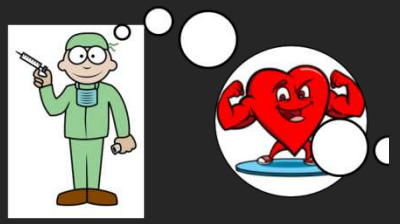
Hemodynamická optimalizace

pohledem perioperačního procesu

Beneš Jan

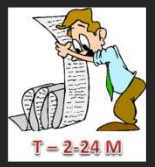
Klinika anesteziologie, resuscitace a intenzivní medicíny,
Fakultní nemocnice a Lékařská Fakulta v Plzni Univerzity Karlovy v Praze




T

T – 2/4 dny

T



T – 2-24 M

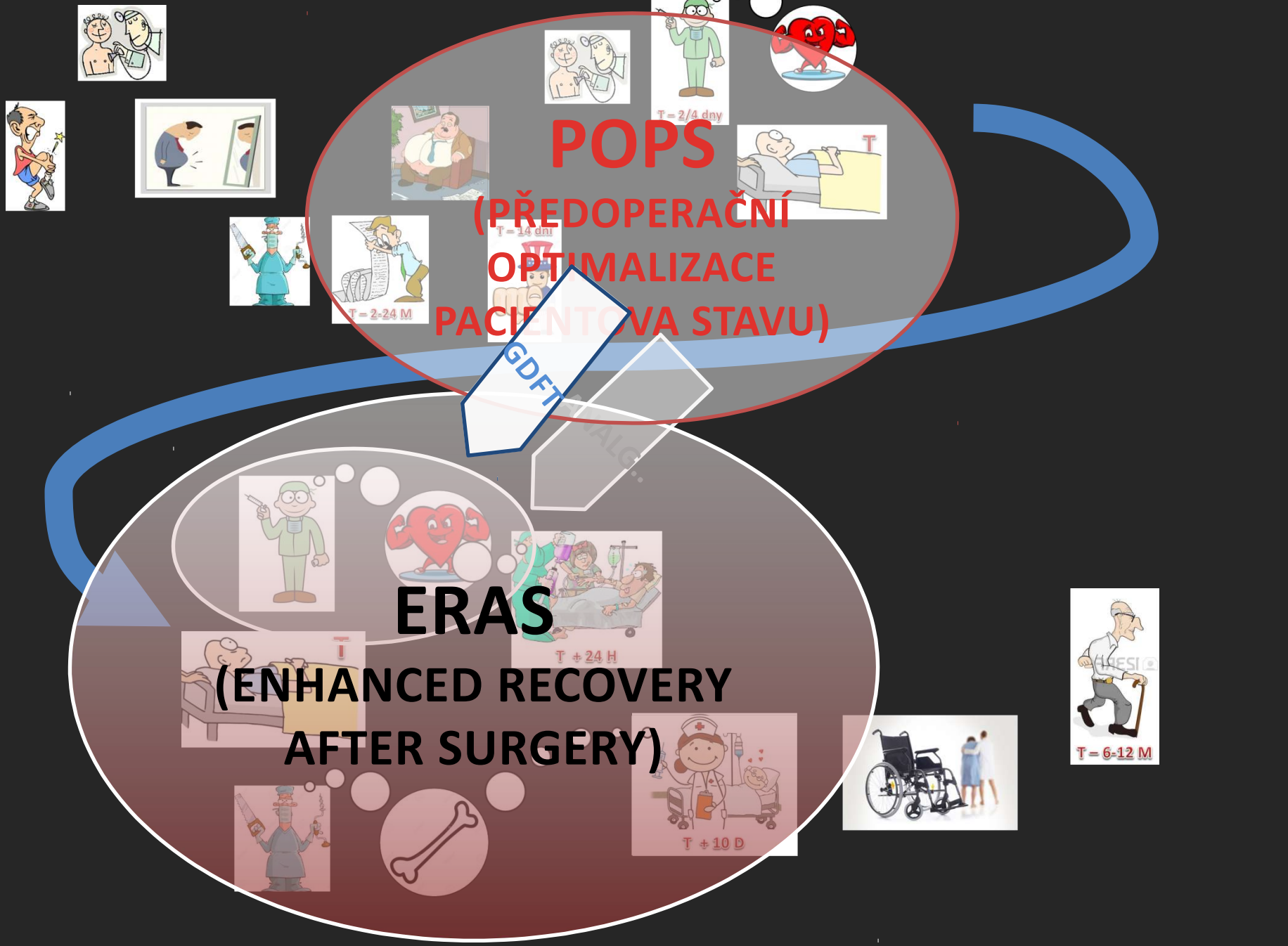
T – 14 dní

T + 24 H

T

T + 10 D

T – 6-12 M


POPS
(PŘEDOPERAČNÍ
OPTIMALIZACE
PACIENTOVA STAVU)
GDFT
ERAS
(ENHANCED RECOVERY
AFTER SURGERY)
T = 2/4 dny
T = 14 dní
T = 2-24 M
T + 24 H
T + 10 D
T = 6-12 M

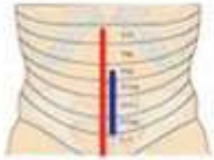
Colorectal ERAS Perioperative Components

Preoperative Timeline

No Food after MN

Clears PO up to 2h before surgery

Take 1-2 hours before surgery



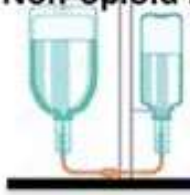
TEC or TAP depending on incision

Initial PONV Prophylaxis (scopolamine patch)

To OR

Intraoperative Components

Non-opioid Maximodal Analgesia



Lidocaine infusion
Ketamine infusion
Ketorolac IV
Run TEC if present

PONV Prophylaxis
Modalities=
Risk Factors

NO BUGS to Avoid SSI

GDFT

✔GDFT

Normal Saline

NoGT

Postoperative Components

Fluid Balance

24h Lido infusion

Scheduled

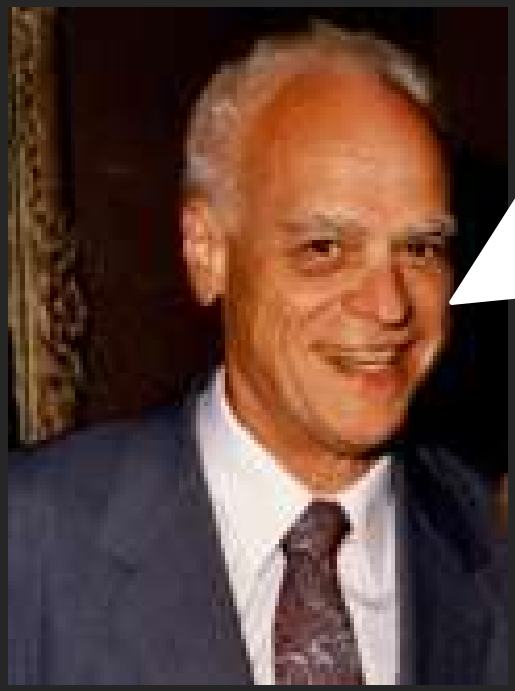
Non-opioid Maximodal Analgesia

Early Milestones

Goal-Directed D/C
Goal LOS ≤ 3d

Enhanced Surgical Recovery program

BACK TO THE 80s



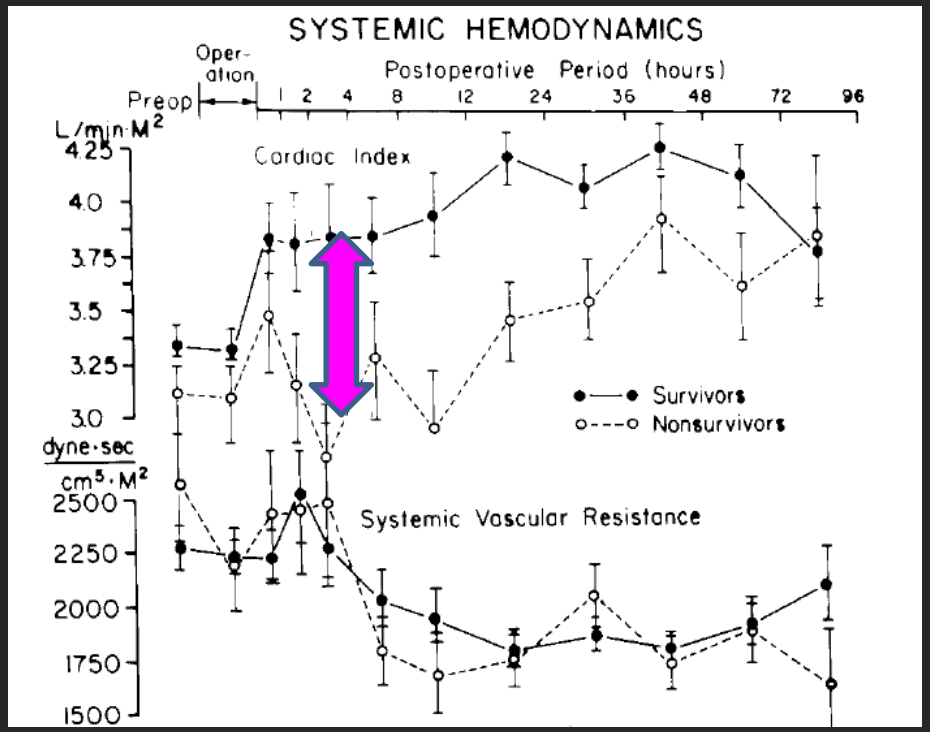
Postoperative deaths may be due to anatomic problems including surgical technical errors, judgment errors and the severity of the patients' illness as well as inadequate physiologic compensations. It follows that therapeutic goals include surgical correction of the anatomic problems, followed by supplementation of those physiologic compensations that are determinants of survival. Thus, the physiologic goals of therapy are not the normal values of unstressed, healthy volunteer subjects, but rather the values of survivors of a life-threatening surgical illness.[17]

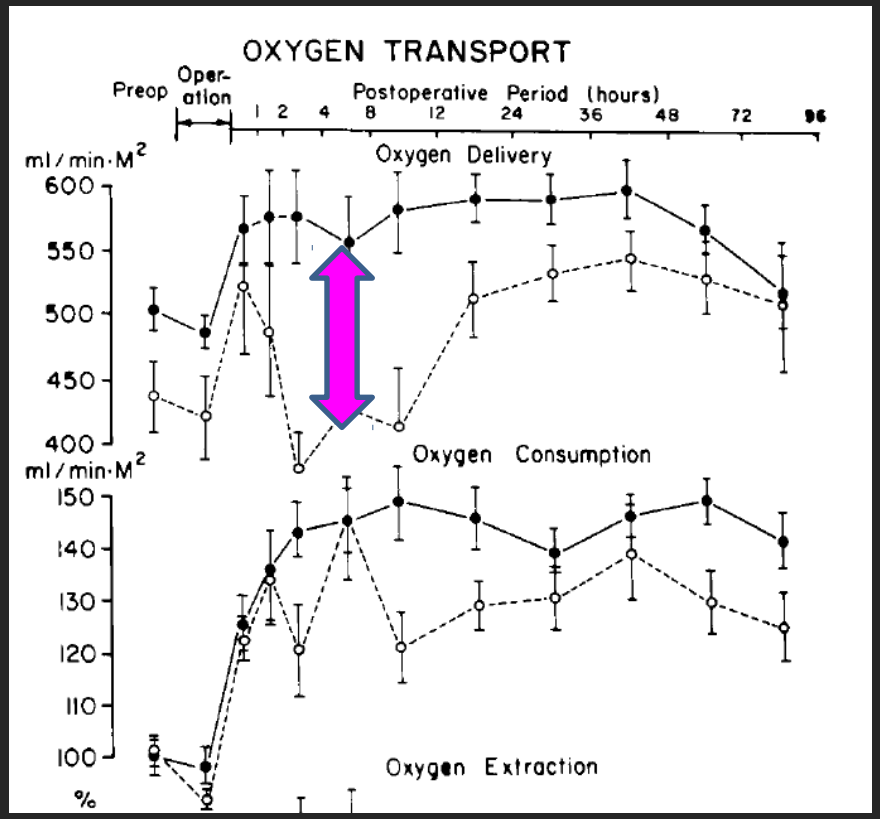
0090-3493/85/1302-0085$02.00/0
CRITICAL CARE MEDICINE

Vol. 13, No. 2
Printed in U.S.A.

Hemodynamic and oxygen transport patterns in surviving and nonsurviving postoperative patients

RICHARD D. BLAND, MD; WILLIAM C. SHOEMAKER, MD; EDWARD ABRAHAM, MD; JUAN CARLOS COBO, MD



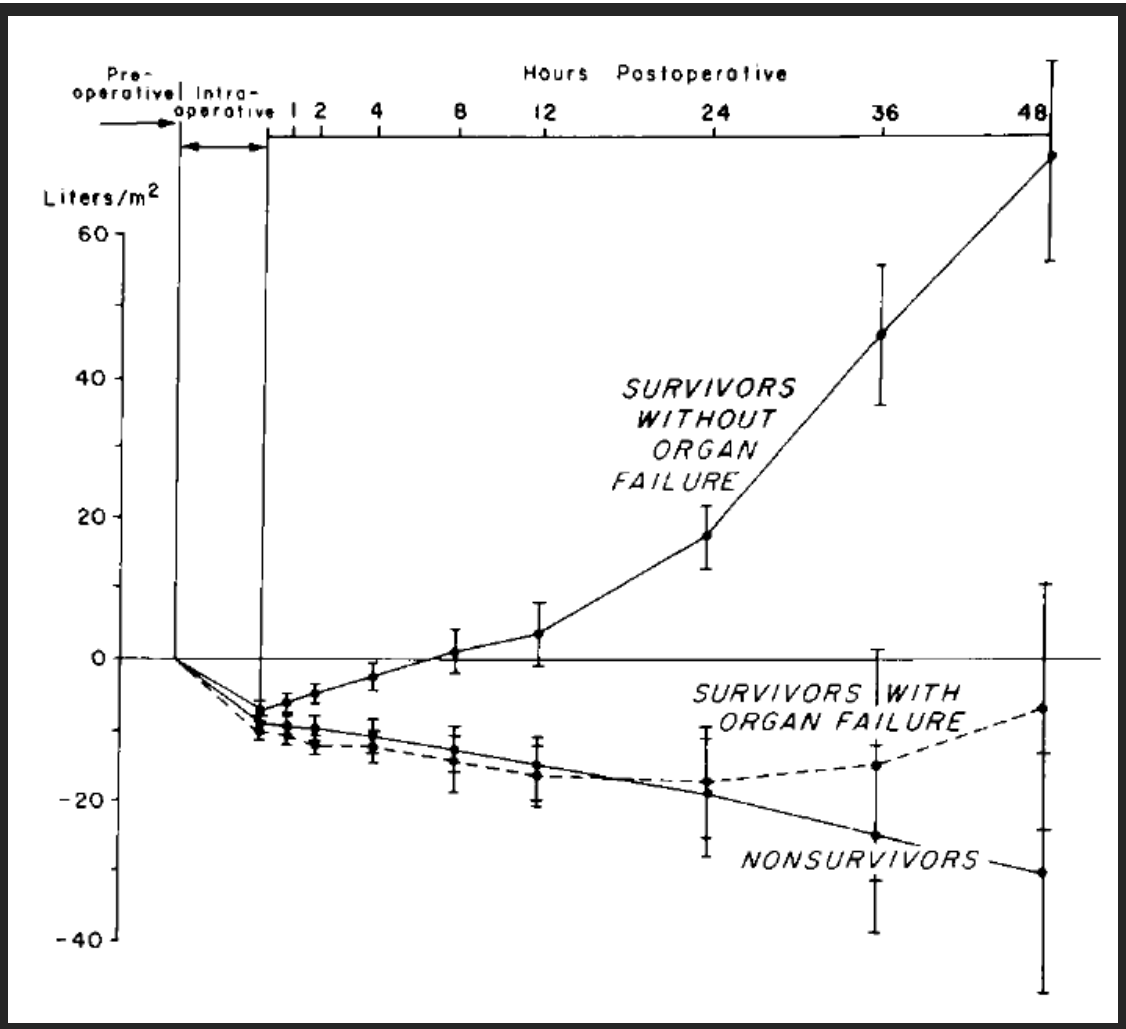


0090-3493/88/1611-1117$02.00/0
CRITICAL CARE MEDICINE

Vol. 16, No. 11
Printed in U.S.A.

Tissue oxygen debt as a determinant of lethal and nonlethal postoperative organ failure

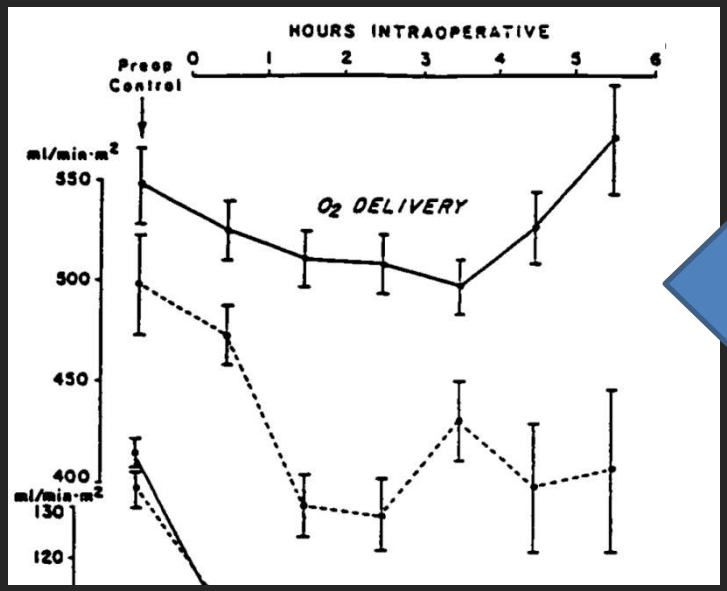
WILLIAM C. SHOEMAKER, MD; PAUL L. APPEL, MPA; HARRY B. KRAM, MD



Prospective Trial of Supranormal Values of Survivors as Therapeutic Goals in High-Risk Surgical Patients*

William C. Shoemaker, M.D.; Paul L. Appel, M.P.A.; Harry B. Kram, M.D.; Kenneth Waxman, M.D.; and Tai-Shion Lee, M.D., F.C.C.P.

(Chest 1988; 94:1176-86)



DO_2I 600 ml/min/m²

CI 4,5 l/min/m²

VO_2I 170 ml/min/m²

Prospective Trial of Supranormal Values of Survivors as Therapeutic Goals in High-Risk Surgical Patients*

William C. Shoemaker, M.D.; Paul L. Appel, M.P.A.; Harry B. Kram, M.D.; Kenneth Waxman, M.D.; and Tai-Shion Lee, M.D., F.C.C.P.

(Chest 1988; 94:1176-86)

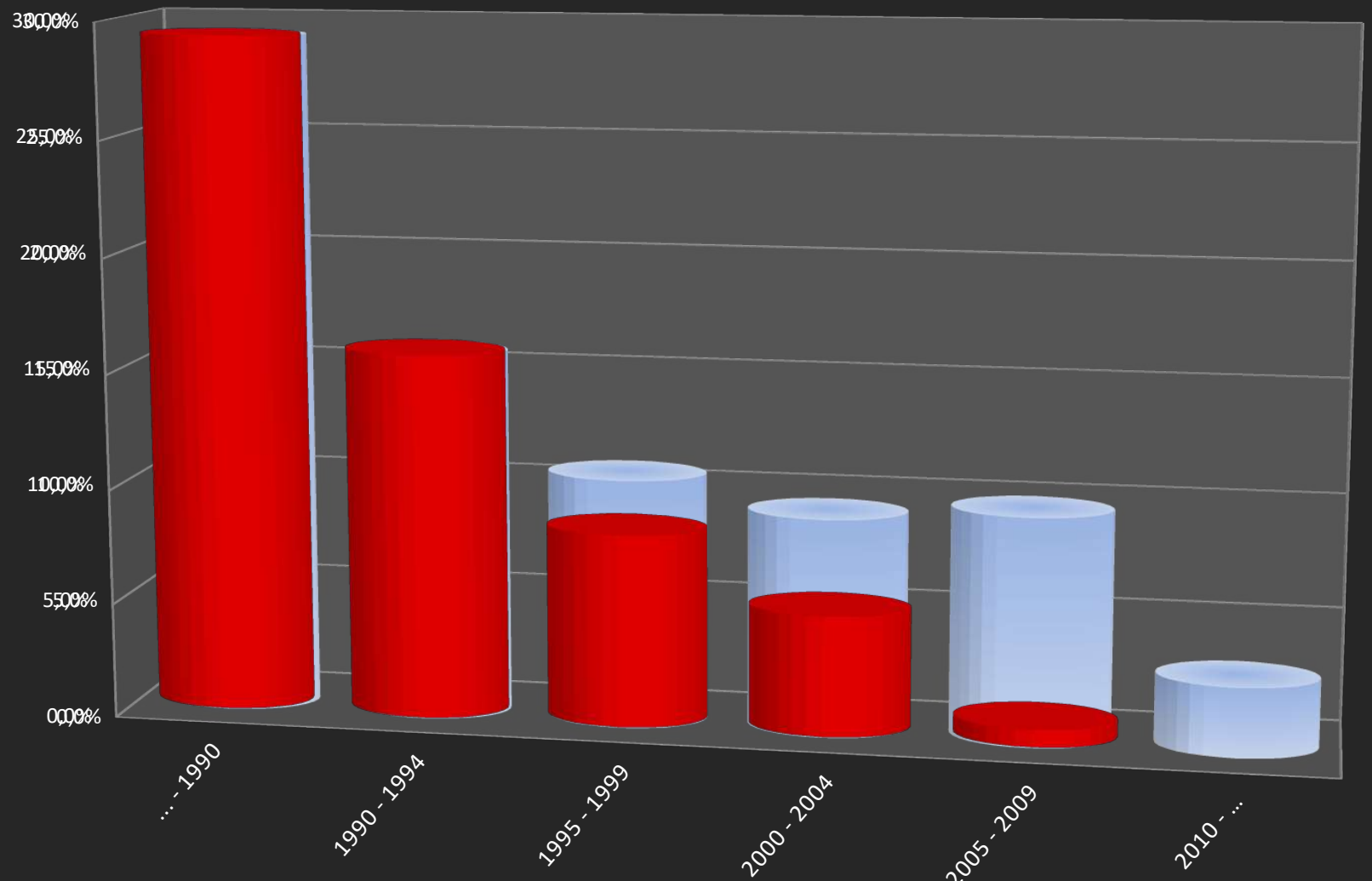
Table 9—*Summary of Mortality of the Prospective Series*

		Control		Protocol	
Series	Date	Number	Deaths	Number	Deaths, %
Series 1	1/78-6/80	168	57 (34%)	108	21 (19%)
Control period between trials	6/80-5/83	239	66 (28%)	. . .	. . .
Series 2	5/83-5/84	105	34 (32%)	28	1 (4%)
Control period after trials	5/84-5/85	160	40 (25%)	. . .	. . .
Total		672	197 (29%)	136	22 (16%)

Shoemaker W., 1988

Swan-Ganz catheter

GDT NENÍ (JEN) PAC ?




PLUG
&
PLAY

Shoemaker W., 1988

Lobo S., 2006

Swan-Ganz catheter

Mythen M., 1995

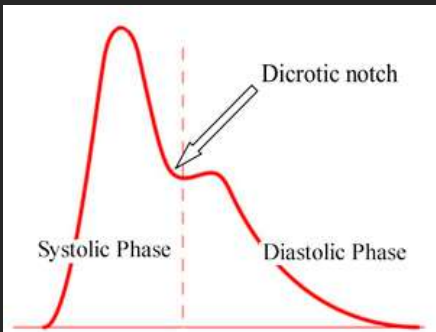
Chytra I., 2007

Esophageal Doppler

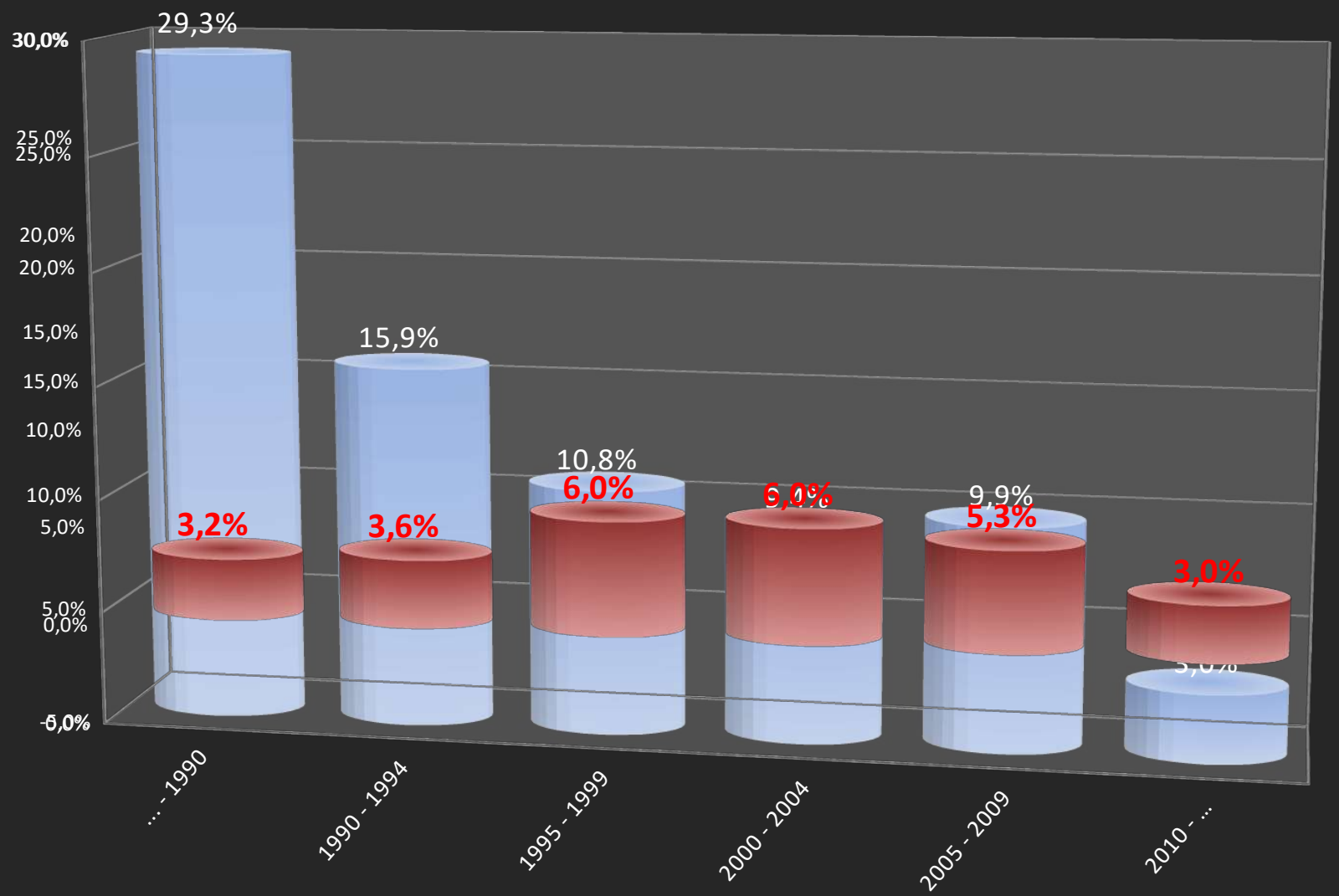
Lopes M., 2007

Pearse R., 2005

Arterial Wave analysis

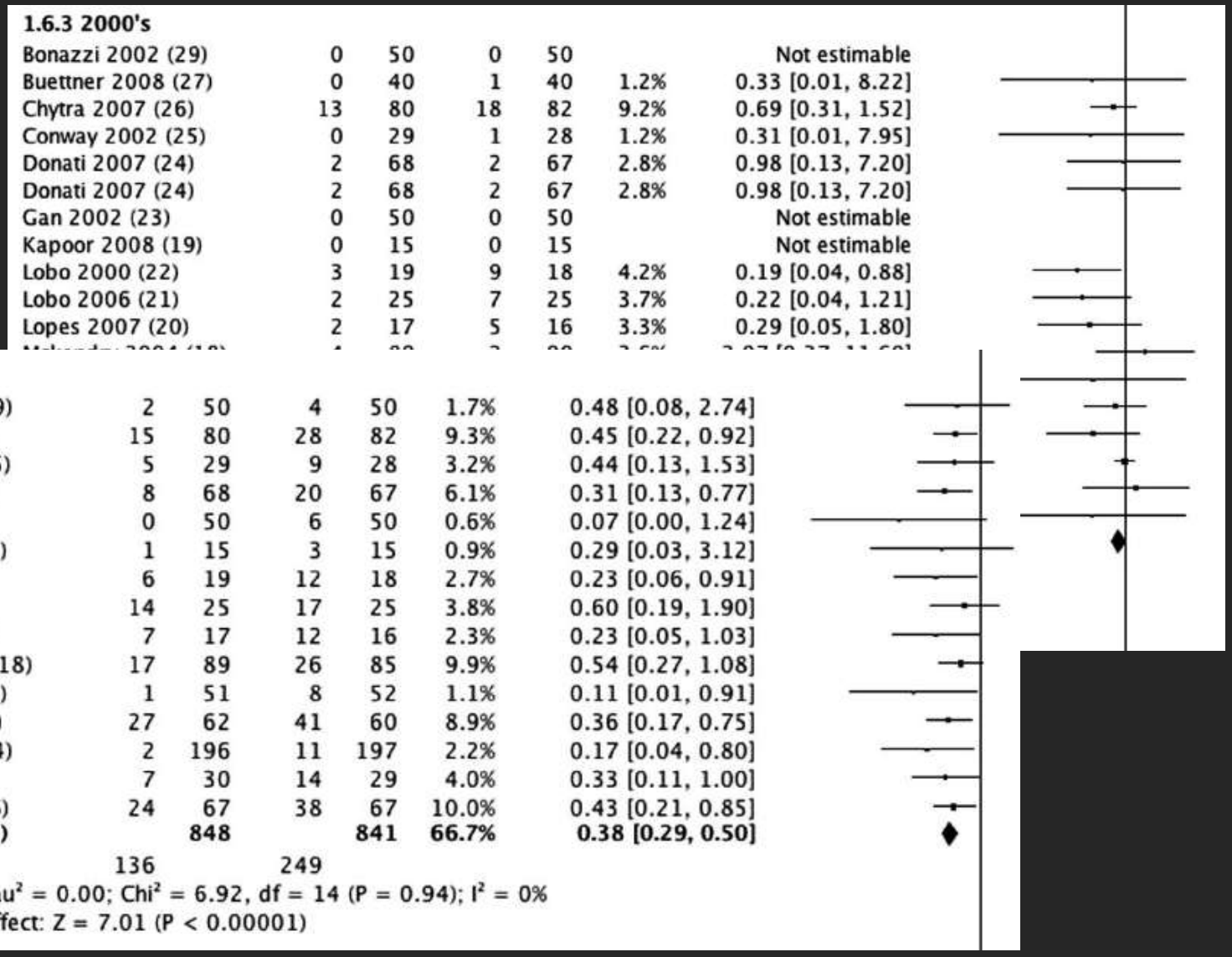


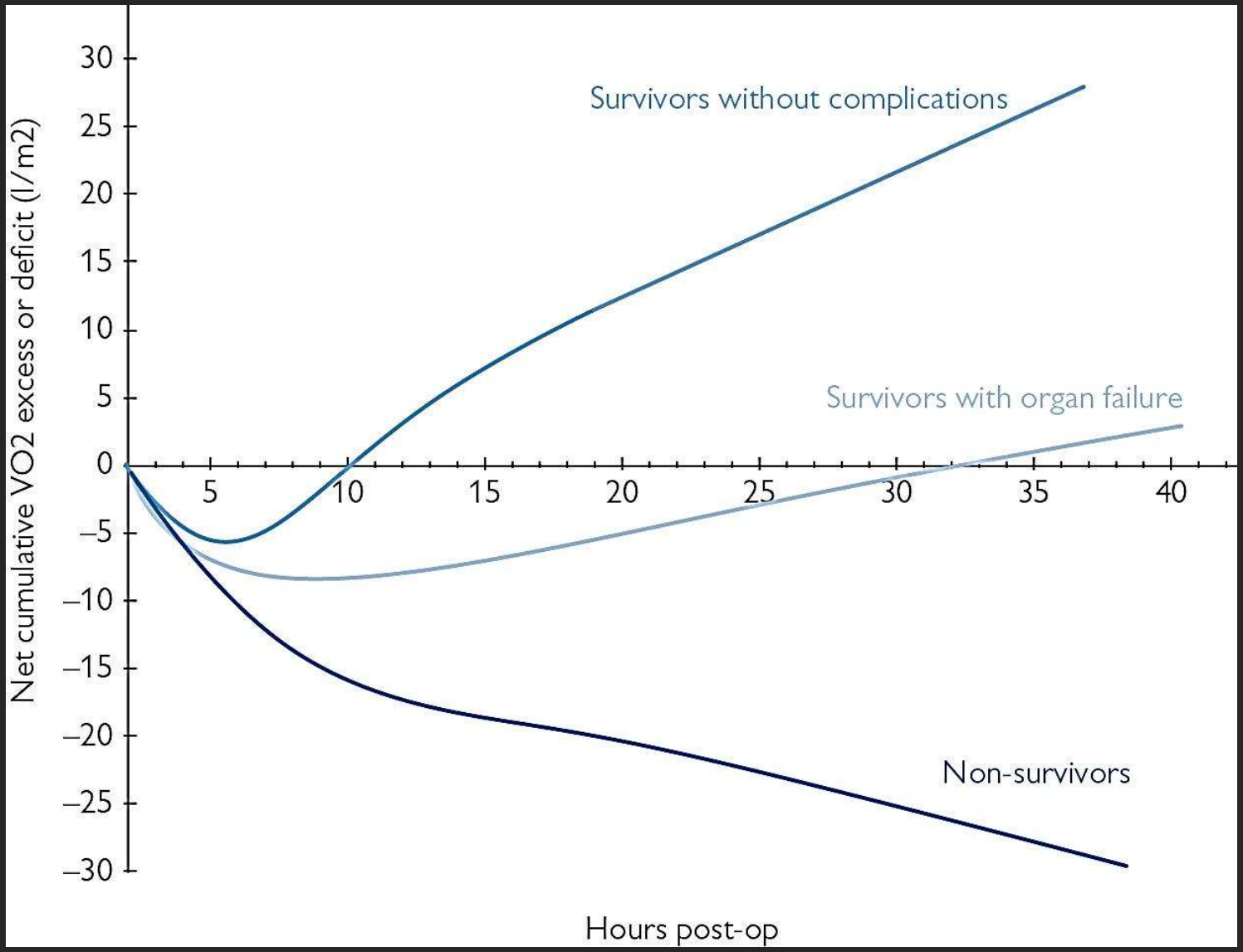
VÝVOJ MORTALITY v pGDT studiích



A Systematic Review and Meta-Analysis on the Use of Preemptive Hemodynamic Intervention to Improve Postoperative Outcomes in Moderate and High-Risk Surgical Patients

Mark A. Hamilton, MRCP, FRCA, Maurizio Cecconi, MD, and Andrew Rhodes, FRCP, FRCA




Survivors without complications
Survivors with organ failure
Non-survivors
Net cumulative VO2 excess or deficit (l/m2)
Hours post-op
30
25
20
15
10
5
0
–5
–10
–15
–20
–25
–30
5
10
15
20
25
30
35
40

Determinants of Long-Term Survival After Major Surgery and the Adverse Effect of Postoperative Complications

(*Ann Surg* 2005;242: 326–343)

Shukri F. Khuri, MD,†‡ William G. Henderson, PhD,§ Ralph G. DePalma, MD,¶ Cecilia Mosca, MSPH,§ Nancy A. Healey, BS,* Dharam J. Kumbhani, MD, SM,* and the Participants in the VA National Surgical Quality Improvement Program*

Methods: NSQIP data were merged with BIRLS to determine the vital status of 105,951 patients who underwent 8 types of operations performed between 1991 and 1999, providing an average follow up of 8 years. Logistic and Cox regression analyses were performed to identify the predictors of 30-day mortality and long-term survival, respectively.

Results: The most important determinant of decreased postoperative survival was the occurrence, within 30 days postoperatively, of any one of 22 types of complications collected in the NSQIP. *Independent of preoperative patient risk*, the occurrence of a 30-day complication in the total patient group reduced median patient survival by 69%. The adverse effect of a complication on patient survival

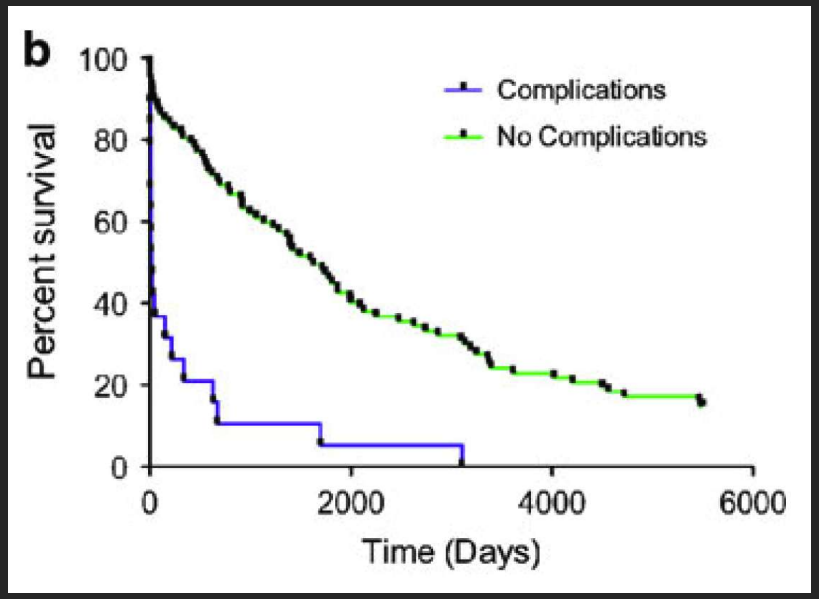
Intensive Care Med (2010) 36:1327–1332
DOI 10.1007/s00134-010-1869-6

ORIGINAL

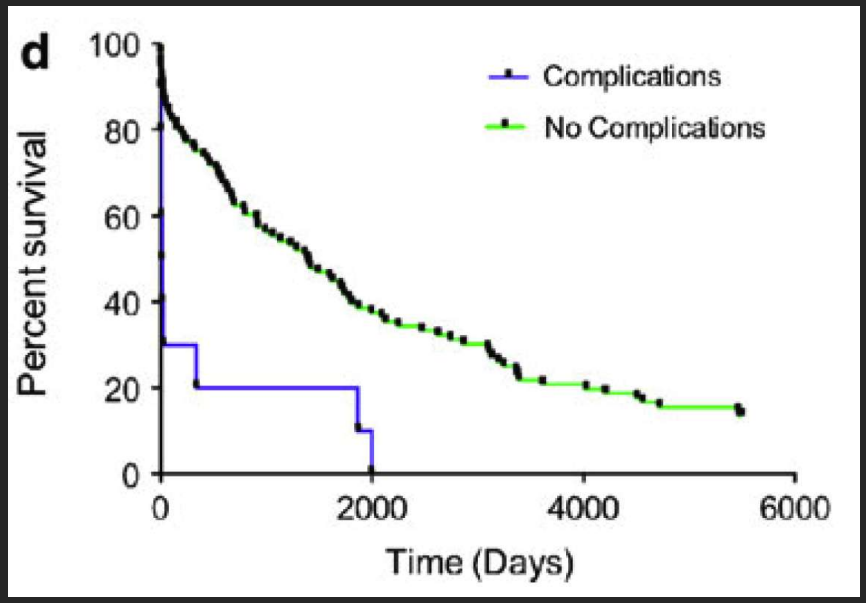
Andrew Rhodes
Maurizio Cecconi
Mark Hamilton
Jan Poloniecki
Justin Woods
Owen Boyd
David Bennett
R. Michael Grounds

Goal-directed therapy in high-risk surgical patients: a 15-year follow-up study

Srdeční komplikace



Renální komplikace



Review

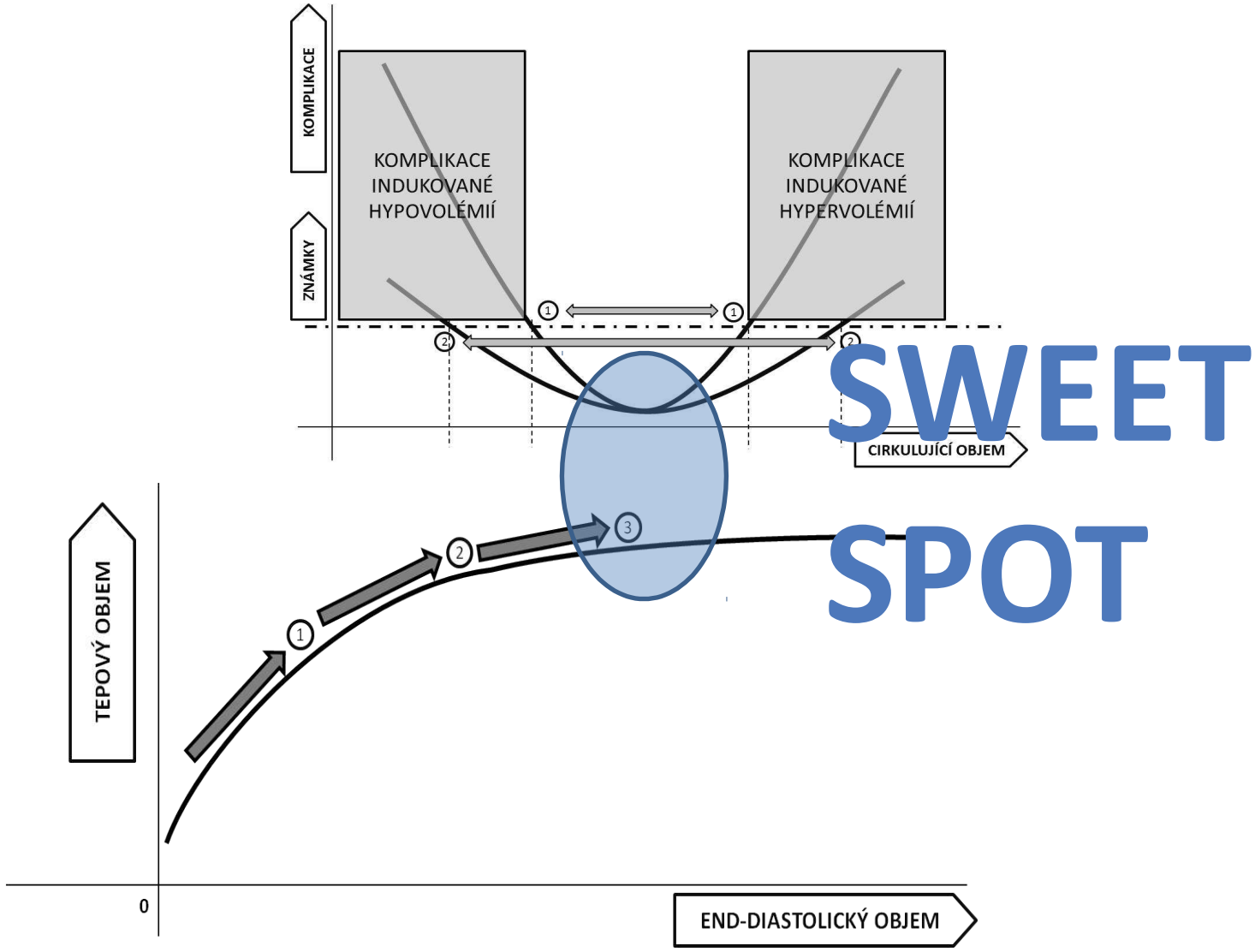
Clinical review: Goal-directed therapy in high risk surgical patients

Critical Care 2009, 13:231 (doi:10.1186/cc8039)

Nicholas Lees, Mark Hamilton and Andrew Rhodes

1. **Vyhledat OPTIMÁLNÍ INTRAVASKULÁRNÍ OBJEM !**
2. **Zajistit dostatečnou globální DODÁVKU KYSLÍKU !**
3. **Sledovat a reagovat na známky poruchy ORGÁNOVÉ PERFUZE !**

Optimální cíl tekutinové léčby



ORIGINAL ARTICLE

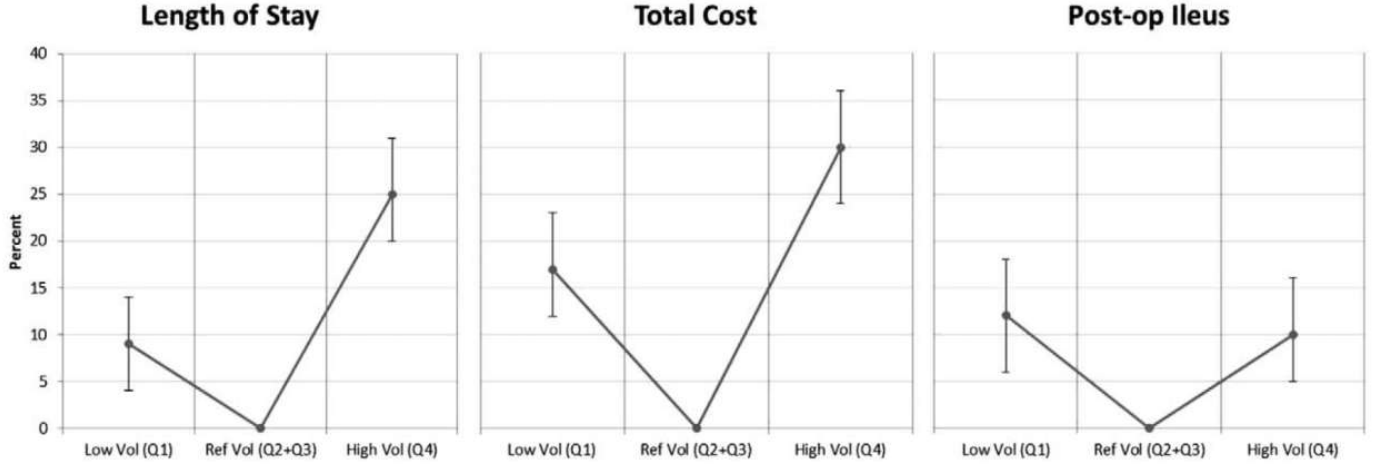
Perioperative Fluid Utilization Variability and Association With Outcomes

Considerations for Enhanced Recovery Efforts in Sample US Surgical Populations

Julie K. M. Thacker, MD, William K. Mountford, PhD,† Frank R. Ernst, PharmD, MS,‡ Michelle R. Krukas, MA,‡ and Michael (Monty) G. Mythen, MBBS, MD, FRCA, FFICM, FCAI (Hon)§*

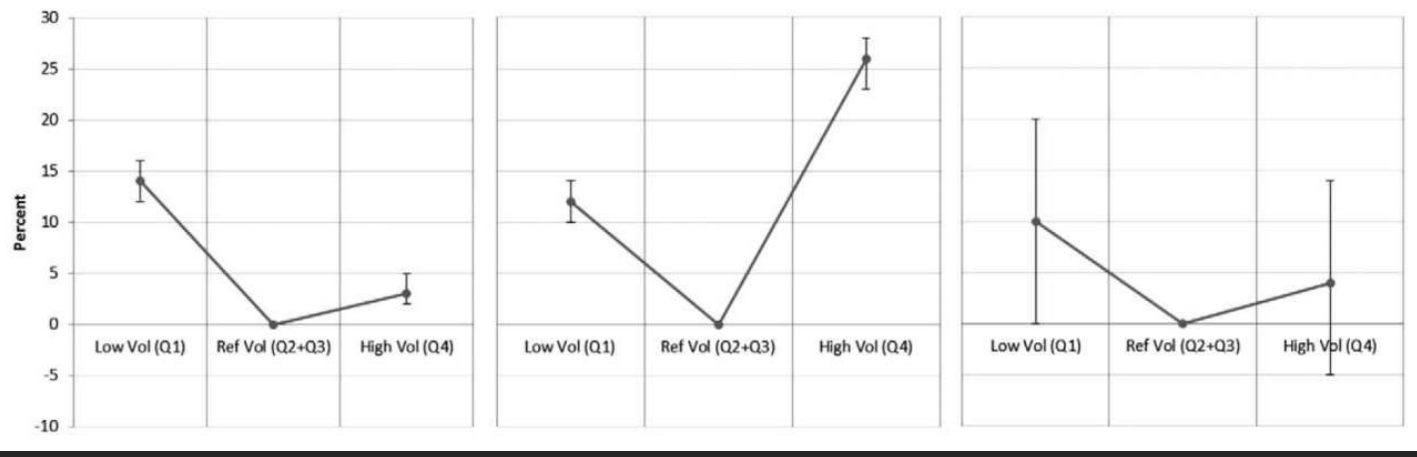
84 722 pts

Colon Surgery

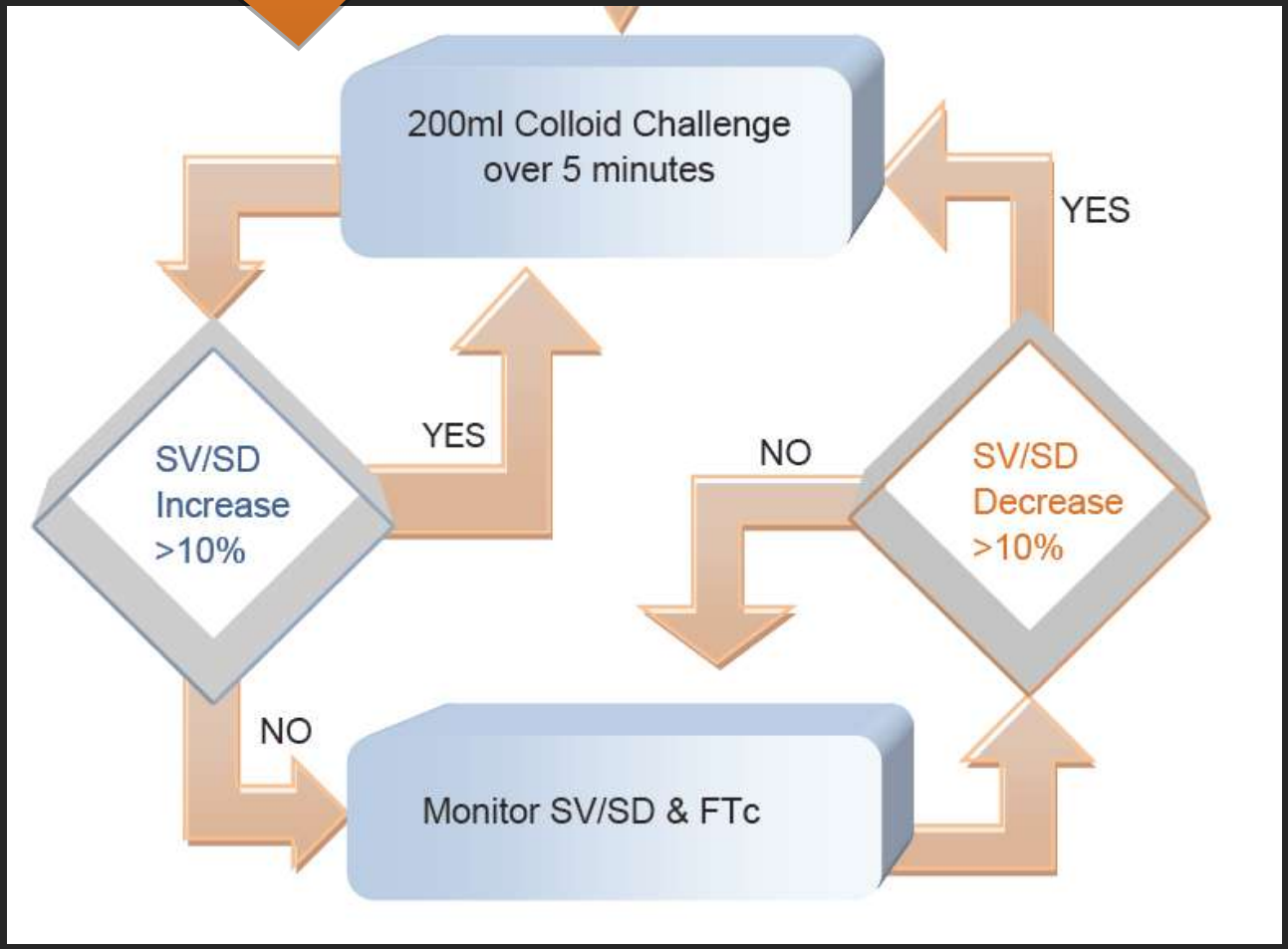


548 526 pts

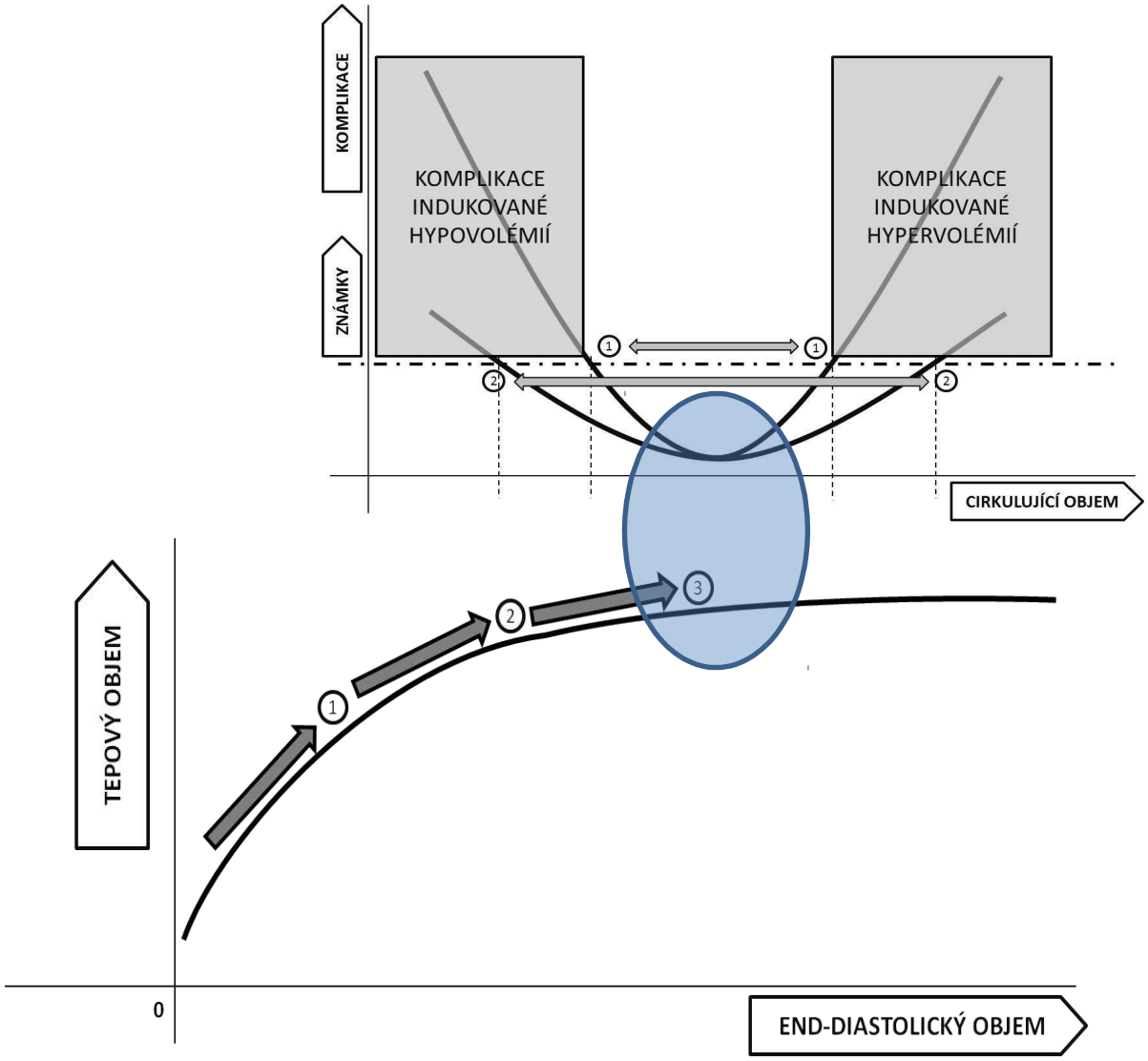
Hip/Knee Surgery



Optimalizace SV



Optimální cíl tekutinové léčby



Review

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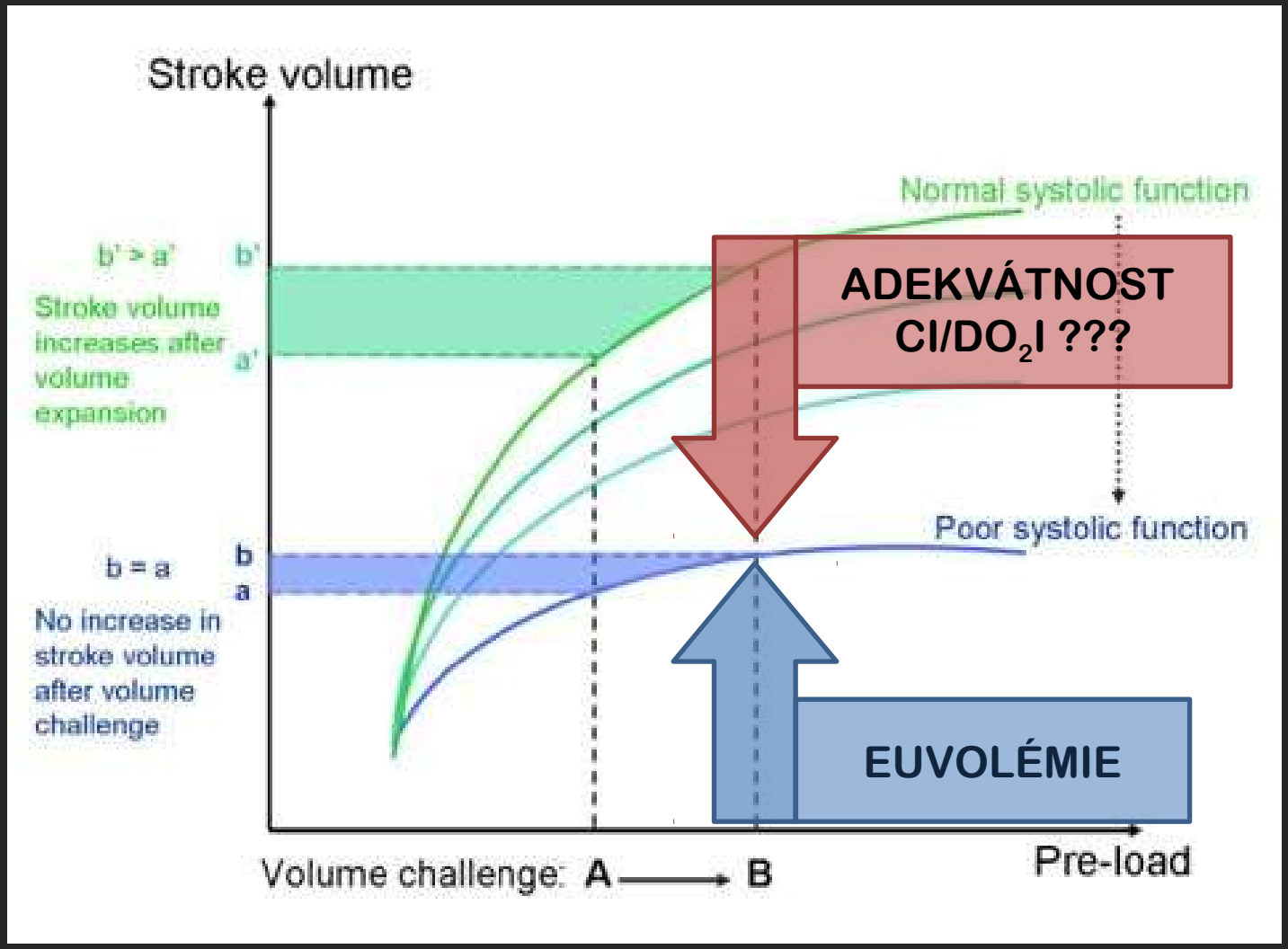
3. **Sledovat a reagovat na známky poruchy ORGÁNOVÉ PERFUZE !**

Dosažení adekvátní dodávky kyslíku




you only
see what
your eyes
want
to see

Cannesson et al. Critical Care 2011, 15:R197
http://ccforum.com/content/15/4/R197

CRITICAL CARE

RESEARCH Open Access

Hemodynamic monitoring and management in patients undergoing high risk surgery: a survey among North American and European anesthesiologists

Maxime Cannesson[1*], Gunther Pestel[2], Cameron Ricks[1], Andreas Hoeft[3] and Azriel Perel[4]

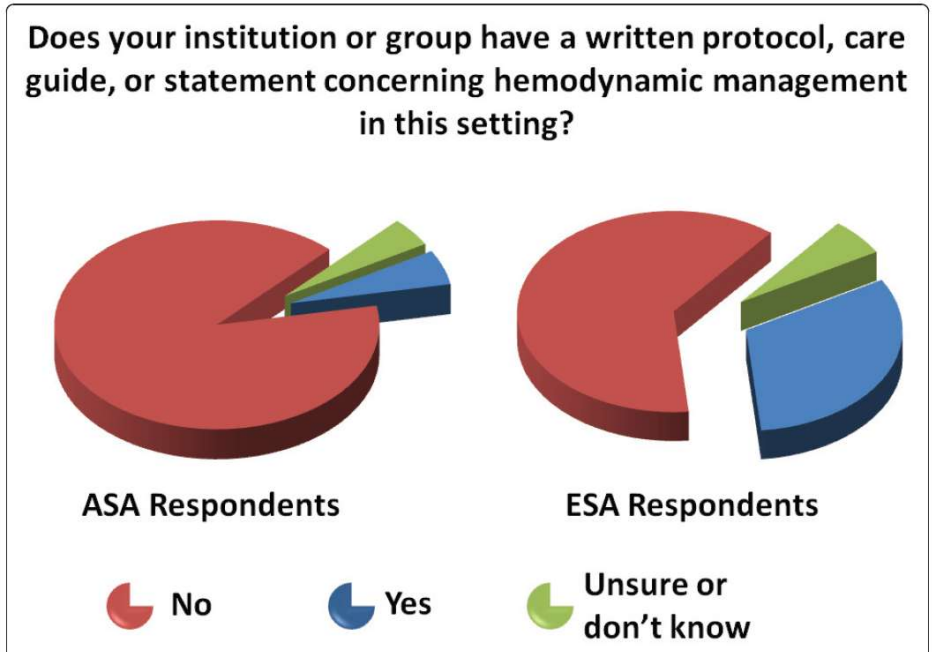


Figure 2 Incidence of institutional guidelines concerning hemodynamic management in this setting?

Cannesson et al. Critical Care 2011, 15:R197
http://ccforum.com/content/15/4/R197

CRITICAL CARE

RESEARCH Open Access

Hemodynamic monitoring and management in patients undergoing high risk surgery: a survey among North American and European anesthesiologists

Maxime Cannesson[1*], Gunther Pestel[2], Cameron Ricks[1], Andreas Hoeft[3] and Azriel Perel[4]

Table 3 What are your indicators for volume expansion in this setting (diagnostic tools)?

	ASA Respondents (*n* = 209)	ESA Respondents (*n* = 165)
Answer Options	**Response Percent**	**Response Percent**
Blood pressure	88.5%	77.6%
Urine output	83.3%	77.0%
Clinical experience	77.5%	64.8%
Central venous pressure	70.8%	64.2%
Cardiac output	49.3%	53.3%
Pulse Pressure Variation or Systolic Pressure Variation	45.0%	55.8%
Transesophageal echocardiography	43.5%	28.5%
Pulmonary capillary wedge pressure	38.8%	24.2%
Plethysmographic Waveform Variation	25.4%	25.5%
Stroke Volume Variation	19.1%	36.4%
Mixed venous saturation (ScvO2)	18.7%	21.8%
Global end diastolic volume	10.5%	17.0%
Central venous saturation (SvO2)	10.0%	34.5%

ASA, American society of anesthesiology respondents; ESA, European society of anaesthesiology respondents.

72%

Srinivasa et al. BMC Anesthesiology 2013, 13:5
http://www.biomedcentral.com/1471-2253/13/5

BMC Anesthesiology

RESEARCH ARTICLE Open Access

Goal-directed fluid therapy- a survey of anaesthetists in the UK, USA, Australia and New Zealand

Sanket Srinivasa[1*], Arman Kahokehr[1], Mattias Soop[2], Matthew Taylor[3] and Andrew

I NEVER DO !!!

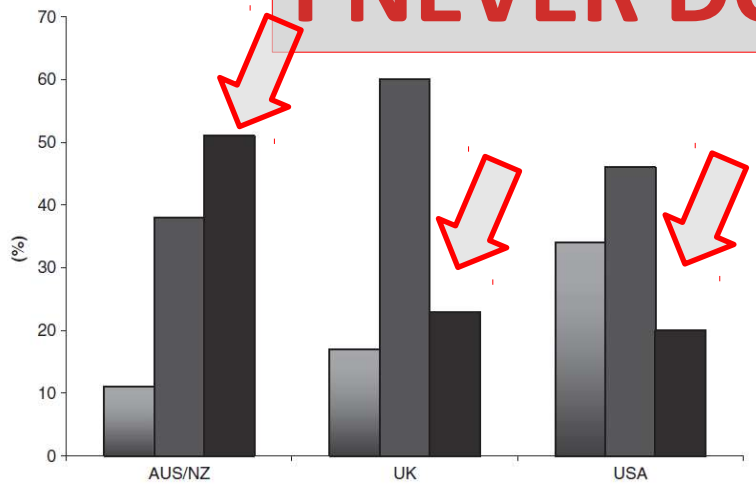


Figure 1 Do you use Goal-directed fluid th).
Always/Sometimes: USA vs. UK, p = 0.36; USA v

I´D LOVE TO …

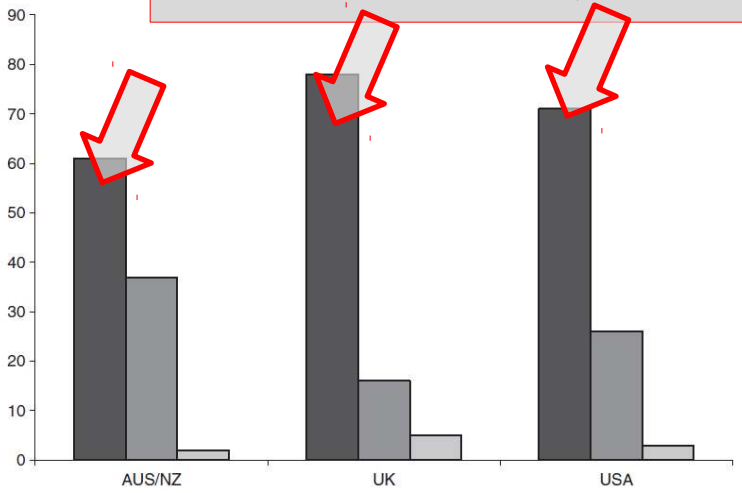


Figure 2 Would you like to use Goal-Directed Fluid Therapy? (Columns from left to right respectively: Yes/No/Undecided).

EVIDENCE

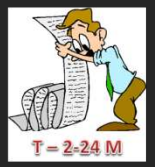
EXPERIENCE

Drahý přístroj
Drahý spotřebák
Extra práce

Snížení komplikací
Snížení mortality
Zkrácení hospitalizace

T – 2/4 dny

T



T – 2-24 M

T – 14 dní

T + 24 H

T

T + 10 D

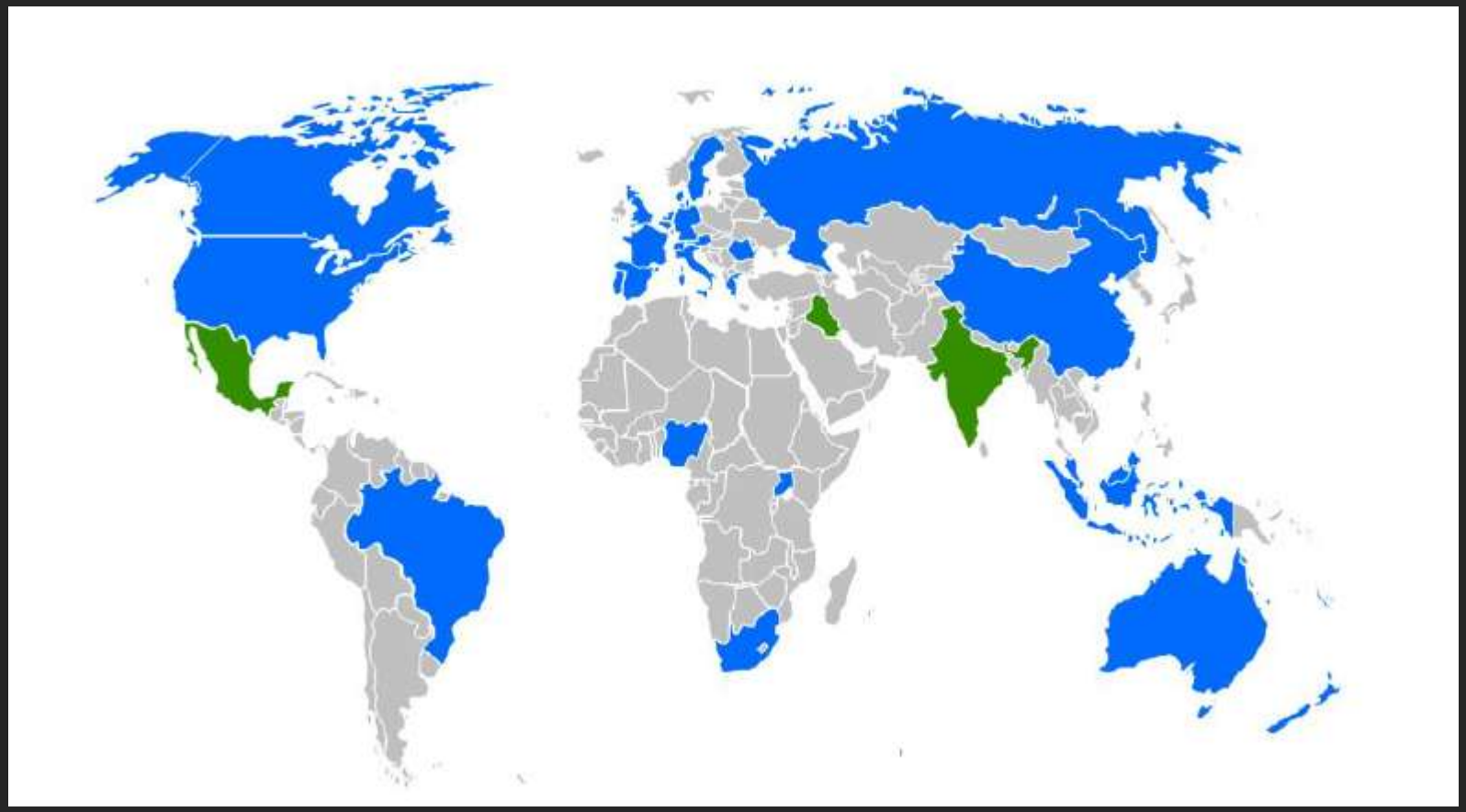
T – 6-12 M

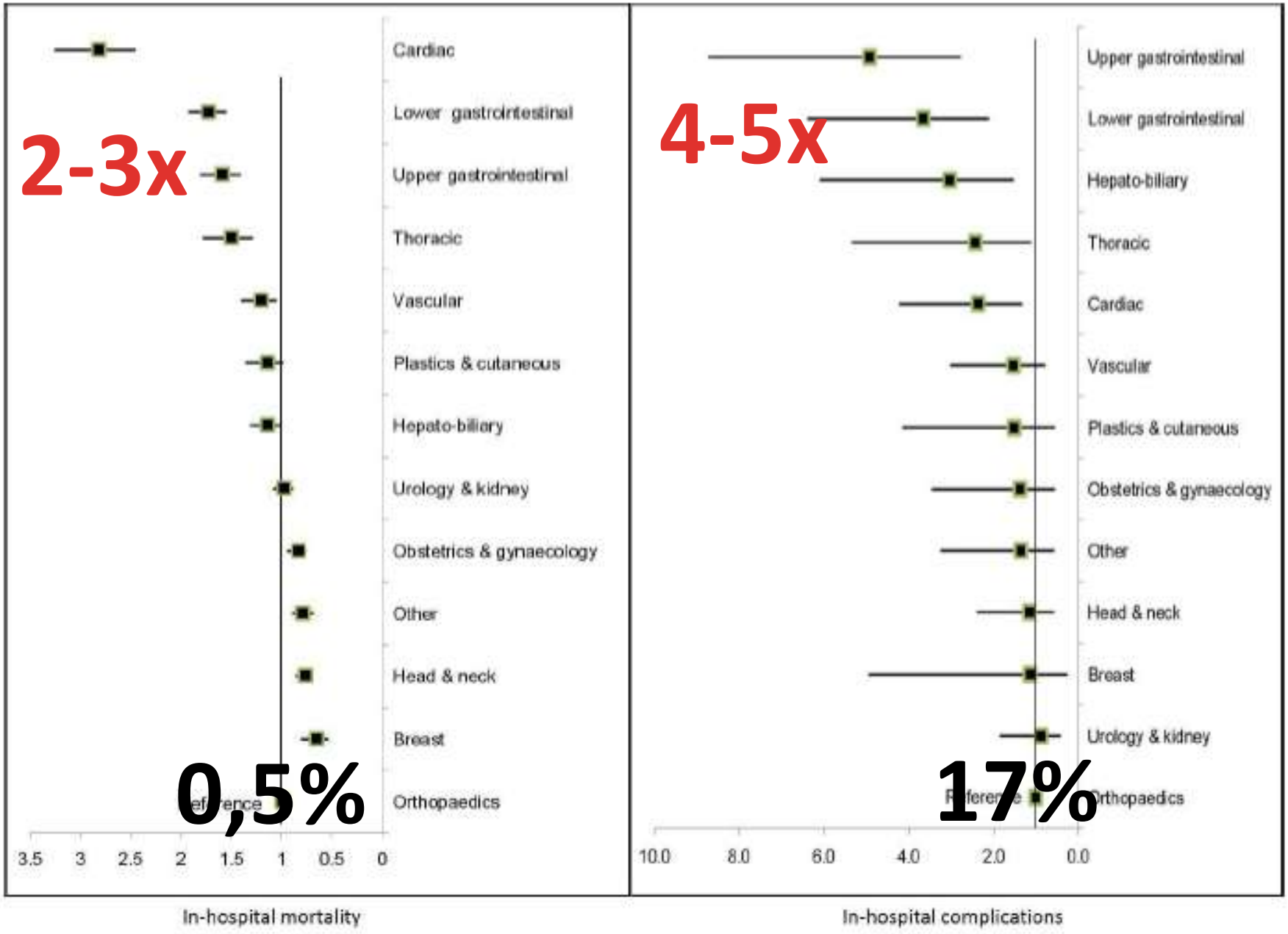
Global patient outcomes after elective surgery: Prospective cohort study in 27 low, middle and high income countries

Running title: Global patient outcomes after elective surgery

International Surgical Outcomes Study (ISOS) group*

44 814 pts




2-3x
Cardiac
Lower gastrointestinal
Upper gastrointestinal
Thoracic
Vascular
Plastics & cutaneous
Hepato-biliary
Urology & kidney
Obstetrics & gynaecology
Other
Head & neck
Breast
Orthopaedics
0,5%
3.5
3
2.5
2
1.5
1
0.5
0
In-hospital mortality
4-5x
Upper gastrointestinal
Lower gastrointestinal
Hepato-biliary
Thoracic
Cardiac
Vascular
Plastics & cutaneous
Obstetrics & gynaecology
Other
Head & neck
Breast
Urology & kidney
17%
10.0
8.0
6.0
4.0
2.0
0.0
In-hospital complications

Mortality after surgery in Europe: a 7 day cohort study

*Rupert M Pearse, Rui P Moreno, Peter Bauer, Paolo Pelosi, Philipp Metnitz, Claudia Spies, Benoit Vallet, Jean-Louis Vincent, Andreas Hoeft, Andrew Rhodes, for the European Surgical Outcomes Study (EuSOS) group for the Trials groups of the European Society of Intensive Care Medicine and the European Society of Anaesthesiology**

Lancet 2012; 380: 1059–65

	All patients (n=46 539)	Died in hospital (n=1864)	Survived to hospital discharge (n=44 657)	Odds ratio (95% CI)	p value
Age (years)	56·7 (18·5)	61·0 (18·7)	56·6 (18·5)	1·01 (1·01–1·02)	<0·0001
Men	22 607	968	21 629	1·15 (1·05–1·26)	0·003
Present smoker	9872	363	9503	0·90 (0·80–-1·01)	0·07
ASA score					
1	11 642	362	11 280	Reference	..
2	21 582	633	20 944	0·94 (0·83–1·07)	0·36
3	11 574	539	11 025	1·51 (1·32–1·73)	<0·0001
Minor	12 041	431	11 608	Reference	..
Intermediate	22 231	741	21 483	0·93 (0·82–1·05)	0·22
Major	12 170	685	11 476	1·59 (1·40–1·80)	<0·0001
Urgency of surgery					
Elective	35 049	1129	33 908	Reference	..

ASA 4 3,5% 18%
ASA 5 54%

Emergency 5,5% 10%

Mortality after surgery in Europe: a 7 day cohort study

*Rupert M Pearse, Rui P Moreno, Peter Bauer, Paolo Pelosi, Philipp Metnitz, Claudia Spies, Benoit Vallet, Jean-Louis Vincent, Andreas Hoeft, Andrew Rhodes, for the European Surgical Outcomes Study (EuSOS) group for the Trials groups of the European Society of Intensive Care Medicine and the European Society of Anaesthesiology**

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ASA score					
1	11 642	362	11 280	Reference	..
2	21 582	633	20 944	0·94 (0·83–1·07)	0·36
5	90	49	41	35·61 (23·23–54·59)	<0·0001
Grade of surgery					
Minor	12 041	431	11 608	Reference	..
Intermediate	22 231	741	21 483	0·93 (0·82–1·05)	0·22
Elective	35 049	1129	33 908	Reference	..

ASA 3 25% 5%

Major 26% 6%

Urgent 19% 5%

Intensive Care Med
DOI 10.1007/s00134-017-4703-6

WHAT'S NEW IN INTENSIVE CARE

Intensive care medicine in 2050: perioperative critical care

Zsolt Molnár[1*], Jan Benes[2,3] and Daniel A. Reuter[4]

BUDOUCNOST VYPADÁ DOST NEINVAZIVNĚ…

Shoemaker W., 1988

Lobo S., 2006

Swan-Ganz catheter

Mythen M., 1995

Challand, 2012

Esophageal Doppler

Pearse R., 2005

Salzwedel, 2013

Arterial Wave analysis

Forget, 2010

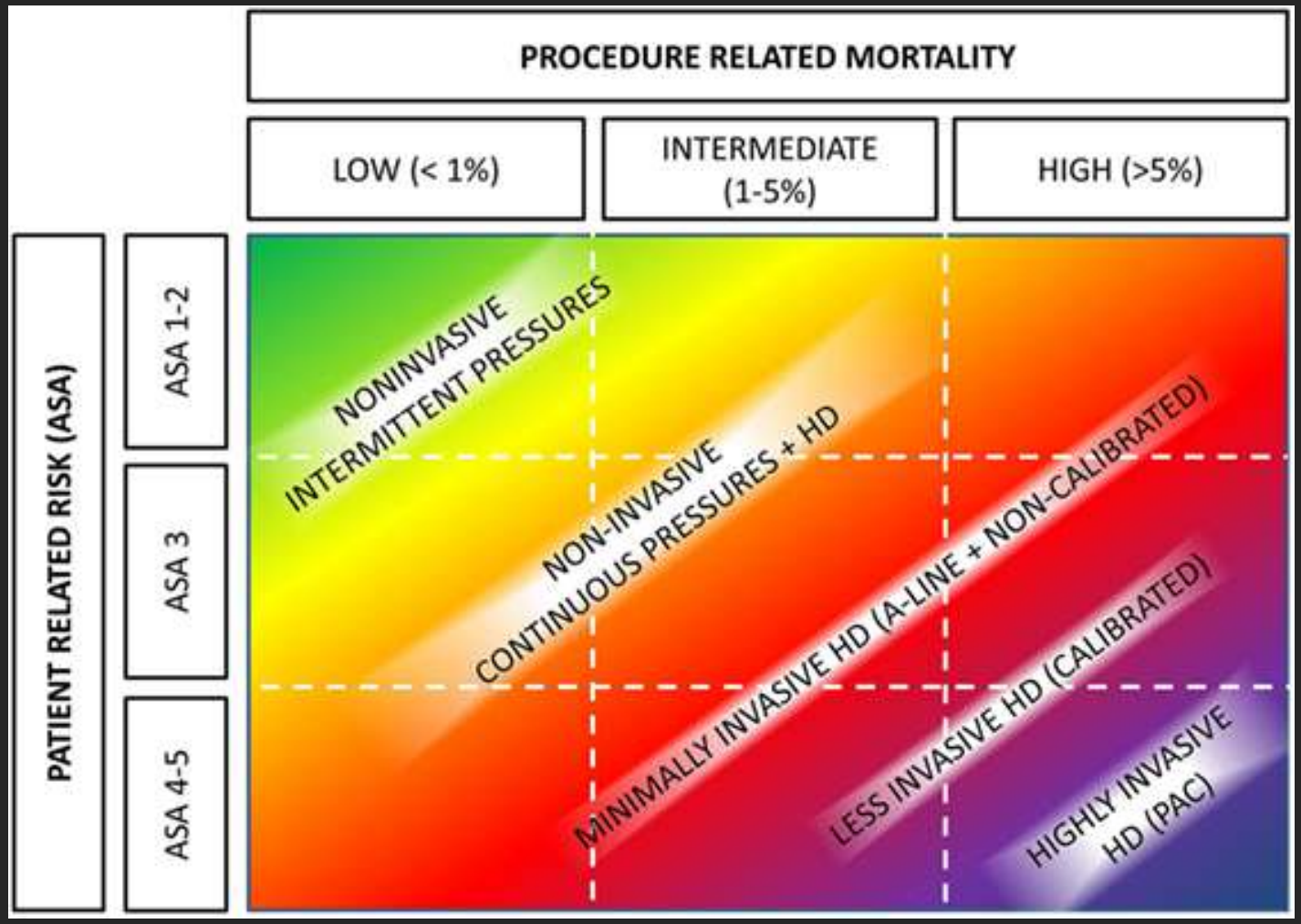
NON INVASIVE HD

frontiers in Medicine

REVIEW
published: 17 November 2017
doi: 10.3389/fmed.2017.00202

Continuous Non-Invasive Arterial Pressure Assessment during Surgery to Improve Outcome

*Alena Stenglova[1] and Jan Benes[1,2]**



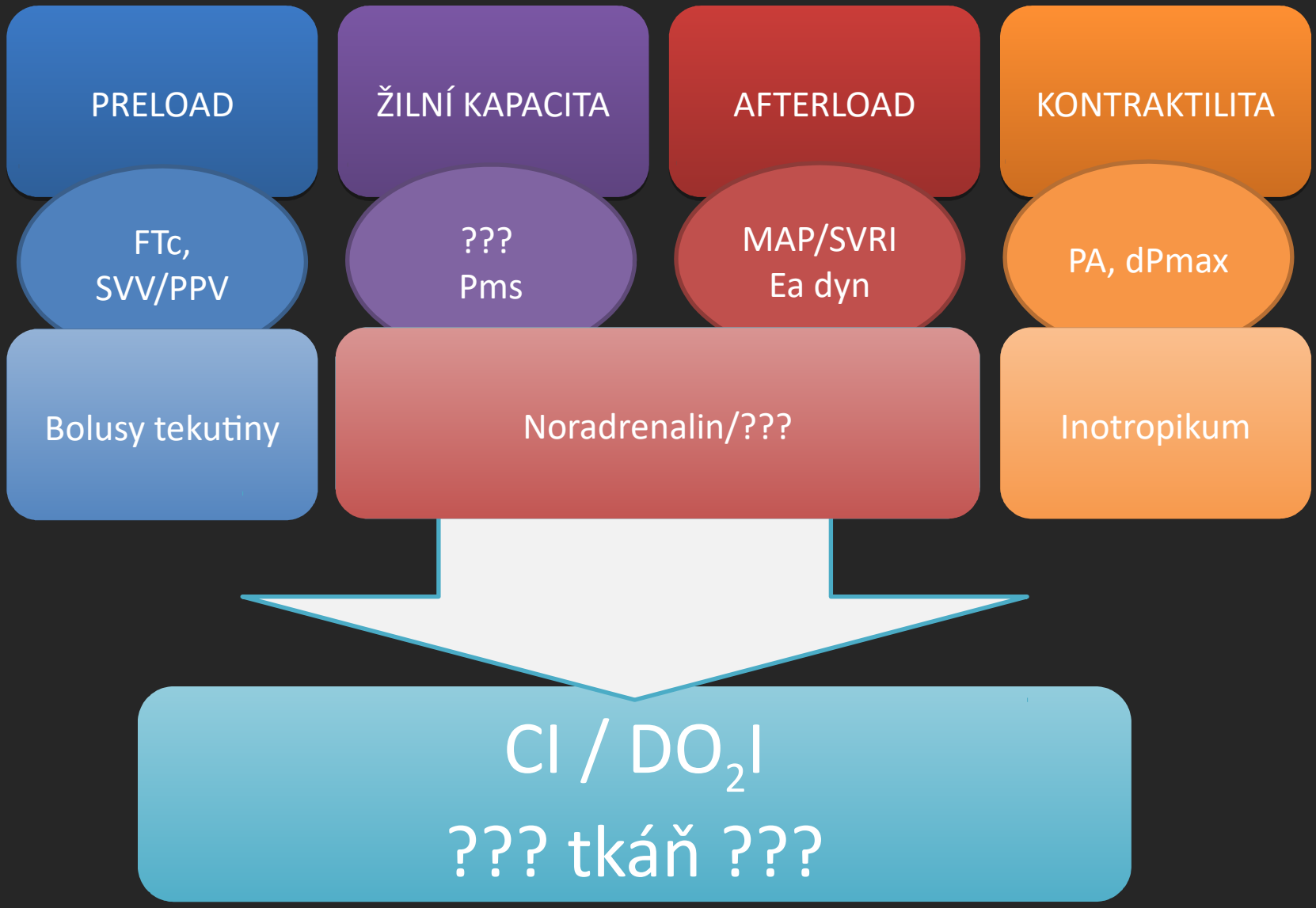
INTERVENCE

FIRST NO HARM

PŘEDOPERAČNÍ OPTIMALIZACE/ERAS
RACIONÁLNÍ TEKUTINOVÁ TERAPIE (1-2 ml/kg/h udržovací infuze)
PROTEKTIVNÍ VENTILACE

PRELOAD	ŽILNÍ KAPACITA	AFTERLOAD	KONTRAKTILITA
SV	SV	SV-RI	SV
Bolusy tekutiny	Noradrenalin/???		Inotropikum

INTERVENCE


PRELOAD
ŽILNÍ KAPACITA
AFTERLOAD
KONTRAKTILITA
FTc,
SVV/PPV
???
Pms
MAP/SVRI
Ea dyn
PA, dPmax
Bolusy tekutiny
Noradrenalin/???
Inotropikum
CI / DO_2I
??? tkáň ???

děkuji vám

za pozornost…

benesj@fnplzen.cz