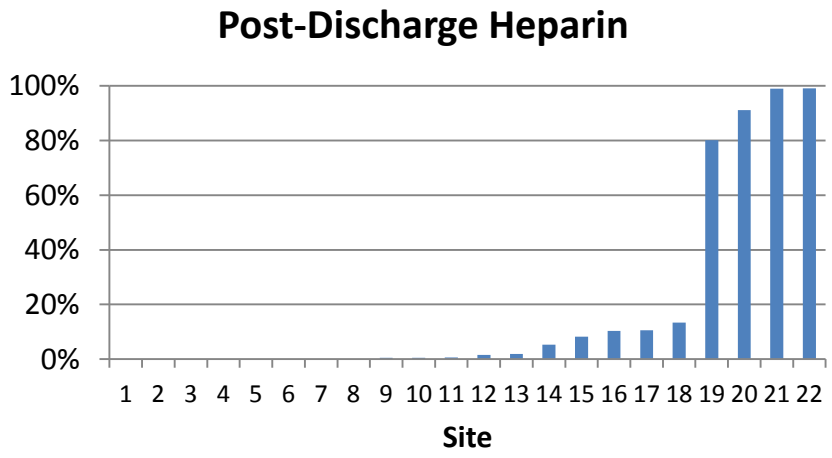
VTE Prophylaxis Options

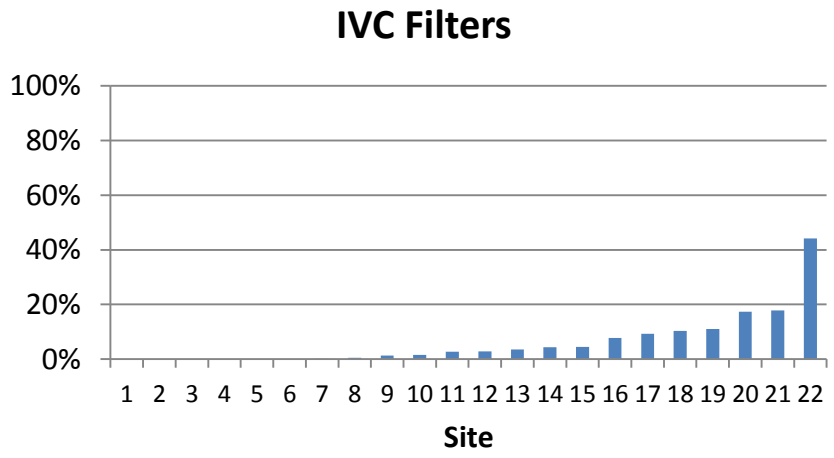
- Sequential compression devices
- In-hospital heparin/LMW heparin
- Post-discharge LMW heparin
- IVC filter

Variation in VTE Prophylaxis in 2007

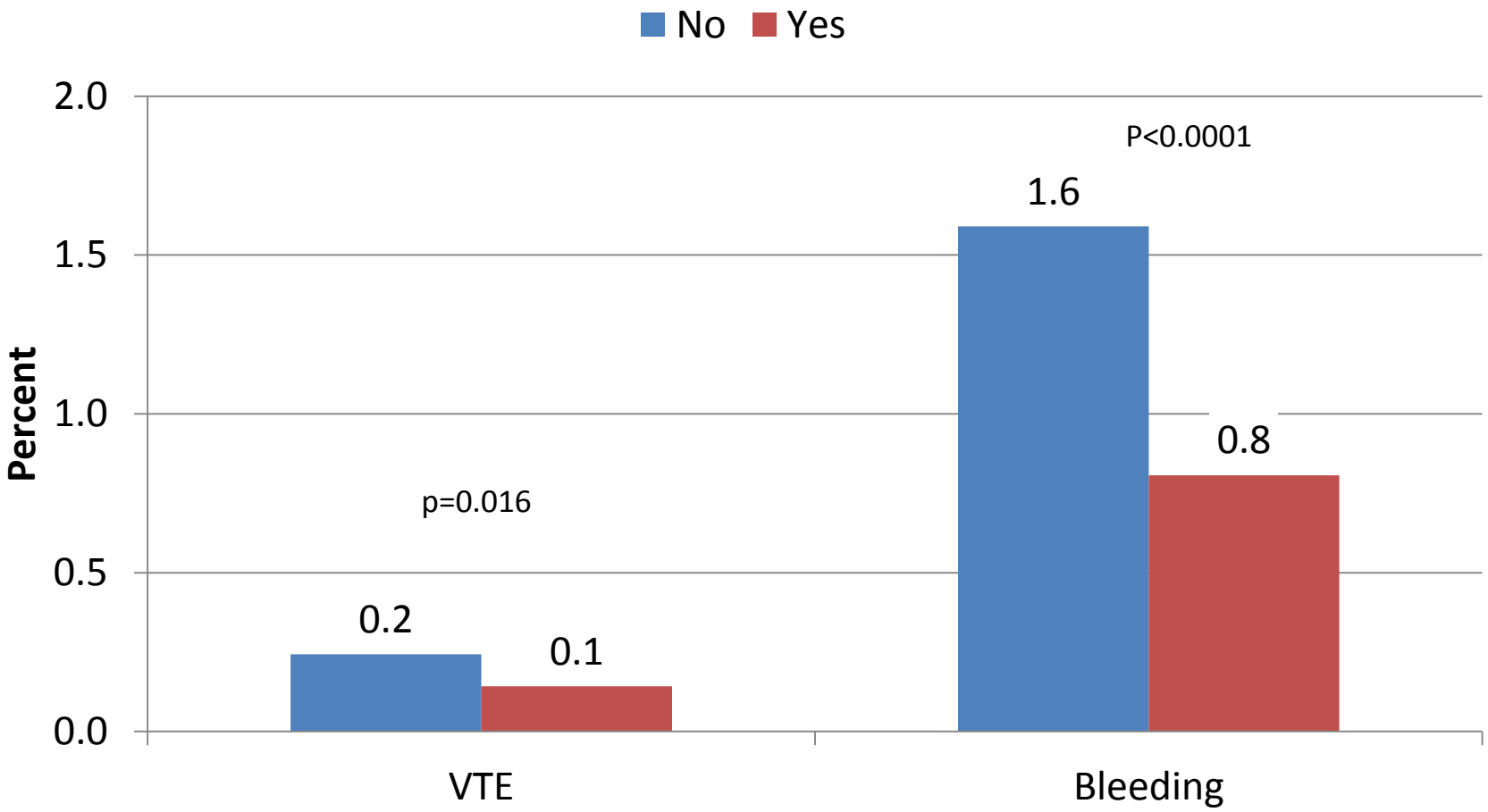






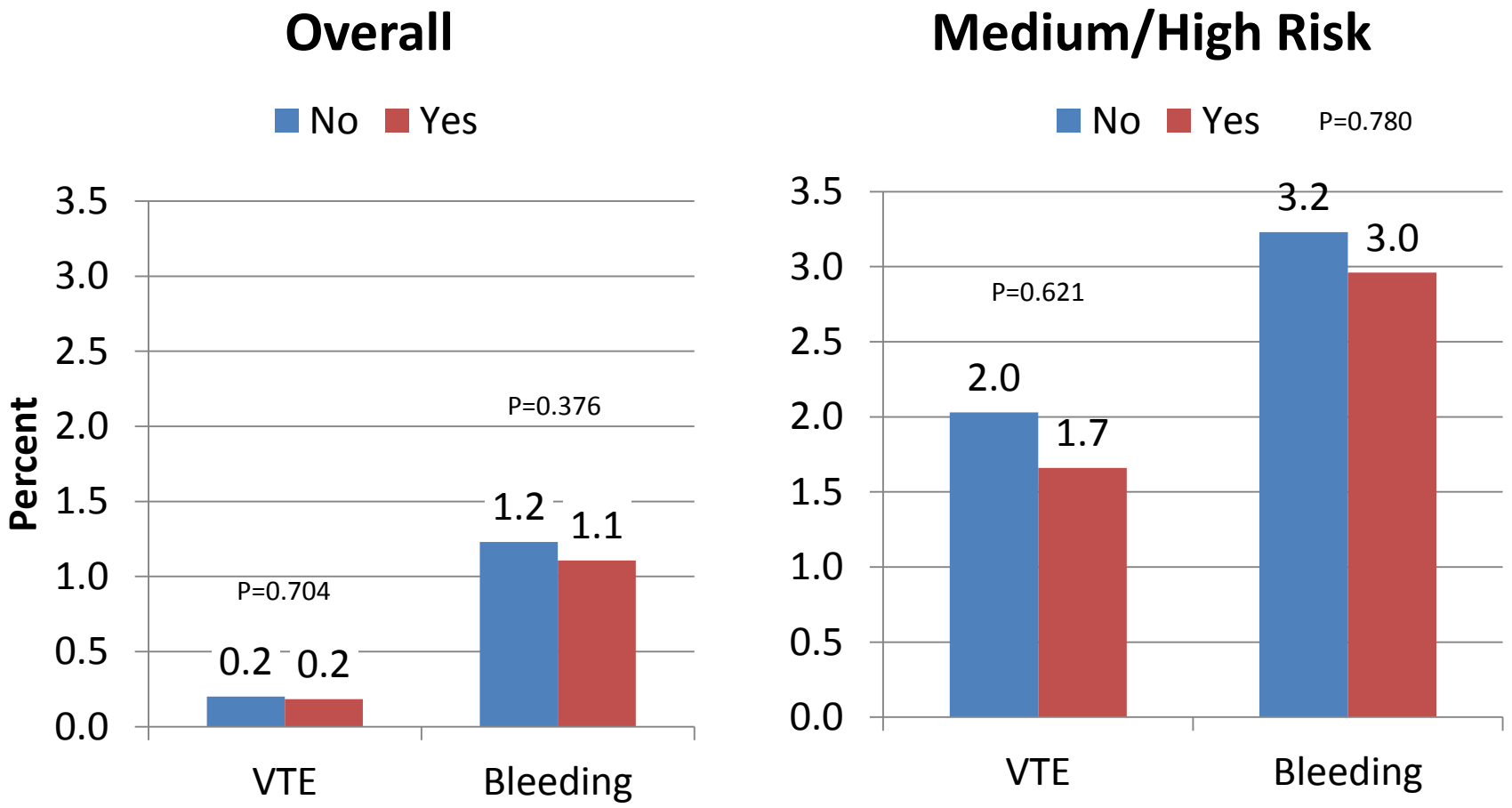


Rates* of VTE and Bleeding in Those Treated with In-Hospital LMW Heparin Compared to Those Treated with Heparin



* Adjusted for procedure type, age, BMI, sex, smoking, procedure length >3 hours, and prior history of VTE.

Rates* of VTE and Bleeding in Patients Treated with and without Post-Discharge LMW Heparin



* Adjusted for procedure type, age, BMI, sex, smoking, procedure length >3 hours, and prior history of VTE.

Preoperative Placement of Inferior Vena Cava Filters and Outcomes After Gastric Bypass Surgery

Nancy J. O. Birkmeyer, PhD, David Share, MD, MPH,† Onur Baser, PhD,* Arthur M. Carlin, MD,‡ Jonathan F. Finks, MD,* Carl M. Pesta, DO,§ Jeffrey A. Genaw, MD,‡ and John D. Birkmeyer, MD*; for the Michigan Bariatric Surgery Collaborative*

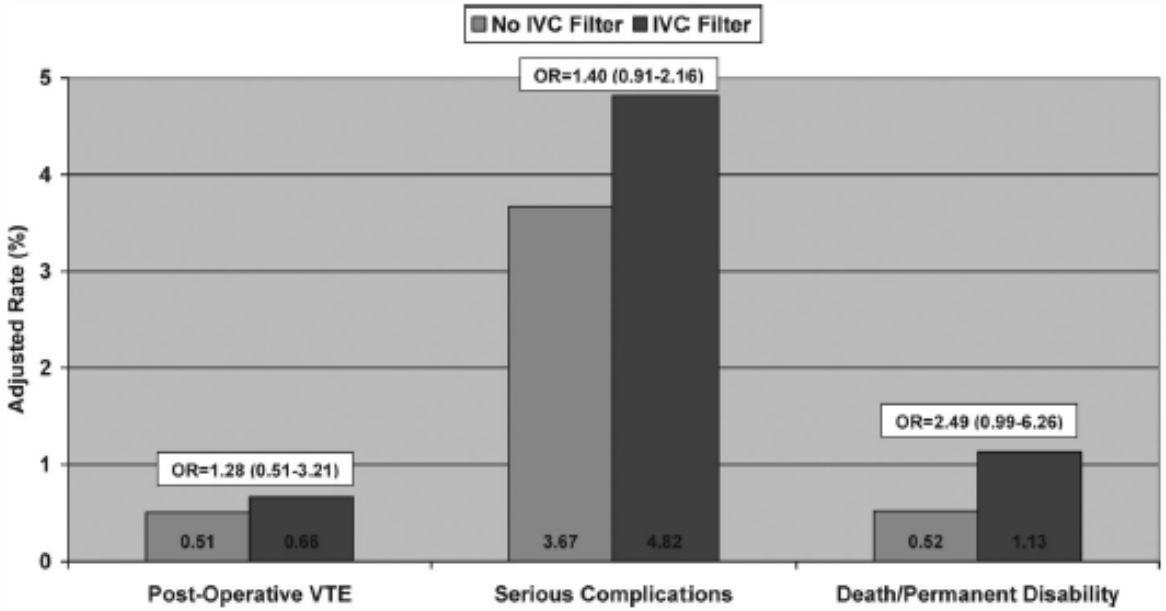


FIGURE 1. Propensity-adjusted rates of complications in gastric bypass patients with preoperative IVC filter placement compared with those without IVC filters.

Outline

- Risk factors
- Identification of best practices
- Risk stratified treatment guideline
- Results to date

VTE Risk-Stratified Treatment Guideline

- Pocket Card
- Web-Based Instrument

VTE Pocket Card

Blue Cross Blue Shield Blue Care Network of Michigan

Nonprofit corporations and independent licensees of the Blue Cross and Blue Shield Association

Michigan Bariatric Surgery Collaborative MBSC

VTE Risk Calculator		
Risk Factor		Points
PROC	Lap-Band	0
	Lap-RYGB	3
	Sleeve Gastrectomy	4
	Open RYGB	6
	BPD/DS	8
AGE	<30	1
	30-39	2
	40-49	3
	50-59	4
	60+	5
BMI	<40	1
	40-49	2
	50-59	3
	60+	4
Male sex		2
Any smoking history		2
OR time >3 hours *		2
Prior history of VTE		5
Total		

* Add 2 points post-operative if patient's operative time exceeds 3 hours.

Instructions: Sum patient's points then look-up risk-stratified treatment guidelines on the table on the opposite side.

Risk-Stratified Treatment Guidelines				
Points	Risk Group	Peri-Operative	Post-Operative	Post-Discharge
0-14	Low (<1.0%)	LMWH (P)	LMWH (P)	None
15-19	Medium (1.0%-4.0%)	LMWH (P)	LMWH (P)	LMWH (P)
20-28	High (>4.0%)	LMWH (P)	LMWH (T)	LMWH (T)

LMWH: low molecular weight heparin, (P) prophylactic dosing, (T) therapeutic dosing

Patients with known hypercoaguable state (e.g. Factor V Leiden, Activated Protein C Resistance, Protein C Deficiency) may be at substantially increased risk for VTE. For patients with renal insufficiency (creatinine clearance < 30 ml/min) who require therapeutic dosing of LMWH, it is recommended to monitor Anti-Factor Xa levels to guide dosing. You may also consider therapeutic anticoagulation with warfarin instead of LMWH in these patients.

Web-Based VTE Risk Calculator

Michigan Bariatric Surgery Collaborative

Home | About Us | LAP-BAND | RYGB | BPD/DS/SG | PATIENT SURVEY | Contact Us | Logout

Please fill in following information to get the risk of developing VTE for each patient:

1. Age category (years):
<30
30-39
40-49
50-59

2. BMI category:
<40
40-49
50-59

3. Gender: ⊙ Male ○ Female

4. Current or previous smoker: ⊙ Yes ○ No

5. Operative time>3 hours (if patient is pre-op, check "No") ○ Yes ⊙ No

6. VTE history: ○ Yes ⊙ No

7. Procedure Type (Please choose one)

a. Lap-Band ..... ○

b. Sleeve Gastrectomy ..... ○

c. Lap-RYGB ..... ⊙

d. Open-RYGB ..... ○

e. BPD/DS ..... ○

Submit

Web-Based VTE Risk Calculator

Michigan Bariatric Surgery Collaborative

Home | About Us | LAP-BAND | RYGB | BPD/DS/SG | PATIENT SURVEY | Contact Us | Logout

Predicted risk for developing VTE: 0.92%

Risk-Stratified Treatment Guidelines

Risk Group	Predicted Risk	Peri-Operative	Post-Operative	Post-Discharge
Low	<1.0%	LMWH (P)	LMWH (P)	None
Medium	1.0%-4.0%	LMWH (P)	LMWH (P)	LMWH (P)
High	>4.0%	LMWH (P)	LMWH (T)	LMWH (T)

LMWH: low molecular weight heparin
(P) prophylactic dosing
(T) therapeutic dosing

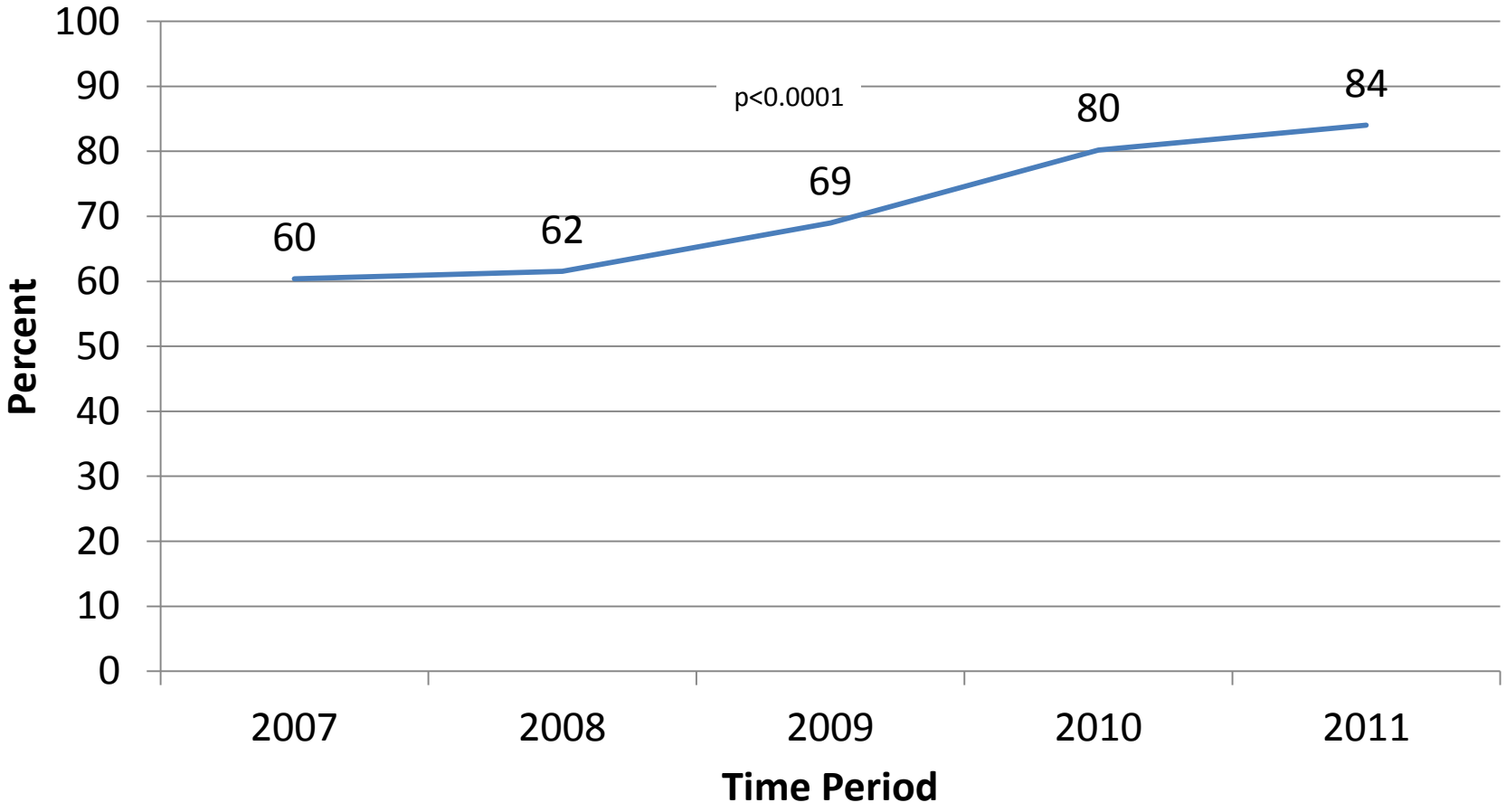
- Patients with operative times exceeding 3 hours are a greater risk of VTE. Please recalculate the risks for these patients post-operatively to determine whether treatment recommendations are affected.
- Patients with known hypercoaguable state (e.g. Factor V Leiden, Activated Protein C Resistance, Protein C Deficiency) may be at substantially increased risk for VTE.
- For patients with renal insufficiency (creatinine clearance < 30 ml/min) who require therapeutic dosing of LMWH, it is recommended to monitor Anti-Factor Xa levels to guide dosing. You may also consider therapeutic anticoagulation with warfarin instead of LMWH in these patients .

Go Back

Outline

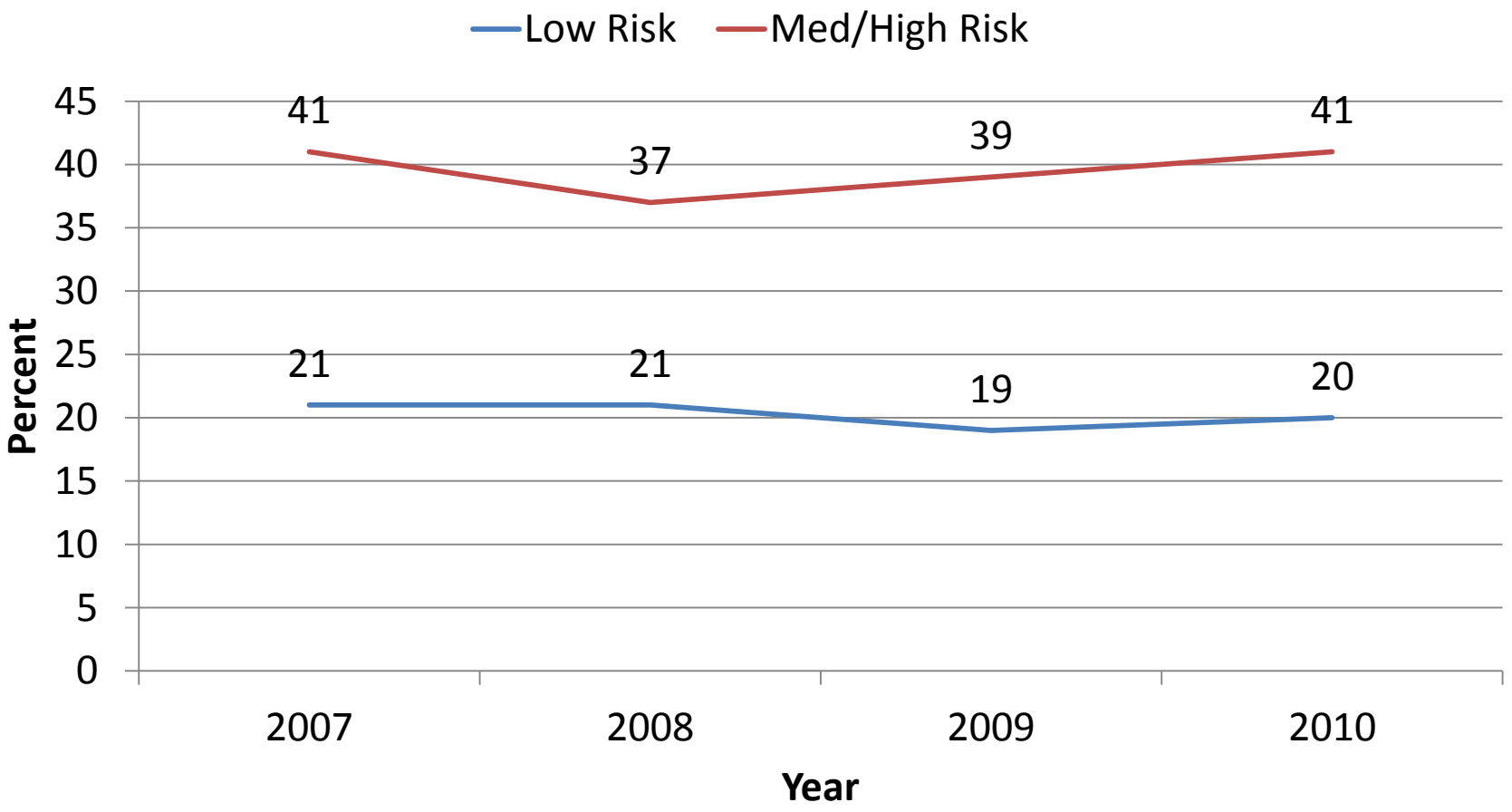
- Risk factors
- Identification of best practices
- Risk stratified treatment guideline
- Results to date

Temporal Trends in Rates of Use of In-Hospital LMW Heparin



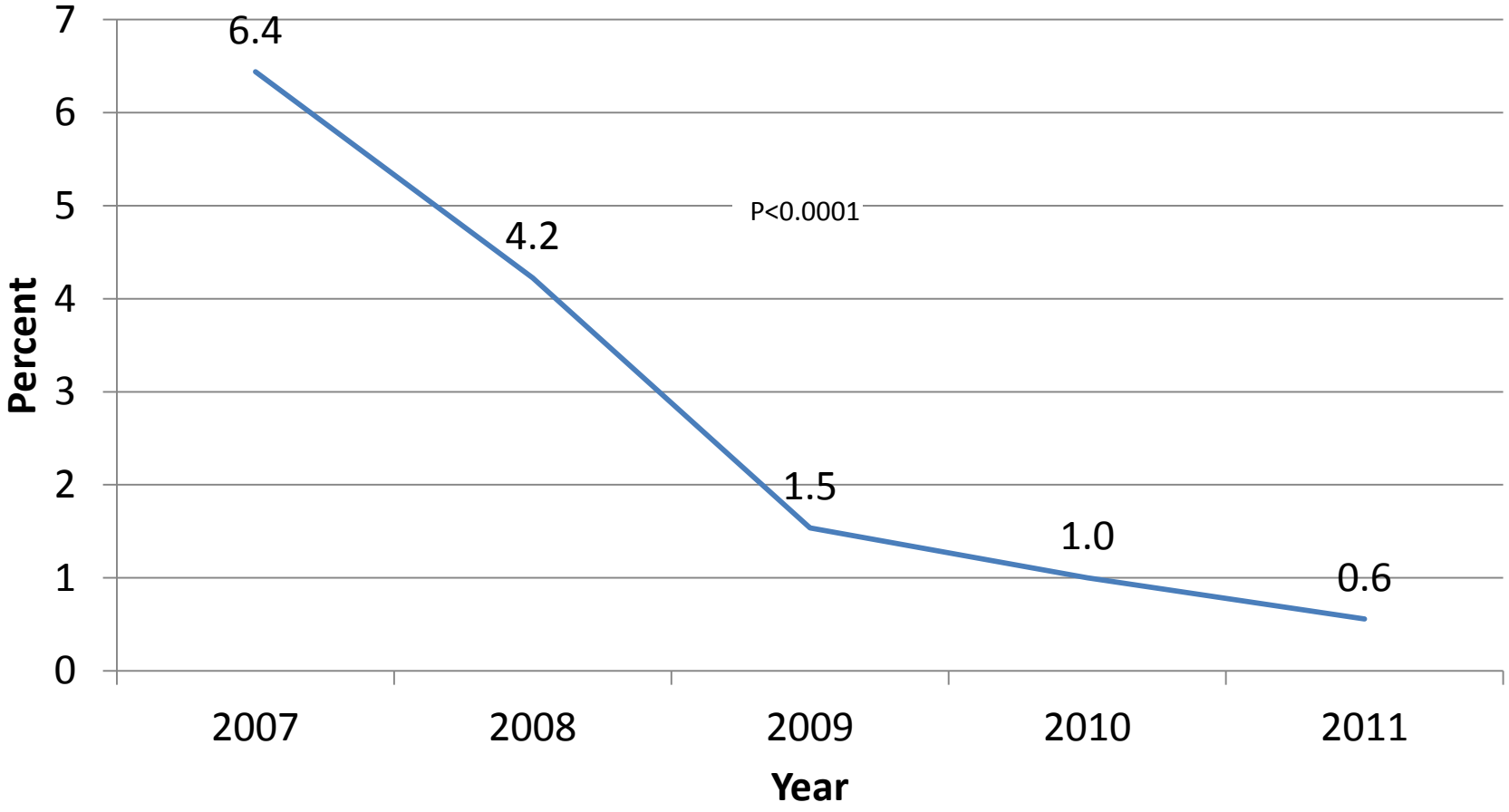
* Adjusted for procedure type, age, BMI, sex, smoking, procedure length >3 hours, and prior history of VTE.

Temporal Trends in Rates of Use of Post-Discharge LMW Heparin



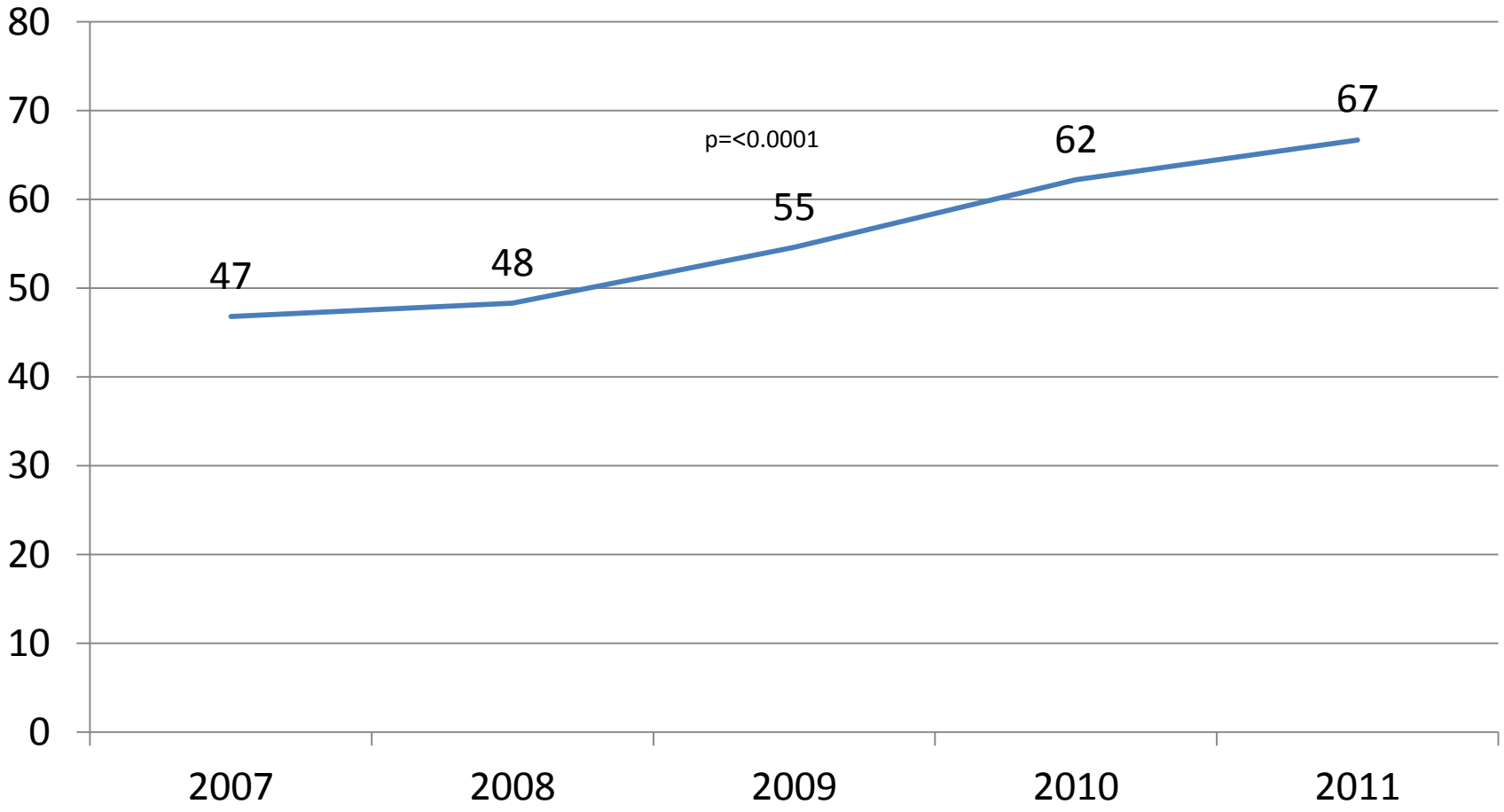
* Adjusted for procedure type, age, BMI, sex, smoking, procedure length >3 hours, and prior history of VTE.

Temporal Trends* in the Use of IVC Filters



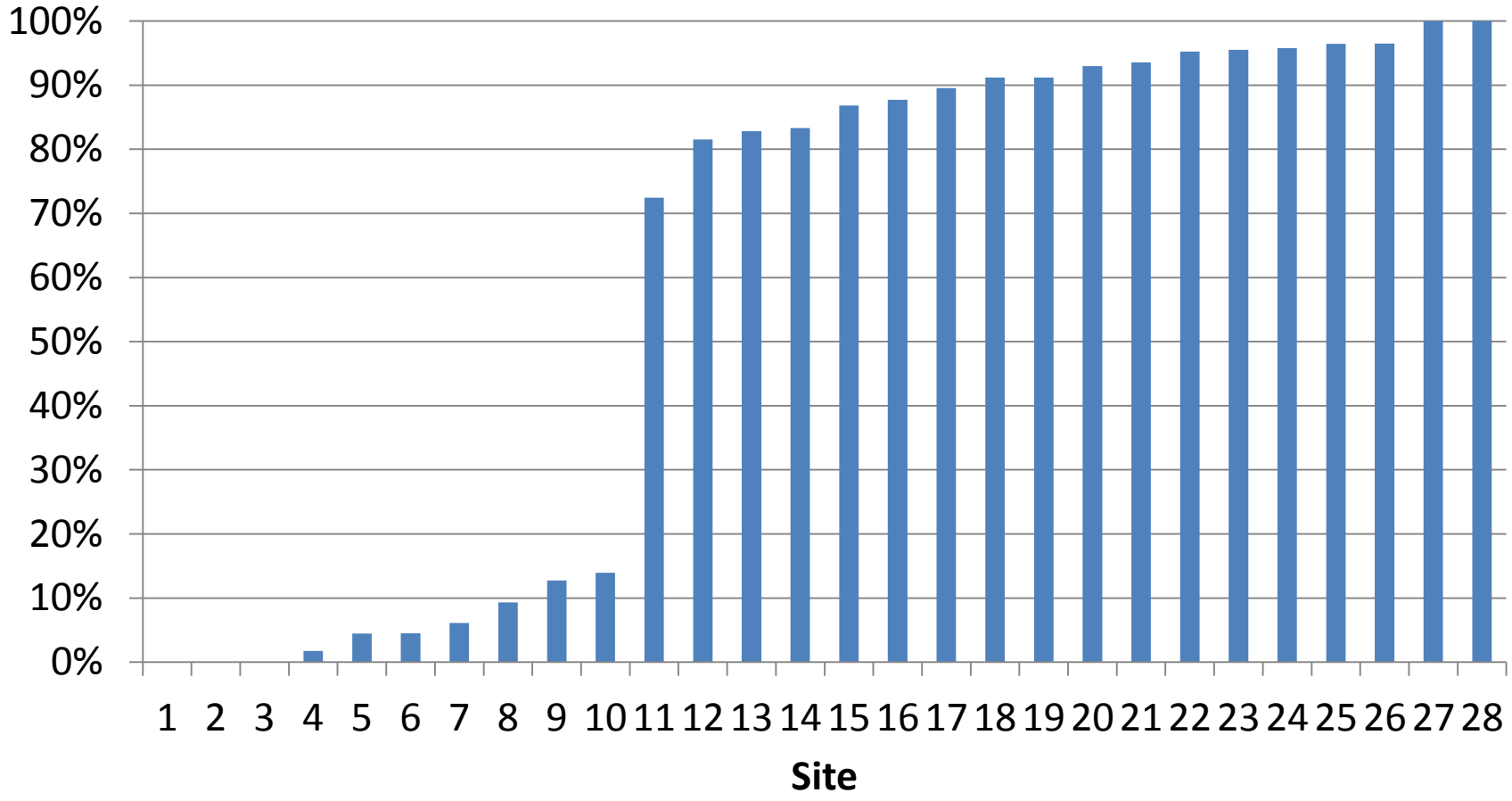
* Adjusted for procedure type, age, BMI, sex, smoking, procedure length >3 hours, and prior history of VTE.

VTE Guideline Adherence Over Time

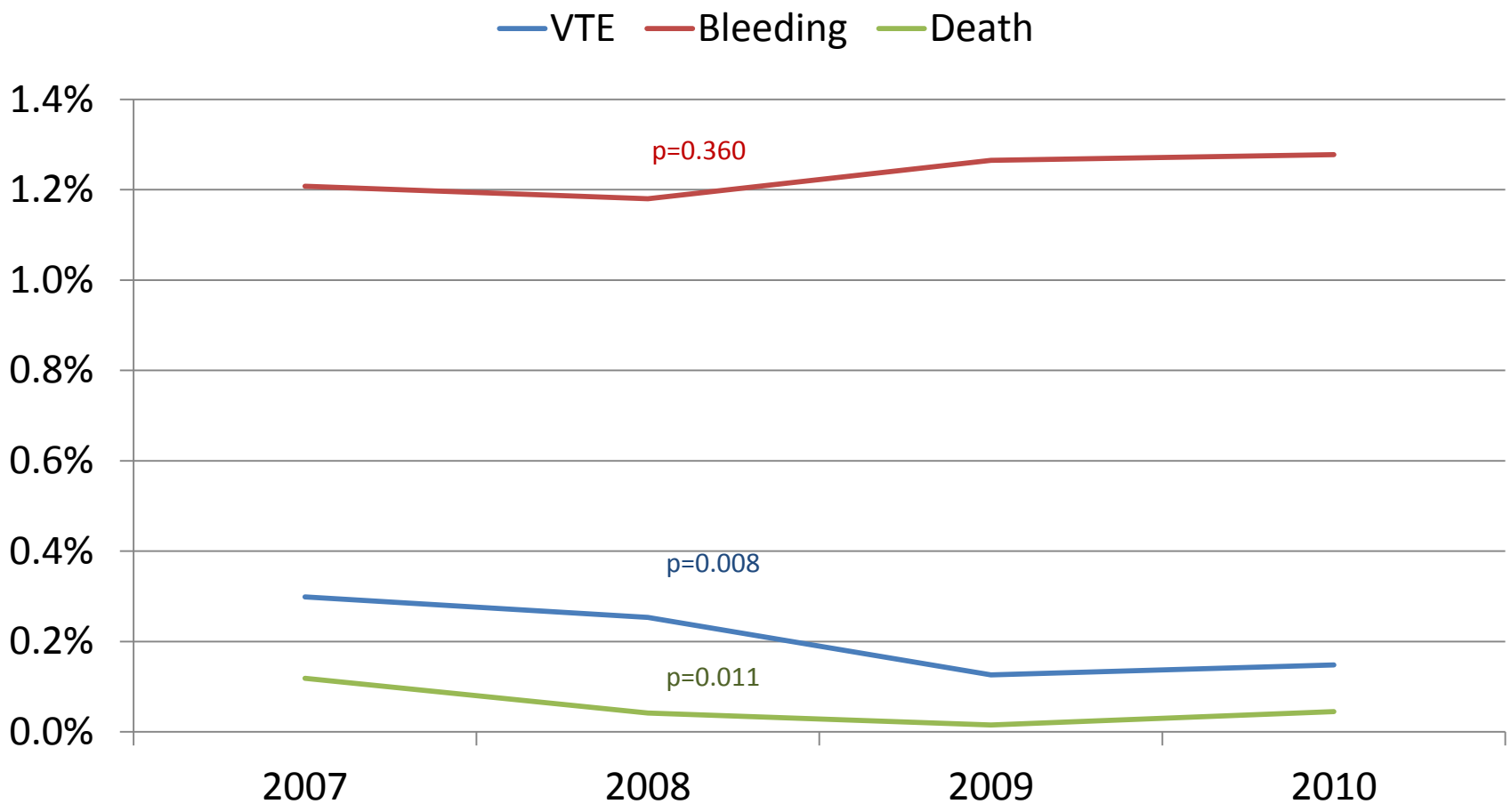


* Adjusted for procedure type, age, BMI, sex, smoking, procedure length >3 hours, and prior history of VTE.

Variation in VTE Guideline Adherence in the Last Two Quarters by Site



Temporal Trends* in Rates of VTE, Bleeding, and Death



* Adjusted for procedure type, age, BMI, sex, smoking, mobility limitations, procedure length >3 hours, and prior history of VTE.

Barriers to Implementation

- Local, e.g.
  1. Surgeon thinks he will have increased rates of bleeding if he gives his patients Lovenox
  2. Hospital administration thinks Lovenox is too expensive
  3. Surgeons want to treat all their bariatric patients with post-discharge Lovenox

Conclusions

- Barriers are local
- No one size fits all solutions