Lo studio FRESH (Fluid Response Evaluation in Sepsis Hypotension and Shock)

Riccardo Pini

XII congresso nazionale
simeu
RICCIONE 13-15 MAGGIO 2022

LA GESTIONE DELLA SEPSI NELL'ADULTO IN PRONTO SOCCORSO E MEDICINA D'URGENZA IN ITALIA: LE RACCOMANDAZIONI DELLA CONSENSUS SIMEU

REVISIONE 2021

FLUIDI E INOTROPI IN PS
15) Somministrare 30 ml/kg di cristalloidi entro le prime 3 ore nei pazienti con ipoperfusione correlata alla sepsi *Tipo di raccomandazione: A (fortemente raccomandato)* *Consenso: 100%* *Livello di evidenza: III (studi di coorte non randomizzati).*
16) Non utilizzare i colloidi nella rianimazione volemica del paziente settico *Tipo di raccomandazione: A (fortemente raccomandato)* *Consenso: 100%* *Livello di evidenza: VI (opinione di esperti).*
17) Monitoraggio accurato del paziente sottoposto a fluidoterapia e adeguamento dell'infusione dei liquidi quando si accerti o sospetti il sovraccarico idrico. *Tipo di raccomandazione: A (fortemente raccomandato)* *Consenso: 100%* *Livello di evidenza: III (studi di coorte non randomizzati).*
18) Uso dell'ecografia polmonare per il monitoraggio della ridotta fluido-tolleranza. *Tipo di raccomandazione: B (esecuzione attentamente considerata)* *Consenso: 100%* *Livello di evidenza: III (studi di coorte non randomizzati)*

Obiettivi

Terapia con fluidi nella sepsi

- **Migliorare la portata cardiaca**
- **Garantire una adeguata perfusione periferica**

30-50% di pazienti volume *responders* all'ingresso in TI

ORIGINAL

Fluid administration in severe sepsis and septic shock, patterns and outcomes: an analysis of a large national database

Paul E. Marik[1*], Walter T. Linde-Zwirble[2], Edward A. Bittner[3], Jennifer Sahatjian[4] and Douglas Hansell[3,4]

23513 pazienti reclutati nelle ICU
di 344 ospedali

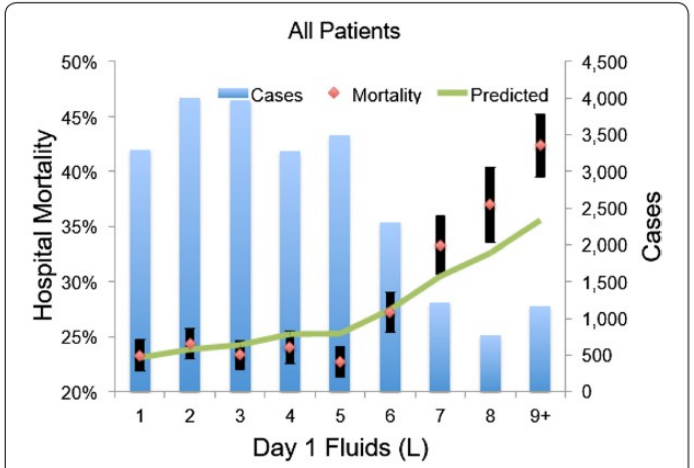

Fig. 2 Actual and expected hospital mortality, by day 1 fluid groups

Intensive Care Med (2017) 43:625–632
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Journal of Critical Care 42 (2017) 42–46

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Stroke volume guided resuscitation in severe sepsis and septic shock improves outcomes

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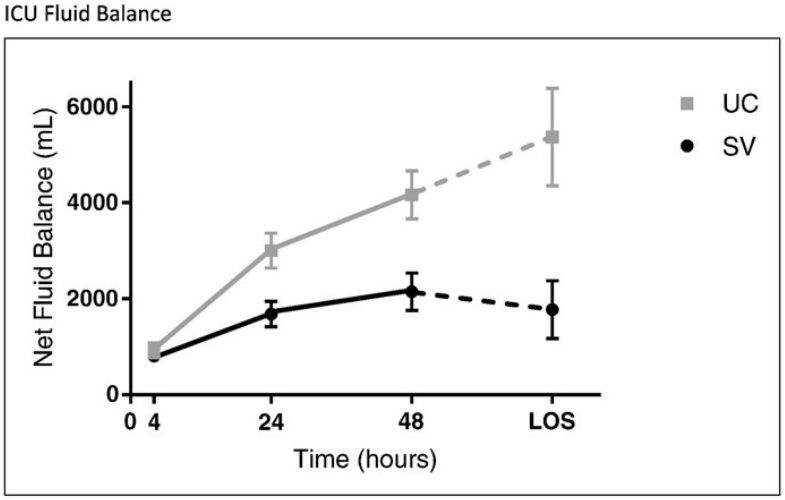

Fig. 1. The fluid balance between the two groups was significantly less in the stroke volume (SV) group at 24 h, 48 h, and at the end of the ICU stay compared with the usual care (UC) group. Dashed lines represent the difference in length of stay (LOS) between the two groups.

Table 3
SV resuscitation results as an independent variable for patient outcomes in multivariate analyses.

Outcome	Results	Confidence intervals	p-Value
Net-fluid balance – 4 h	−360.91 mL	−727.16 to −5.340	0.053
Net-fluid balance – 24 h	−1391.95 mL	−2150.96 to −632.95	<0.0001
Net-fluid balance – 48 h	−1485.26 mL	−2496.60 to −473.92	0.004
Net-fluid balance – ICU LOS	−2779.17 mL	−4686.48 to −871.86	0.005
In-hospital mortality	OR 0.58	0.23–1.47	0.25
ICU LOS – survivors	−2.55 days	−4.98 to −0.12	0.040
Mechanically ventilated	OR 0.34	0.15–0.80	0.01
Ventilator days	−2.15 days	−5.24–0.97	0.17
Vasopressor initiated	OR 0.57	0.26–1.24	0.15
Vasopressor duration	−27.94 h	−51.16 to −4.74	0.02
Acute dialysis initiated[a]	OR 1.11	0.08–15.74	0.94

ICU = Intensive Care Unit, LOS = Length of Stay.
[a] Excludes patients that required chronic hemodialysis prior to admission.

Am J Physiol Heart Circ Physiol 293: H583–H589, 2007.
First published March 23, 2007; doi:10.1152/ajpheart.00195.2007.

Evaluation of a noninvasive continuous cardiac output monitoring system based on thoracic bioreactance

Hanan Keren,[1] Daniel Burkhoff,[2] and Pierre Squara[3]
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Submitted 14 February 2007; accepted in final form 18 March 2007

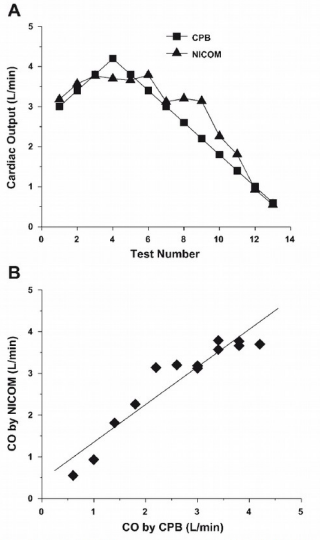

Fig. 4. Cardiac output (CO) measurements in animals on cardiopulmonary bypass (CPB) by the NICOM system during gradual changes in CPB pump flow. *A*: comparison between CPB flow and NICOM measurements from a typical experiment. *B*: data from *A* plotted to show the correlation between the CO measurements by NICOM and CPB.

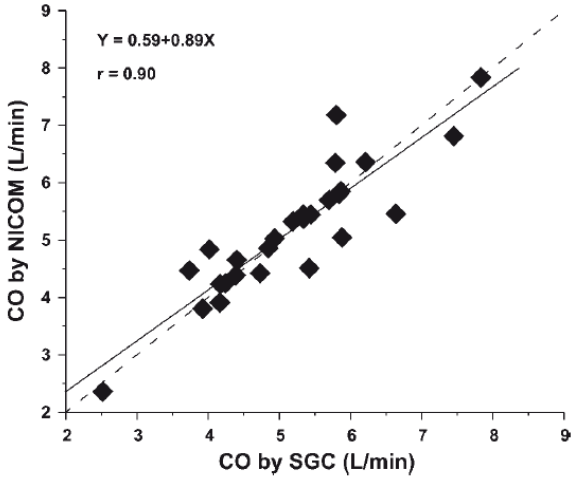

Fig. 9. Correlation between mean values of CO measured from the NICOM system and thermodilution in 27 postoperative patients.

Intensive Care Med (2007) 33:1191–1194
DOI 10.1007/s00134-007-0640-0

BRIEF REPORT

Pierre Squara
Dominique Denjean
Philippe Estagnasie
Alain Brusset
Jean Claude Dib
Claude Dubois

Noninvasive cardiac output monitoring (NICOM): a clinical validation

110 pazienti 65.888 misurazioni) in ICU dopo intervento cardiochirurgico

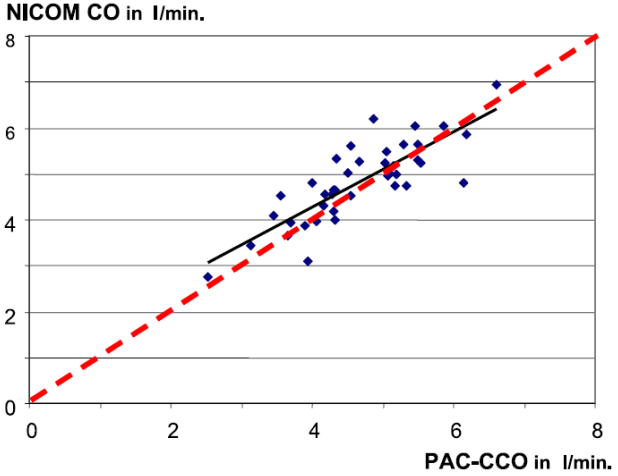

Fig. 1 Regression PAC-CCO vs. NICOM (each point represents the mean CO value during a period of stable CO). $R = 0.82$. Slope = 0.82 (95%CI = 0.64–1.0) not significantly different from the identity line (*red dotted line*)

Intensive Care Med (2010) 36:1875–1881
DOI 10.1007/s00134-010-1990-6

ORIGINAL

Brahim Benomar
Alexandre Ouattara
Philippe Estagnasie
Alain Brusset
Pierre Squara

Fluid responsiveness predicted by noninvasive Bioreactance-based passive leg raise test

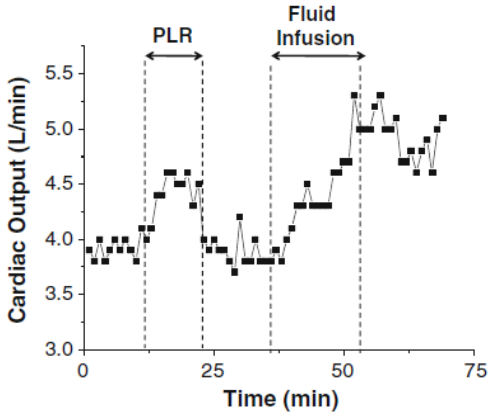

Fig. 1 A typical experimental recording

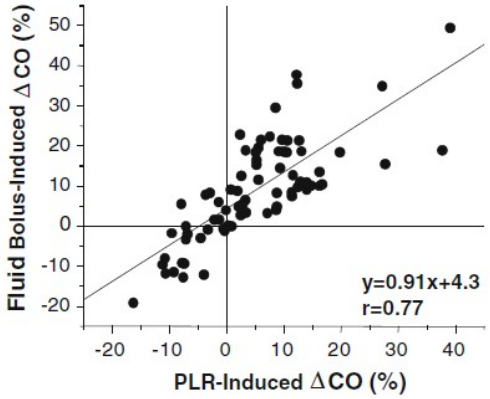

Fig. 2 Relationship between PLR-induced and fluid-induced changes in CO in L min^{-1}

Conclusions: In this specific population of patients, it is clinically valid to use the bioreactance-based NICOM system to predict FR from changes in CO during PLR.

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Fluid responsiveness predicted by noninvasive Bioreactance-based passive leg raise test

Fluid Response Evaluation in Sepsis Hypotension and Shock

A Randomized Clinical Trial

Ivor S. Douglas, MD; Philip M. Alapat, MD; Keith A. Corl, MD; Matthew C. Exline, MD, MPH; Lui G. Forni, PhD; Andre L. Holder, MD; David A. Kaufman, MD; Akram Khan, MD; Mitchell M. Levy, MD; Gregory S. Martin, MD; Jennifer A. Sahatjian, PsyD; Eric Seeley, MD; Wesley H. Self, MD; Jeremy A. Weingarten, MD; Mark Williams, MD; and Douglas M. Hansell, MD

CHEST 2020; 158(4):1431-1445

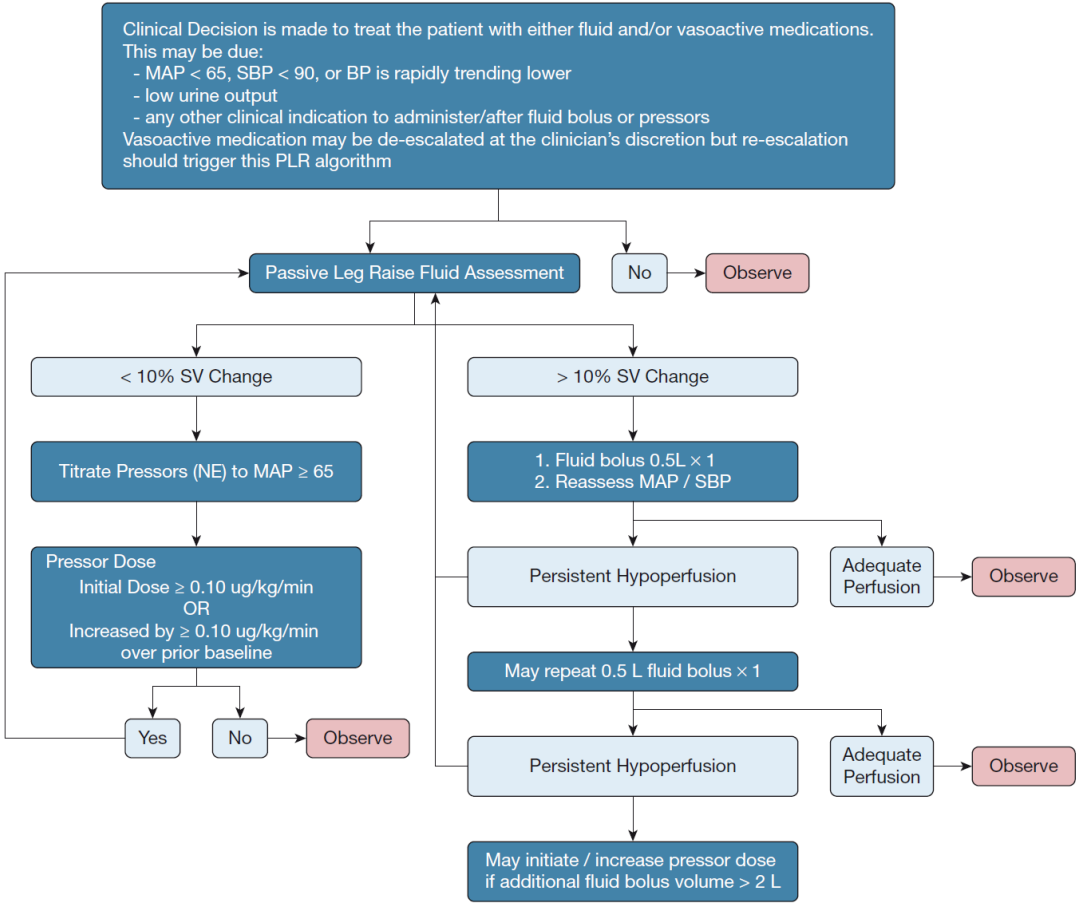


Figure 1 – *Flow chart model of the algorithm used to guide treatment in the Fluid Responsiveness Evaluation in Sepsis-associated Hypotension study. MAP = mean arterial pressure; NE = norepinephrine; PLR = passive leg raise; SBP = systolic BP; SV = stroke volume.*

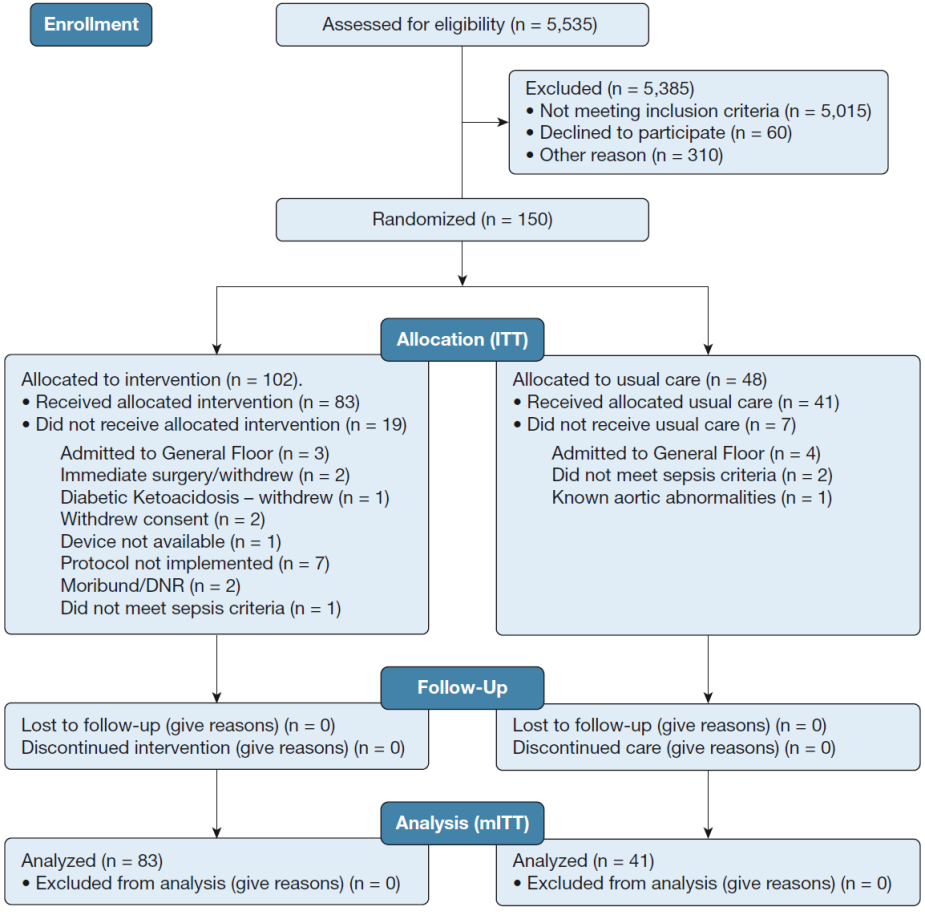


Figure 2 – *CONSORT patient flow chart diagram that tracks study participation and the number of patients whose condition was assessed for eligibility but could not be included in the study. DNR = do not resuscitate; ITT = intent to treat; mITT = modified intent to treat.*

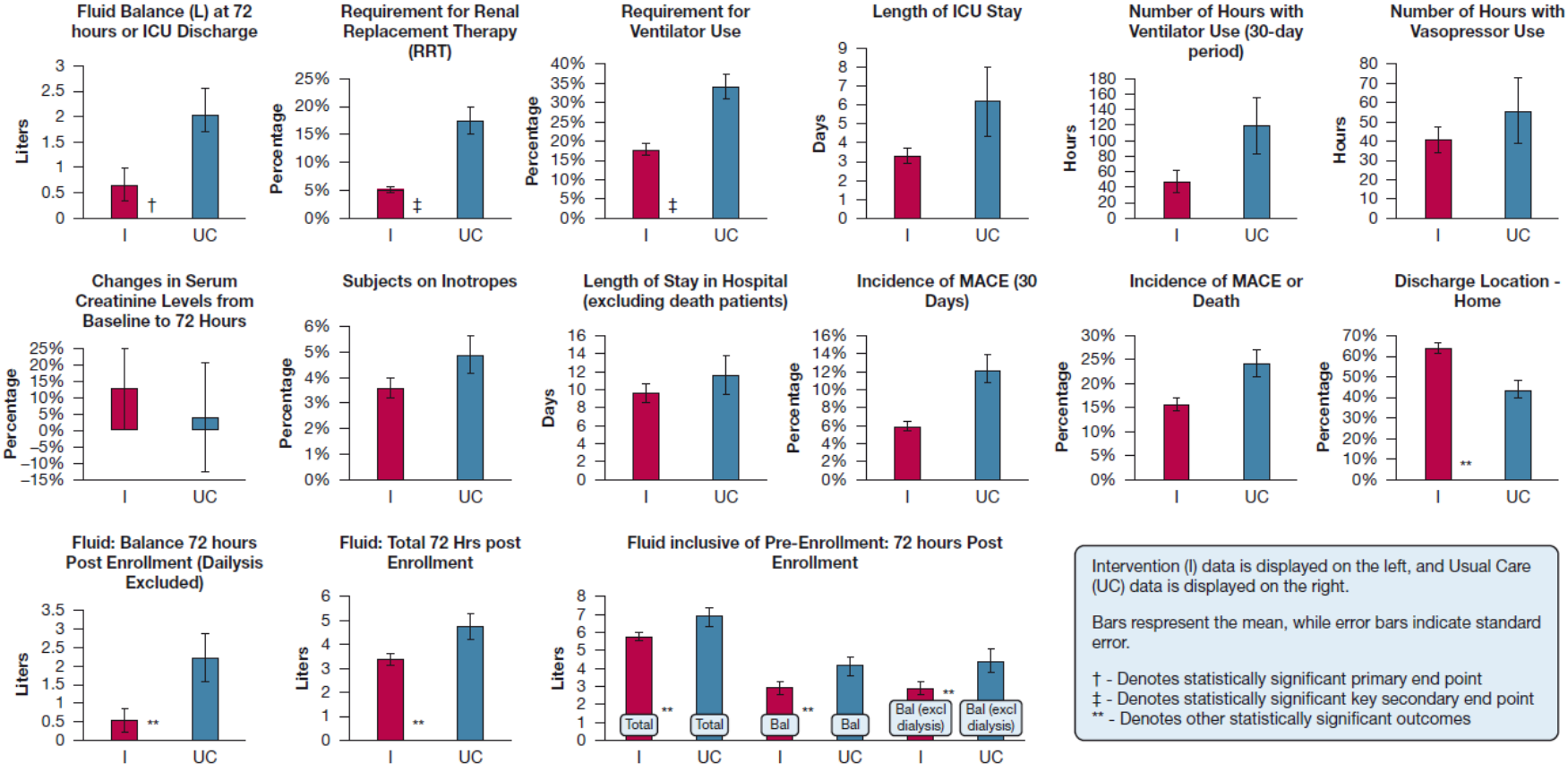
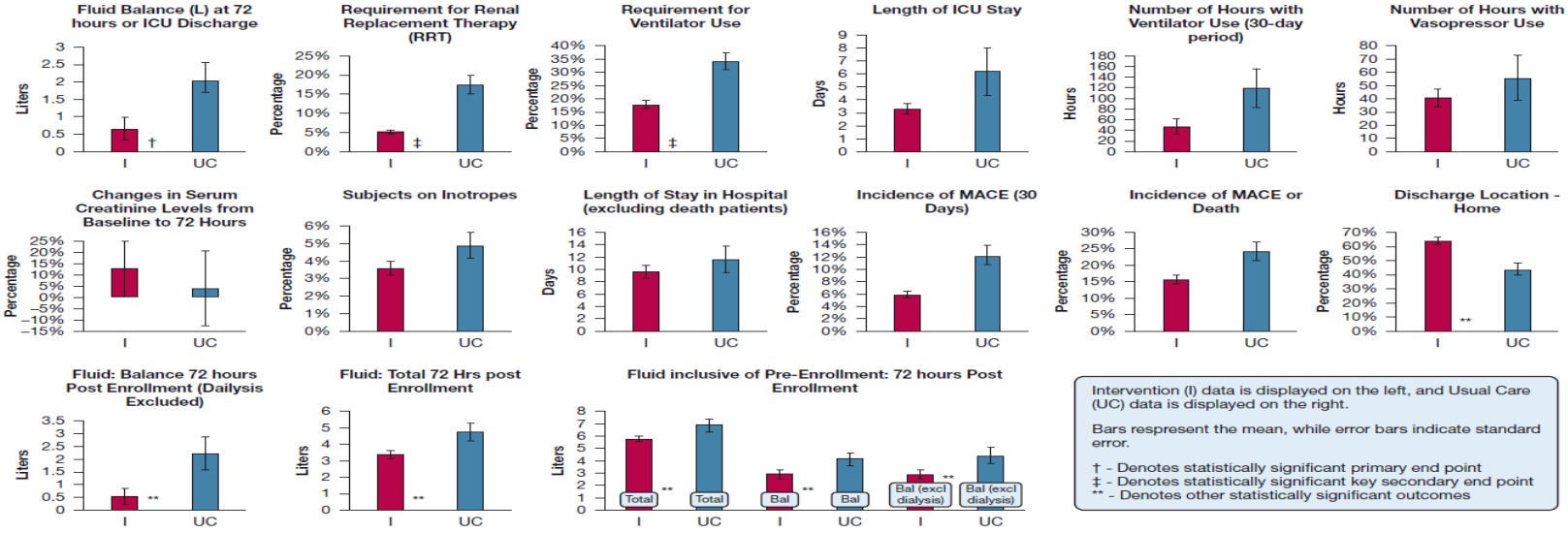


Figure 5 – *Bar charts compare intervention to usual care for study end points. Bal = fluid balance; MACE = major adverse cardiac event.*



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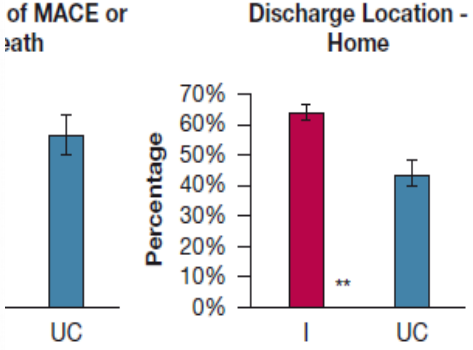
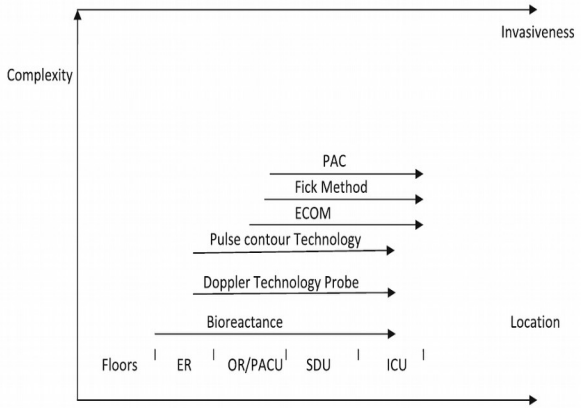


In conclusion, physiologically informed fluid and pressor resuscitation with the use of PLR-induced SV change to guide personalized management of sepsis-associated hypotension and shock was safe. Among patients who met prespecified enrollment criteria and were treated according to protocol, dynamic measure-guided resuscitation was associated with lower net fluid balance and reductions in the risk of renal and respiratory failure. Functional evaluation for lack of FR adequately identifies a group of patients with sepsis-associated hypotension who should not have further IV fluids infused. Although PLR-guided fluid and vasopressor resuscitation did not improve survival in this study, the administration of IV fluids and vasopressors only when they were likely to improve CO did reduce 72-hour fluid balance and improve discharge to home.

Conclusioni

Fig. 3 Suggested use of cardiac output devices and monitoring system within the hospital system. *ER* emergency room, *OR/PACU* operating room/post-anesthesia care unit, *SDU* step down unit, *ICU* intensive care unit, *ECOM* endotracheal cardiac output monitoring



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Intern Emerg Med (2012) 7:163–171

- Il trattamento dei pazienti con sepsi e shock settico, dopo il riempimento iniziale, richiede una valutazione accurata della condizione volemica
- Un sovraccarico di volume si correla ad una prognosi peggiore
- La bioreattanta è una metodica non-invasiva che consente una valutazione accurata della *Fluid Responsiveness*
- Per la sua facilità di applicazione, la bioreattanza può essere utilizzata facilmente in Medicina di Emergenza-Urgenza