

IV FLUIDS: ROLE OF VOLUME RESUSCITATION IN SEPTIC SHOCK

Pacific Northwest Sepsis Conference, June 16th 2020

Catherine Beni, MD, PhD

T32 Research Fellow

University of Washington, Department of Surgery

OBJECTIVES



Introduction



Adverse Effects +
Controversy



Next Steps

SURVIVING SEPSIS: 2016 GUIDELINES FOR IVF

Initial Resuscitation

≤ 3
hours

- ▶ Check lactate
- ▶ Blood cx before antibiotics
- ▶ Start broad-spectrum antibiotics
- ▶ **30 mL/kg crystalloid**

≤ 6
hours

- ▶ Start vasopressors for unresponsive HoTN
- ▶ Persistent HoTN or lactate ≥ 4 :
 - ▶ CVP
 - ▶ ScvO₂
- ▶ Recheck lactate

SURVIVING SEPSIS: 2016 GUIDELINES FOR IVF

Resuscitation Goals

- CVP 8-12 mmHg
- MAP \geq 65
- UOP \geq 0.5 cc/kg/hr
- ScvO₂ 70%
- Lactate normalization

Additional IVF

- Albumin if substantial crystalloids required
- Fluid challenge for continued IVF



- Administer additional fluids if improvement in static or dynamic variables

WHERE DO WE GET 30 mL/kg?

2001

- ▶ Rivers et al. landmark study on EGDT
 - ▶ Follow-up single- and multi-centre RCTs in China

2014

-

2015

- ▶ ARISE, ProCESS, and ProMISE trials: EGDT had no change in mortality for septic shock vs standard care
 - ▶ EGDT patients received more IVF (~500 mL)

IVF: WHY DO WE CARE?

Adverse Outcomes

- Ventilator days, ARDS
- Need for RRT, length of time on RRT
- Risk of wound infection
- ICU LOS
- Discharge to SNF > home
- New inability to ambulate

IVF: WHY DO WE CARE?

Adverse Outcomes

- Ventilator days, ARDS
- Need for RRT, length of time on RRT
- Risk of wound infection
- ICU LOS
- Discharge to SNF > home
- New inability to ambulate

Prevalent Problem

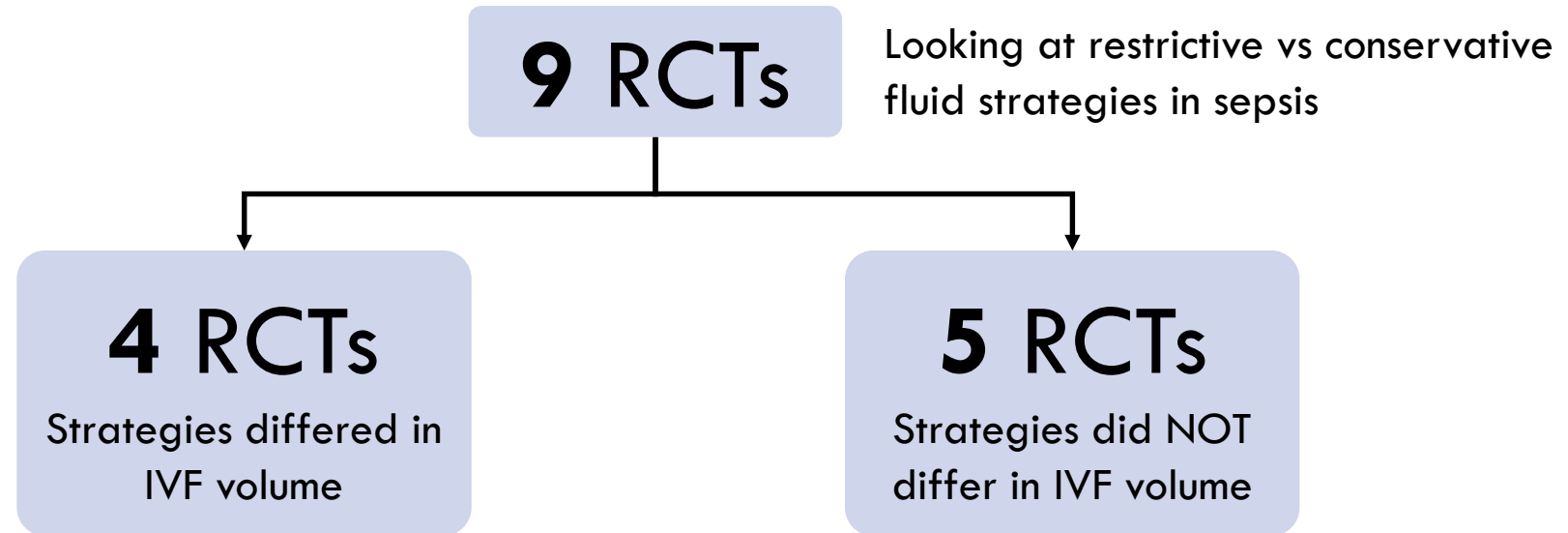
- **35% of patients suffer volume overload** by ICU discharge
- Patients are **equally likely to receive additional fluids regardless of whether they respond** to a bolus
- Fluid responsiveness is assessed prior to bolus ~ half of the time

IVF: WHY DO WE CARE?

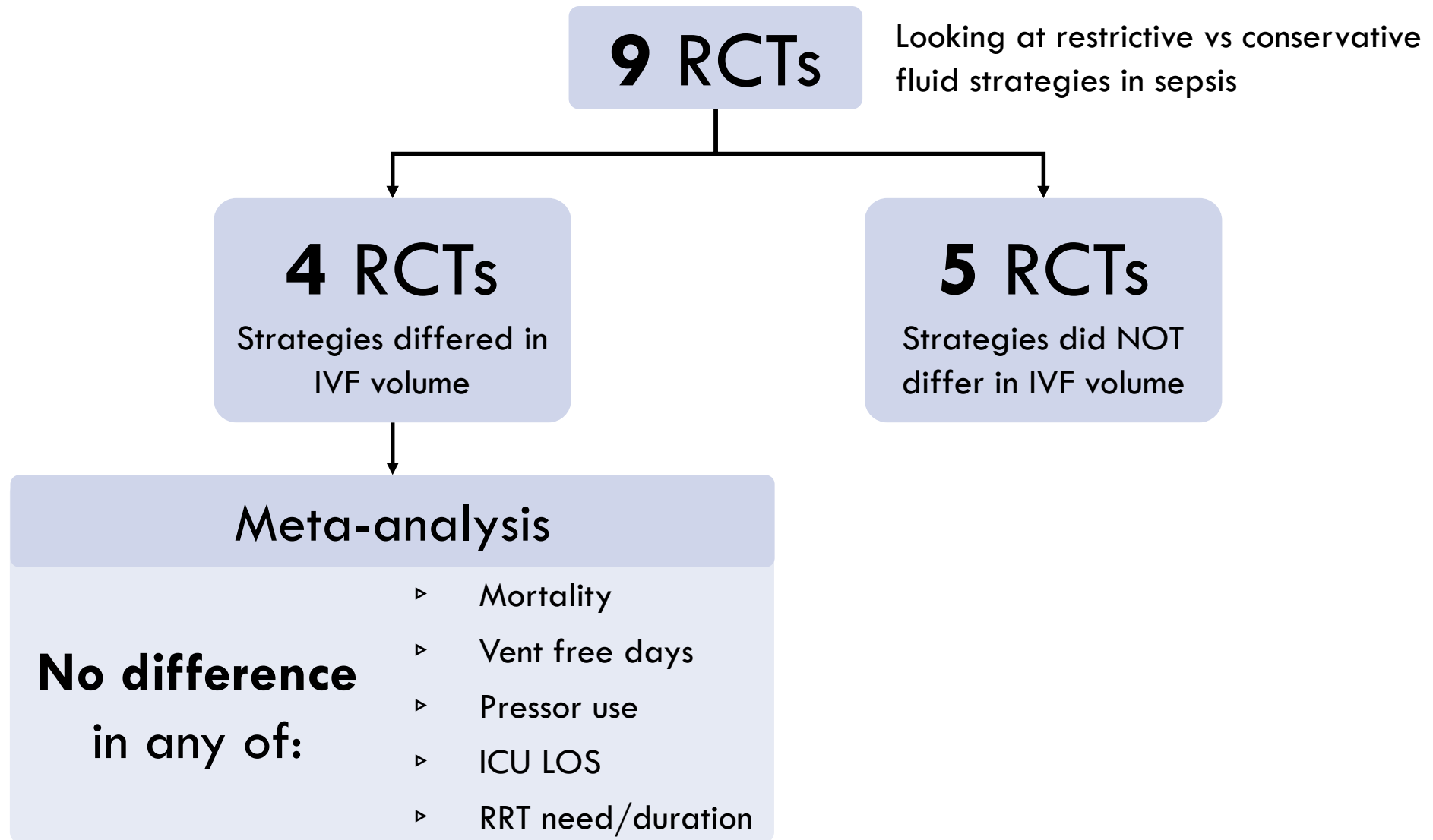
Controversy?

- Unclear if adverse effects causative or purely correlated
 - Expect sicker patients to receive more IVF
- Unclear how much impact clinician education may have on outcomes
- Unclear if fluid restrictive strategies can improve outcomes

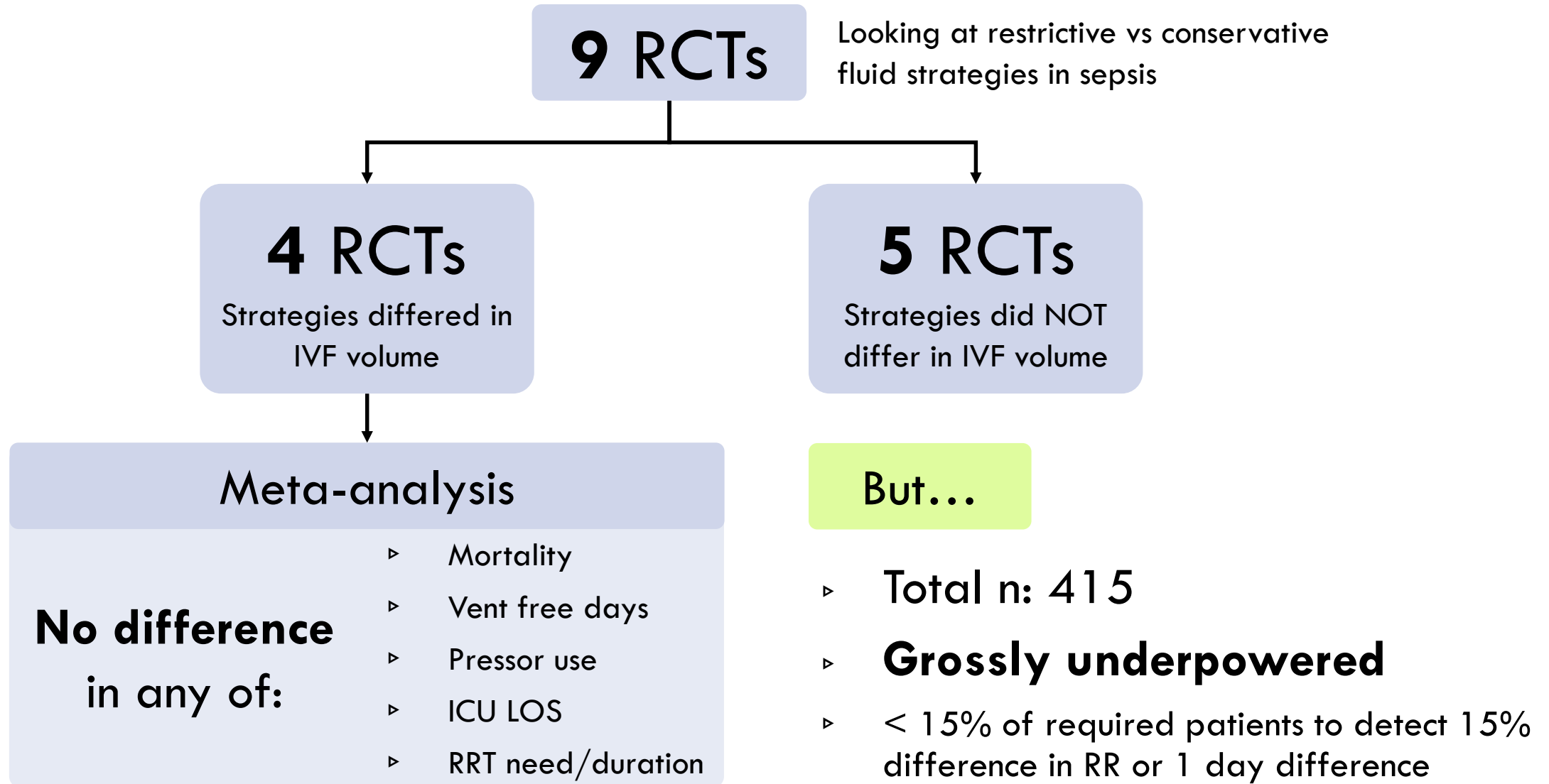
FLUID RESTRICTIVE STRATEGIES: PAUCITY OF EVIDENCE



FLUID RESTRICTIVE STRATEGIES: PAUCITY OF EVIDENCE



FLUID RESTRICTIVE STRATEGIES: PAUCITY OF EVIDENCE



NEXT STEPS?

- ▶ Evidence for volume, rate, and frequency of IVF administration in septic shock is lacking in both quantity and quality
- ▶ There is a **serious need for large, multi-center RCTs** comparing IVF administration strategies

REFERENCES

- ▶ [1] Rhodes A, Evans LE, Alhazzani W, et al. Surviving Sepsis Campaign: International Guidelines for Management of Sepsis and Septic Shock: 2016. *Crit Care Med.* 2017;45(3):486-552.
- ▶ [2] Rivers E, Nguyen B, Havstad S, et al. Early goal-directed therapy in the treatment of severe sepsis and septic shock. *N Engl J Med.* 2001;345(19):1368-77.
- ▶ [3] Mouncey PR, Osborn TM, Power GS, et al. Trial of early, goal-directed resuscitation for septic shock. *N Engl J Med.* 2015;372(14):1301-11.
- ▶ [4] Yealy DM, Kellum JA, Huang DT, et al. A randomized trial of protocol-based care for early septic shock. *N Engl J Med.* 2014;370(18):1683-93.
- ▶ [5] Peake SL, Delaney A, Bailey M, et al. Goal-directed resuscitation for patients with early septic shock. *N Engl J Med.* 2014;371(16):1496-506.
- ▶ [6] Mitchell KH, Carlbom D, Caldwell E, Leary PJ, Himmelfarb J, Hough CL. Volume Overload: Prevalence, Risk Factors, and Functional Outcome in Survivors of Septic Shock. *Ann Am Thorac Soc.* 2015;12(12):1837-44.
- ▶ [7] Malbrain ML, Marik PE, Witters I, et al. Fluid overload, de-resuscitation, and outcomes in critically ill or injured patients: a systematic review with suggestions for clinical practice. *Anaesthesiol Intensive Ther.* 2014;46(5):361-80.
- ▶ [8] Cecconi M, Hofer C, Teboul JL, et al. Fluid challenges in intensive care: the FENICE study: A global inception cohort study. *Intensive Care Med.* 2015;41(9):1529-37.
- ▶ [9] Meyhoff TS, Møller MH, Hjortrup PB, Cronhjort M, Perner A, Wetterslev J. Lower vs Higher Fluid Volumes During Initial Management of Sepsis: A Systematic Review With Meta-Analysis and Trial Sequential Analysis. *Chest.* 2020;
- ▶ [10] Byrne L, Van haren F. Fluid resuscitation in human sepsis: Time to rewrite history?. *Ann Intensive Care.* 2017;7(1):4.
- ▶ [11] Ferguson AJ, Silversides JA. Fluid Volume Trials in Sepsis: An Arid Landscape. *Chest.* 2020