CONSORCI
HOSPITAL GENERAL
UNIVERSITARI
VALÈNCIA

FLUIDOTERAPIA Y OPTIMIZACIÓN HEMODINÁMICA EN CIRUGÍA

Dr. Javier Ripolles Melchor.

Servicio de Anestesia Reanimación y Tratamiento del Dolor

Hospital Universitario Infanta Leonor

Madrid

SARTD-CHGUV Sesión de Formación Continuada

Valencia 3 de Diciembre de 2018

CONFLICTOS DE INTERÉS

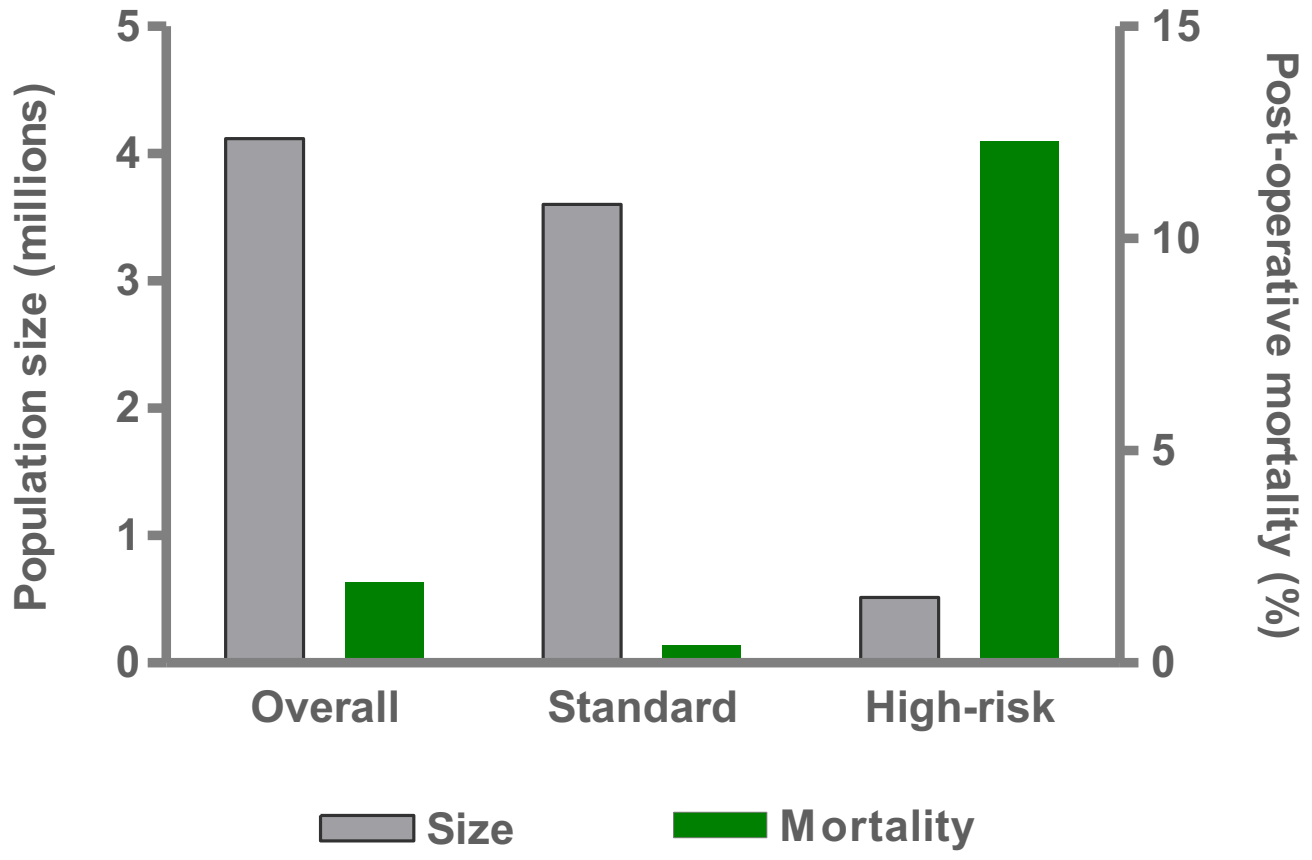
- Edwards Lifesciences, Fresenius Kabi, Nokia Health, Vitor Farma, MSD
- Head of Fluid Therapy ERAS Spain
- Financiación para estudios de RedGERM
- Coordinador Nacional OPTIMISE 2/Squeeze (ESA)

Research

Open Access

Identification and characterisation of the high-risk surgical population in the United Kingdom

Rupert M Pearse[1], David A Harrison[2], Philip James[3], David Watson[1], Charles Hinds[1], Andrew Rhodes[4], R Michael Grounds[4] and E David Bennett[4]



Research

Open Access

Identification and characterisation of the high-risk surgical population in the United Kingdom

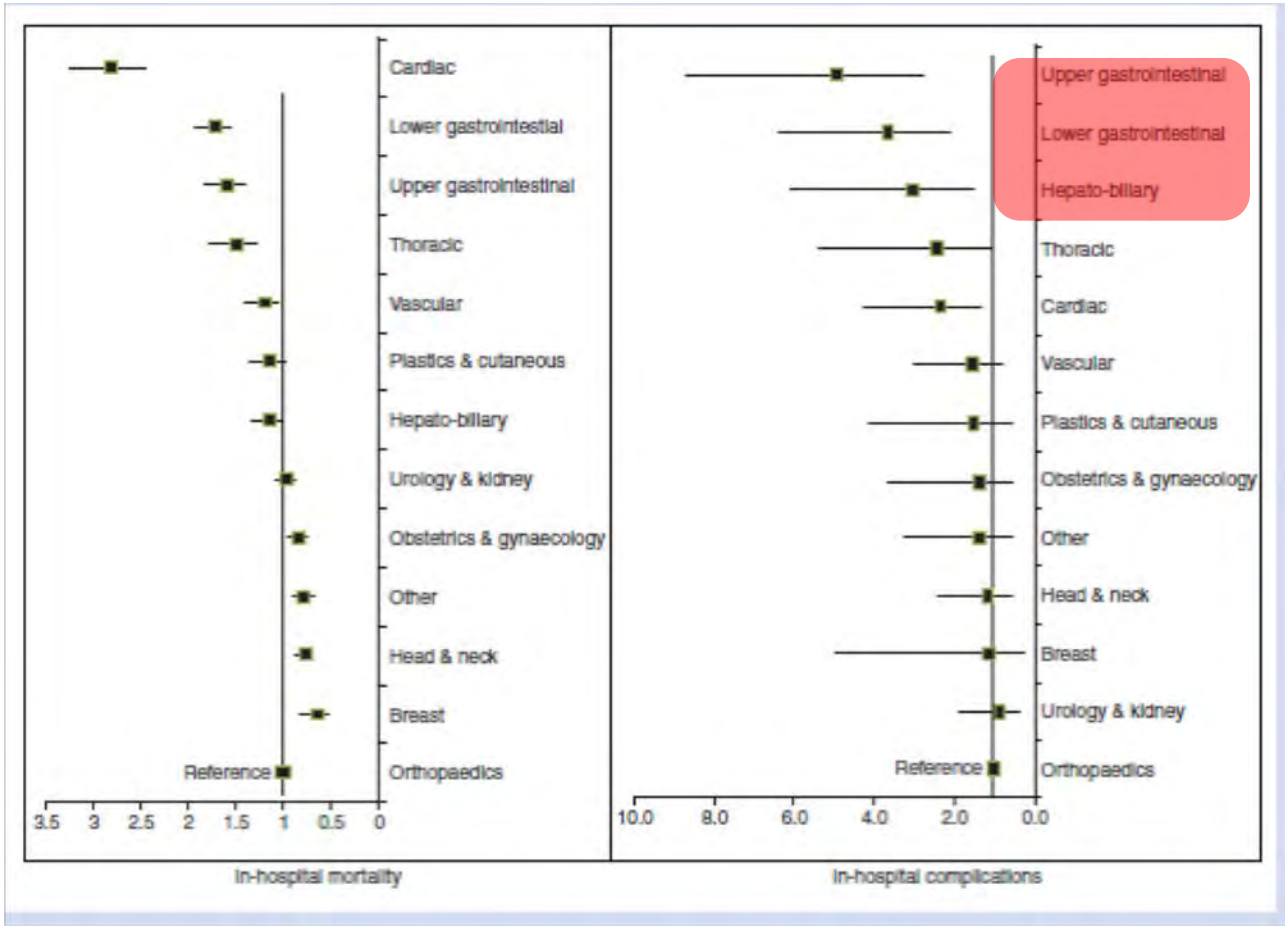
Rupert M Pearse[1], David A Harrison[2], Philip James[3], David Watson[1], Charles Hinds[1], Andrew Rhodes[4], R Michael Grounds[4] and E David Bennett[4]

	Standard risk	High risk	p
n	3,603,803	513,924	-
Age (years)	54 (38-69)	75 (63-83)	<0.0001
Emergencies (%)	769,371 (21.3%)	454,924 (88.5%)	<0.0001
Hospital stay (days)	3 (1-6)	16 (9-29)	<0.0001
Mortality (%)	15,038 (0.42%)	63,340 (12.3%)	<0.0001

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

The International Surgical Outcomes Study group[†]

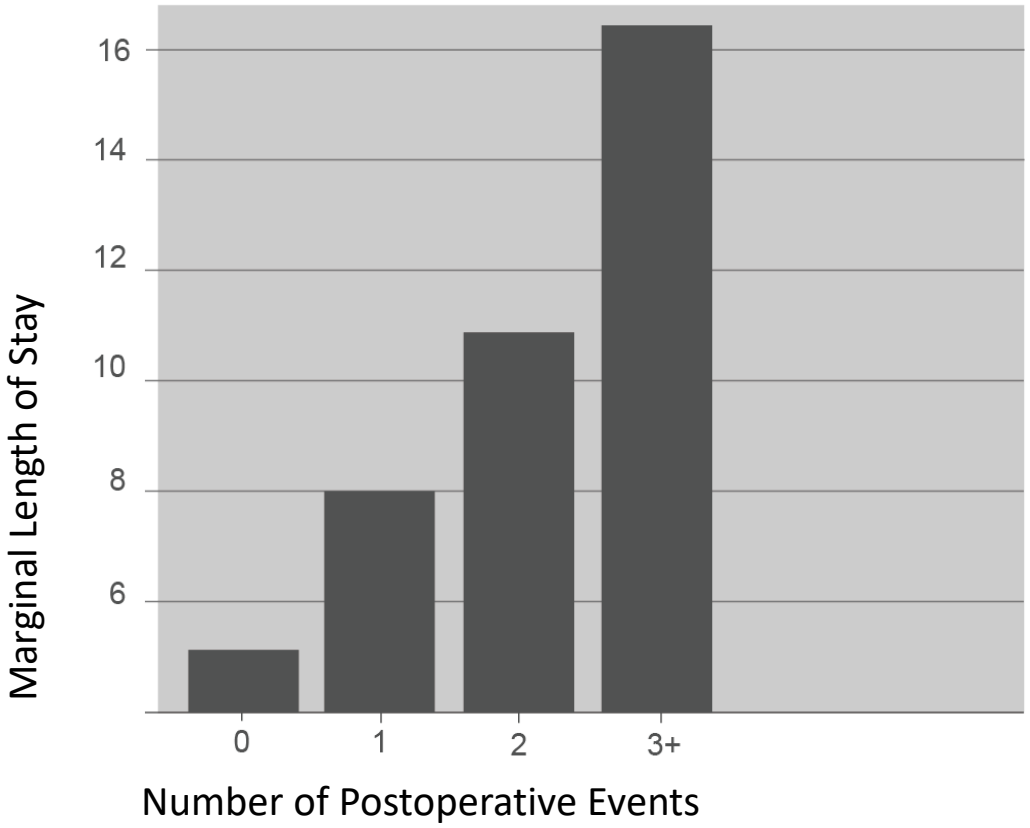
*Corresponding author. E-mail: r.pearse@qmul.ac.uk
†Members of study group are listed in a supplementary file.



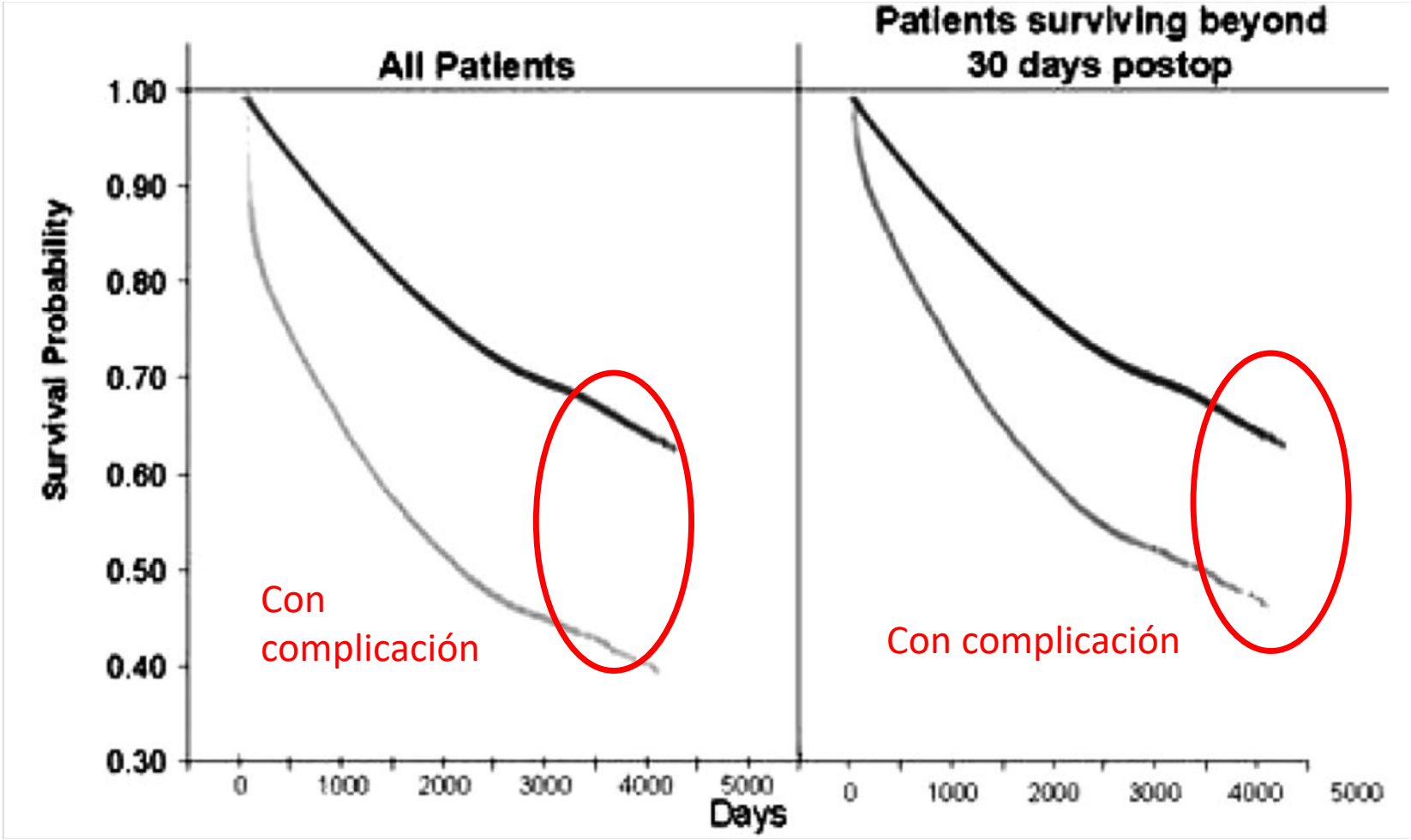
Synergistic Implications of Multiple Postoperative Outcomes.

Melissa M. Boltz, DO, Christopher S. Hollenbeak, Ph.D., Gail Ortenzi, RN, BSN, and Peter W. Dillon, M.D.

Am J Med Quality 2012

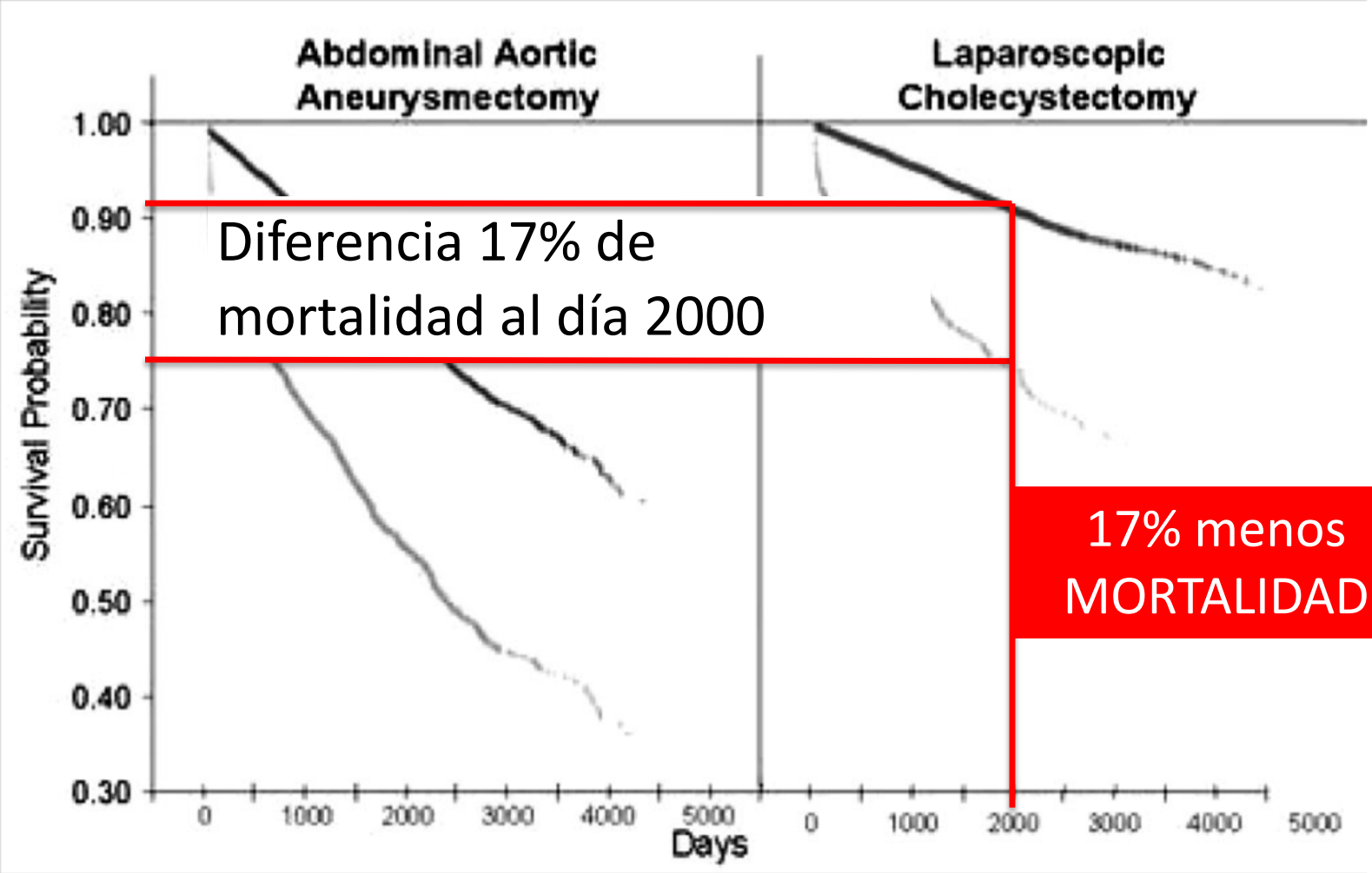


MORTALIDAD SEGÚN INCIDENCIA DE COMPLICACIONES



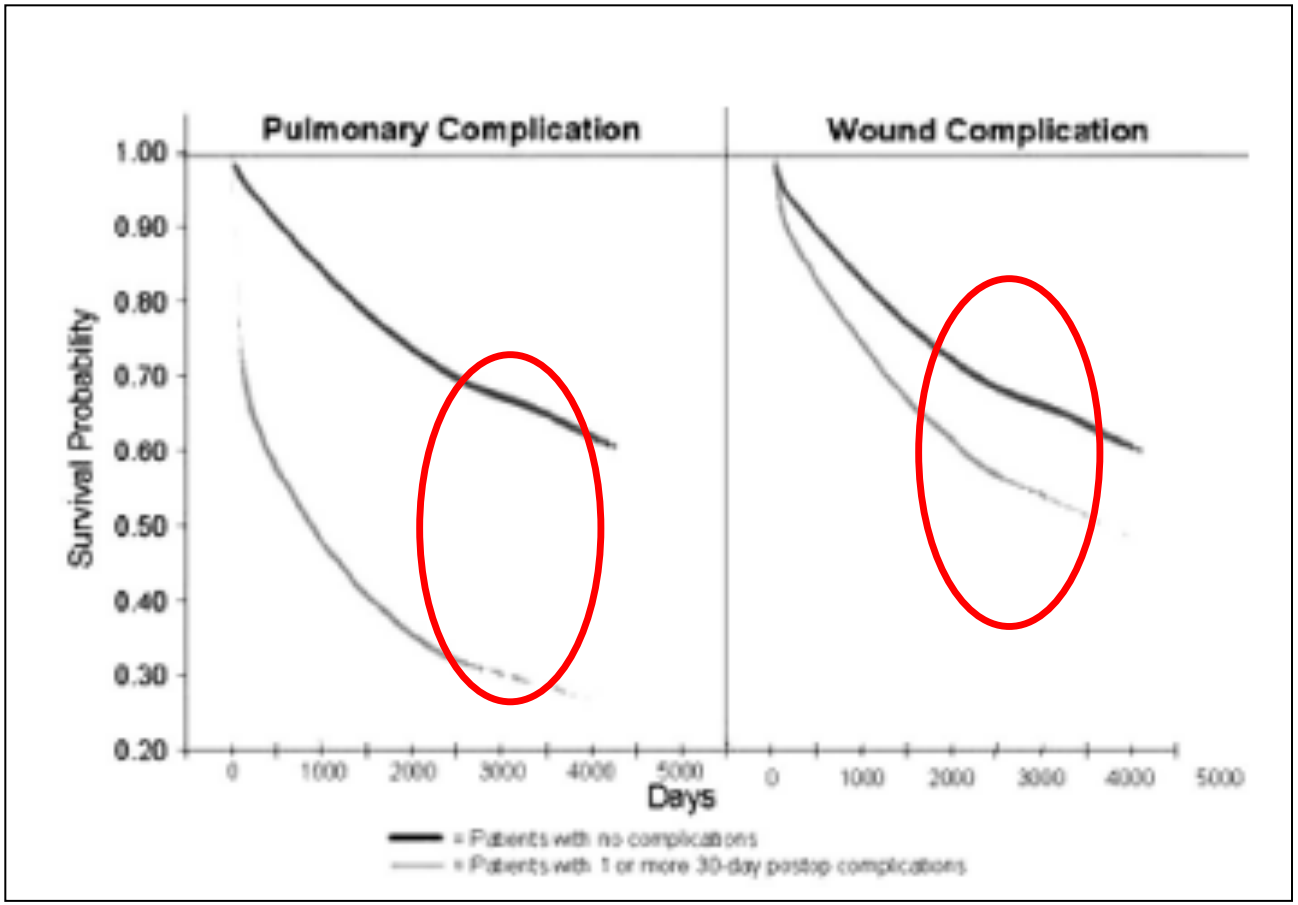
Khuri SF et al. Annals of Surgery;242(3),2005

MORTALIDAD SEGÚN INCIDENCIA DE COMPLICACIONES



Khuri SF et al. Annals of Surgery;242(3),2005

MORTALIDAD SEGÚN INCIDENCIA DE COMPLICACIONES



Khuri SF et al. Annals of Surgery;242(3),2005

Rev Esp Anestesiol Reanim. 2015;62(5):241–244

ELSEVIER

Revista Española de Anestesiología y Reanimación

www.elsevier.es/redar

EDITORIAL

La responsabilidad del anestesiólogo sobre el proceso perioperatorio del paciente

The responsibility of the anesthesiologist in the patient's perioperative process

A. Feldheiser[a,*], T. Ruíz Garcés[b] y R. Casans Francés[b]

[a] *Department of Anaesthesiology and Intensive Care Medicine, Campus Charité Mitte and Campus Virchow-Klinikum, Charité-University Medicine Berlin, Berlín, Alemania*
[b] *Servicio de Anestesiología y Reanimación, Hospital Clínico Universitario Lozano Blesa, Zaragoza, España*

La lectura crítica de los resultados del estudio EuSOS[1], el primer gran estudio prospectivo multinacional europeo de resultados quirúrgicos donde se evalúa la mortalidad intrahospitalaria durante los primeros 60 días posoperatorios tras cirugía no cardiaca, nos hace plantear determinadas preguntas sobre nuestra actuación y responsabilidad como

camas de cuidados críticos disponibles en cada país, lo que está fuera de toda duda, y lo que llama mucho la atención, es que el estudio muestra una gran variabilidad de resultados entre países. Si estos resultados hubieran sido similares entre naciones, la lectura que podríamos realizar sería que existe poco margen de mejora, que sería difícil perfeccio-

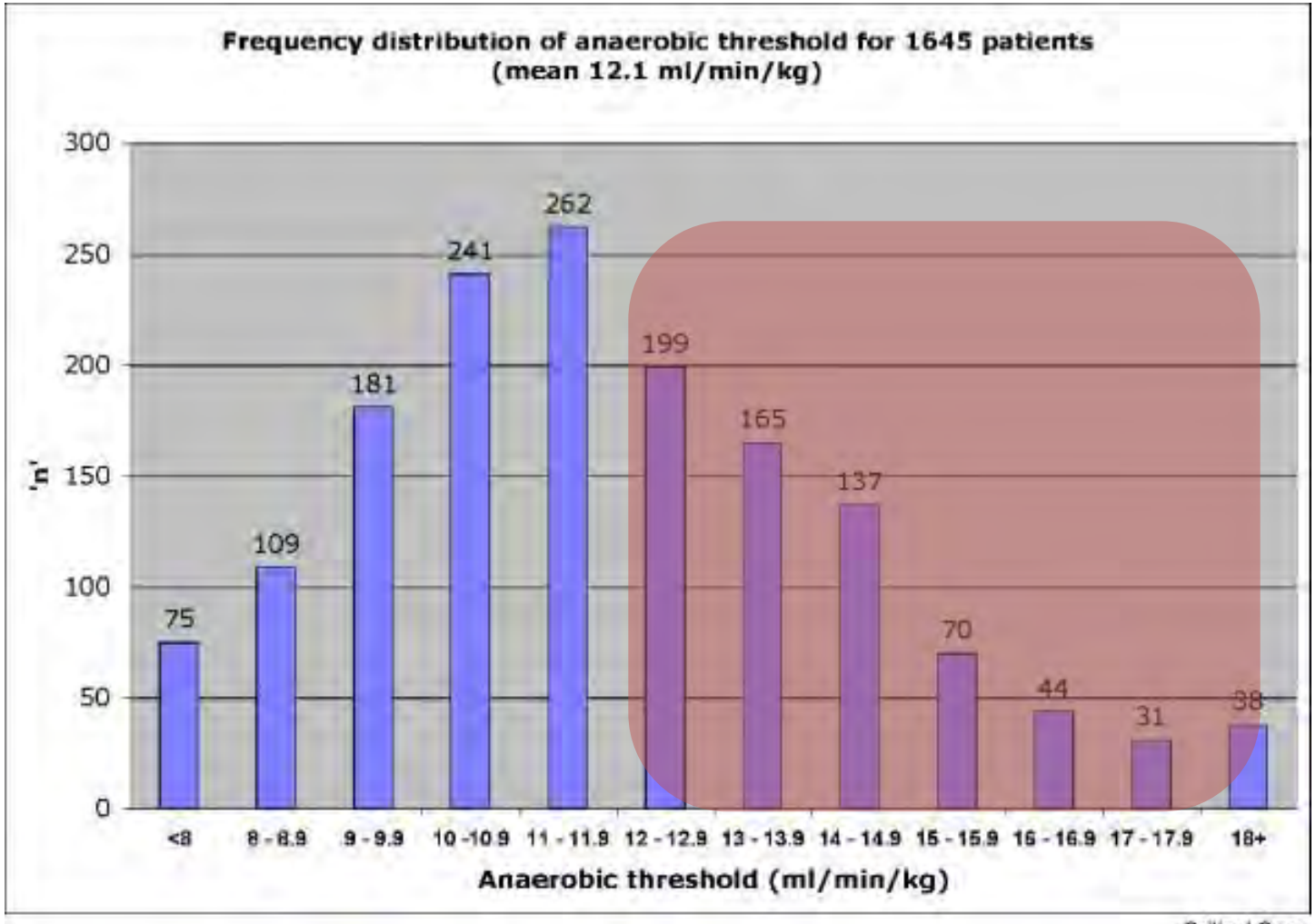
Review

Clinical review: How to identify high-risk surgical patients

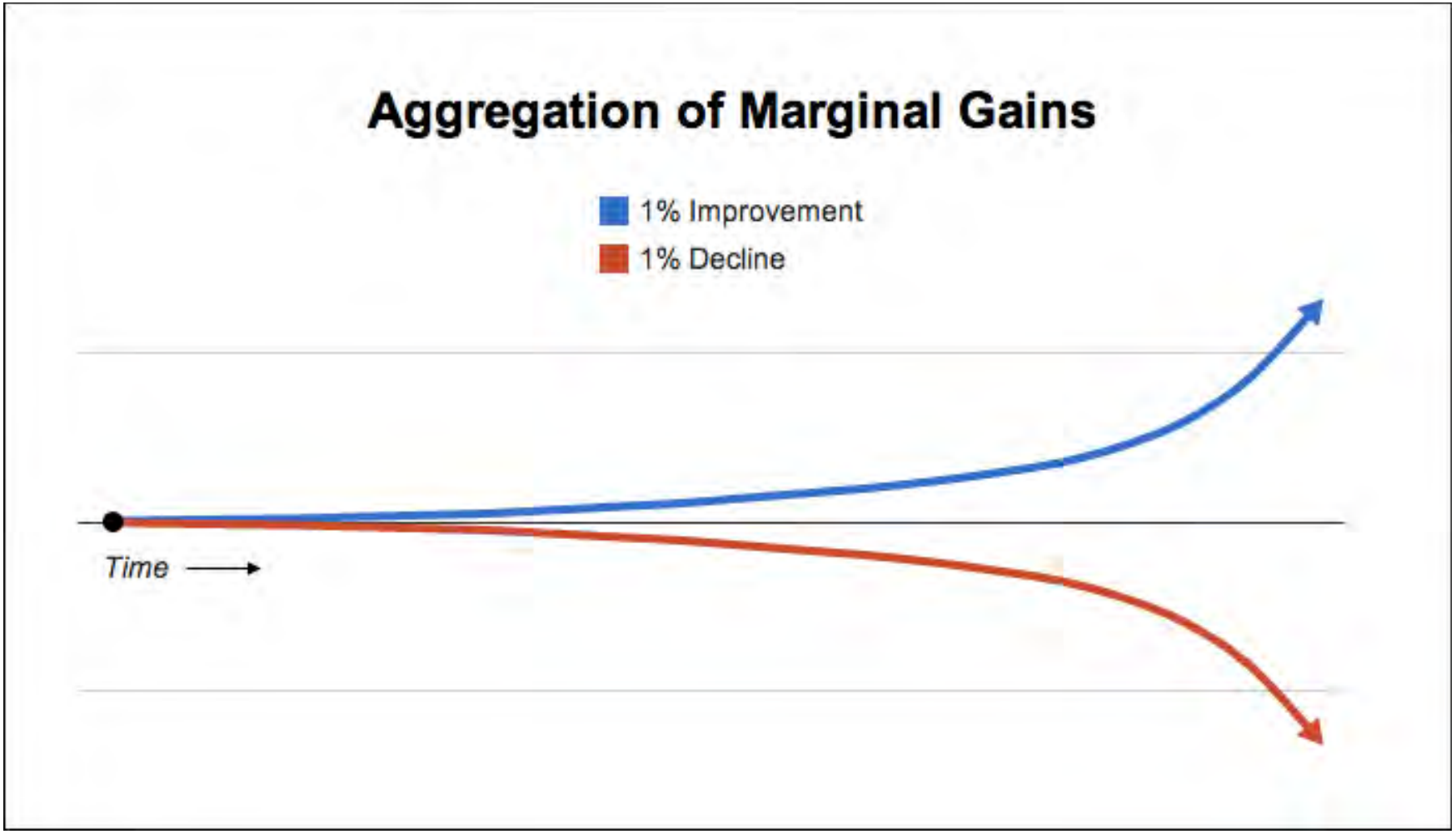
Paul Older[1] and Adrian Hall[2]

[1]Director (Emeritus), Intensive Care Unit and Director, CPX Laboratory, Western Hospital, Footscray, Victoria, Australia
[2]Deputy Director, Intensive Care Unit, Western Hospital, Footscray, Victoria, Australia

The functional capacity of the patient determines their ability to support the perioperative demand of increased oxygen consumption and therefore of cardiac output




David Brailsford
sky
sky


Aggregation of Marginal Gains
1% Improvement
1% Decline
Time

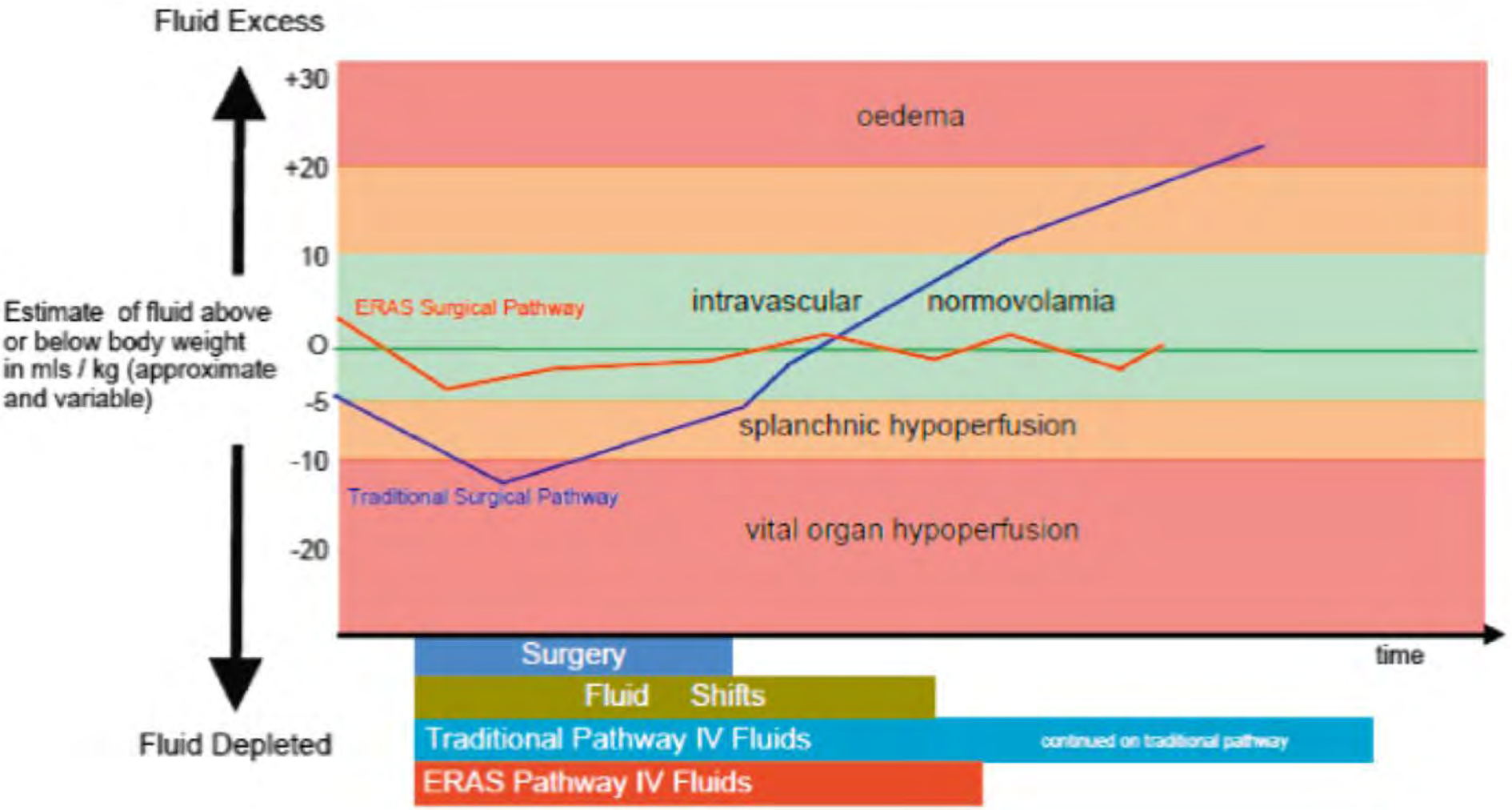
Online version at http://www.minervamedica.it

Minerva Anestesiologica 2018 ???;84(???):000-000
DOI: 10.23736/S0375-9393.18.12286-3

EXPERTS' OPINION

Committed to be fit. The value of preoperative care in the perioperative medicine era

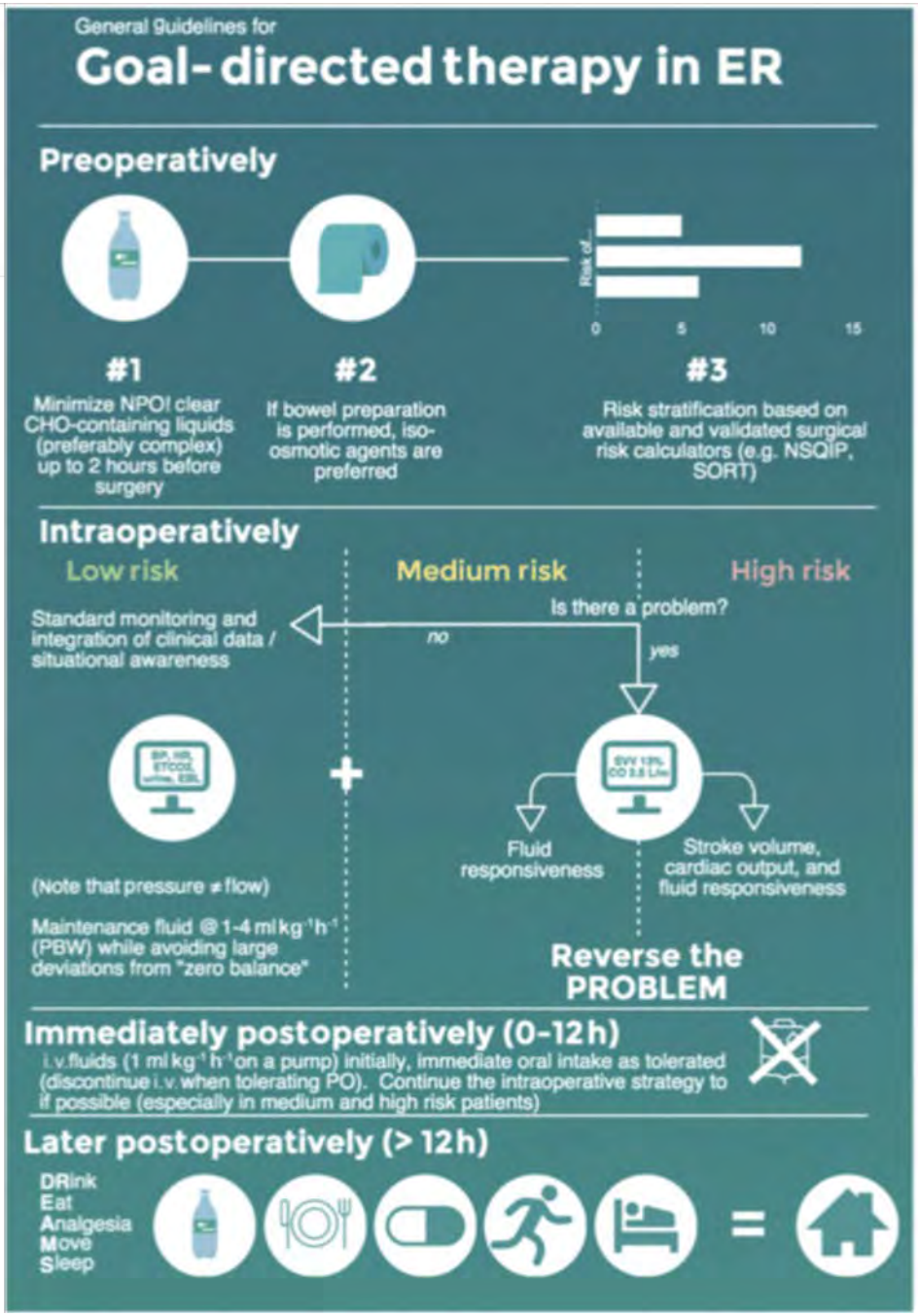
Javier RIPOLLÉS-MELCHOR [1] *, Francesco CARLI [2], Miquel COCA-MARTÍNEZ [3], Macarena BARBERO-MIELGO [4], José M. RAMÍREZ-RODRÍGUEZ [5], José A. GARCÍA-ERCE [6]


Fluid Excess
+30
+20
10
0
-5
-10
-20
oedema
intravascular
normovolamia
splanchnic hypoperfusion
vital organ hypoperfusion
ERAS Surgical Pathway
Traditional Surgical Pathway
Estimate of fluid above or below body weight in mls / kg (approximate and variable)
Fluid Depleted
time
Surgery
Fluid Shifts
Traditional Pathway IV Fluids
continued on traditional pathway
ERAS Pathway IV Fluids

Current concepts of fluid management in enhanced recovery pathways

R. Makaryus[1], T. E. Miller[2] and T. J. Gan[1,*]

[1]Department of Anesthesiology, Stony Brook University, Stony Brook, NY, USA and [2]Division of General, Vascular and Transplant Anesthesia, Duke University Medical Center, Durham, NC, USA



Intraoperative goal directed hemodynamic therapy in noncardiac surgery: a systematic review and meta-analysis

Javier Ripollés[a,*], Angel Espinosa[b], Eugenio Martínez-Hurtado[a], Alfredo Abad-Gurumeta[c], Rubén Casans-Francés[d], Cristina Fernández-Pérez[e], Francisco López-Timoneda[f], José María Calvo-Vecino[a], EAR Group (Evidence Anestesia Review Group)

SOLO MONITORIZACIÓN MÍNIMAMENTE INVASIVA

Study	GDHT Events	GDHT Total	Control Events	Control Total	Weight	Risk Ratio M-H, Random, 95% CI	Year
Gan et al. 2002	21	60	38	59	4.7%	0.54 [0.37, 0.81]	2002
Venn et al. 2002	11	30	21	29	3.5%	0.51 [0.30, 0.85]	2002
Conway et al. 2002	5	29	9	28	1.4%	0.54 [0.20, 1.40]	2002
Wakeling et al. 2005	24	64	38	64	5.0%	0.63 [0.43, 0.92]	2005
Nobblat et al. 2006	1	54	8	54	0.3%	0.13 [0.02, 0.97]	2006
Donati et al. 2007	9	68	27	67	2.4%	0.33 [0.17, 0.64]	2007
Lopes et al. 2007	7	17	12	16	2.6%	0.55 [0.29, 1.04]	2007
Sanagoro et al. 2009	9	42	4	44	1.0%	2.10 [0.68, 6.44]	2009
Mayer et al. 2010	6	30	15	30	1.9%	0.40 [0.18, 0.89]	2010
Forget et al. 2010	32	41	41	41	7.9%	0.78 [0.66, 0.93]	2010
Jammer et al. 2010	51	121	51	120	6.0%	0.99 [0.74, 1.33]	2010
Van der Linden et al. 2010	3	20	2	17	0.5%	1.27 [0.24, 6.76]	2010
Benes et al. 2010	18	60	35	50	4.4%	0.43 [0.28, 0.66]	2010
Cecconi et al. 2011	16	20	20	20	7.0%	0.80 [0.64, 1.02]	2011
Zhang et al. 2012	12	40	10	40	2.2%	1.20 [0.59, 2.45]	2012
Brandstrup et al. 2012	23	71	24	71	3.9%	0.96 [0.60, 1.53]	2012
Challand et al. 2012	10	89	13	90	2.0%	0.78 [0.36, 1.68]	2012
Bartha et al. 2012	44	74	43	75	6.4%	1.04 [0.79, 1.36]	2012
Zhang et al. 2013	9	30	16	30	2.6%	0.56 [0.30, 1.07]	2013
McKenny et al. 2013	8	51	15	50	2.0%	0.52 [0.24, 1.12]	2013
Schoeren et al. 2013	12	36	16	26	3.2%	0.54 [0.31, 0.94]	2013
Salzwedal et al. 2013	52	79	72	81	7.8%	0.74 [0.62, 0.88]	2013
Forget et al. 2013	1	10	7	10	0.4%	0.14 [0.02, 0.96]	2013
Srinivasa et al. 2013	26	37	27	37	6.2%	0.96 [0.72, 1.28]	2013
Zakhaleva et al. 2013	7	32	19	40	2.1%	0.46 [0.22, 0.96]	2013
Zhang et al. 2013	19	30	30	30	6.3%	0.64 [0.49, 0.84]	2013
Pang et al. 2014	25	40	32	40	6.2%	0.78 [0.59, 1.04]	2014
Total (95% CI)		1275		1259	100.0%	0.70 [0.62, 0.79]	
Total events	460		645				

Heterogeneity: Tau^2=0.04 ; Chi^2=54.70, df=26 (P=.0008); I^2=52%
Test for overall effect: Z=5.71 (P<.00001)

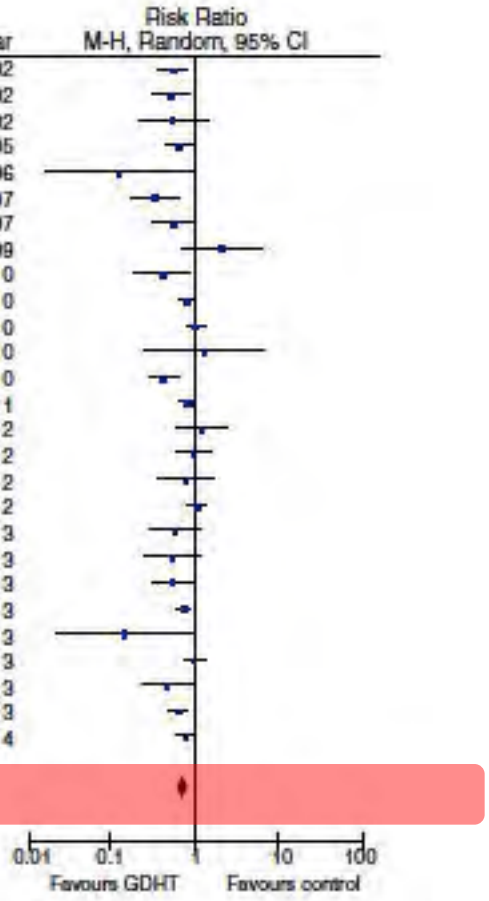


Figure 4 Effect of GDHT in the protocol group vs control group on overall complications.

Intraoperative goal directed hemodynamic therapy in noncardiac surgery: a systematic review and meta-analysis

Javier Ripollés[1,*], Angel Espinosa[2], Eugenio Martínez-Hurtado[3], Alfredo Abad-Gurumeta[4], Rubén Casans-Francés[5], Cristina Fernández-Pérez[6], Francisco López-Timoneda[7], José María Calvo-Vecino[8], EAR Group (Evidence Anestesia Review Group)

SOLO MONITORIZACIÓN MÍNIMAMENTE INVASIVA

Study or Subgroup	GDT Events	GDT Total	Control Events	Control Total	Weight	Risk Ratio M-H, Random, 95% CI	Year
SV maximization							
Venn et al 2002	11	30	21	29	5.4%	0.51 [0.30, 0.85]	2002
Gan et al 2002	21	60	38	59	4.7%	0.54 [0.37, 0.81]	2002
Conway et al 2002	5	29	9	28	1.3%	0.54 [0.20, 1.40]	2002
Walkening et al 2005	34	64	38	64	5.0%	0.63 [0.43, 0.92]	2005
Noblet et al 2006	1	54	8	54	0.3%	0.13 [0.02, 0.97]	2006
Senagore et al 2009	6	42	4	44	0.9%	1.57 [0.48, 5.18]	2009
Cecconi et al 2011	16	20	20	20	7.2%	0.80 [0.64, 1.02]	2011
Brandstrup et al 2012	22	71	24	71	3.9%	0.96 [0.60, 1.53]	2012
Bastin et al 2012	44	74	43	75	6.5%	1.04 [0.79, 1.36]	2012
Challand et al 2012	10	89	13	90	1.9%	0.78 [0.36, 1.68]	2012
McKenny et al 2013	8	51	15	50	1.9%	0.52 [0.24, 1.12]	2013
Zakhaleva et al 2013	7	32	19	40	2.1%	0.46 [0.22, 0.96]	2013
Srinivasa et al 2013	26	37	27	37	6.3%	0.96 [0.72, 1.28]	2013
El Sharkawy et al 2013	5	29	16	30	1.4%	0.32 [0.20, 1.71]	2013
Subtotal (95% CI)		**682**		**691**	**46.7%**	**0.73 [0.60, 0.87]**	
Total events	207		289				
Heterogeneity: $Tau^2 = 0.05$; $Chi^2 = 24.55$, df = 13 (P = 0.03); $I^2 = 47\%$							
Test for overall effect: Z = 3.59 (P = 0.0007)							
Preload Responsiveness (SVV, PPV, PVI)							
Lopes et al 2007	7	17	12	16	2.6%	0.55 [0.29, 1.04]	2007
Forget et al 2010	32	41	41	41	8.3%	0.78 [0.66, 0.93]	2010
Zhang et al 2012	12	40	10	40	2.1%	1.20 [0.59, 2.45]	2012
Forget et al 2013	1	10	7	10	0.4%	0.14 [0.02, 0.96]	2013
Scheeren et al 2013	12	36	16	26	3.1%	0.54 [0.31, 0.94]	2013
Peng et al 2014	25	40	32	40	6.3%	0.78 [0.59, 1.04]	2014
Subtotal (95% CI)		**184**		**173**	**22.8%**	**0.73 [0.59, 0.91]**	
Total events	89		118				
Heterogeneity: $Tau^2 = 0.02$; $Chi^2 = 7.76$, df = 5 (P = 0.17); $I^2 = 36\%$							
Test for overall effect: Z = 2.78 (P = 0.005)							
CI>2.5ml/min/m2							
Donati et al 2007	9	68	17	67	2.3%	0.33 [0.17, 0.64]	2007
Benes et al 2010	38	60	35	60	4.3%	0.43 [0.28, 0.66]	2010
Mayer et al 2010	6	30	15	30	0.0%	0.40 [0.18, 0.89]	2010
Van der Linden et al 2010	3	20	2	17	0.5%	1.27 [0.24, 6.76]	2010
Zheng et al 2013	49	90	90	90	6.5%	0.64 [0.49, 0.84]	2013
Salzwedel et al 2013	52	79	72	81	8.1%	0.74 [0.62, 0.88]	2013
Zhang et al 2013	9	30	16	30	2.5%	0.56 [0.30, 1.07]	2013
Subtotal (95% CI)		**287**		**275**	**24.3%**	**0.58 [0.44, 0.76]**	
Total events	110		184				
Heterogeneity: $Tau^2 = 0.06$; $Chi^2 = 12.50$, df = 5 (P = 0.03); $I^2 = 60\%$							
Test for overall effect: Z = 3.80 (P = 0.0001)							
ScVO2 > 75%							
Jammer et al 2010	51	121	51	120	6.1%	0.99 [0.74, 1.33]	2010
Subtotal (95% CI)		**121**		**120**	**6.1%**	**0.99 [0.74, 1.33]**	
Total events	51		51				
Heterogeneity: Not applicable							
Test for overall effect: Z = 0.06 (P = 0.96)							
Total (95% CI)		**1274**		**1259**	**100.0%**	**0.71 [0.63, 0.79]**	
Total events	457		640				
Heterogeneity: $Tau^2 = 0.04$; $Chi^2 = 51.18$, df = 26 (P = 0.002); $I^2 = 49\%$							
Test for overall effect: Z = 5.79 (P < 0.00001)							
Test for subgroup differences: $Chi^2 = 6.95$, df = 3 (P = 0.07), $I^2 = 56.9\%$							

Risk Ratio M-H, Random, 95% CI

0.01 0.1 1 10 100

Favours GDT Favours control

BJA

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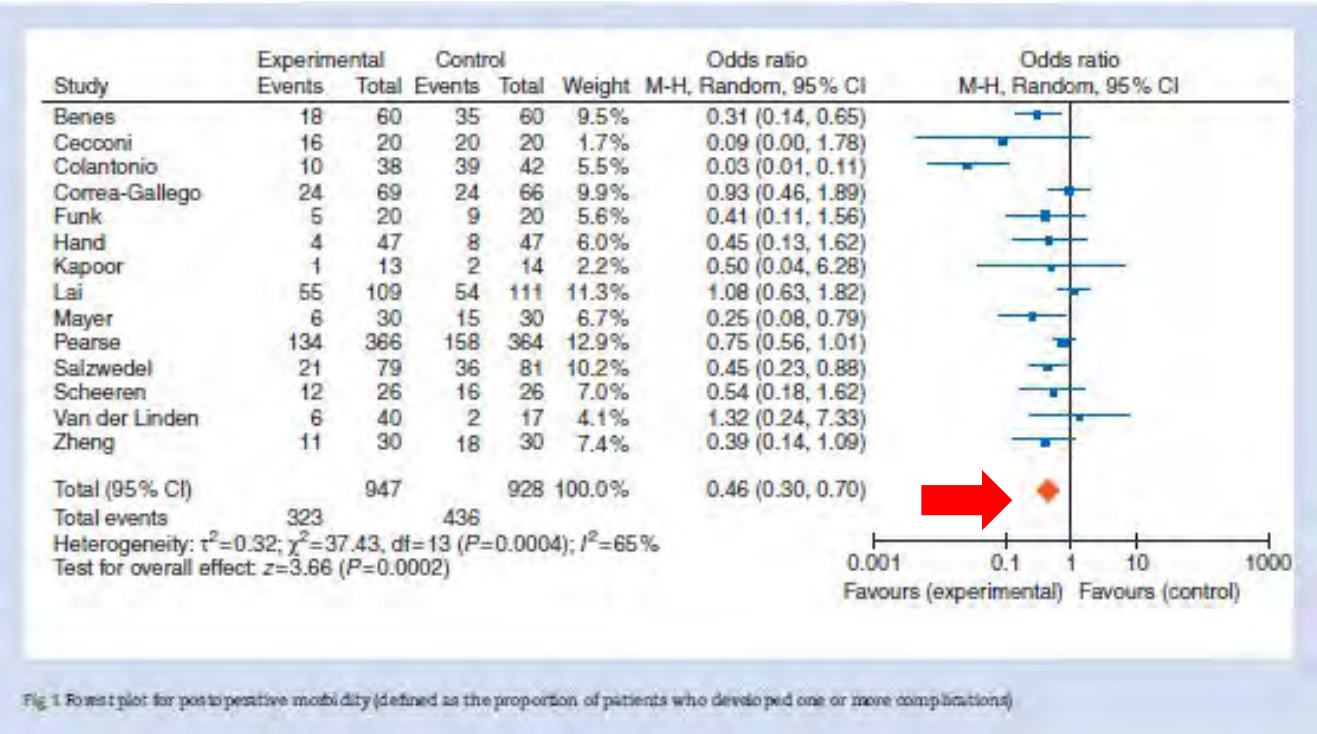
doi: 10.1093/bja/aex138
Review Article

REVIEW ARTICLE

Perioperative goal-directed therapy with uncalibrated pulse contour methods: impact on fluid management and postoperative outcome

F. Michard[1,*], M. T. Giglio[2] and N. Brienza[2]

SOLO CONTORNO DE PULSO NO CALIBRADO



Study	Experimental Events	Total	Control Events	Total	Weight	Odds ratio M-H, Random, 95% CI
Benes	18	60	35	60	9.5%	0.31 (0.14, 0.65)
Cecconi	16	20	20	20	1.7%	0.09 (0.00, 1.78)
Colantonio	10	38	39	42	5.5%	0.03 (0.01, 0.11)
Correa-Gallego	24	69	24	66	9.9%	0.93 (0.46, 1.89)
Funk	5	20	9	20	5.6%	0.41 (0.11, 1.56)
Hand	4	47	8	47	6.0%	0.45 (0.13, 1.62)
Kapoor	1	13	2	14	2.2%	0.50 (0.04, 6.28)
Lai	55	109	54	111	11.3%	1.08 (0.63, 1.82)
Mayer	6	30	15	30	6.7%	0.25 (0.08, 0.79)
Pearse	134	366	158	364	12.9%	0.75 (0.56, 1.01)
Salzwedel	21	79	36	81	10.2%	0.45 (0.23, 0.88)
Scheeren	12	26	16	26	7.0%	0.54 (0.18, 1.62)
Van der Linden	6	40	2	17	4.1%	1.32 (0.24, 7.33)
Zheng	11	30	18	30	7.4%	0.39 (0.14, 1.09)
Total (95% CI)		947		928	100.0%	0.46 (0.30, 0.70)
Total events	323		436			

Heterogeneity: $\tau^2=0.32$; $\chi^2=37.43$, df=13 ($P=0.0004$); $I^2=65\%$
Test for overall effect: $z=3.66$ ($P=0.0002$)

Fig 1 Forest plot for postoperative morbidity (defined as the proportion of patients who developed one or more complications)

BJA

British Journal of Anaesthesia, ■ (■): 1–11 (2018)

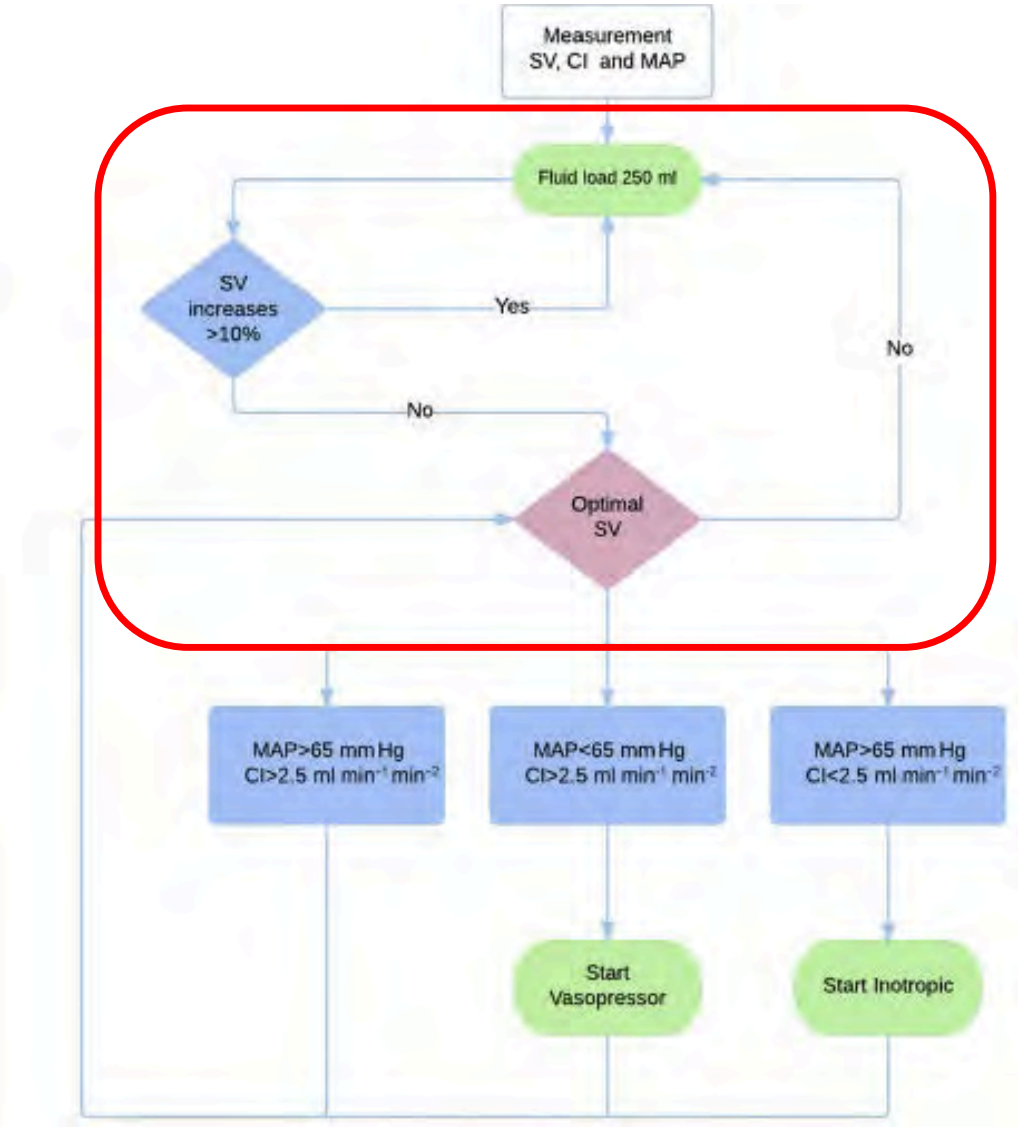
doi: 10.1016/j.bja.2017.12.018
Advance Access Publication Date: xxx
Clinical Investigation

CLINICAL INVESTIGATION

Effect of goal-directed haemodynamic therapy on postoperative complications in low–moderate risk surgical patients: a multicentre randomised controlled trial (FEDORA trial)

J. M. Calvo-Vecino[1,8], J. Ripollés-Melchor[1,*,8], M. G. Mythen[2], R. Casans-Francés[3,8], A. Balik[4], J. P. Artacho[5], E. Martínez-Hurtado[1,8], A. Serrano Romero[6], C. Fernández Pérez[7,8], S. Asuero de Lis[7], and FEDORA Trial Investigators Group

RCT
ERAS NO ESTABLECIDO
CIRUGÍA BAJO RIESGO
Fluidoterapia convencional vs GDHT (209 vs 211)



BJA

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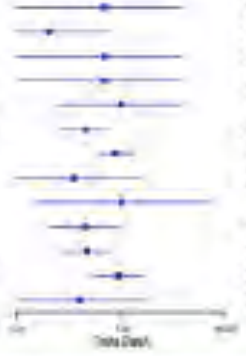
Moderate and severe complications (*n* GDHT = 209 *vs* *n* Control = 211)	GDHT *n* (%)	Control *n* (%)	Odds Ratio (95% CI)	*p*-value
Patients with at least one moderate or severe complication	19 (9.61%)	35 (16.58%)	0.48 (0.27, 0.89)	0.018*
Subgroups by surgical procedure				
Gastrointestinal (150 *vs* 154)	11 (7.33%)	25 (16.23%)	0.41 (0.19, 0.88)	0.020*
Urology (48 *vs* 38)	6 (12.5%)	5 (13.16%)	0.94 (0.26, 3.36)	>0.999
Gynecologic (11 *vs* 19)	1 (9.09%)	5 (26.32%)	0.28 (0.03, 2.78)	0.372
Approach				
Open (104 *vs* 102)	13 (12.5%)	19 (18.63%)	0.62 (0.29, 1.34)	0.253
Laparoscopic (105 *vs* 109)	5 (4.76%)	16 (14.68%)	0.29 (0.1, 0.82)	0.020*
Type of complication				
Stroke	0 (0%)	0 (0%)	1 (0.02, 51.12)	>0.999
AKI	3 (1.44%)	18 (8.53%)	0.16 (0.05, 0.54)	0.001*
ARDS	1 (0.48%)	12 (5.69%)	0.08 (0.01, 0.62)	0.003*
Anastomotic Breakdown	1 (0.48%)	5 (2.37%)	0.2 (0.02, 1.71)	0.215
Arrhytmia	2 (0.96%)	6 (2.84%)	0.33 (0.07, 1.65)	0.284
Cardiac Arrest	0 (0%)	2 (0.95%)	0.25 (0.01, 5.59)	0.499
Cardiopulmonary Oedema	0 (0%)	11 (5.16%)	0.04 (0.01, 0.74)	<0.001*
DVT	0 (0%)	0 (0%)	1 (0.02, 51.12)	>0.999
Delirium	0 (0%)	4 (1.9%)	0.12 (0.01, 2.36)	0.123
Gastrointestinal Bleed	0 (0%)	1 (0.95%)	0.5 (0.01, 15.09)	>0.999
Infection Source Uncertain	0 (0%)	13 (6.16%)	0.04 (0.01, 0.62)	<0.001*
Bloodstream infection	0 (0%)	1 (0.95%)	0.5 (0.01, 15.09)	>0.999
Myocardial Infarction	0 (0%)	1 (0.95%)	0.5 (0.01, 15.09)	>0.999
MINS	1 (0.48%)	1 (0.47%)	1 (0.06, 16.25)	>0.999
Pneumonia	4 (1.91%)	18 (8.53%)	0.21 (0.07, 0.63)	0.003*
Paralytic Ileus	12 (5.74%)	15 (7.11%)	0.8 (0.36, 1.74)	0.691
Postoperative Haemorrhage	0 (0%)	4 (1.9%)	0.12 (0.01, 2.36)	0.123
PE	0 (0%)	0 (0%)	1 (0.02, 51.12)	>0.999
Surgical Site Infection (Superficial)	2 (0.96%)	10 (4.74%)	0.19 (0.04, 0.89)	0.036*
Surgical Site Infection (Deep)	4 (1.91%)	17 (8.06%)	0.22 (0.07, 0.67)	0.006*
Surgical Site Infection (Organ Space)	6 (2.87%)	7 (3.32%)	0.86 (0.28, 2.61)	>0.999
Urinary Tract Infection	0 (0%)	3 (1.42%)	0.15 (0.01, 3.34)	0.248

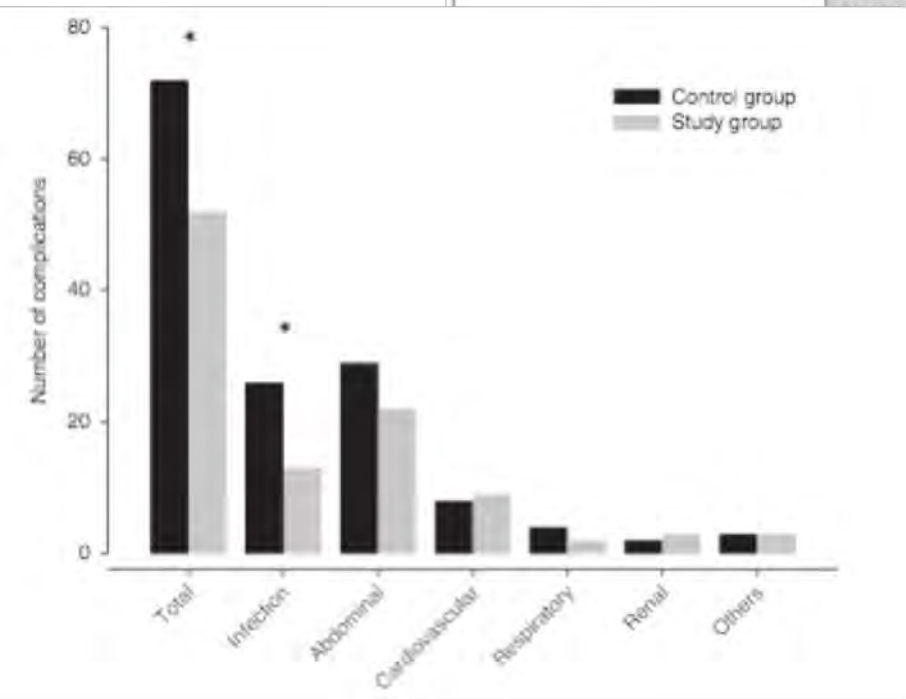


8 vs 16%

RESEARCH Open Access

Perioperative goal-directed hemodynamic therapy based on radial arterial pulse pressure variation and continuous cardiac index trending reduces postoperative complications after major abdominal surgery: a multi-center, prospective, randomized study

Cornelie Salzwedel[1†], Jaume Puig[2†], Arne Carstens[3], Berthold Bein[3], Zsolt Molnar[4], Krisztian Kiss[4], Ayyaz Hussain[3], Javier Belda[2], Mikhail Y Kirov[5], Samir G Sakka[6] and Daniel A Reuter[1*]



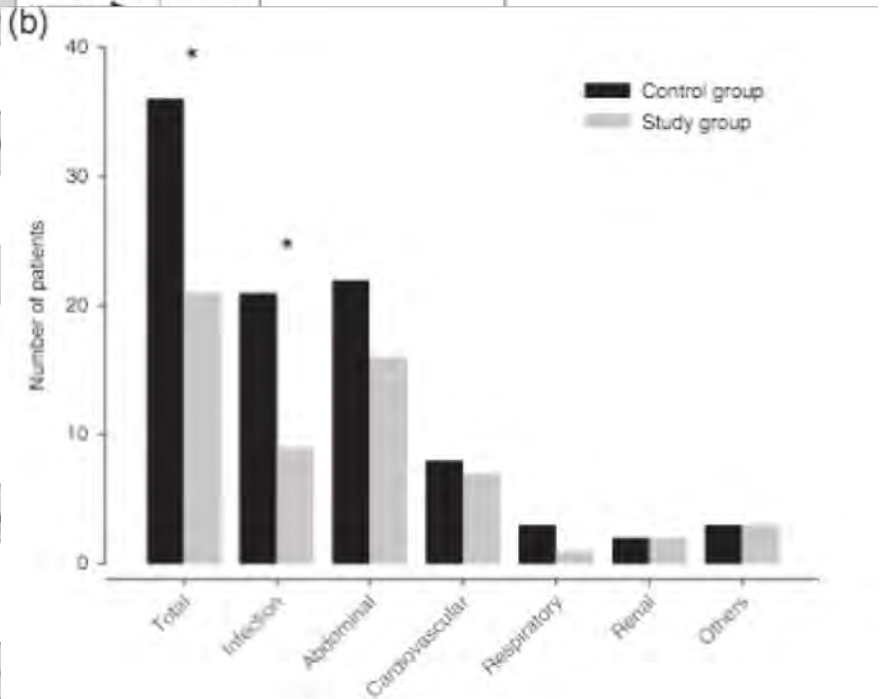


Figure 1 Hemodynamic treatment algorithms: a) Algorithm for initial assessment and treatment. b) Algorithm for further intraoperative optimization.

META-ANALYSIS

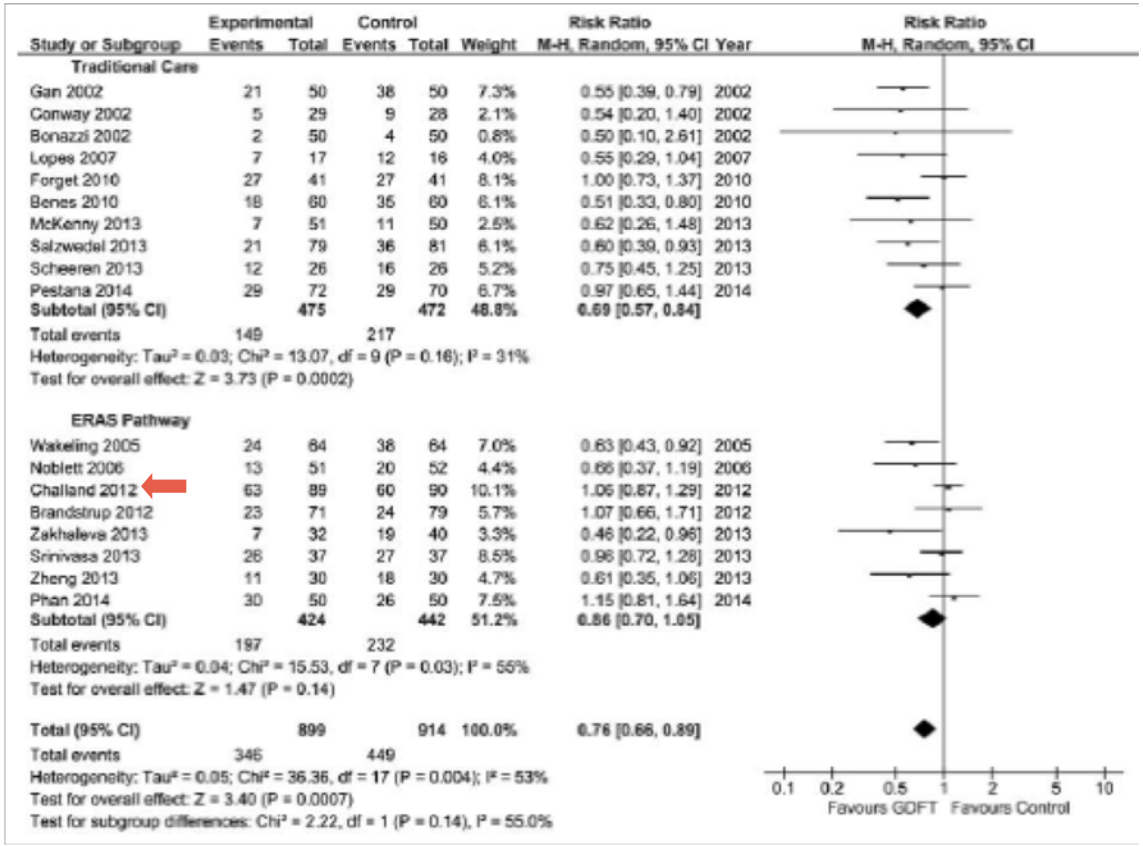
OPEN

Intraoperative Goal-directed Fluid Therapy in Elective Major Abdominal Surgery

A Meta-analysis of Randomized Controlled Trials

Katie E. Rollins, MRCS, and Dileep N. Lobo, DM, FRCS, FACS, FRCPE

SUBGRUPOS ERAS VS NO ERAS



Goal-directed Fluid Therapy Does Not Reduce Primary Postoperative Ileus after Elective Laparoscopic Colorectal Surgery

A Randomized Controlled Trial

Juan C. Gómez-Izquierdo, M.D., Alessandro Trainito, M.D., David Mirzakandov, R.R.T., B.Sc., Barry L. Stein, M.D., Sender Liberman, M.D., Patrick Charlebois, M.D., Nicolò Pecorelli, M.D., Liane S. Feldman, M.D., Franco Carli, M.D., Gabriele Baldini, M.D., M.Sc.

	Goal-directed Fluid Therapy (n = 64)	Control (n = 64)	*P* Value
Age, yr	63 ± 15	61 ± 15	
Sex M/F, n	31/33	40/24	
Weight, kg	71.1 (62.2–85.1)	76.5 (67.6–84.7)	
BMI	24.9 (22.4–28.6)	26.1 (23.4–29.1)	
BSA, m^2	1.8 ± 0.2	1.9 ± 0.2	
ASA physical status (I/II/III/IV), n	6/42/14/2	8/38/18/0	
CR-POSSUM score			
Physiology	8 (7–10)	8 (7–9)	
Operative	7 (7–7)	7 (7–7)	
Predictive mortality (%)	1.8 (0.9–9.3)	1.8 (0.9–2.6)	
Charlson comorbidity index	2 (2–3)	2 (1–3)	

Goal-directed Fluid Therapy Does Not Reduce Primary Postoperative Ileus after Elective Laparoscopic Colorectal Surgery

A Randomized Controlled Trial

Juan C. Gómez-Izquierdo, M.D., Alessandro Trainito, M.D., David Mirzakandov, R.R.T., B.Sc., Barry L. Stein, M.D., Sender Liberman, M.D., Patrick Charlebois, M.D., Nicolò Pecorelli, M.D., Liane S. Feldman, M.D., Franco Carli, M.D., Gabriele Baldini, M.D., M.Sc.

PACIENTE
ASA II
BMI 26
ERAS ESTABLECIDO
CIRUGÍA BAJO RIESGO

	Goal-directed Fluid Therapy (n = 64)	Control (n = 64)	RR (95% CI)	*P* Values	$RR_{adjusted}$ (95% CI)	*P* Values
Primary postoperative ileus,* n (%)						
ITT analysis	14 (22)	14 (22)	1 (0.5–1.9)	1.000	1 (0.5–1.9)	0.094
Per protocol	12 (21)	12 (20)	1 (0.5–2.1)	*1.000*	1.1 (0.5–2.1)	0.225
LOS, days	4 (3–5)	4 (3–5.7)		na		0.922
30-day mortality, n (%)	0 (0)	0 (0)		na		na
Patients with at least one 30-day complication, n (%)	28 (44)	25 (39)		1.1 (0.7–1.7)		0.590
In-hospital	22 (34)	20 (31)		1.1 (0.7–1.8)		0.707

GDHT SE DESARROLLÓ EN ERAS
Y NO FUNCIONA EN ERAS?

British Journal of Anaesthesia **118** (6): 819–2 (2017)
doi:10.1093/bja/aex076

The great fluid debate: time for Flexit?

R. T. J. Wilson[1] and G. Minto[2,3,*]

[1]York Teaching Hospital NHS Foundation Trust, York, UK, [2]Directorate of Anaesthesia, Derriford Hospital, Plymouth, UK and [3]Plymouth University, Peninsula Schools of Medicine and Dentistry, Plymouth, UK

Anaesthesia 2017

Editorial

What should we do when traditional research fails?

Optimisation of Perioperative Cardiovascular Management to Improve Surgical Outcome II (OPTIMISE II) Trial: study protocol for a multi-centre international trial of cardiac output-guided fluid therapy with low dose inotrope infusion compared to usual care in patients undergoing major elective gastrointestinal surgery.

Edwards M R*[1,2], Forbes G[3], Berdunov V[3], Dias P[4], Thomson A[3], Grocott M P W[1,2], Mythen M G[5], Gillies M A[6], MacDonald N[7], Sander M[8], Phan T D[9], Evered L[9], Wijeysundera D N[10], McCluskey S A[8], Aldecoa C[11], Ripollés-Melchor J[12], Hofer C[13], Abukhudair H[14], Szczeklik W[15], Grigoras I[16], Kahan B C[3], Pearse R M[4], for the OPTIMISE II investigators.

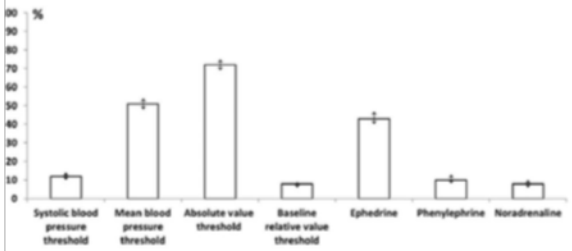
Cual es la realidad fuera de ensayos clínicos?

Original Article

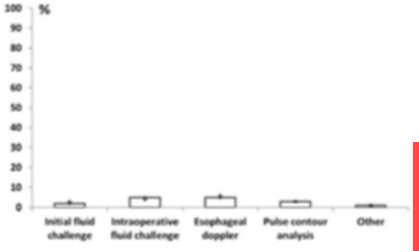
A multicentre observational study on management of general anaesthesia in elderly patients at high-risk of postoperative adverse outcomes

Serge Molliex [a,*], Sylvie Passot [a], Jerome Morel [a], Emmanuel Futier [b], Jean Yves Lefrant [c], Jean Michel Constantin [b], Yannick Le Manach [d], Bruno Pereira [e], for the Opti-Aged group, Azurea clinical research Network [1]

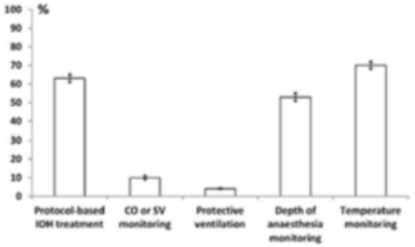
S. Molliex et al. / Anaesth Crit Care Pain Med xxx (2018) xxx–xxx



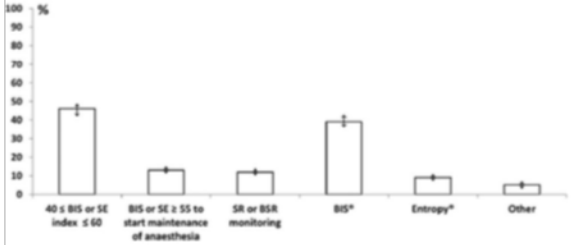
B: protocol-based treatment of hypotension



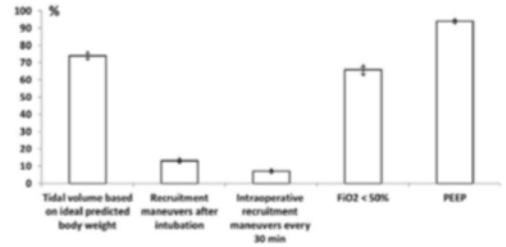
C: cardiac output or stroke volume monitoring



A: parameters of optimization strategy



D: depth of anaesthesia monitoring



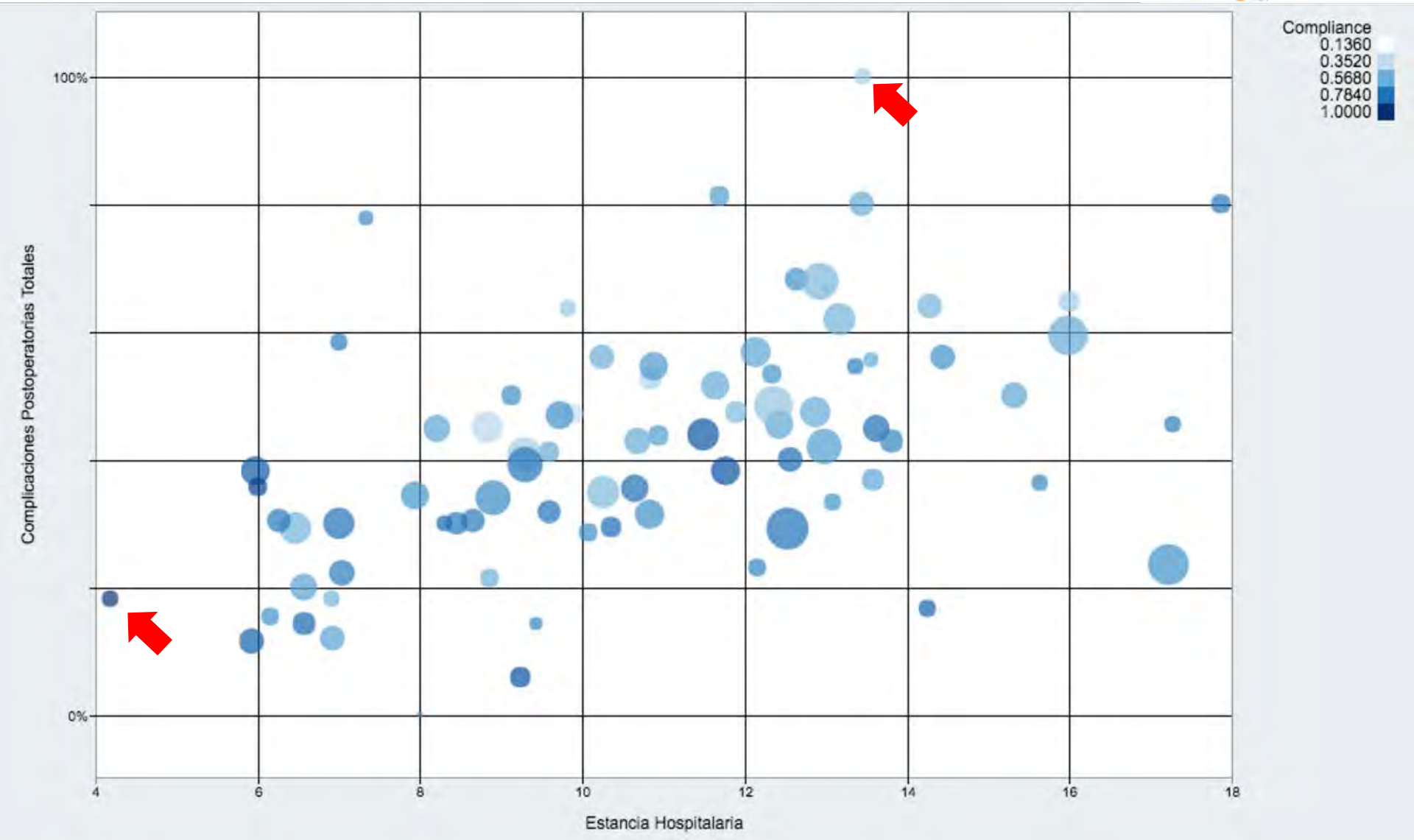
E: protective ventilation

<10%!

	Total (n = 2084)	ERAS (n = 1304)	No ERAS (n = 780)	p-value
Presurgical Education	1346 (64.59%)	977 (74.92%)	369 (47.31%)	<0.001*
Presurgical Optimization	1453 (69.72%)	921 (70.63%)	532 (68.21%)	0.257
Premedication	1067 (51.2%)	743 (56.98%)	324 (41.54%)	<0.001*
Avoid Fasting	1302 (62.48%)	937 (71.86%)	365 (46.79%)	<0.001*
Carbohydrates Preload	591 (28.36%)	509 (39.03%)	82 (10.51%)	<0.001*
Avoid Sedatives	1719 (82.49%)	1147 (87.96%)	572 (73.33%)	<0.001*
Antithrombotic Prophylaxis	2016 (96.74%)	1265 (97.01%)	751 (96.28%)	0.375
Antibiotic Prophylaxis	2068 (99.23%)	1295 (99.31%)	773 (99.1%)	0.612
Standarized Anesthesia Protocol	1447 (69.43%)	1023 (78.45%)	424 (54.36%)	<0.001*
PONV Prophylaxis	1911 (91.7%)	1243 (95.32%)	668 (85.64%)	<0.001*
Laparoscopic approach	1371 (65.79%)	860 (65.95%)	511 (65.51%)	0.849
Avoid Nasogastric Tube	1231 (59.07%)	790 (60.58%)	441 (56.54%)	0.073
Normothermia	2012 (96.55%)	1272 (97.55%)	740 (94.87%)	0.002*
Goal-directed Fluidtherapy	635 (30.47%)	519 (39.8%)	116 (14.87%)	<0.001*
Avoid Drainages	724 (34.74%)	504 (38.65%)	220 (28.21%)	<0.001*
Avoid Urinary Tube	1450 (69.58%)	950 (72.85%)	500 (64.1%)	<0.001*
Ileus Prophylaxis	1544 (74.09%)	1061 (81.37%)	483 (61.92%)	<0.001*
Postsurgical Analgesia Protocol	1717 (82.39%)	1131 (86.73%)	586 (75.13%)	<0.001*
Postsurgical Nutritional Support	1404 (67.37%)	840 (64.42%)	564 (72.31%)	<0.001*
Normoglucemia	1572 (75.43%)	1072 (82.21%)	500 (64.1%)	<0.001*
Early Movilization	765 (36.71%)	631 (48.39%)	134 (17.18%)	<0.001*
Early Feeding	735 (35.27%)	620 (47.55%)	115 (14.74%)	<0.001*
ERAS Protocol Compliance	63.6% [54.5%-77.3%]	0.727 [0.591-0.818]	0.591 [0.5-0.636]	<0.001*

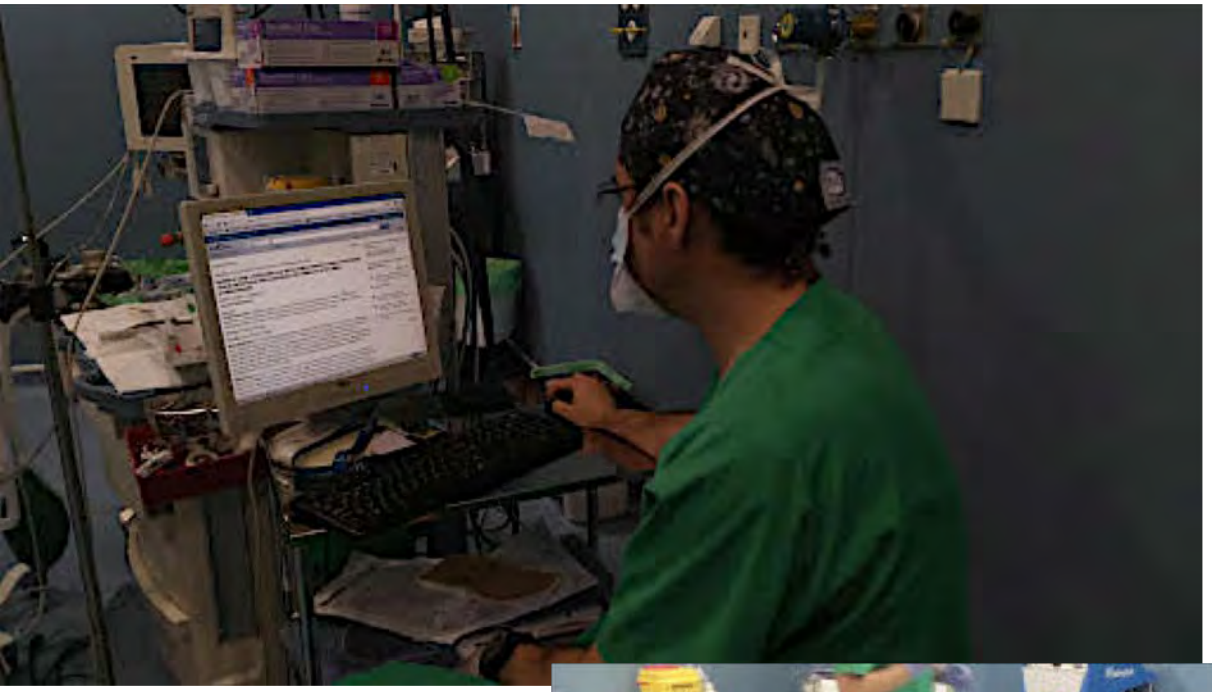
POWER AUDIT

Postoperative Outcomes Within an Enhanced Recovery After Surgery Protocol



Cual es la realidad fuera de ensayos clínicos?

- Cuantos de vosotros realizáis GDHT?
- Cuantos de vosotros hacéis fluidoterapia “restrictiva” o “liberal”?

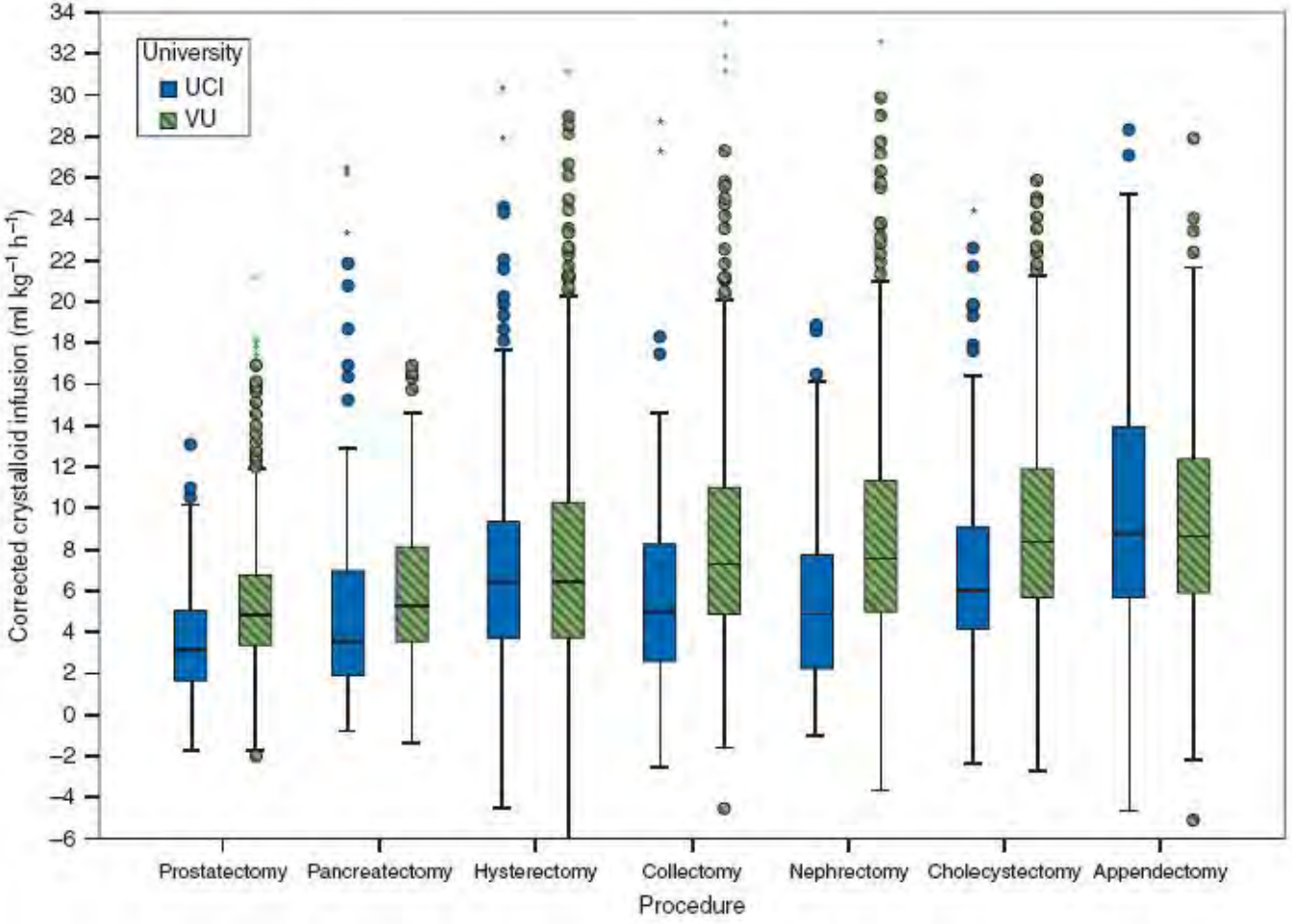


British Journal of Anaesthesia Page 1 of 10
doi:10.1093/bja/aeu452

BJA

Variability in practice and factors predictive of total crystalloid administration during abdominal surgery: retrospective two-centre analysis

M. Lilot[1,2], J. M. Ehrenfeld[3], C. Lee[1], B. Harrington[1], M. Cannesson[1] and J. Rinehart[1]*



British Journal of Anaesthesia 114 (5): 767–76 (2015)
Advance Access publication 13 January 2015 · doi:10.1093/bja/aeu452

BJA

CLINICAL PRACTICE

Variability in practice and factors predictive of total crystalloid administration during abdominal surgery: retrospective two-centre analysis†

M. Lilot[1,2], J. M. Ehrenfeld[3], C. Lee[1], B. Harrington[1], M. Cannesson[1] and J. Rinehart[1]*

A patient weighing 75 kg who has a 4 h procedure with 400 ml blood loss and 1ml/kg/h urine output will receive anything between 700 and 5400 ml of crystalloiID, DEPENDING OF THEIR ANESTHESIA PROVIDER

$$\text{Corrected crystalloid} = \text{crystalloid} - \text{estimated blood loss} - \text{urine output}$$

ORIGINAL

Encuesta nacional sobre cirugía con recuperación intensificada

J. Ripollés-Melchor[a,*], R. Casans-Francés[b], A. Abad-Gurumeta[c], A. Suárez-de-la-Rica[c], J.M. Ramírez-Rodríguez[d], F. López-Timoneda[e], J.M. Calvo-Vecino[a] y Grupo Español de Rehabilitación Multimodal y Evidence Anesthesia Review Group (EAR)

¿Se realiza fluidoterapia intraoperatoria guiada por objetivos?

Ahmad et al. Perioperative Medicine (2015) 4:8
DOI 10.1186/s13741-015-0018-8

Perioperative Medicine

RESEARCH Open Access

Variation in haemodynamic monitoring for major surgery in European nations: secondary analysis of the EuSOS dataset

Tahania Ahmad[1†], Christian M. Beilstein[1†], Cesar Aldecoa[2], Rui P. Moreno[3], Zsolt Molnár[4], Vesna Novak-Jankovic[5], Christoph K. Hofer[6], Michael Sander[7], Andrew Rhodes[8] and Rupert M. Pearse[1,9*]

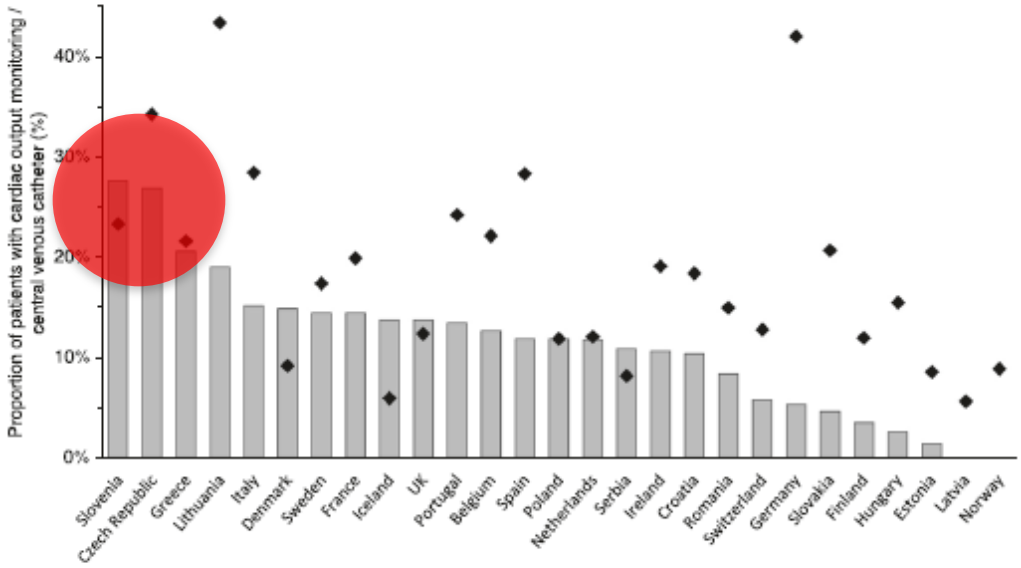


Fig. 3 Variation in use of cardiac output monitoring and central venous catheter in European nations. Data is presented in % of patients with any type of cardiac output monitoring (*bar*) and central venous catheter (*black diamond*) per nation. Only nations with more than ten recruited patients are included into this graph. *UK* United Kingdom

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]

Critical Care 2011, **15**:R197

ASA Respondents ESA Respondents

What hemodynamic monitoring do you routinely use for the management of high-risk surgery patients?

Global end diastolic volume

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]

Critical Care 2011, **15**:R197

	ASA Respondents (n = 237)	ESA Respondents (n = 195)
Answer Options	**Response Percent**	**Response Percent**
Invasive arterial pressure	95.4%	89.7%
Central venous pressure	72.6%	83.6%
Non-invasive arterial pressure	51.9%	53.8%
Cardiac output	35.4%	34.9%
Pulmonary capillary wedge pressure	30.8%	14.4%
Transesophageal echocardiography	28.3%	19.0%
Systolic Pressure Variation	20.3%	23.6%
Plethysmographic Waveform Variation	17.3%	17.9%
Pulse Pressure Variation	15.2%	25.6%
Mixed venous saturation (ScvO2)	14.3%	15.9%
Central venous saturation (SvO2)	12.7%	33.3%
Oxygen delivery (DO2)	6.3%	14.4%
Stroke Volume Variation	6.3%	21.5%
Near infrared spectroscopy	4.6%	5.1%
Global end diastolic volume	2.1%	8.2%

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]

Critical Care 2011, **15**:R197

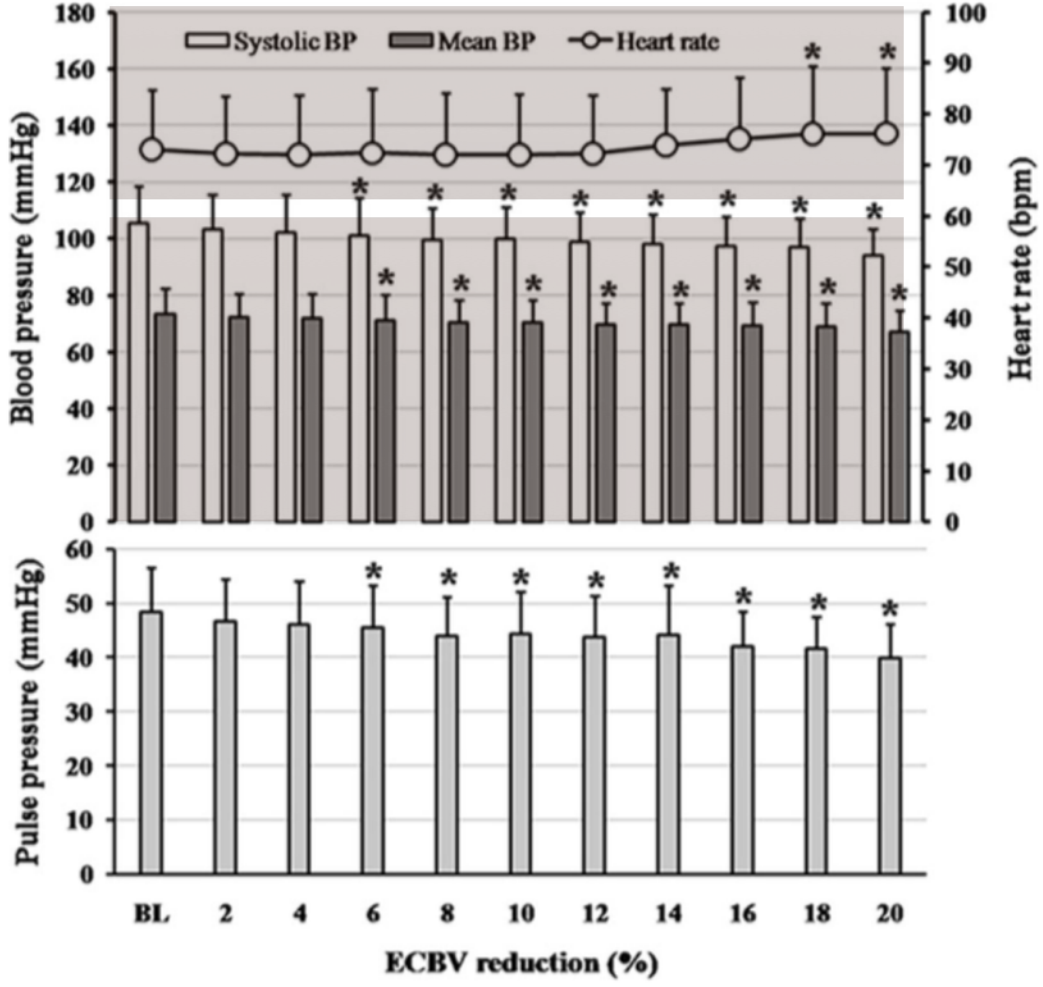
What are your indicators for volume expansion in patients undergoing high-risk surgery?

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%

Anesthesiology 2010; 113:83–91

Arterial and Plethysmographic Waveform Analysis in Anesthetized Patients with Hypovolemia

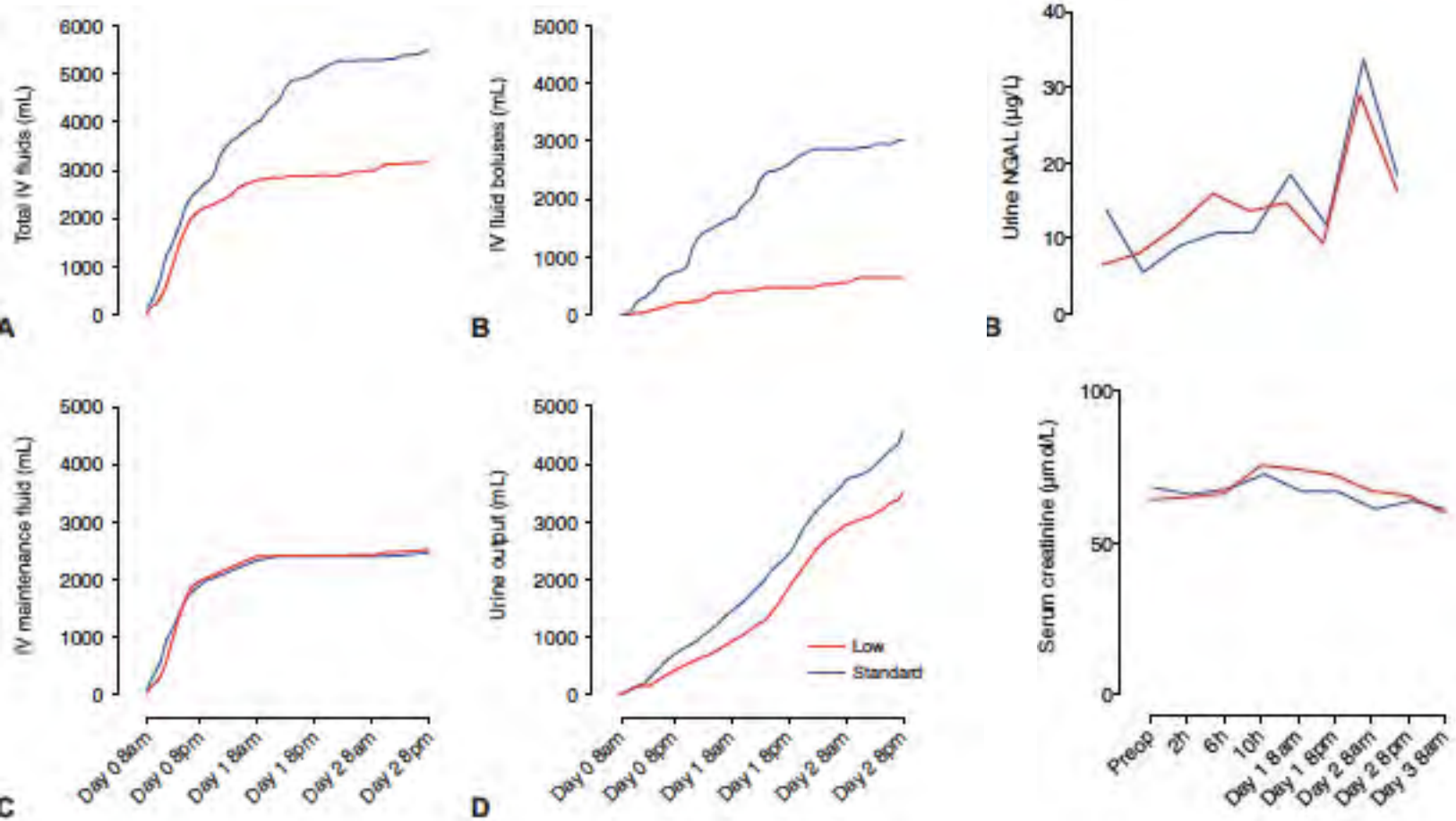
Reuven Pizov, M.D.,* Arieh Eden, M.D.,† Dmitri Bystritski, M.D.,† Elena Kalina, M.D.,‡
Ada Tamir, D.Sc.,§ Simon Gelman, M.D., Ph.D.‖



Low Versus Standard Urine Output Targets in Patients Undergoing Major Abdominal Surgery

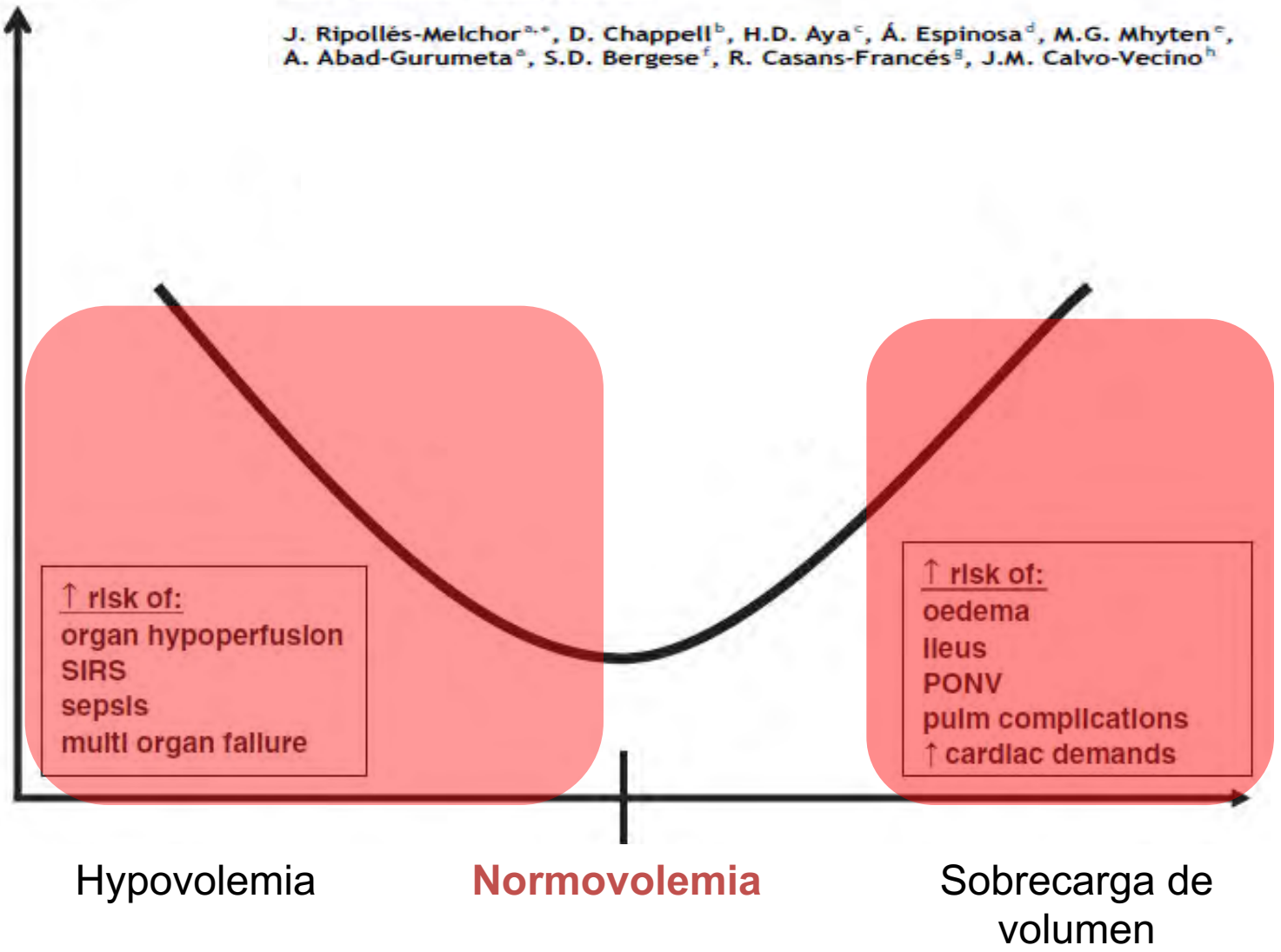
A Randomized Noninferiority Trial

Jevon R. Puckett, MBBS, John W. Pickering, PhD,† Suetonia C. Palmer, MB ChB, PhD,† John L. McCall, MB ChB, MD,‡ Michal T. Kluger, MB ChB, MD,§ Janak De Zoysa, MB ChB,¶ Zoltan H. Endre, MB ChB, PhD,† and Mattias Soop, MD, PhD**



Recomendaciones de fluidoterapia perioperatoria para la cirugía abdominal mayor. Revisión de las recomendaciones de la Vía RICA. Parte II: Terapia hemodinámica guiada por objetivos. Fundamento para la optimización del volumen intravascular

J. Ripollés-Melchor[a,*], D. Chappell[b], H.D. Aya[c], Á. Espinosa[d], M.G. Mhyten[e], A. Abad-Gurumeta[a], S.D. Bergese[f], R. Casans-Francés[g], J.M. Calvo-Vecino[h]



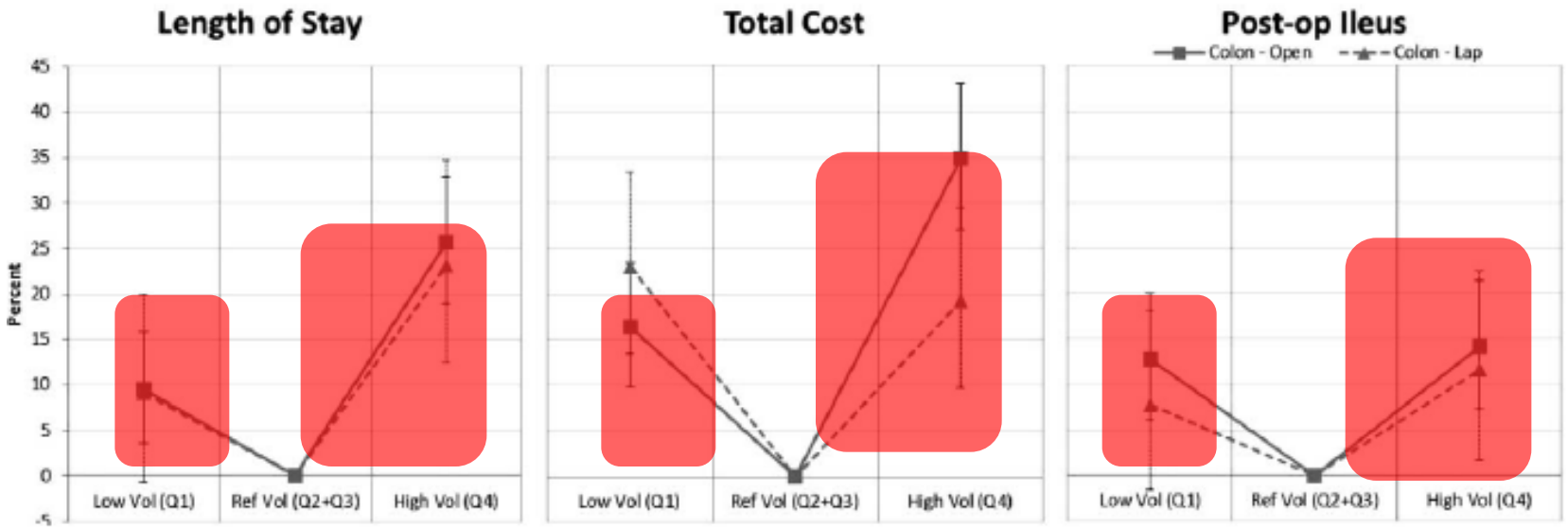
Bundgaard-Nielsen et al. Acta Anesth Scand 2009; 53: 843

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)§*



RESEARCH Open Access

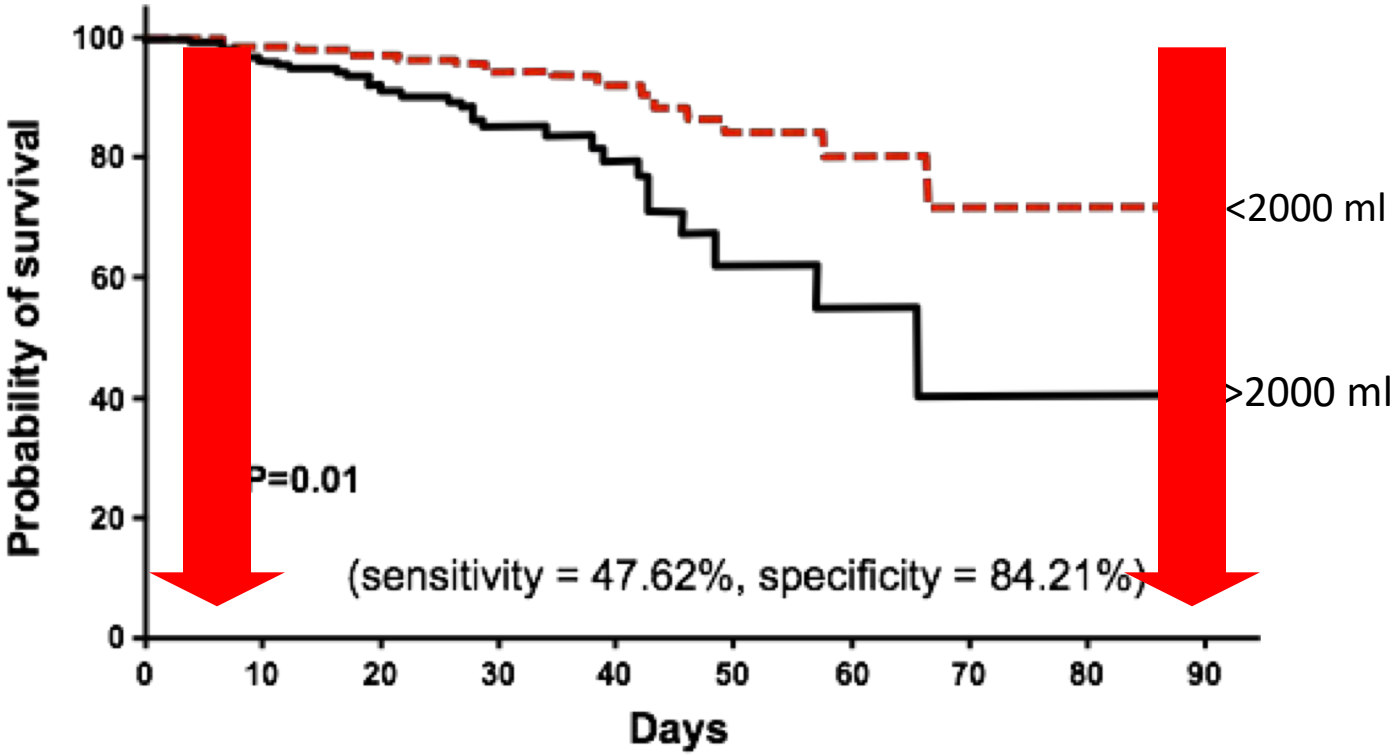
The effect of excess fluid balance on the mortality rate of surgical patients: a multicenter prospective study

João M Silva Jr[1,2,4*], Amanda Maria Ribas Rosa de Oliveira[2,3], Fernando Augusto Mendes Nogueira[1], Pedro Monferrari Monteiro Vianna[1], Marcos Cruz Pereira Filho[1], Leandro Ferreira Dias[1], Vivian Paz Leão Maia[1], Cesar de Souza Neucamp[1], Cristina Prata Amendola[3], Maria José Carvalho Carmona[2] and Luiz M Sá Malbouisson[2]

CRITICAL CARE

N=479 patients aged ≥18 years that have undergone surgery that required postoperative ICU

BALANCE INTRAOPERATORIO



Silva et al. Critical Care 2013, 17:R288

RESEARCH Open Access

The effect of excess fluid balance on the mortality rate of surgical patients: a multicenter prospective study

Variables	Fluid balance is not excessive (n = 372)	Fluid balance is excessive (n = 107)	*P*
Postoperative organ dysfunction (%)	57.1	77.4	<0.001
Cardiovascular	39.6	63.2	<0.001
Neurological	13.2	46.2	<0.001
Respiratory	11.6	34.3	<0.001
Urine output in the first postoperative 24 hours (mL)	1,300.0 (800.0 to 2,100.0)	1,050.0 (700.0 to 1,750.0)	0.034
Infection	25.9	41.9	0.001
ICU stay (days)	3.0 (2.0 to 6.0)	4.0 (3.0 to 8.0)	<0.001

LA GRAN PREGUNTA:

QUÉ ES NORMOVOLEMIA O FLUIDOTERAPIA ÓPTIMA?

BJA

"I would have everie man write what he knowes and no more."—Montaigne

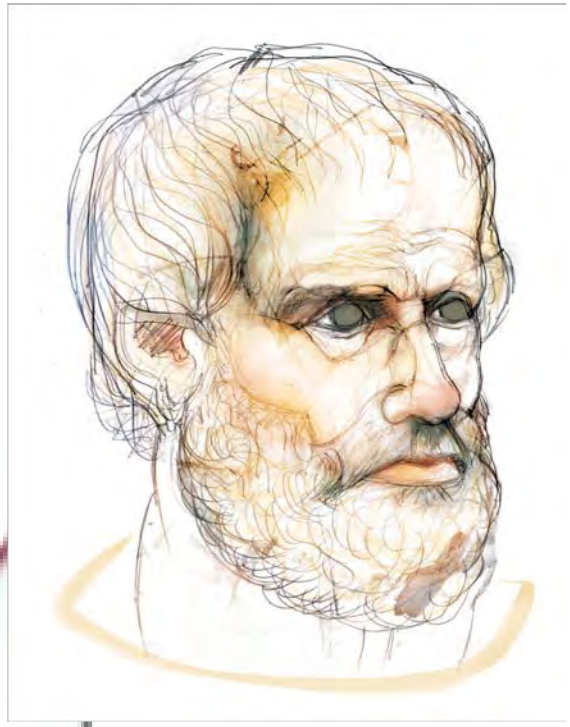
BRITISH JOURNAL OF ANAESTHESIA

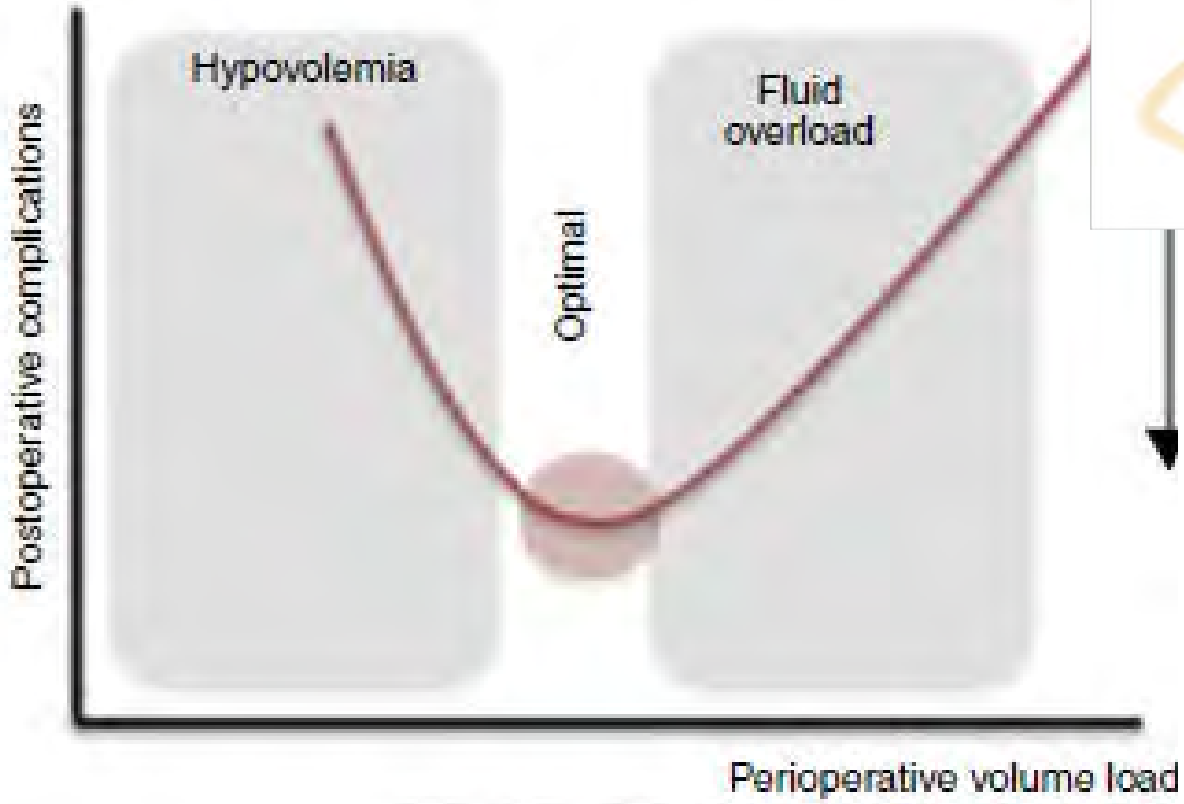
Volume 97, Number 6, December 2006

British Journal of Anaesthesia 97 (6): 755–7 (2006)
doi:10.1093/bja/ael290

Editorial

Wet, dry or something else?



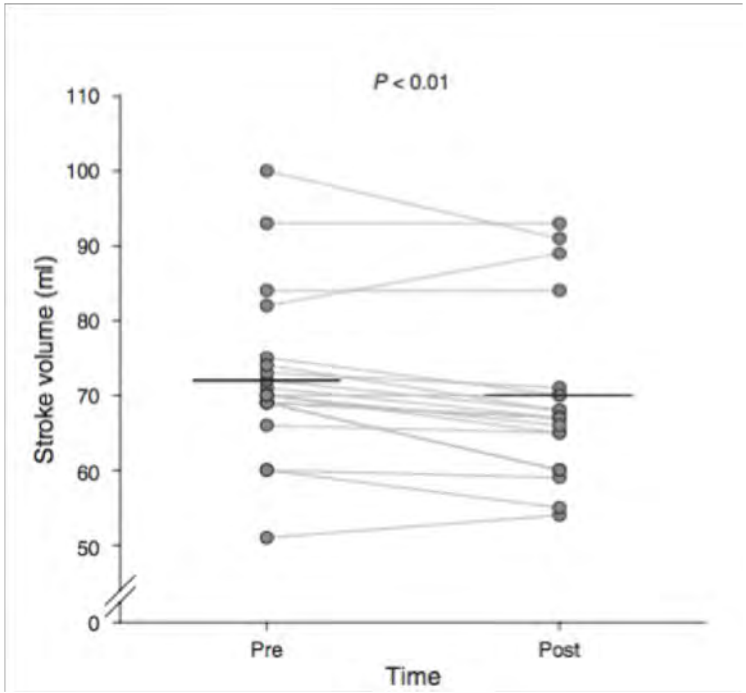


Clin Physiol Funct Imaging (2010) **30,** pp318–322 doi: 10.1111/j.1475-097X.2010.00944.x

Normovolemia defined according to cardiac stroke volume in healthy supine humans

Morten Bundgaard-Nielsen[1,2], Christoffer C. Jørgensen[1,2], Henrik Kehlet[2] and Niels H. Secher[1]

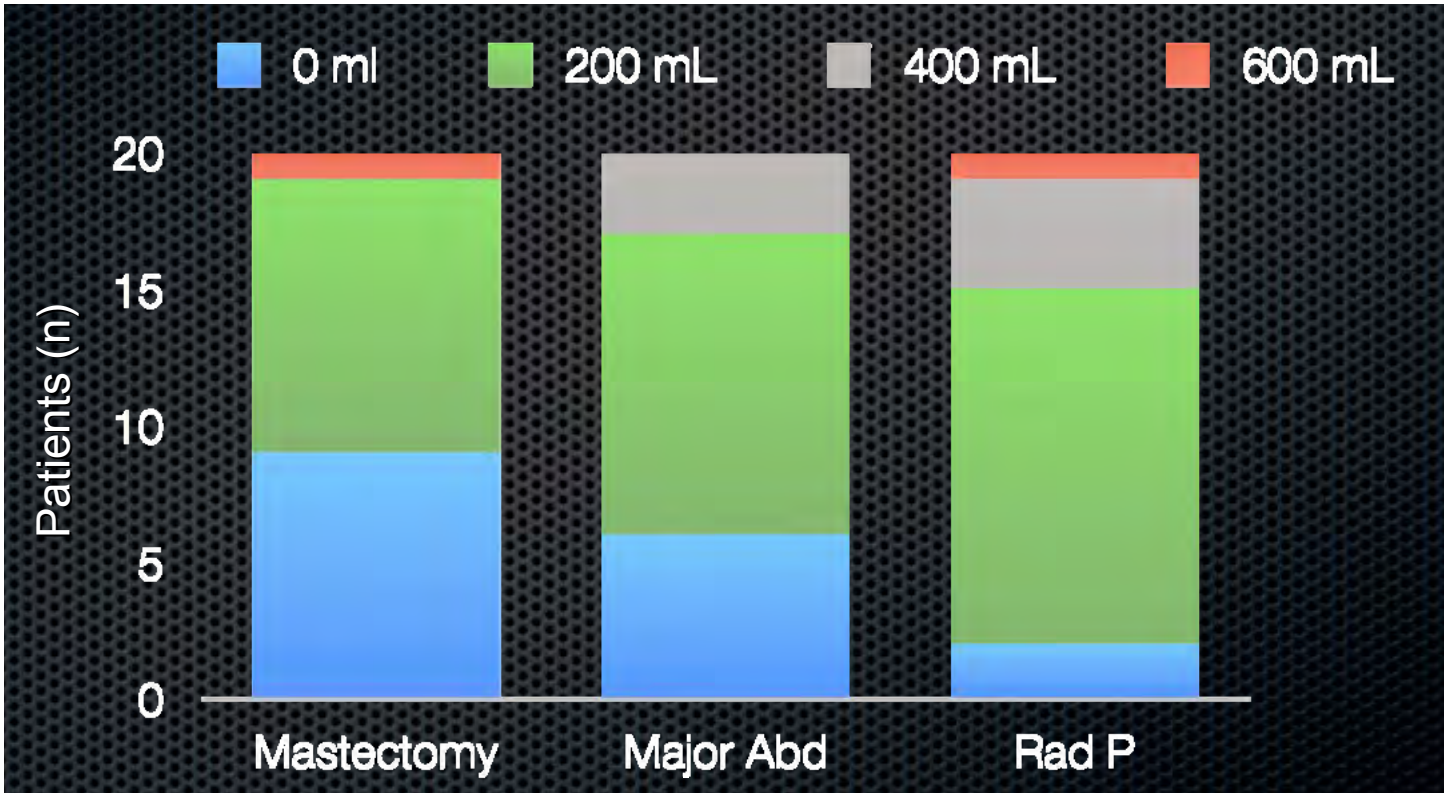
[1]*Department of Anesthesiology, and* [2]*Section of Surgical Pathophysiology, Rigshospitalet, University of Copenhagen, Denmark*



Conclusion: Supporting the proposed definition of normovolemia, non-fasting, supine, healthy subjects are provided with a preload to the heart that does not limit SV suggesting that the upper flat part of the Frank-Starling relationship is reached.

Functional intravascular volume deficit in patients before surgery

M. Bundgaard-Nielsen[1,2], C. C. Jørgensen[1,2], N. H. Secher[2] and H. Kehlet[1]
[1]*Section of Surgical Pathophysiology and* [2]*Department of Anaesthesia, Rigshospitalet, University of Copenhagen, Copenhagen, Denmark*

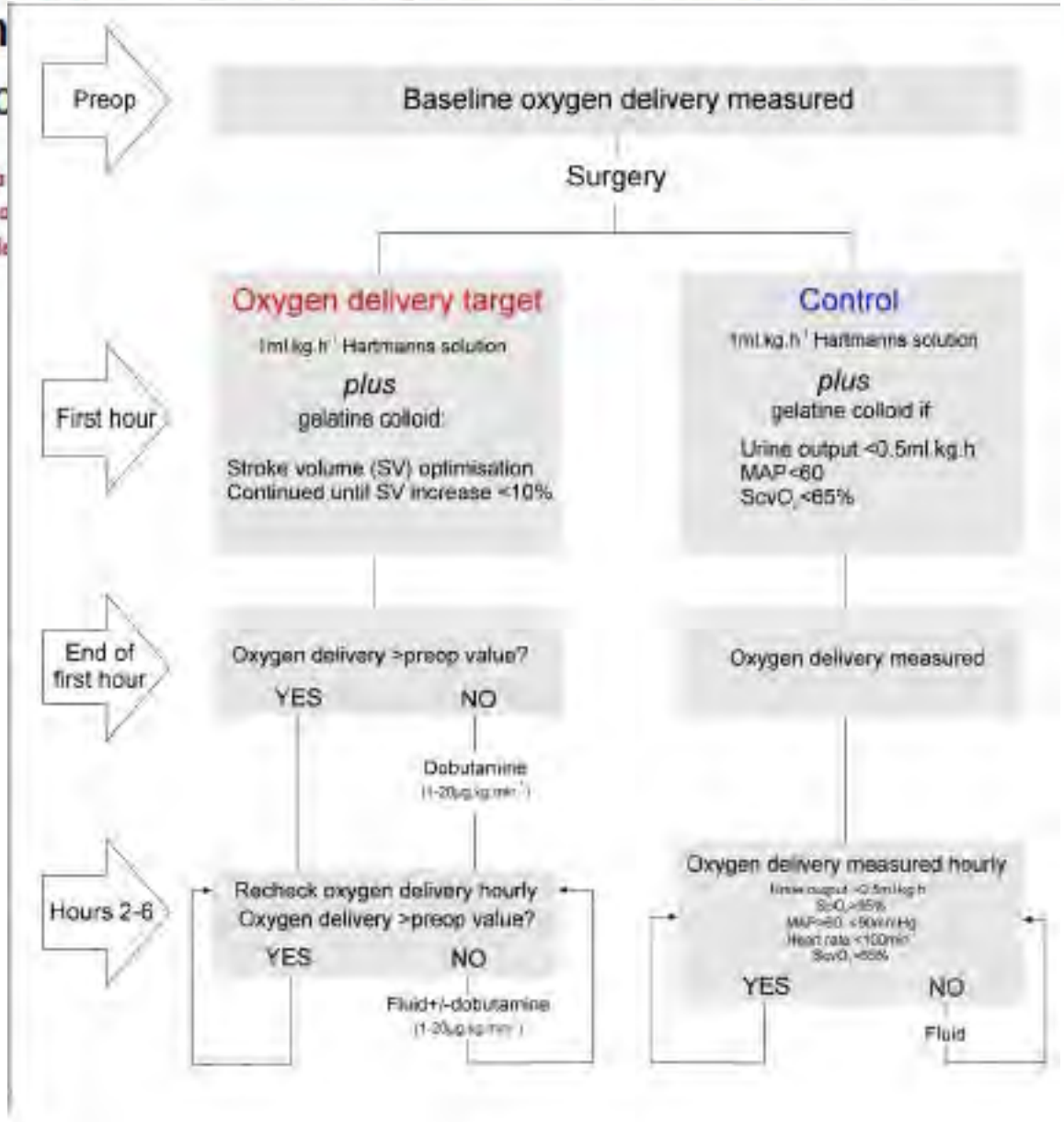


BAJO RIESGO

ALTO RIESGO

Individualised oxygen delivery targeted haemodynamic therapy in high
randomised, do

Gareth L Ackland, Sadaf Iqbal, Laura
Anna Reyes, Mervyn Singer, Mark Ho
(Post Operative Morbidity- Oxygen de



Individualised oxygen delivery targeted haemodynamic therapy in high-risk surgical patients: a multicentre, randomised, double-blind, controlled, mechanistic trial

Gareth L Ackland, Sadaf Iqbal, Laura Gallego Paredes, Andrew Toner, Craig Lyness, Nicholas Jenkins, Phoebe Bodger, Shamir Karmali, John Whittle, Anna Reyes, Mervyn Singer, Mark Hamilton, Maurizio Cecconi, Rupert M Pearse, Susan V Mallett, Rumana Z Omar, for the POM-O (PostOperative Morbidity-Oxygen delivery) study group*

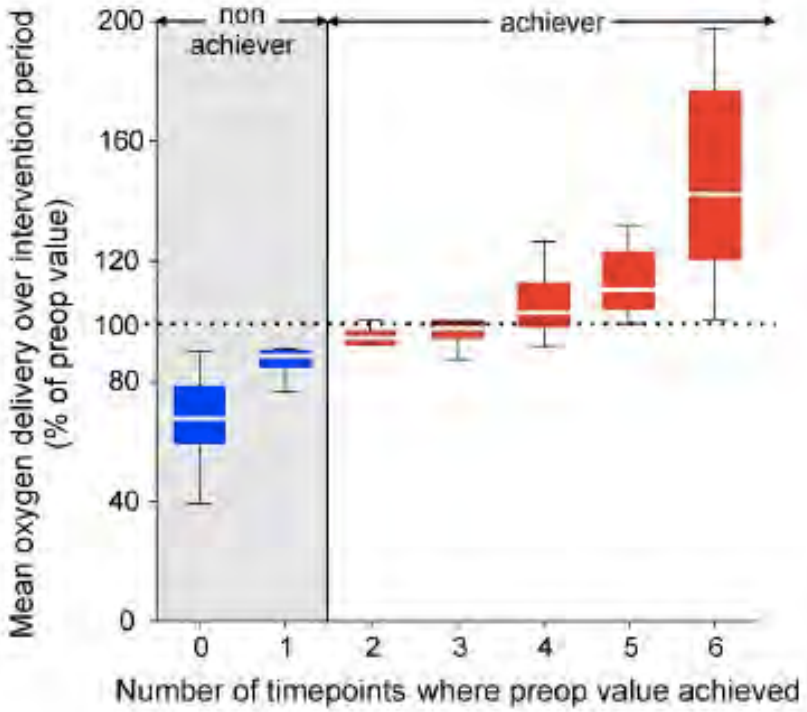
	Control (n=92)	Goal-directed therapy (n=95)	ARR (95% CI)	p value
Clavien–Dindo grade II or more	49 (53%)	44 (46%)	−7 (−22 to 7)	0·30
POMS-defined morbidity	85 (92%)	91 (96%)	−3 (−10 to 3)	0·32
Pulmonary	69 (75%)	79 (83%)	−10 (−22 to 1)	
Infection	34 (37%)	34 (36%)	1 (−13 to 15)	
Renal	76 (83%)	81 (85%)	−3 (−13 to 8)	
Gastrointestinal	55 (60%)	63 (66%)	−7 (−20 to 7)	
Cardiovascular	24 (26%)	27 (28%)	−2 (−15 to 10)	
Neurological	17 (18%)	9 (9%)	9 (−1 to 19)	
Wound	3 (3%)	3 (3%)	0 (−5 to 5)	
Haematological	8 (9%)	11 (12%)	−3 (−12 to 6)	
Pain	67 (73%)	79 (83%)	−10 (−22 to 1)	
Mobility	80 (87%)	85 (89%)	−3 (−12 to 7)	

Data are n (%) unless otherwise stated. Excludes patients randomised preoperatively but who met exclusion criteria by the end of their operation. p values are for prespecified primary outcomes. ARR=absolute risk reduction. POMS=Postoperative Morbidity Survey.

Table 4: **Morbidity on postoperative day 2**

Individualised oxygen delivery targeted haemodynamic therapy in high-risk surgical patients: a multicentre, randomised, double-blind, controlled, mechanistic trial

Gareth L Ackland, Sadaf Iqbal, Laura Gallego Paredes, Andrew Toner, Craig Lyness, Nicholas Jenkins, Phoebe Bodger, Shamir Karmali, John Whittle, Anna Reyes, Mervyn Singer, Mark Hamilton, Maurizio Cecconi, Rupert M Pearse, Susan V Mallett, Rumana Z Omar, for the POM-O (PostOperative Morbidity-Oxygen deli

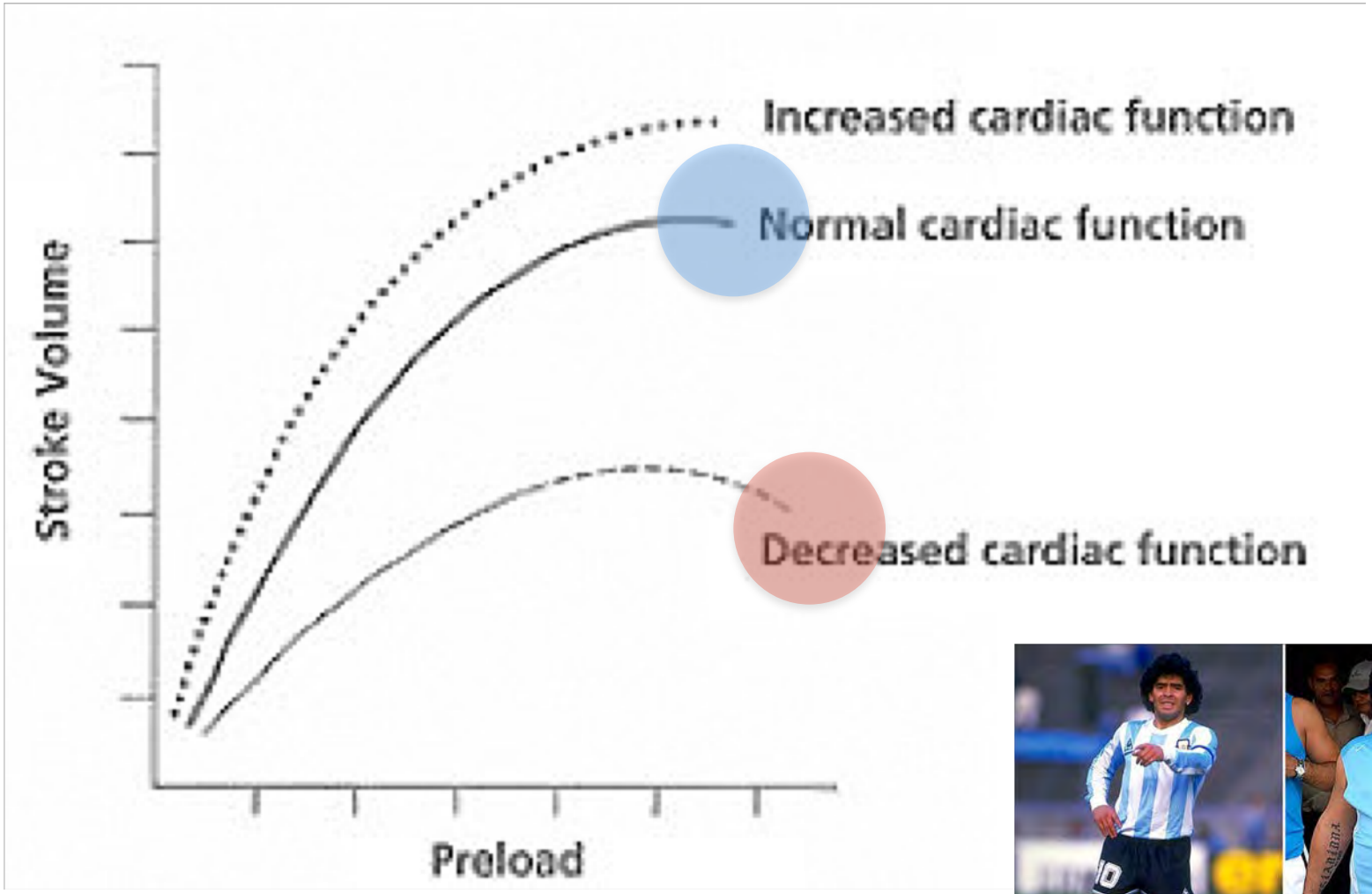


	Non-achiever (n=64)	Achiever* (n=123)	ARR (95% CI)	p-value
Clavien-Dindo >grade 2	40 (62·5%)	53 (43·1%)	19% [3-34%]	p=0.016

2 GRANDES CONCLUSIONES

LOS PACIENTES QUE NO ALCANZAN DO_2 BASAL SE COMPLICAN MÁS

LOS MÉTODOS HABITUALES PARA MANEJO HDM NO SIRVEN


Increased cardiac function
Normal cardiac function
Decreased cardiac function
Stroke Volume
Preload

Plumb et al. Extrem Physiol Med (2016) 5:5
DOI 10.1186/s13728-016-0046-0

Extreme Physiology & Medicine

REVIEW

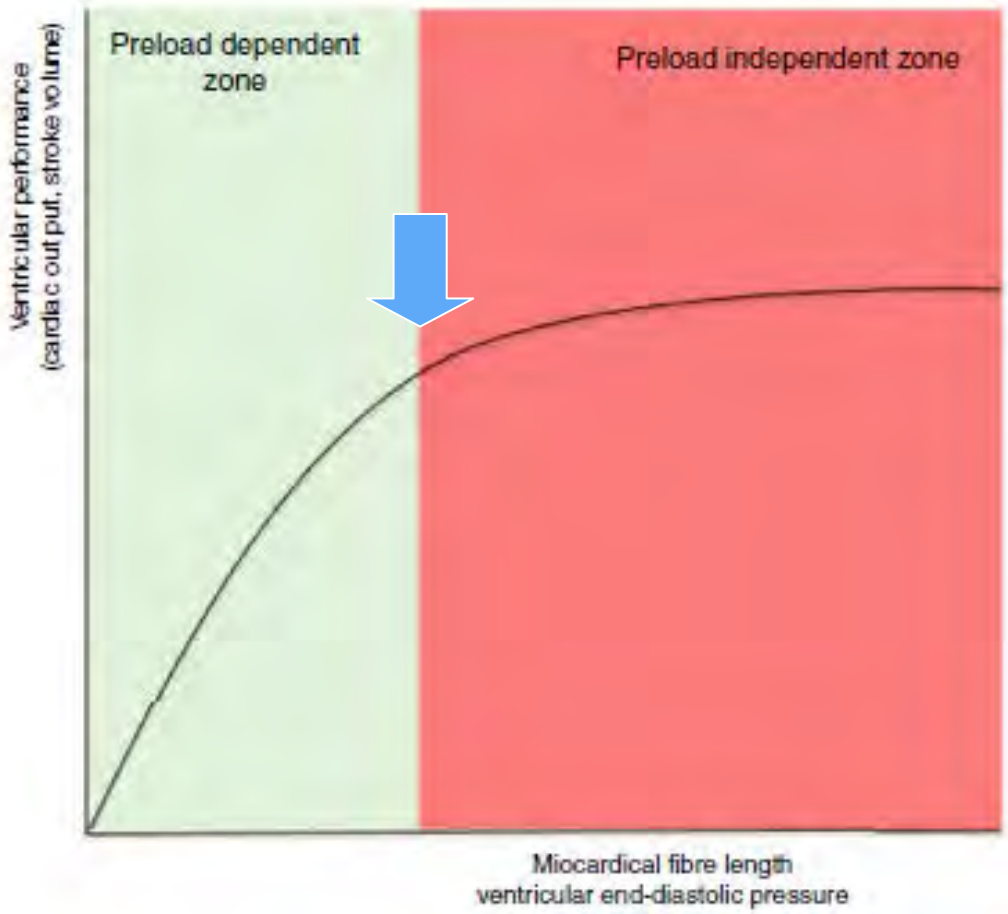
Open Access

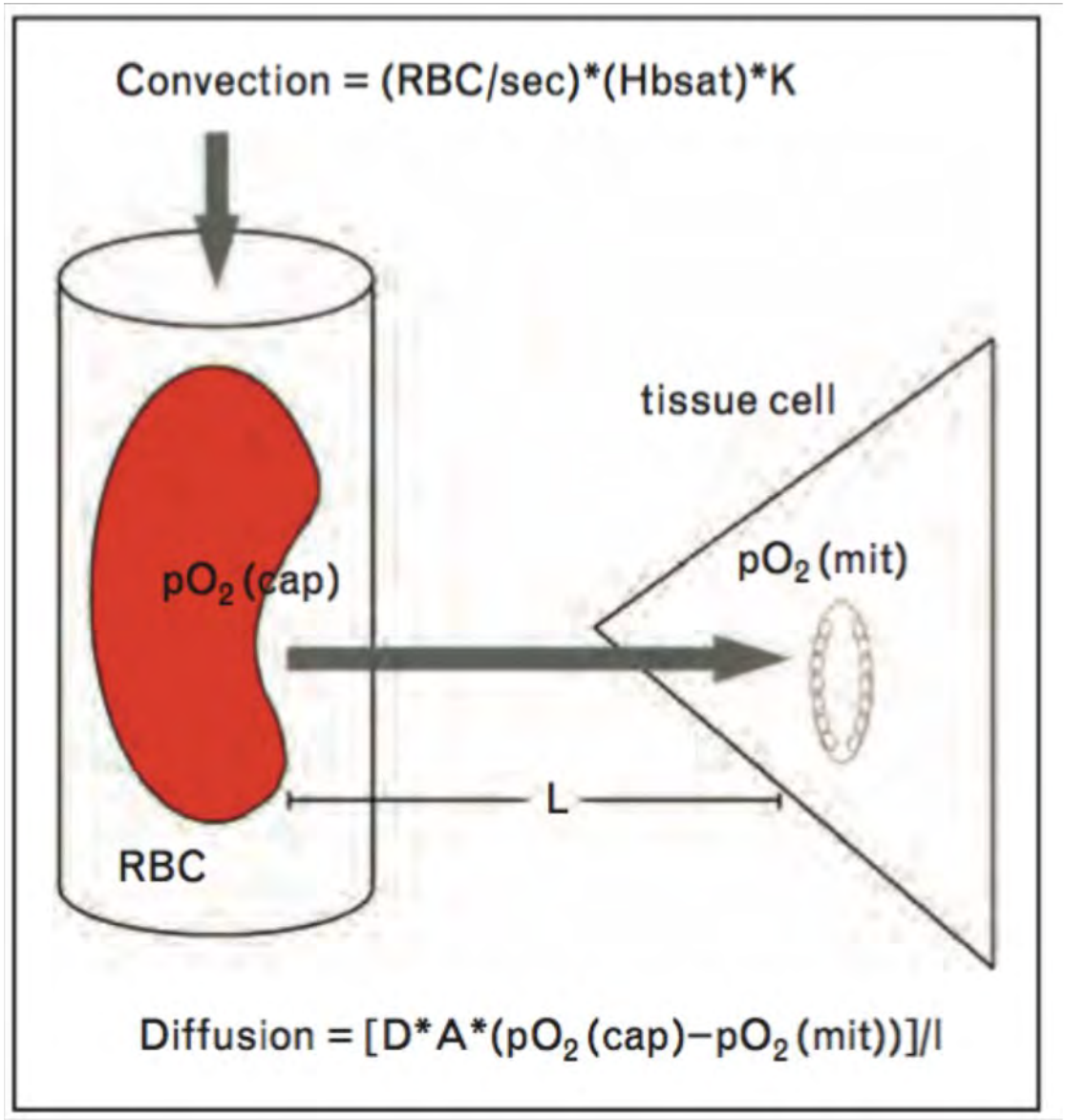
'Blood doping' *from Armstrong to prehabilitation:* manipulation of blood to improve performance in athletes and physiological reserve in patients

James O. M. Plumb[1,2,3,4*], James M. Otto[5] and Michael P. W. Grocott[1,2,3,4]

Recomendaciones de fluidoterapia perioperatoria para la cirugía abdominal mayor. Revisión de las recomendaciones de la Vía RICA. Parte II: Terapia hemodinámica guiada por objetivos. Fundamento para la optimización del volumen intravascular

J. Ripollés-Melchor[a,*], D. Chappell[b], H.D. Aya[c], Á. Espinosa[d], M.G. Mhyten[e], A. Abad-Gurumeta[a], S.D. Bergese[f], R. Casans-Francés[g], J.M. Calvo-Vecino[h]




Convection = (RBC/sec)*(Hbsat)*K
tissue cell
pO_2 (cap)
pO_2 (mit)
L
RBC
Diffusion = [D*A*(pO_2 (cap)−pO_2 (mit))]/l

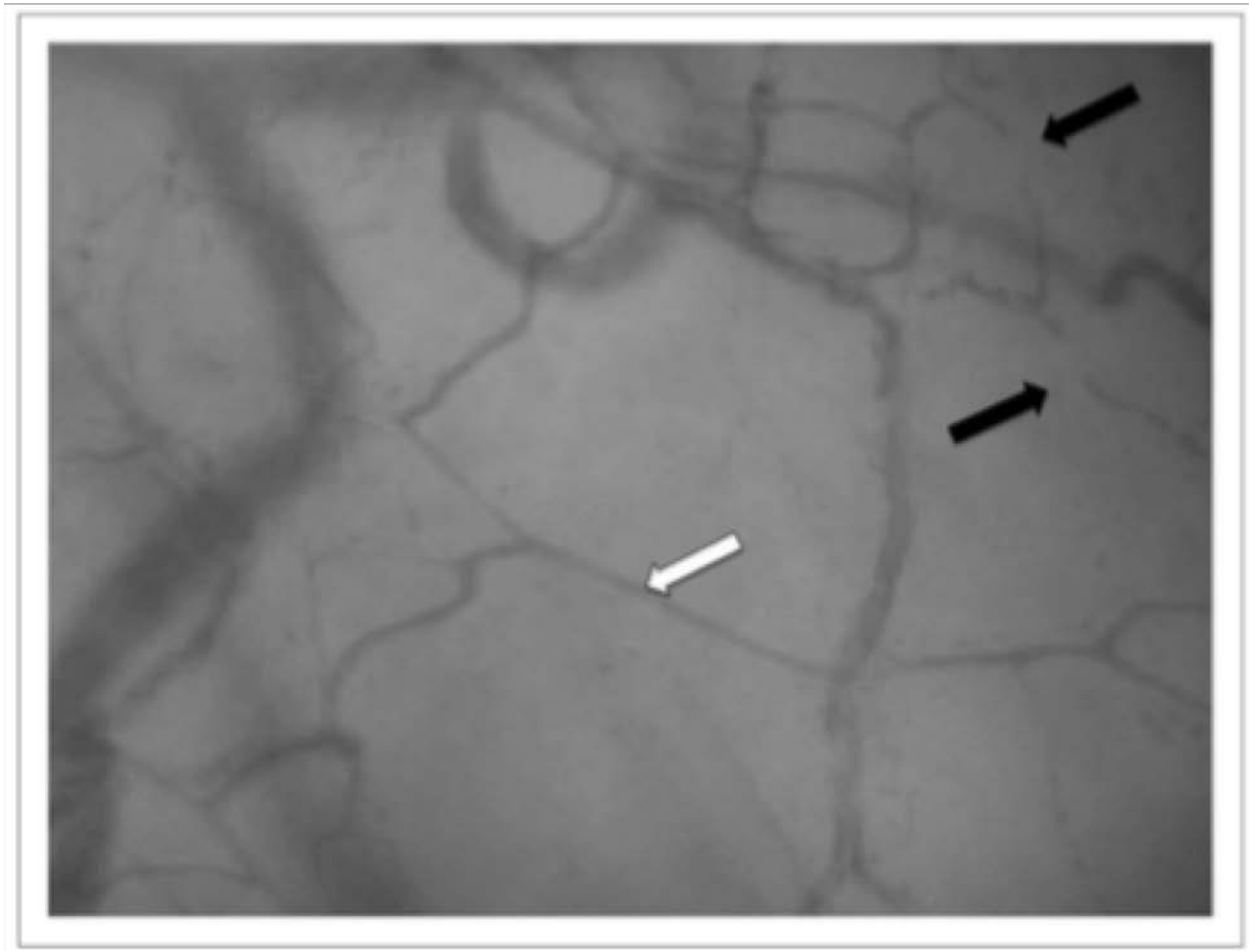
REVIEW

Virulence 5:1, 73–79; January 1, 2014; © 2014 Landes Bioscience

Pathophysiology of microcirculatory dysfunction and the pathogenesis of septic shock

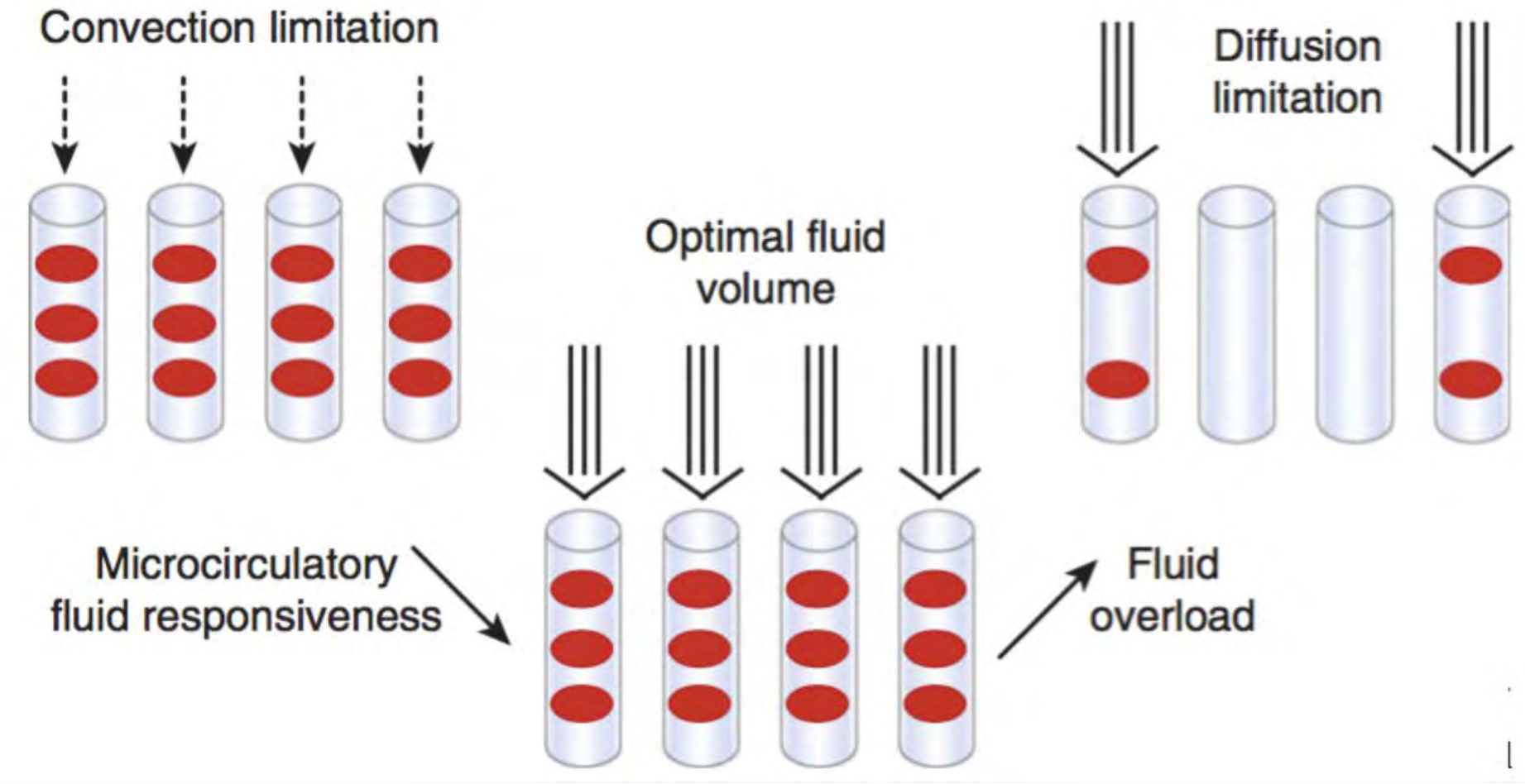
Daniel De Backer*, Diego Orbegozo Cortes, Katia Donadello, and Jean-Louis Vincent

Department of Intensive Care; Erasme University Hospital; Université Libre de Bruxelles (ULB); Bruxelles, Belgium



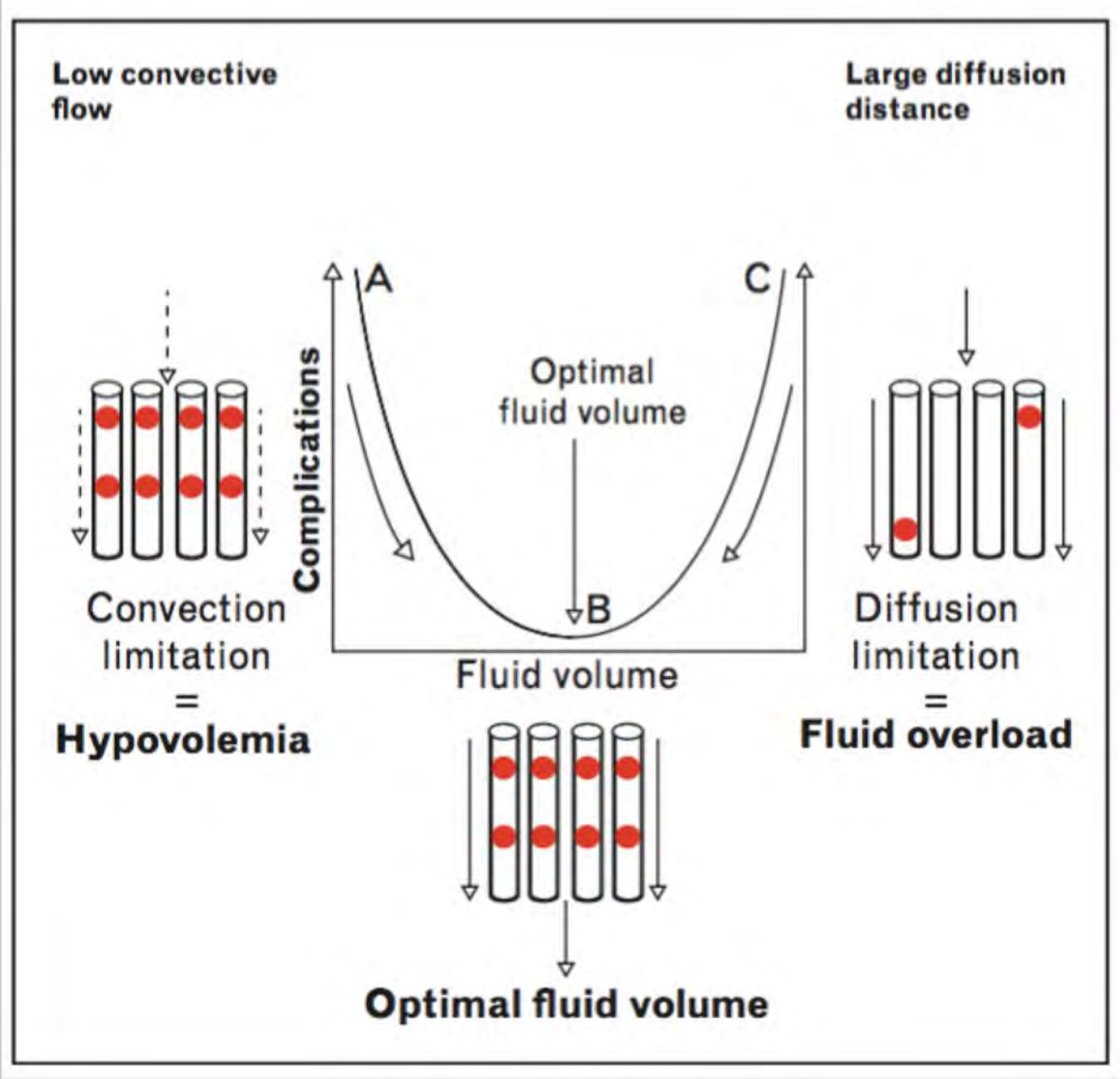
CRITICAL CARE
REVIEW Open Access

Hemodynamic coherence and the rationale for monitoring the microcirculation



FLUIDOTERAPIA GUIADA A LA MICROCIRCULACIÓN

El fin de la fluidoterapia es mejorar el gasto cardiaco con el fin de mejorar la perfusión capilar.

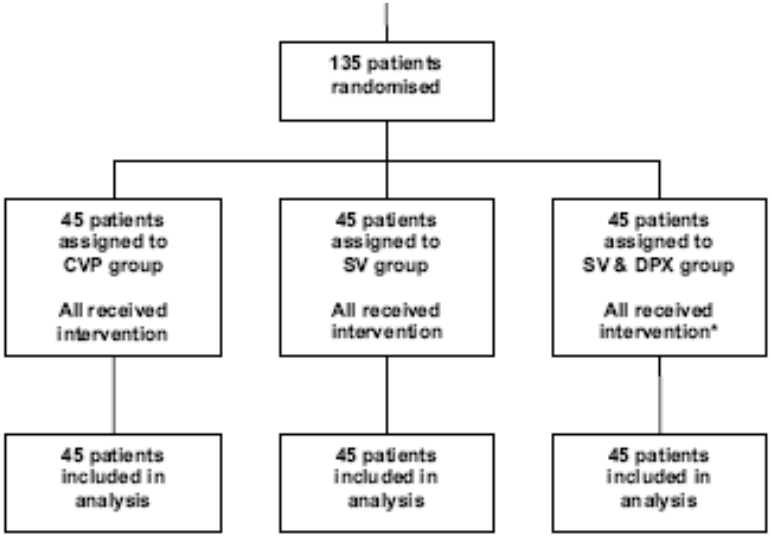


FLUIDOTERAPIA ÓPTIMA

Condición en la que existe una convección óptima de hematíes, y los capilares presentan un relleno de hematíes óptimo

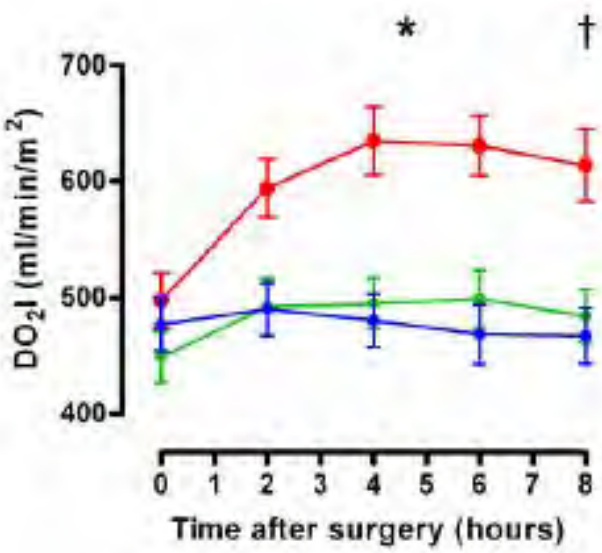
Haemodynamic optimisation improves tissue microvascular flow and oxygenation after major surgery: a randomised controlled trial

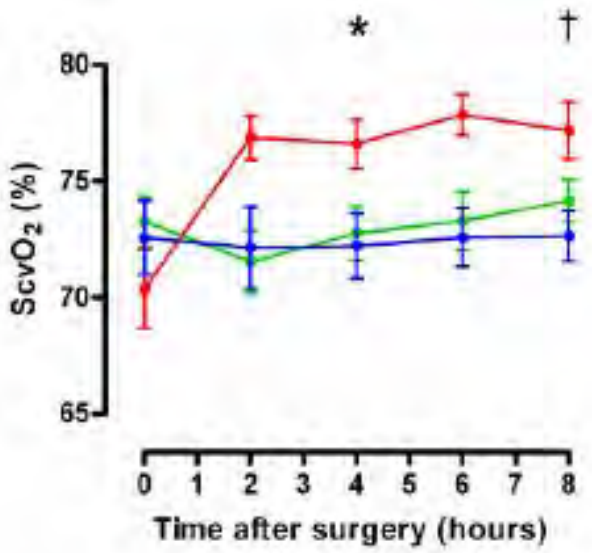
Shaman Jhanji[1], Amanda Vivian-Smith[2], Susana Lucena-Amaro[2], David Watson[1], Charles J Hinds[1], Rupert M Pearse[1*]



Haemodynamic optimisation improves tissue microvascular flow and oxygenation after major surgery: a randomised controlled trial

Shaman Jhanji[1], Amanda Vivian-Smith[2], Susana Lucena-Amaro[2], David Watson[1], Charles J Hinds[1], Rupert M Pearse[1*]





Haemodynamic optimisation improves tissue microvascular flow and oxygenation after major surgery: a randomised controlled trial

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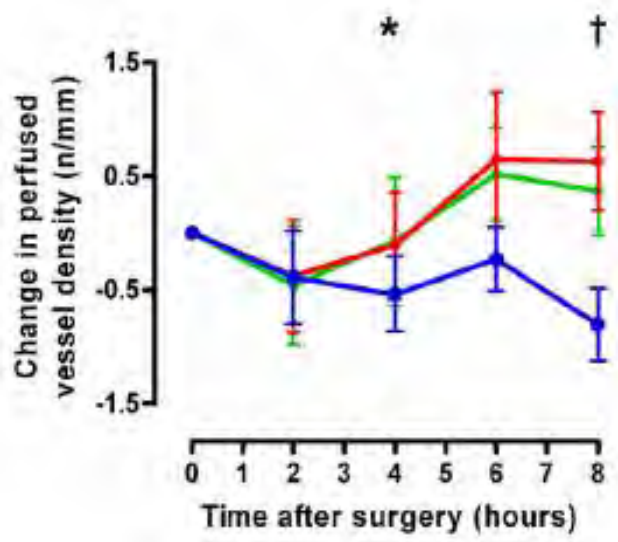
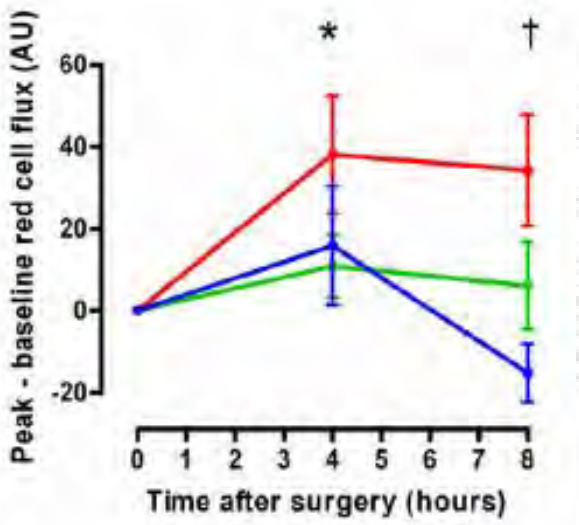
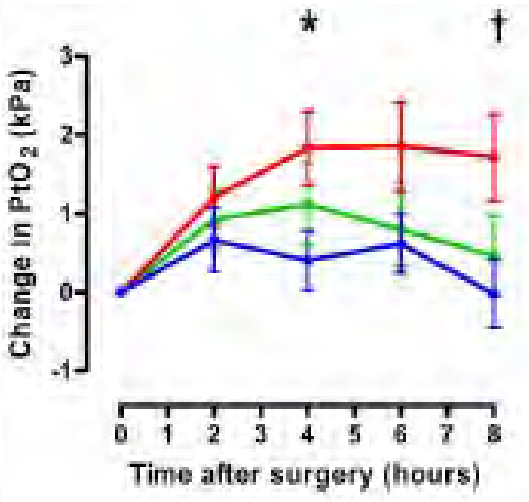
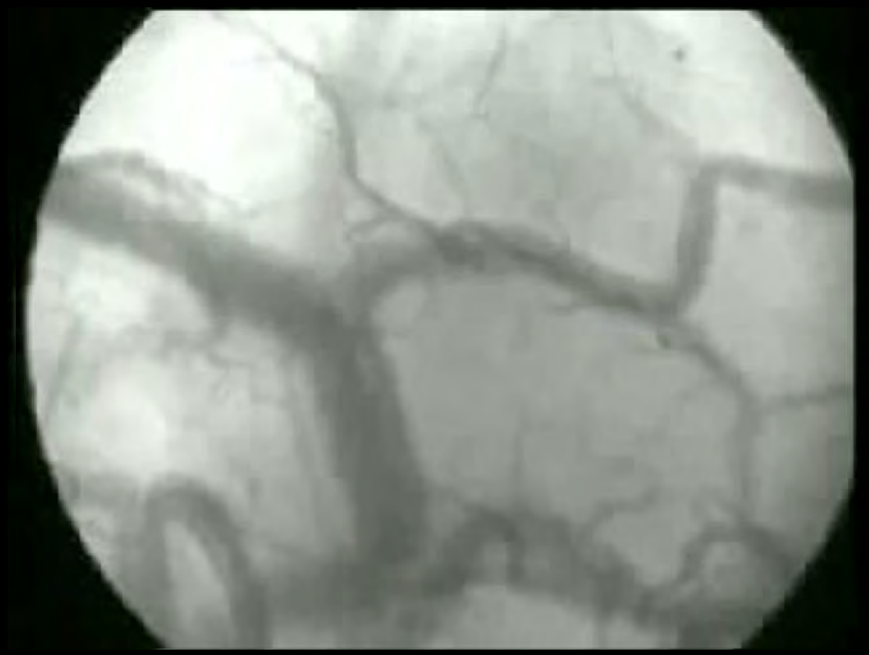








PREOPERATORIO

POSTOPERATORIO

Haemodynamic optimisation improves tissue microvascular flow and oxygenation after major surgery: a randomised controlled trial

Shaman Jhanji[1], Amanda Vivian-Smith[2], Susana Lucena-Amaro[2], David Watson[1], Charles J Hinds[1], Rupert M Pearse[1*]

Table 5 Clinical outcomes in the three intervention groups

	CVP group *n* = 45	SV group *n* = 45	SV & DPX group *n* = 45	*P*
Complications (number of patients, %)	30 (67%)	26 (58%)	31 (69%)	0.51
Cardiac complications (number of patients, %)	4 (9%)	3 (7%)	3 (7%)	0.90
Infectious complications (number of patients, %)	29 (64%)	24 (53%)	28 (62%)	0.52
Other complications (number of patients, %)	10 (22%)	14 (31%)	12 (27%)	0.63
Acute kidney injury within 7 days of surgery	10 (22%)	3 (7%)	4 (9%)	0.055*
Critical care free days within 28 days of surgery	24 (21-26)	24 (21-26)	26 (21-27)	0.45
Duration of hospital stay (days)	15 (10-26)	14 (11-26)	16 (11-28)	0.73
Hospital mortality (%)	6 (13%)	5 (11%)	4 (9%)	0.45

UN POCO COMPLICADO EN EL DÍA A DÍA

QUÉ PODEMOS HACER EN EL DÍA A DÍA?

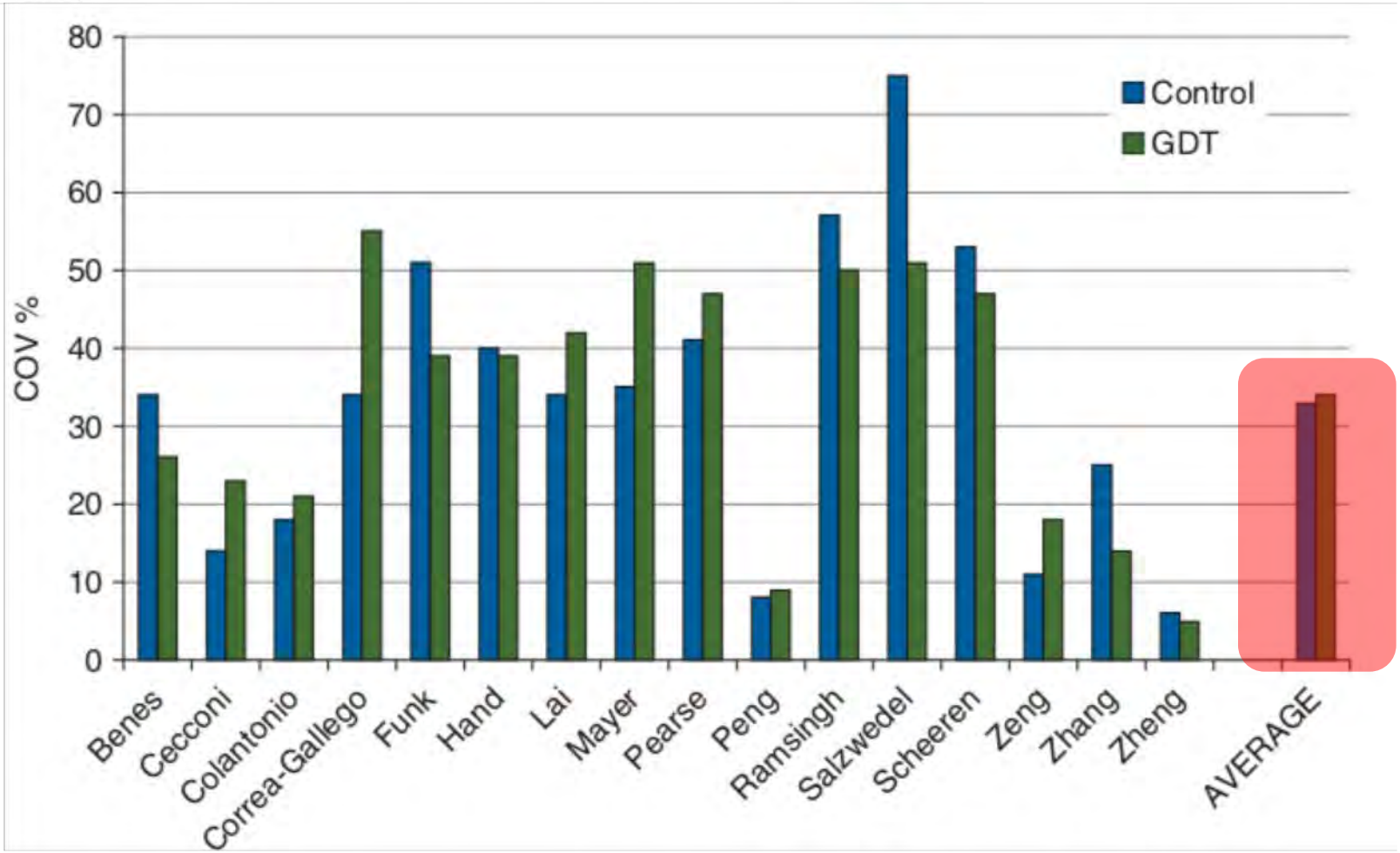
1. EVITAR SOBRECARGA DE VOLUMEN
2. SELECCIONAR EL FLUIDO ADECUADO
3. GDHT DE FORMA SENCILLA Y POCO INVASIVA
4. ASEGURAR QUE SE CUMPLE!

REVIEW ARTICLE

Perioperative goal-directed therapy with uncalibrated pulse contour methods: impact on fluid management and postoperative outcome

F. Michard[1,*], M. T. Giglio[2] and N. Brienza[2]

[1]MiCo, Chemin de Chapallaz 4, Denens, Switzerland and [2]Department of Emergency and Organ Transplantation, Anaesthesia and Intensive Care Unit, University of Bari, Policlinico, Piazza G. Cesare 11, 70124 Bari, Italy



ORIGINAL ARTICLE

ONLINE FIRST

Adherence to the Enhanced Recovery After Surgery Protocol and Outcomes After Colorectal Cancer Surgery

Ulf O. Gustafsson, MD, PhD; Jonatan Hausel, MD; Anders Thorell, MD, PhD; Olle Ljungqvist, MD, PhD; Mattias Soop, MD, PhD; Jonas Nygren, MD, PhD; for the Enhanced Recovery After Surgery Study Group

For each additional liter of fluids given during the day of operation, the risk of postoperative symptoms delaying recovery increased by 16% (OR, 1.16; 95% CI 1.02-1.31) and the probability of **postoperative complications increased by 32%** (OR, 1.32; 95% CI, 1.17-1.50).

British Journal of Anaesthesia 108 (1): 53–62 (2012)
Advance Access publication 26 August 2011 · doi:10.1093/bja/aer273

BJA

Randomized controlled trial of intraoperative goal-directed fluid therapy in aerobically fit and unfit patients having major colorectal surgery

C. Challand[1,3], R. Struthers[2,3], J. R. Sneyd[2,3], P. D. Erasmus[2], N. Mellor[1], K. B. Hosie[1] and G. Minto[2,3]*

Randomized controlled trial of stroke volume optimization during elective major abdominal surgery in patients stratified by aerobic fitness

C. W. Lai[1,3], T. Starkie[2], S. Creanor[3], R. A. Struthers[2,3], D. Portch[4], P. D. Erasmus[2], N. Mellor[1], K. B. Hosie[1], J. R. Sneyd[2,3] and G. Minto[2,3,*]

UTION.

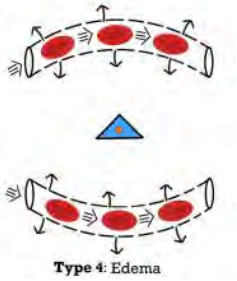
edian (IQR) or absolute number. Data

			Difference	P-value
Surgical readiness for discharge (days)	4.7 (3.0–7.8)	7.0 (4.7–9.6)	+2.3	0.01
Total postoperative stay (days)	6.0 (4.1–9.8)	8.8 (6.8–11.0)	+2.8	0.01
Flatus passed (days)	1.7 (0.7–2.8)	1.5 (0.7–2.6)	−0.2	0.59
Bowel movement (days)	2.7 (0.9–3.7)	2.9 (1.3–4.9)	+0.2	0.16
Toleration of diet (days)	1.6 (0.7–2.8)	1.7 (0.8–3.0)	+0.1	0.41
Any deviation from normal postoperative course	38	42		0.47
Serious postoperative complication (Dindo grade 3–5)[19]	6	6		0.32
Critical care admission	5	14		0.03
Readmission <30 days	10	11		0.36
Mortality				
<30 days	2	1		0.46
<90 days	3	2		0.43

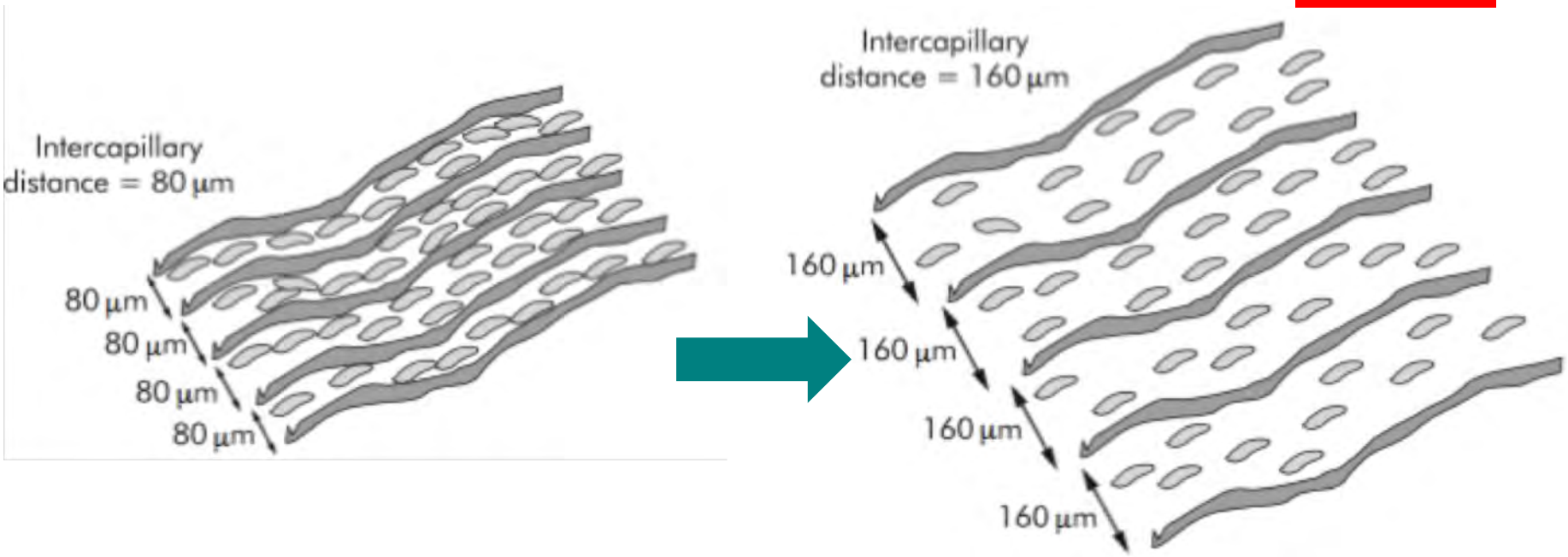
CRITICAL CARE
REVIEW Open Access

Hemodynamic coherence and the rationale for monitoring the microcirculation

PÉRDIDA DE COHERENCIA HEMODINÁMICA DE TIPO 4



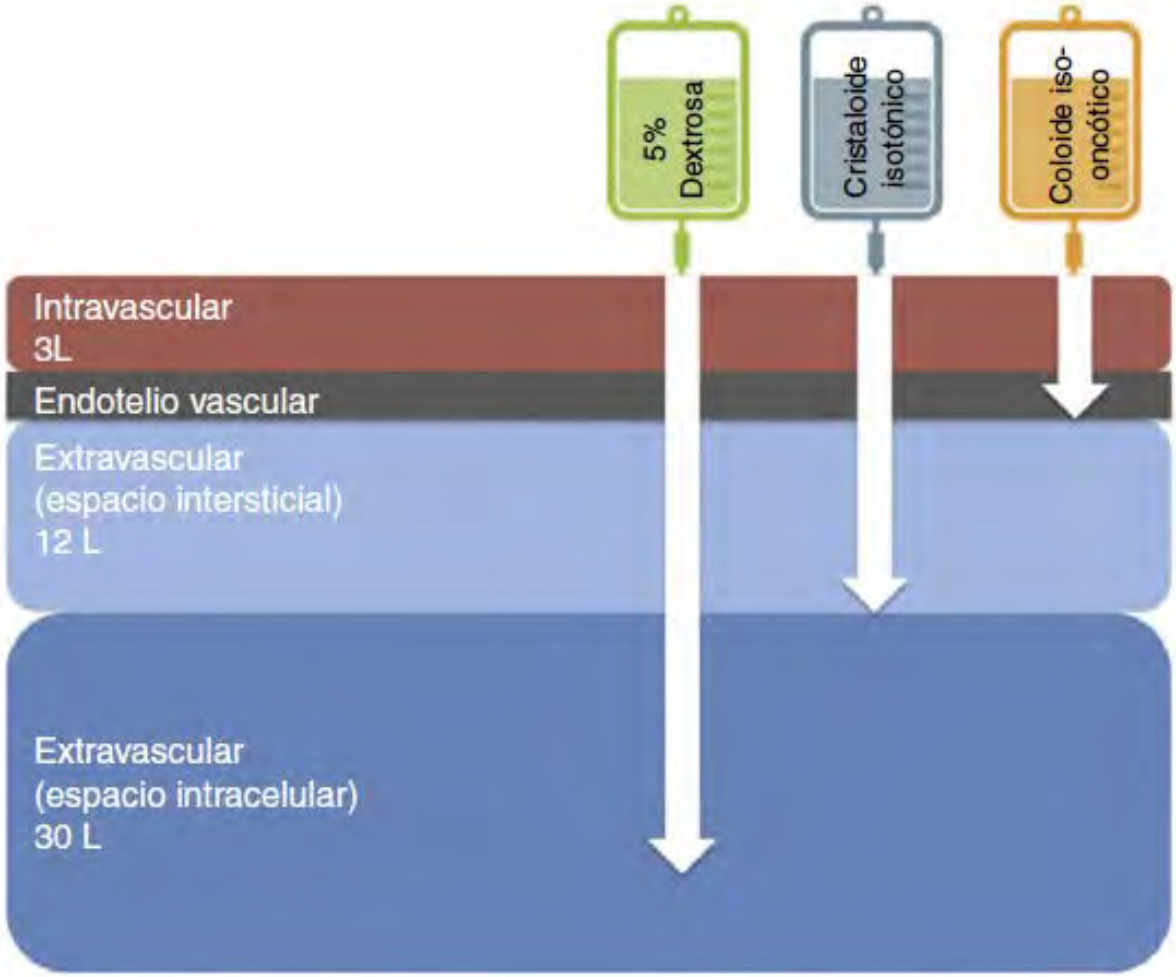
DIFUSIÓN LIMITADA



Gradiente de oxígeno a mitocondria disminuye, pese a una DO2 adecuada

Perioperative fluid therapy recommendations for major abdominal surgery. Via RICA recommendations revisited. Part I: Physiological background

J. Ripollés-Melchor[a,*], D. Chappell[b], Á. Espinosa[c], M.G. Mhyten[d], A. Abad-Gurumeta[a], S.D. Bergese[e], R. Casans-Francés[f] y J.M. Calvo-Vecino[g]



FLUID PHYSIOLOGY MEETS CLINICAL PRACTICE: THE TRUTH ABOUT VOLUME EFFECTS

Anesthesiology
2000; 92:657–64

Changes in Intravascular Volume during Acute Normovolemic Hemodilution and Intraoperative Retransfusion in Patients with Radical Hysterectomy

Markus Rehm, M.D., Victoria Orth, M.D.,* Uwe Kreimeier, M.D.,† Manfred Thiel, M.D.,* Mathias Haller, M.D.,† Heinz Brechtelsbauer,‡ Udilo Finsterer, M.D.§*

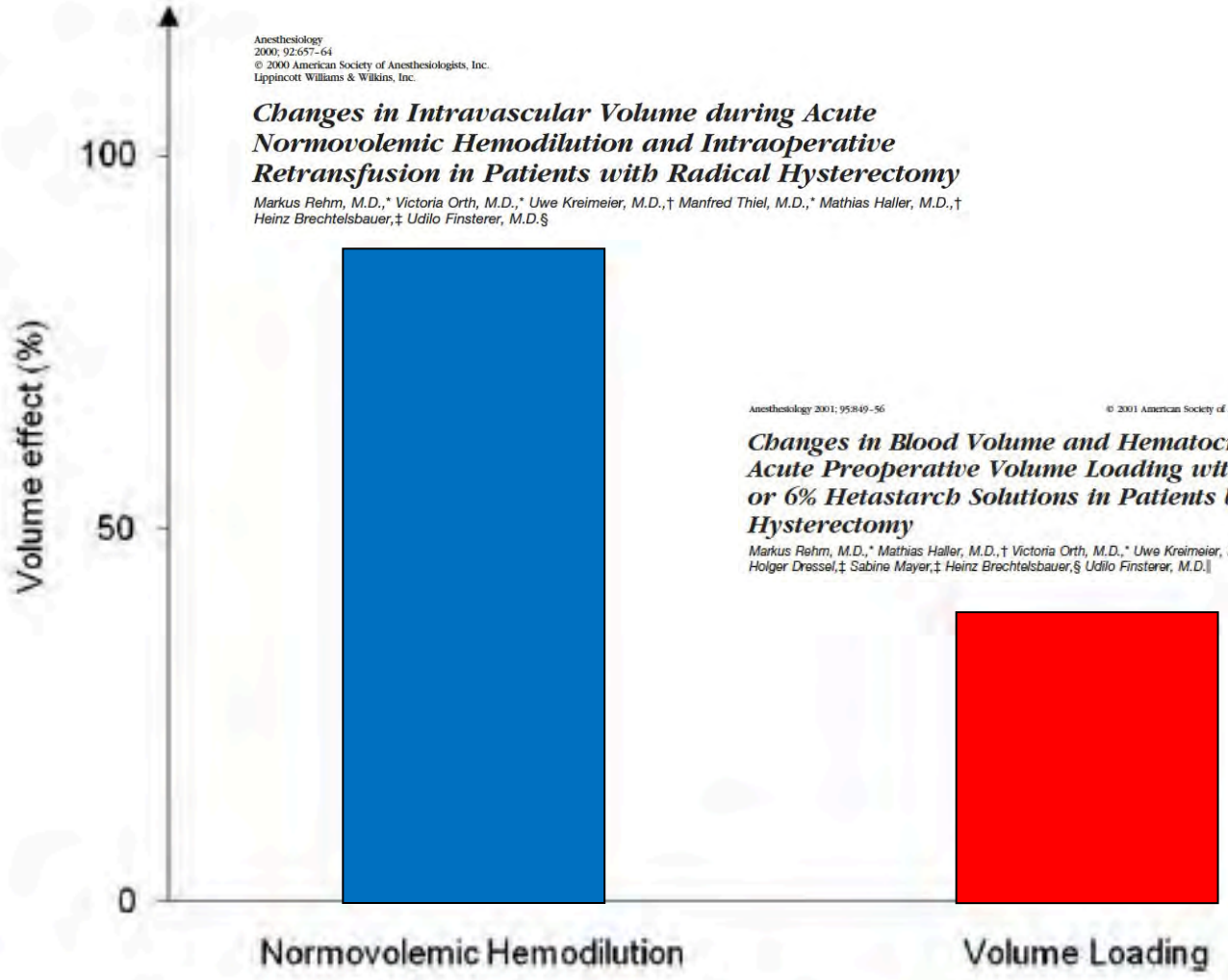
HEMODILUCIÓN NORMOVOLÉMICA

Anesthesiology 2001; 95:849–56

Changes in Blood Volume and Hematocrit during Acute Preoperative Volume Loading with 5% Albumin or 6% Hetastarch Solutions in Patients before Radical Hysterectomy

Markus Rehm, M.D., Mathias Haller, M.D.,† Victoria Orth, M.D.,* Uwe Kreimeier, M.D.,† Mathias Jacob, M.D.,* Holger Dressel,‡ Sabine Mayer,‡ Heinz Brechtelsbauer,§ Udilo Finsterer, M.D.‖*

HEMODILUCIÓN HIPERVOLÉMICA



Anesthesiology
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Changes in Intravascular Volume during Acute Normovolemic Hemodilution and Intraoperative Retransfusion in Patients with Radical Hysterectomy

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Fig. 4. Context-sensitivity of volume effects of isooncotic colloids in normovolemic individuals. Normovolemic hemodilution: removal of mean 1150 (SD 196) ml blood and simultaneous replacement of 1333 (204) ml colloid (5% human albumin, $n = 15$). Volume loading: infusion of 1379 (128) ml colloid ($n = 10$). Bar = SD, difference $p < 0.05$. (Modified from[29]).

DEL MISMO MODO QUE NO TIENE FUNDAMENTO TRATAR UNA HIPOTENSIÓN POR BAJA CARGA ARTERIAL CON FLUIDOS, NO TIENE SENTIDO TRATAR HIPOVOLEMIA CON CRISTALOIDES

Jacob et al. Critical Care 2012, 16:R86
http://ccforum.com/content/16/3/R86

CRITICAL CARE

RESEARCH Open Access

The intravascular volume effect of Ringer's lactate is below 20%: a prospective study in humans

Matthias Jacob[1*†], Daniel Chappell[1†], Klaus Hofmann-Kiefer[1], Tobias Helfen[1], Anna Schuelke[1], Barbara Jacob[1], Alexander Burges[2], Peter Conzen[1] and Markus Rehm[1]

EFECTO EXPANSOR CRISTALOIDE

17 ± 10%

ARTÍCULO ESPECIAL

Guía de práctica clínica para la elección del fluido de restauración volémica perioperatoria en los pacientes adultos intervenidos de cirugía no cardiaca☆,☆☆

M. Basora[a,*], M.J. Colomina[b], V. Moral[c], M.S. Asuero de Lis[d], E. Boix[e], J.L. Jover[f], J.V. Llau[g], M.P. Rodrigo[h], J. Ripollés[i] y J.M. Calvo Vecino[j]

EJA

Eur J Anaesthesiol 2016; **33**:1–34

OPEN

GUIDELINES

Intravascular volume therapy in adults

Guidelines from the Association of the Scientific Medical Societies in Germany

Recommendation 4a-2	GoR
Balanced crystalloid and/or balanced colloid solutions should be used for peri-interventional volume substitution	B

Crystalloid *versus* Colloid for Intraoperative Goal-directed Fluid Therapy Using a Closed-loop System

A Randomized, Double-blinded, Controlled Trial in Major Abdominal Surgery

Alexandre Joosten, M.D., Amelie Delaporte, M.D., Brigitte Ickx, M.D., Karim Touihri, M.D., Ida Stany, M.D., Luc Barvais, M.D., Ph.D., Luc Van Obbergh, M.D., Ph.D., Patricia Loi, M.D., Ph.D., Joseph Rinehart, M.D., Maxime Cannesson, M.D., Ph.D., Philippe Van der Linden, M.D., Ph.D.

Variables	Crystalloid Group (N = 80)	Colloid Group (N = 80)	Difference (95% CI)	*P* Value
Maintenance crystalloid volume (ml · kg^{-1} · h^{-1})	3.8 [3.5 to 4.2]	3.8 [3.4 to 4.1]	0.1 (–0.1 to 0.3)	0.31
Study fluid volume (ml · kg^{-1} · h^{-1})	4.0 [2.6 to 6.2]	2.9 [1.9 to 3.9]	1.2 (0.5 to 1.9)	< **0.001**
Patients reaching limit dose of study solution (%)*	20	1	19 (10 to 28)	< **0.001**
Rescue fluid required (%)†	24	11	13 (1 to 24)	**0.035**
Rescue fluid volume (ml/kg)†	12.2 [4.2 to 18.8]	7.0 [4.7 to 12.2]	2.9 (–2.1 to 10.4)	0.31
Total in (ml · kg^{-1} · h^{-1})	9.5 [6.8 to 11.1]	7.1 [5.7 to 8.5]	2.0 (1.1 to 3.0)	< **0.001**
Urine output (ml · kg^{-1} · h^{-1})	1.2 [0.8 to 1.9]	1.4 [0.9 to 2.3]	–0.2 (–0.5 to 0.0)	0.07
Estimated blood loss (ml · kg^{-1} · h^{-1})	1.7 [0.8 to 3.3]	2.1 [1.1 to 4.1]	–0.3 (–0.8 to 0.2)	0.18
Total out (ml · kg^{-1} · h^{-1})	3.5 [1.9 to 5.6]	4.5 [2.7 to 6.1]	–0.8 (–1.5 to –0.1)	**0.037**
Fluid balance (ml · kg^{-1} · h^{-1})	5.2 [3.2 to 7.5]	2.7 [1.5 to 4.1]	2.6 (1.8 to 3.5)	< **0.001**

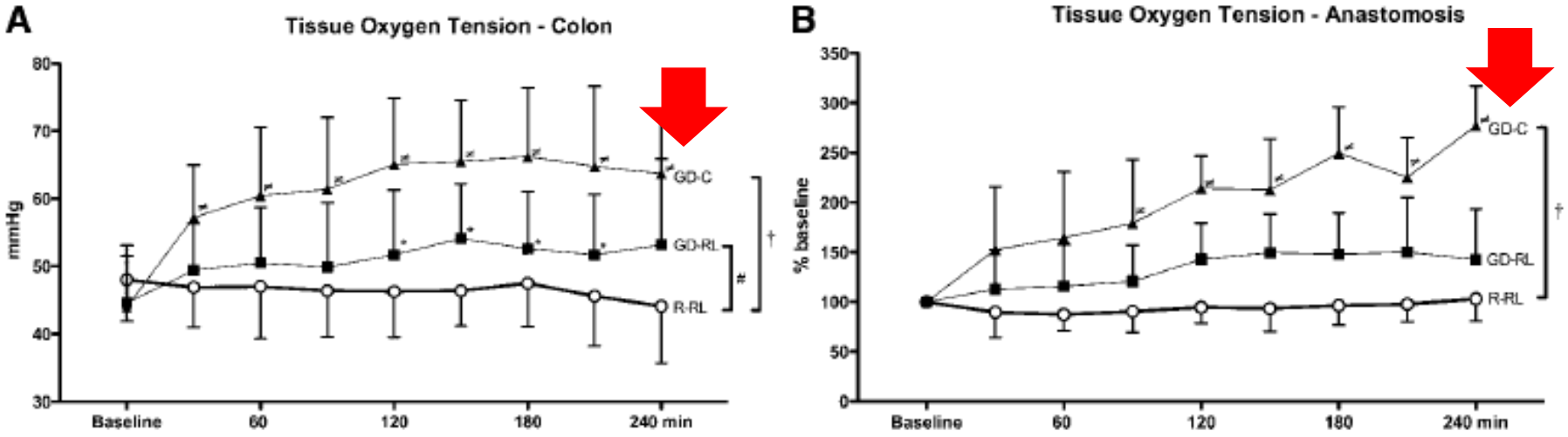
Table 4. Postoperative Data and Outcome Variables

Variables	Crystalloid Group (N = 80)	Colloid Group (N = 80)	Difference (95% CI)	*P* Value
POMS score at POD2	3 [1 to 4]	2 [1 to 3]	1 (0 to 1)	**< 0.001**
Patients under vasopressors (%)	18	4	14 (4 to 23)	**0.009**
Fluid balance at POD1 (ml/kg)	22.1 [11.7 to 40.9]	15.8 [9.2 to 26.0]	5.5 (–0.2 to 12.0)	0.06
Weight gain at POD2 (kg)*	0.25 [0 to 1.00]	0.00 [–0.20 to 0.10]	0.30 (0.0 to 1.00)	**0.028**
Blood components transfusion (%)				
PRBC	20	11	9 (–2 to 20)	0.13
FFP	3	1	1 (–3 to 5)	1.0
Any kind of blood product (%)	20	13	8 (–4 to 19)	0.20
Major complications (%)				
Patients with any major complications (%)	23	9	14 (3 to 25)	**0.015**
Anastomotic leakage†	8	0	8 (1 to 16)	**0.046**
Peritonitis	5	1	4 (–2 to 9)	0.37
Sepsis	6	4	3 (–4 to 9)	0.72
Wound dehiscence	5	1	4 (–2 to 9)	0.37
Bleeding requiring a redo surgery	5	0	5 (0 to 10)	0.12
Pulmonary embolism	4	0	4 (0 to 8)	0.25
Pulmonary edema	6	1	5 (0 to 11)	0.21
Pneumonia	4	3	1 (–4 to 7)	1.00
Acute coronary syndrome	0	1	–1 (–4 to 1)	1.00
Atrial fibrillation/arrhythmia	0	1	–1 (–4 to 1)	1.00
Stroke	0	1	–1 (–4 to 1)	1.00
Renal replacement therapy	1	1	0 (–3 to 3)	1.00
Reoperation	8	4	4 (–3 to 11)	0.50
30-day mortality	4	0	4 (0 to 8)	0.25
Minor complications (%)				
Patients with any minor complications (%)	63	44	19 (4 to 34)	**0.016**
Superficial wound infection	6	5	1 (–6 to 8)	1.00
Urinary and other infection	26	16	10 (–3 to 23)	0.12
Paralytic ileus	14	9	5 (–5 to 15)	0.32
Need for loop diuretics	11	5	6 (–2 to 15)	0.25
Postoperative confusion	5	3	3 (–3 to 8)	0.68
Postoperative nausea and vomiting	33	28	5 (–9 to 19)	0.49
Pruritus	6	6	0 (–8 to 8)	1.00
Acute kidney injury	23	19	4 (–9 to 16)	0.56
KDIGO I	11	13	–1 (–11 to 9)	0.81
KDIGO II	9	6	3 (–6 to 11)	0.55
KDIGO III	3	1	1 (–3 to 5)	1.00
Length of stay				
ICU/PACU (h)	20 [18 to 22]	20 [18 to 22]	0 (–1 to 1)	0.96
Hospital (days)	10 [6 to 16]	10 [6 to 13]	1 (–1 to 3)	0.43
Fit for discharge criteria (days)	10 [6 to 15]	9 [6 to 12]	1 (–1 to 3)	0.22
30-day readmission	5	8	–3 (–10 to 5)	0.75

Anesthesiology 2009; 110:496–504

Goal-directed Colloid Administration Improves the Microcirculation of Healthy and Perianastomotic Colon

Oliver Kimberger, M.D., Michael Arnberger, M.D.,* Sebastian Brandt, M.D.,* Jan Plock, M.D.,† Gisli H. Sigurdsson, M.D., Ph.D.,‡ Andrea Kurz, M.D.,§ Luzius Hiltebrand, M.D.**



Online version at http://www.minervamedica.it

Minerva Anestesiologica 2016 October;82(10):1039-42

EDITORIAL

Colloidophobia

Javier RIPOLLÉS MELCHOR [1]*, Dietmar FRIES [2], Daniel CHAPPELL [3]

[1]Department of Anesthesia and Critical Care, Infanta Leonor University Hospital, Madrid, Spain; [2]Department for General and Surgical Intensive Care Medicine, Medical University Innsbruck, Innsbruck, Austria; [3]Department of Anaesthesiology, University Hospital of Munich (LMU), Munich, Germany

*Corresponding author: Javier Ripollés Melchor, Goya 111, 2 D, 28009, Madrid, Spain. ripo542@gmail.com

NO SÓLO FLUJO

LA HIPOTENSIÓN SE ASOCIA A COMPLICACIONES

Relationship between Intraoperative Mean Arterial Pressure and Clinical Outcomes after Noncardiac Surgery

Toward an Empirical Definition of Hypotension

Michael Walsh, M.D.,* Philip J. Devereaux, M.D., Ph.D.,† Amit X. Garg, M.D., Ph.D.,‡
Andrea Kurz, M.D.,§ Alparslan Turan, M.D.,‖ Reitze N. Rodseth, M.D.,# Jacek Cywinski, M.D.,**
Lehana Thabane, Ph.D.,†† Daniel I. Sessler, M.D.‡‡

- 33,330 cirugías no cardiacas en Cleveland Clinic
- Evaluaron la asociación entre una TAM intraoperatoria desde < 55 a 75 mmHg y complicaciones postoperatorias (AKI, Miocárdicas)
- Determinan umbrales de TAM en los que se incrementa el el riesgo
- < 55, < 60, < 65, < 70, < 75 mmHg; 0, 1-5, 6-10, 11-20 minutos

Relationship between Intraoperative Mean Arterial Pressure and Clinical Outcomes after Noncardiac Surgery

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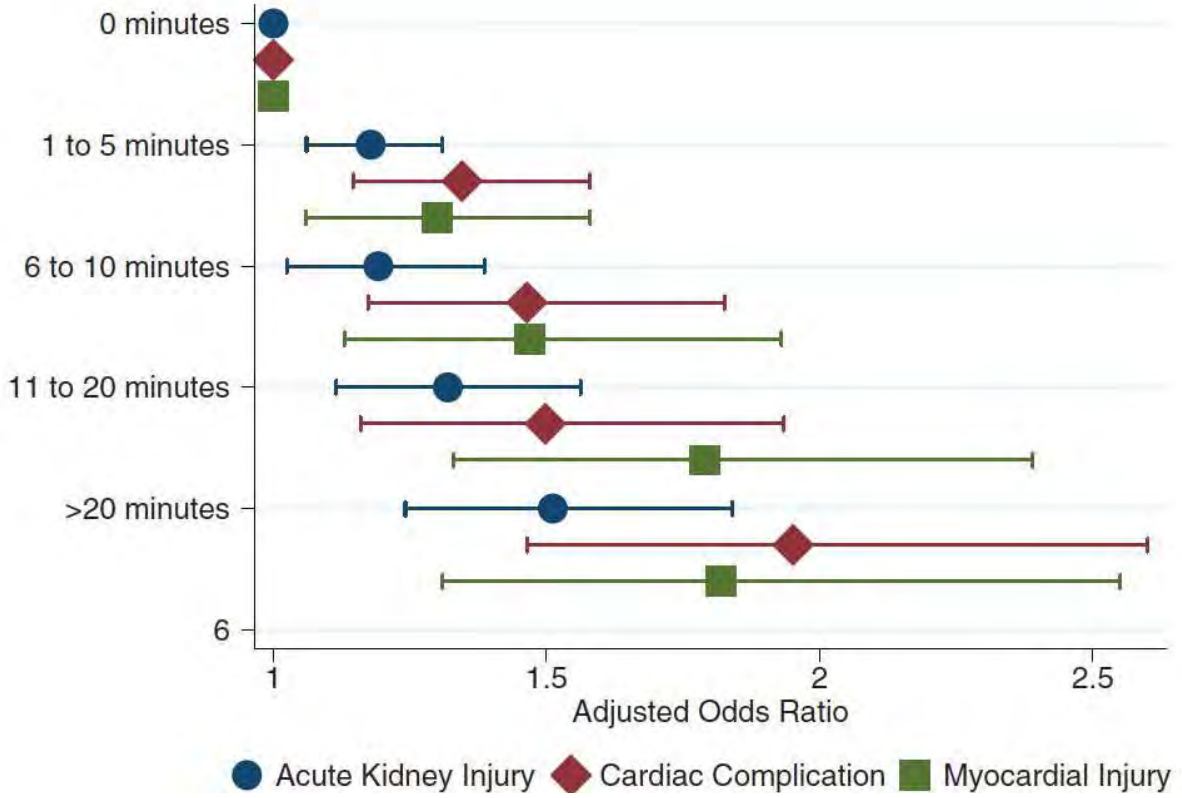

Relación independiente entre el tiempo de permanencia en **TAM < 55 mmHg y** AKI
No relación entre TA preoperatoria y tiempo con TAM< 55
A mayor tiempo con TAM < 55 mmHg, tendencia a **incremento en mortalidad a 30 día**s
(> 20 minutos con significación estadística)

Relationship between Intraoperative Mean Arterial Pressure and Clinical Outcomes after Noncardiac Surgery

Toward an Empirical Definition of Hypotension

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Table 2. Adjusted Odds Ratios for Acute Kidney Injury, Myocardial Injury, and Cardiac Complications for Intraoperative Time Spent with a MAP <55 mmHg

Time MAP <55 mmHg (min)	Adjusted Odds Ratio (95% CI)			
	Acute Kidney Injury	Myocardial Injury	Cardiac Complication	30-day Mortality
0	Referent			
1–5	1.18 (1.06–1.31)	1.30 (1.06–1.58)	1.35 (1.15–1.58)	1.16 (0.91–1.46)
6–10	1.19 (1.03–1.39)	1.47 (1.13–1.93)	1.46 (1.17–1.83)	1.16 (0.84–1.60)
11–20	1.32 (1.11–1.56)	1.79 (1.33–2.39)	1.50 (1.16–1.94)	1.26 (0.89–1.80)
>20	1.51 (1.24–1.84)	1.82 (1.31–2.55)	1.95 (1.46–2.60)	1.79 (1.21–2.65)

Estimates adjusted for patient age, sex, Charlson comorbidity index, emergency procedure status, type of surgery, preoperative hemoglobin, decrement in hemoglobin concentration, estimated blood loss, and volume of erythrocyte transfusions.
MAP = mean arterial pressure.

NO HAY UN TIEMPO " SEGURO" DE TAM < 55 mmHg

HIPOTENSIÓN COMO FACTOR
DE RIESGO PARA COMPLICACIONES

JAMA | Original Investigation | CARING FOR THE CRITICALLY ILL PATIENT

Effect of Individualized vs Standard Blood Pressure Management Strategies on Postoperative Organ Dysfunction Among High-Risk Patients Undergoing Major Surgery

A Randomized Clinical Trial

Emmanuel Futier, MD, PhD; Jean-Yves Lefrant, MD, PhD; Pierre-Gregoire Guinot, MD, PhD; Thomas Godet, MD, PhD; Emmanuel Lorne, MD; Philippe Cuvillon, MD, PhD; Sebastien Bertran, MD; Marc Leone, MD, PhD; Bruno Pastene, MD; Vincent Piriou, MD, PhD; Serge Molliex, MD, PhD; Jacques Albanese, MD, PhD; Jean-Michel Julia, MD; Benoit Tavernier, MD, PhD; Etienne Imhoff, MD; Jean-Etienne Bazin, MD, PhD; Jean-Michel Constantin, MD, PhD; Bruno Pereira, PhD; Samir Jaber, MD, PhD; for the INPRESS Study Group

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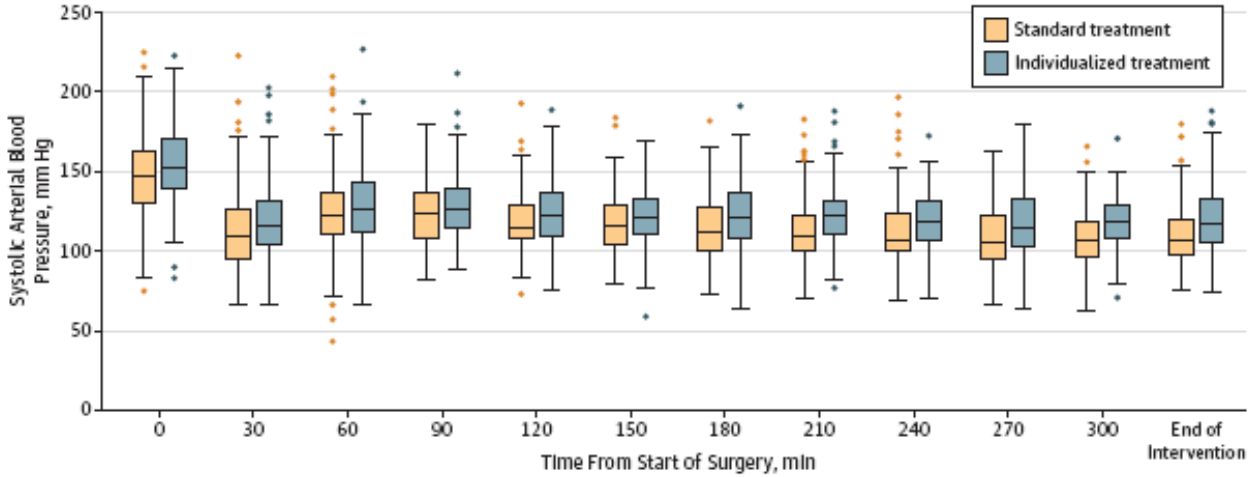
TAS ± 10% BASAL

TAS > 80mmHg o TAS<80% basal



No. of patients												
Standard treatment	145	143	144	144	140	136	128	119	113	96	86	145
Individualized treatment	147	144	145	145	140	133	122	113	99	82	72	147

JAMA | Original Investigation | CARING FOR THE CRITICALLY ILL PATIENT

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Variable	Individualized Treatment (n = 147)	Standard Treatment (n = 145)	Between-Group Absolute Difference, % (95% CI)	Unadjusted Relative Risk (95% CI)	*P* Value	Adjusted Relative Risk (95% CI)[a]	*P* Value
Primary Outcome							
Primary composite outcome, No. (%)[b]	56 (38.1)	75 (51.7)	−14 (−25 to −2)	0.74 (0.57 to 0.95)	.02	0.73 (0.56 to 0.94)	.02

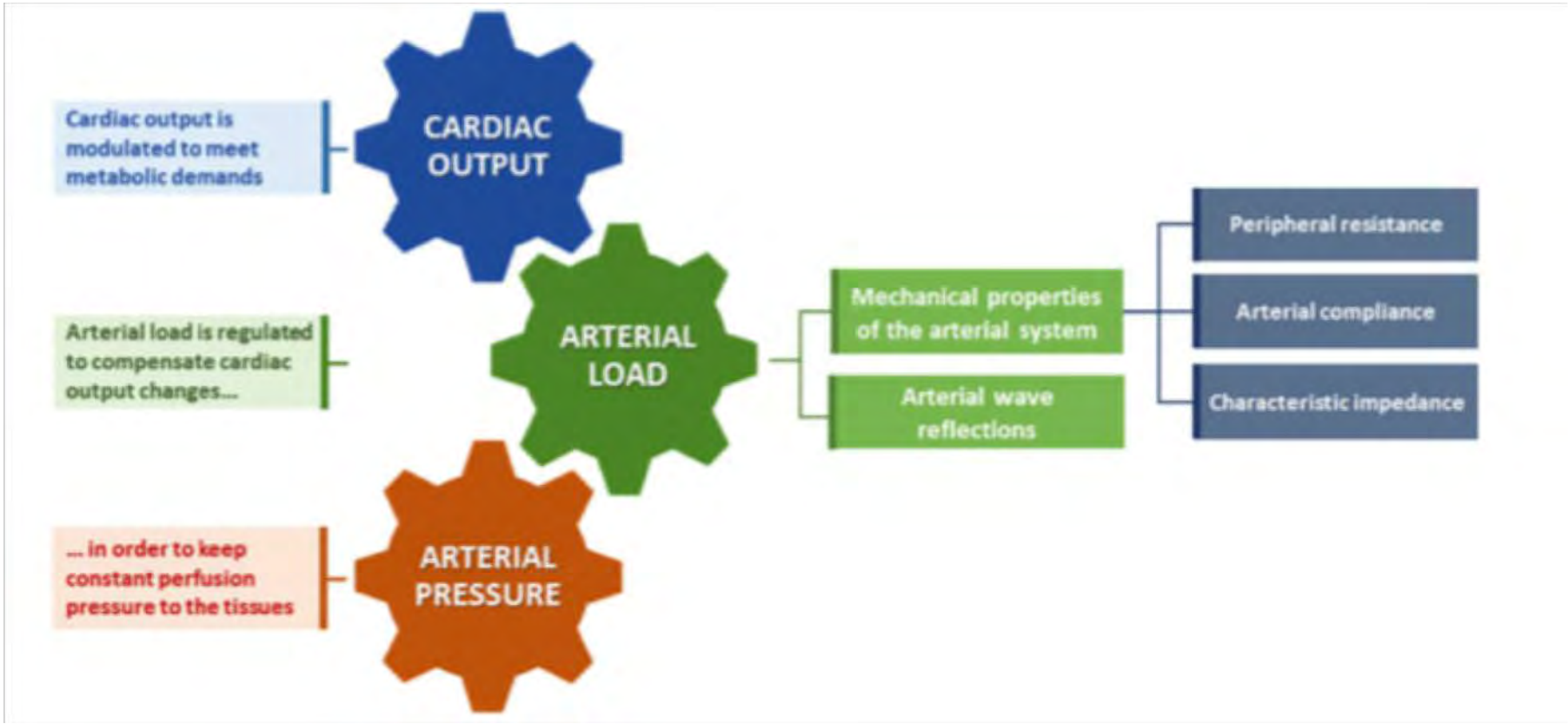
14% MENOS COMPLIACIONES

Intensive Care Med
DOI 10.1007/s00134-016-4212-z

UNDERSTANDING THE DISEASE

Understanding arterial load

Manuel Ignacio Monge García[1,3*], Paula Saludes Orduña[1,2] and Maurizio Cecconi[3]



BIEN, PERO, SON ENSAYOS CLÍNICOS

QUÉ PUEDO HACER YO?

EDITORIAL

Perioperative Management of High-Risk Patients Going Beyond "Avoid Hypoxia and Hypotension"

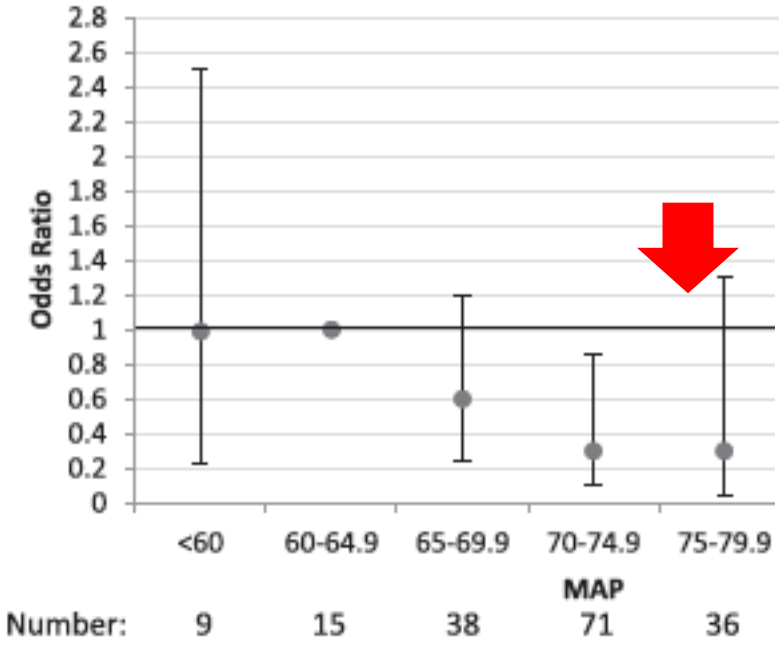
Solomon Aronson, MD, MBA; Monty G. Mythen, MBBS, MD, FRCA, FFICM, FCAI (Hon)

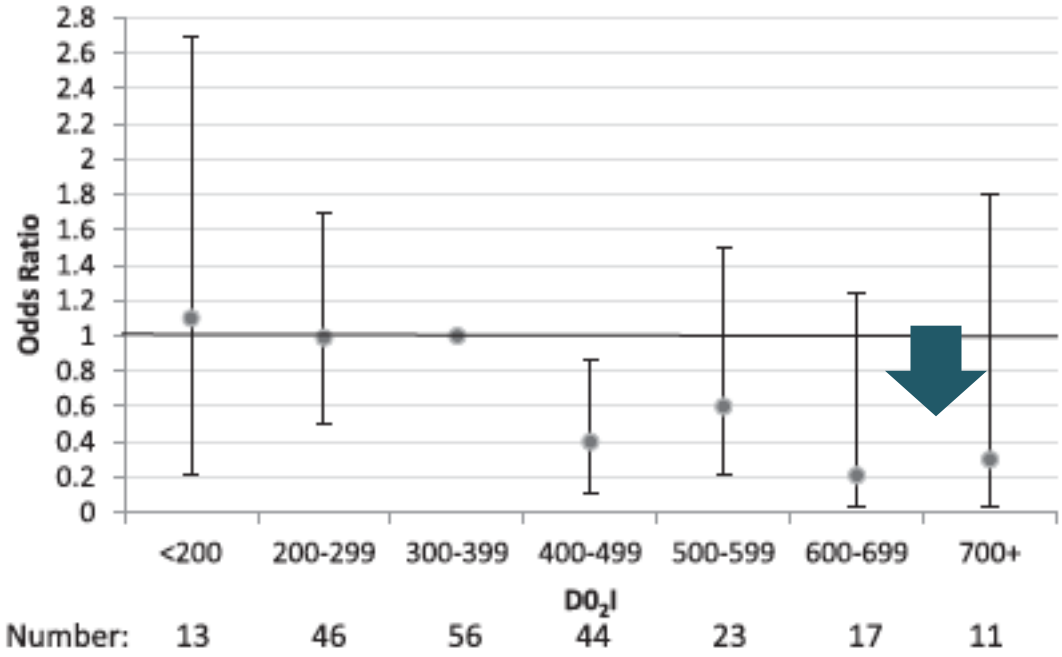
SIMPLIFICADO PERO VÁLIDO

MANTENER FLUJO, MANTENER PRESIÓN

Low Systemic Oxygen Delivery and BP and Risk of Progression of Early AKI

Mario Raimundo,[*†] *Siobhan Crichton,*[‡] *Yadullah Syed,*[*] *Jonathan R. Martin,*[*] *Richard Beale,*[*] *David Treacher,*[*] *and Marlies Ostermann*[*]





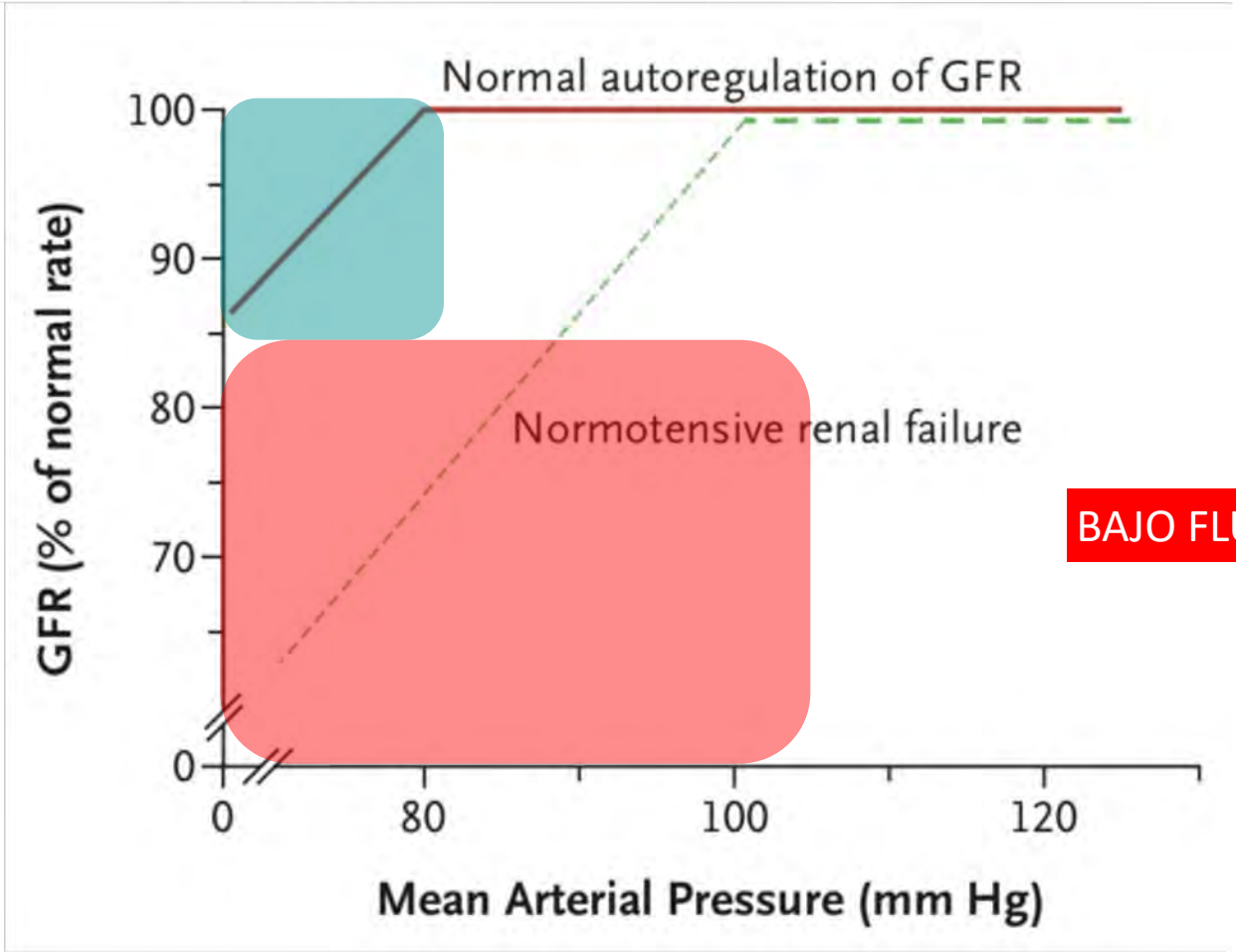
The NEW ENGLAND JOURNAL of MEDICINE

REVIEW ARTICLE

CURRENT CONCEPTS

Normotensive Ischemic Acute Renal Failure

J. Gary Abuelo, M.D.

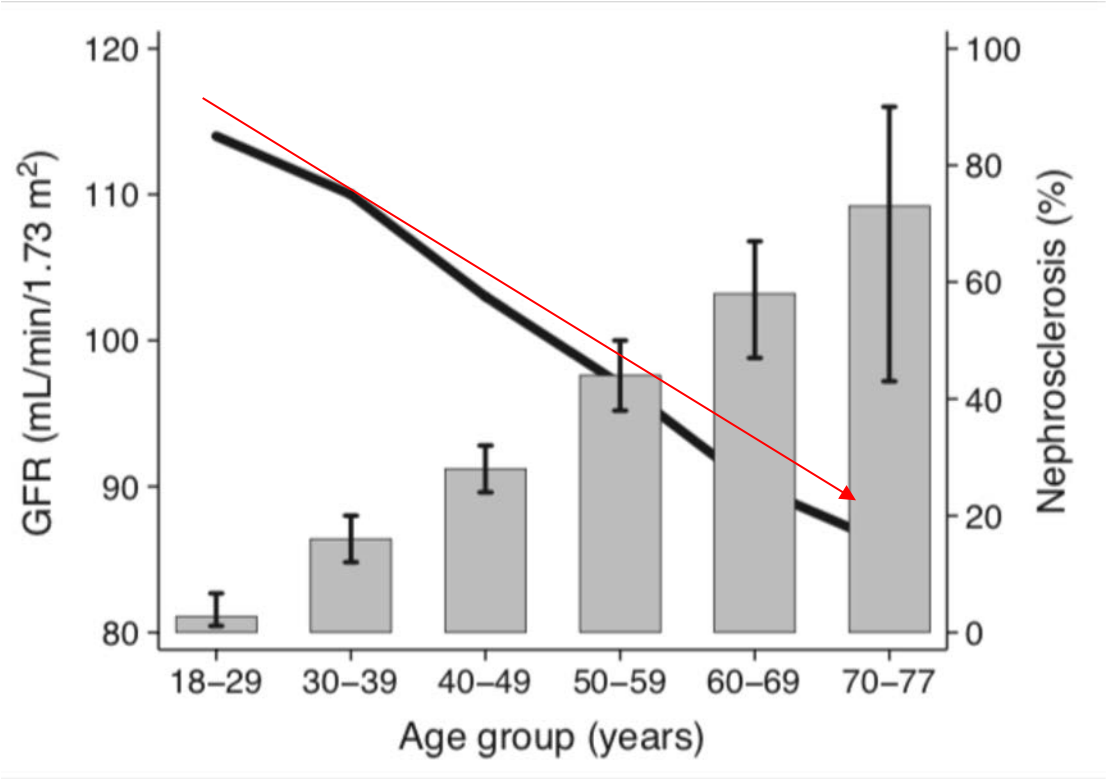


BAJO FLUJO

Annals of Internal Medicine | ARTICLE

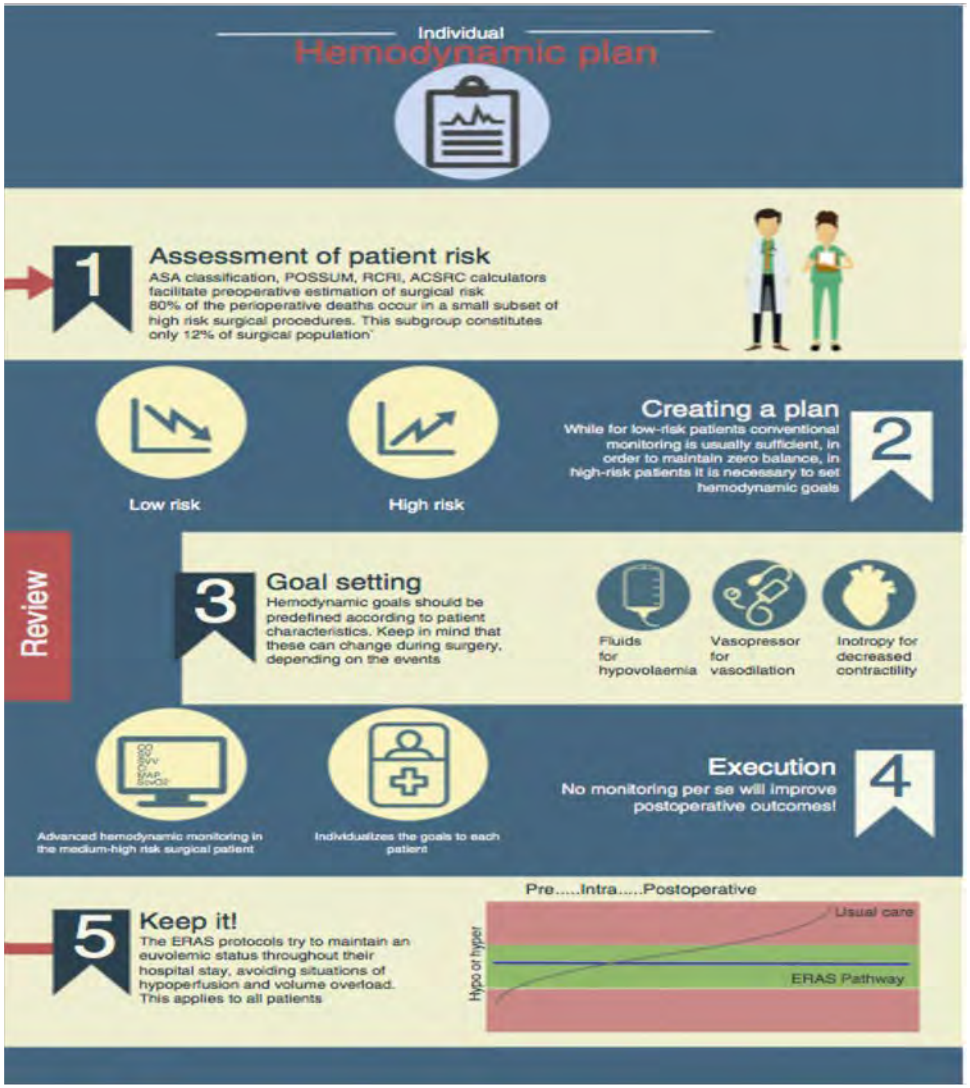
The Association Between Age and Nephrosclerosis on Renal Biopsy Among Healthy Adults

Andrew D. Rule, MD, MSc; Hatem Amer, MD; Lynn D. Cornell, MD; Sandra J. Taler, MD; Fernando G. Cosio, MD; Walter K. Kremers, PhD; Stephen C. Textor, MD; and Mark D. Stegall, MD



Recomendaciones de fluidoterapia perioperatoria para la cirugía abdominal mayor. Revisión de las recomendaciones de la Vía RICA. Parte III: Terapia hemodinámica guiada por objetivos. Fundamento para el mantenimiento del tono vascular y la contractilidad

J. Ripollés-Melchor[a,*], D. Chappell[b], H.D. Aya[c], Á. Espinosa[d], M.G. Mhyten[e], A. Abad-Gurumeta[a], S.D. Bergese[f], R. Casans-Francés[g], J.M. Calvo-Vecino[h]



Support Process for Implementing PGDT

Vincent et al. Critical Care (2015) 19:224
DOI 10.1186/s13054-015-0932-7

CRITICAL CARE

REVIEW Open Access

Perioperative cardiovascular monitoring of high-risk patients: a consensus of 12

Jean-Louis Vincent[1*], Paolo Pelosi[2], Rupert Pearse[3], Didier Payen[4], Azriel Perel[5], Andreas Hoeft[6], Stefano Romagnoli[7], V Marco Ranieri[8], Carole Ichai[9], Patrice Forget[10], Giorgio Della Rocca[11] and Andrew Rhodes[12]

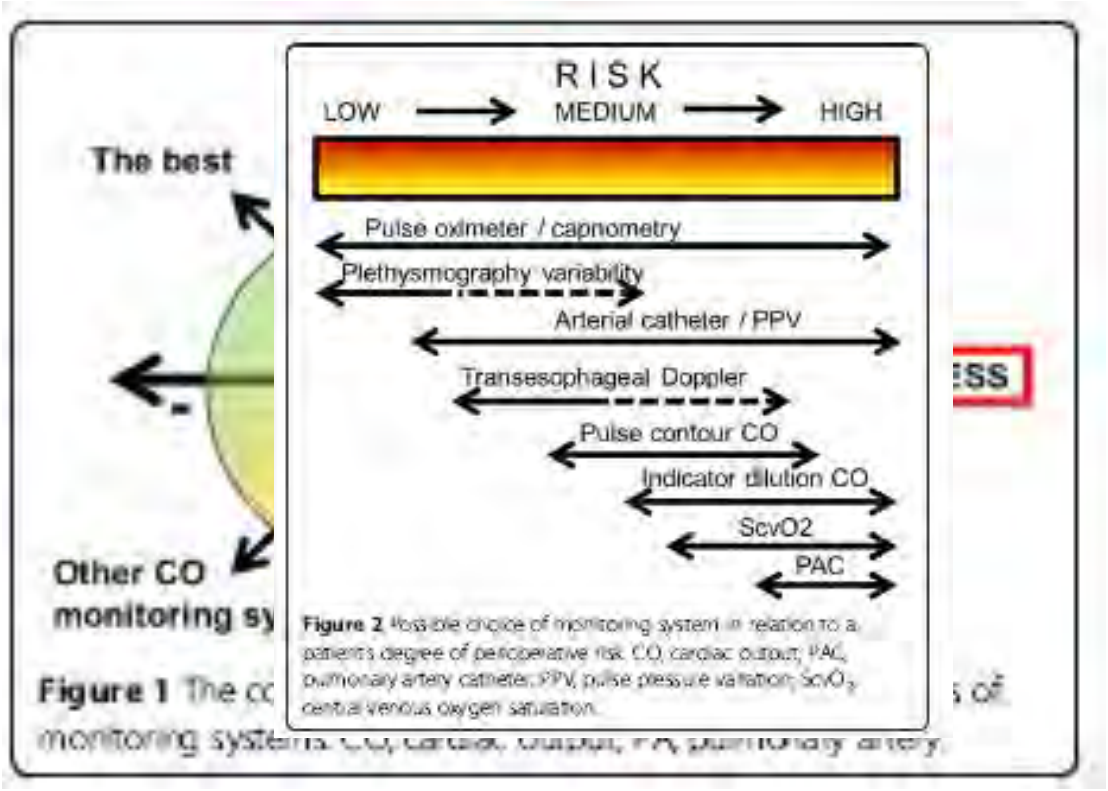


Figure 2 Possible choice of monitoring system in relation to a patient's degree of perioperative risk. CO, cardiac output; PAC, pulmonary artery catheter; PPV, pulse pressure variation; $ScvO_2$, central venous oxygen saturation.

Figure 1 The co ... of monitoring systems. CO, cardiac output; PA, pulmonary artery.

Prioritizing Quality Improvement in General Surgery.

Schilling et al.

J Am Coll Surg. 2008; 207:698–704.

129,233 cases

Complication rates depend on the surgical procedure

Surgery	Morbidity rate %
Esophagectomy	55.1
Pelvic exenteration	45.0
Pancreatectomy	34.9
Colectomy	28.9
Gastrectomy	28.7
Liver resection	27

Successful Implementation of the Department of Veterans Affairs' NSQIP in the Private Sector: The Patient Safety in Surgery Study.

Khuri et al.

Ann Surg 2008

129,546 cases

Complication rates depend on the patient

Risk factor	Odd ratio
ASA 4/5 vs 1/2	1.9
ASA 3 vs 1/2	1.5
Dyspnea at rest vs. none	1.4
History of COPD	1.3
Dyspnea with minimal exertion vs. none	1.2

Can J Anesth/J Can Anesth
DOI 10.1007/s12630-014-0266-y

REVIEW ARTICLE/BRIEF REVIEW

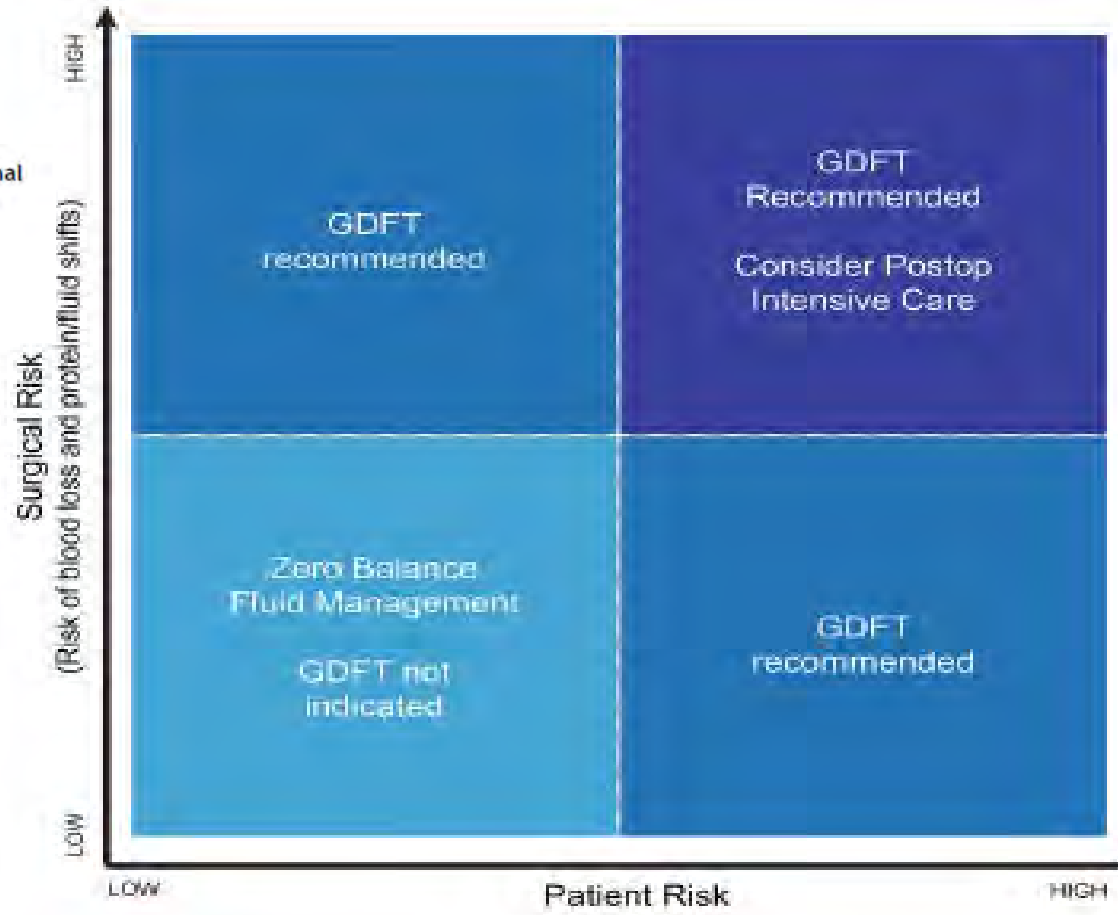
Fluid management and goal-directed therapy as an adjunct to Enhanced Recovery After Surgery (ERAS)

Gestion des liquides et traitement ciblé en annexe de la Récupération rapide après la chirurgie (RRAC)

Timothy E. Miller, MBChB · Anthony M. Roche, MBChB · Michael Mythen, MD

Recomendaciones de fluidoterapia perioperatoria para la cirugía abdominal mayor. Revisión de las recomendaciones de la Vía RICA. Parte II: Terapia hemodinámica guiada por objetivos. Fundamento para la optimización del volumen intravascular

J. Ripollés-Melchor[a,*], D. Chappell[b], H.D. Aya[c], Á. Espinosa[d], M.G. Mhyten[e], A. Abad-Gurumeta[a], S.D. Bergese[f], R. Casans-Francés[g], J.M. Calvo-Vecino[h]



CONSENSUS STATEMENT Open Access

American Society for Enhanced Recovery (ASER) and Perioperative Quality Initiative (POQI) joint consensus statement on perioperative fluid management within an enhanced recovery pathway for colorectal surgery

Robert H. Thiele[1], Karthik Raghunathan[2], C. S. Brudney[3], Dileep N. Lobo[4], Daniel Martin[5,6], Anthony Senagore[7], Maxime Cannesson[8], Tong Joo Gan[9], Michael Monty G. Mythen[10], Andrew D. Shaw[11], Timothy E. Miller[12*] and For the Perioperative Quality Initiative (POQI) I Workgroup

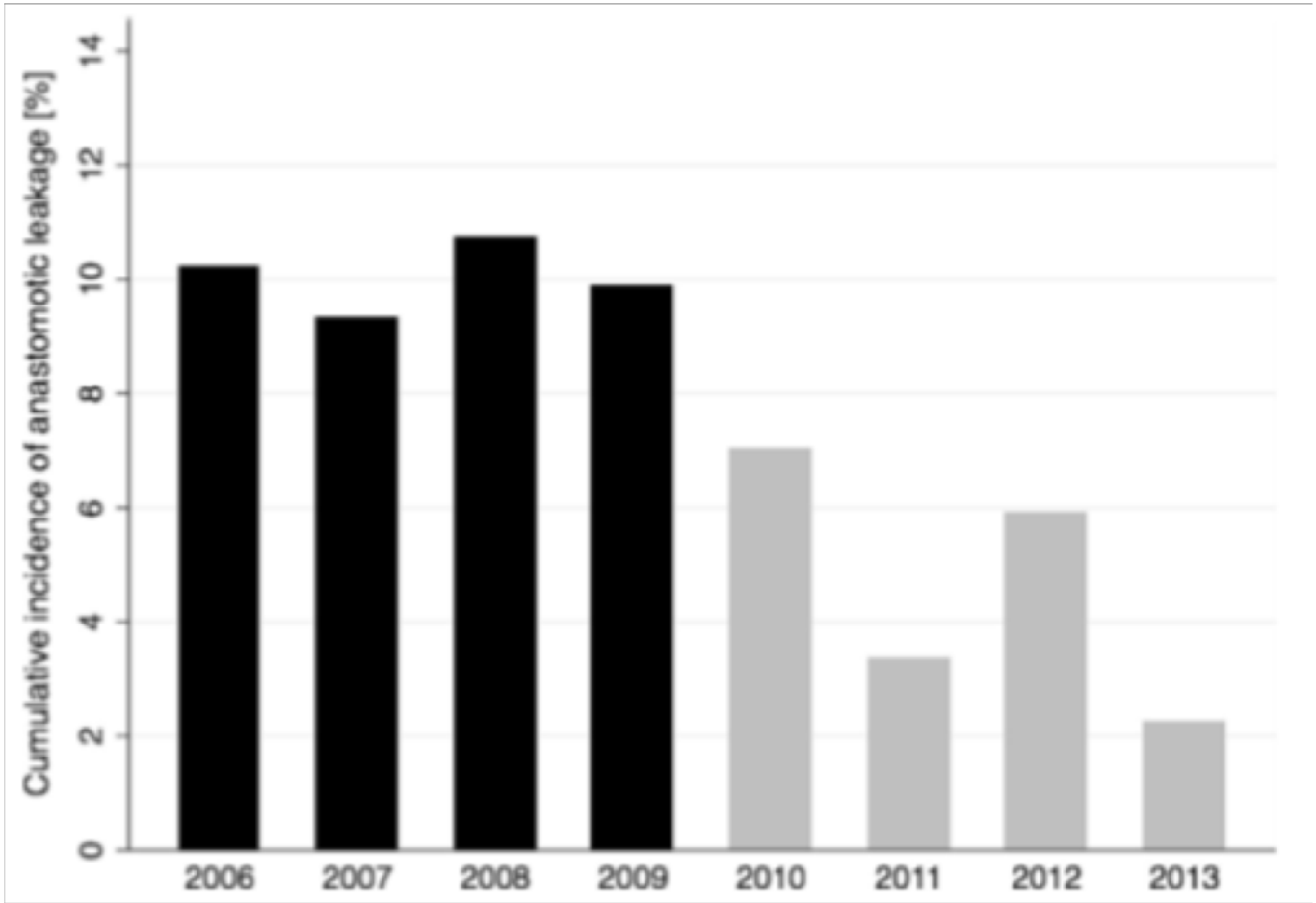
World J Surg (2018) 42:2234–2241
https://doi.org/10.1007/s00268-017-4423-7

ORIGINAL SCIENTIFIC REPORT

Changes in Clinical Practice Reduce the Rate of Anastomotic Leakage After Colorectal Resections

Henrik Iversen[1] · Madelene Ahlberg[1] · Marja Lindqvist[2] · Christian Buchli[1]

OPTIMIZACIÓN VS + PC
NORADRENALINA +
FLUIDOTERPiA RESTRICTIVA

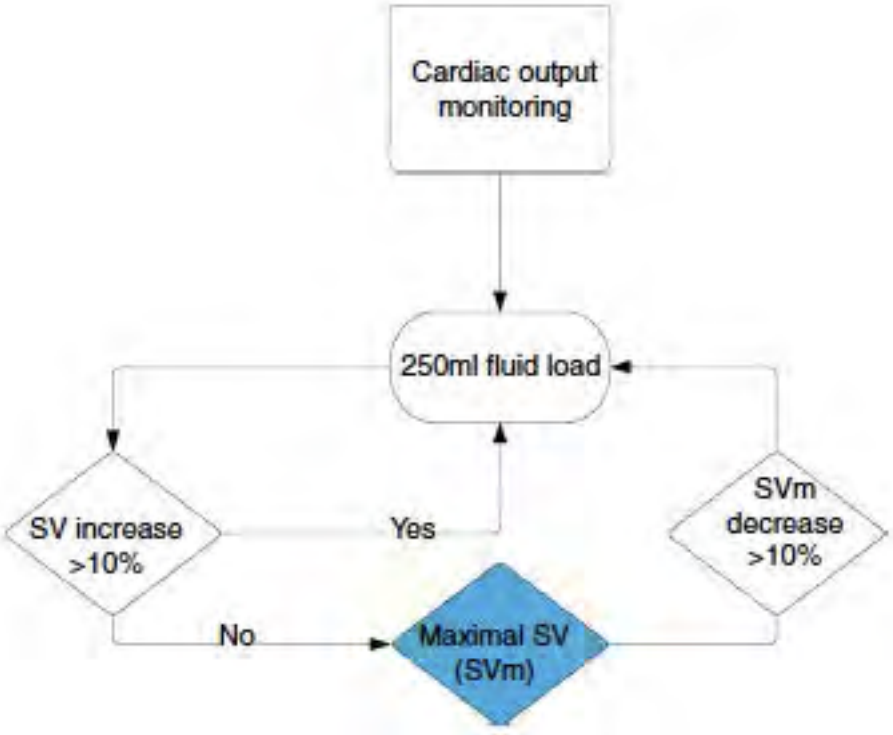


SCIENTIFIC ARTICLE

Enhanced recovery after surgery protocol versus conventional perioperative care in colorectal surgery. A single center cohort study

Javier Ripollés-Melchor[a,b,i,*], María Luisa de Fuenmayor Varela[c], Susana Criado Camargo[a,d], Pablo Jerez Fernández[a,d], Álvaro Contreras del Barrio[a,d], Eugenio Martínez-Hurtado[a,b,i], Rubén Casans-Francés[e,i], Alfredo Abad-Gurumeta[a,b,i], José Manuel Ramírez-Rodríguez[f,i], José María Calvo-Vecino[g,h,i]

ESTUDIO ANTES-DESPUÉS
N 360 VS 319
CIRUGÍA COLORECTAL PROGRAMADA



SCIENTIFIC ARTICLE

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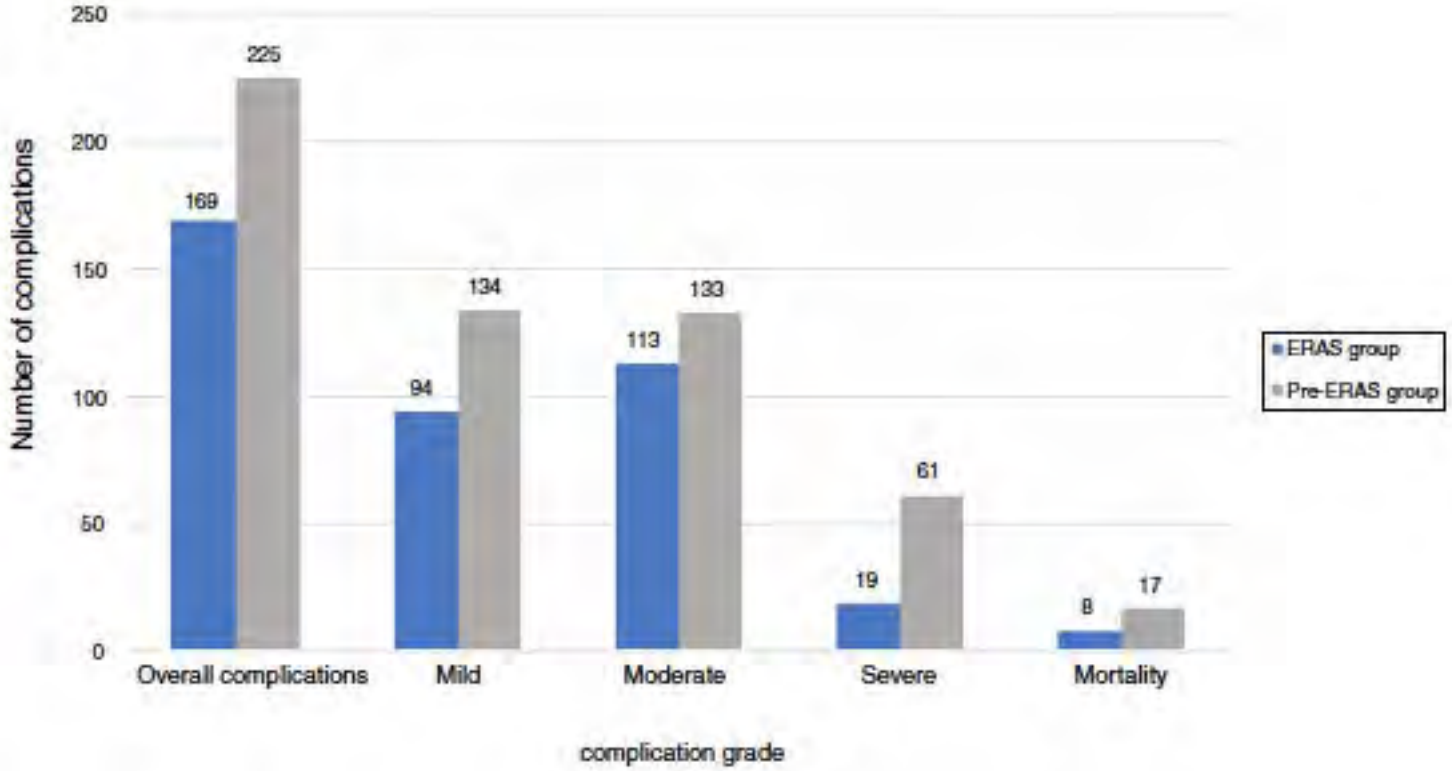


Table 5 Multivariable analysis of complications development after colorectal surgery in all included patients (pre-ERAS and ERAS groups).

	Correlation	Lower end 95% CI	Upper end 95% CI	*p*-value
Patients with complications (all severity)				
ERAS	−0.08	−0.15	−0.01	0.030
Age	0.15	0.07	0.22	<0.001
ASA	0.21	0.13	0.27	<0.001
Laparoscopy	−0.26	−0.32	−0.18	<0.001
Female	0.09	0.01	0.16	0.020
Epidural	0.08	0.01	0.15	0.035
Duration	0.18	0.11	0.26	<0.001
Intraoperative fluids	0.21	0.14	0.28	<0.001
24 h fluids	0.25	0.18	0.32	<0.001
24 h fluid balance	0.26	0.19	0.33	<0.001
Patients with complications (moderate or severe)				
ERAS	−0.10	−0.17	−0.02	0.008
Age	0.11	0.04	0.19	0.002
ASA	0.17	0.10	0.25	<0.001
Laparoscopy	−0.23	−0.30	−0.15	<0.001
Female	0.16	0.09	0.24	<0.001
Epidural	0.08	0.01	0.16	0.021
Duration	0.19	0.12	0.26	<0.001
Intraoperative fluids	0.23	0.16	0.30	<0.001
24 h fluids	0.22	0.15	0.30	<0.001
24 h fluid balance	0.20	0.13	0.27	<0.001
Patients with complications (severe)				
ERAS	−0.16	−0.23	−0.09	<0.001
Age	0.09	0.01	0.16	0.017
ASA	0.12	0.04	0.19	0.001
Laparoscopy	−0.15	−0.22	−0.07	<0.001
Female	0.14	0.07	0.21	<0.001
Epidural	0.04	−0.03	0.11	0.283
Duration	0.18	0.11	0.25	<0.001
Intraoperative fluids	0.16	0.08	0.23	<0.001
24 h fluid balance	0.18	0.10	0.25	<0.001

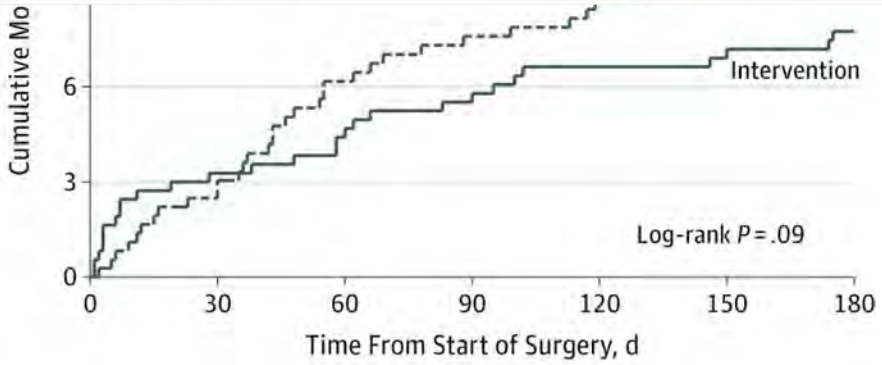
ERAS, Enhanced Recovery After Surgery; ASA, American Society of Anesthesiologists physical status classification; CI, confidence interval; ERAS, Enhanced Recovery After Surgery.

Effect of a Perioperative, Cardiac Output–Guided Hemodynamic Therapy Algorithm on Outcomes Following Major Gastrointestinal Surgery

A Randomized Clinical Trial and Systematic Review FREE

Rupert M. Pearse, MD[1]; David A. Harrison, PhD[2]; Neil MacDonald, FRCA[1]; Michael A. Gillies, FRCA[3]; Mark Blunt, FRCA[4]; Gareth Ackland, PhD[5]; Michael P. W. Grocott, MD[6]; Aoife Ahern, BSc[1]; Kathryn Griggs, MSc[2]; Rachael Scott, PhD[2]; Charles Hinds, FRCA[1]; Kathryn Rowan, PhD[2] ; for the OPTIMISE Study Group

Timing of recruitment*				0.019
Earlier (first 10 patients per site)	33 (42.3) (n=78)	28 (34.1) (n=82)	1.51 (0.75-3.01)	
Later (all subsequent patients)	100 (35.0) (n=286)	129 (46.7) (n=276)	0.59 (0.41-0.84)	



No. at risk							
Intervention	368	350	344	339	334	333	306
Usual care	365	348	331	325	321	317	286

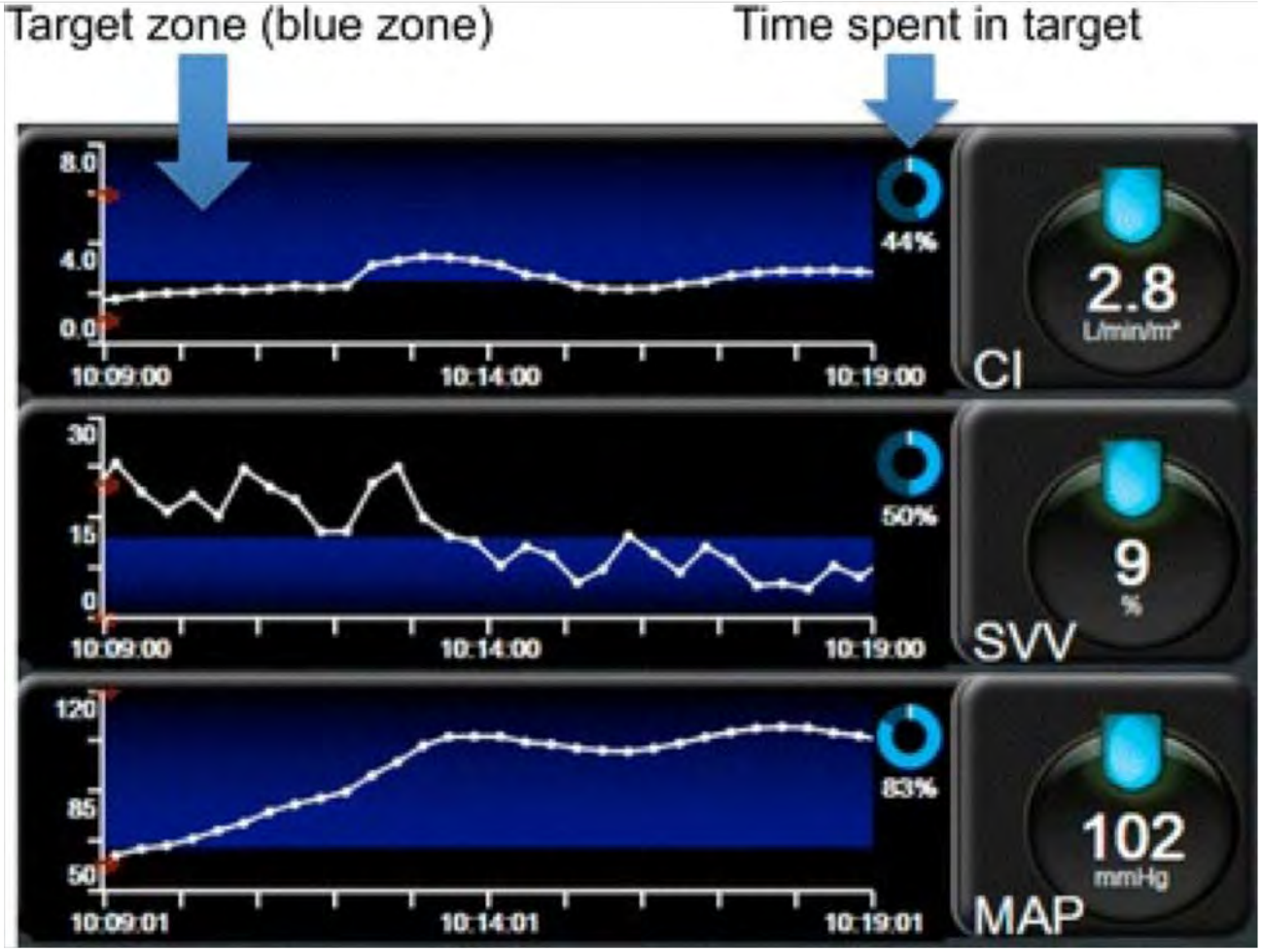
Michard *Ann. Intensive Care* (2016) 6:15
DOI 10.1186/s13613-016-0119-7

Annals of Intensive Care
a SpringerOpen Journal

REVIEW Open Access

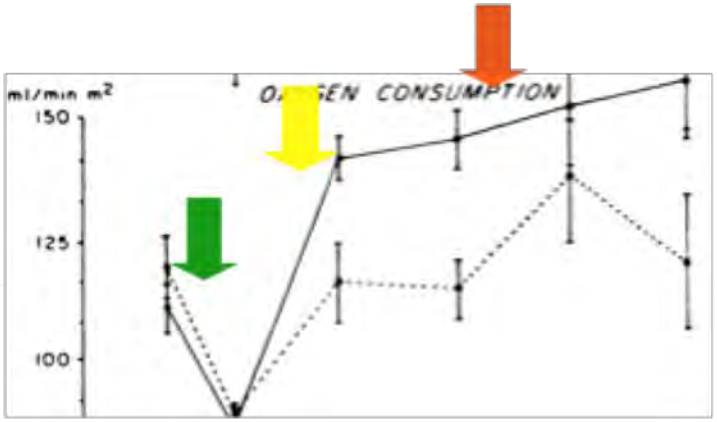
Hemodynamic monitoring in the era of digital health

Frederic Michard*



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.



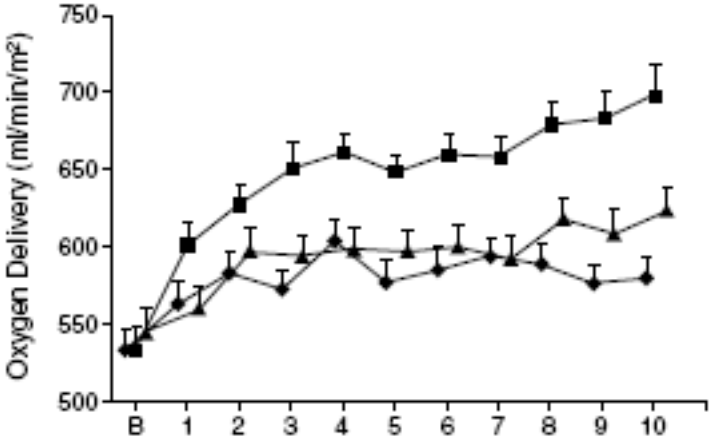
VS

The New England
Journal of Medicine

Volume 333 OCTOBER 19, 1995 Number 16

A TRIAL OF GOAL-ORIENTED HEMODYNAMIC THERAPY IN CRITICALLY ILL PATIENTS

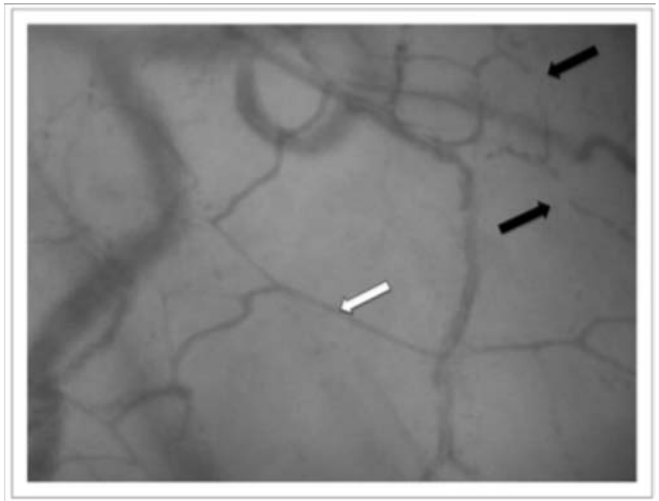
LUCIANO GATTINONI, M.D., LUCA BRAZZI, M.D., PAOLO PELOSI, M.D., ROBERTO LATINI, M.D., GIANNI TOGNONI, M.D., ANTONIO PESENTI, M.D., AND ROBERTO FUMAGALLI, M.D., FOR THE SvO_2 COLLABORATIVE GROUP*

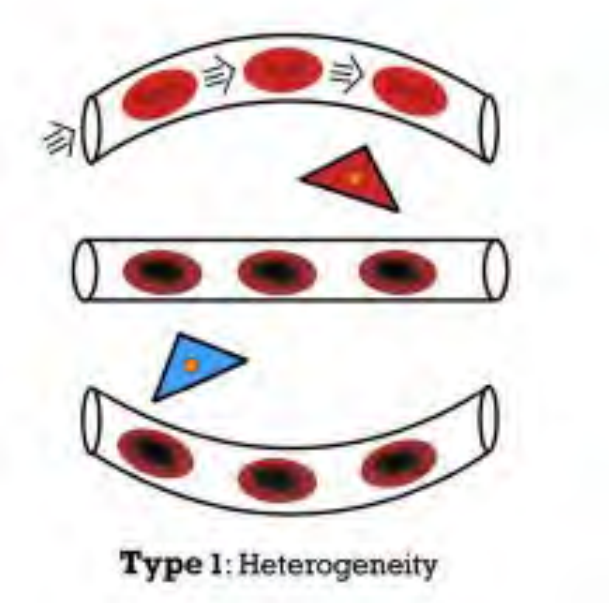


CRITICAL CARE
REVIEW Open Access

Hemodynamic coherence and the rationale for monitoring the microcirculation

PÉRDIDA DE COHERENCIA HEMODINÁMICA DE TIPO 1



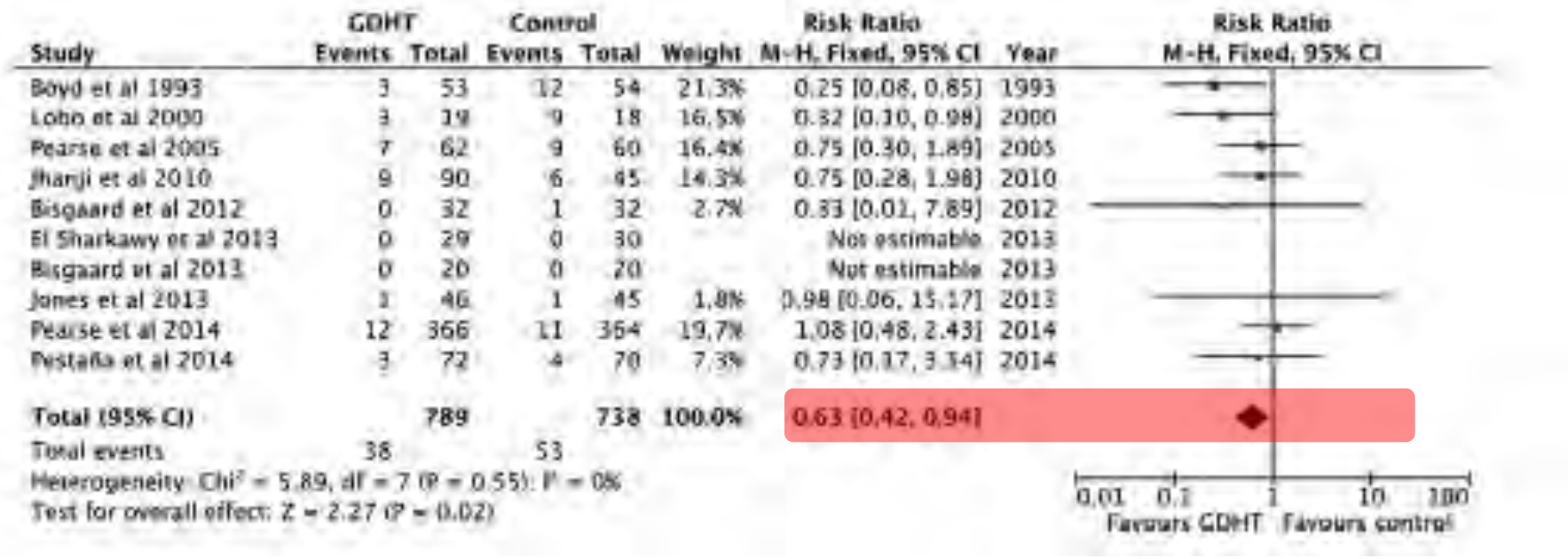


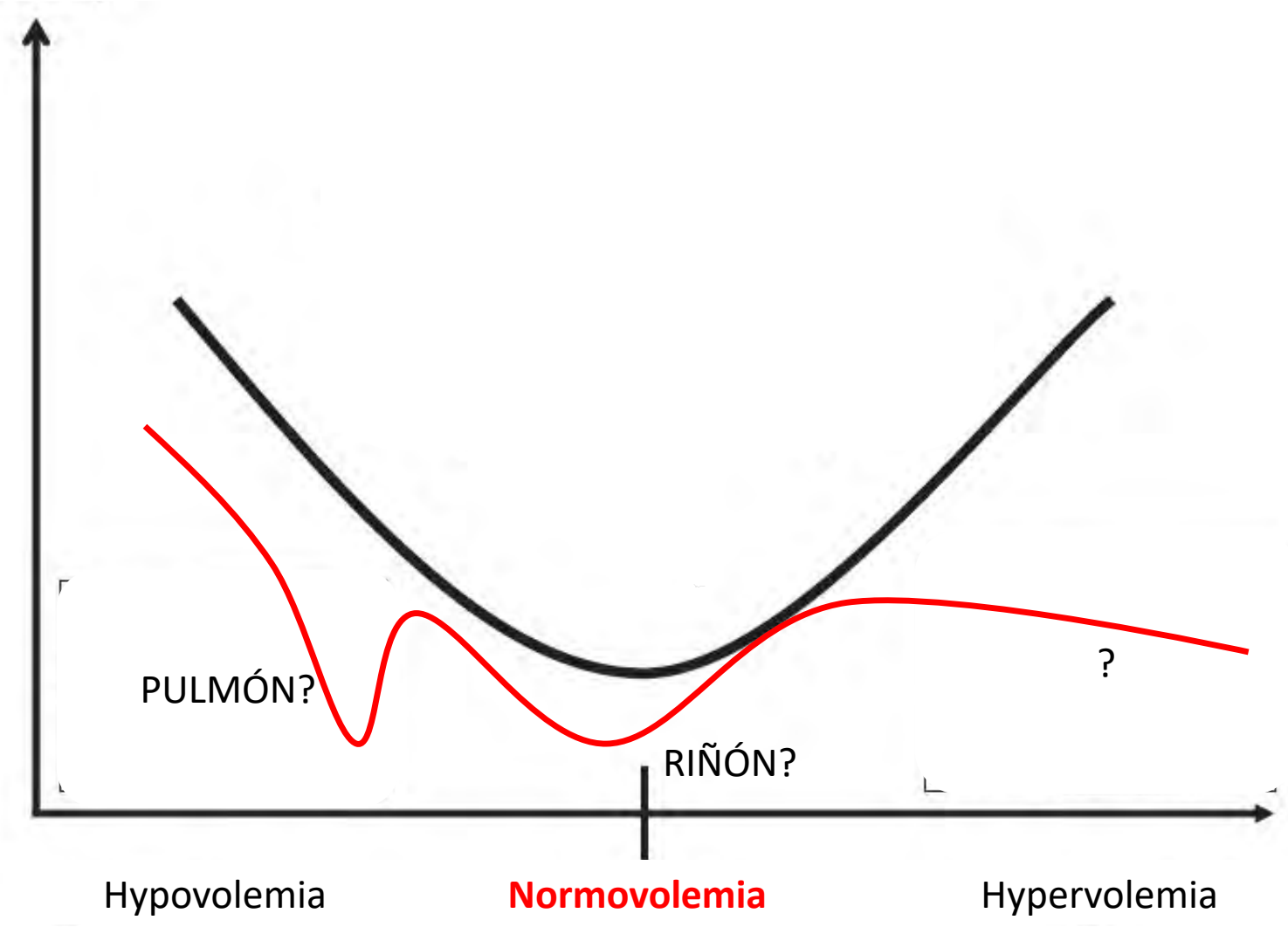
La heterogeneidad de la perfusión de la microcirculación con capilares obstruidos junto con los capilares bien perfundidos.

Perioperative goal-directed hemodynamic therapy in noncardiac surgery: a systematic review and meta-analysis☆,☆☆

Javier Ripollés-Melchor MD[a,g,*], Ángel Espinosa MD[b,g], Eugenio Martínez-Hurtado MD[a,g], Alfredo Abad-Gurumeta PhD[c,g], Rubén Casans-Francés PhD[d,g], Cristina Fernández-Pérez (Professor)[e,g], Francisco López-Timoneda (Professor)[f,g], José María Calvo-Vecino (Professor)[a,g]

INCLUYE PAC Y MÍNIMAMNETE INVASIVA



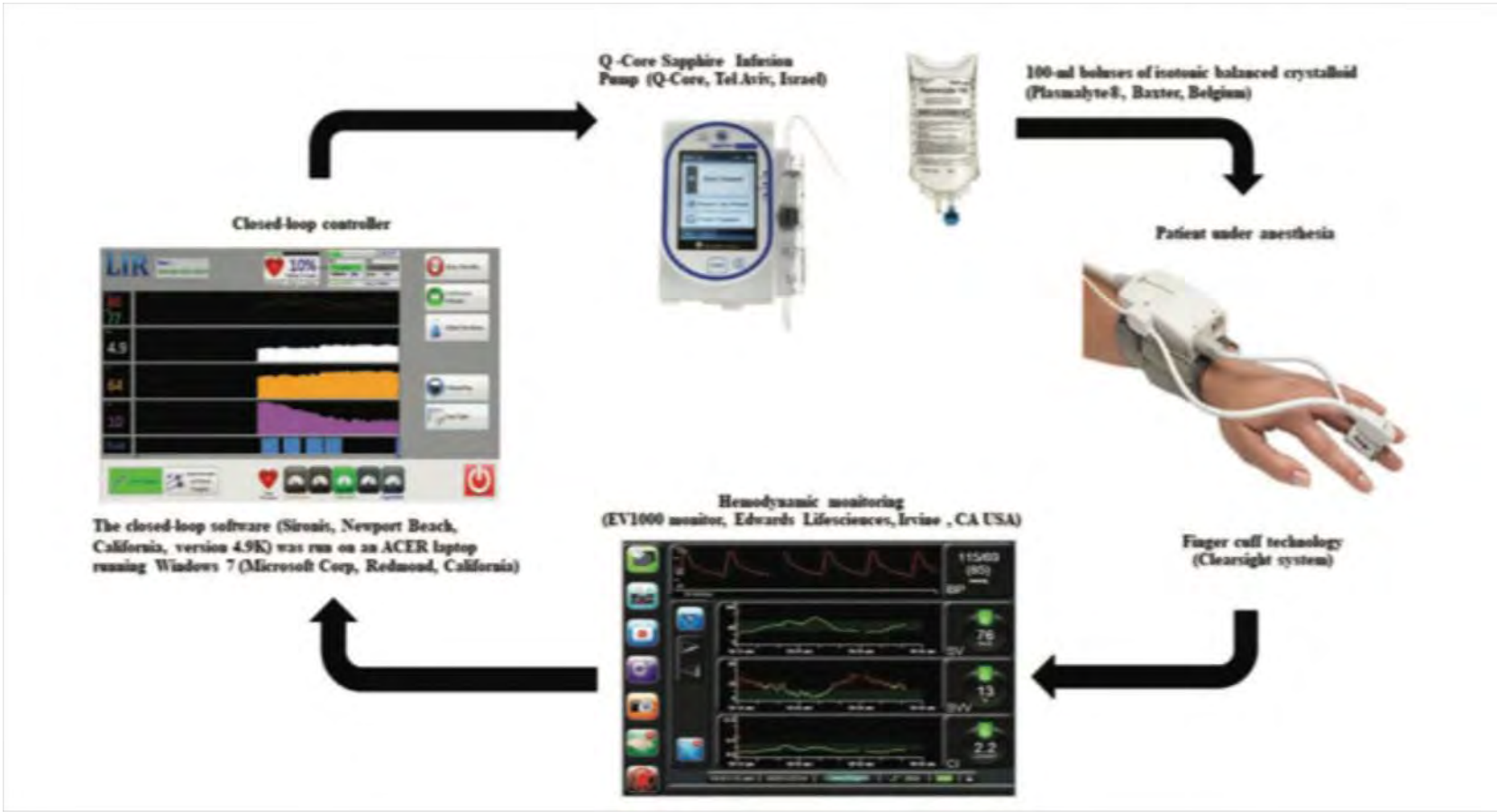


Bundgaard-Nielsen et al. Acta Anesth Scand 2009; 53: 843

CUAL ES EL FUTURO?

Perioperative goal directed therapy using automated closed-loop fluid management: the future?

Alexandre Joosten[1], Brenton Alexander[2], Amélie Delaporte[1], Marc Lilot[3], Joseph Rinehart[2], Maxime Cannesson[2]



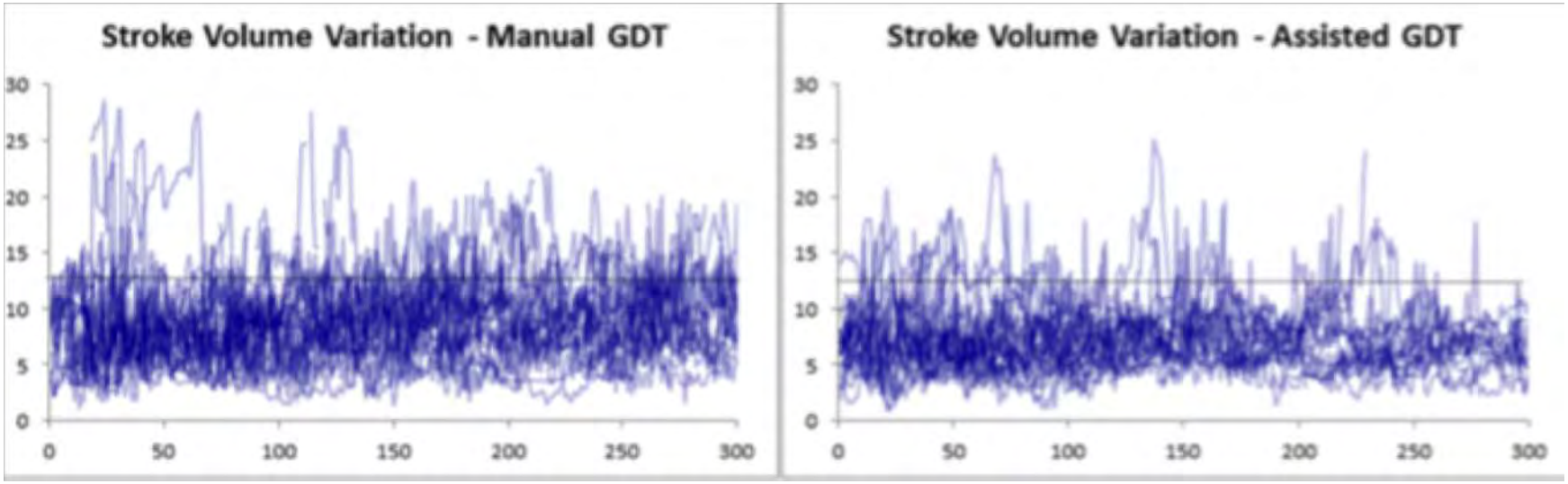
Rinehart et al. Critical Care (2015) 19:94
DOI 10.1186/s13054-015-0827-7

CRITICAL CARE

RESEARCH Open Access

Closed-loop assisted versus manual goal-directed fluid therapy during high-risk abdominal surgery: a case–control study with propensity matching

Joseph Rinehart[1*], Marc Lilot[2], Christine Lee[1], Alexandre Joosten[1], Trish Huynh[1], Cecilia Canales[1], David Imagawa[3], Aram Demirjian[3] and Maxime Cannesson[1]



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CRITICAL CARE

RESEARCH Open Access

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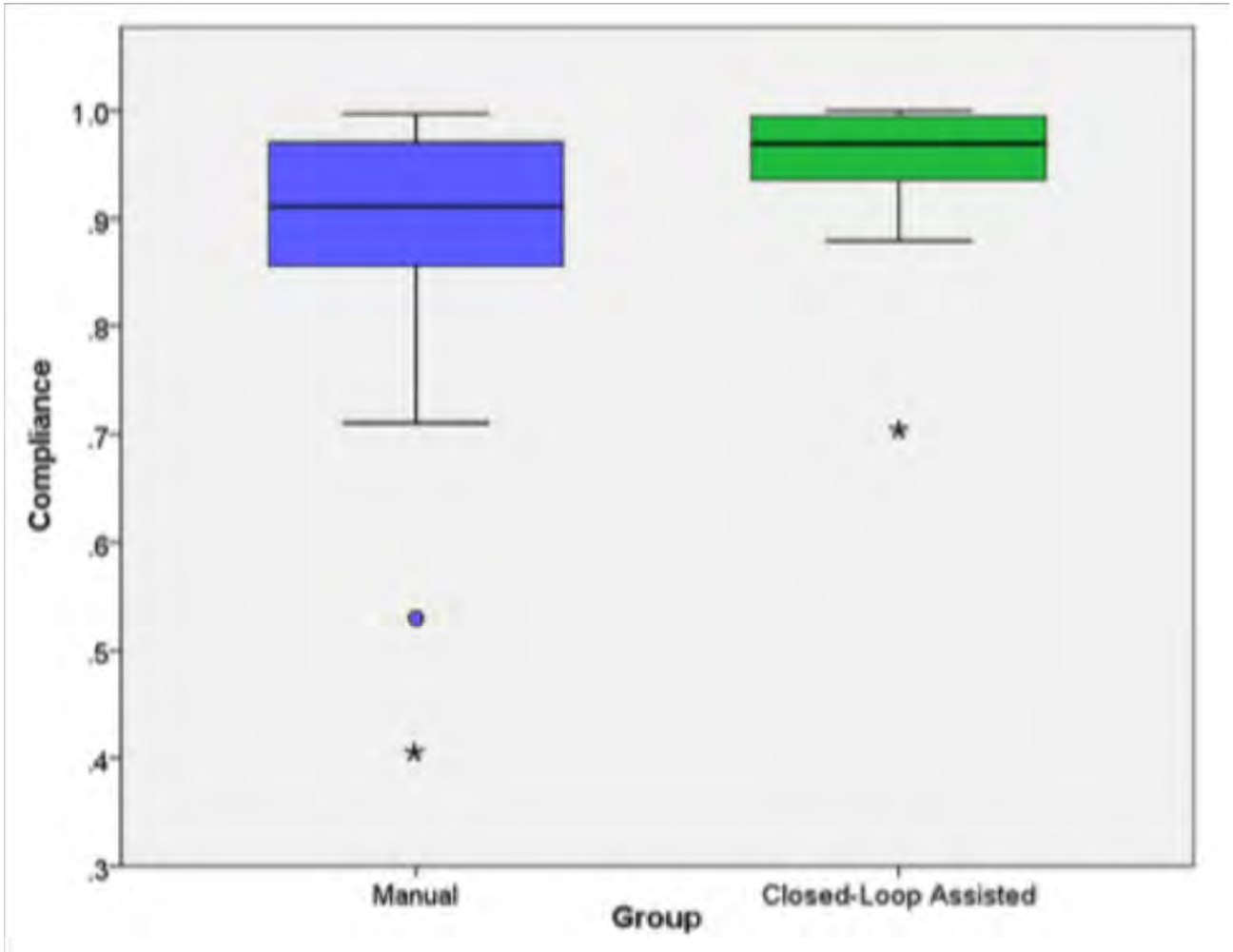


EJA

Eur J Anaesthesiol 2018; **35**:1–9

ORIGINAL ARTICLE

Implementation of closed-loop-assisted intra-operative goal-directed fluid therapy during major abdominal surgery

A case–control study with propensity matching

Alexandre Joosten, Sean Coeckelenbergh*, Amelie Delaporte, Brigitte Ickx, Jean Closset, Thierry Roumeguere, Luc Barvais, Luc Van Obbergh, Maxime Cannesson, Joseph Rinehart and Philippe Van der Linden

BRIEF REPORT

Personalized Versus Protocolized Fluid Management Using Noninvasive Hemodynamic Monitoring (Clearsight System) in Patients Undergoing Moderate-Risk Abdominal Surgery

Alexandre Joosten, MD,* Shalini Raj Lawrence, MD,* Alexandra Colesnicenco, MD,* Sean Coeckelenbergh, MD,* Jean Louis Vincent, MD, PhD,† Philippe Van der Linden, MD, PhD,‡ Maxime Cannesson, MD, PhD,§ and Joseph Rinehart, MD‖

Journal of Clinical Monitoring and Computing
https://doi.org/10.1007/s10877-018-0156-x

ORIGINAL RESEARCH

Practical impact of a decision support for goal-directed fluid therapy on protocol adherence: a clinical implementation study in patients undergoing major abdominal surgery

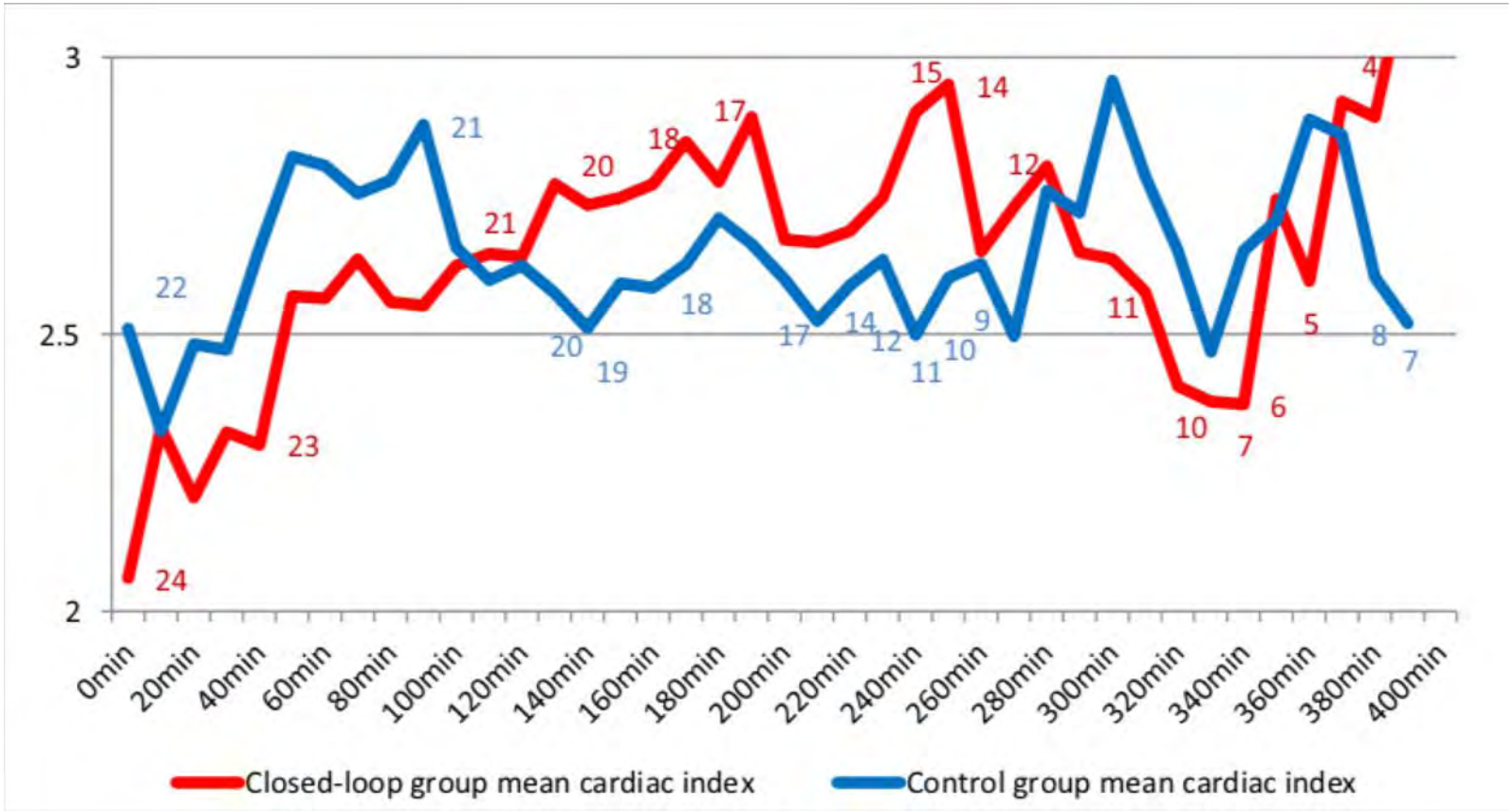
Alexandre Joosten[1] · Reda Hafiane[1] · Marco Pustetto[1] · Luc Van Obbergh[1] · Thierry Quackels[2] · Alexis Buggenhout[3] · Jean-Louis Vincent[4] · Brigitte Ickx[1] · Joseph Rinehart[5]

Journal of Clinical Monitoring and Computing
https://doi.org/10.1007/s10877-018-0106-7

ORIGINAL RESEARCH

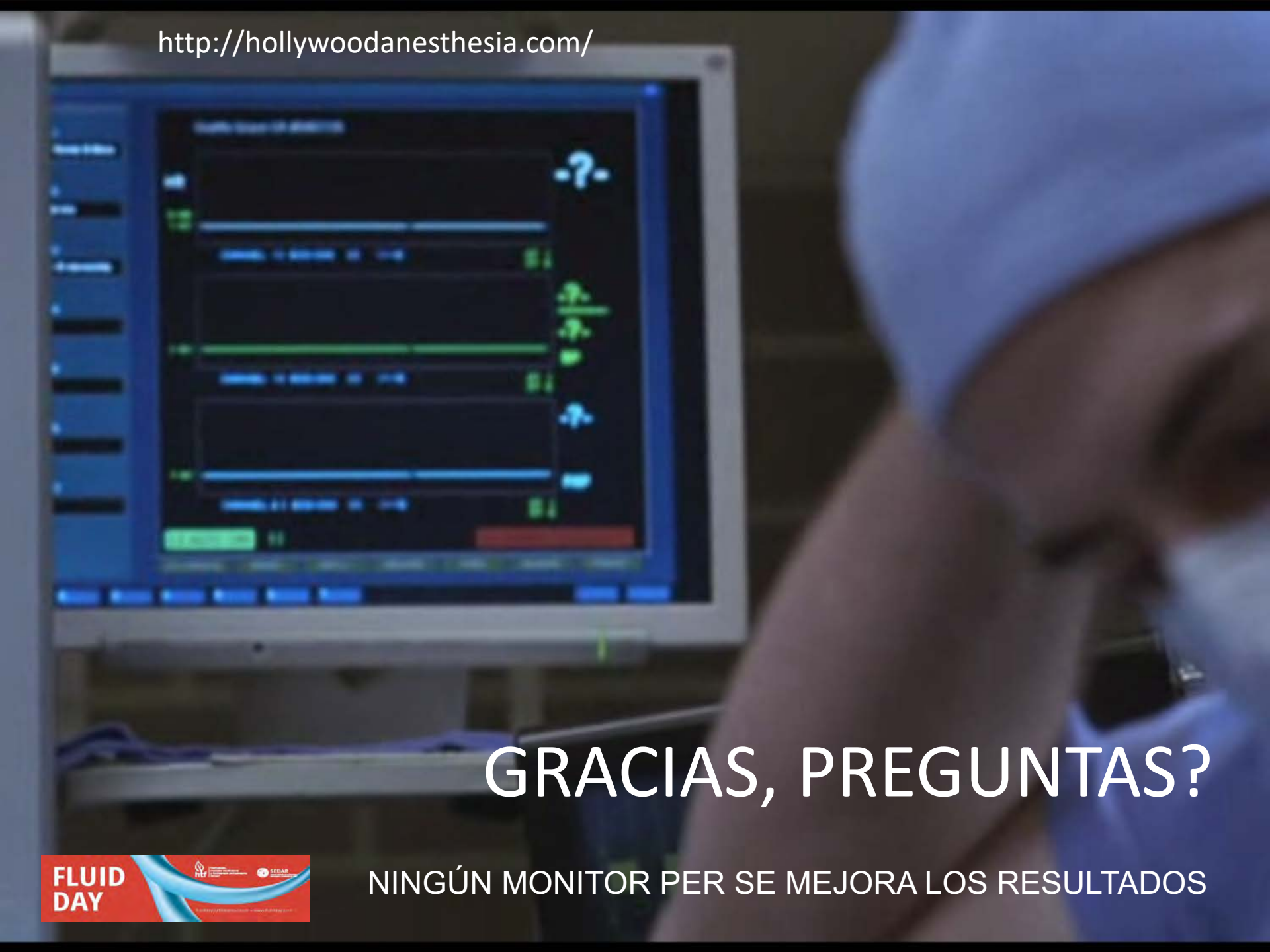
Comparison of cardiac output optimization with an automated closed-loop goal-directed fluid therapy versus non standardized manual fluid administration during elective abdominal surgery: first prospective randomized controlled trial

Marc Lilot[1,2,3] · Amandine Bellon[1] · Marine Gueugnon[4] · Marie-Christine Laplace[4] · Bruno Baffeleuf[4] · Pauline Hacquard[4] · Felicie Barthomeuf[4] · Camille Parent[4] · Thomas Tran[4] · Jean-Luc Soubirou[4] · Philip Robinson[5] · Lionel Bouvet[1,6] · Olivia Vassal[2,3,4] · Jean-Jacques Lehot[2,3,7] · Vincent Piriou[4,8]



Measure, interpret, apply — the MIA rule in critical care monitoring

J.-L. Vincent



GRACIAS, PREGUNTAS?

FLUID DAY

NINGÚN MONITOR PER SE MEJORA LOS RESULTADOS

EDITORIAL

Perioperative goal directed therapy: Evidence and compliance are two sides of the same coin

Tratamiento perioperatorio enfocado hacia los objetivos: las pruebas y el cumplimiento son las dos caras de una misma moneda

A. Joosten[a,b], J. Rinehart[a], M. Cannesson[a,*]

Journal of Clinical Monitoring and Computing
https://doi.org/10.1007/s10877-018-0156-x

ORIGINAL RESEARCH

Practical impact of a decision support for goal-directed fluid therapy on protocol adherence: a clinical implementation study in patients undergoing major abdominal surgery

Alexandre Joosten[1] · Reda Hafiane[1] · Marco Pustetto[1] · Luc Van Obbergh[1] · Thierry Quackels[2] · Alexis Buggenhout[3] · Jean-Louis Vincent[4] · Brigitte Ickx[1] · Joseph Rinehart[5]

Table 2 Intraoperative data

Variables	Control-group (N = 38)	AFM-group (N = 46)	Difference (95% CI)	P-value
Surgery duration (min)	224 [169, 270]	202 [159, 289]		0.41
Anaesthesia duration (min)	286 [252, 340]	263 [211, 361]		0.61
Maintenance crystalloid volume (ml)	1050 [800, 1300]	611 [500, 900]	− 240, − 508	**< 0.0001**
Maintenance crystalloid volume (ml/kg/h)	3.0 [2.6, 3.4]	1.9 [1.8, 2.0]	− 0.94, − 1.3	**< 0.0001**
Goal-directed therapy fluid volume (ml)	1500 [700, 2250]	1125 [750, 1500]		0.381
Total IN (ml)	2350 [1825, 3250]	1775 [1225, 2425]	− 140, − 1060	**0.010**
Urine output (ml)	200 [150, 425]	300 [225, 600]		0.020
Estimated blood loss (ml)	300 [65, 515]	175 [100, 500]		0.80
Total OUT (ml)	600 [300, 925]	650 [400, 1325]		0.35
Fluid balance (ml)	1725 [1100, 2525]	1010 [575, 1450]	− 277, − 1020	**0.00056**
Blood component transfusion (%)				
Packed red blood cell	3 (7.9)	4 (8.7)		1.0
Fresh frozen plasma	0 (0)	1 (2.2)		1.0
Platelets (6–8 units bags)	0 (0)	0 (0)		1.0
Any blood product (%)	3 (7.9)	4 (8.7)		1.0
Ephedrine (%)	21 (55)	30 (65)		0.38
Phenylephrine (%)	0 (0)	4 (8.7)		0.12
Noradrenaline (%)	27 (71)	10 (21)	0.04, 0.30	**< 0.0001**
Any vasopressor used (%)	29 (76)	34 (73)		1.0
HR (beats/min)	70 [63, 78]	73 [67, 78]		0.27
MAP (mmHg)	76 [72, 82]	85 [77, 90]	4.3, 11.2	**< 0.0005**
Stroke volume index (ml/m^2)	38 [33, 43]	40 [35, 44]		0.39
Cardiac index (l/min/m^2)	2.6 [2.2, 3.0]	2.9 [2.4, 3.2]		0.49
SVV (%)	10.4 [9.0, 12.1]	9 [7.7, 9.7]	− 1.0, − 2.9	**< 0.0005**
% Time with a SVV < 13%	76 [54, 86]	92 [82, 96]	7.6, 25	**< 0.0005**
% Time with cardiac index ≥ 2.5 (l/min/m^2)	52 [27, 95]	84 [49, 94]	3.0, 31	**0.029**
% Time with mean arterial pressure > 70 mmHg	77 [60, 89]	90 [75, 96]	4.0, 17	**0.002**

Journal of Clinical Monitoring and Computing
https://doi.org/10.1007/s10877-018-0156-x

ORIGINAL RESEARCH

Practical impact of a decision support for goal-directed fluid therapy on protocol adherence: a clinical implementation study in patients undergoing major abdominal surgery

Alexandre Joosten[1] · Reda Hafiane[1] · Marco Pustetto[1] · Luc Van Obbergh[1] · Thierry Quackels[2] · Alexis Buggenhout[3] · Jean-Louis Vincent[4] · Brigitte Ickx[1] · Joseph Rinehart[5]

Table 4 Postoperative data

Variables	Control-group (N = 38)	AFM-group (N = 46)	Difference (95% CI)	P-value
Fluid balance at exit PACU/ICU (ml)	1675 [750, 2300]	475 [–50, 1700]	− 370, − 1440	**0.00069**
Blood product transfusion[a]	2 (5)	2 (4)		1.0
Major complications (%)				
Patients with any major complications	7 (18)	11 (24)		0.54

Intensive Care Med
https://doi.org/10.1007/s00134-018-5345-z

SYSTEMATIC REVIEW

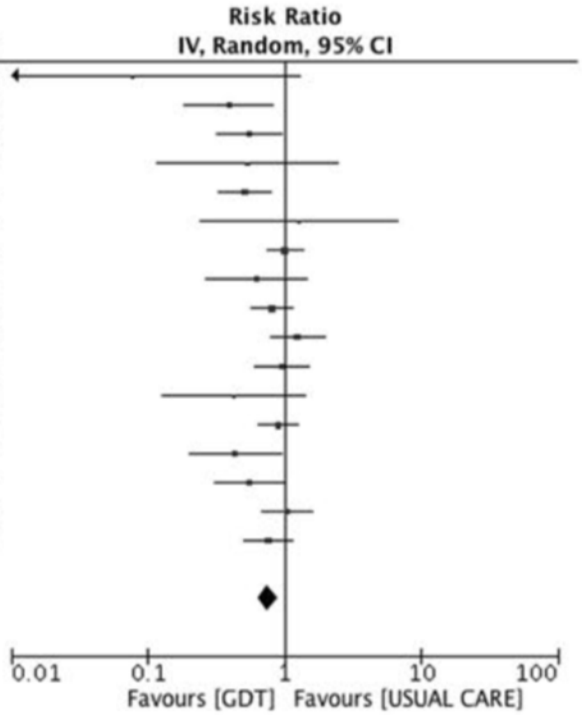
Association of conflicts of interest with the results and conclusions of goal-directed hemodynamic therapy research: a systematic review with meta-analysis

Lina Zhang[1], Feng Dai[2], Alexandria Brackett[3], Yuhang Ai[1] and Lingzhong Meng[4*]

C Studies declared no conflicts of interest (n = 17)

Study or Subgroup	GDT Events	GDT Total	USUAL CARE Events	USUAL CARE Total	Weight	Risk Ratio IV, Random, 95% CI	Year
Mythen1995	0	30	6	30	0.4%	0.08 [0.00, 1.31]	1995
Donati2007	8	68	20	67	4.0%	0.39 [0.19, 0.83]	2007
Chytra 2007	15	80	28	82	6.3%	0.55 [0.32, 0.95]	2007
Kapoor2008	2	13	4	14	1.2%	0.54 [0.12, 2.46]	2008
Benes 2010	18	60	35	60	8.0%	0.51 [0.33, 0.80]	2010
Van der Linden 2010	3	20	2	17	1.0%	1.27 [0.24, 6.76]	2010
Jammer 2010	51	121	50	120	11.4%	1.01 [0.75, 1.36]	2010
Mckenny2013	7	51	11	50	3.2%	0.62 [0.26, 1.48]	2013
Bartha 2013	30	70	38	72	10.1%	0.81 [0.57, 1.15]	2013
Bundgaard-Nielsen2013	15	21	12	21	7.7%	1.25 [0.79, 1.98]	2013
Correa-Gallego2015	24	69	24	66	7.8%	0.96 [0.61, 1.51]	2015
Kumar2015	3	20	7	20	1.8%	0.43 [0.13, 1.43]	2015
Moppett2015	27	51	37	63	10.5%	0.90 [0.65, 1.26]	2015
Elgendy2017	7	43	16	43	3.8%	0.44 [0.20, 0.96]	2017
Luo2017	14	73	25	72	6.0%	0.55 [0.31, 0.97]	2017
Corbella 2018	17	26	15	24	8.5%	1.05 [0.69, 1.59]	2018
Kim 2018	16	31	21	31	8.5%	0.76 [0.50, 1.16]	2018
Total (95% CI)		**847**		**852**	**100.0%**	**0.76 [0.64, 0.90]**	
Total events	257		351				

Heterogeneity: $Tau^2 = 0.04$; $Chi^2 = 26.35$, df = 16 (P = 0.05); $I^2 = 39\%$
Test for overall effect: Z = 3.15 (P = 0.002)



Intensive Care Med
https://doi.org/10.1007/s00134-018-5345-z

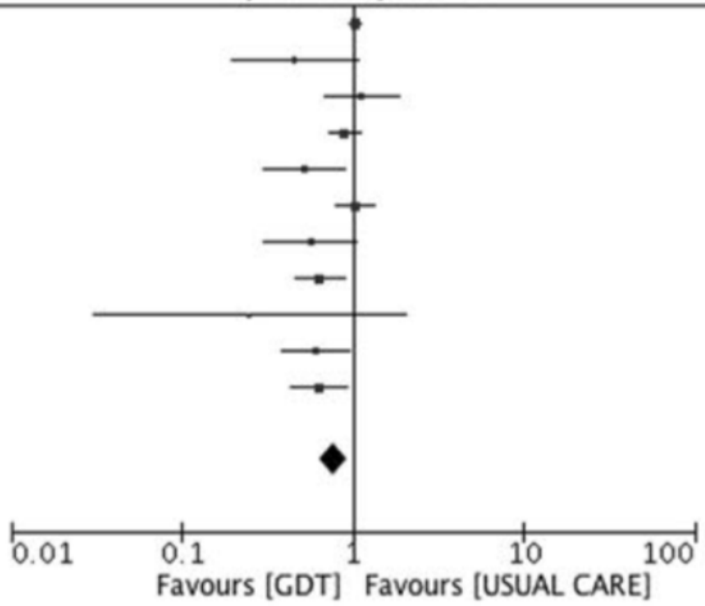
SYSTEMATIC REVIEW

Association of conflicts of interest

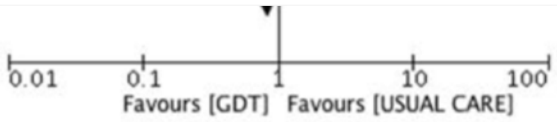
e Studies with author conflict (n =11)

Study or Subgroup	GDT Events	GDT Total	USUAL CARE Events	USUAL CARE Total	Weight	Risk Ratio IV, Random, 95% CI
Ackland2015	91	95	85	92	17.2%	1.04 [0.96, 1.11]
Bisgaard 2013	5	20	11	20	3.7%	0.45 [0.19, 1.07]
Bisgaard 2013	17	32	15	32	7.9%	1.13 [0.69, 1.85]
Broch2016	29	38	34	40	14.2%	0.90 [0.72, 1.12]
Calvo-Vecino 2018	18	209	35	211	7.2%	0.52 [0.30, 0.89]
Lai 2015	55	109	54	111	13.0%	1.04 [0.79, 1.35]
Mikor 2015	10	38	19	41	5.9%	0.57 [0.30, 1.06]
Pearse 2005	27	62	41	60	11.3%	0.64 [0.46, 0.89]
Smetkin 2009	1	20	4	20	0.7%	0.25 [0.03, 2.05]
Szturz 2018	20	71	32	69	8.7%	0.61 [0.39, 0.95]
Wakeling 2005	24	64	38	64	10.3%	0.63 [0.43, 0.92]
Total (95% CI)		**758**		**760**	**100.0%**	**0.77 [0.64, 0.93]**
Total events	297		368			

Heterogeneity: $Tau^2 = 0.05$; $Chi^2 = 32.33$, df = 10 (P = 0.0004); $I^2 = 69\%$
Test for overall effect: Z = 2.70 (P = 0.007)



Total events 340 410
Heterogeneity: $Chi^2 = 18.69$, df = 11 (P = 0.07); $I^2 = 41\%$
Test for overall effect: Z = 3.45 (P = 0.0006)



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Bisgaard 2013	5	20	11	20	3.7%	0.45 [0.19, 1.07]
Bisgaard 2013	17	32	15	32	7.9%	1.13 [0.69, 1.85]
Broch2016	29	38	34	40	14.2%	0.90 [0.72, 1.12]
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Lai 2015	55	109	54	111	13.0%	1.04 [0.79, 1.35]
Mikor 2015	10	38	19	41	5.9%	0.57 [0.30, 1.06]
Pearse 2005	27	62	41	60	11.3%	0.64 [0.46, 0.89]
Smetkin 2009	1	20	4	20	0.7%	0.25 [0.03, 2.05]
Szturz 2018	20	71	32	69	8.7%	0.61 [0.39, 0.95]
Wakeling 2005	24	64	38	64	10.3%	0.63 [0.43, 0.92]
Total (95% CI)		**758**		**760**	**100.0%**	**0.77 [0.64, 0.93]**
Total events	297		368			

Heterogeneity: $Tau^2 = 0.05$; $Chi^2 = 32.33$, df = 10 (P = 0.0004); $I^2 = 69\%$
Test for overall effect: Z = 2.70 (P = 0.007)

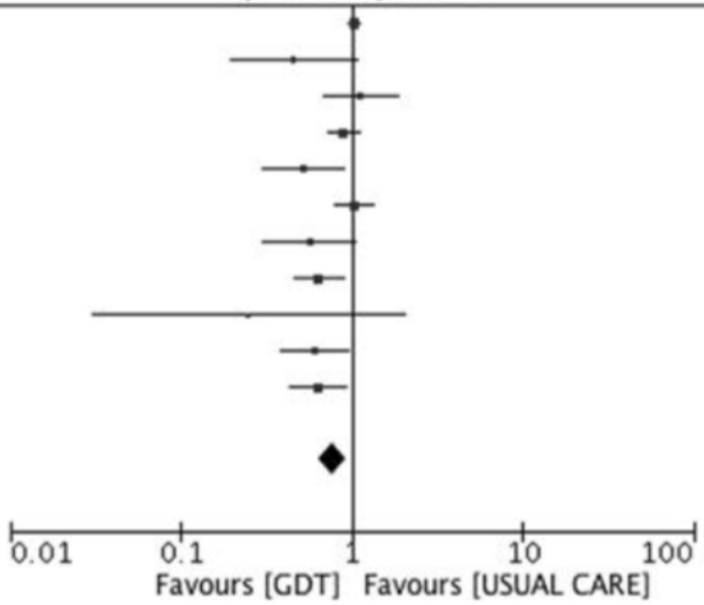

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Table 3. Primary and Secondary Outcomes.*

Outcome	Restrictive Fluid (N=1490)	Liberal Fluid (N=1493)	Hazard or Risk Ratio (95% CI)†	P Value
Primary outcome				
Disability-free survival at 1 yr — no. (%)‡	1223 (81.9)	1232 (82.3)	1.05 (0.88–1.24)	0.61
Death or persistent disability — no.	267	261		
Death	95	96		
Persistent disability	172	165		
Secondary outcomes§				
Composite septic outcome or death — no./total no. (%)¶	323/1481 (21.8)	295/1487 (19.8)	1.10 (0.96–1.27)	0.19
Surgical-site infection — no./total no. (%)	245/1481 (16.5)	202/1487 (13.6)	1.22 (1.03–1.45)	0.02‖
Sepsis — no./total no. (%)	157/1481 (10.6)	129/1487 (8.7)	1.22 (0.98–1.52)	0.08
Anastomotic leak — no./total no. (%)	49/1481 (3.3)	35/1487 (2.4)	1.41 (0.92–2.16)	0.12
Pneumonia — no./total no. (%)	54/1481 (3.6)	57/1487 (3.8)	0.95 (0.66–1.37)	0.79
Acute kidney injury — no./total no. (%)**	124/1443 (8.6)	72/1439 (5.0)	1.71 (1.29–2.27)	<0.001
Renal-replacement therapy — no./total no. (%)	13/1460 (0.9)	4/1462 (0.3)	3.27 (1.01–13.8)	0.048‖
Pulmonary edema — no./total no. (%)	20/1481 (1.4)	32/1487 (2.2)	0.63 (0.36–1.09)	0.10
Unplanned admission to ICU — no./total no. (%)	161/1487 (10.8)	145/1491 (9.7)	1.11 (0.90–1.38)	0.32
Median peak serum lactate level (IQR) — mmol per liter††	1.6 (1.1–2.5)	1.6 (1.1–2.4)	NA	NA
Median C-reactive protein level on day 3 (IQR) — mg per liter‡‡	136 (82–198)	133 (80–200)	NA	0.66
Median duration of mechanical ventilation (IQR) — hr§§	17 (5–65)	14 (3–31)	NA	0.07
Median score on quality-of-recovery scale (IQR)¶¶	106 (89–121)	107 (90–122)	NA	0.31
Median duration of stay in HDU or ICU (IQR) — days‖‖	1.8 (1.0–3.1)	1.4 (0.9–2.9)	NA	0.13
Median duration of hospital stay (IQR) — days	6.4 (3.6–10.6)	5.6 (3.6–10.5)	NA	0.26
Death — no. (%)‡				
At 90 days	31 (2.1)	18 (1.2)	1.73 (0.97–3.10)	0.06
At 12 mo	95 (6.5)	96 (6.6)	1.03 (0.78–1.36)	0.86

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Table 2. Blood Loss and Administered Intravenous-Fluid Volumes.*

Variable	Restrictive Fluid (N=1490)	Liberal Fluid (N=1493)	P Value
During surgery			
Median intraoperative blood loss (IQR) — ml	200 (100 to 400)	200 (100 to 500)	0.14†
Median intraoperative fluid administration (IQR) — ml			
Crystalloid	1677 (1173 to 2294)	3000 (2100 to 3850)	<0.001
Colloid‡	500 (250 to 800)	500 (400 to 1000)	0.01
Median infusion rate (IQR) — ml/kg/hr	6.5 (5.1 to 8.4)	10.9 (8.7 to 13.5)	<0.001
In PACU§			
Median administration of fluid (IQR) — ml			
Crystalloid	160 (90 to 302)	300 (160 to 500)	<0.001
Colloid‡	400 (250 to 500)	500 (250 to 500)	0.27
Postoperative day 1, post-PACU			
Median administration of fluid (IQR) — ml			
Crystalloid	1556 (1200 to 1960)	2600 (2052 to 3150)	<0.001
Colloid‡	500 (250 to 1000)	500 (400 to 750)	0.89
Median infusion rate (IQR) — ml/kg/hr	0.9 (0.7 to 1.2)	1.5 (1.2 to 1.7)	<0.001
At 24 hr after surgery			
Median cumulative total for intravenous fluids (IQR) — ml	3671 (2885 to 4880)	6146 (5000 to 7410)	<0.001
Median fluid balance (IQR) — ml¶	1380 (540 to 2338)	3092 (2010 to 4241)	<0.001†
Median weight gain (IQR) — kg‖	0.3 (−1.0 to 1.9)	1.6 (0.0 to 3.6)	ND

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Our findings should not be used to support excessive administration of intravenous fluid