РНИМУ
имени Н.И. ПИРОГОВА

ГКБ ИМ. И. В. ДАВЫДОВСКОГО

1866

Особенности инфузионной терапии при критических состояниях

А.В. Бабаянц

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MARK DERSHWITZ
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Задача

489. A 41-year-old woman underwent resection of an acoustic neuroma under total intravenous anesthesia (TIVA). The surgical procedure was notable for 12-h duration with 500 mL blood loss. She is admitted to the ICU postoperatively, is extubated, breathing comfortably, and is neurologically intact. Vital signs are normal. An ABG reveals pH 7.30, $Paco_2$ 42 mm Hg, Pao_2 150 mm Hg on supplemental oxygen, base deficit 4. A metabolic panel shows Na 143 mEq/ L, K 3 mEq/ L, Cl 115 mEq/ L, HCO_3 20 mEq/ L. Which one of the following is the most likely explanation for the patient's acid-base disturbance?

Клиническая ситуация

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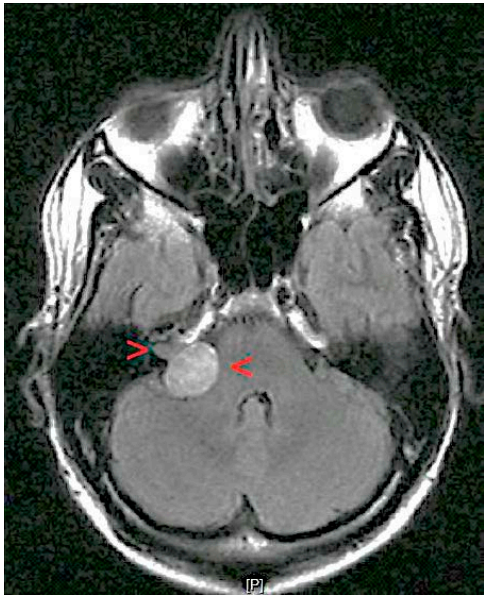

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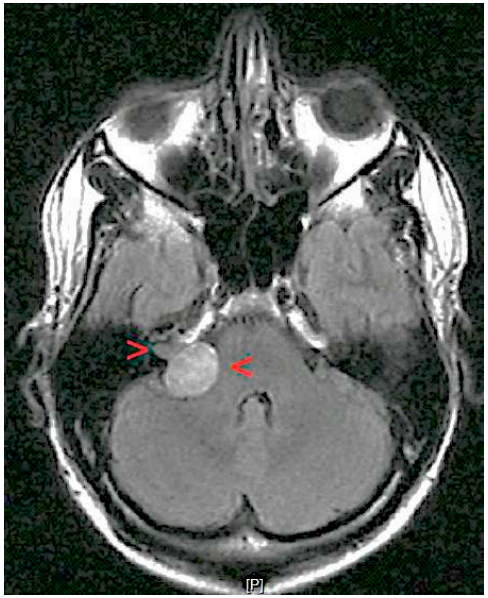

41-летней женщине выполнено удаление невриномы слухового нерва (ТВВА). Длительность операции - 12 ч.

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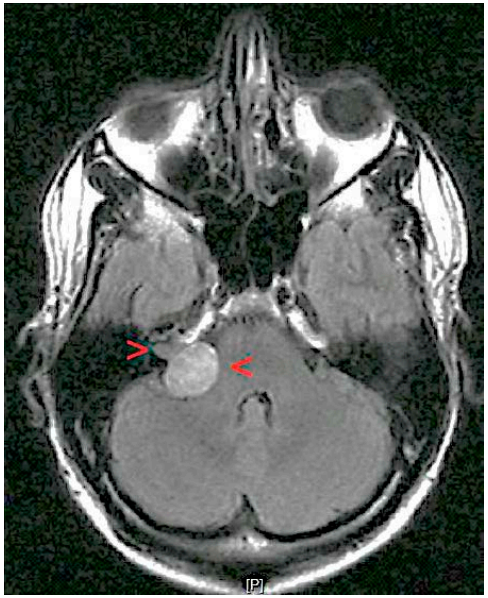

41-летней женщине выполнено удаление невриномы слухового нерва (ТВВА). Длительность операции - 12 ч.

Кровопотеря 500 мл. Перевод в ОРИТ, экстубация

Без неврологического дефицита

Витальные показатели стабильны

Анализ кислотно-основного состояния

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pH = 7,30; PaCO2 = 42 мм рт.ст.

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Cl = 115 мэкв/л; HCO_3 = 20 мэкв /л

Вопрос

Что из перечисленного вероятнее всего объясняет данные нарушения КОС?

Варианты ответа

(A) Crystalloid resuscitation fluid administered during operation

Варианты ответа

(A) Crystalloid resuscitation fluid administered during operation

(B) Loop diuretic administered to reduce brain swelling

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(C) TIVA anesthetic agent

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(A) Crystalloid resuscitation fluid administered during operation

(B) Loop diuretic administered to reduce brain swelling

(C) TIVA anesthetic agent

(D) Hypovolemia due to underresuscitation

(E) Nitroprusside treatment of intraoperative hypertension

Ответ:

489. **(A)** The patient's acid-base disorder is a mild metabolic acidosis without an increased anion gap. The most likely diagnosis is intraoperative resuscitation with 0.9% NaCl (normal saline) intravenous solution that is commonly used during neurosurgical procedures because it is slightly hypertonic compared to plasma and theoretically may provide benefit in diminishing brain edema. However, administration of large quantities of normal saline causes a hyperchloremic metabolic acidosis with normal anion gap as a result of dilutional acidosis. The clinical significance of this acid-base disorder remains to be elucidated, but likely does not carry as poor a prognosis as lactic acidosis. Loop diuretic administration generally causes a metabolic "contraction" alkalosis. Propofol infusion syndrome and cyanide toxicity due to nitroprusside both cause an elevated anion gap metabolic acidosis due to lactic acidosis. *(1:796; 5:508, 528, 535-6)*

Ответ:

489. **(A)** The patient's acid-base disorder is a mild metabolic acidosis without an increased anion gap. The most likely diagnosis is intraoperative resuscitation with 0.9% NaCl (normal saline) intravenous solution that is commonly used during neurosurgical procedures because it is slightly hypertonic compared to plasma and theoretically may provide benefit in diminishing brain edema. However, administration of large quantities of normal saline causes a hyperchloremic metabolic acidosis with normal anion gap as a result of dilutional acidosis. The clinical significance of this acid-base disorder remains to be elucidated, but likely does not carry as poor a prognosis as lactic acidosis. Loop diuretic administration generally causes a metabolic "contraction" alkalosis. Propofol infusion syndrome and cyanide toxicity due to nitroprusside both cause an elevated anion gap metabolic acidosis due to lactic acidosis. *(1:796; 5:508, 528, 535-6)*

Гиперхлоремический метаболический ацидоз

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Особенности инфузионной терапии при критических состояниях

- Сепсис
- Кровопотеря

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- Кровопотеря

Special Article

Surviving Sepsis Campaign: International Guidelines for Management of Sepsis and Septic Shock: 2016

Andrew Rhodes, MB BS, MD(Res) (Co-chair)[1]; Laura E. Evans, MD, MSc, FCCM (Co-chair)[2]; Waleed Alhazzani, MD, MSc, FRCPC (methodology chair)[3]; Mitchell M. Levy, MD, MCCM[4]; Massimo Antonelli, MD[5]; Ricard Ferrer, MD, PhD[6]; Anand Kumar, MD, FCCM[7]; Jonathan E. Sevransky, MD, FCCM[8]; Charles L. Sprung, MD, JD, MCCM[9]; Mark E. Nunnally, MD, FCCM[2]; Bram Rochwerg, MD, MSc (Epi)[3]; Gordon D. Rubenfeld, MD (conflict of interest chair)[10]; Derek C. Angus, MD, MPH, MCCM[11]; Djillali Annane, MD[12]; Richard J. Beale, MD, MB BS[13]; Geoffrey J. Bellinghan, MRCP[14]; Gordon R. Bernard, MD[15]; Jean-Daniel Chiche, MD[16]; Craig Coopersmith, MD, FACS, FCCM[8]; Daniel P. De Backer, MD, PhD[17]; Craig J. French, MB BS[18]; Seitaro Fujishima, MD[19]; Herwig Gerlach, MBA, MD, PhD[20]; Jorge Luis Hidalgo, MD, MACP, MCCM[21]; Steven M. Hollenberg, MD, FCCM[22]; Alan E. Jones, MD[23]; Dilip R. Karnad, MD, FACP[24]; Ruth M. Kleinpell, PhD, RN-CS, FCCM[25]; Younsuck Koh, MD, PhD, FCCM[26]; Thiago Costa Lisboa, MD[27]; Flavia R. Machado, MD, PhD[28]; John J. Marini, MD[29]; John C. Marshall, MD, FRCSC[30]; John E. Mazuski, MD, PhD, FCCM[31]; Lauralyn A. McIntyre, MD, MSc, FRCPC[32]; Anthony S. McLean, MB ChB, MD, FRACP, FJFICM[33]; Sangeeta Mehta, MD[34]; Rui P. Moreno, MD, PhD[35]; John Myburgh, MB ChB, MD, PhD, FANZCA, FCICM, FAICD[36]; Paolo Navalesi, MD[37]; Osamu Nishida, MD, PhD[38]; Tiffany M. Osborn, MD, MPH, FCCM[31]; Anders Perner, MD[39]; Colleen M. Plunkett[25]; Marco Ranieri, MD[40]; Christa A. Schorr, MSN, RN, FCCM[22]; Maureen A. Seckel, CCRN, CNS, MSN, FCCM[41]; Christopher W. Seymour, MD[42]; Lisa Shieh, MD, PhD[43]; Khalid A. Shukri, MD[44]; Steven Q. Simpson, MD[45]; Mervyn Singer, MD[46]; B. Taylor Thompson, MD[47]; Sean R. Townsend, MD[48]; Thomas Van der Poll, MD[49]; Jean-Louis Vincent, MD, PhD, FCCM[50]; W. Joost Wiersinga, MD, PhD[51], Janice L. Zimmerman, MD, MACP, MCCM[52]; R. Phillip Dellinger, MD, MCCM[22]

*See also p. 553.

[1]St. George's Hospital London, England, United Kingdom.
[2]New York University School of Medicine New York, NY.
[3]McMaster University Hamilton, Ontario, Canada.
[4]Brown University School of Medicine Providence, RI.
[5]Instituto di Anestesiologia e Rianimazione, Università Cattolica del Sacro Cuore, Rome, Italy.
[6]Vall d'Hebron University Hospital Barcelona, Spain.
[7]University of Manitoba Winnipeg, Manitoba, Canada.
[8]Emory University Hospital Atlanta, GA.
[9]Hadassah Hebrew University Medical Center Jerusalem, Israel.
[10]Sunnybrook Health Sciences Centre Toronto, Ontario, Canada.
[11]University of Pittsburgh Critical Care Medicine CRISMA Laboratory Pittsburgh, PA.
[12]Hospital Raymond Poincare Garches, France.
[13]Saint Thomas Hospital London, England, United Kingdom.
[14]University College London Hospitals London, England, United Kingdom.
[15]Vanderbilt University Medical Center Nashville, TN.
[16]Service de Reanimation Medicale Paris, France.
[17]CHIREC Hospitals Braine L'Alleud, Belgium.
[18]Western Hospital Victoria, Australia.

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DOI 10.1007/s00134-017-4681-8

FOREWORD

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Layers of the SSC Guidelines

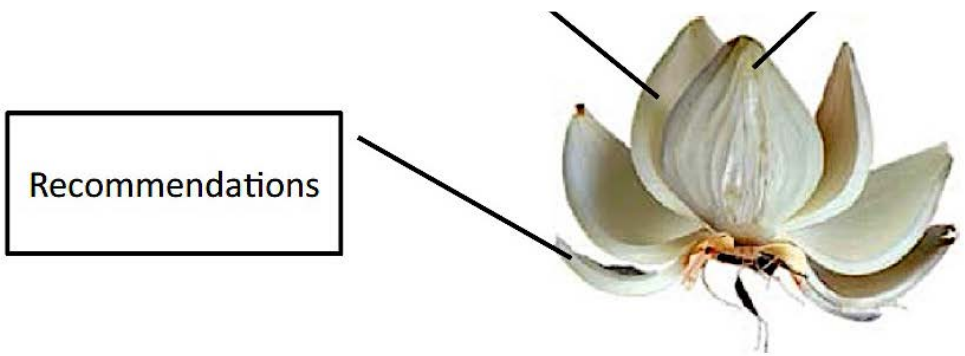

Fig. 1 The layers of an onion are paralleled to the components of the guidelines document, reflecting the depth of exploration by the user

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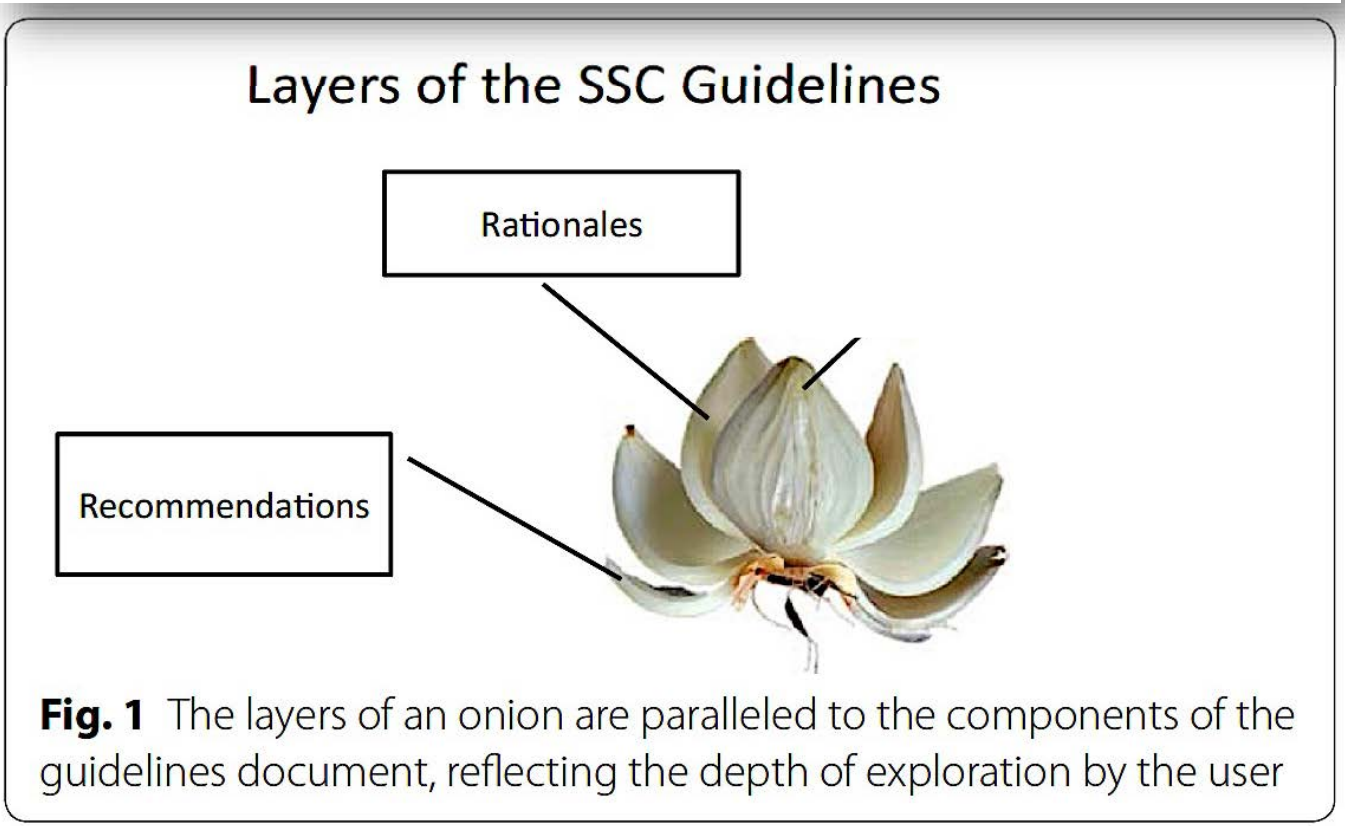

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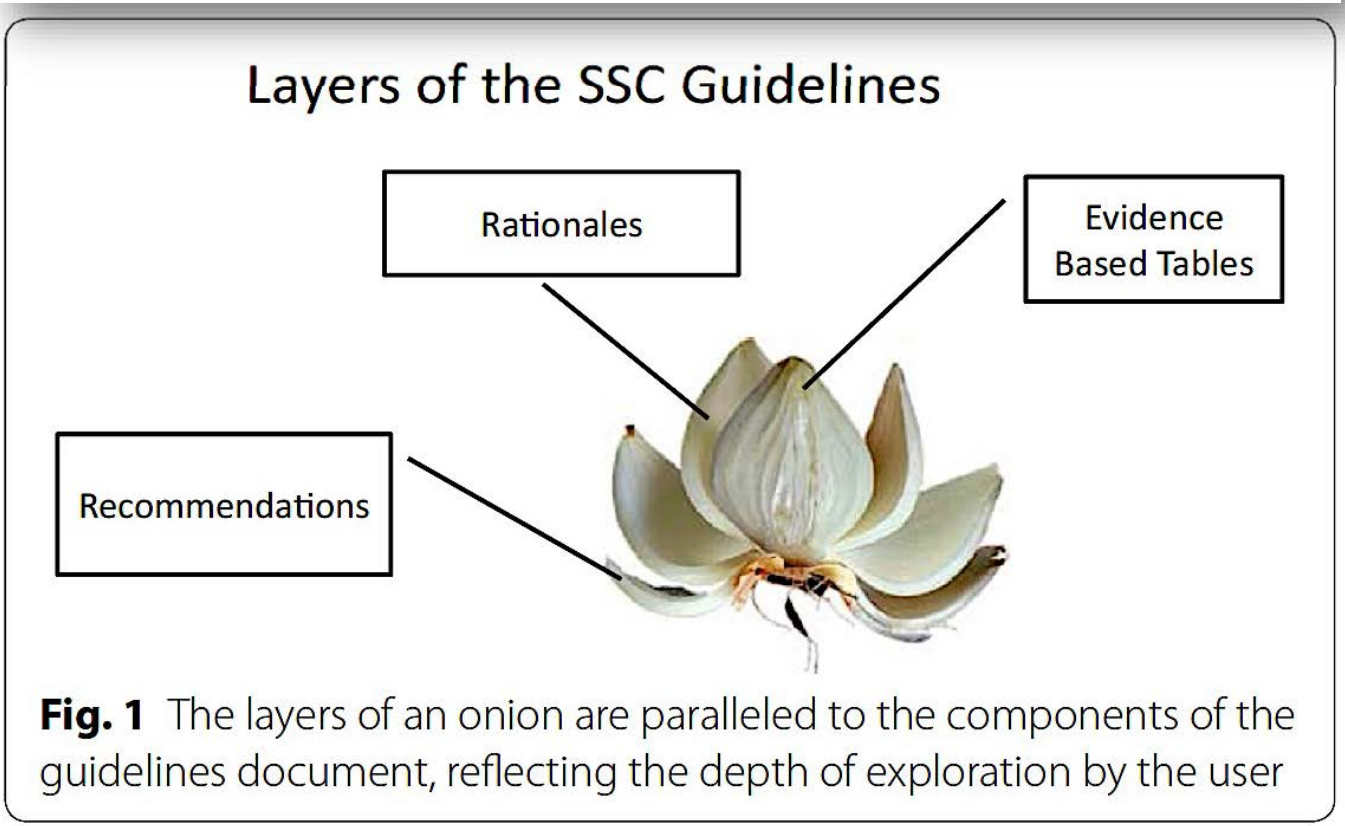

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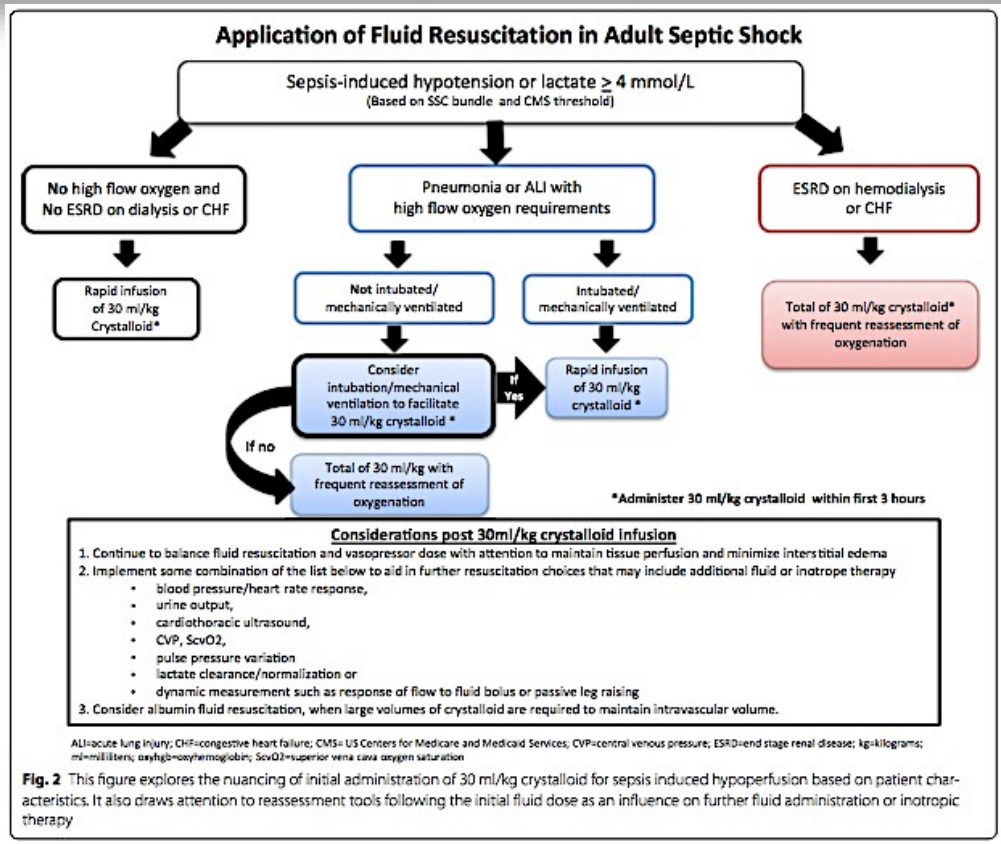
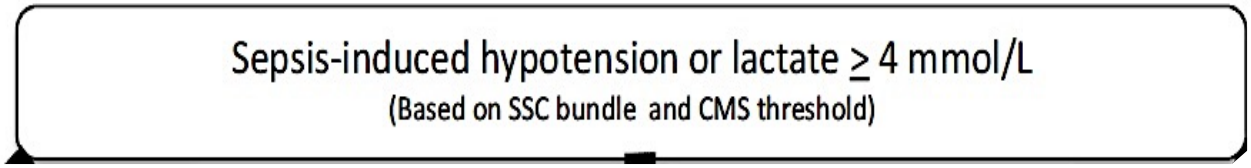


Fig. 2 This figure explores the nuancing of initial administration of 30 ml/kg crystalloid for sepsis induced hypoperfusion based on patient characteristics. It also draws attention to reassessment tools following the initial fluid dose as an influence on further fluid administration or inotropic therapy

Application of Fluid Resuscitation in Adult Septic Shock

Application of Fluid Resuscitation in Adult Septic Shock

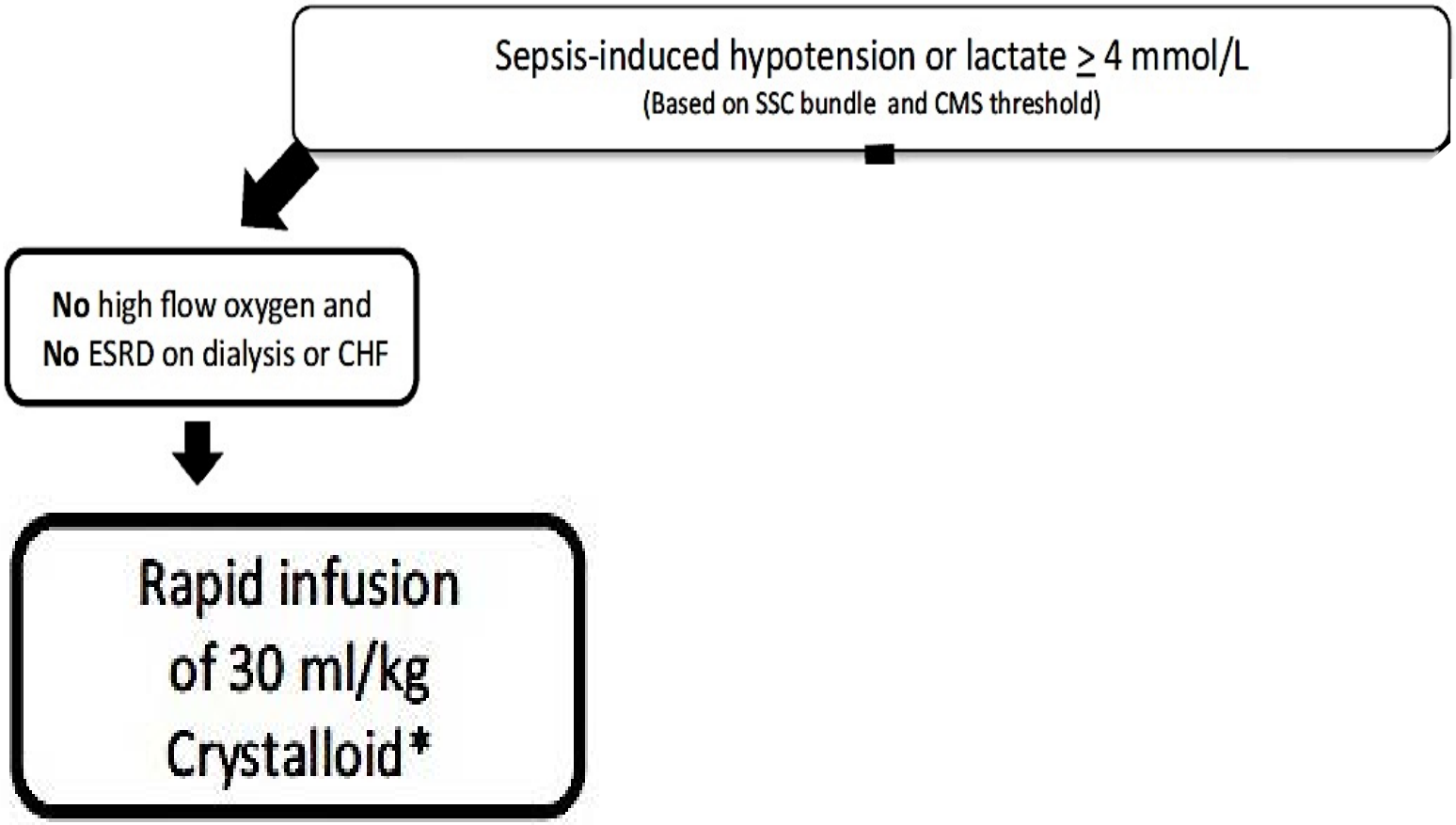


Application of Fluid Resuscitation in Adult Septic Shock

Sepsis-induced hypotension or lactate ≥ 4 mmol/L
(Based on SSC bundle and CMS threshold)

No high flow oxygen and
No ESRD on dialysis or CHF

Application of Fluid Resuscitation in Adult Septic Shock



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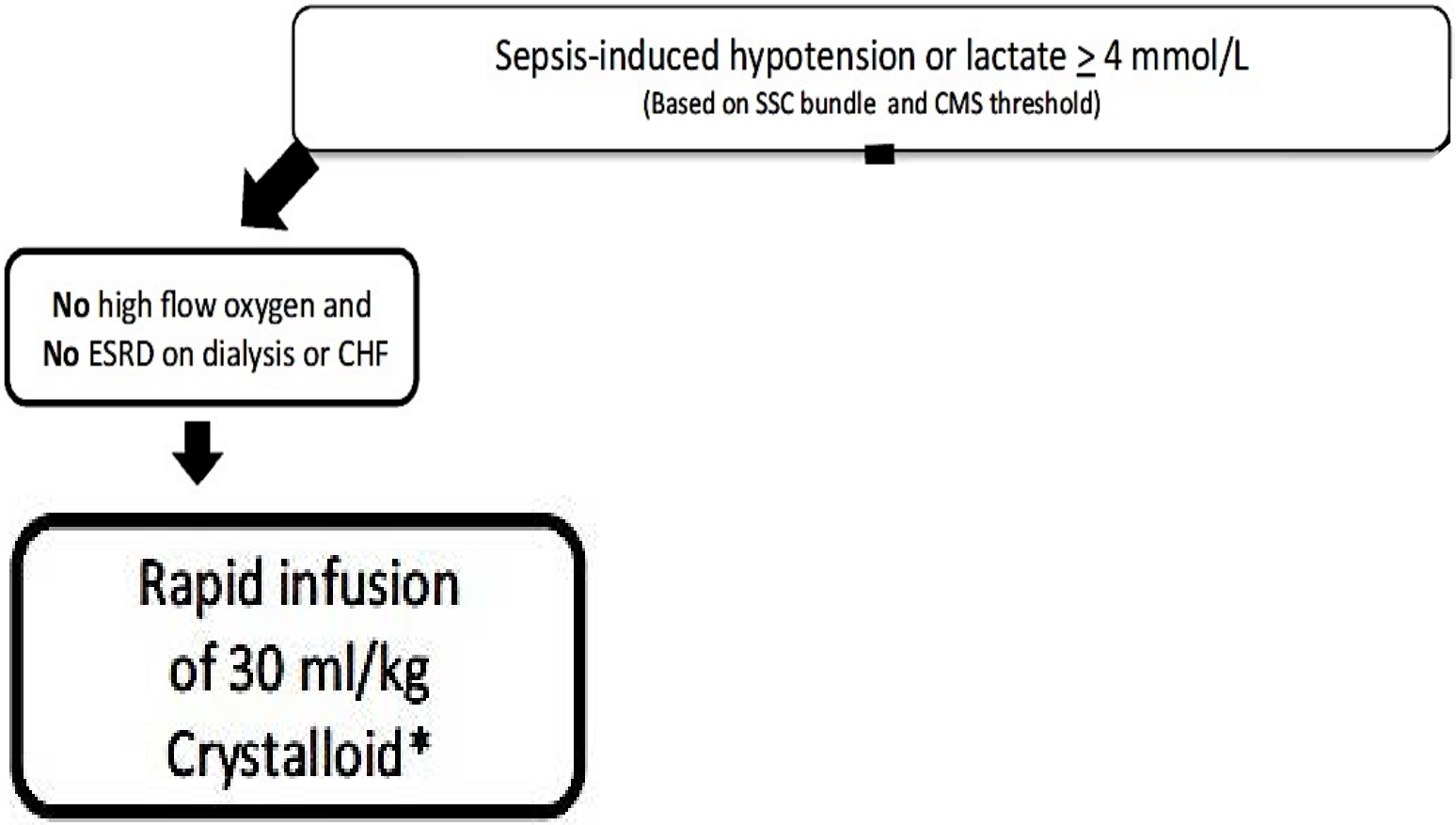

*Administer 30 ml/kg crystalloid within first 3 hours

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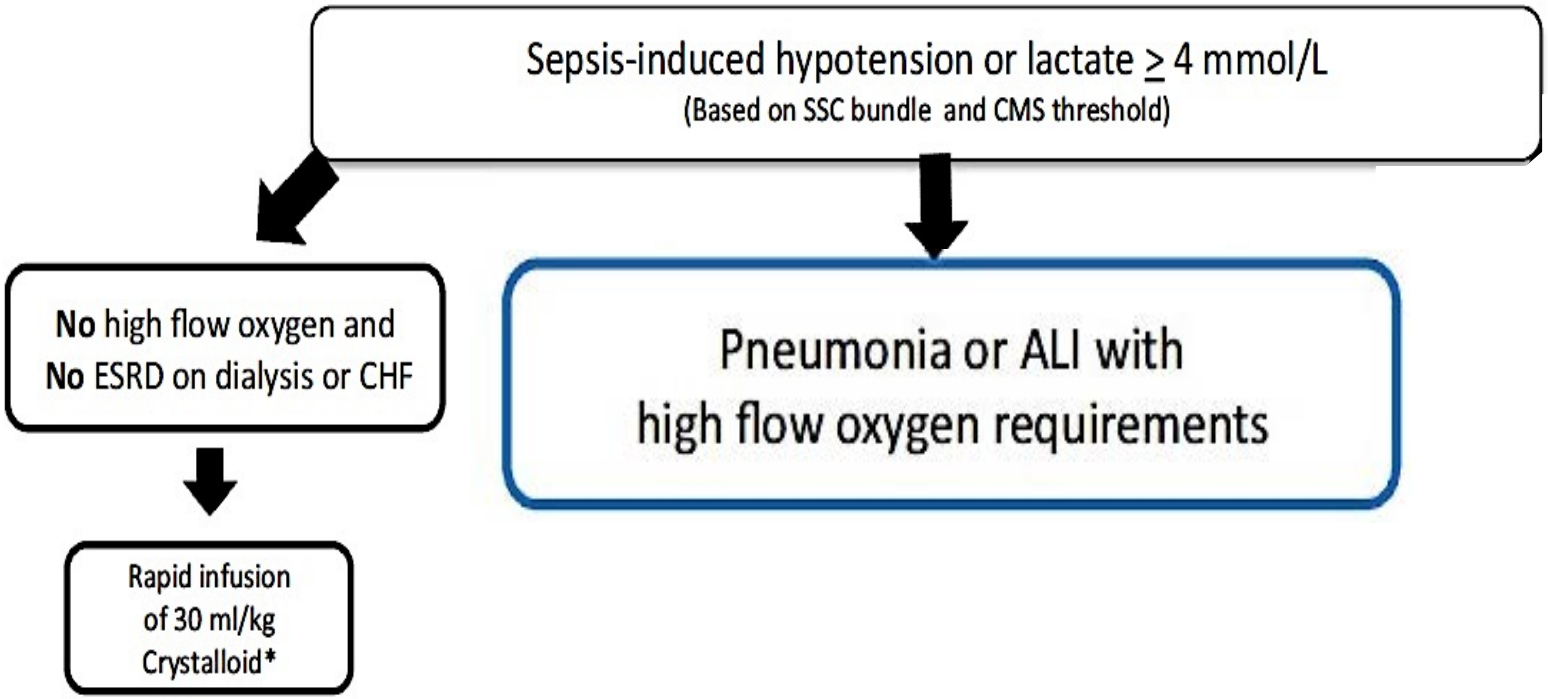

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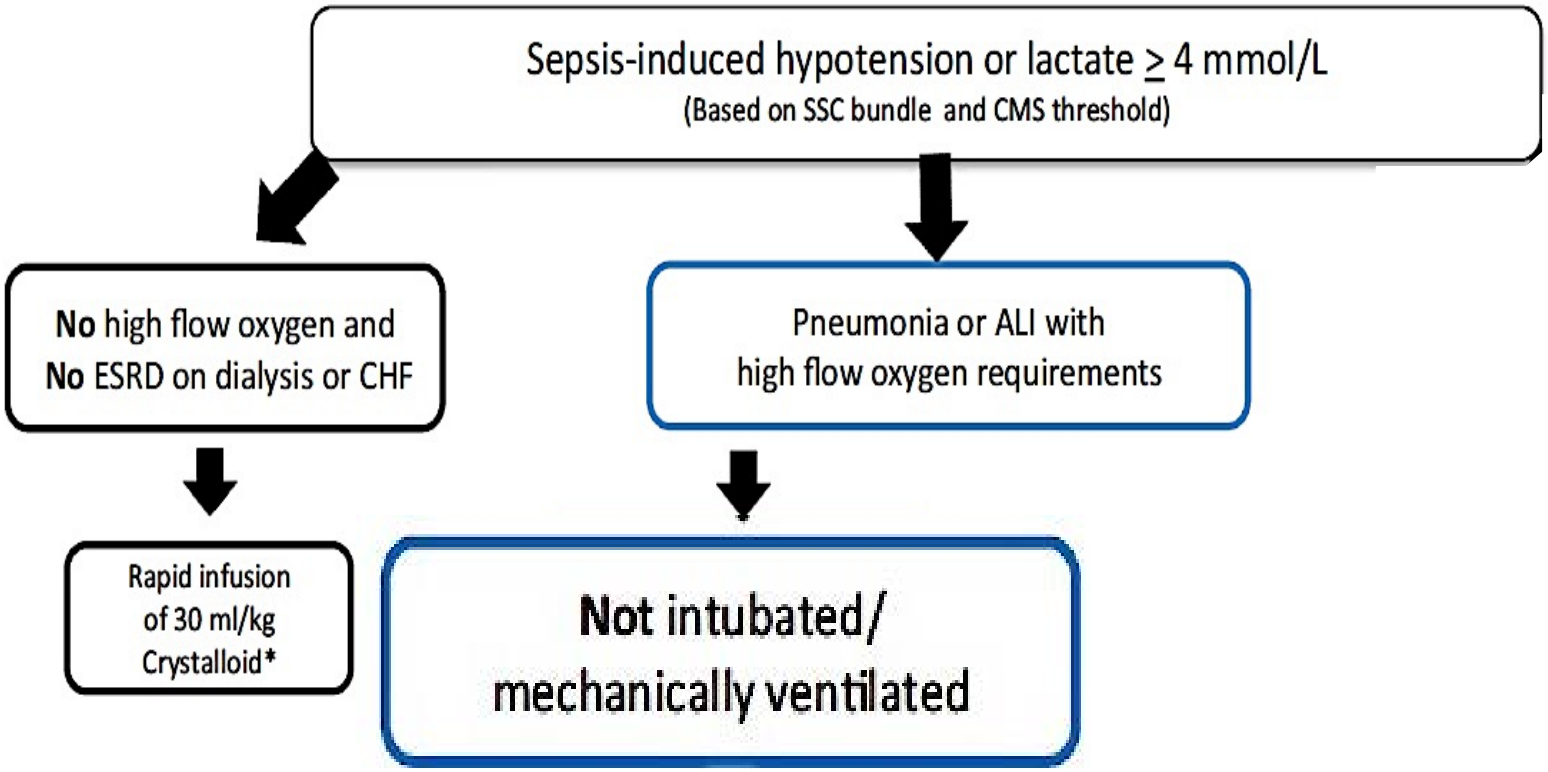

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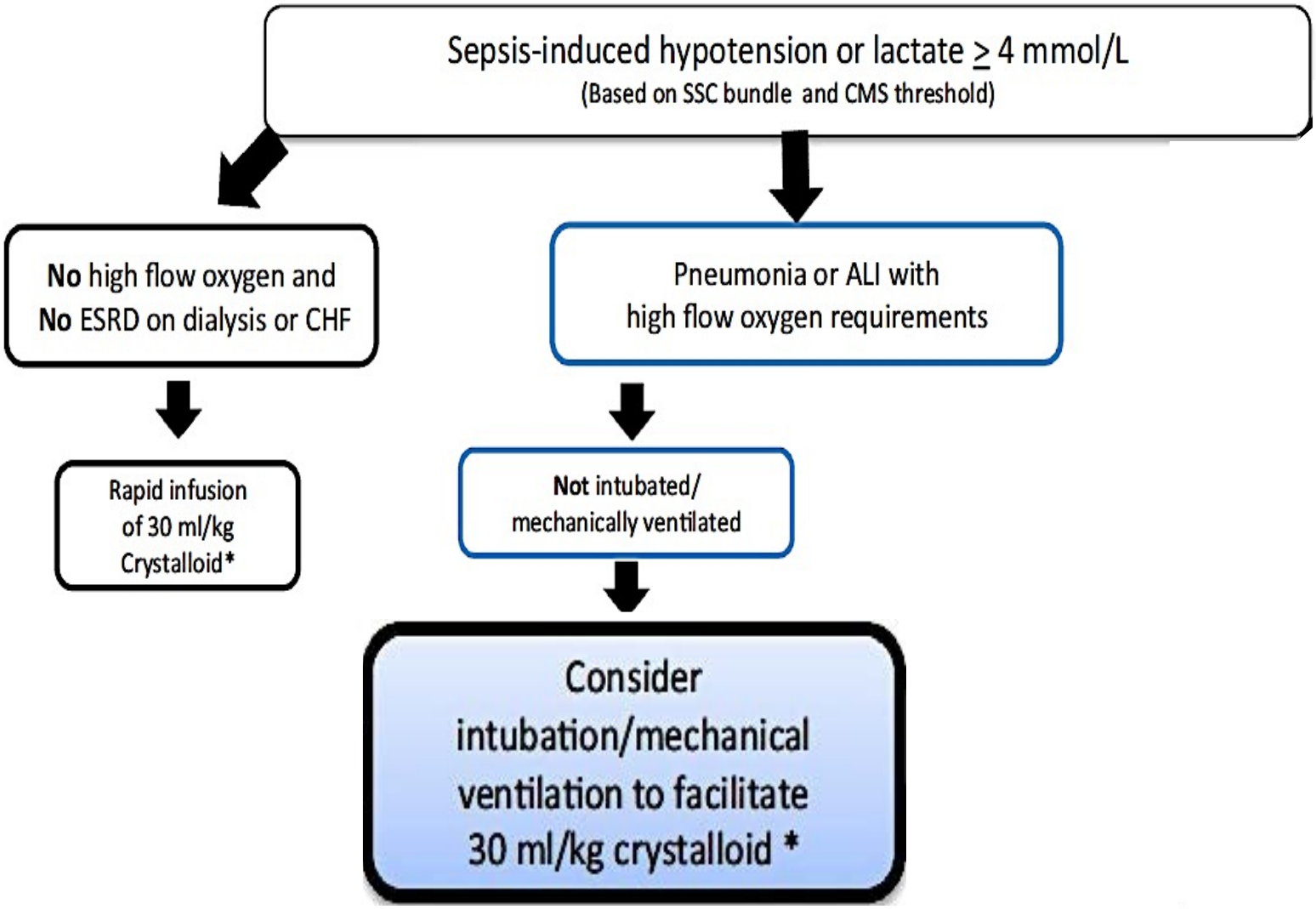

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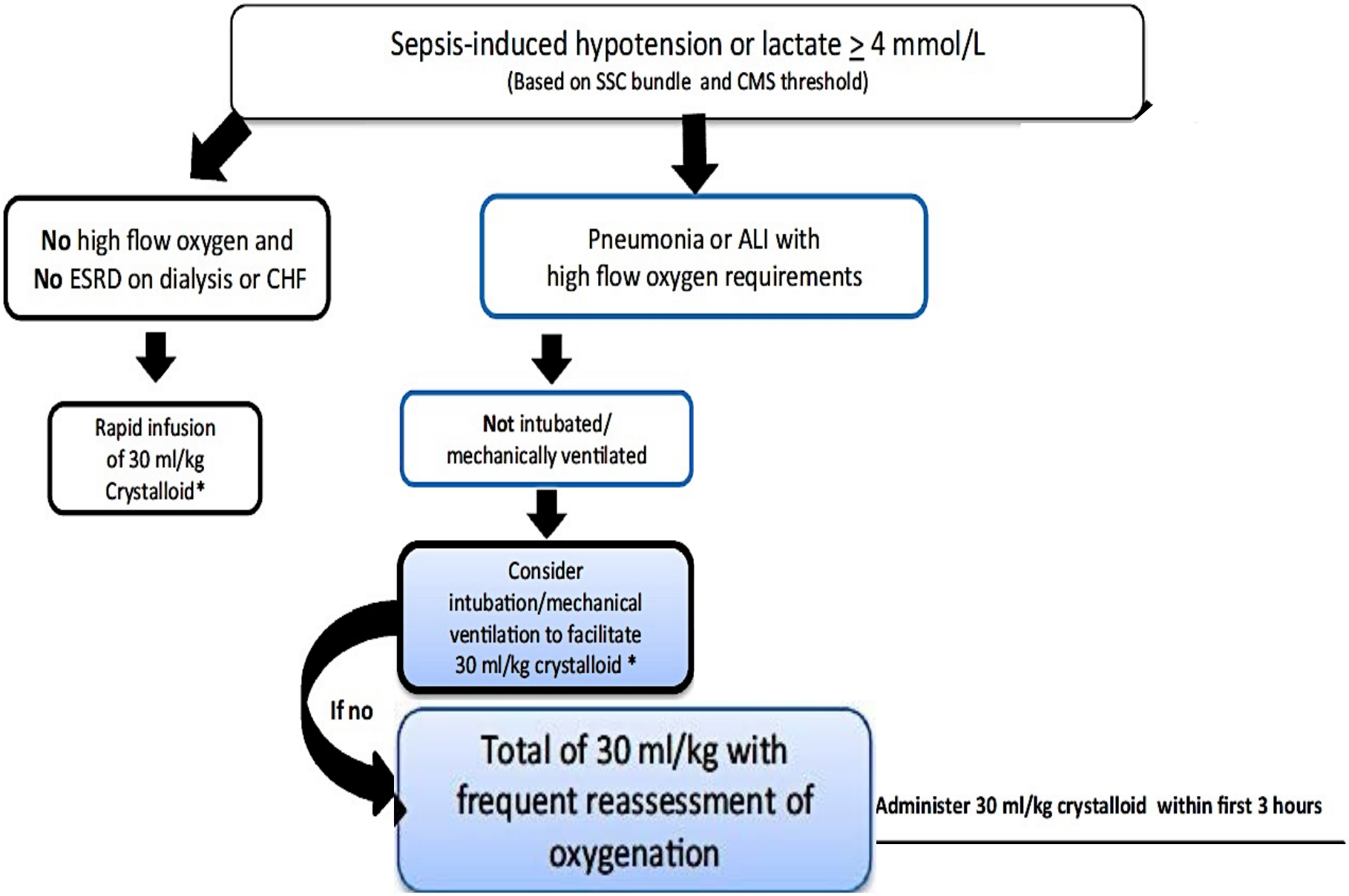

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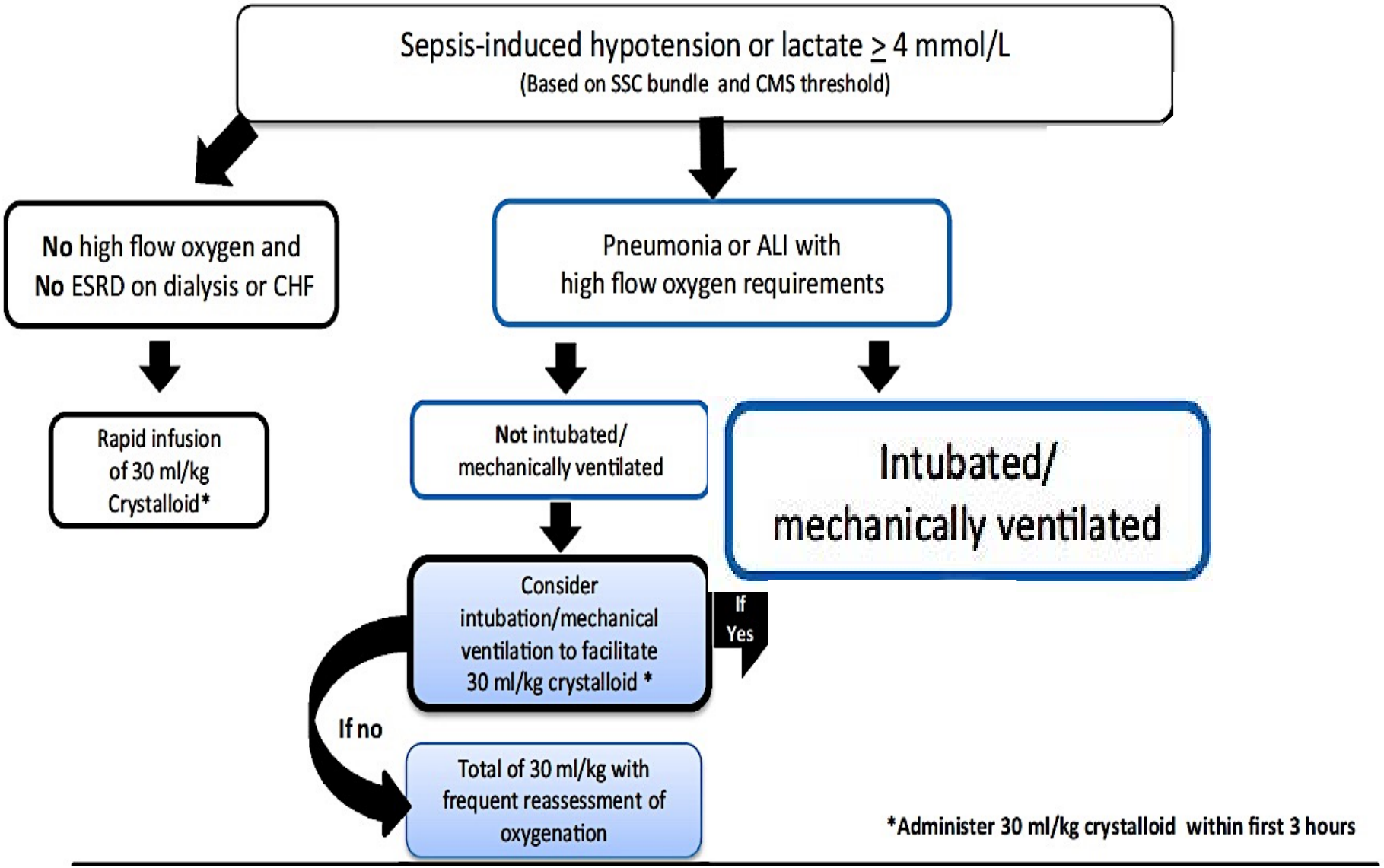

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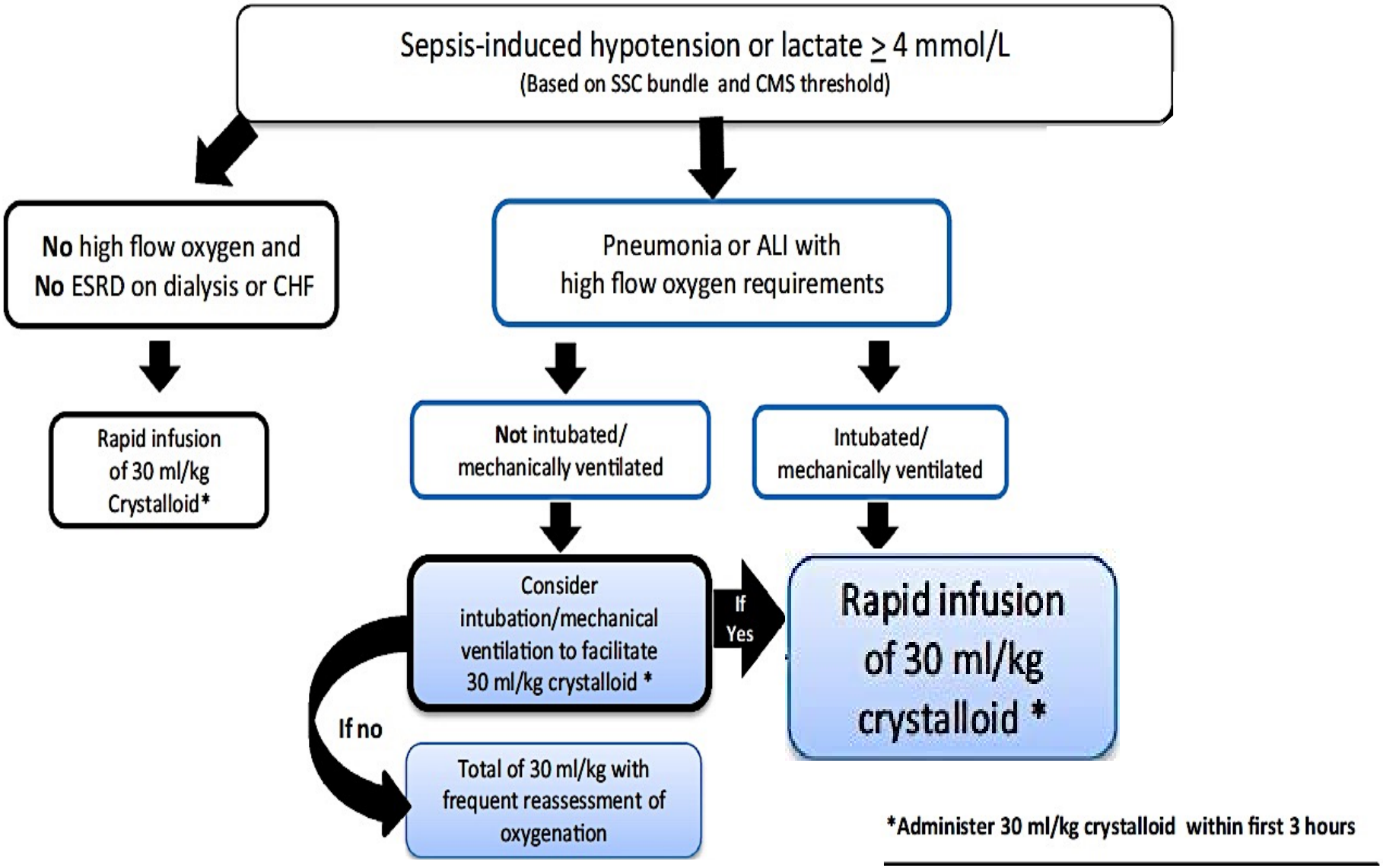

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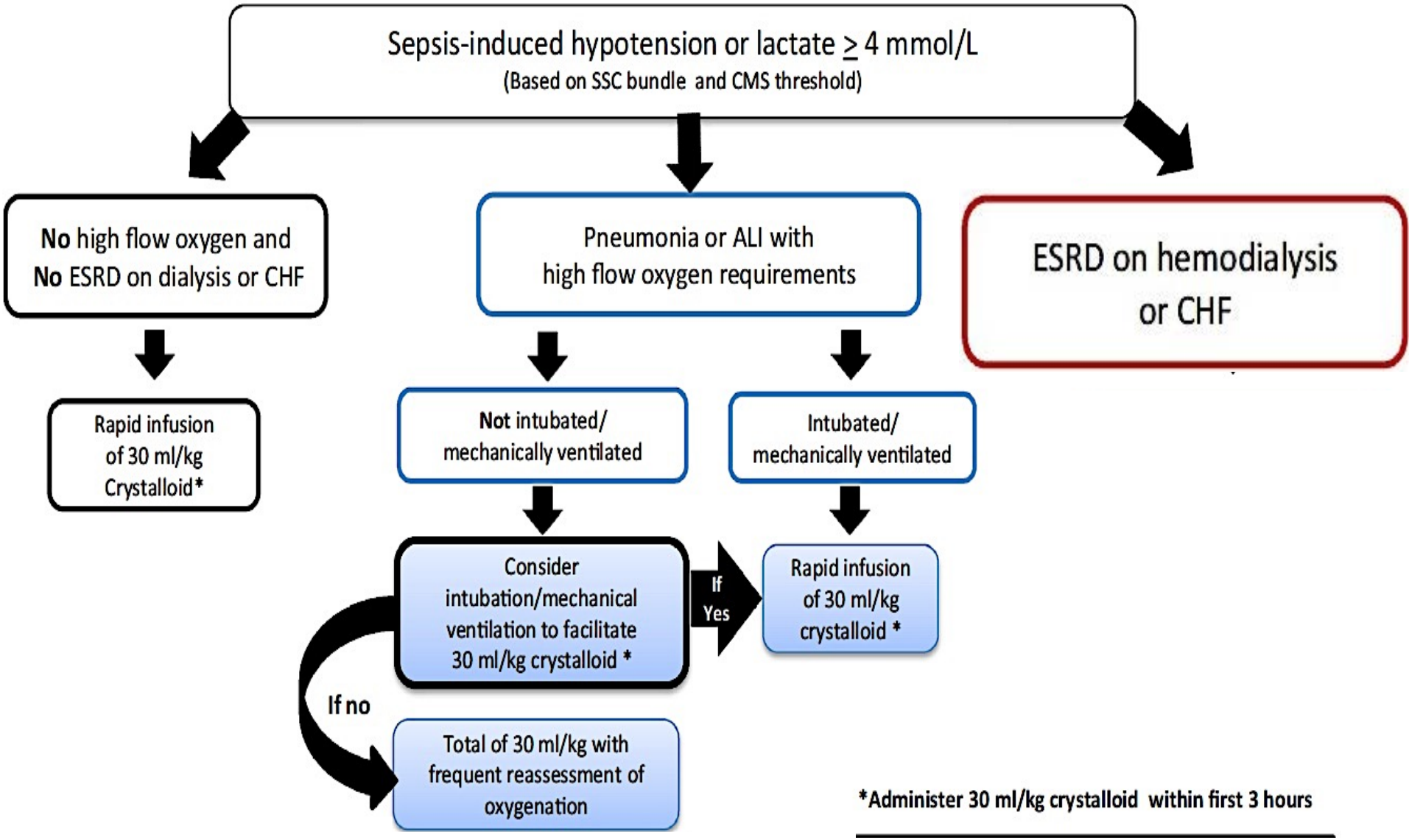

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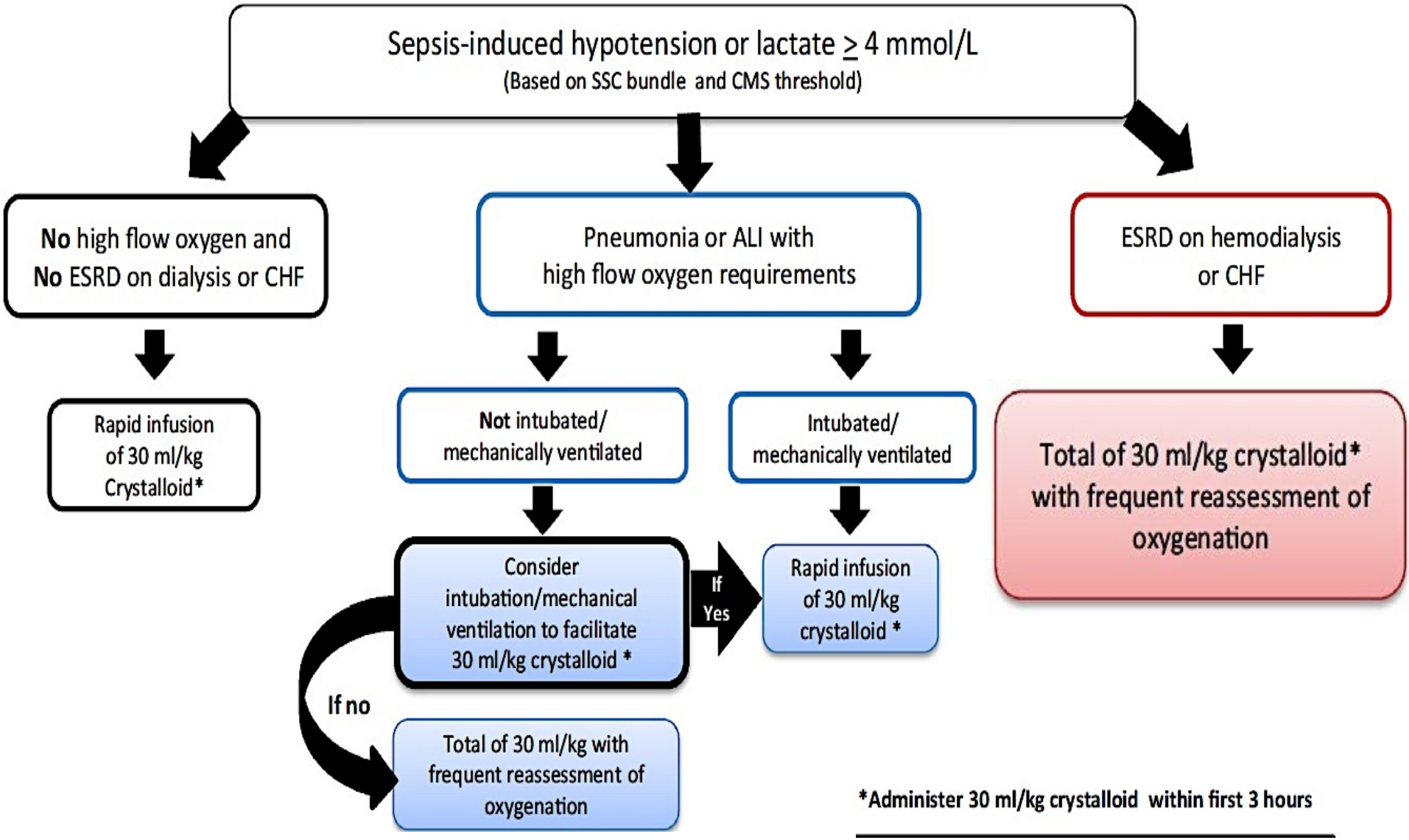

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Considerations post 30ml/kg crystalloid infusion

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    - pulse pressure variation
    - lactate clearance/normalization or
    - dynamic measurement such as response of flow to fluid bolus or passive leg raising
3. Consider albumin fluid resuscitation, when large volumes of crystalloid are required to maintain intravascular volume.

Целевые показатели:

- АД ср. > 65 мм рт. ст. (у больных с сопутствующей артериальной гипертензией АДср. должно быть в пределах 75-85 мм рт. ст.)
- Сердечный индекс 2,5-5,0 л/мин/м^2
- Вариации УО и пульсового давления < 13%
- Темп мочевыделения – ≥0,5 мл/кг/ч,
- Лактат < 2,0 ммоль/л
- SpO_2 в верхней полой вене – ≥ 70% (±5%).

Eissa D., Carton G., Buggy D.J. Anaesthetic management of patients with severe sepsis. British Journal of Anaesthesia 2010; 105(6): 734-43
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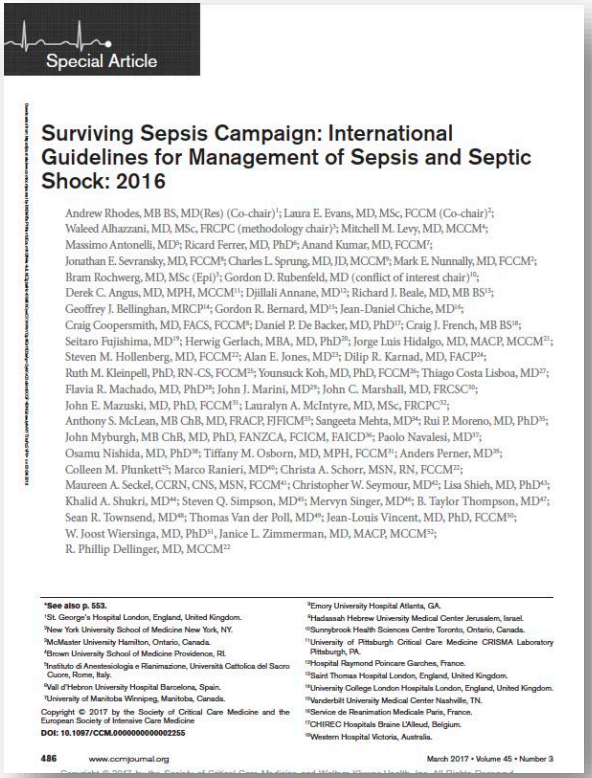
Инфузия при сепсисе



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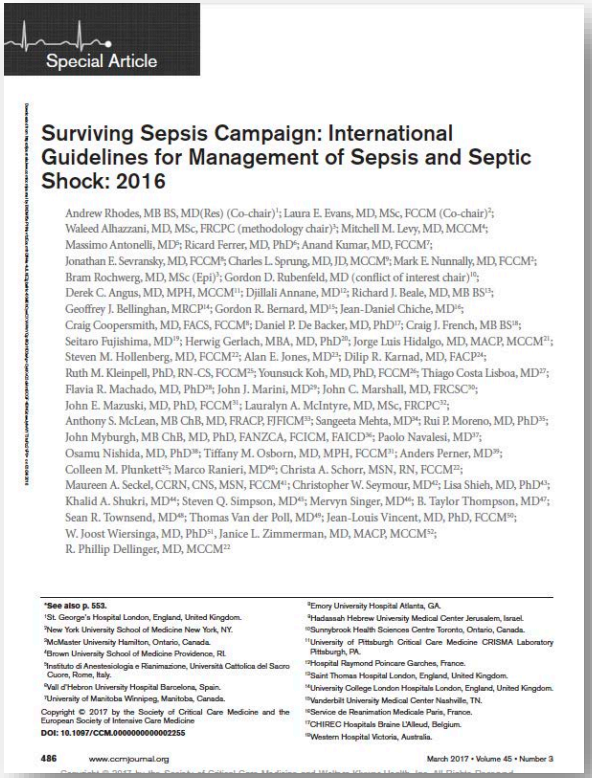

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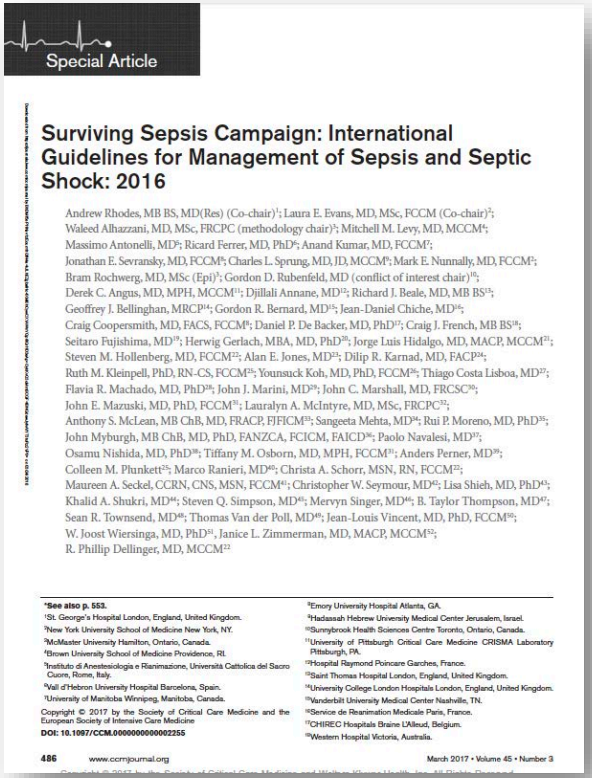

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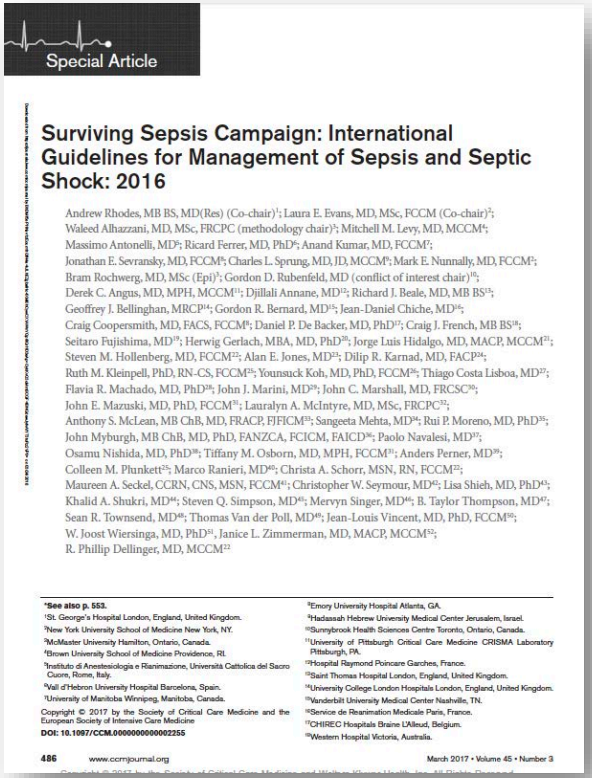

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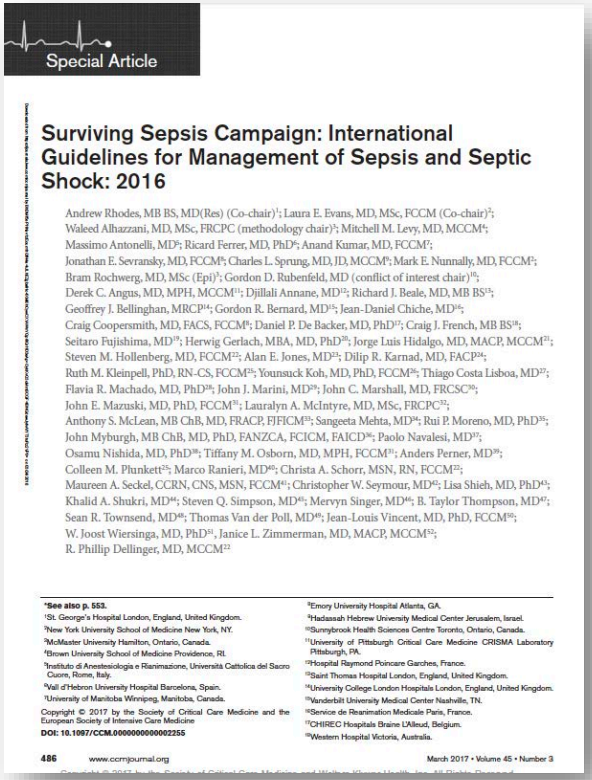

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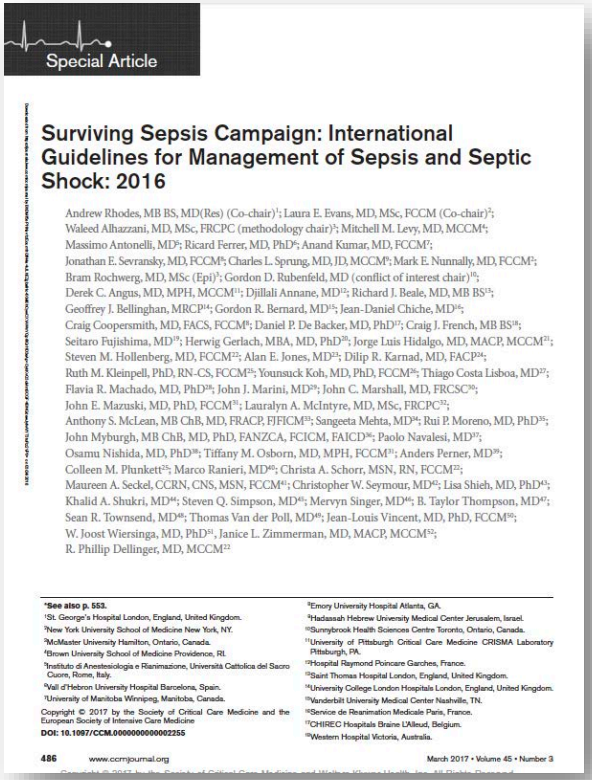

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Andrew Rhodes, MB BS, MD(Res) (Co-chair)[1]; Laura E. Evans, MD, MSc, FCCM (Co-chair)[2]; Waleed Alhazzani, MD, MSc, FRCPC (methodology chair)[3]; Mitchell M. Levy, MD, MCCM[4]; Massimo Antonelli, MD[5]; Ricard Ferrer, MD, PhD[6]; Anand Kumar, MD, FCCM[7]; Jonathan E. Sevransky, MD, FCCM[8]; Charles L. Sprung, MD, JD, MCCM[9]; Mark E. Nunnally, MD, FCCM[10]; Bram Rochwerg, MD, MSc (Epi)[3]; Gordon D. Rubenfeld, MD (conflict of interest chair)[11]; Derek C. Angus, MD, MPH, MCCM[12]; Djillali Annane, MD[13]; Richard J. Beale, MD, MB BS[14]; Geoffrey J. Bellinghan, MRCP[14]; Gordon R. Bernard, MD[15]; Jean-Daniel Chiche, MD[16]; Craig Coopersmith, MD, FACS, FCCM[8]; Daniel P. De Backer, MD, PhD[17]; Craig J. French, MB BS[18]; Seitaro Fujishima, MD[19]; Herwig Gerlach, MBA, MD, PhD[20]; Jorge Luis Hidalgo, MD, MACP, MCCM[21]; Steven M. Hollenberg, MD, FCCM[22]; Alan E. Jones, MD[23]; Dilip R. Karnad, MD, FACP[24]; Ruth M. Kleinpell, PhD, RN-CS, FCCM[25]; Younsuck Koh, MD, PhD, FCCM[26]; Thiago Costa Lisboa, MD[27]; Flavia R. Machado, MD, PhD[28]; John J. Marini, MD[29]; John C. Marshall, MD, FRCSC[30]; John E. Mazuski, MD, PhD, FCCM[31]; Lauralyn A. McIntyre, MD, MSc, FRCPC[32]; Anthony S. McLean, MB ChB, MD, FRACP, FJFICM[33]; Sangeeta Mehta, MD[34]; Rui P. Moreno, MD, PhD[35]; John Myburgh, MB ChB, MD, PhD, FANZCA, FCICM, FAICD[36]; Paolo Navalesi, MD[37]; Osamu Nishida, MD, PhD[38]; Tiffany M. Osborn, MD, MPH, FCCM[31]; Anders Perner, MD[39]; Colleen M. Plunkett[25]; Marco Ranieri, MD[40]; Christa A. Schorr, MSN, RN, FCCM[22]; Maureen A. Seckel, CCRN, CNS, MSN, FCCM[41]; Christopher W. Seymour, MD[42]; Lisa Shieh, MD, PhD[43]; Khalid A. Shukri, MD[44]; Steven Q. Simpson, MD[45]; Mervyn Singer, MD[46]; B. Taylor Thompson, MD[47]; Sean R. Townsend, MD[48]; Thomas Van der Poll, MD[49]; Jean-Louis Vincent, MD, PhD, FCCM[50]; W. Joost Wiersinga, MD, PhD[51], Janice L. Zimmerman, MD, MACP, MCCM[52]; R. Phillip Dellinger, MD, MCCM[22]

*See also p. 553.

[1]St. George's Hospital London, England, United Kingdom.
[2]New York University School of Medicine New York, NY.
[3]McMaster University Hamilton, Ontario, Canada.
[4]Brown University School of Medicine Providence, RI.
[5]Institute di Anestesiologia e Rianimazione, Università Cattolica del Sacro Cuore, Rome, Italy.
[6]Vall d'Hebron University Hospital Barcelona, Spain.
[7]University of Manitoba Winnipeg, Manitoba, Canada.
[8]Emory University Hospital Atlanta, GA.
[9]Hadassah Hebrew University Medical Center Jerusalem, Israel.
[10]Sunnybrook Health Sciences Centre Toronto, Ontario, Canada.
[11]University of Pittsburgh Critical Care Medicine CRISMA Laboratory Pittsburgh, PA.
[12]Hospital Raymond Poincare Garches, France.
[13]Saint Thomas Hospital London, England, United Kingdom.
[14]University College London Hospitals London, England, United Kingdom.
[15]Vanderbilt University Medical Center Nashville, TN.
[16]Service de Reanimation Medicale Paris, France.
[17]CHIREC Hospitals Braine L'Alleud, Belgium.
[18]Western Hospital Victoria, Australia.

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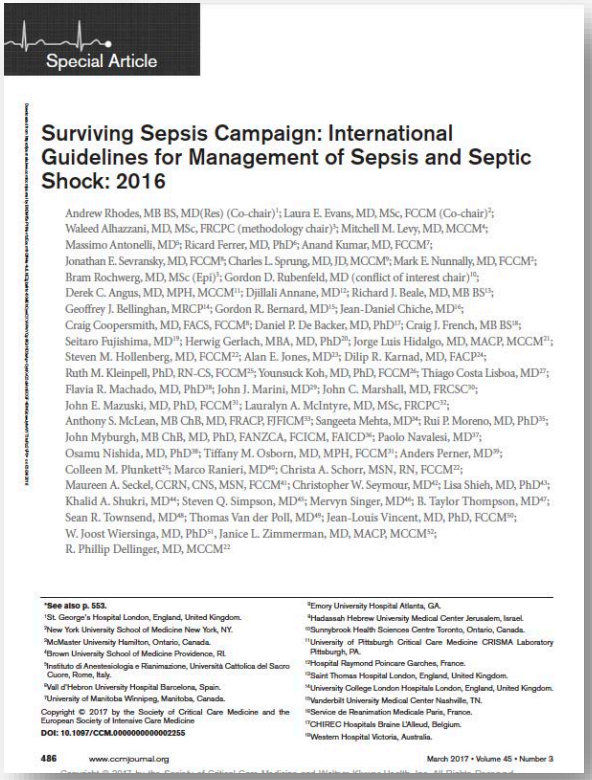
DOI: 10.1097/CCM.0000000000002255

F. FLUID THERAPY

1. We recommend that a fluid challenge technique be applied where fluid administration is continued as long as hemodynamic factors continue to improve (BPS).
2. We recommend crystalloids as the fluid of choice for initial resuscitation and subsequent intravascular volume replacement in patients with sepsis and septic shock (strong recommendation, moderate quality of evidence).
3. We suggest using either balanced crystalloids or saline for fluid resuscitation of patients with sepsis or septic shock (weak recommendation, low quality of evidence).
4. We suggest using albumin in addition to crystalloids for initial resuscitation and subsequent intravascular volume replacement in patients with sepsis and septic shock when patients require substantial amounts of crystalloids (weak recommendation, low quality of evidence).
5. We recommend against using hydroxyethyl starches (HESs) for intravascular volume replacement in patients with sepsis or septic shock (strong recommendation, high quality of evidence).

Инфузия при сепсисе



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5. We recommend against using hydroxyethyl starches (HESs) for intravascular volume replacement in patients with sepsis or septic shock (strong recommendation, high quality of evidence).
6. We suggest using crystalloids over gelatins when resuscitating patients with sepsis or septic shock (weak recommendation, low quality of evidence).

Особенности инфузионной терапии при критических состояниях

- Сепсис
- Кровопотеря

Нормативные документы

Приказ Минздрава РФ от 25 ноября 2002 г. **N 363**
«Об утверждении Инструкции по применению компонентов крови»

Нормативные документы

Приказ Минздрава РФ от 25 ноября 2002 г. **N 363**
«Об утверждении Инструкции по применению компонентов крови»

МИНИСТЕРСТВО ЗДРАВООХРАНЕНИЯ РОССИЙСКОЙ ФЕДЕРАЦИИ
ПРИКАЗ
от 2 апреля 2013 г. **N 183н**
ОБ УТВЕРЖДЕНИИ ПРАВИЛ
КЛИНИЧЕСКОГО ИСПОЛЬЗОВАНИЯ ДОНОРСКОЙ КРОВИ
И (ИЛИ) ЕЕ КОМПОНЕНТОВ

VII. Правила переливания консервированной донорской крови и эритроцитсодержащих компонентов

30. Медицинским показанием к трансфузии (переливанию) донорской крови и эритроцитсодержащих компонентов **при острой анемии** вследствие массивной кровопотери является потеря 25 - 30% объема циркулирующей крови, сопровождающаяся снижением уровня гемоглобина ниже 70 - 80 г/л и гематокрита ниже 25% и возникновением циркуляторных нарушений.

ПРИКАЗ
от 2 апреля 2013 г. N 183н
ОБ УТВЕРЖДЕНИИ ПРАВИЛ
КЛИНИЧЕСКОГО ИСПОЛЬЗОВАНИЯ ДОНОРСКОЙ КРОВИ
И (ИЛИ) ЕЕ КОМПОНЕНТОВ

СЗП

При острой массивной кровопотере (более 30% ОЦК, для взрослых - более 1500 мл), сопровождающейся развитием острого ДВС-синдрома, количество переливаемой СЗП должно составлять не менее 25 - 30% всего объема переливаемой крови и (или) ее компонентов, назначаемых для восполнения кровопотери (не менее 800 - 1000 мл).

ПРИКАЗ
от 2 апреля 2013 г. N 183н
ОБ УТВЕРЖДЕНИИ ПРАВИЛ
КЛИНИЧЕСКОГО ИСПОЛЬЗОВАНИЯ ДОНОРСКОЙ КРОВИ
И (ИЛИ) ЕЕ КОМПОНЕНТОВ

Лечение тяжелых периоперационных кровотечений

Рекомендации Европейского Общества Анестезиологов

Eur J Anaesthesiol 2017; 34:332–395

Лечение тяжелых периоперационных кровотечений

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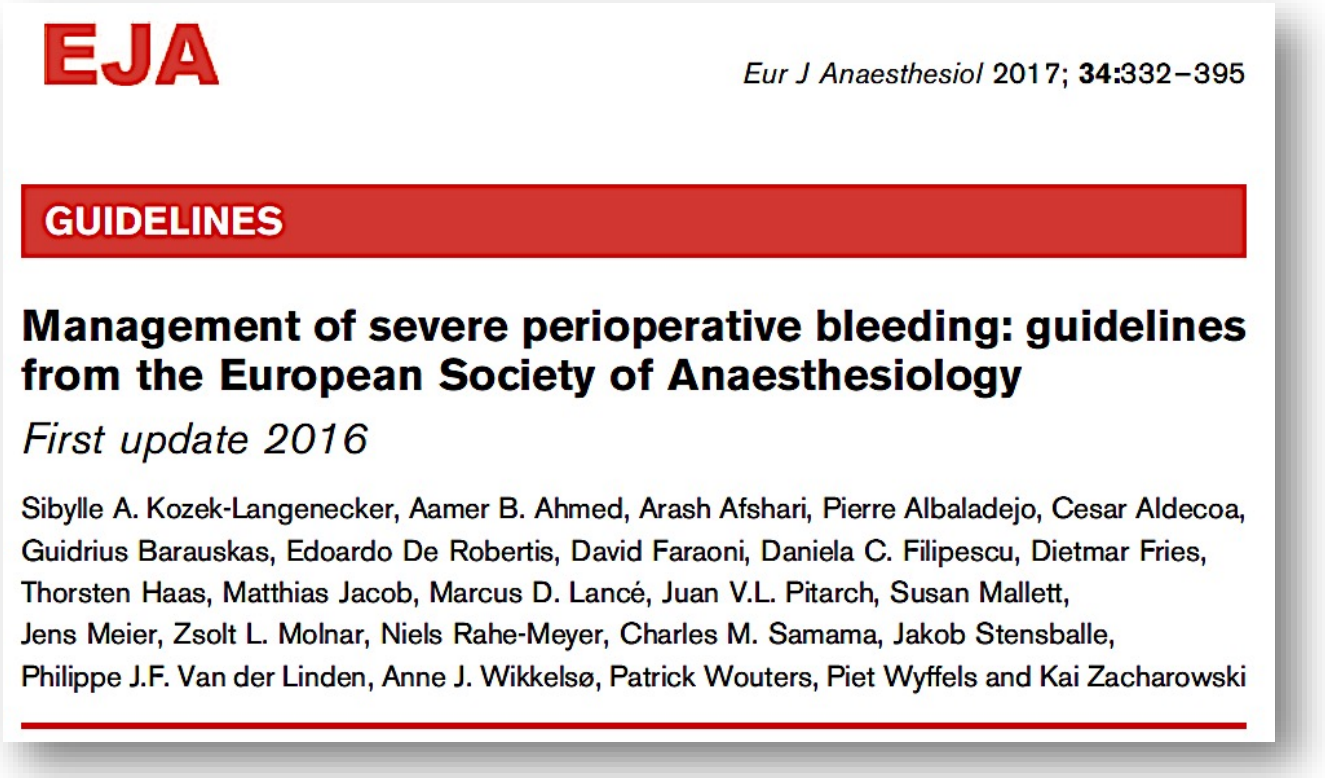


EJA

Eur J Anaesthesiol 2017; **34**:332–395

GUIDELINES

Management of severe perioperative bleeding: guidelines from the European Society of Anaesthesiology

First update 2016

Sibylle A. Kozek-Langenecker, Aamer B. Ahmed, Arash Afshari, Pierre Albaladejo, Cesar Aldecoa, Guidrius Barauskas, Edoardo De Robertis, David Faraoni, Daniela C. Filipescu, Dietmar Fries, Thorsten Haas, Matthias Jacob, Marcus D. Lancé, Juan V.L. Pitarch, Susan Mallett, Jens Meier, Zsolt L. Molnar, Niels Rahe-Meyer, Charles M. Samama, Jakob Stensballe, Philippe J.F. Van der Linden, Anne J. Wikkelsø, Patrick Wouters, Piet Wyffels and Kai Zacharowski

Eur J Anaesthesiol 2017; 34:332–395

СЗП – по показаниям

We recommend against indiscriminate use of plasma transfusion in perioperative bleeding management. **1C**

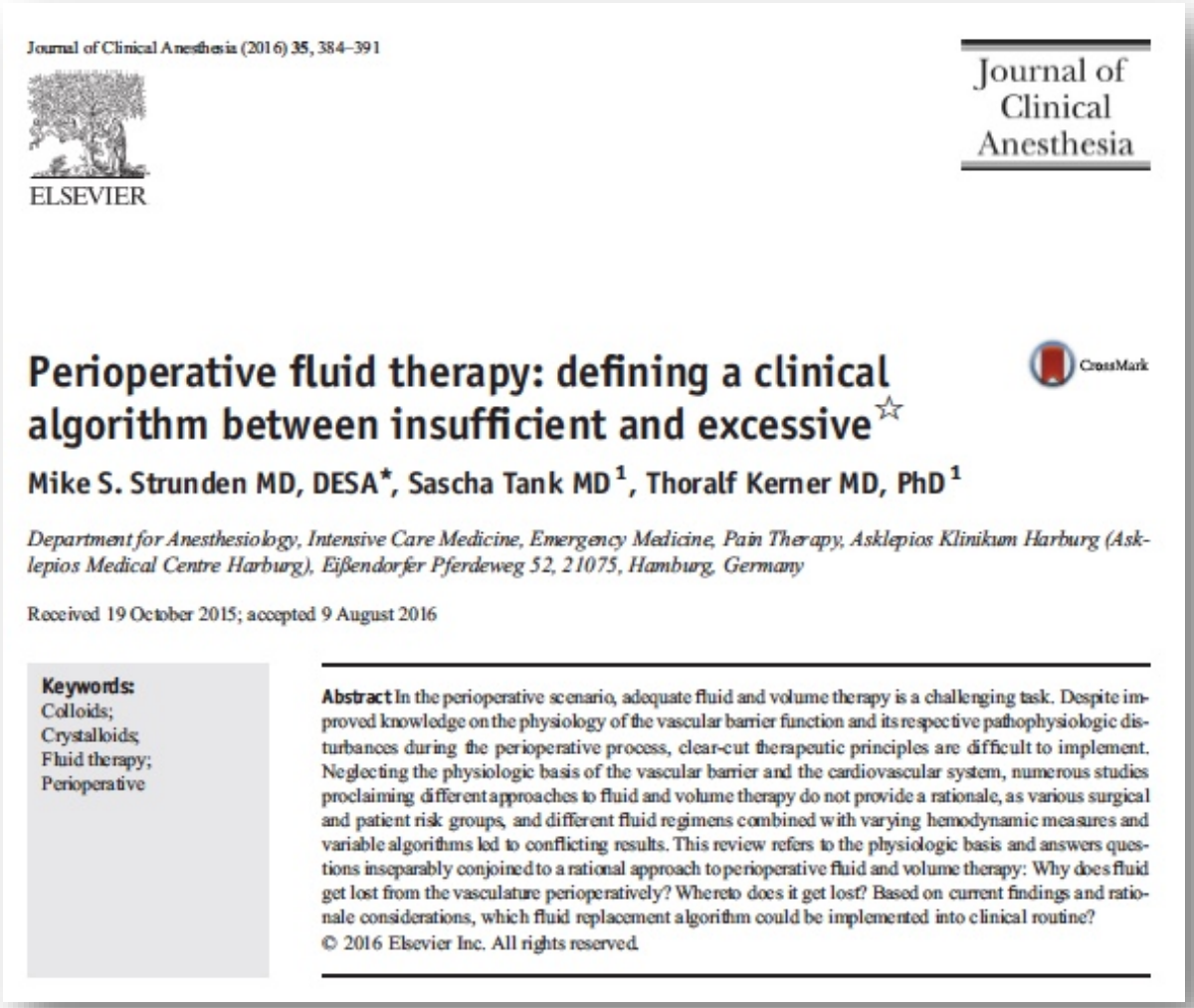
Избегать гиперволемии

При инфузии кристаллоидов/коллоидов во избежание отека интерстиция и чрезмерной преднагрузки следует избегать гиперволемии

1B

Eur J Anaesthesiol 2017; 34:332–395

Периоперационная инфузия: где граница между недостаточным и чрезмерным?



Journal of Clinical Anesthesia (2016) 35, 384–391

ELSEVIER

Journal of Clinical Anesthesia

Perioperative fluid therapy: defining a clinical algorithm between insufficient and excessive ☆

Mike S. Strunden MD, DESA*, Sascha Tank MD [1], Thoralf Kerner MD, PhD [1]

Department for Anesthesiology, Intensive Care Medicine, Emergency Medicine, Pain Therapy, Asklepios Klinikum Harburg (Asklepios Medical Centre Harburg), Eißendorfer Pferdeweg 52, 21075, Hamburg, Germany

Received 19 October 2015; accepted 9 August 2016

Keywords:
Colloids;
Crystalloids;
Fluid therapy;
Perioperative

Abstract In the perioperative scenario, adequate fluid and volume therapy is a challenging task. Despite improved knowledge on the physiology of the vascular barrier function and its respective pathophysiologic disturbances during the perioperative process, clear-cut therapeutic principles are difficult to implement. Neglecting the physiologic basis of the vascular barrier and the cardiovascular system, numerous studies proclaiming different approaches to fluid and volume therapy do not provide a rationale, as various surgical and patient risk groups, and different fluid regimens combined with varying hemodynamic measures and variable algorithms led to conflicting results. This review refers to the physiologic basis and answers questions inseparably conjoined to a rational approach to perioperative fluid and volume therapy: Why does fluid get lost from the vasculature perioperatively? Whereto does it get lost? Based on current findings and rationale considerations, which fluid replacement algorithm could be implemented into clinical routine?
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Journal of Clinical Anesthesia (2016) 35, 384–391

Алгоритм стабилизации гемодинамики при гиповолемии

Снижение исходного АД >20% или среднее АД< 60 mmHg

* SVV- вариабельность ударного объема

Strunden et al. Journal of Clinical Anesthesia 2016;35:384–391

Снижение исходного АД >20%
или среднее АД< 60 mmHg

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Кровопотеря или перераспределение жидкости при операции? SVV>15%?

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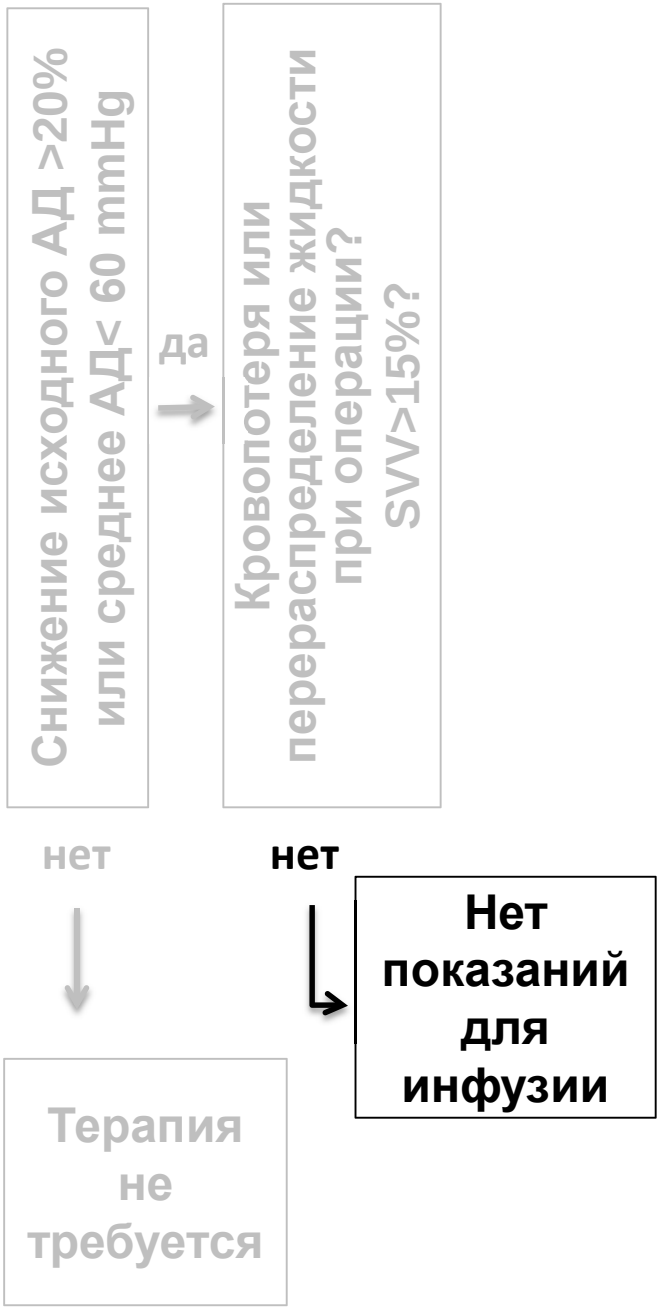

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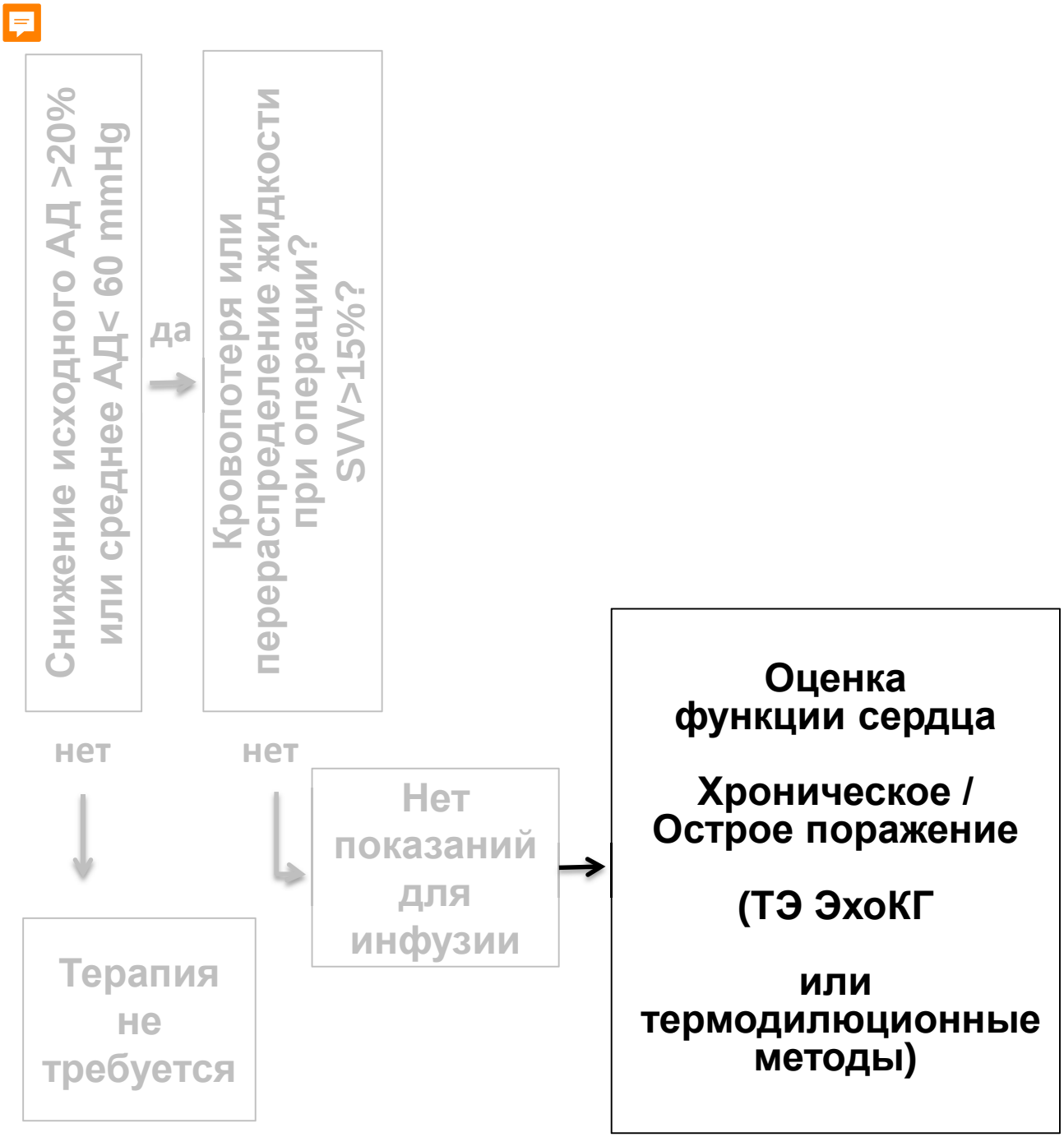

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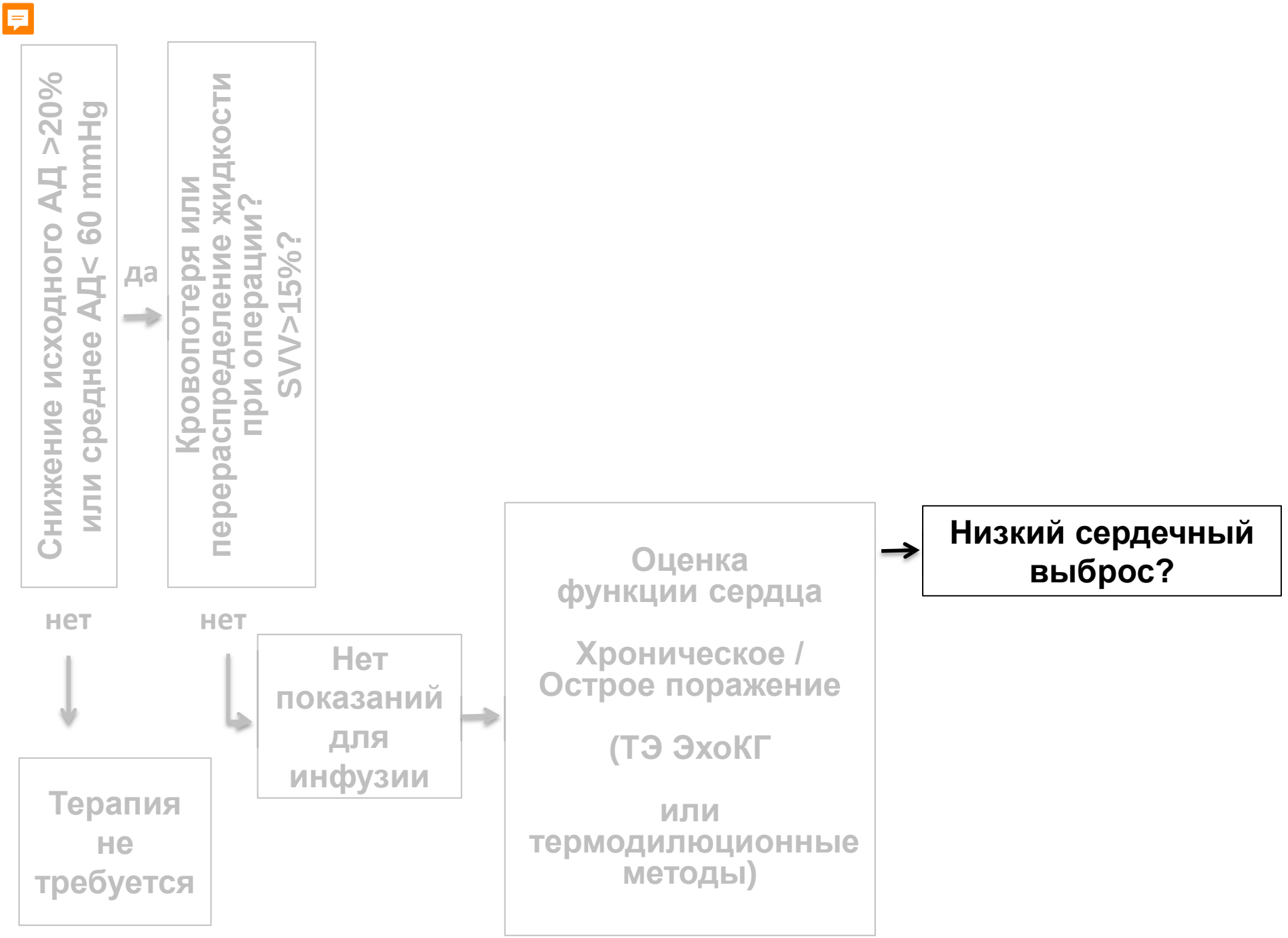

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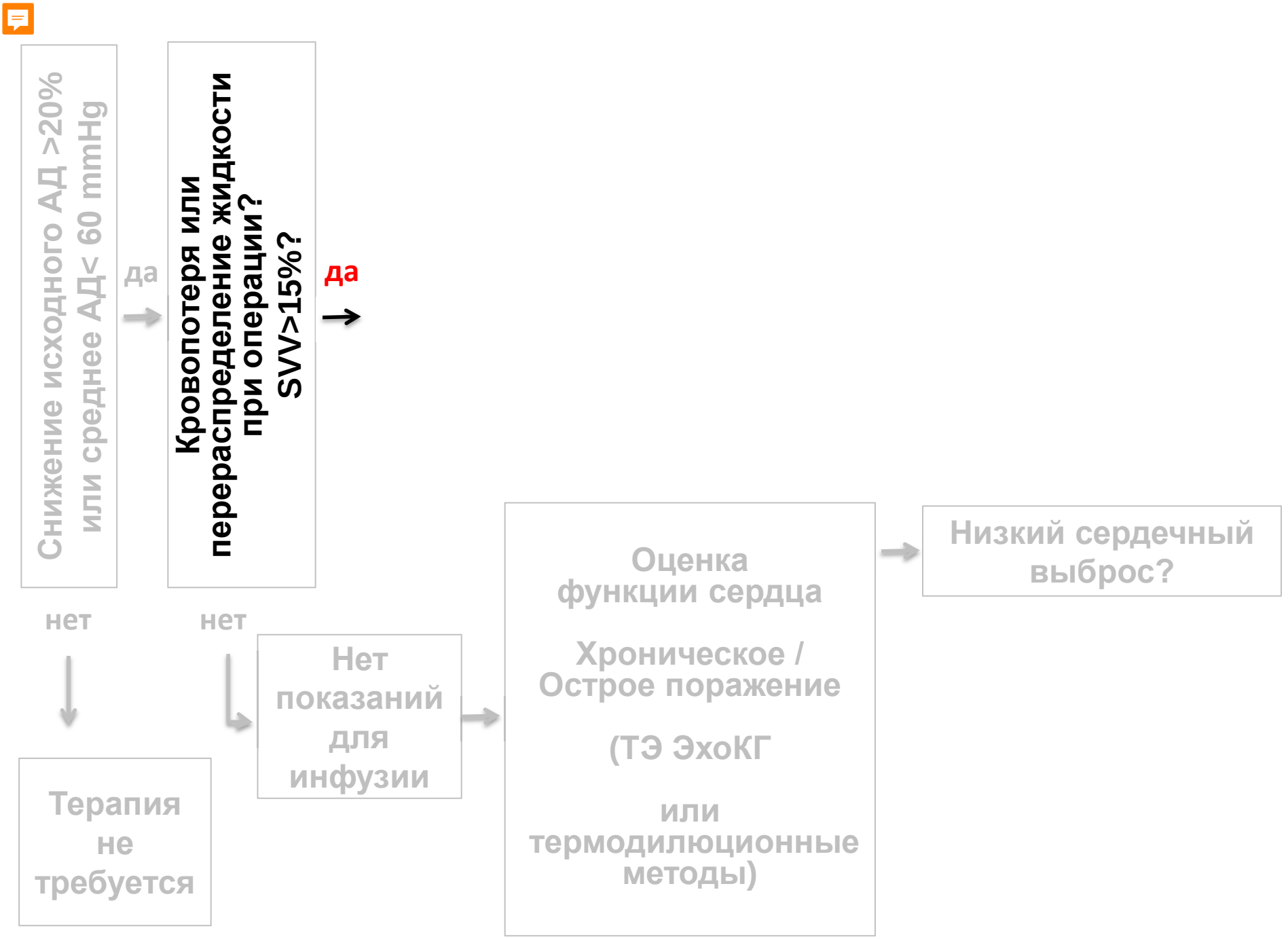

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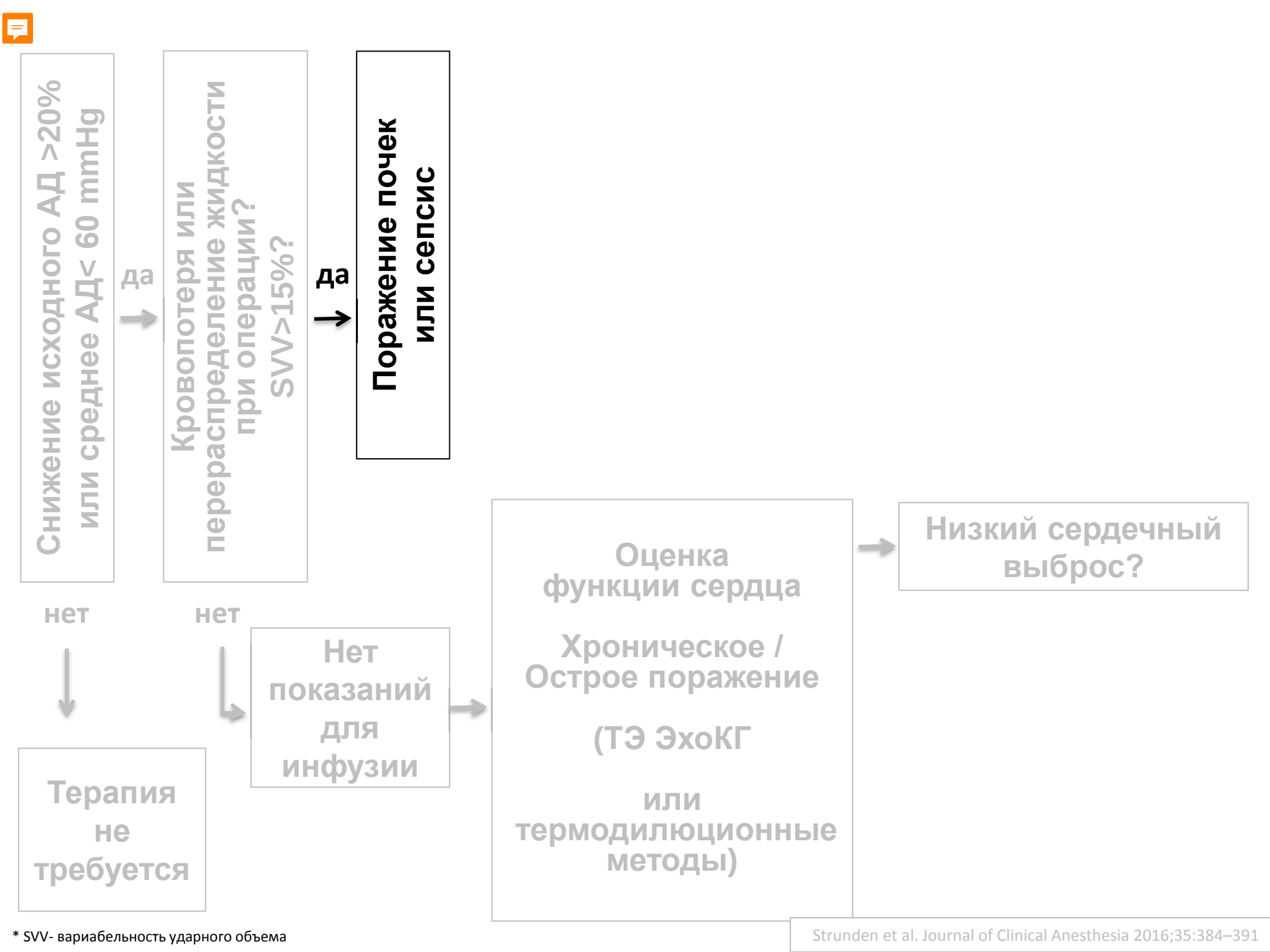

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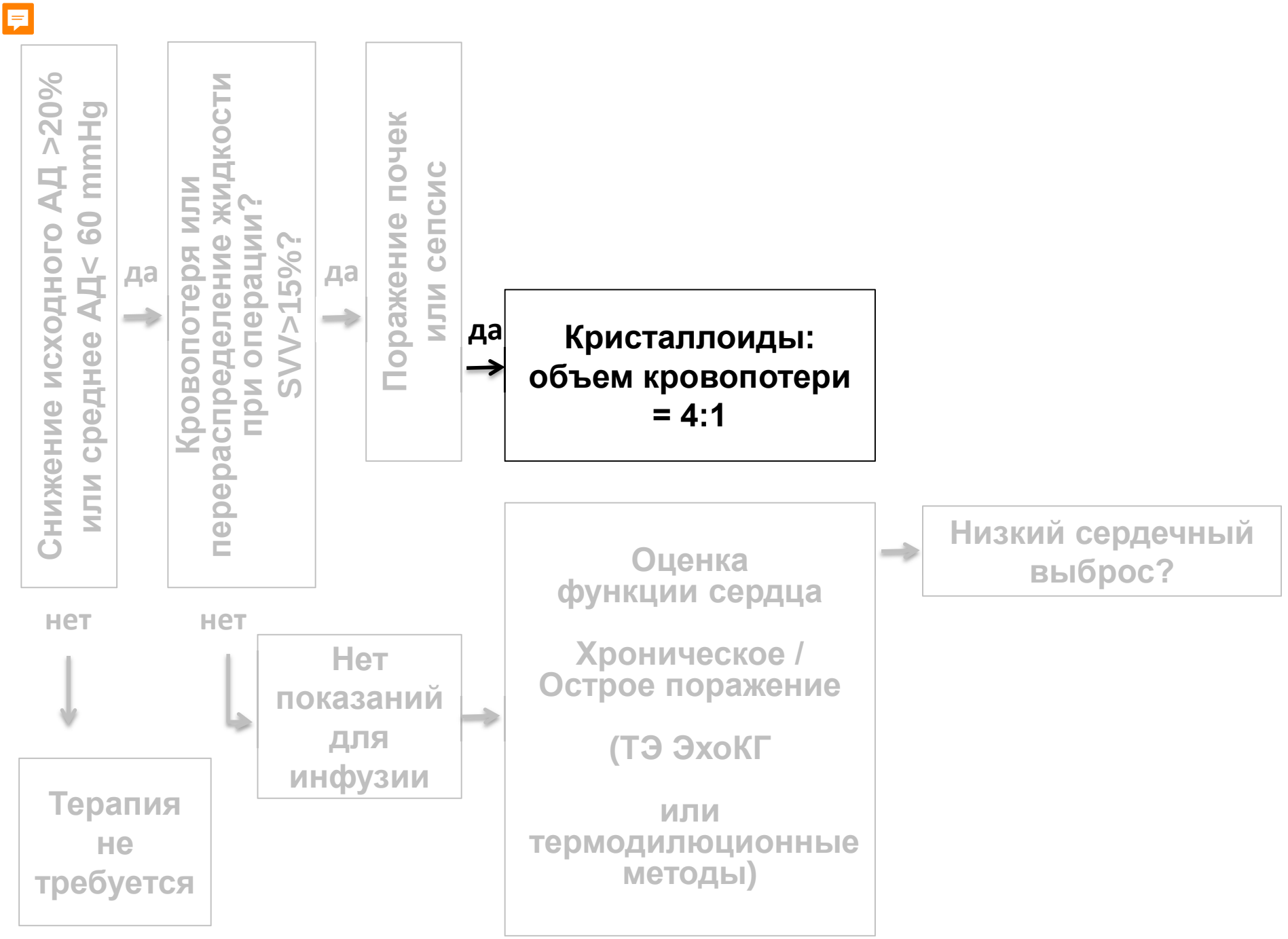

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Применение ГЭК сегодня

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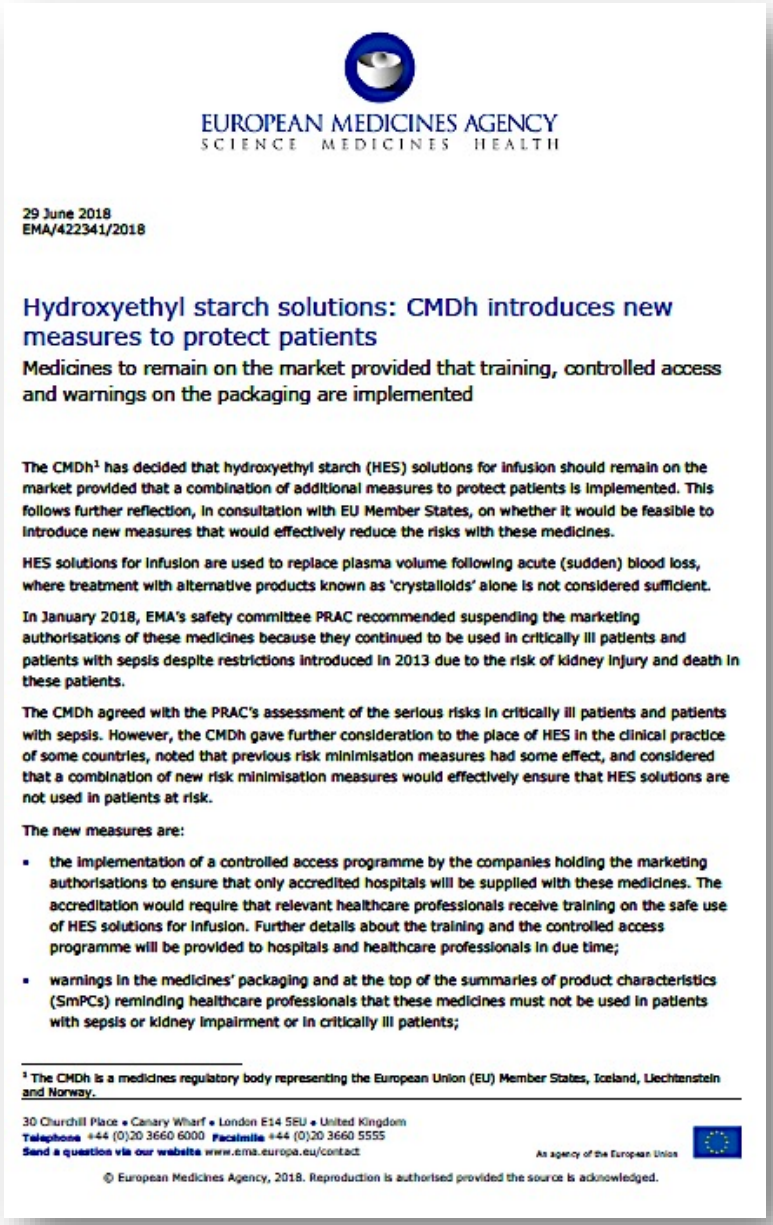

EUROPEAN MEDICINES AGENCY
SCIENCE MEDICINES HEALTH

29 June 2018
EMA/422341/2018

Hydroxyethyl starch solutions: CMDh introduces new measures to protect patients

Medicines to remain on the market provided that training, controlled access and warnings on the packaging are implemented

The CMDh[1] has decided that hydroxyethyl starch (HES) solutions for infusion should remain on the market provided that a combination of additional measures to protect patients is implemented. This follows further reflection, in consultation with EU Member States, on whether it would be feasible to introduce new measures that would effectively reduce the risks with these medicines.

HES solutions for infusion are used to replace plasma volume following acute (sudden) blood loss, where treatment with alternative products known as 'crystalloids' alone is not considered sufficient.

In January 2018, EMA's safety committee PRAC recommended suspending the marketing authorisations of these medicines because they continued to be used in critically ill patients and patients with sepsis despite restrictions introduced in 2013 due to the risk of kidney injury and death in these patients.

The CMDh agreed with the PRAC's assessment of the serious risks in critically ill patients and patients with sepsis. However, the CMDh gave further consideration to the place of HES in the clinical practice of some countries, noted that previous risk minimisation measures had some effect, and considered that a combination of new risk minimisation measures would effectively ensure that HES solutions are not used in patients at risk.

The new measures are:

- the implementation of a controlled access programme by the companies holding the marketing authorisations to ensure that only accredited hospitals will be supplied with these medicines. The accreditation would require that relevant healthcare professionals receive training on the safe use of HES solutions for infusion. Further details about the training and the controlled access programme will be provided to hospitals and healthcare professionals in due time;
- warnings in the medicines' packaging and at the top of the summaries of product characteristics (SmPCs) reminding healthcare professionals that these medicines must not be used in patients with sepsis or kidney impairment or in critically ill patients;

[1] The CMDh is a medicines regulatory body representing the European Union (EU) Member States, Iceland, Liechtenstein and Norway.

30 Churchill Place ● Canary Wharf ● London E14 5EU ● United Kingdom
Telephone +44 (0)20 3660 6000 Facsimile +44 (0)20 3660 5555
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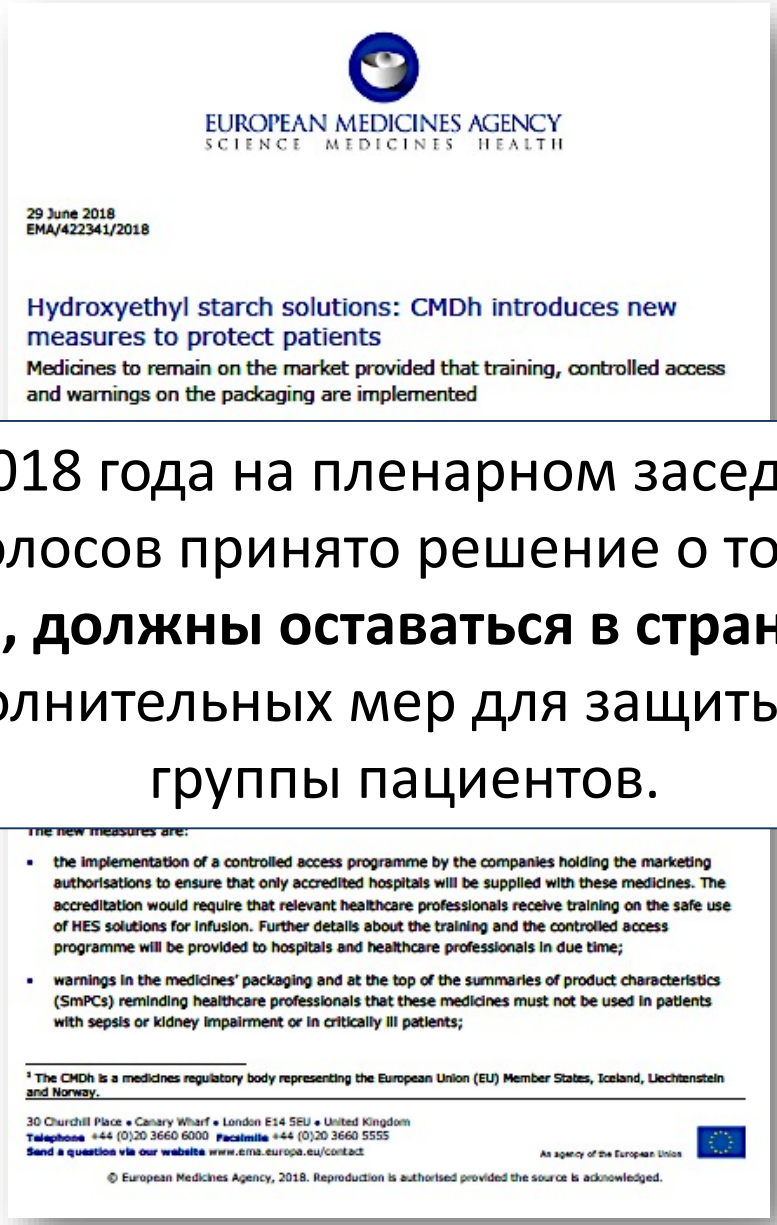
Применение ГЭК сегодня



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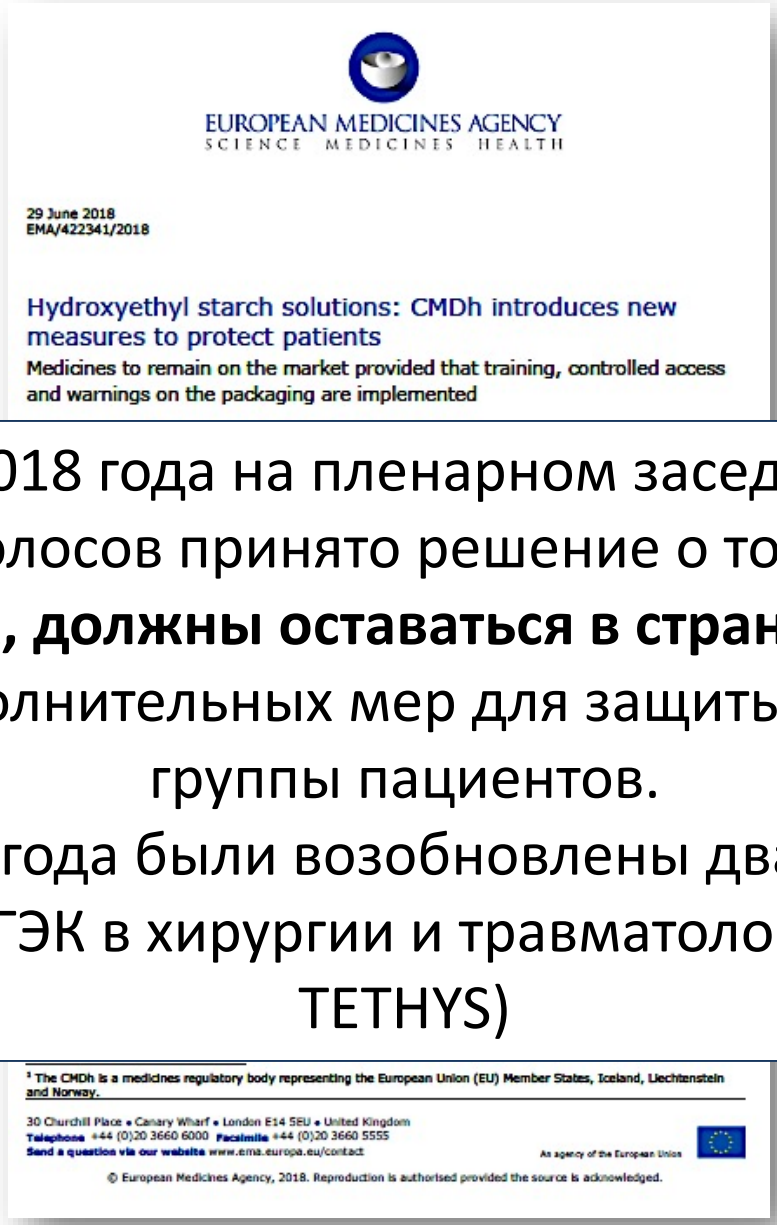
29 июня 2018 года на пленарном заседании CMDh большинством голосов принято решение о том, что **препараты, содержащие ГЭК, должны оставаться в странах ЕС** при условии введения дополнительных мер для защиты определенных группы пациентов.

Применение ГЭК сегодня



EUROPEAN MEDICINES AGENCY
SCIENCE MEDICINES HEALTH

29 June 2018
EMA/422341/2018

Hydroxyethyl starch solutions: CMDh introduces new measures to protect patients

Medicines to remain on the market provided that training, controlled access and warnings on the packaging are implemented

[1] The CMDh is a medicines regulatory body representing the European Union (EU) Member States, Iceland, Liechtenstein and Norway.

30 Churchill Place ● Canary Wharf ● London E14 5EU ● United Kingdom
Telephone +44 (0)20 3660 6000 Facsimile +44 (0)20 3660 5555
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В июне 2018 года были возобновлены два клинических исследования ГЭК в хирургии и травматологии (PHOENICS и TETHYS)

Применение ГЭК сегодня
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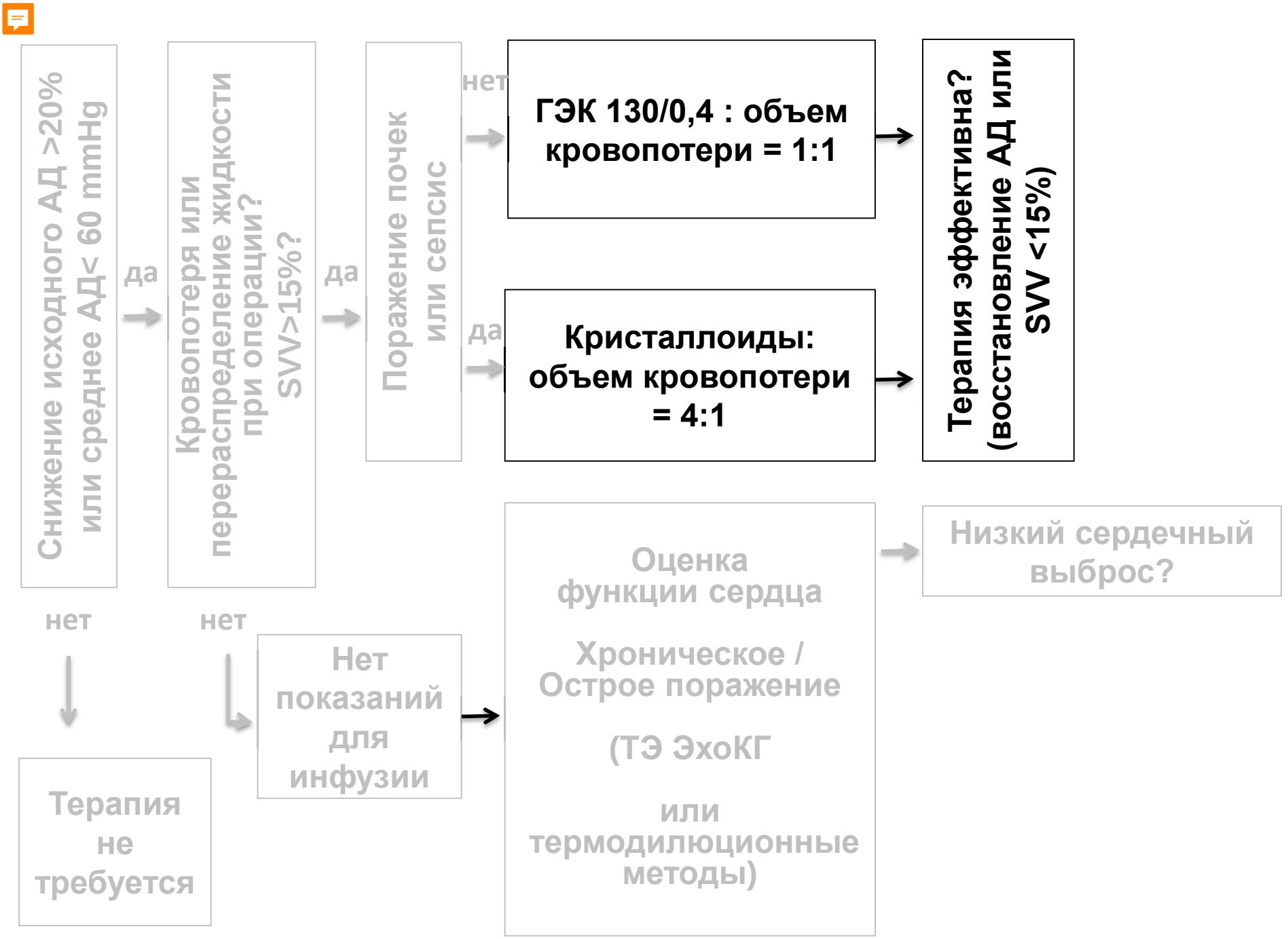
- Применение у детей не рекомендуется, в связи ограниченным опытом применения у данной возрастной категории

* SVV- вариабельность ударного объема

Strunden et al. Journal of Clinical Anesthesia 2016;35:384–391



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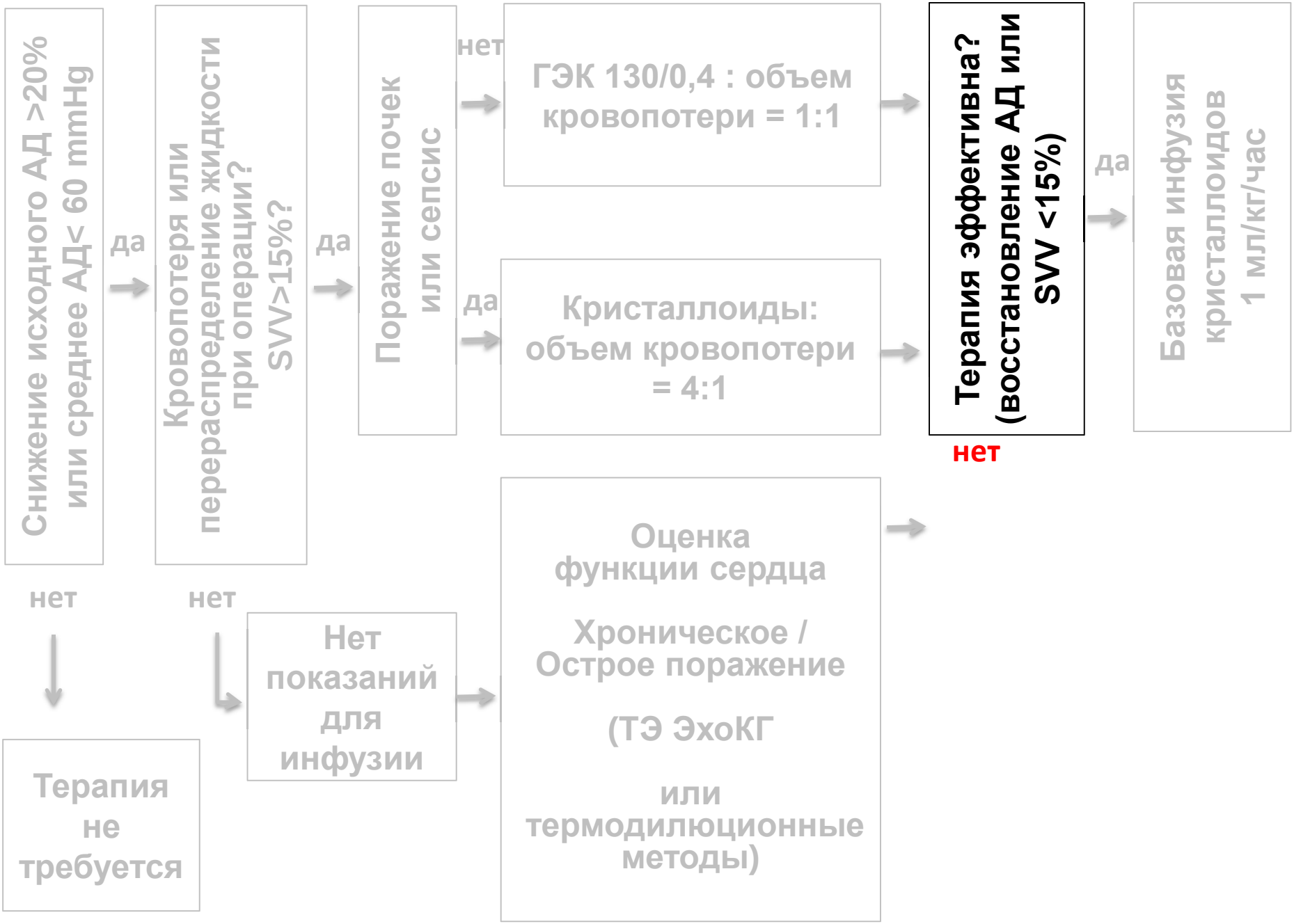

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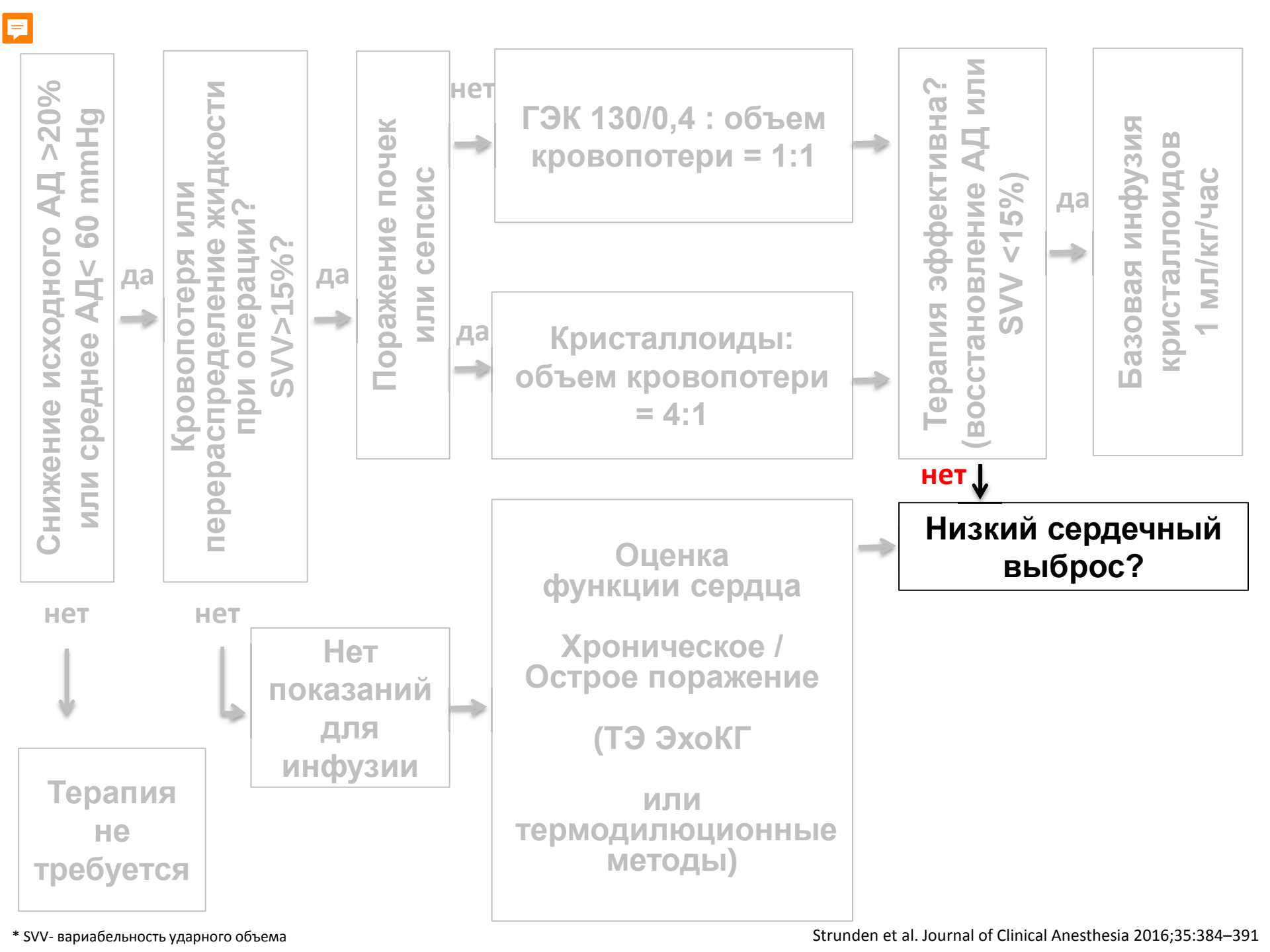

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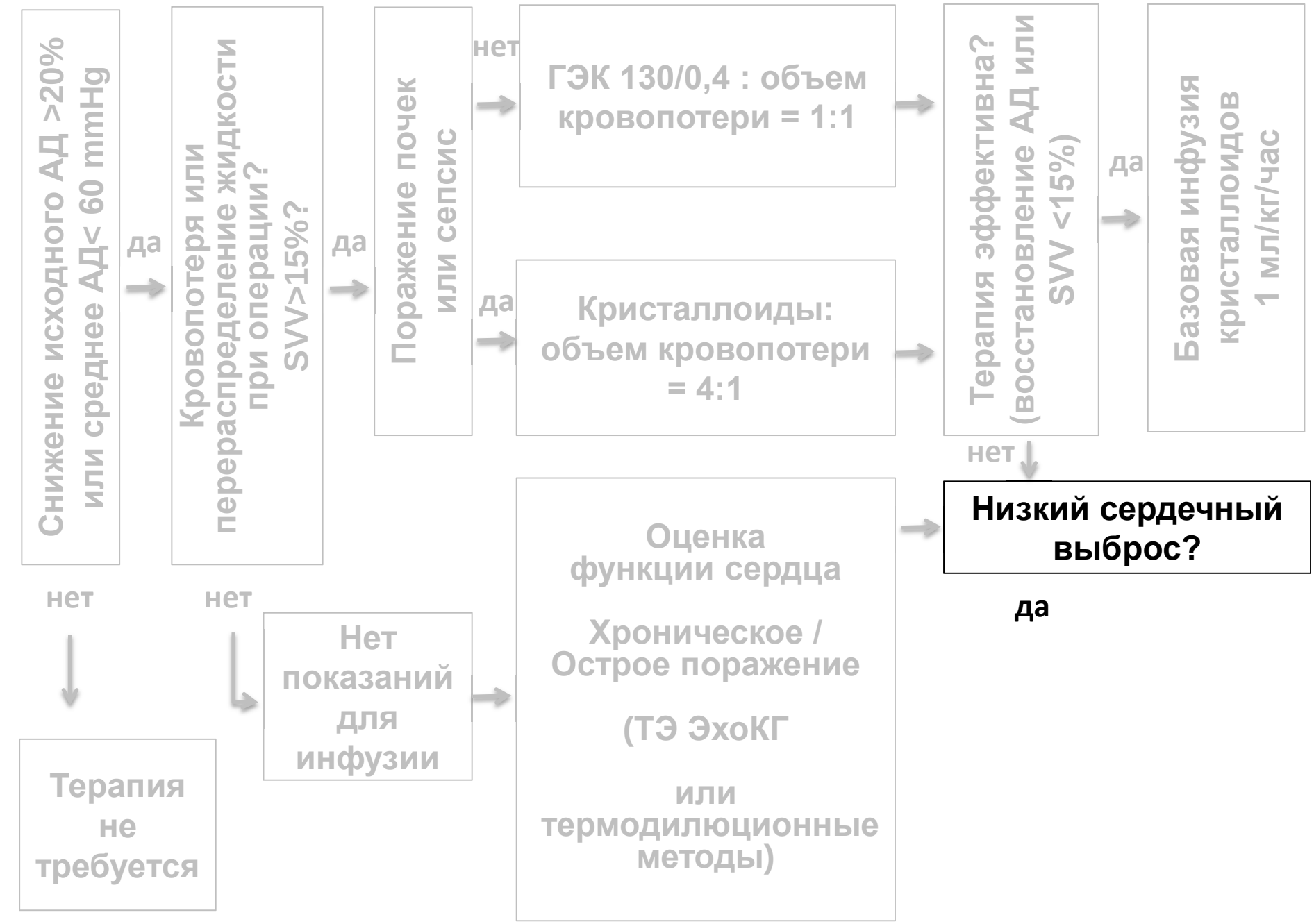

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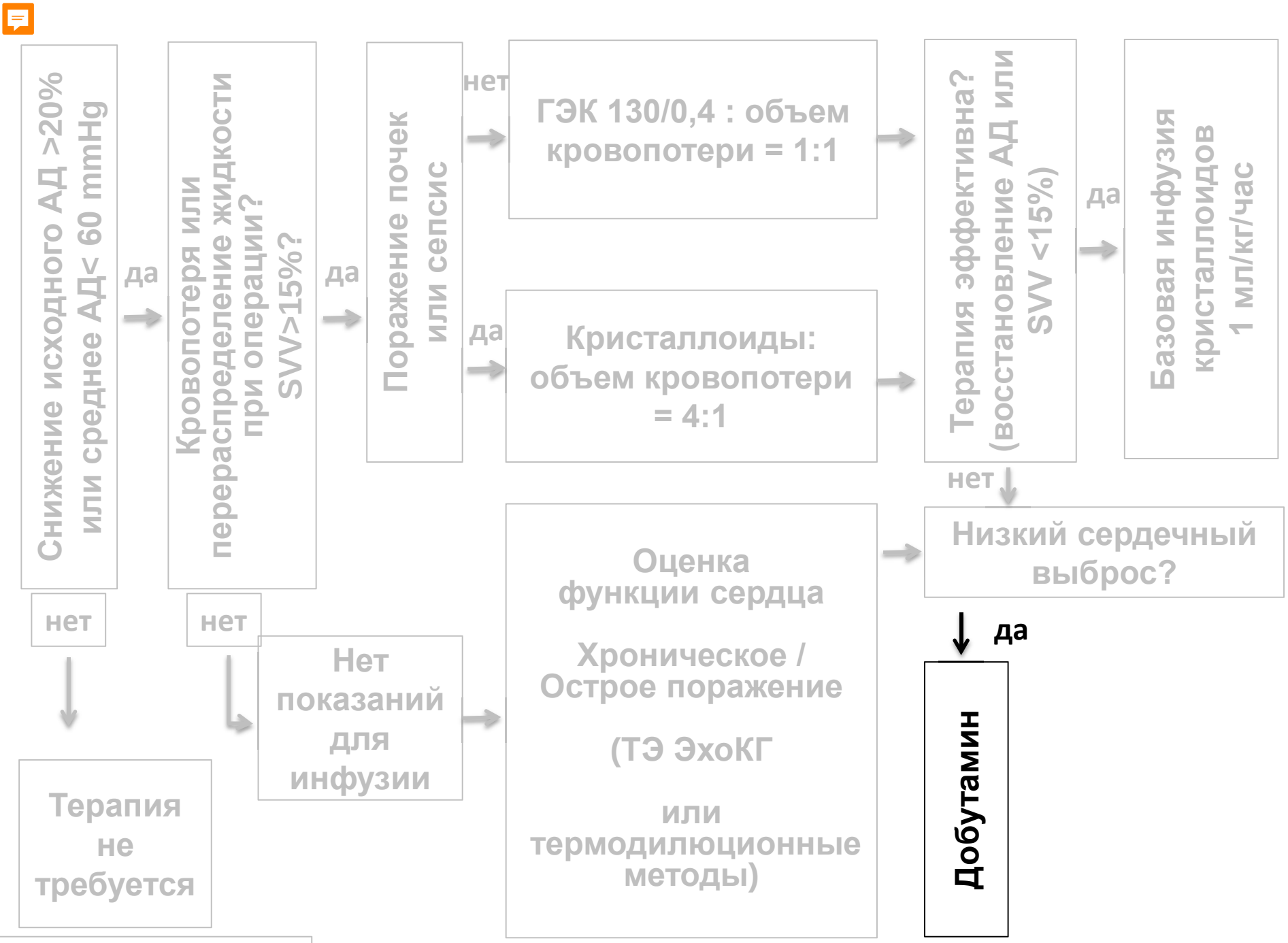

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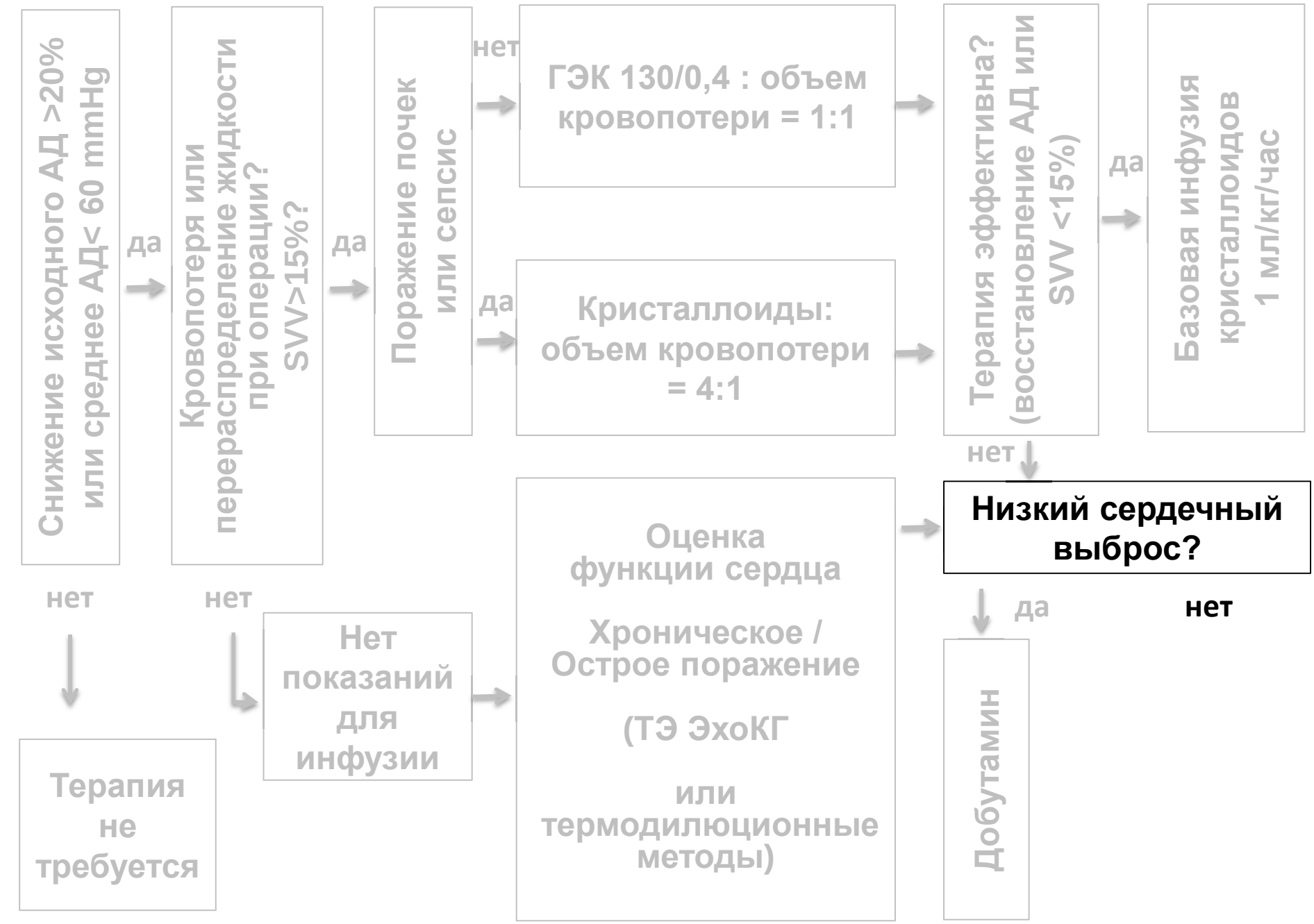

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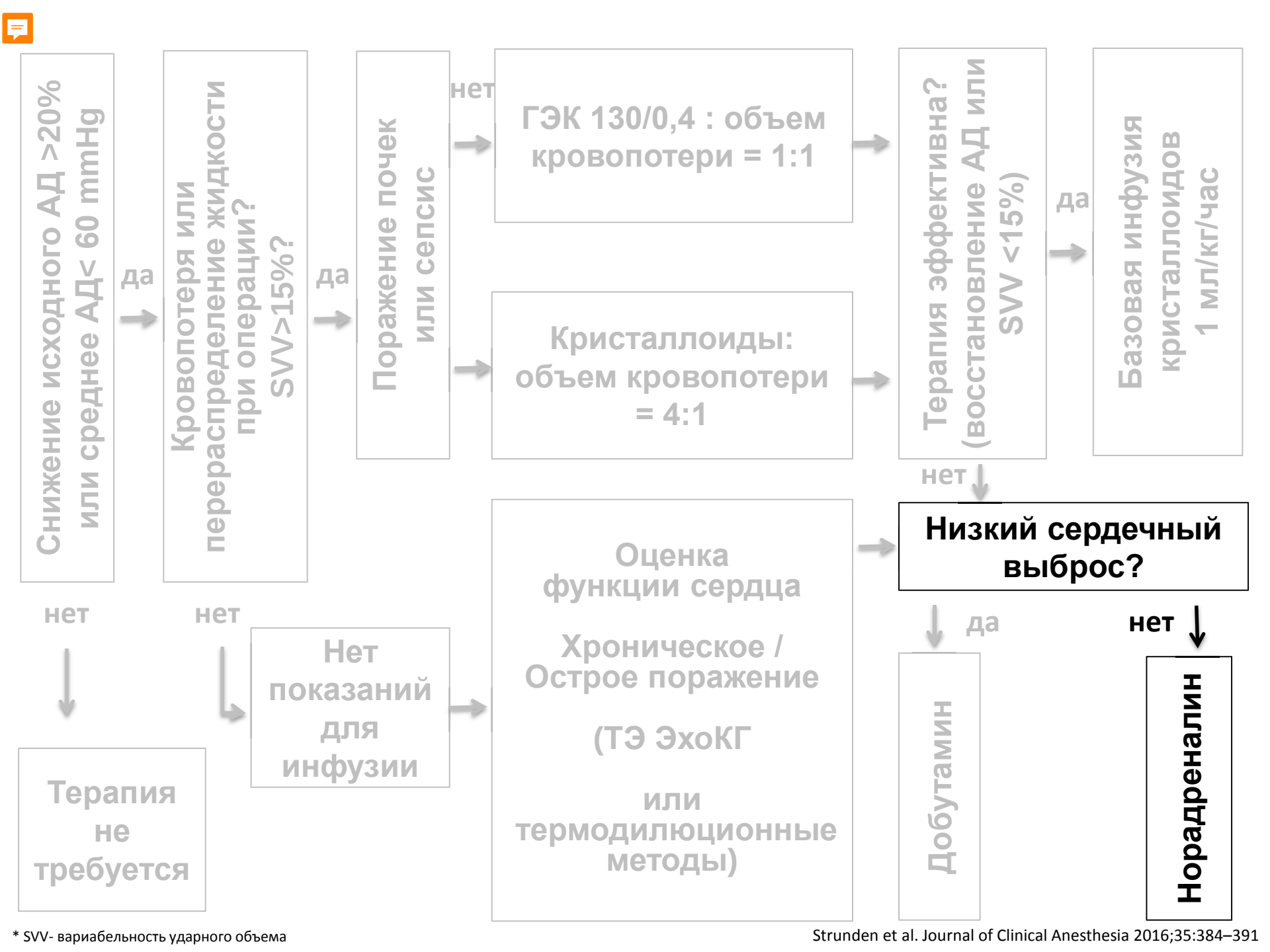

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«Смертельная триада» массивной кровопотери

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- Гипотермия

SA ORTHOPAEDIC JL Summer 2011 | Vol 10 • No 4
Moore E, Thomas G. Staged laparotomy for the hypothermia, acidosis and coagulopathy syndrome. Am J Surg. 1996;172:405-10.

«Смертельная триада» массивной кровопотери

- Гипотермия
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Гипотермия

8.2. Correction of confounding factors

Recommendations

We recommend maintaining perioperative normothermia because it reduces blood loss and transfusion requirements. **1B**

Гипотермия

- нарушение функции тромбоцитов

Watts DD, Trask A, Soeken K, Perdue P, Dols S, Kaufmann C: Hypothermic coagulopathy in trauma: effect of varying levels of hypothermia on enzyme speed, platelet function, and fibrinolytic activity. J Trauma 1998, 44:846-854.
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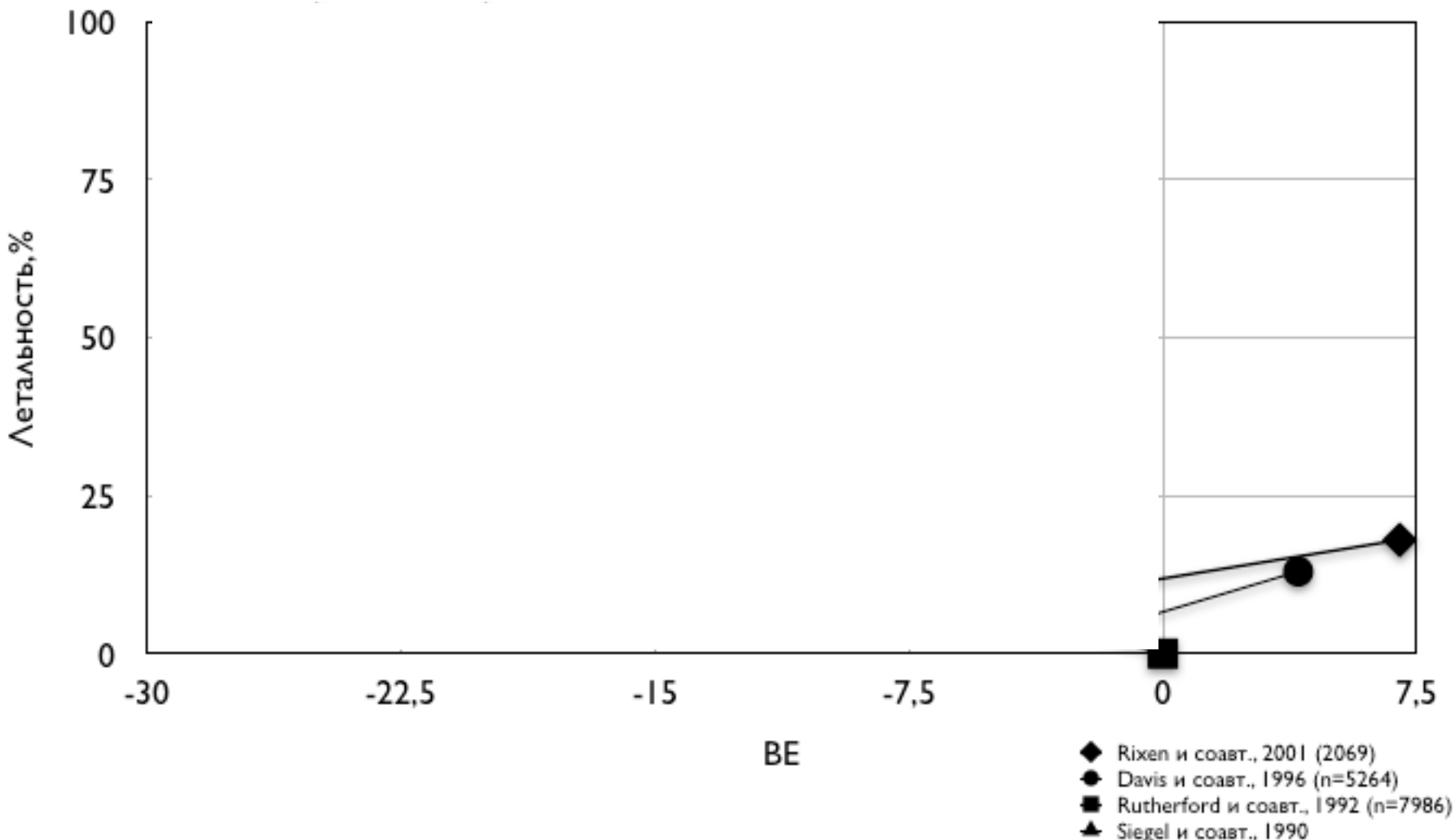

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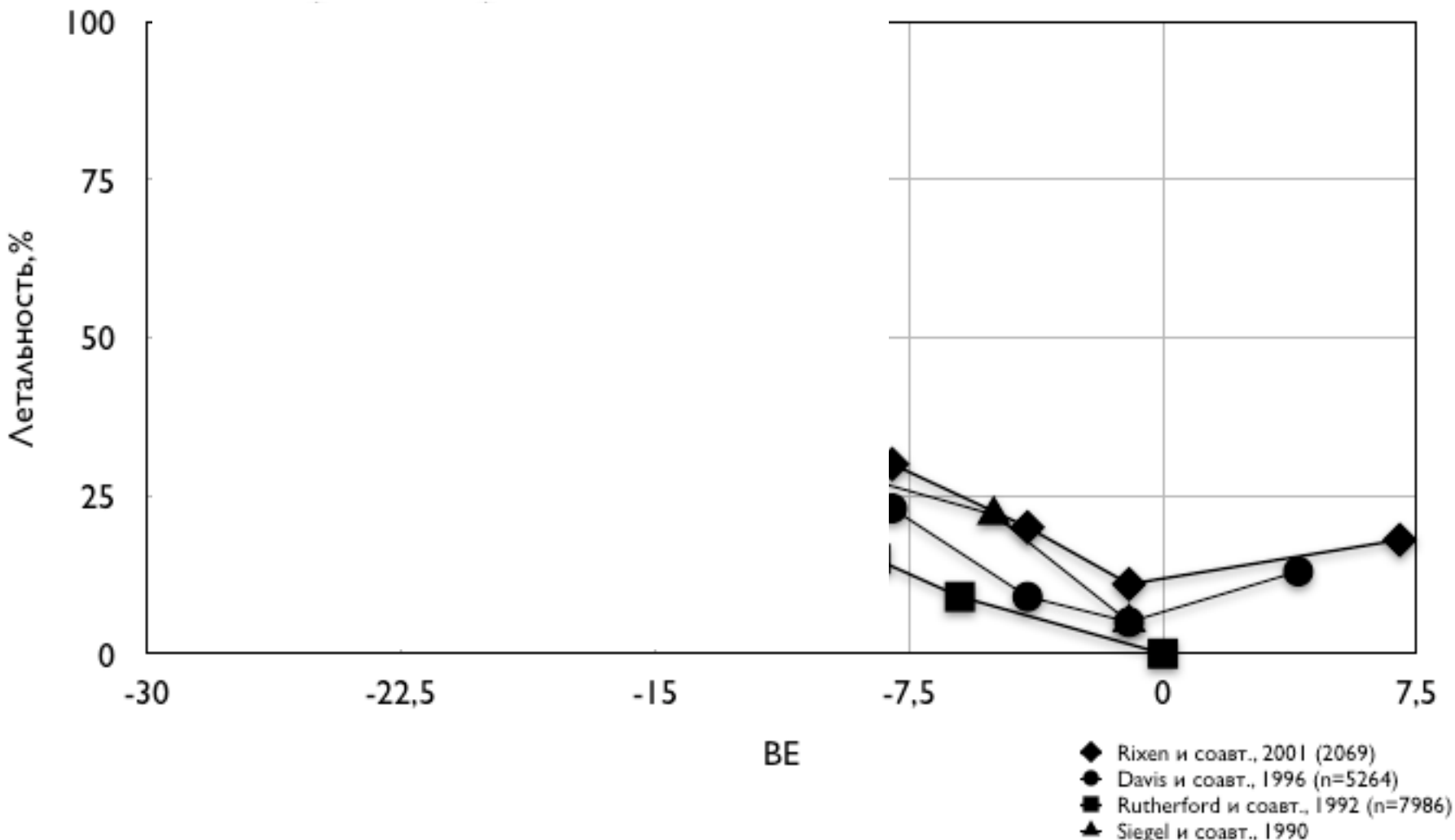

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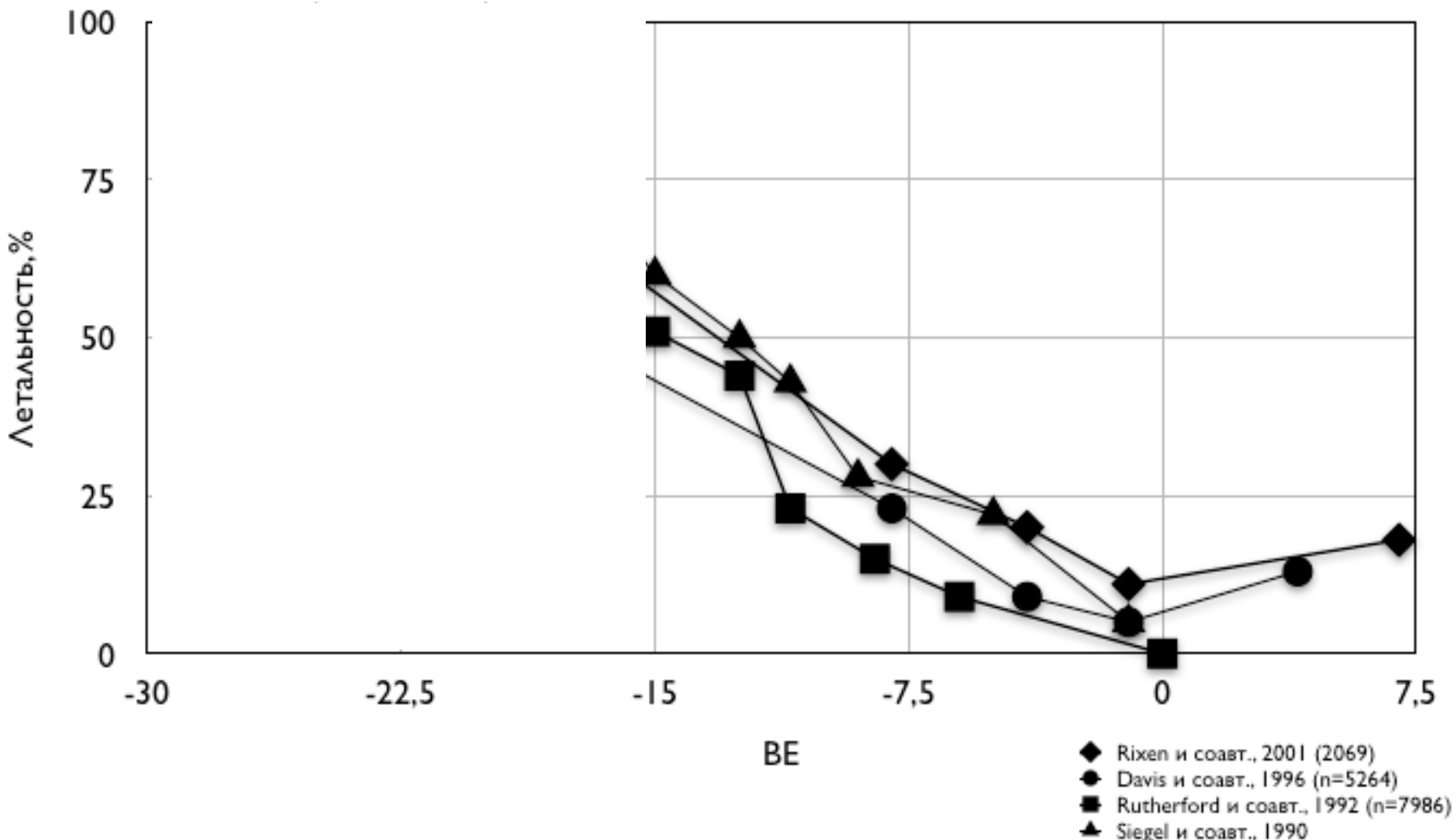

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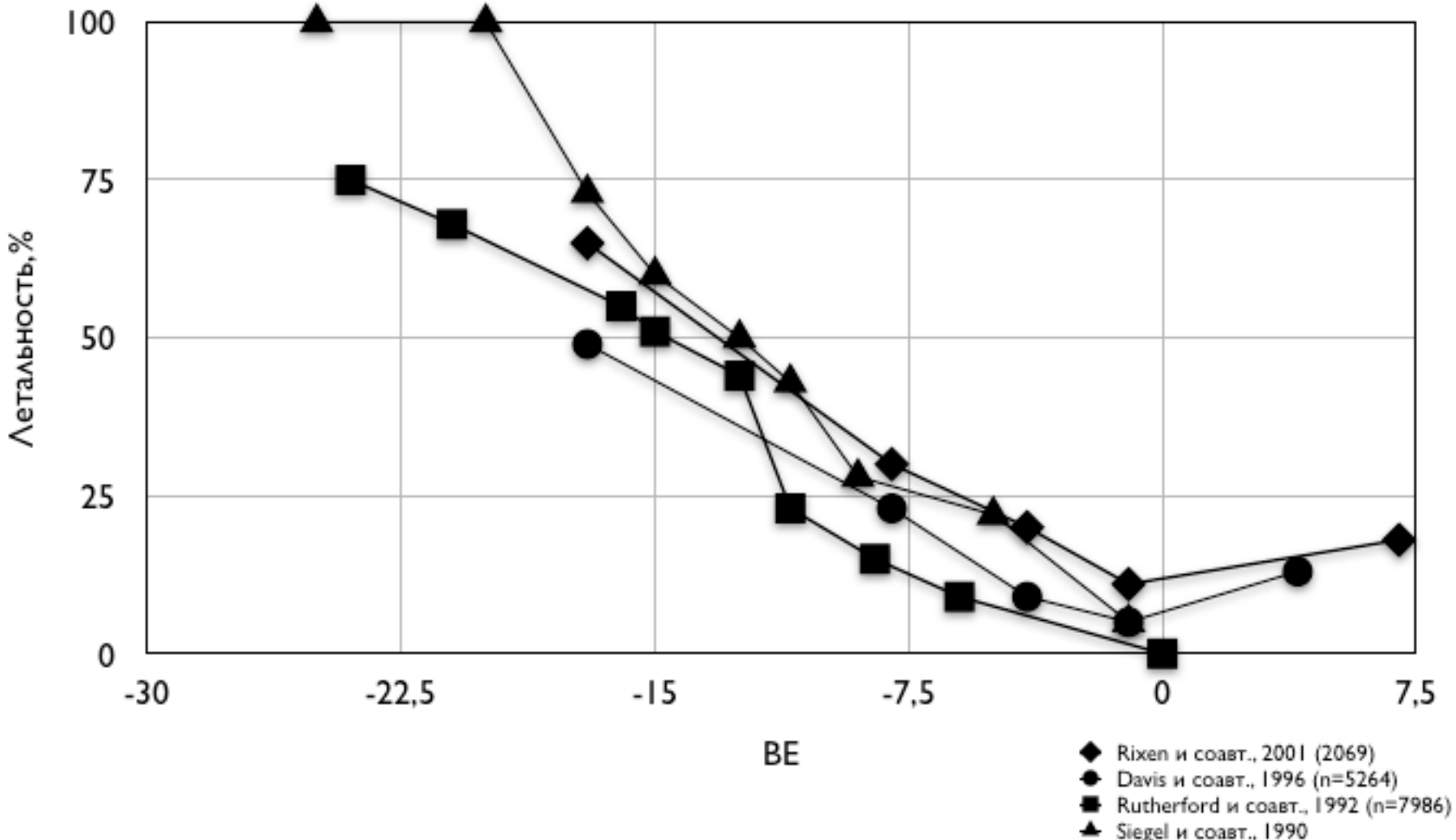


КОС

Коррекцию pH

и

лечение ацидоз-индуцированной коагулопатии

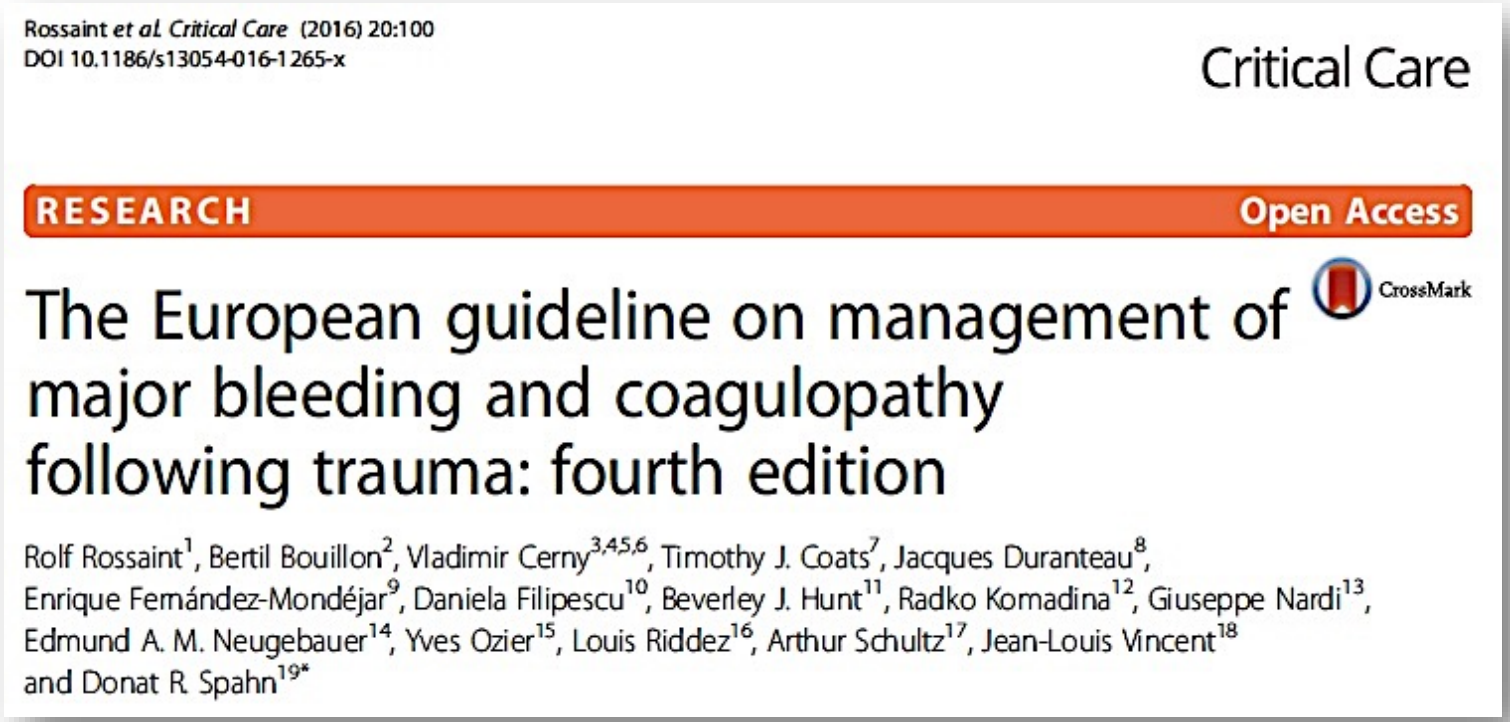
следует проводить одновременно

1С

Eur J Anaesthesiol 2017; 34:332–395

Лечение тяжелых кровотечений и коагулопатии при травме

Европейское руководство



Rossaint *et al. Critical Care* (2016) 20:100
DOI 10.1186/s13054-016-1265-x

Critical Care

RESEARCH Open Access

The European guideline on management of major bleeding and coagulopathy following trauma: fourth edition

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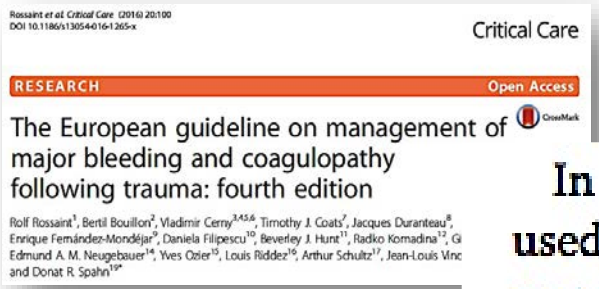
Ограничить применение «физ.раствора»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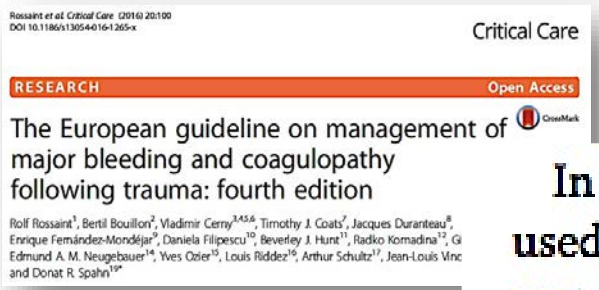
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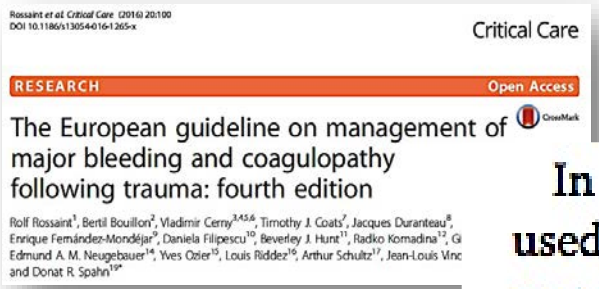
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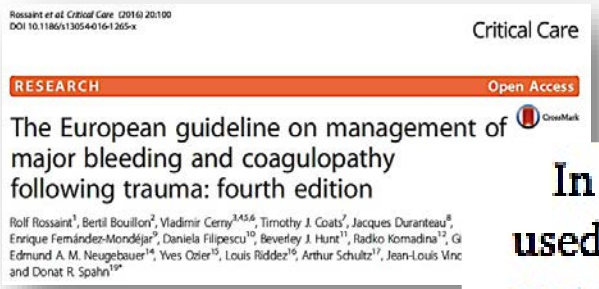

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С.Г. Решетников, Д.Н. Проценко, А.В. Бабаянц, Б.Р. Гельфанд
Вестник АиР, Т.9.- №1.-2012. -с.14-18.

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Гипернатриемия
Гиперхлоремия

С.Г. Решетников, Д.Н. Проценко, А.В. Бабаянц, Б.Р. Гельфанд
Вестник АиР, Т.9.- №1.-2012. -с.14-18.

Гиперхлоремический дилюционный ацидоз

0,9% раствор натрия хлорида
растворы ГЭК, декстрана, желатина и проч.
не содержат донаторов резервной щелочности

Гипернатриемия
Гиперхлоремия

Гиперхлоремический дилюционный ацидоз

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Гиперхлоремический дилюционный ацидоз

- Смещение кривой диссоциации оксигемоглобина вправо
- Олигурия
- Нарушение работы ферментных систем
- Послеоперационная тошнота и рвота

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Состав полиэлектролитных растворов

(ммоль/л)

	Плазма	NaCl 0,9%	Рингер	Стерофундин	Реамберин
Na^+	140	154	147	145	147
K^+	4	-	4	4	4
Ca^{2+}	2,45	-	2,25	2,5	-
Mg^{2+}	1	-	1	1	1,25
Cl	100	154	156	127	109
$HCO3^-$	24	-	-	-	-
Лактат	-	-	-	-	-
Ацетат	-	-	-	24	-
Малат	-	-	-	5	-
Сукцинат	-	-	-	-	44,7
Осмолярность мОсм/л	300	308	309	304	313
РСИ (SID)	47	0	0	20	43

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АНЕСТЕЗИЯ В ТРАВМАТОЛОГИИ

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Герасимов Л.В.[1], Марченков Ю.В.[2], Волков Д.П.[1], Родионов Е.П.[1], Измайлов В.В.[2]

ВОЗМОЖНОСТИ КОРРЕКЦИИ МЕТАБОЛИЧЕСКИХ НАРУШЕНИЙ С ИСПОЛЬЗОВАНИЕМ РЕАМБЕРИНА В ОСТРОМ ПЕРИОДЕ ТРАВМЫ

[1]ГКБ им. С.П. Боткина, Москва; [2]ФГБУ «НИИ общей реаниматологии им. В.А. Неговского», Москва

Обследовано 56 больных в возрасте 18–60 лет, поступивших в реанимационное отделение № 18 ГКБ им. С.П. Боткина с диагнозом «тяжелая сочетанная травма». Проведена сравнительная оценка влияния полиэлектролитного раствора «Реамберин» на кислотно-основное состояние, осмоляльность и электролитный состав плазмы у больных в остром посттравматическом периоде. Установлено, что на фоне традиционной инфузионной терапии у больных отмечались метаболический ацидоз и гиперхлоремия. В группе, получавшей реамберин, уже на 2-е сутки происходила нормализация кислотно-основного состояния у 82% больных, а также отмечались более низкие показатели концентрации хлоридов. Применение реамберина существенно не влияло на осмоляльность плазмы и частоту развития алкалоза в остром периоде травмы.

Ключевые слова: *тяжелая сочетанная травма; метаболический ацидоз; инфузионная терапия; реамберин.*

Для цитирования: *Анестезиология и реаниматология. 2015; 60(6): 50-54.*

Выводы

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1. На фоне применения традиционных кристаллоидных растворов нарушения кислотно-основного состояния в остром периоде травмы представлены лактат-ацидозом, гиперхлоремическим и дилюционным ацидозом.

Выводы

1. На фоне применения традиционных кристаллоидных растворов нарушения кислотно-основного состояния в остром периоде травмы представлены лактат-ацидозом, гиперхлоремическим и дилюционным ацидозом.

2. В группе, где использовался реамберин, уже на 2-е сутки происходила нормализация показателей кислотно-основного состояния у 82% больных, а также отмечались более низкие показатели концентрации хлоридов.

Выводы

1. На фоне применения традиционных кристаллоидных растворов нарушения кислотно-основного состояния в остром периоде травмы представлены лактат-ацидозом, гиперхлоремическим и дилюционным ацидозом.

2. В группе, где использовался реамберин, уже на 2-е сутки происходила нормализация показателей кислотно-основного состояния у 82% больных, а также отмечались более низкие показатели концентрации хлоридов.

3. Включение в состав инфузионной терапии реамберина не влияло на осмоляльность плазмы и частоту развития алкалоза в остром периоде травмы.

Сбалансированные растворы

We suggest the use of balanced solutions for crystalloids and as a basic solute for iso-oncotic preparations. **2C**

Eur J Anaesthesiol 2017; 34:332–395

Сбалансированные растворы

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9.5.2. Fluid resuscitation
Recommendation

We recommend the use of isotonic and balanced resuscitation fluids in bleeding children. **1C**

Eur J Anaesthesiol 2017; 34:332–395

Особенности инфузионной терапии при критических состояниях

- Сепсис
- Кровопотеря

Филипп Ауреол Теофраст Бомбаст фон Гогенхайм

1493 -1541

Парацельс

1493 -1541

Парацельс

Dosis facit venenum

Благодарю за внимание