

Sepsis, septischer Schock in der Intensivmedizin

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Outline

Definition Sepsis & septischer Schock

Relevanz

Katecholamine & Vasopressoren im septischen Schock

Case 1

Case 2

Sepsis



Lebensbedrohliche Organdysfunktion aufgrund einer fehlgeleiteten Antwort (des Körpers) auf eine Infektion

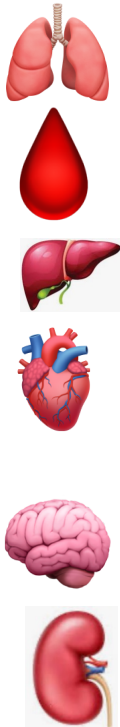


Infektion -> SOFA $\geq$ 2 Punkte

Perner A, Gordon AC, De Backer D, Dimopoulos G, Russell JA, Lipman J, Jensen JU, Myburgh J, Singer M, Bellomo R, Walsh T. Sepsis: frontiers in diagnosis, resuscitation and antibiotic therapy. Intensive Care Med. 2016 Dec;42(12):1958-1969.

SOFA Score

Sepsis Severity



System	Measurement	Scoring (0–4)
Respiratory	PaO ₂ /FiO ₂ ratio	>400 (0), ≤100 with respiratory support (4)
Coagulation	Platelet count (×10 ³ /μL)	≥150k (0), <20k (4)
Liver	Bilirubin (mg/dL)	<1.2 (0), >12 (4)
Cardiovascular	MAP / Vasopressors	MAP ≥70 (0), Dopamine >15 or
CNS (Neurologic)	Glasgow Coma Scale (GCS)	15 (0), <6 (4)
Renal	Creatinine (mg/dL) / Urine output	<1.2 (0), >5.0 or <500 mL/day (4)

Sepsis



Lebensbedrohliche Organdysfunktion aufgrund einer fehlgeleiteten Antwort (des Körpers) auf eine Infektion



Infektion $\rightarrow$ SOFA $\geq$ 2 Punkte

Septischer Schock



Sepsis + Vasopressoren (um 65mmHg MAP zu erreichen) + Serumlaktat $>$ 2mmol/l (trotz adäquater Volumenssubstitution)



Sepsis + Vasopressoren + Lac $>$ 2mmol/l

Perner A, Gordon AC, De Backer D, Dimopoulos G, Russell JA, Lipman J, Jensen JU, Myburgh J, Singer M, Bellomo R, Walsh T. Sepsis: frontiers in diagnosis, resuscitation and antibiotic therapy. Intensive Care Med. 2016 Dec;42(12):1958-1969.

Sepsis



Häufigster Grund für ED Aufnahmen



11% der ICU Aufnahmen



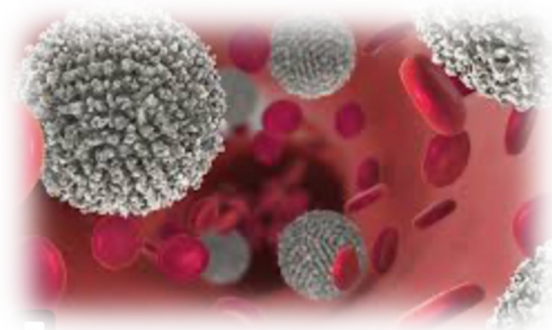
Mortalität 10-15%

Hooper MH, Weavind L, Wheeler AP, Martin JB, Gowda SS, Semler MW, Hayes RM, Albert DW, Deane NB, Nian H, Mathe JL, Nadas A, Sztipanovits J, Miller A, Bernard GR, Rice TW. Randomized trial of automated, electronic monitoring to facilitate early detection of sepsis in the intensive care unit*. Crit Care Med. 2012 Jul;40(7):2096-101.

Fall 1, Hr P., 76a

Anamnese:

- AML, 2. Zy CHT
- FK:
HTN
BPH



Aplasie
(Leukopenie)
(Thrombopenie)
(Anämie)



Erfassungsdatum : 05.11.2025 09:45

Resultat

Referenzbereich

Einheit

Klinische Chemie

> Natrium	137	136 - 145	mmol/L
> Kalium	3.90	3.5 - 5.1	mmol/L
> Chlorid	102	98 - 107	mmol/L
> Kalzium	2.15	2.20 - 2.55	mmol/L
> Anorganisches Phosphat	0.95	0.81 - 1.45	mmol/L
> Magnesium	0.76	0.66 - 1.07	mmol/L
> Kalzium - Phosphat - Produkt	2.04		mmol ² /L ²
> Kreatinin	0.84	0.70 - 1.20	mg/dL
> Harnstoff - N	21.2	8 - 23	mg/dL
> Harnsäure	3.7	3.4 - 7.0	mg/dL
> Hämolyseindex	3		

Immunologie

97 mm

C-reaktives Protein CRP	↑	0.95	< 0.5	mg/dL
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Fall 1, Hr P.



Fieber $>38^{\circ}$ KKT



subjektives Krankheitsgefühl

Erfassungsdatum : 07.11.2025 09:09

	Resultat	Referenzbereich	Einheit
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Klinische Chemie

> Natrium		136	136 - 145	mmol/L
> Kalium		3.95	3.5 - 5.1	mmol/L
> Chlorid		101	98 - 107	mmol/L
> Kalzium	↓	2.10	2.20 - 2.55	mmol/L
> Anorganisches Phosphat		1.05	0.81 - 1.45	mmol/L
> Magnesium		0.66	0.66 - 1.07	mmol/L
> Kalzium - Phosphat - Produkt		2.21		mmol ² /L ²
> Kreatinin		1.13	0.70 - 1.20	mg/dL
> Harnstoff - N	↑	25.6	8 - 23	mg/dL
> Harnsäure	↓	3.3	3.4 - 7.0	mg/dL
> Hämolyseindex		4		

Immunologie

> C-reaktives Protein CRP	↑	6.90	< 0.5	mg/dL
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Erfassungsdatum : 09.11.2025 09:57

		Resultat	Referenzbereich	Einheit
Natrium	↓	132	136 - 145	mmol/L
Kalium		4.09	3.5 - 5.1	mmol/L
Chlorid		98	98 - 107	mmol/L
Kalzium	↓	2.10	2.20 - 2.55	mmol/L
Anorganisches Phosphat	↓	0.75	0.81 - 1.45	mmol/L
Magnesium		0.68	0.66 - 1.07	mmol/L
Kalzium - Phosphat - Produkt		1.58		mmol ² /L ²
Kreatinin		0.94	0.70 - 1.20	mg/dL
Harnstoff - N		17.7	8 - 23	mg/dL
Harnsäure	↓	2.2	3.4 - 7.0	mg/dL
Hämolyseindex		0		

Immunologie

C-reaktives Protein CRP	↑	15.90	< 0.5	mg/dL
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Mikrobiologie

Untersuchungsmaterial: **Blut**
Lokalisation: zentral

Angeforderte Untersuchung: Kultur
Durchgeführte Untersuchung: Kultur

Ergebnis:

Aerobe Kultur positiv nach: 3 Stunden
Anaerobe Kultur positiv nach: 3 Stunden

Kulturergebnis : #

Escherichia coli 3 MRGN

Wachstum in aerober und anaerober Flasche

Antibiogramm	
Ampicillin	-
Ampicillin/ Sulbactam	+
Amoxicillin/ Clavulansäure	-
Piperacillin/ Tazobactam	+
Cefepim	+
Cefotaxim	-

Antibiogramm	
Ertapenem	+
Meropenem	+
Aztreonam	+/-
Amikacin	+
Gentamicin	+
Trimethoprim/ Sulf.	-

lieg



Fall 1, Hr P.



AB mit Piperazillin/Tazobactam 3x4.5G begonnen

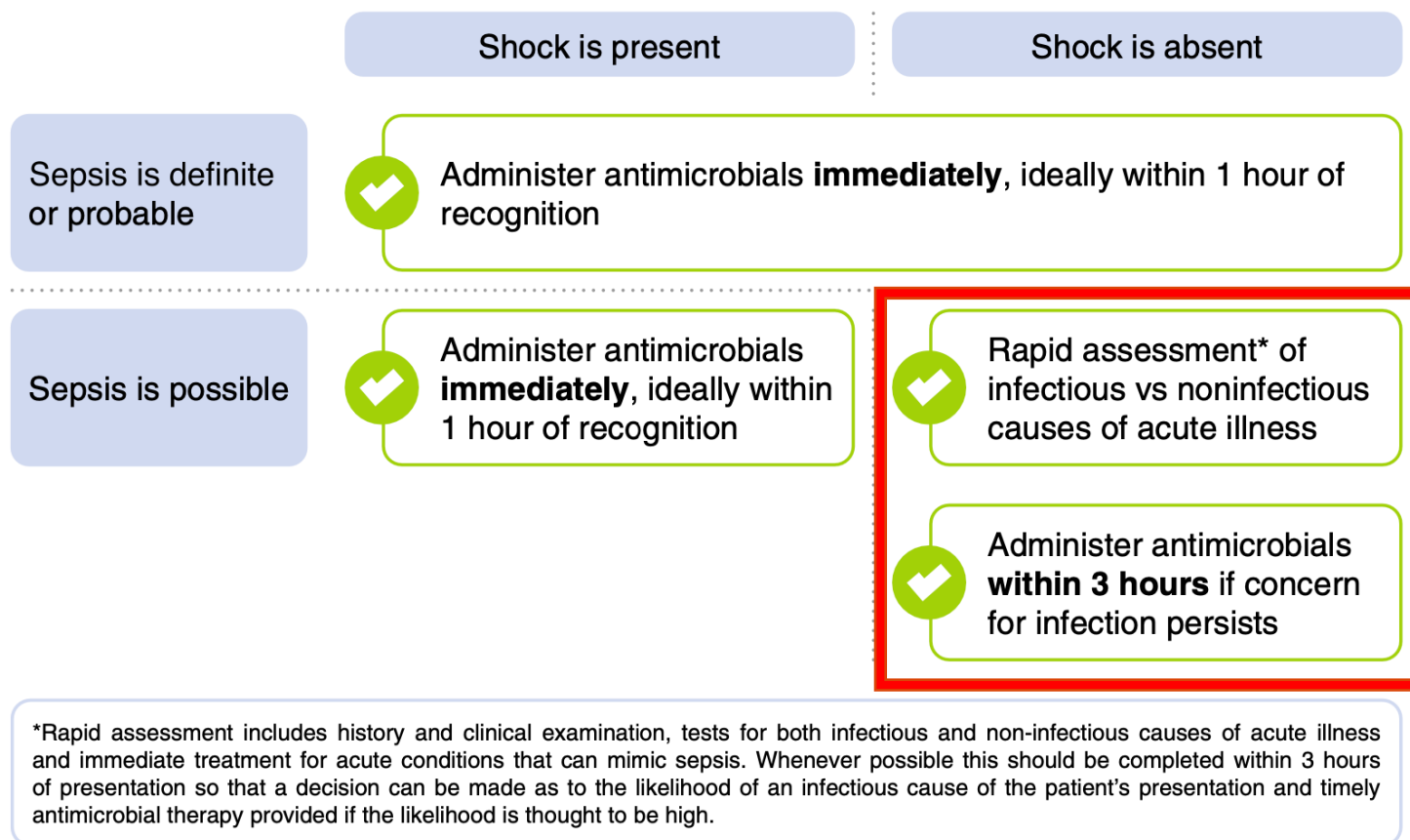


Wechsel d. zentralen Zugangs



klinische Verschlechterung

Antibiotic Timing



Antifungal therapy

Recommendations

22. For adults with sepsis or septic shock at high risk of fungal infection, we **suggest** using empiric antifungal therapy over no antifungal therapy

Antiviral therapy

Recommendation

24. We make **no recommendation** on the use of antiviral agents

Perner A, Gordon AC, De Backer D, Dimopoulos G, Russell JA, Lipman J, Jensen JU, Myburgh J, Singer M, Bellomo R, Walsh T. Sepsis: frontiers in diagnosis, resuscitation and antibiotic therapy. Intensive Care Med. 2016 Dec;42(12):1958-1969.



klinische Verschlechterung



2-3L O₂ in Ruhe, SpO₂ 90-93%



thrombopen



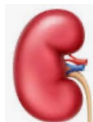
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MAP < 60mmHg, Flüssigkeit



GCS = 15, intermitt. Delir



SKr 0.8mg/dl -> 1.2mg/dl (AKI °1)

SOFA Score

Sepsis Severity



System	Measurement	Scoring (0–4)
Respiratory	PaO ₂ /FiO ₂ ratio	>400 (0), ≤100 with respiratory support (4)
Coagulation	Platelet count (×10 ³ /μL)	≥150k (0), <20k (4)
Liver	Bilirubin (mg/dL)	<1.2 (0), >12 (4)
Cardiovascular	MAP / Vasopressors	MAP ≥70 (0), Dopamine >15 or
CNS (Neurologic)	Glasgow Coma Scale (GCS)	15 (0), <6 (4)
Renal	Creatinine (mg/dL) / Urine output	<1.2 (0), >5.0 or <500 mL/day (4)

ca. 2 Pt

1 Pt

1 Pt

Resultat

Referenzbereich

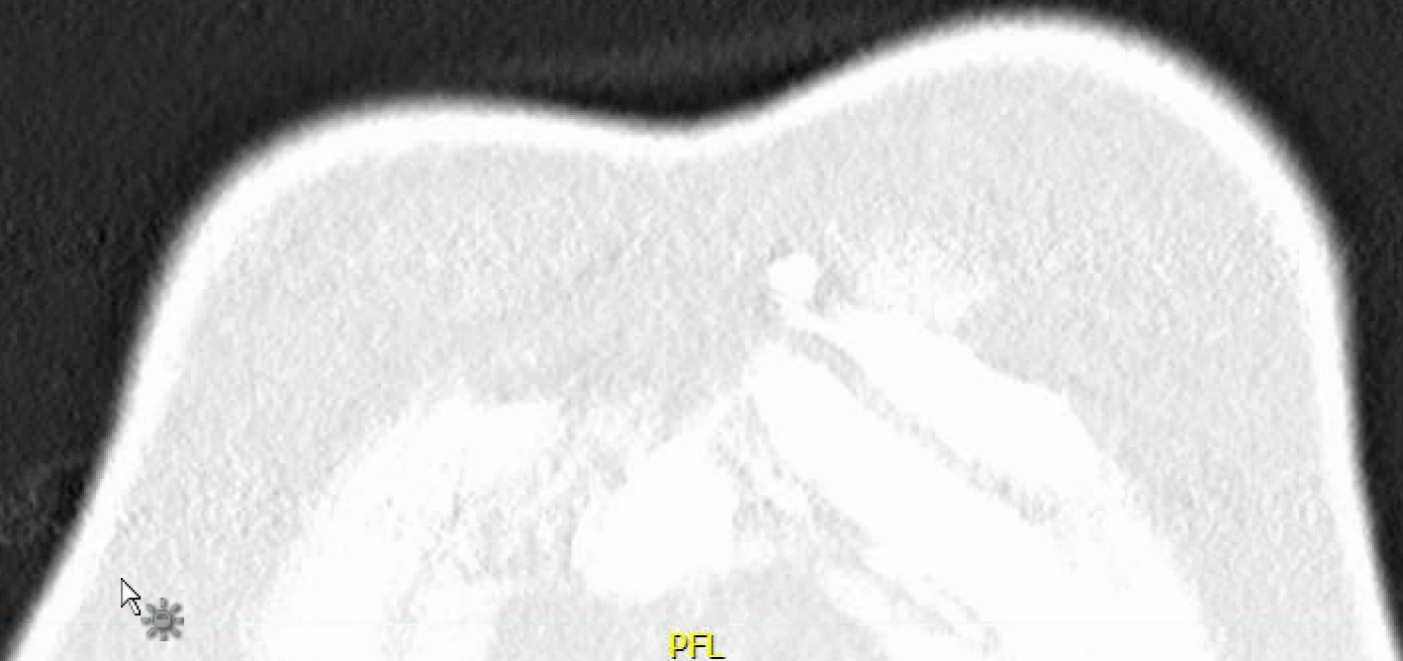
Einheit

Klinische Chemie

>	Natrium	↓	133	136 - 145	mmol/L
>	Kalium	↓	3.37	3.5 - 5.1	mmol/L
>	Chlorid	↓	97	98 - 107	mmol/L
>	Kalzium	↓	1.99	2.20 - 2.55	mmol/L
>	Anorganisches Phosphat	↓	0.62	0.81 - 1.45	mmol/L
>	Magnesium		0.72	0.66 - 1.07	mmol/L
>	Kalzium - Phosphat - Produkt		1.23		mmol ² /L ²
>	Harnstoff - N	↑	31.6	8 - 23	mg/dL
>	Harnsäure	↓	2.9	3.4 - 7.0	mg/dL
>	Hämolyseindex		3		

Immunologie

>	C-reaktives Protein CRP	↑	26.38	< 0.5	mg/dL
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PFL



Mikrobiologie

Untersuchungsmaterial:

Angeforderte Untersuchung:

Durchgeführte Untersuchung:

Sputum

Multiplex PCR - Pneumonie Panel

Multiplex PCR - Pneumonie Panel

Ergebnis:

Multiplex PCR - Pneumonie Panel

Acinetobacter	nicht nachgewiesen
calcoaceticus-baumannii complex	
Enterobacter cloacae complex	nachgewiesen
Escherichia coli	nicht nachgewiesen
Hämophilus influenzae	nicht nachgewiesen
Klebsiella aerogenes	nicht nachgewiesen
Klebsiella oxytoca	nachgewiesen
Klebsiella pneumoniae group	nicht nachgewiesen
Moraxella catarrhalis	nicht nachgewiesen
Proteus spp	nicht nachgewiesen
Pseudomonas aeruginosa	nachgewiesen
Serratia marcescens	nicht nachgewiesen
Staphylococcus aureus	nicht nachgewiesen
Streptococcus agalactiae	nicht nachgewiesen

Fall 1, Hr P.



AB auf Meropenem/Linzolid (+ Rokiprim) eskaliert



weiterhin katecholaminfrei, MAP mit Kristalloider Flüssigkeit stabil

Fall 1, Hr P.

13.11.	>	C-reaktives Protein CRP	↑	19.10
15.11.	>	C-reaktives Protein CRP	↑	16.77
17.11.	>	 C-reaktives Protein CRP	↑	11.09
19.11.	>	C-reaktives Protein CRP	↑	7.26
25.11.		 		

Sepsis



Lebensbedrohliche Organdysfunktion aufgrund einer fehlgeleiteten Antwort (des Körpers) auf eine Infektion



Infektion $\rightarrow$ SOFA $\geq$ 2 Punkte

Septischer Schock



Sepsis + Vasopressoren (um 65mmHg MAP zu erreichen) + Serumlaktat $>$ 2mmol/l (trotz adäquater Volumenssubstitution)



Sepsis + Vasopressoren + Lac $>$ 2mmol/l

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Septischer Schock

↳ Sepsis + Lac > 2mmol/l + Vasopressoren



Mortalität 25-30%

Sterling SA, Miller WR, Pryor J, Puskarich MA, Jones AE. The Impact of Timing of Antibiotics on Outcomes in Severe Sepsis and Septic Shock: A Systematic Review and Meta-Analysis. Crit Care Med. 2015 Sep;43(9):1907-15.

Septischer Schock

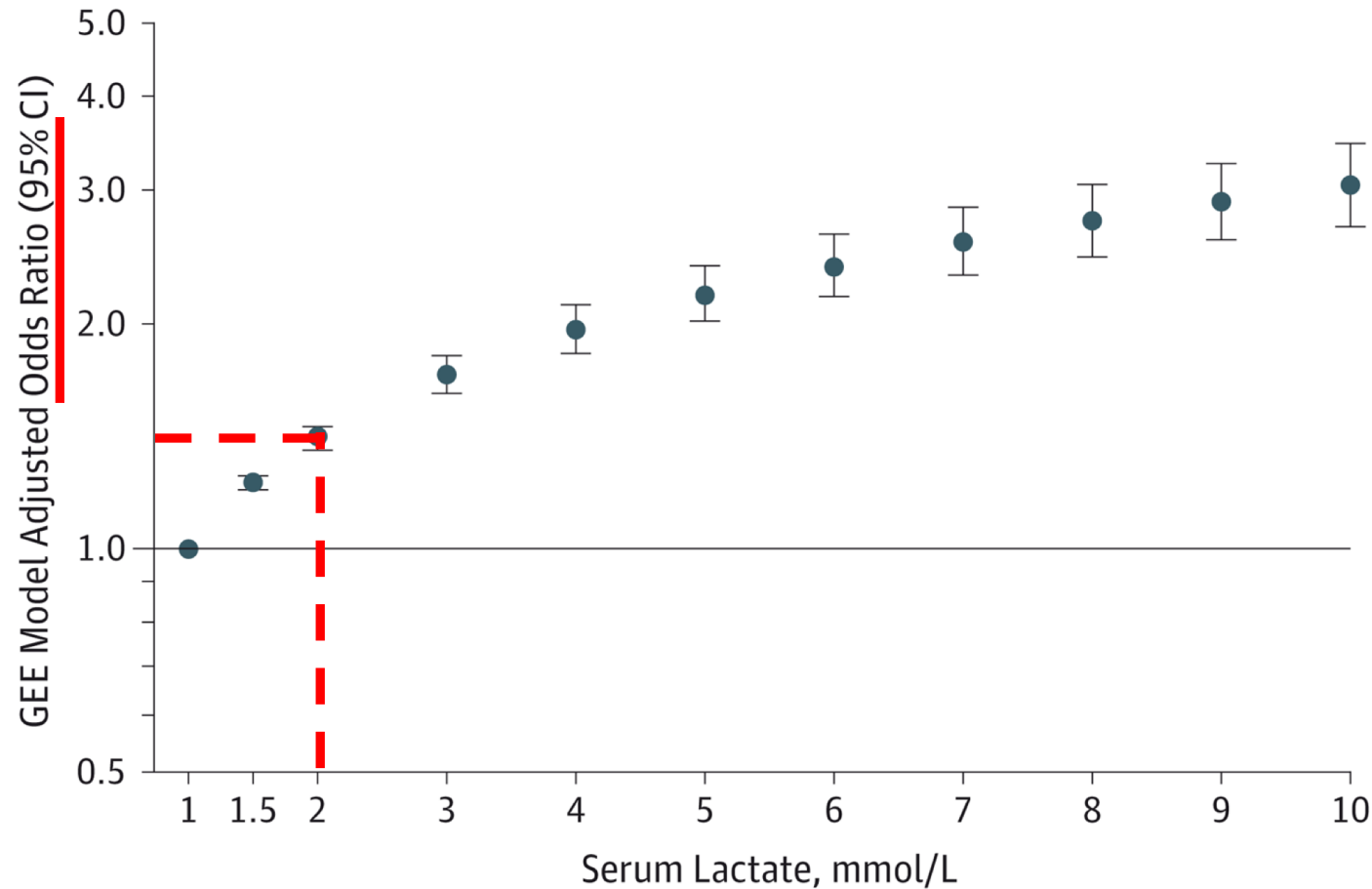


➡ Lac

Sterling SA, Miller WR, Pryor J, Puskarich MA, Jones AE. The Impact of Timing of Antibiotics on Outcomes in Severe Sepsis and Septic Shock: A Systematic Review and Meta-Analysis. Crit Care Med. 2015 Sep;43(9):1907-15.

Septischer Schock

Sepsis + Lac > 2mmol/l + Vasopressoren



Shankar-Hari M, Phillips GS, Levy ML, Seymour CW, Liu VX, Deutschman CS, Angus DC, Rubenfeld GD, Singer M; Sepsis Definitions Task Force. Developing a New Definition and Assessing New Clinical Criteria for Septic Shock: For the Third International Consensus Definitions for Sepsis and Septic Shock (Sepsis-3). JAMA. 2016 Feb 23;315(8):775-87.

Septischer Schock

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Sepsis & Septischer Schock

HEMODYNAMIC MANAGEMENT



MODERATE

32 For adults with sepsis or septic shock, we **recommend** using **crystalloids** as first-line fluid for resuscitation.



LOW

33 For adults with sepsis or septic shock, we **suggest** using balanced crystalloids instead of normal saline for resuscitation.



VERY LOW

43 For adults with septic shock, we **suggest** invasive monitoring of arterial blood pressure over non-invasive monitoring, as soon as practical and if resources are available.



VERY LOW

44 For adults with septic shock, we **suggest** starting **vasopressors** peripherally to restore mean arterial pressure rather than delaying initiation until a central venous access is secured.



WEAK RECOMMENDATION

Sterling SA, Miller WR, Pryor J, Puskarich MA, Jones AE. The Impact of Timing of Antibiotics on Outcomes in Severe Sepsis and Septic Shock: A Systematic Review and Meta-Analysis. Crit Care Med. 2015 Sep;43(9):1907-15.

Septischer Schock

└→ Sepsis + Lac > 2mmol/l + Vasopressoren



Arterenol (Noradrenalin)

Epinephrin (Adrenalin)

Vasopressin

Dopamin

Terlipressin

Phenylephrin

Angiotensin II

Sterling SA, Miller WR, Pryor J, Puskarich MA, Jones AE. The Impact of Timing of Antibiotics on Outcomes in Severe Sepsis and Septic Shock: A Systematic Review and Meta-Analysis. Crit Care Med. 2015 Sep;43(9):1907-15.

Noradrenalin (Arterenol)

Vasoactive Agent Management



Use norepinephrine as first-line vasopressor

For patients with septic shock on vasopressor



Target a MAP of 65mm Hg



Consider invasive monitoring of arterial blood pressure

If central access is not yet available



Consider initiating vasopressors peripherally*



If MAP is inadequate despite low-to-moderate-dose norepinephrine



Consider adding vasopressin

If cardiac dysfunction with persistent hypoperfusion is present despite adequate volume status and blood pressure



Consider adding dobutamine or switching to epinephrine



Strong recommendations



Weak recommendations

*When using vasopressors peripherally, they should be administered only for a short period of time and in a vein proximal to the antecubital fossa.

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;45:486–552.

Noradrenalin (Arterenol)



33 For adults with sepsis or septic shock, we **suggest** using balanced crystalloids instead of normal saline for resuscitation.



37 For adults with septic shock, we **recommend** using norepinephrine as the first-line agent over other vasopressors.



WEAK RECOMMENDATION

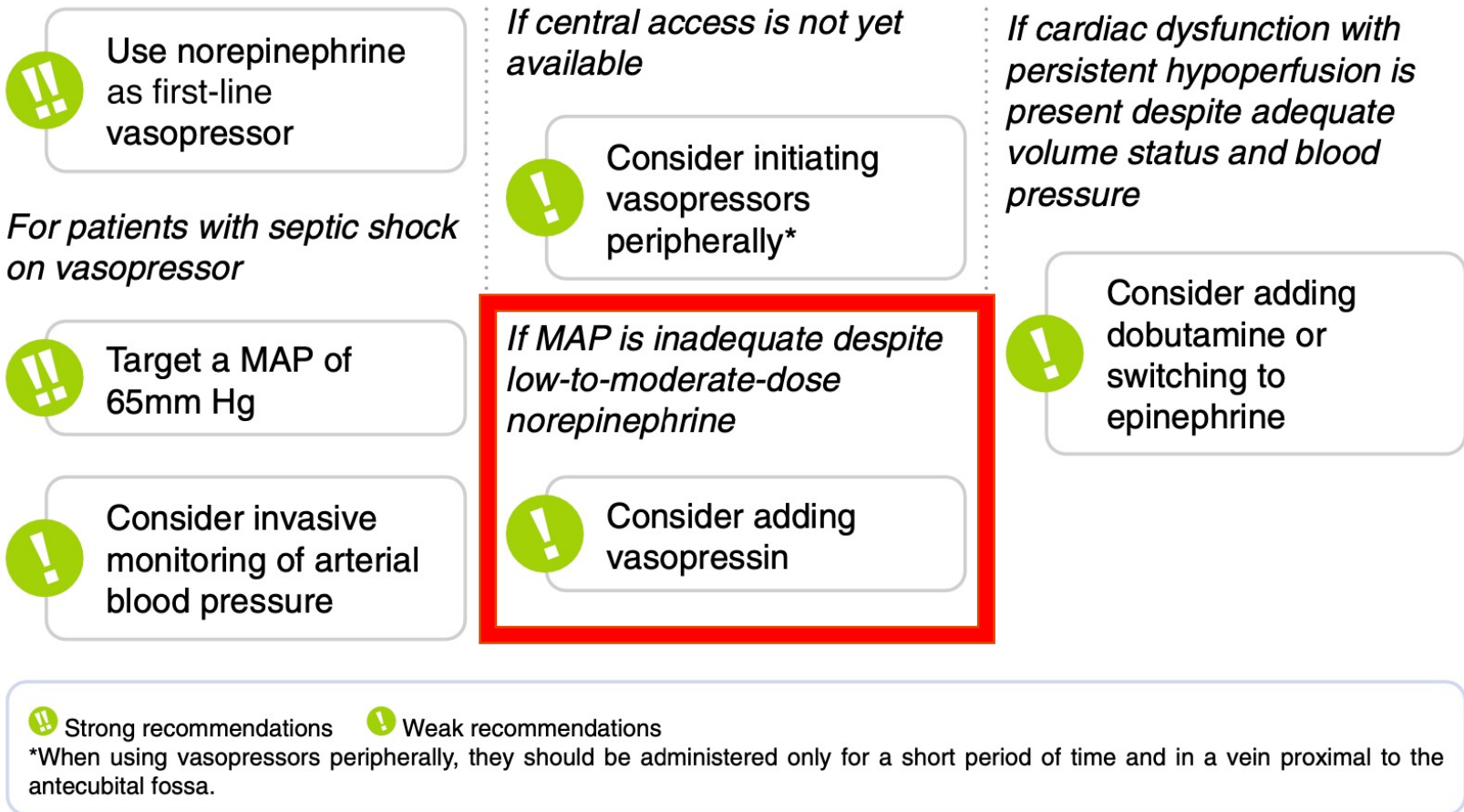


STRONG RECOMMENDATION

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Noradrenalin (Arterenol)

Vasoactive Agent Management



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;45:486–552.

Vasopressin



MODERATE

38 For adults with septic shock on norepinephrine with inadequate mean arterial pressure levels, we **suggest** adding vasopressin instead of escalating the dose of norepinephrine.

In our practice, vasopressin is usually started when the dose of norepinephrine is in the range of 0.25–0.5 µg/kg/min

39. For adults with septic shock and inadequate MAP levels despite norepinephrine and vasopressin, we **suggest** adding epinephrine
Weak recommendation, low-quality evidence



WEAK RECOMMENDATION

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Dopamin



HIGH

Dopamine

In settings where norepinephrine is not available, epinephrine or dopamine can be used as an alternative, but we encourage efforts to improve the availability of norepinephrine. Special attention should be given to patients at risk for arrhythmias when using dopamine and epinephrine



WEAK RECOMMENDATION

Rhodes A, Evans LE, Alhazzani W, et al: Sur- viving Sepsis Campaign: International Guide- lines for Management of Sepsis and Septic Shock: 2016. Crit Care Med 2017;45:486–552.

Terlipressin



40

For adults with septic shock, we **suggest against** using terlipressin.

serious adverse events:

- digital ischemia
- mesenteric ischaemia



WEAK RECOMMENDATION
AGAINST

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;45:486–552.

Epinephrine



LOW

39 For adults with septic shock and inadequate mean arterial pressure levels despite norepinephrine and vasopressin, we **suggest** adding epinephrine.

In our practice, vasopressin is usually started when the dose of norepinephrine is in the range of 0.25–0.5 µg/kg/min

39. For adults with septic shock and inadequate MAP levels despite norepinephrine and vasopressin, we **suggest** adding epinephrine
Weak recommendation, low-quality evidence

Adverse events:

- arrhythmias
- impaired splanchnic circulation
- aerobic lactate production via β -2



WEAK RECOMMENDATION

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;45:486–552.

Noradrenalin (Arterenol)

Vasoactive Agent Management



Use norepinephrine as first-line vasopressor

For patients with septic shock on vasopressor



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If cardiac dysfunction with persistent hypoperfusion is present despite adequate volume status and blood pressure



Consider adding dobutamine or switching to epinephrine



Strong recommendations



Weak recommendations

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Phenylephrin

no recommendation



MODERATE

38

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WEAK RECOMMENDATION

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Angiotensin II



Angiotensin 2

VERY LOW

- increase of MAP
- no difference in mortality



WEAK RECOMMENDATION

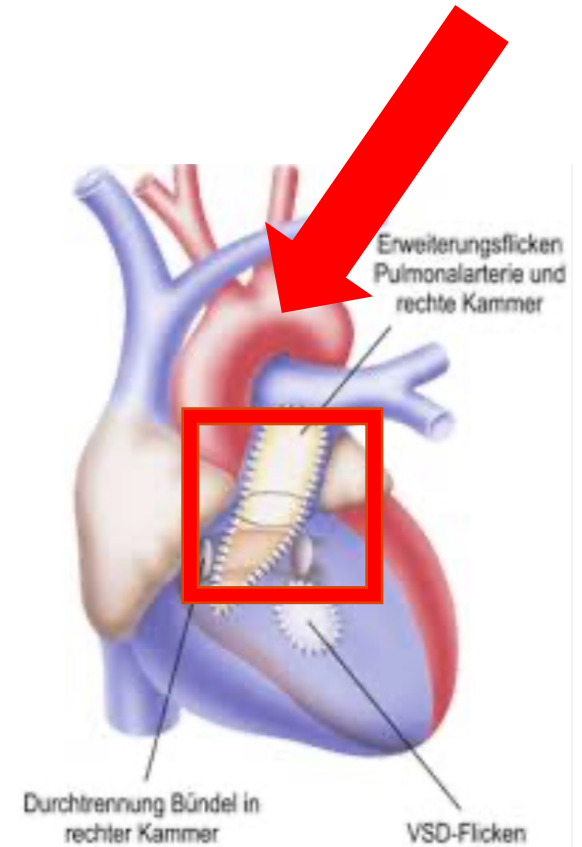
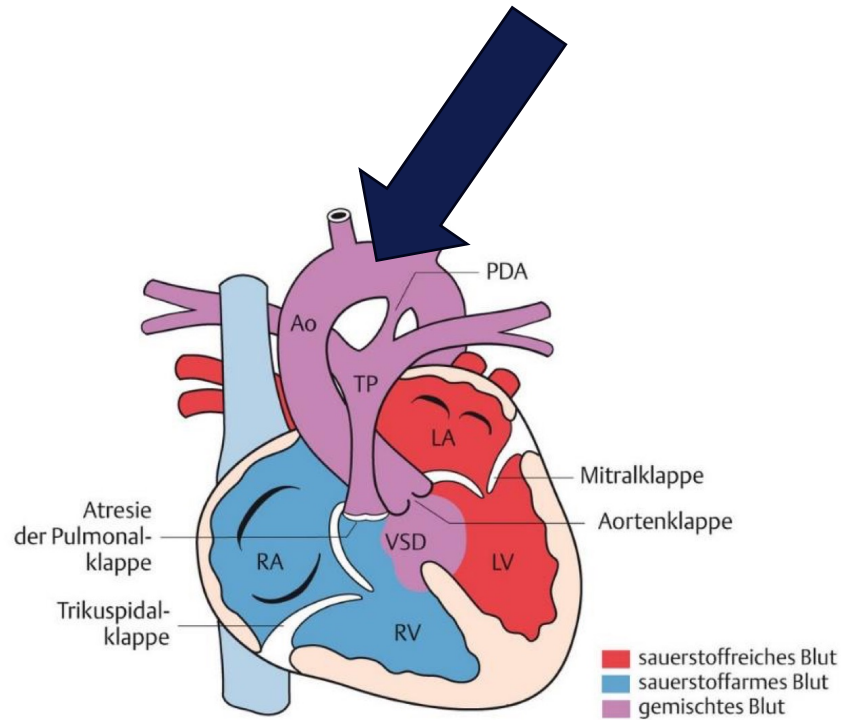
Rhodes A, Evans LE, Alhazzani W, et al: Surviving Sepsis Campaign: International Guidelines for Management of Sepsis and Septic Shock: 2016. Crit Care Med 2017;45:486–552.

Fall 2, Hr K.

Anamnese:

- GUCH (grown up congenital heart disease)
4 vorangegangene herzchir. und interventionelle Eingriffe

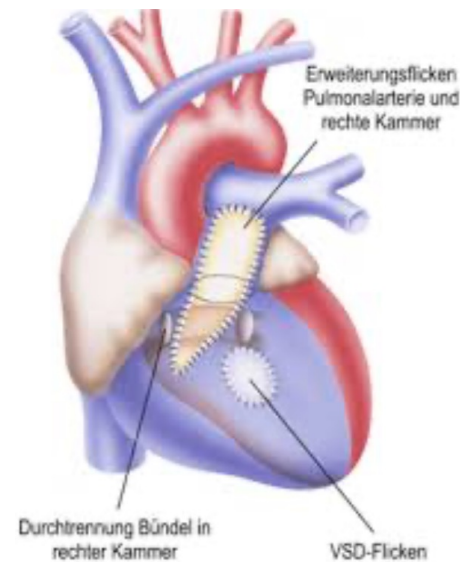
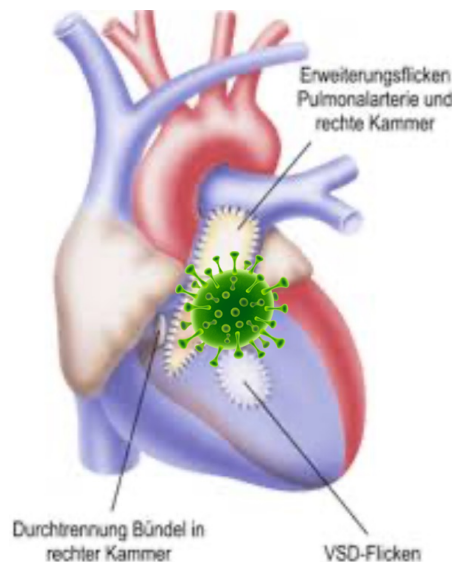
Fall 2, Hr K.

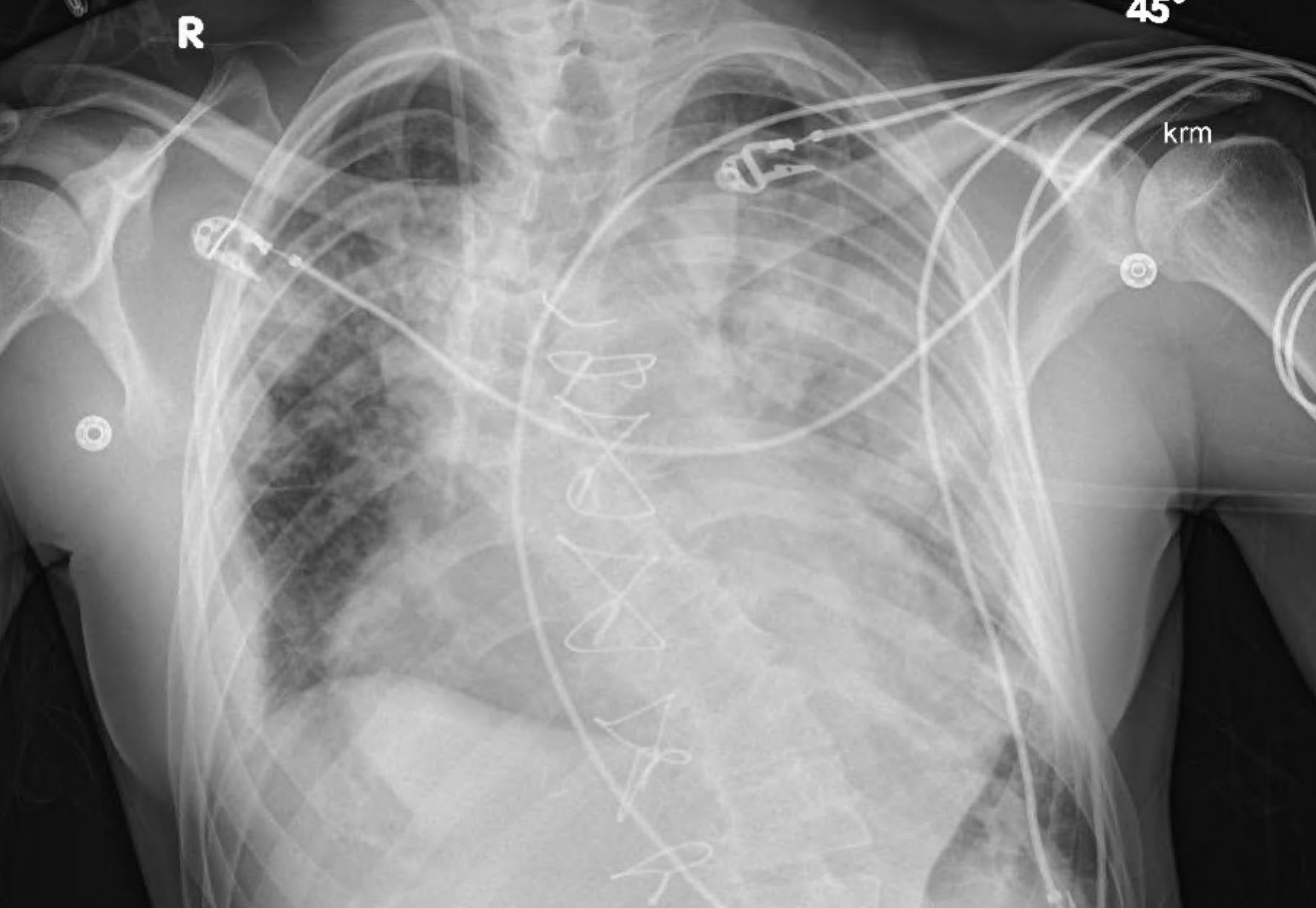


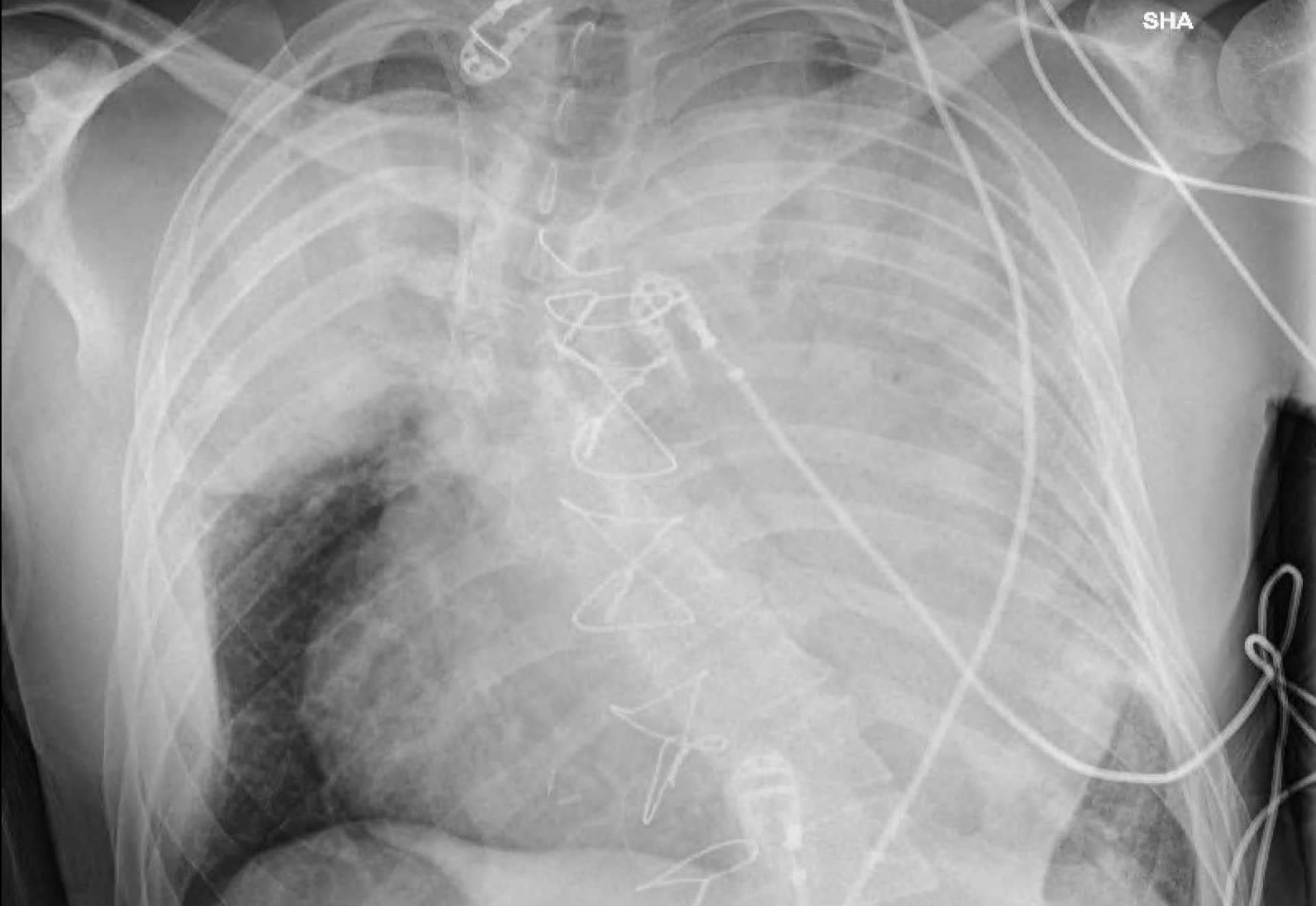
Fall 2, Hr K.

Anamnese:

- GUCH (grown up congenital heart disease)
4 vorangegangene herzchir. und interventionelle Eingriffe
- Pulmonalklappenendokarditis mit *Streptococcus gordonii*
St. p. 8 Wochen AB mit Cefotaxim/Aztreonam







Fall 2, Hr K.



Meropenem/Fosfomycin (empirisch)
Daptomycin (Endokarditis)



High flow nasal oxygen





Intubation



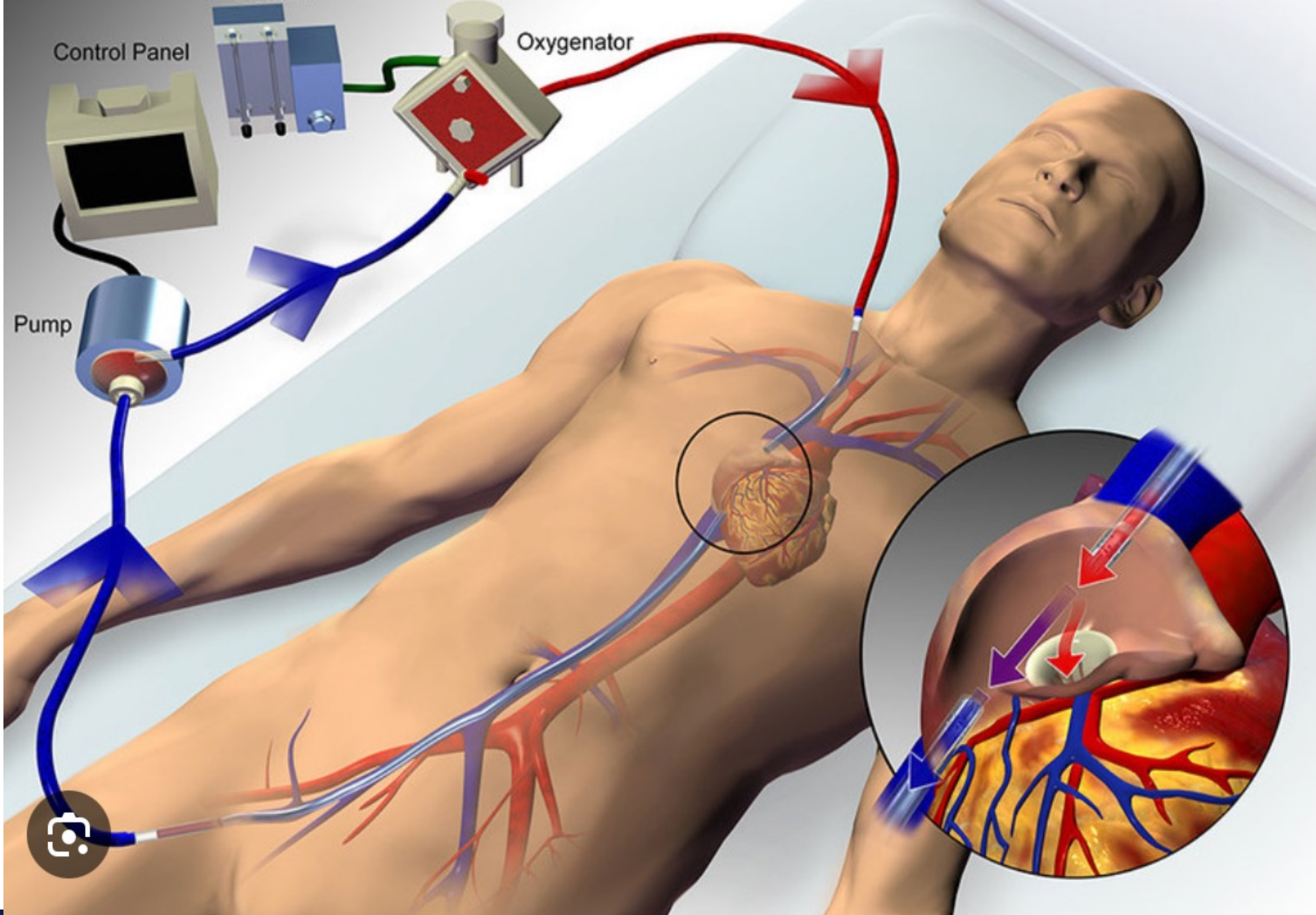
Hoher Noradrenalin-
bedarf

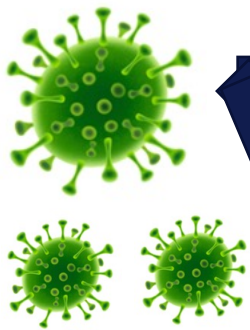


additiv Vasopressin



Venovenöse ECMO





MCS



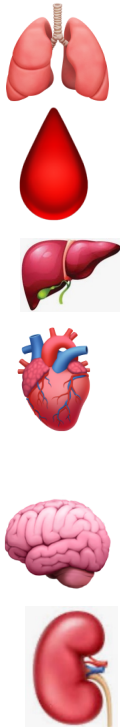
Katecholamine



invasive Beatmung

SOFA Score

Sepsis Severity



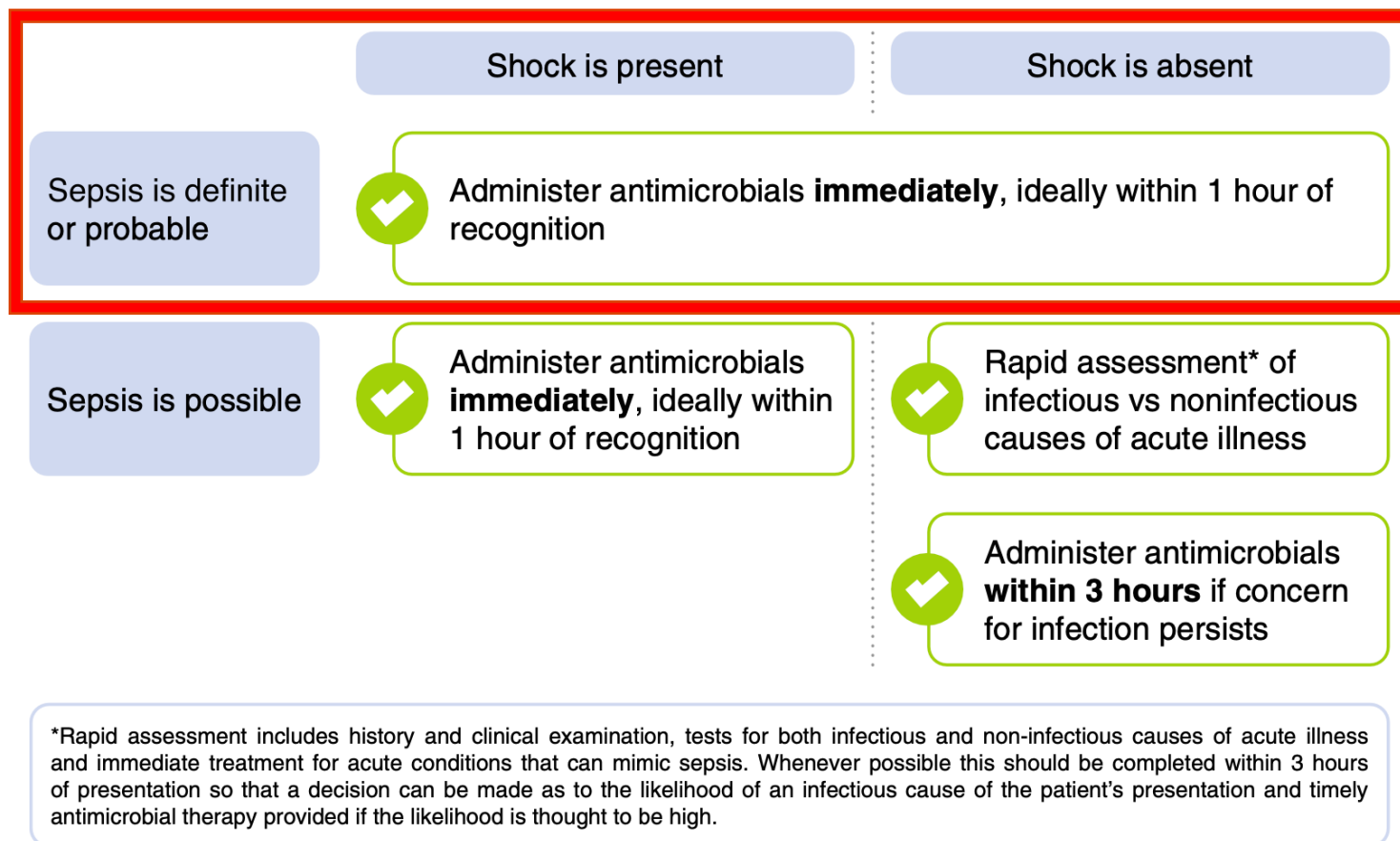
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Renal	Creatinine (mg/dL) / Urine output	<1.2 (0), >5.0 or <500 mL/day (4)

4 Pt

3 Pt

1 Pt

Antibiotic Timing



Antifungal therapy

Recommendations

22. For adults with sepsis or septic shock at high risk of fungal infection, we **suggest** using empiric antifungal therapy over no antifungal therapy

Antiviral therapy

Recommendation

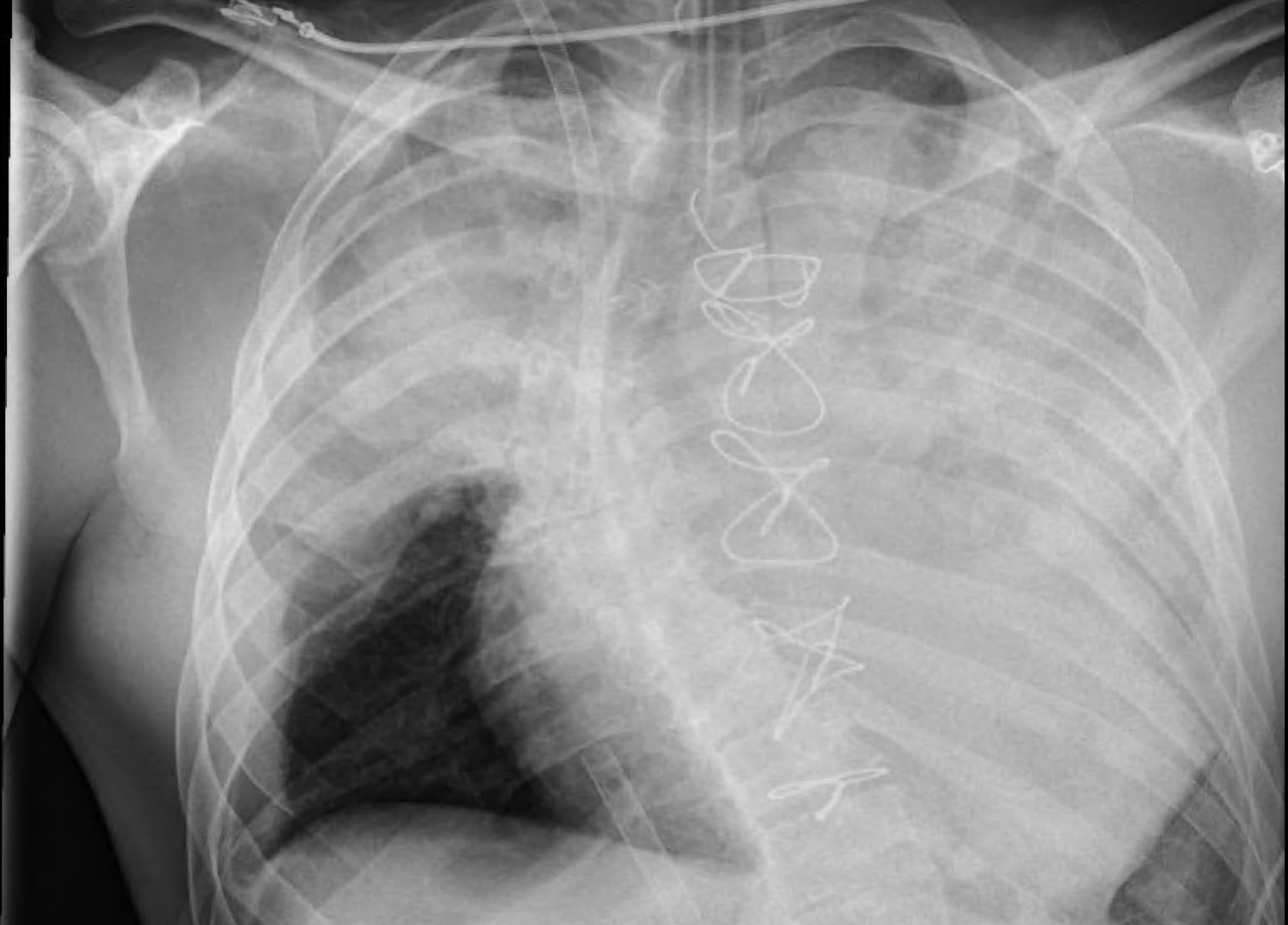
24. We make **no recommendation** on the use of antiviral agents

Fall 2, Hr K.



AB: empir. Zavicefta (Zeftazidim/Avibactam) statt Meropenem/Fosfomycin

Visite (HTG)	28.02.2025 06:00	01.03.2025 06:00	02.03.2025 06:00	03.03.2025 06:00	04.03.2025 06:00	05.03.2025 06:00
⊕ Hämoglobin (BGA) [g/dl]	8,20	8,50	8,70	8,50	8,70	8,30
⊕ Hämatokrit (BGA) [%]	25,6	26,4	27,0	26,4	26,9	25,9
⊕ Kalium (BGA) [mmol/L]	3,7	4,6	4,2	4,1	4,5	4,2
⊕ Natrium (BGA) [mmol/L]	149	154	156	154	151	146
⊕ Calcium ion. (BGA) [mmol/L]	1,16	1,29	1,35	1,33	1,27	1,19
⊕ Chlorid (BGA) [mmol/L]	112	123	128	123	120	112
⊕ Glucose (BGA) [mg/dl]	158	153	133	139	137	116
⊕ Laktat (BGA) [mmol/L]	2,9	1,1	0,8	0,9	0,5	0,5
⊕ CRP [mg/dl]	18,05	14,93	9,55	4,64	4,33	5,02
⊕ Leukozyten [G/L]	8,29	5,24	6,28	6,66	6,04	4,72
⊕ Erythrozyten [T/L]	5,10	2,80	2,80	2,90	2,80	2,80
⊕ Hämoglobin [g/dl]	8,70	7,70	7,90	8,20	8,20	8,10
⊕ Hämatokrit [%]	27,9	24,0	24,2	25,9	24,7	25,1
⊕ MCV [fl]	90,3	87,0	87,4	90,6	89,2	89,0
⊕ MCHC [g/dl]	31,2	32,1	32,6	31,7	33,2	32,3
⊕ Thrombozyten [G/L]	143	177	179	204	142	105
⊕ TPZ [%]	65	58	63	68	70	68
⊕ INR	1,3	1,3	1,3	1,2	1,2	1,2
⊕ PTT [sec]	48,3	48,9	47,7	41,4	43,3	44,4
⊕ Anti Xa LMW-Heparin [IU/ml]	0,3	0,5	0,6	0,4	0,3	0,5
⊕ Thrombinzeit [sec]						
⊕ Fibrinogen [mg/dl]	576	471	419	350	409	418



Mikrobiologie

Untersuchungsmaterial:

Lokalisation:

Blut

peripher

Klinische Angaben:

Sepsis

Angeforderte Untersuchung:

Kultur

Durchgeführte Untersuchung:

Kultur

Ergebnis:

Kulturergebnis : #

Kein Wachstum

Mikrobiologie

Untersuchungsmaterial:	Blut
Lokalisation:	zentral
Angeforderte Untersuchung:	Kultur
Durchgeführte Untersuchung:	Kultur

Ergebnis:

Kulturergebnis : #

Kein Wachstum

Untersuchungsmaterial:
Lokalisation:

BAL-Flüssigkeit
rechts

Angeforderte Untersuchung:
Durchgeführte Untersuchung:

Bakterienkultur; Pilzkultur
Bakterienkultur; Pilzkultur

Ergebnis:

Gramfärbung #:
(+) Epithelzellen
(+) Flimmerepithelzellen
(+) Granulozyten
Mengenangabe: + bis ++++

Kalilauge : #

negativ

Kulturergebnis : #

1. **Kein Wachstum von Bakterien**
2. **Candida albicans**

vereinzelt

Untersuchungsmaterial:

EDTA-Blut

Angeforderte Untersuchung:

Multiplex PCR - häufigste bakterielle Sepsis-Erreger; Multiplex PCR - Candidämie-Erreger

Durchgeführte Untersuchung:

Multiplex PCR - häufigste bakterielle Sepsis-Erreger; Multiplex PCR - Candidämie-Erreger

Ergebnis:

Multiplex PCR - häufigste bakterielle Sepsis-Erreger

Enterococcus faecium #

nachgewiesen

Staphylococcus aureus #

nicht nachgewiesen

Klebsiella pneumoniae #

nicht nachgewiesen

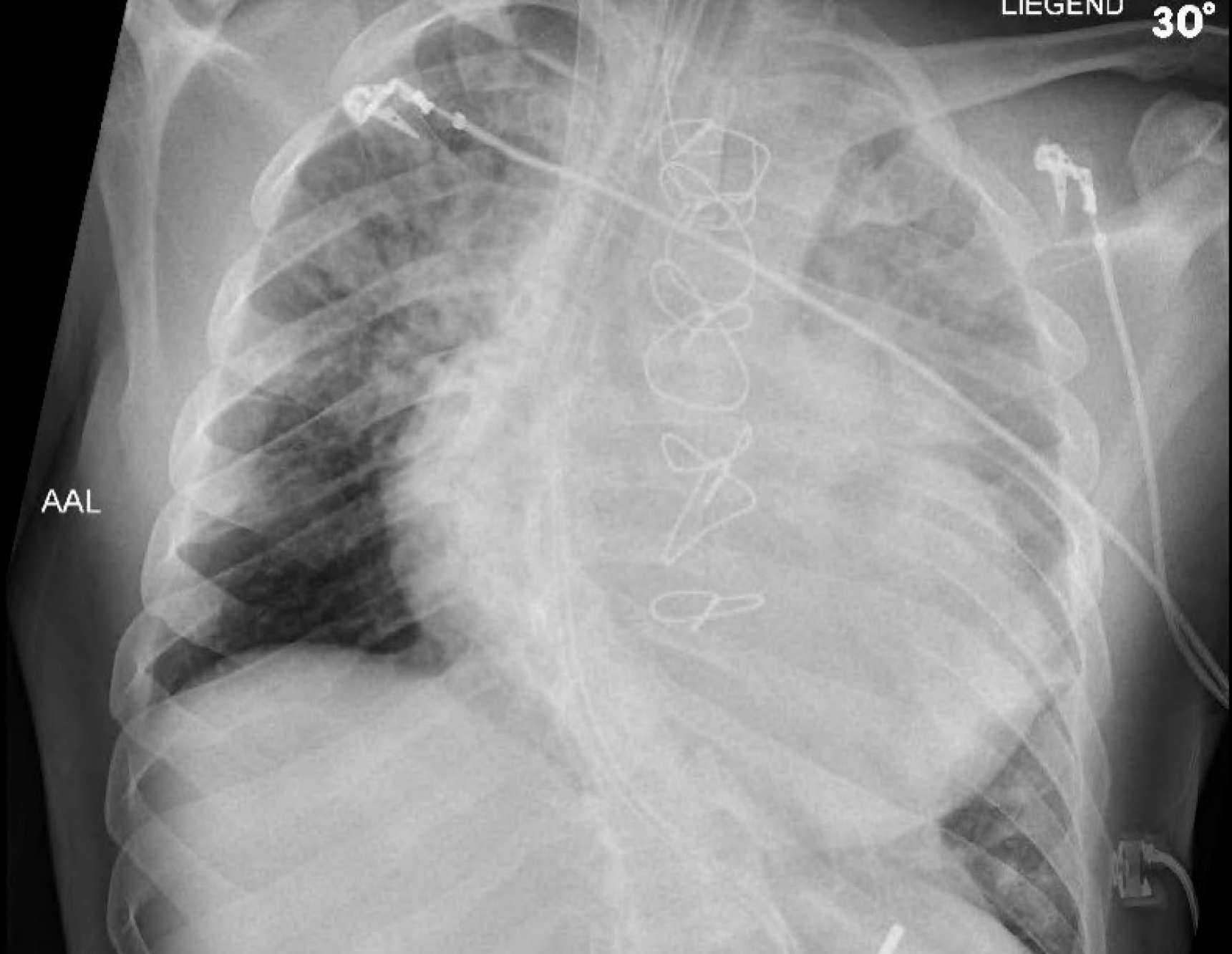
Pseudomonas aeruginosa #

nicht nachgewiesen

Escherichia coli #

nicht nachgewiesen

Ergebnis:





Fall 2, Hr K.



AB nach 14d beendet



Extubation an der VV ECMO



Fall 2, Hr K.



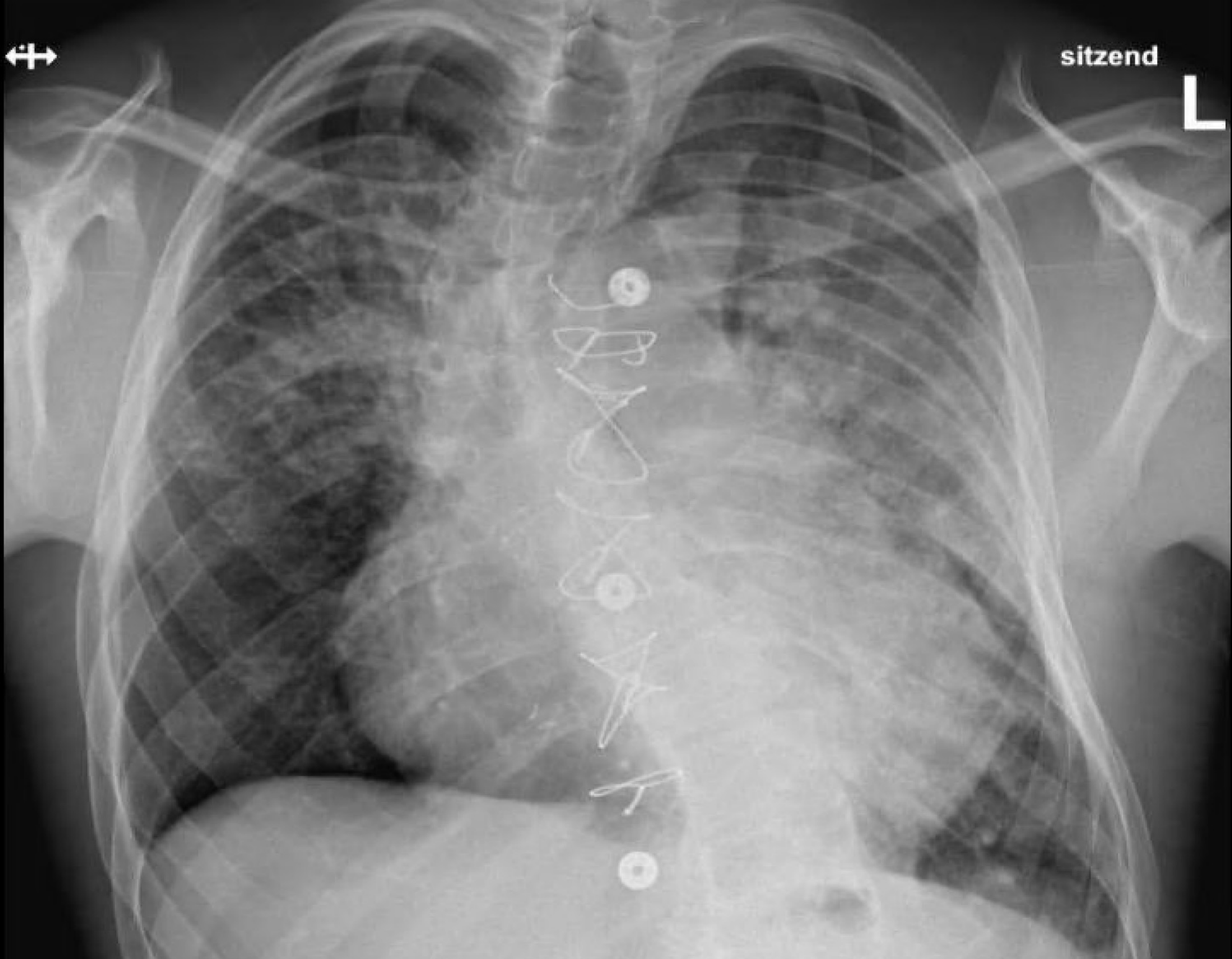
ECMO Explantation



Entlassung von der IBST nach 37 Tagen



Entlassung aus dem KH nach 65 Tagen



Sepsis: Mortalität 10%



Infektion -> SOFA $\geq$ 2 Punkte



Fall 1: Auslöser bekannt

Septischer Schock: Mortalität 30%



Sepsis + Vasopressoren + Lac $>$ 2mmol/l



Fall 2: Auslöser unbekannt

Perner A, Gordon AC, De Backer D, Dimopoulos G, Russell JA, Lipman J, Jensen JU, Myburgh J, Singer M, Bellomo R, Walsh T. Sepsis: frontiers in diagnosis, resuscitation and antibiotic therapy. Intensive Care Med. 2016 Dec;42(12):1958-1969.

Vielen Dank für die Aufmerksamkeit

Fragen?