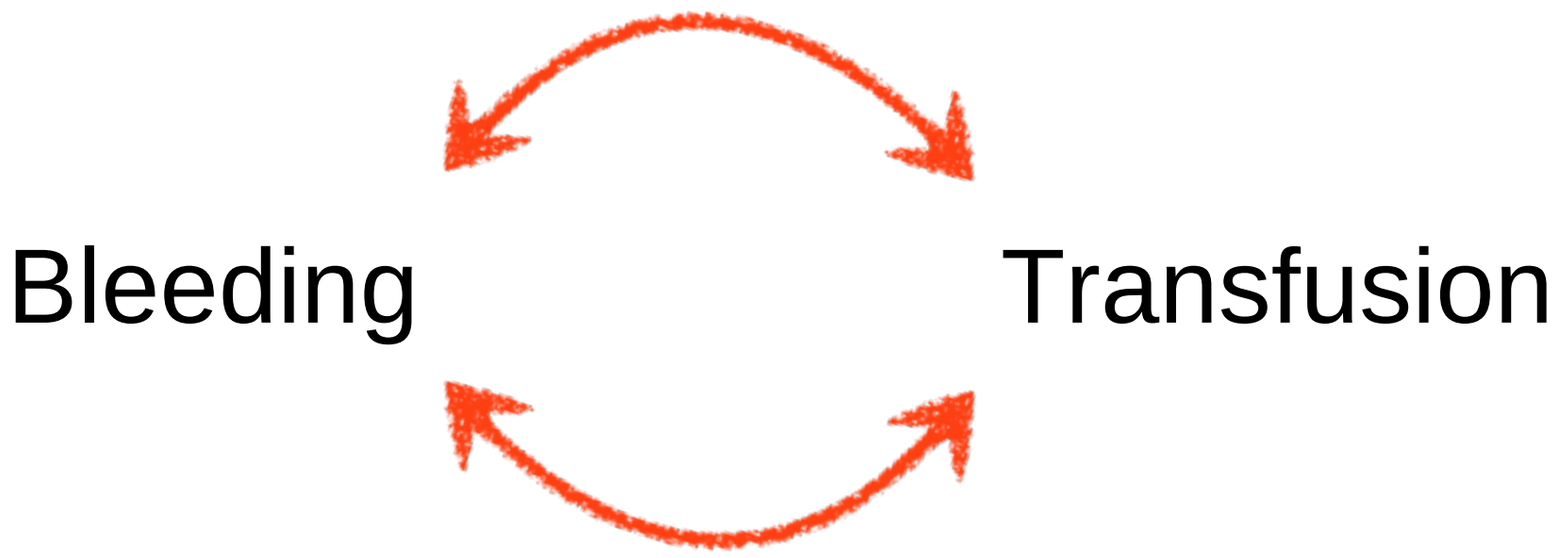
What is the Point of Point Of Care?

Ravi Gill
Cardiac Anaesthetist
Southampton UK

Disclosure

Advisory Board for Haemonetics, Roche and CSL Behring

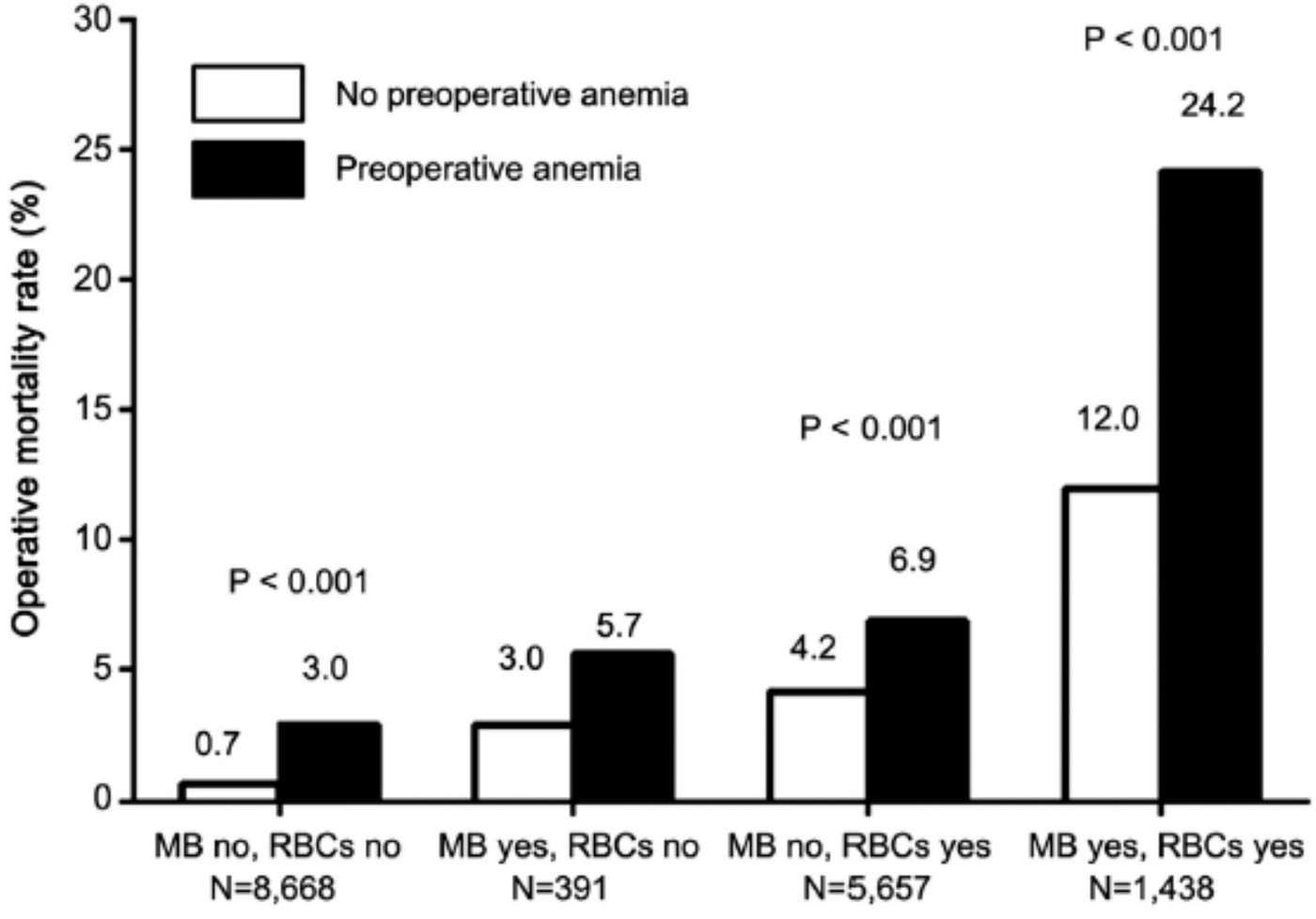
lethal triad leading to poor outcomes



Mortality and Bleeding

16000 patients

2000-2012



Ranucci, M et al Ann Thorac Surg 2013:96;478-84

Can POC or Near Patient Testing?

Identify patients at risk of bleeding

Reduce transfusions

Prevent re-operations

Reduce mortality/morbidity

Clinical surrogates for bleeding

Very little published regarding bleeding

Transfusion targeted at measured bleeding

More often is the assumption the transfusion is given for bleeding

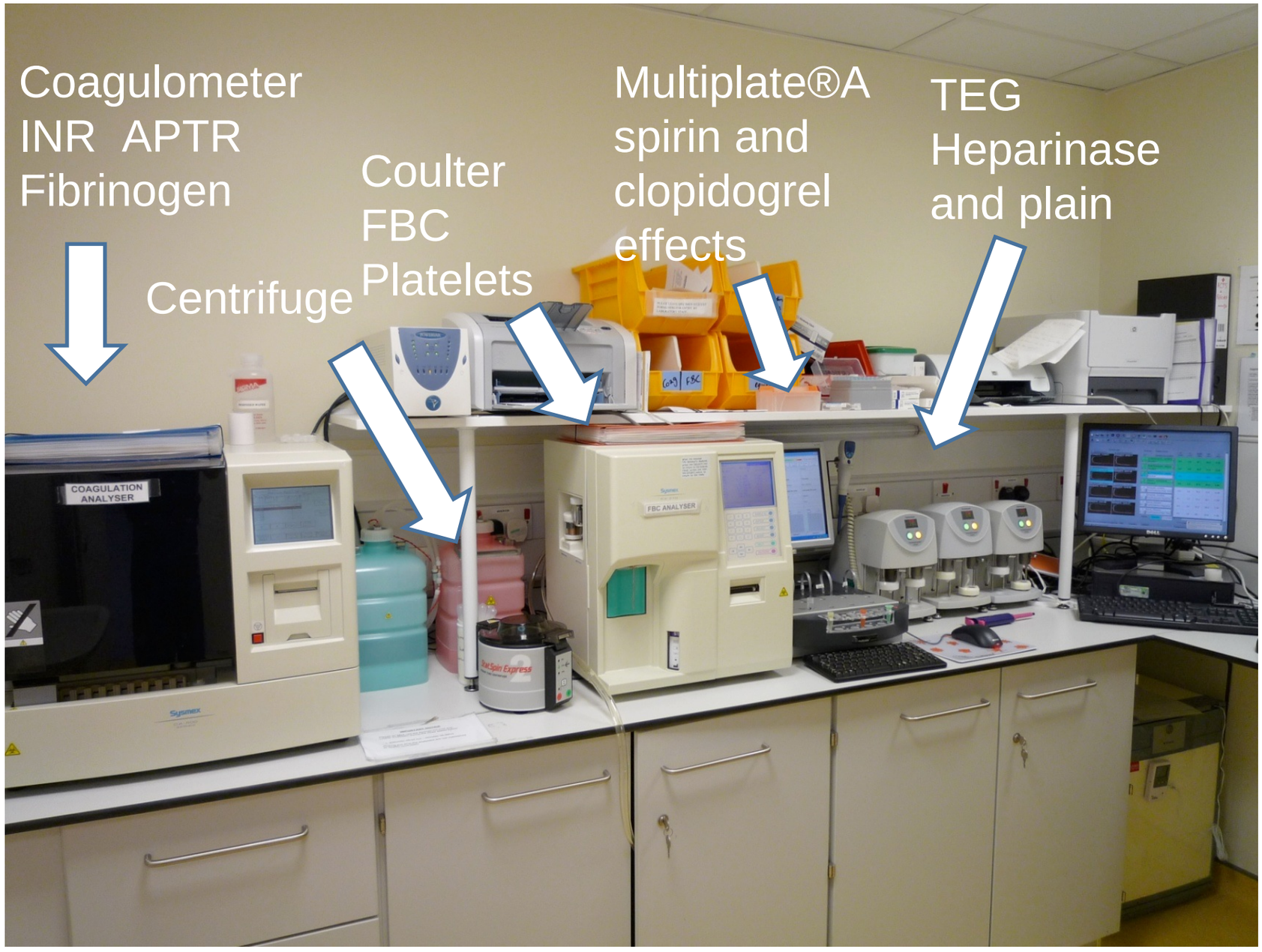
POC or Near Patient Testing

Simple

Quick

Reproducible

Accurate



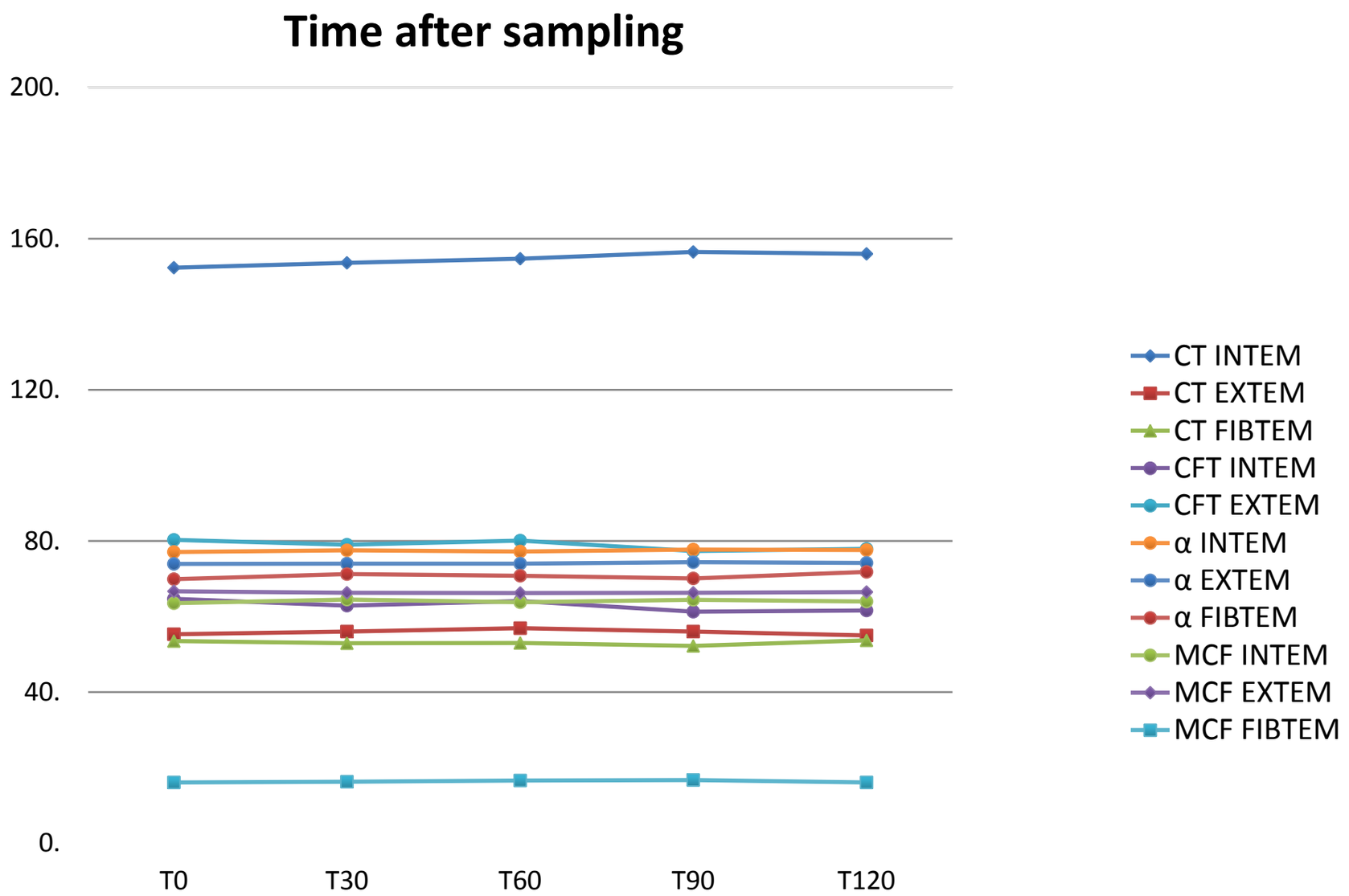
Evidence

- Reproducibility/Accuracy
- Efficacy

Reproducibility and Accuracy

- Two themes
  - Non lab based clinician based research
  - Lab based research

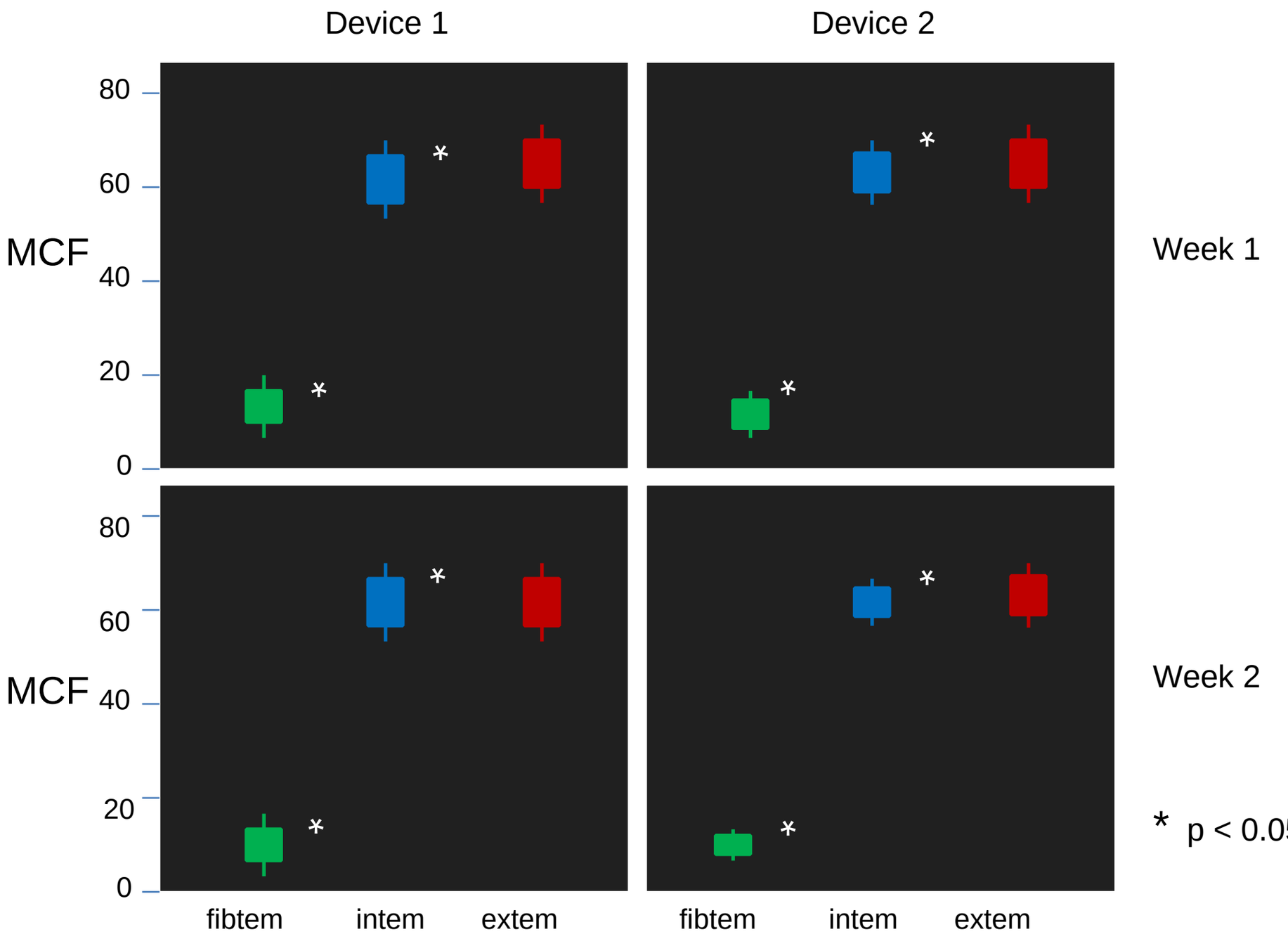
How stable are POC measurements?



Theusinger OM. *Eur J Cardiothorac Surg* 2010;677-83

How Accurate is your POC ?

Reproducibility



Theusinger OM. *Eur J Cardiothorac Surg* 2010;677-83

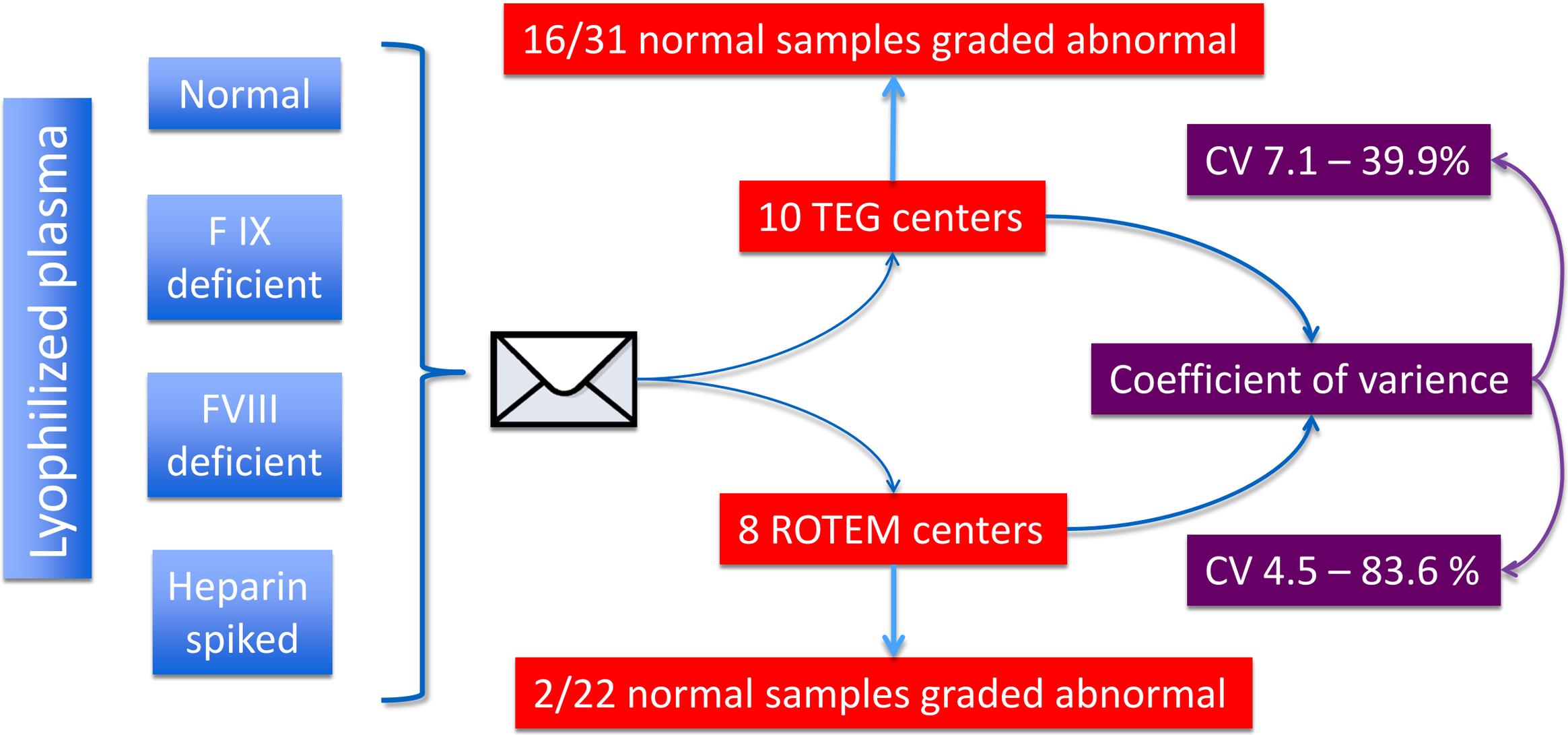
- Two studies
  - supported by industry
  - limited number of expert clinicians involved in tests

Lang T. Blood Coagulation & Fibrinolysis 2005:16(4) 301

Theusinger OM. *Eur J Cardiothorac Surg* 2010;677-83

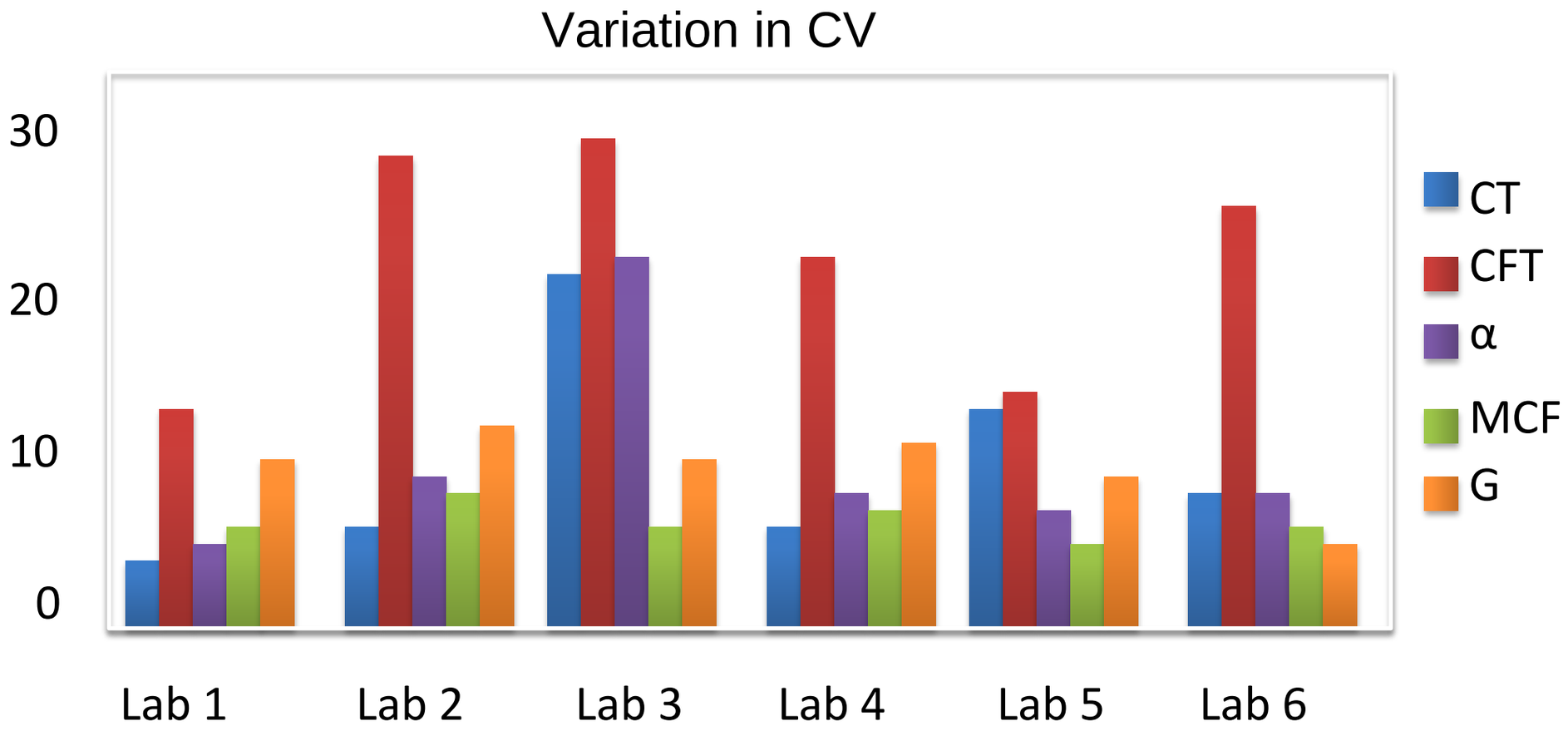
UK NEQAS

UK National External Quality assessement scheme



Kitchen DP. *Sem Thromb Hemost* 2010;36:757-63

International TEG-ROTEM working group



Chitlur M. *Haemophilia* 2011;17:532-7

Two studies

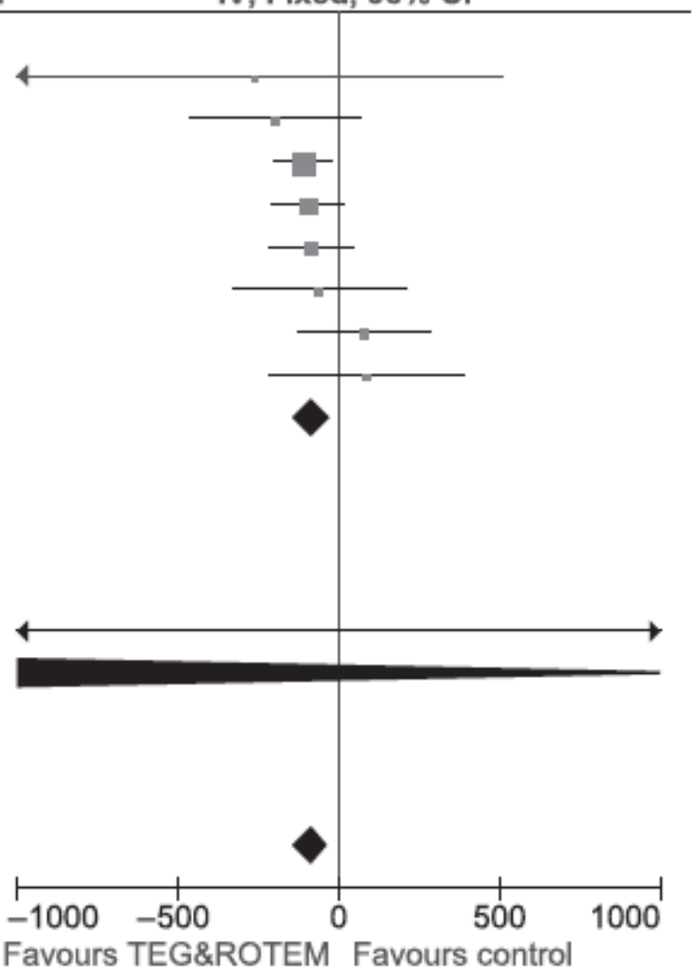
run by laboratory clinicians

similar to external assessment

lack of reproducibility and precision

Efficacy

Study or Subgroup	TEG & ROTEM Mean	SD	Total	Control Mean	SD	Total	Weight	Mean Difference IV, Fixed, 95% CI
3.3.1 Cardiac surgery								
Nuttal 2001 (33)	590	2,475	41	850	523.75	51	0.5%	–260.00 [–1031.10, 511.10]
Shore-Lesserson 1999 (35)	702	500	53	901	847	52	4.4%	–199.00 [–465.68, 67.68]
Ak 2009 (30)	480.5	351	114	591.4	339.2	110	37.9%	–110.90 [–201.29, –20.51]
Avidan 2004 (31)	755	301.48	51	850	273.33	51	24.8%	–95.00 [–206.68, 16.68]
Westbrook 2009 (36)	875	277.778	32	960	281.481	37	17.7%	–85.00 [–217.25, 47.25]
Girdauskas 2010 (38)	890	481.48	27	950	555.56	29	4.2%	–60.00 [–331.79, 211.79]
Royston 2001 (34)	470	388.9	30	390	429.6	30	7.2%	80.00 [–127.36, 287.36]
Kultufan Turan 2006 (32)	837.5	494.1	20	751	489.2	20	3.3%	86.50 [–218.23, 391.23]
Subtotal (95% CI)			368			380	100.0%	–84.53 [–140.16, –28.89]
Heterogeneity: Chi² = 4.93, df = 7 (*P* = 0.67); I² = 0%								
Test for overall effect: *z* = 2.98 (*P* = 0.003)								
3.3.2 Liver transplantation								
Wang 2010 (37)	4,775.7	4,264.7	14	6,348	3,704.1	14	0.0%	–1572.30 [–4531.23, 1386.63]
Subtotal (95% CI)			14			14	0.0%	–1572.30 [–4531.23, 1386.63]
Heterogeneity: Not applicable								
Test for overall effect: *z* = 1.04 (*P* = 0.30)								
Total (95% CI)			382			394	100.0%	–85.05 [–140.68, –29.42]
Heterogeneity: Chi² = 5.90, df = 8 (*P* = 0.66); I² = 0%								
Test for overall effect: *z* = 3.00 (*P* = 0.003)								
Test for subgroup differences: Chi² = 0.97, df = 1 (*P* = 0.32), I² = 0%								



Wikkelsoe A, et al Acta Anaesthesiol Scand 2011; **55:** 1174–1189

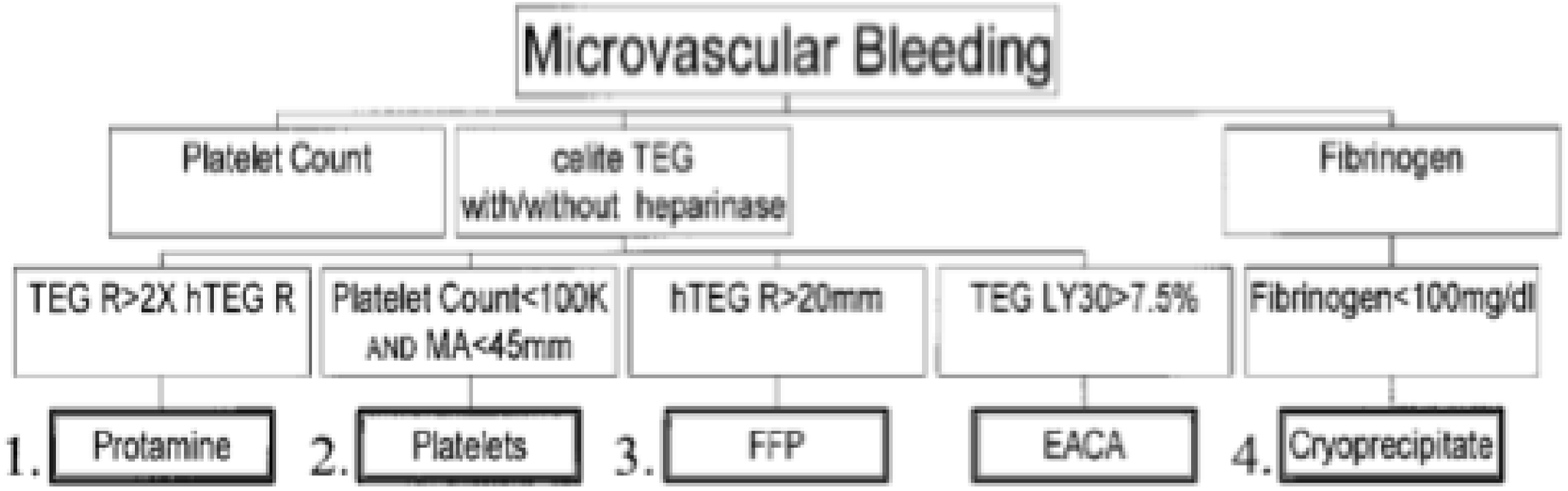


Table 4. Bleeding and Transfusion Requirements

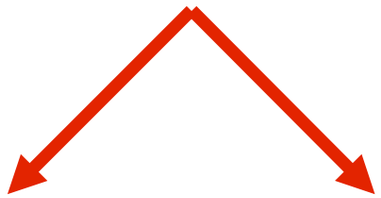
	Intraoperative			Postoperative			Total		
	TEG	Control	*P*	TEG	Control	*P*	TEG	Control	*P*
Packed red blood cells (mL)	267 ± 423	346 ± 449	0.4	103 ± 252	177 ± 318	0.27	354 ± 487	475 ± 593	0.12
Fresh-frozen plasma (mL)	22 ± 101	113 ± 407	0.4	33 ± 169	146 ± 378	0.13	36 ± 142	217 ± 463	<0.04
Platelet concentrates (mL)	22 ± 75	41 ± 122	0.6	11 ± 46	42 ± 107	0.3	34 ± 94	83 ± 160	0.16
Autologous reinfusion volume (mL)	—	—		128 ± 145	141 ± 290	0.19	—	—	
6-h MTD + reinfusion volume (mL)	—	—		362 ± 274	469 ± 637	0.63	—	—	
24-h MTD + reinfusion volume (mL)	—	—		702 ± 500	901 ± 847	0.27	—	—	
Packed red blood cells	17/53	23/52	0.2	10/53	16/52	0.16	22/53	31/52	0.06
Fresh-frozen plasma	3/53	8/52	0.1	2/53	11/52	<0.007	4/53	16/52	0.002
Platelet concentrates	5/53	8/52	0.4	3/53	9/52	0.06	7/53	15/52	<0.05

Values are mean ± SD or proportion of patients transfused.
Nonparametric statistics performed for all data not conforming to normal distribution.
TEG = thromboelastography, MTD = chest tube drainage.

Shore-Lesserson et al 2002A&A 92 (2); 178-176

is clinical discretion okay

102 elective CABG



Lab Group	POC group	Clinical discretion
INR APTR Platelet Count	Hepcon PAF100 TEG	102 retrospective controls

Table 3 Blood components received. The table shows the number of patients (%) in each group that received transfusions. LAG=laboratory-guided algorithm; POC=point of care; CD=clinician discretion

Blood component	LAG group (n=51)	POC group (n=51)	CD group (n=108)	P (χ^2 test)
Packed red blood cells	35 (69)	34 (68)	92 (85)	0.01
Fresh frozen plasma	0	2 (4)	16 (15)	0.003
Platelets	1 (2)	2 (4)	14 (13)	0.02

Avidan M,S et al 2004 BJA 92 (2); 178-176

is clinical discretion okay

102 elective CABG

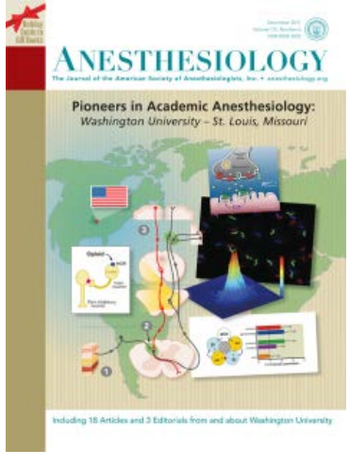
POC group	Lab Group	Clinical discretion
Hepcon PAF100 TEG	INR APTR Platelet Count	102 retrospective controls

Table 3 Blood components received. The table shows the number of patients (%) in each group that received transfusions. LAG=laboratory-guided algorithm; POC=point of care; CD=clinician discretion

Blood component	LAG group (n=51)	POC group (n=51)	CD group (n=108)	P (χ^2 test)
Packed red blood cells	35 (69)	34 (68)	92 (85)	0.01
Fresh frozen plasma	0	2 (4)	16 (15)	0.003
Platelets	1 (2)	2 (4)	14 (13)	0.02

Avidan M,S et al 2004 BJA 92 (2): 178-176

Anesthesiology 2011; 115:1179–91



PERIOPERATIVE MEDICINE

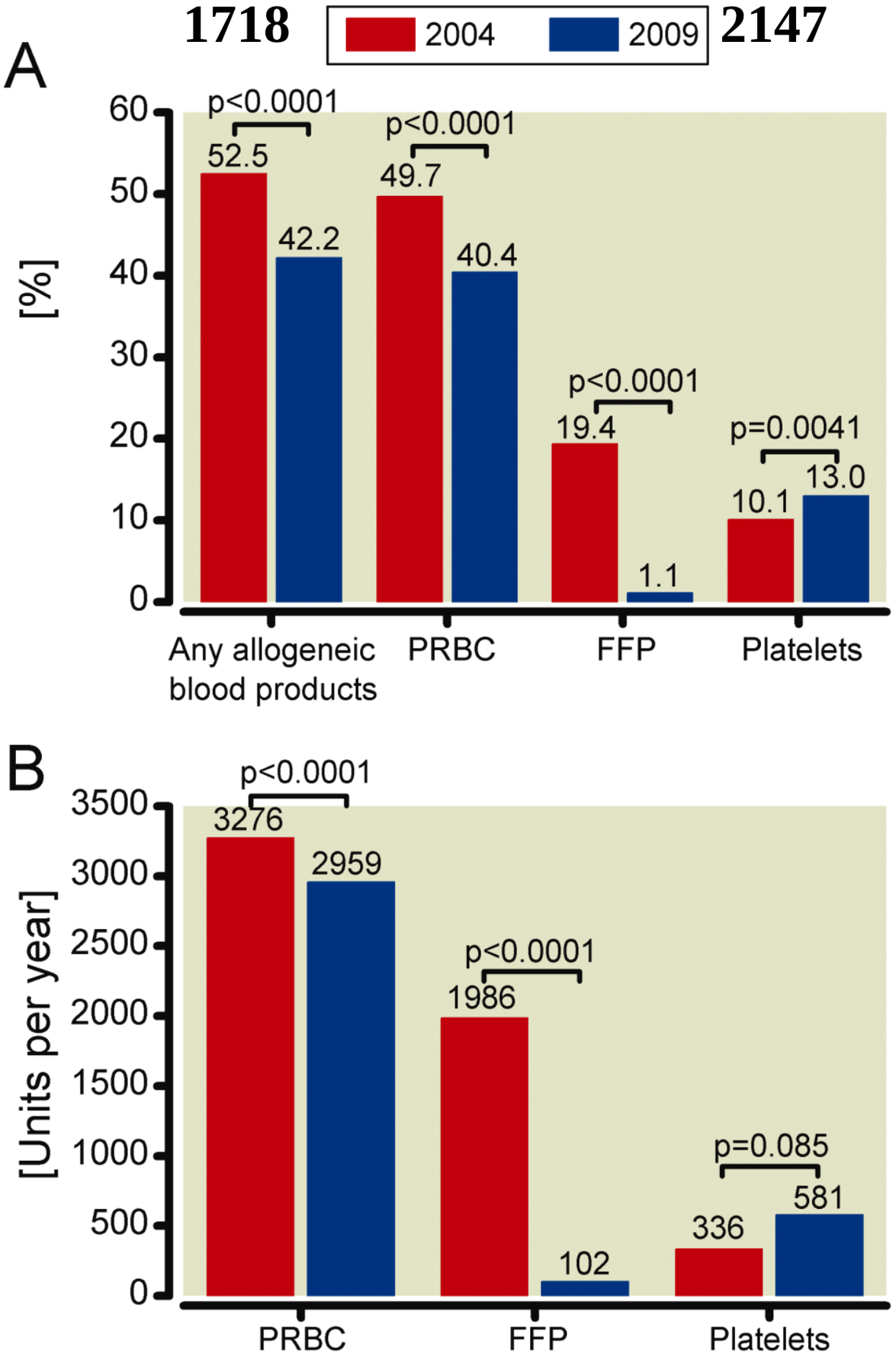
Coagulation Management in Cardiovascular Surgery

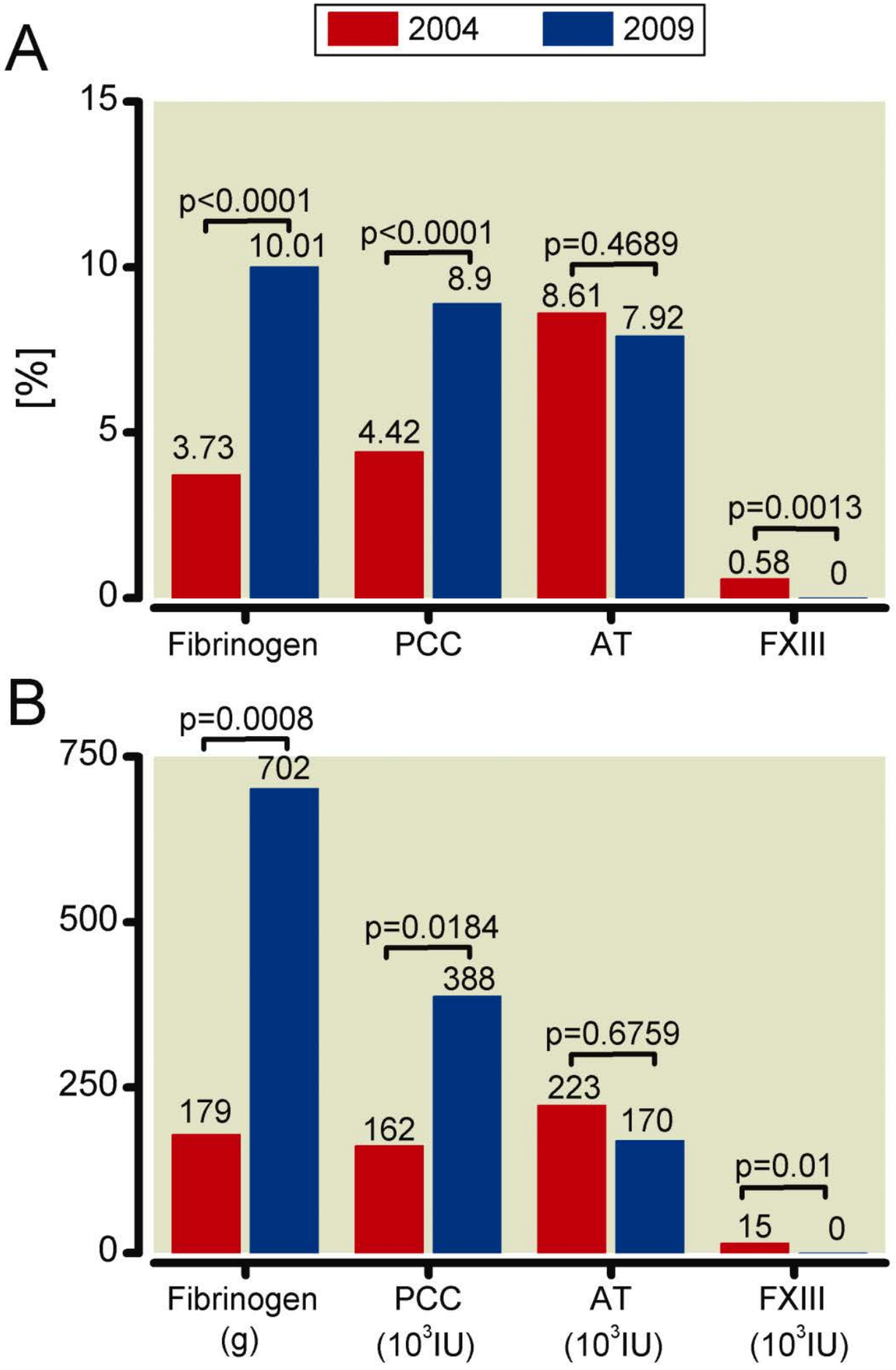
First-line Therapy with Coagulation Factor Concentrates Combined with Point-of-Care Coagulation Testing Is Associated with Decreased Allogeneic Blood Transfusion in Cardiovascular Surgery

A Retrospective, Single-center Cohort Study

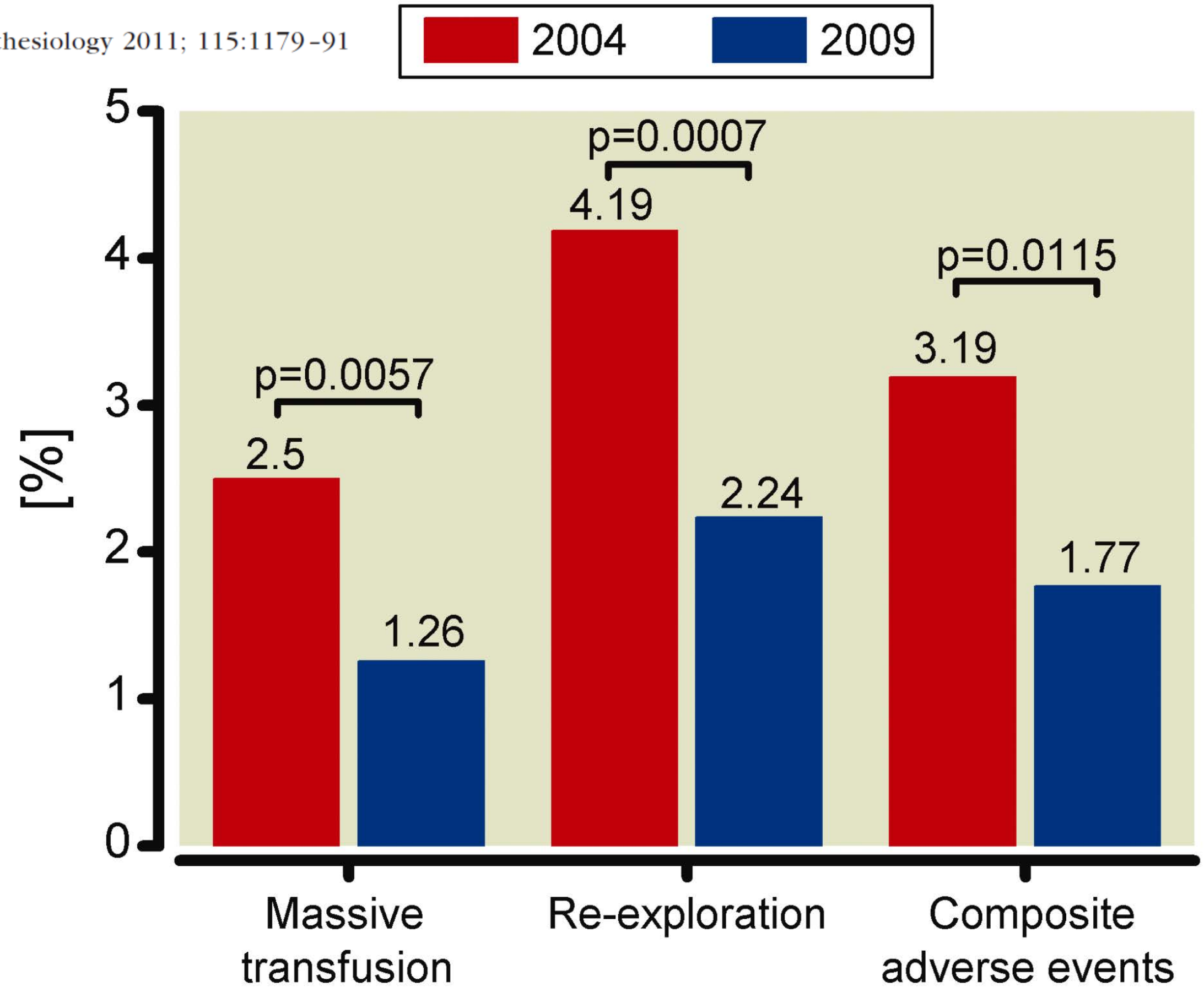
Klaus Görlinger, Dr. med,* Daniel Dirkmann, Dr. med,† Alexander A. Hanke, Dr. med,† Markus Kamler, PD Dr. med,‡ Eva Kottenberg, PD Dr. med,* Matthias Thielmann, PD Dr. med,‡ Heinz Jakob, Prof. Dr. med,§ Jürgen Peters, Prof. Dr. med‖

Methods: In a retrospective cohort study including 3,865 patients, we analyzed the incidence of intraoperative allogeneic blood transfusions (primary endpoints) before and after algorithm implementation.


1718
2004
2009
2147
A
[%]
60
50
40
30
20
10
0
p<0.0001
52.5
42.2
p<0.0001
49.7
40.4
p<0.0001
19.4
1.1
p=0.0041
10.1
13.0
Any allogeneic blood products
PRBC
FFP
Platelets
B
[Units per year]
3500
3000
2500
2000
1500
1000
500
0
p<0.0001
3276
2959
p<0.0001
1986
102
p=0.085
336
581
PRBC
FFP
Platelets


2004
2009
A
[%]
15
10
5
0
p<0.0001
3.73
10.01
p<0.0001
4.42
8.9
p=0.4689
8.61
7.92
p=0.0013
0.58
0
Fibrinogen
PCC
AT
FXIII
B
750
500
250
0
p=0.0008
179
702
p=0.0184
162
388
p=0.6759
223
170
p=0.01
15
0
Fibrinogen (g)
PCC (10^3IU)
AT (10^3IU)
FXIII (10^3IU)

Anesthesiology 2011; 115:1179-91



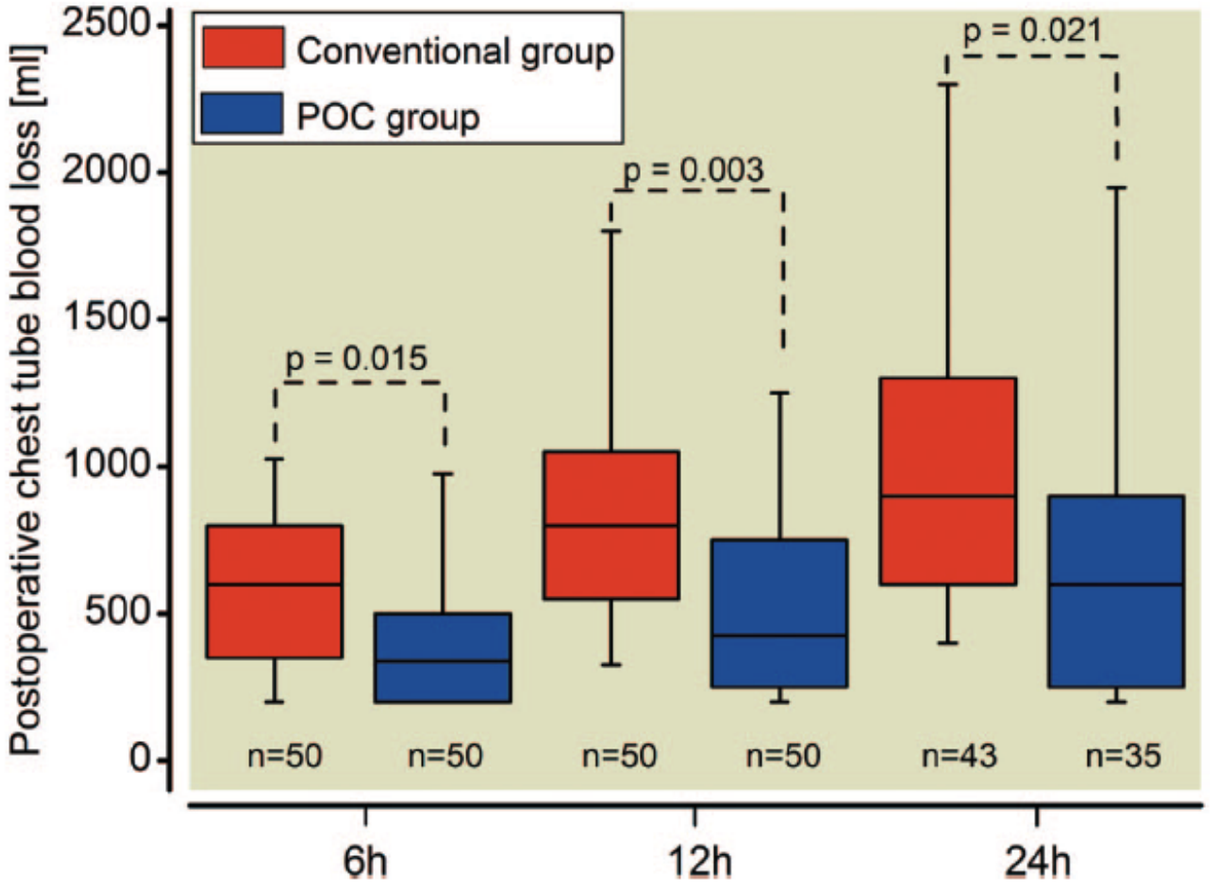


Fig. 3. Postoperative chest tube blood loss. POC = point-of-care.

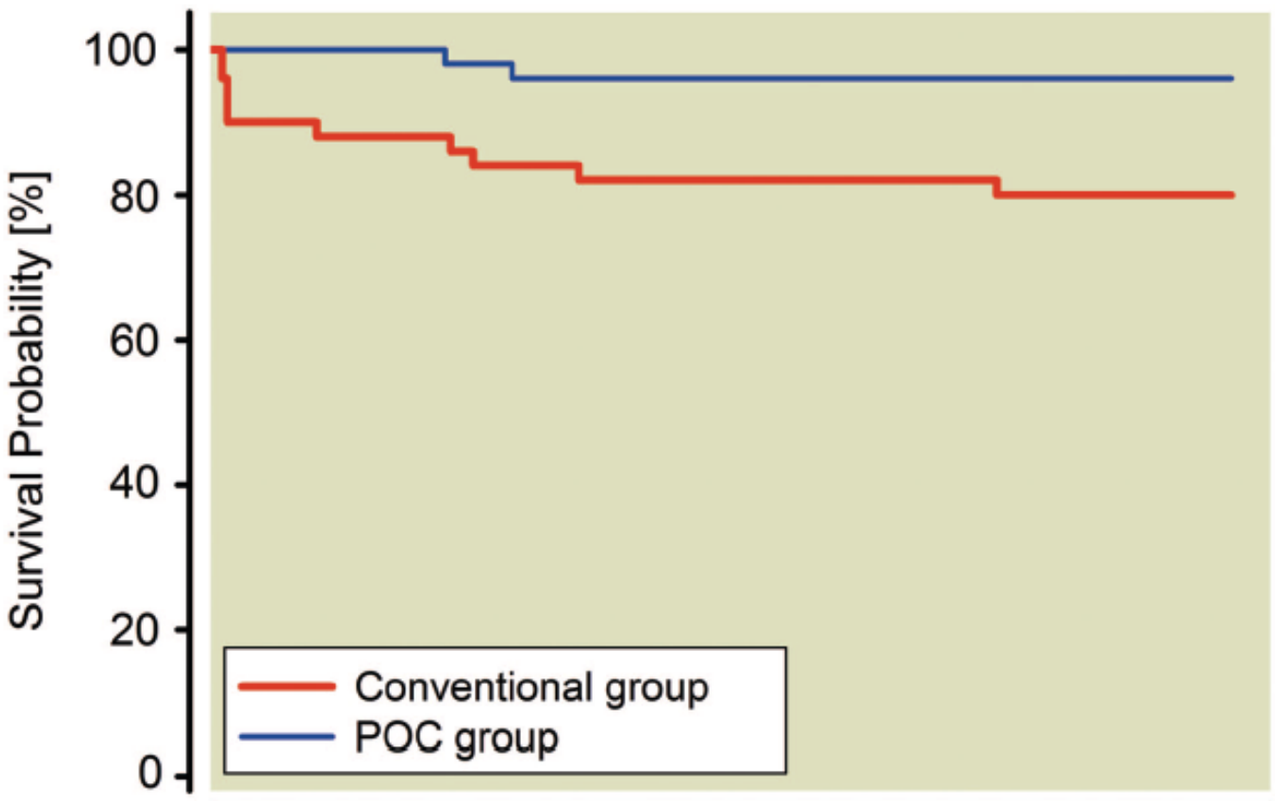


Table 6. Cumulative Costs of Transfused Allogenic Blood Products, Hemostatic Therapy (Including Coagulation Factor Concentrates), and Costs of Performed POC Analyses

	Conventional Group	POC Group
Allogenic blood products	—	—
Packed erythrocytes [72 €/U]	18,648	13,176
FFP [0.162 €/g]	13,530	4,665
PC [231 €/U]	28,755	15,123
Other hemostatic therapy	—	—
Desmopressin [3.3 €/μg]	3,128	3,412
Fibrinogen [233 €/g]	35,882	27,727
PCC [114 €/600 IU]	10,944	6,726
rVIIa [2,784 €/240 kIU]	44,544	5,568
Total blood products and hemostatic therapy	155,431	76,397
Expendable materials	—	—
POC Diagnostics		
ROTEM®	—	4,093
Multiplate®	—	2,427
Cumulative [€]	155,431	82,918
Mean costs per patient [€]	3,109	1,658

Weber et al, Anaesthesiology 117 (3) 531 Sept 2012

Summary

Slow but steady increase in the number and quality of clinical trials that show POC in cardiac surgical patients might be of benefit

POC changes transfusion therapy

Summary

Accurate, reproducible

Quality control, maintenance program

Training program and log

Incorporated in to clinical record