Sepsis 2026

The First Hour, the Next 72, and the Rest of Their Life

Following one patient from hour 3 to year 5

Dhruvangkumar Modi, MD

Pulmonary and Critical Care Medicine



Disclosure

Consultant

Cytovale, Inc.

Cytovale makes IntelliSep, a rapid sepsis test.

- No product is recommended
- The views are my own

Meet Robert, 68

- Retired electrician. Wife: Linda
- Diabetes, COPD, stage 3 kidney disease
- 3 days of cough and fever
- Arrives 9:40 PM, confused and short of breath
- Temp 102 °F, RR 30, SpO_2 88%, BP 86/50
- Lactate 4.6 back in 22 minutes
- Antibiotics at 41 min. 30 mL/kg in by 11:40 PM

1:00 AM

BP 94/56 on norepinephrine

Bundle complete. SEP-1 met.

Still in the ED, waiting for an ICU bed.

Robert is a composite case based on many patients.

Sepsis is common, and more people survive

48.9M

sepsis cases worldwide (2017)

11M

deaths: 1 in 5 of all deaths worldwide

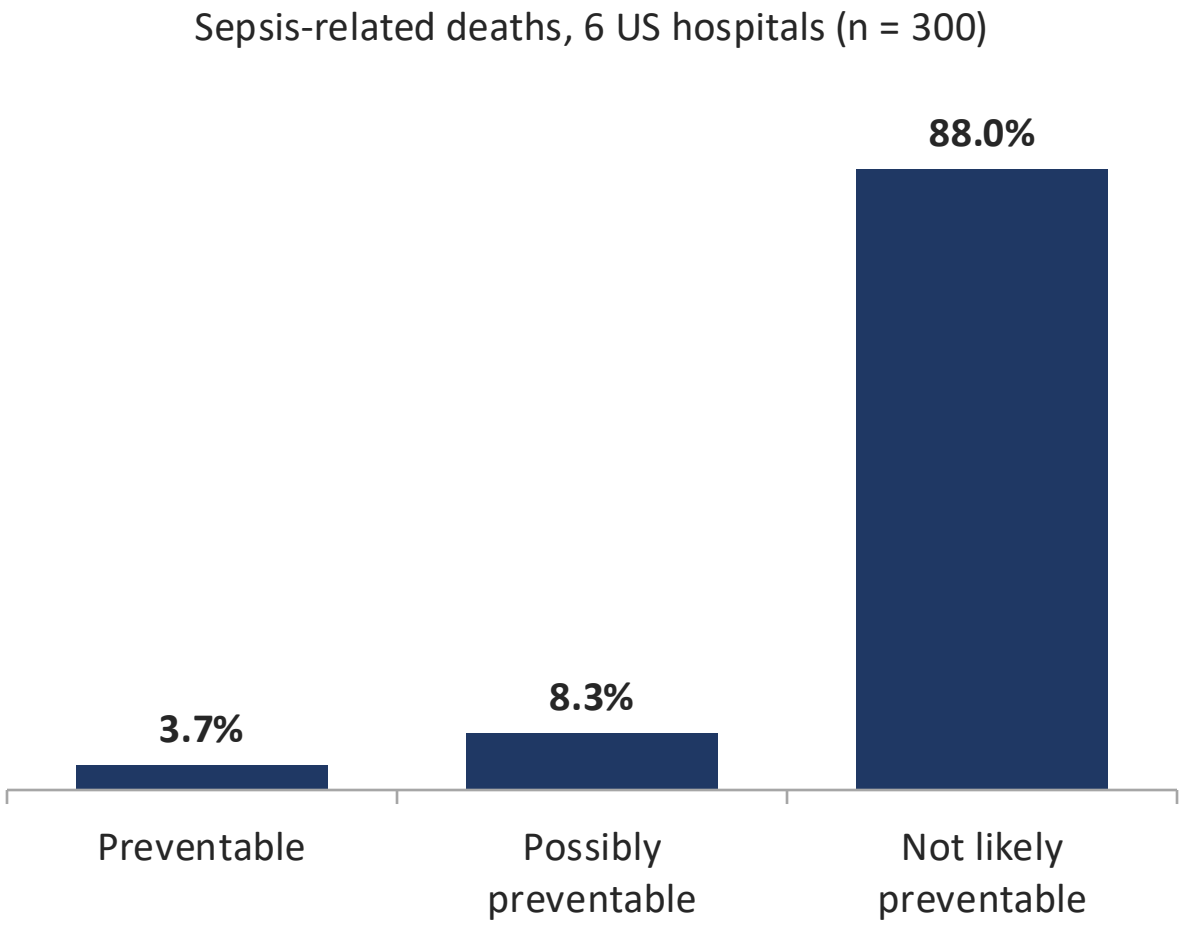
1.7M

US adults in the hospital each year

- Age-standardized sepsis mortality rate fell **53%** (1990–2017)
- About **14 million** survivors a year, many with lasting problems
- Life after discharge is now the biggest gap

Rudd KE et al. Lancet 2020 · CDC Hospital Sepsis Program Core Elements 2025

Most sepsis deaths were not preventable

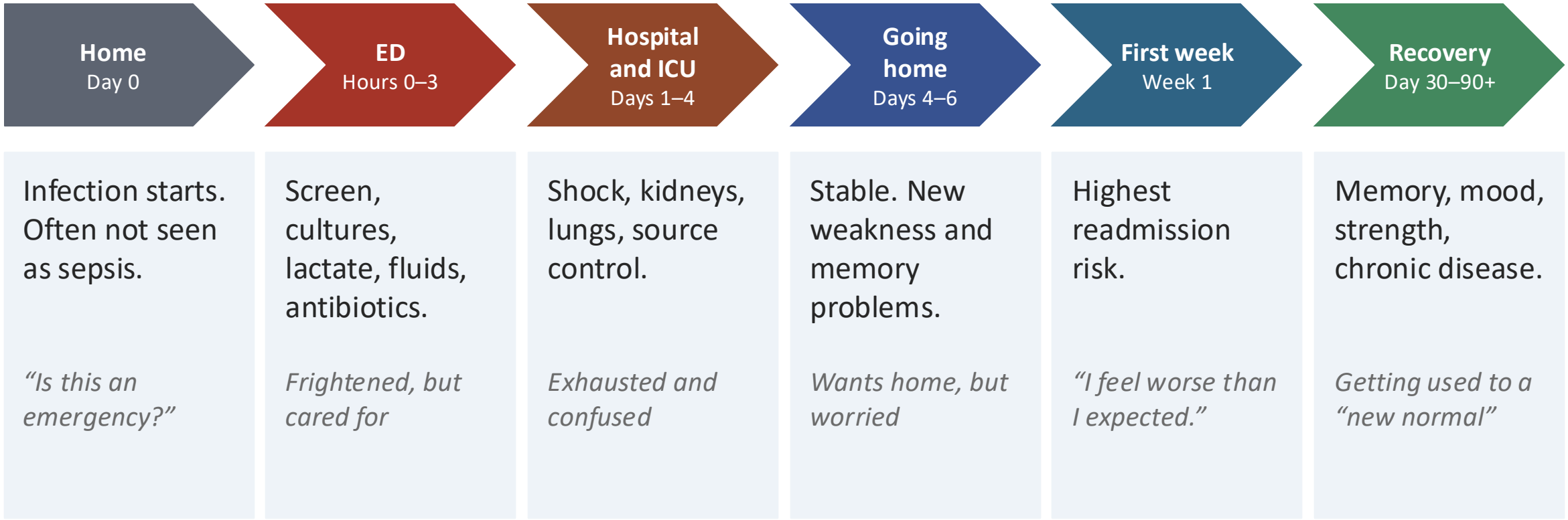


What the reviewers found

- Sepsis present in **53%** of hospital deaths
- Care problems in **23%**, mostly late antibiotics
- Only **3.7%** clearly preventable
- **40%** hospice-eligible on arrival

Rhee C et al. JAMA Netw Open 2019

Robert's journey



Most training covers spotting sepsis and the first hour. Today: everything after.

Journey framework: the speaker's sepsis care model. Readmission timing: Gadre SK et al. Chest 2019.

Part 1

Hours 3 to 6

Robert is still in the ED. The bundle is done.
The big decisions are not.

Shock · ICU triage · fluid · steroids · POCUS: heart and lungs · the source



Septic shock: check perfusion, not just BP

Septic shock (Sepsis-3)

- Pressor to keep MAP ≥ 65
- Lactate > 2
- After adequate fluid

42%

hospital mortality (28,150 patients)

Check at hour 6	What it shows
Urine output	Low urine: OR 10.8 for death
Skin	Mottling 4–5: OR 74 for death
Capillary refill	As good a target as lactate
Mental status	New confusion = poor perfusion

At 6 hours, MAP, CVP and cardiac index did not predict death. Urine, lactate and skin did.

Singer M; Shankar-Hari M. JAMA 2016 · Ait-Oufella H. Intensive Care Med 2011 · Hernández G. JAMA 2019

Lactate: follow the trend

44.5%

mortality with lactate > 4 and low BP (29% with neither)

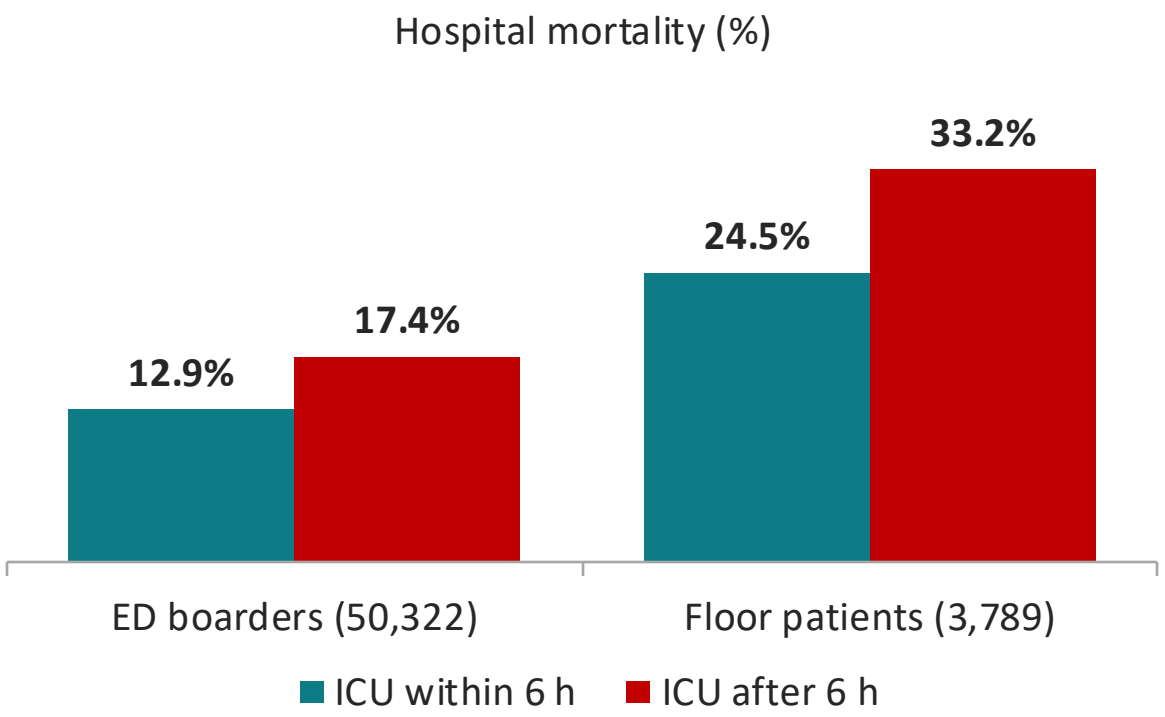
- **Above 4:** high-risk signal; reassess ICU need even if BP is normal
- **Falling:** supports response to treatment
- **Not falling:** check heart, source, belly, bleeding
- **Other causes:** epinephrine, albuterol, liver disease, metformin

Jansen trial protocol: ≥20% fall every 2 h; adjusted mortality HR 0.61.

Do not chase a normal number with fluid.

Casserly B. Crit Care Med 2015 · Mikkelsen ME. Crit Care Med 2009 · Jansen TC. AJRCCM 2010 · Jones AE. JAMA 2010

Who goes to the ICU, and how fast?



Move up if:

- Any vasopressor
- Lactate ≥ 4 or not falling
- Rising oxygen needs
- New confusion or airway risk
- 2 or more failing organs

SSC 2026: ICU within 6 h if ICU care is required. Observational septic shock data: ≤3 h associated with lower mortality (OR 0.48).

SSC 2026 · Nates JL. Crit Care Med 2016 · Chalfin DB. Crit Care Med 2007 · Churpek MM. J Hosp Med 2016 · Cha JH. Acute Crit Care 2025

Use a dynamic test before more fluid

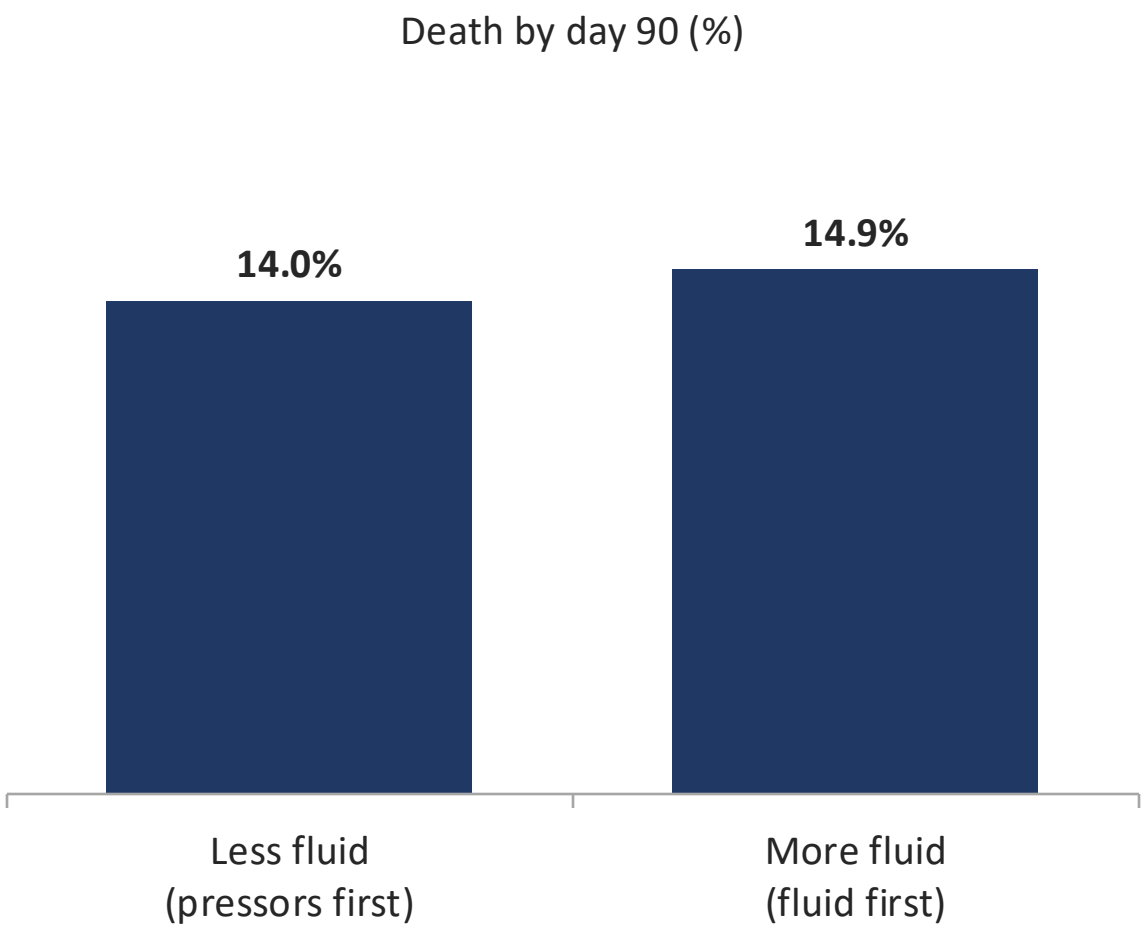
Not enough on its own	Use a dynamic test
CVP (AUROC 0.56)	Passive leg raise with stroke volume (AUROC 0.95)
One IVC size	Stroke volume or pulse pressure variation
One BP reading	Response to a small fluid challenge
“The lungs sound clear”	Echo: LVOT VTI before and after leg raise

Only about **half** of patients respond to fluid at any moment.

FRESH trial: leg-raise-guided care gave 1.4 L less fluid, less dialysis (5% vs 18%) and less ventilation (18% vs 34%).

Douglas IS. Chest 2020 · Marik PE. Chest 2008 · Monnet X. Intensive Care Med 2016 · Hernández G. JAMA 2019

CLOVERS: less fluid vs more fluid



- **1,563** patients, 60 US centers
- Restrictive arm: **2.1 L less** fluid, earlier pressors
- Death **14.0% vs 14.9%** (P = 0.61)
- Serious side effects were similar

One fluid plan does not fit everyone.

Treat the patient in front of you.

Shapiro NI et al. N Engl J Med 2023 (CLOVERS)

Steroids when pressors keep climbing

When to start

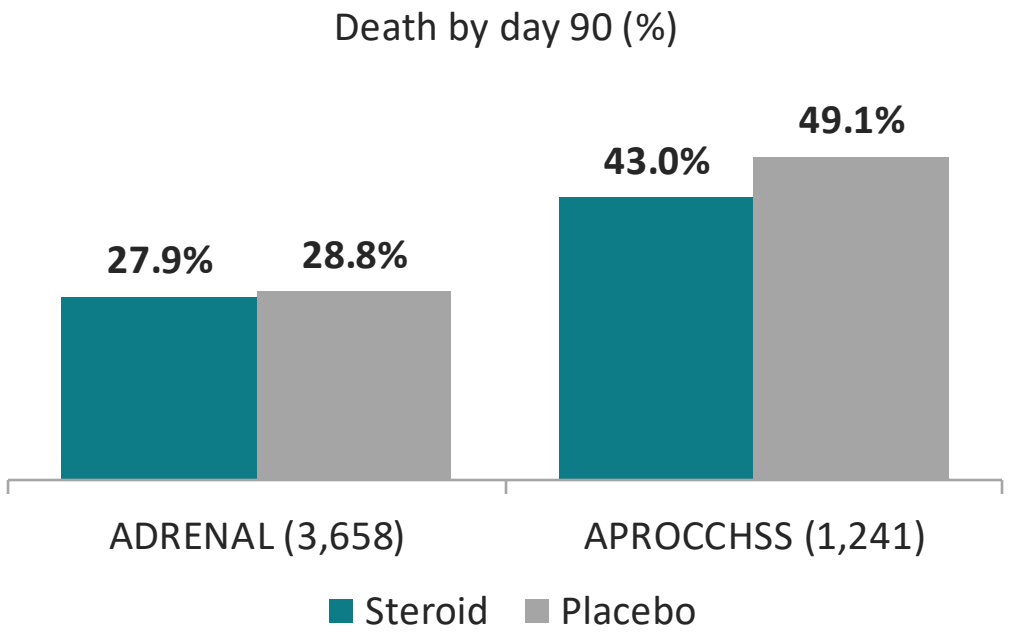
Septic shock still on norepinephrine or epinephrine ≥ 0.25 µg/kg/min for ≥ 4 h. Earlier (within ~12 h of pressors) looks better.

Dose

Hydrocortisone 200 mg/day: 50 mg IV every 6 h or a 24-h infusion. Consider fludrocortisone 50 µg daily by mouth or tube.

How long

Trials gave 7 days and stopped without a taper. Avoid more than 400 mg/day.



Shock resolves faster (3 vs 4 days).

Expect higher glucose.

SSC 2021 (Evans L) and SSC 2026 · Chaudhuri D. Crit Care Med 2024 · Venkatesh B; Annane D. NEJM 2018 · Teja B. AJRCCM 2024 · Zhang L. Anesth Analg 2023

POCUS views: heart and lungs

Heart view	Best for
Parasternal long	LV squeeze, chamber size, effusion
Parasternal short	LV squeeze all around; flat septum
Apical 4-chamber	RV vs LV size; LVOT VTI (apical 5)
Subcostal	Effusion, RV; often best when ventilated
IVC	Size and change with breathing (limited)

Lungs: 3 points each side

- Upper and lower BLUE points (front)
- PLAPS point (low, side and back)

What to look for

- **Sliding:** absent? Think pneumothorax
- **A-lines:** normal, dry lung
- **B-lines:** fluid in lung tissue
- **Consolidation or effusion**

Lichtenstein DA, Mezière GA. Chest 2008 (BLUE protocol) · Volpicelli G et al. Intensive Care Med 2012

Bedside ultrasound: 5 questions

Question	Where to look	What it tells you
1. Is the heart squeezing?	PLAX, PSAX, apical 4	Strong and weak hearts need opposite plans
2. Is the right heart failing?	Apical 4: RV size, septum	Big RV, flat septum: fluid will hurt
3. Will fluid help?	LVOT VTI with leg raise	Rise of 10–15%: fluid likely helps
4. Can the lungs take it?	Front and side of chest	New B-lines: stop fluid
5. Where is the infection?	Kidney, gallbladder, belly, chest	Find a source to drain, before CT

Polyzogopoulou E et al. Medicina (Kaunas) 2023

Cardiac POCUS: what kind of LV?

Hyperdynamic

- EF > 70%, small cavity
- Walls almost touch
- Think: low volume or relaxed vessels
- **Do:** fluid test, pressor
- Linked with higher mortality

Normal

- EF about 55–70%
- Normal size
- Look elsewhere: vessels, volume, RV, source

Weak LV

- EF < 50% (severe < 30%)
- EPSS > 7 mm
- **Do:** stop fluid; dobutamine if still poorly perfused
- Often recovers in 7–10 days

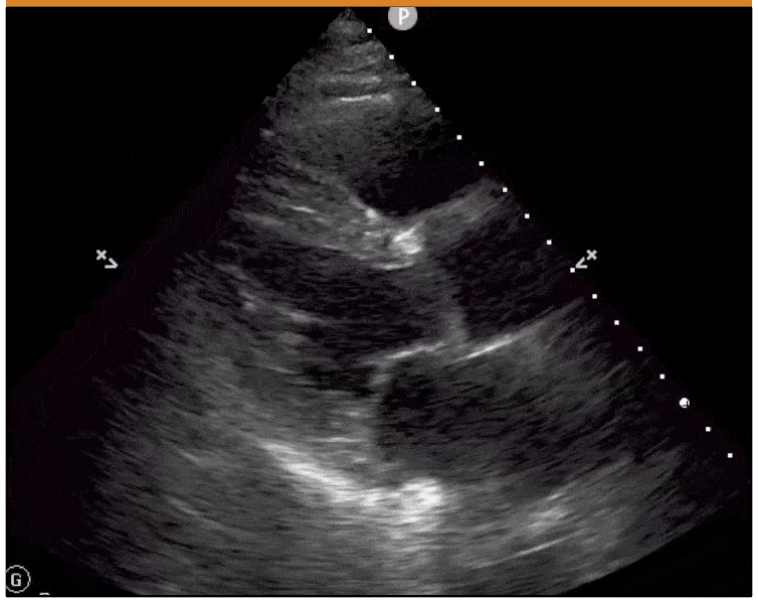
LVOT obstruction

- Small, hyper-squeezing LV
- Fast, turbulent LVOT flow
- **Do:** give fluid; cut inotropes
- 22% of septic shock; higher mortality

Paonessa JR. Crit Care 2015 · McKaigney CJ. Am J Emerg Med 2014 · Parker MM. Ann Intern Med 1984 · Chauvet JL. Crit Care 2015 · Geri G. Intensive Care Med 2019

LV function: what the squeeze looks like

Hyperdynamic



Walls nearly touch.

Dry or vasodilated: fluid test, pressor.

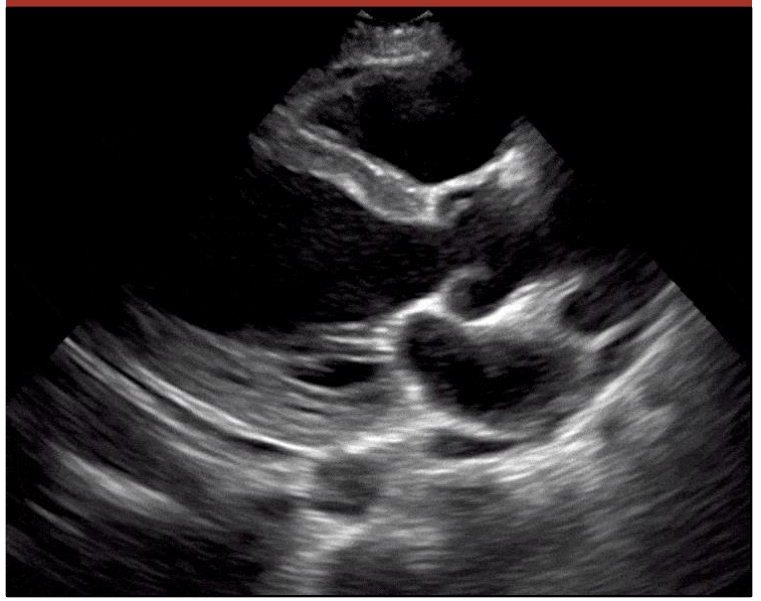
Normal



Strong, even squeeze.

Heart is OK. Look elsewhere.

Severely reduced

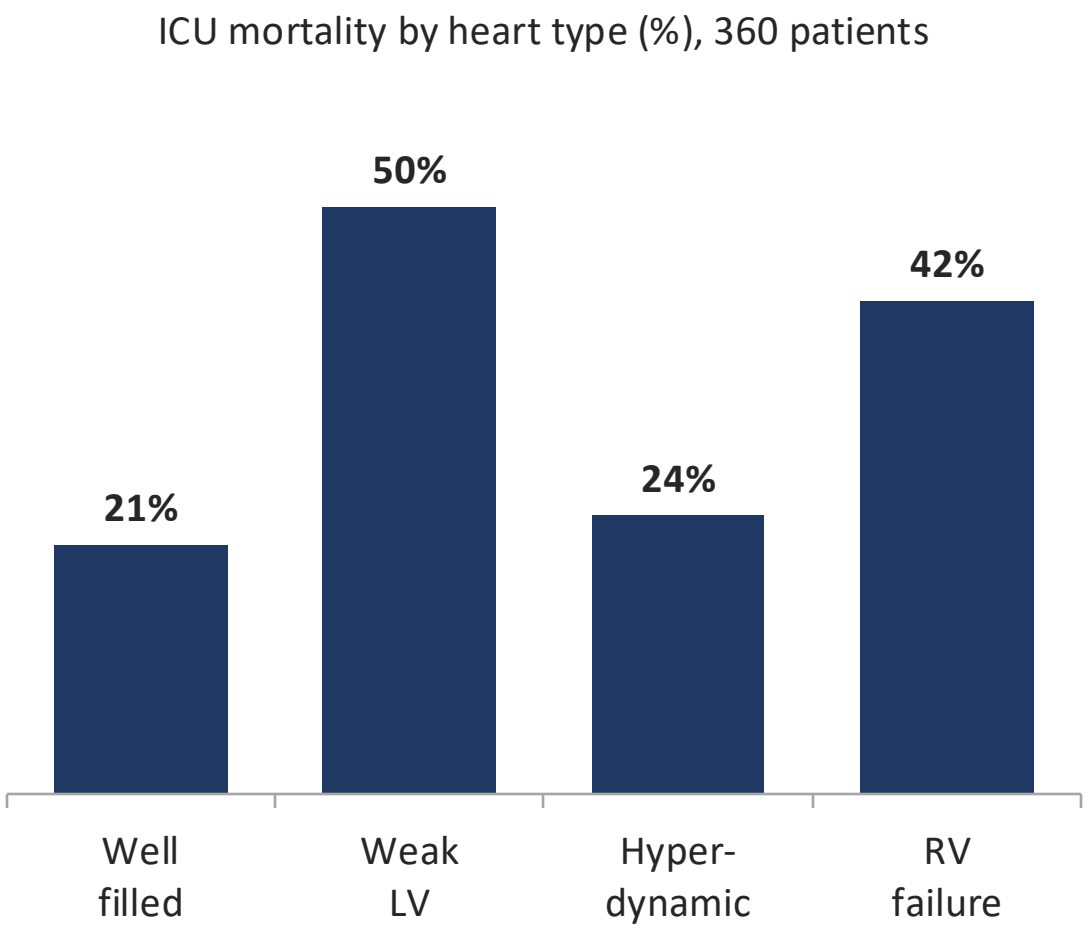


Big LV, barely moves.

Stop fluid. Think dobutamine.

Loops: speaker's own images · Paonessa JR. Crit Care 2015 · Parker MM. Ann Intern Med 1984 · McKaigney CJ. Am J Emerg Med 2014

Same BP, different hearts



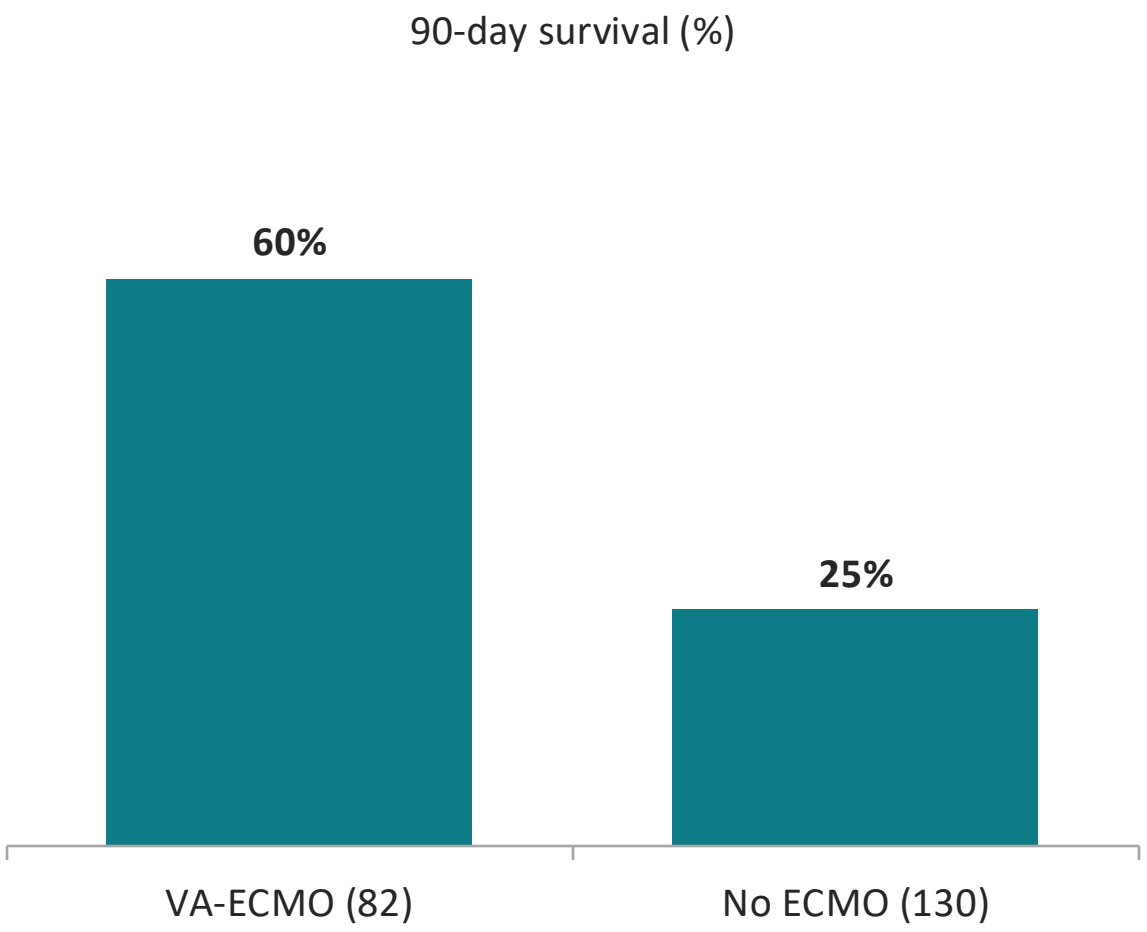
Heart type	What to do
Well filled	Stop fluid
Weak LV	Inotrope; consider ECMO early
Hyperdynamic	Pressor. Heart pumps plenty.
RV failure	Less fluid; check PEEP

Strong squeeze? Do a leg-raise test first.

Positive: give fluid. Negative: pressor.

Geri G et al. Intensive Care Med 2019 · Paonessa JR et al. Crit Care 2015

Septic shock with a weak heart: ECMO



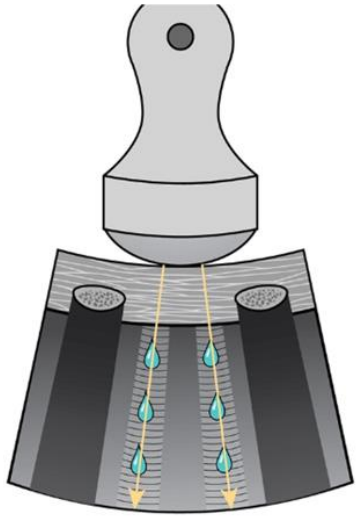
- **Helped:** very weak heart (LVEF ≤ 35%, mean 17%) plus severe shock
- After adjustment: **51% vs 14%** survival
- LVEF above 35%: survival only **32%**
- ECMO fixes a failing pump, not relaxed vessels

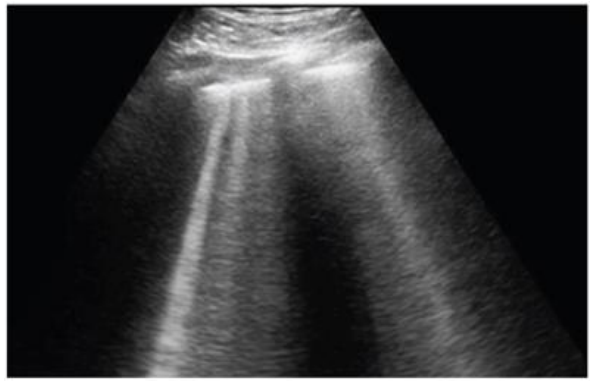
Look-back data from expert centers.

Call your ECMO center early.

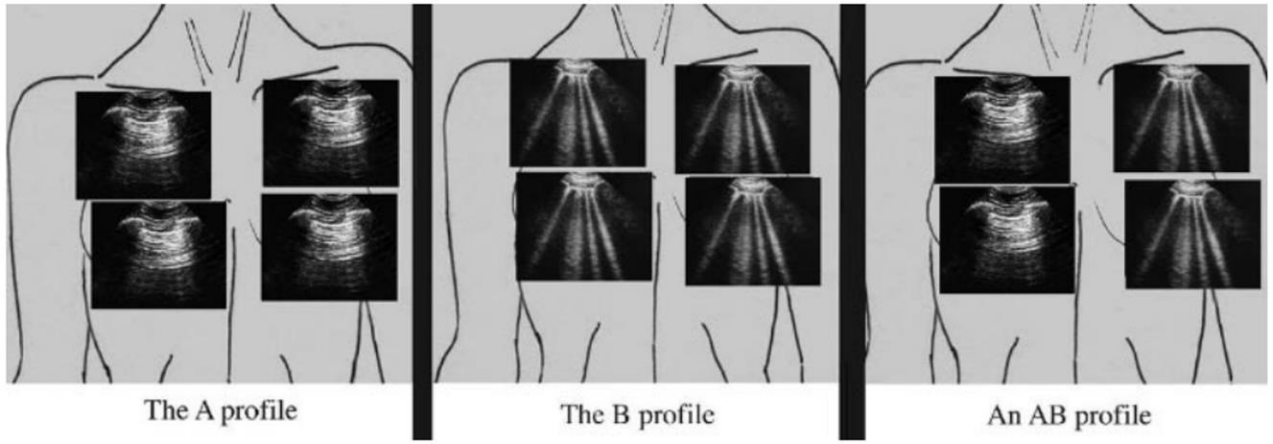
Bréchot N et al. Lancet 2020 · Ling RR et al. Crit Care 2021

Lung ultrasound: B-lines





- Vertical line from pleura to screen bottom
- Moves with sliding; erases A-lines
- 3 or more in one space = positive
- Many, on both sides = lung water



A profile

A-lines, sliding: dry lung (COPD, asthma, PE)

B profile

B-lines both sides: pulmonary edema

A/B profile

B-lines one side: pneumonia

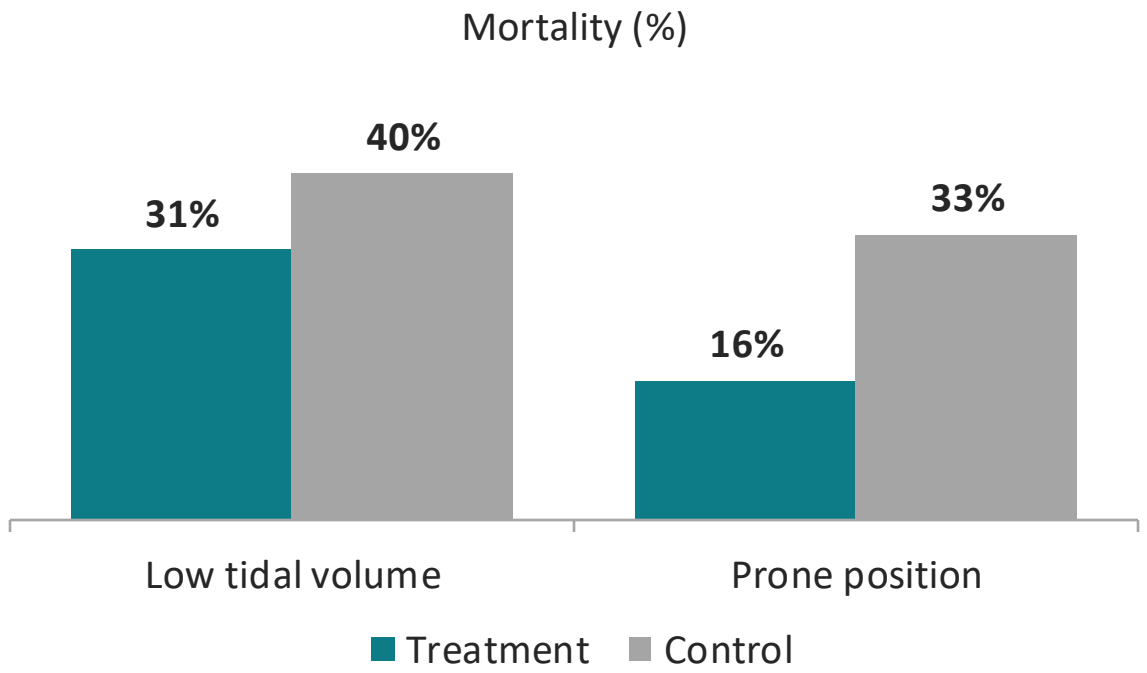
During fluids: new B-lines = stop the fluid.

Lichtenstein DA, Mezière GA. Chest 2008 (BLUE protocol) · Volpicelli G et al. Intensive Care Med 2012 · Images: speaker's slides

ARDS in septic shock

2024 global definition

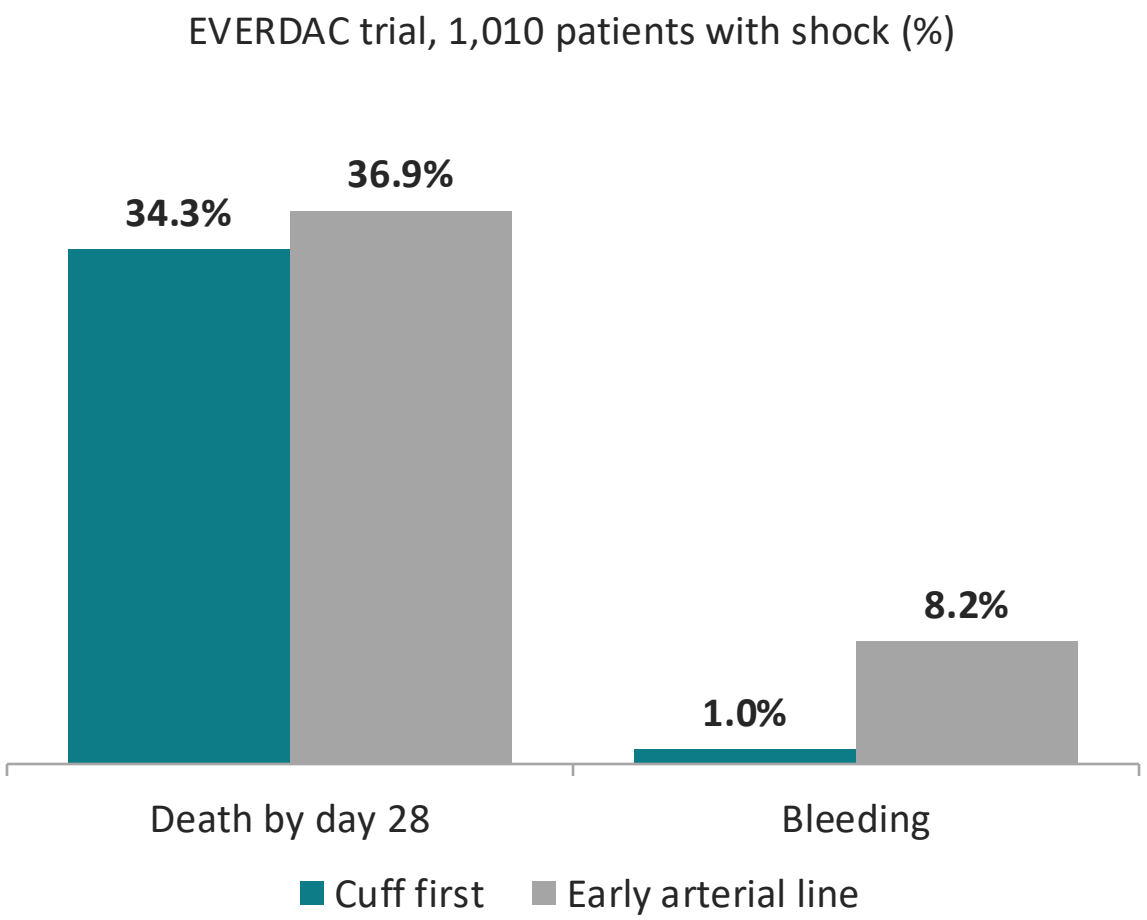
- Within 1 week of a risk (pneumonia, sepsis)
- $SpO_2/FiO_2 \leq 315$ counts. No blood gas needed
- High-flow ≥ 30 L/min counts
- Opacities on X-ray, CT or ultrasound



Treat: 6 mL/kg · plateau ≤ 30 · prone early if P/F < 150 · less fluid after shock

Matthay MA. AJRCCM 2024 · ARDSNet. NEJM 2000 · Guérin C. NEJM 2013 · Wiedemann HP. NEJM 2006

The arterial line can usually wait



What the trial showed

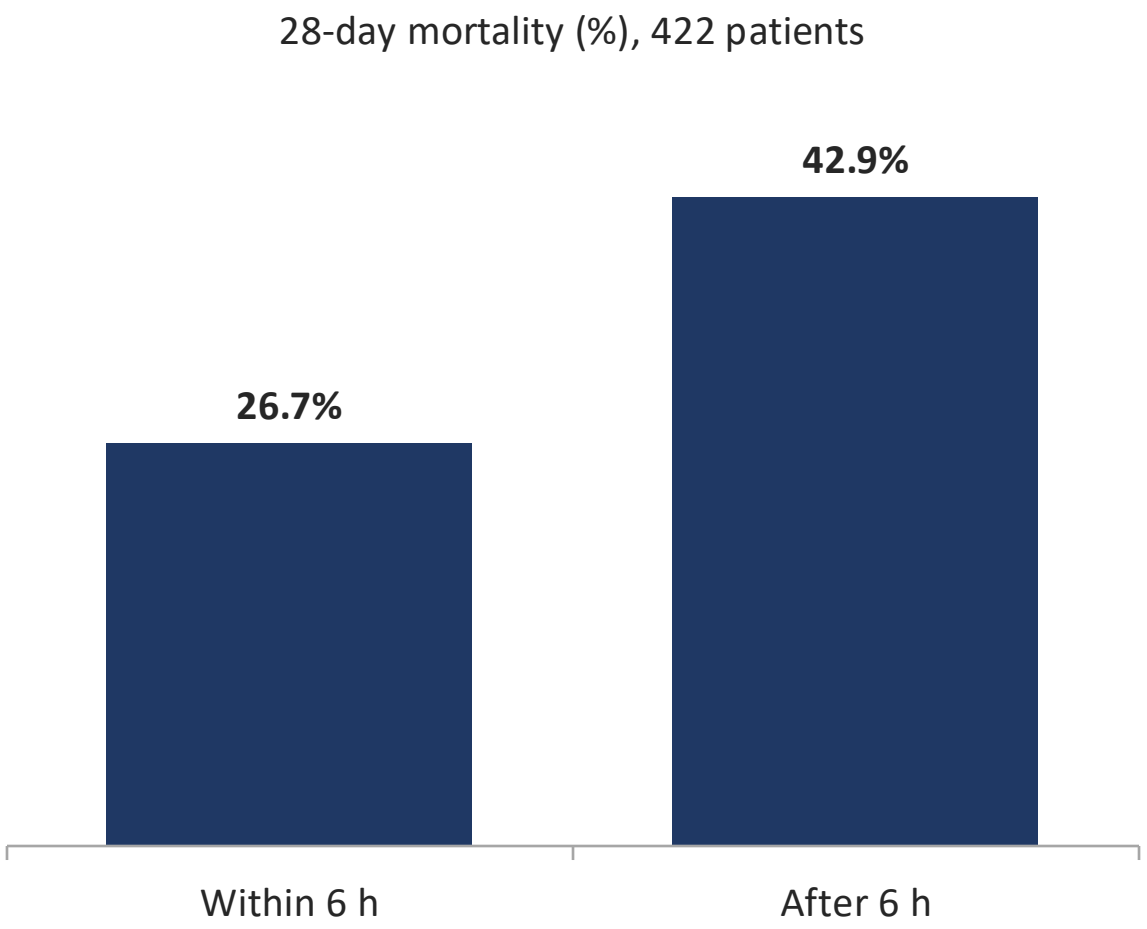
- Same 28-day survival with cuff first
- Only 15% later needed a line
- Bleeding 1% vs 8%

Still place a line for:

- Rising pressors or an unreliable cuff
- Frequent blood gases
- ECMO or mechanical support

Muller G et al. N Engl J Med 2025 (EVERDAC). The second list is clinical judgment.

Source control: early, ideally within 6 hours



- **4,962 patients:** control ≤6 h was associated with lower 90-day mortality (aOR 0.71)
- Biggest benefit: belly and soft tissue
- Median time 15.4 h. Only **27%** within 6 h

Ultrasound finds the abscess, gallbladder or blocked kidney before CT.

Call surgery or IR when you find it.

SSC 2026 · Bloos F. Crit Care 2014 · Reitz KM. JAMA Surg 2022 · Martínez ML. Crit Care Med 2017

Hours 3 to 6: six steps

1 Define the shock

Pressor plus lactate > 2. Check urine, skin, refill, mental status.

2 Triage by the trend

Lactate ≥ 4 or not falling, any pressor: move up now.

3 Use a dynamic test

Passive leg raise before the next bolus.

4 Let the echo pick the drug

Fluid, pressor, inotrope or ECMO. Steroids if pressors keep rising.

5 Protect the lungs

6 mL/kg, plateau ≤ 30, prone early.

6 Control the source

Within 6 hours. The arterial line can wait.

Part 2

Days 1 to 4

Robert is in the ICU.
The fluid that saved him now has to come off.

Kidneys · dialysis · diuretics · antibiotics · ICU liberation

Injured kidneys: more fluid can harm

OR 2.07

for death when fluid overload was over 10% at the start of dialysis

A 500 mL bolus doubled urine in only 1 in 3 patients.

Resuscitation is over when:

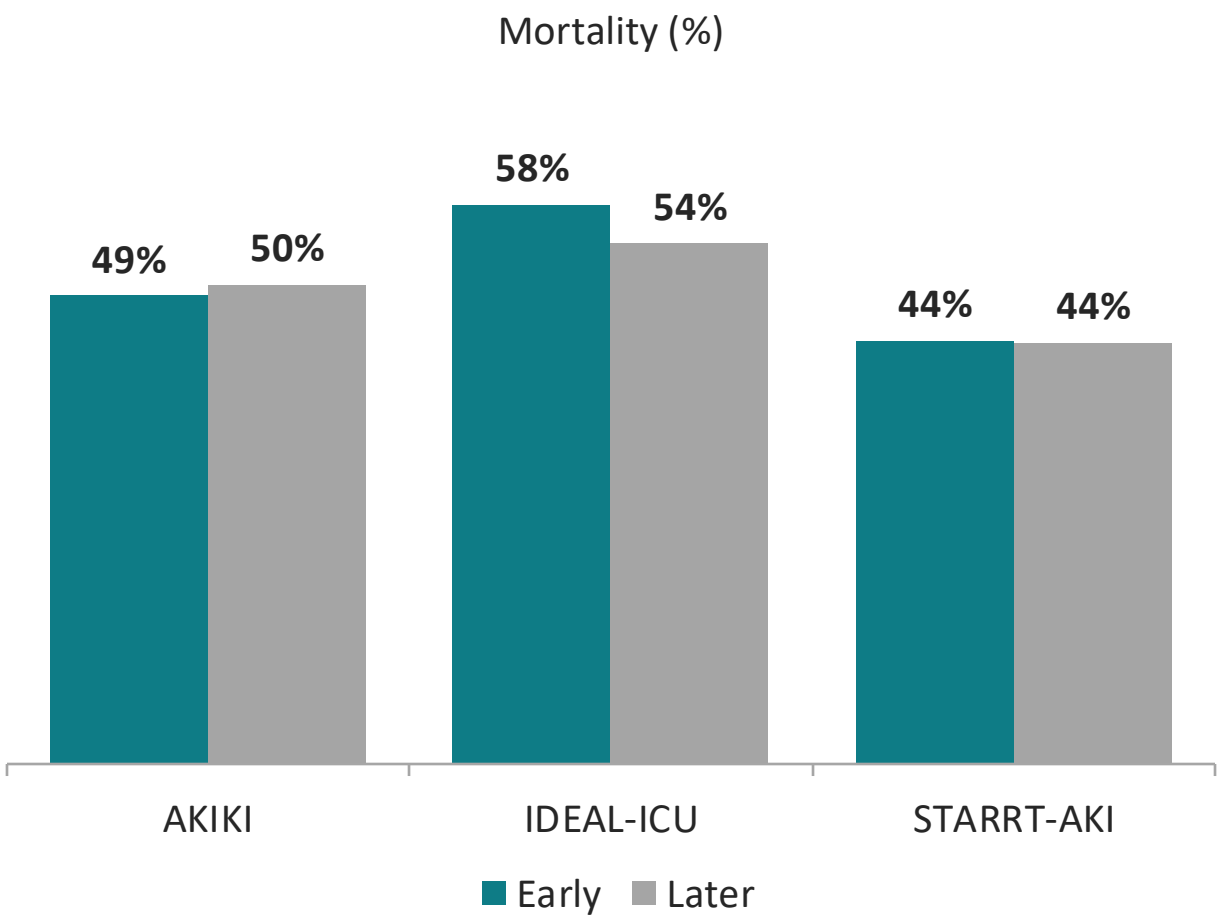
- MAP and perfusion are better
- But urine is still low
- New B-lines or more oxygen needed
- Fluid balance near +10% of body weight

Then:

- Stop maintenance fluid. Count drug fluid
- Avoid kidney toxins. Dose for real kidney function

Inkinen N. Crit Care 2022 · Bouchard J. Kidney Int 2009 · Wiedemann HP. NEJM 2006

Dialysis: early, later, or not at all



- No trial: starting early saved lives
- Waiting: **38–49%** never needed dialysis
- Early start: more dialysis at 90 days (10.4% vs 6.0%)

AKIKI-2:

after severe/persistent AKI criteria were met,

further RRT delay was linked to higher 60-day mortality (HR 1.65).

Gaudry S. NEJM 2016 · Barbar SD. NEJM 2018 · Bagshaw SM. NEJM 2020 · Gaudry S. Lancet 2021

Fluid has 4 phases

R

Resuscitation

Minutes to hours

Give fluid to save life

O

Optimization

Hours

Give only if a dynamic test says yes

S

Stabilization

Days

Keep the balance even. Count drug fluid

E

Evacuation

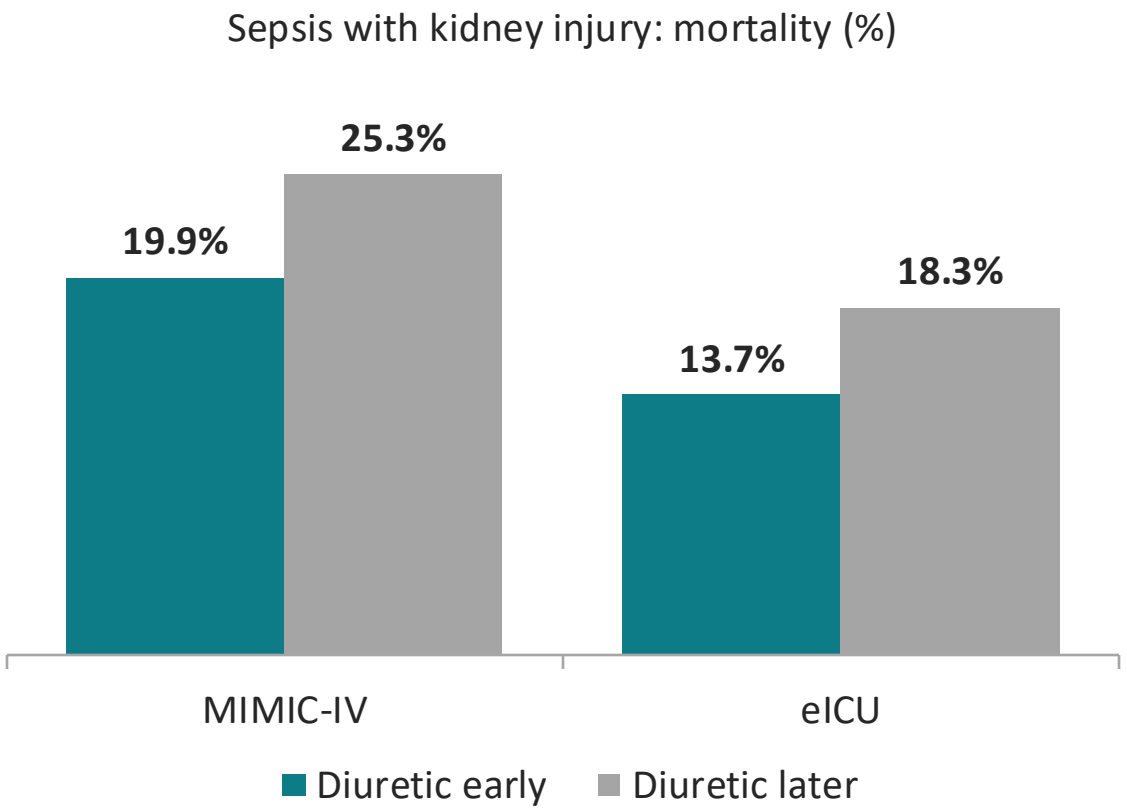
Days

Take fluid off: diuretics, then dialysis

- **Start removal** when pressors are stable or falling and volume is no longer needed
- VASST: the average patient was **+11 L** by day 4. Name the person who takes it off.

Malbrain MLNG et al. Ann Intensive Care 2018 · Boyd JH et al. Crit Care Med 2011

Diuretics: timing matters



Observational data (4,937 patients). Not proof.

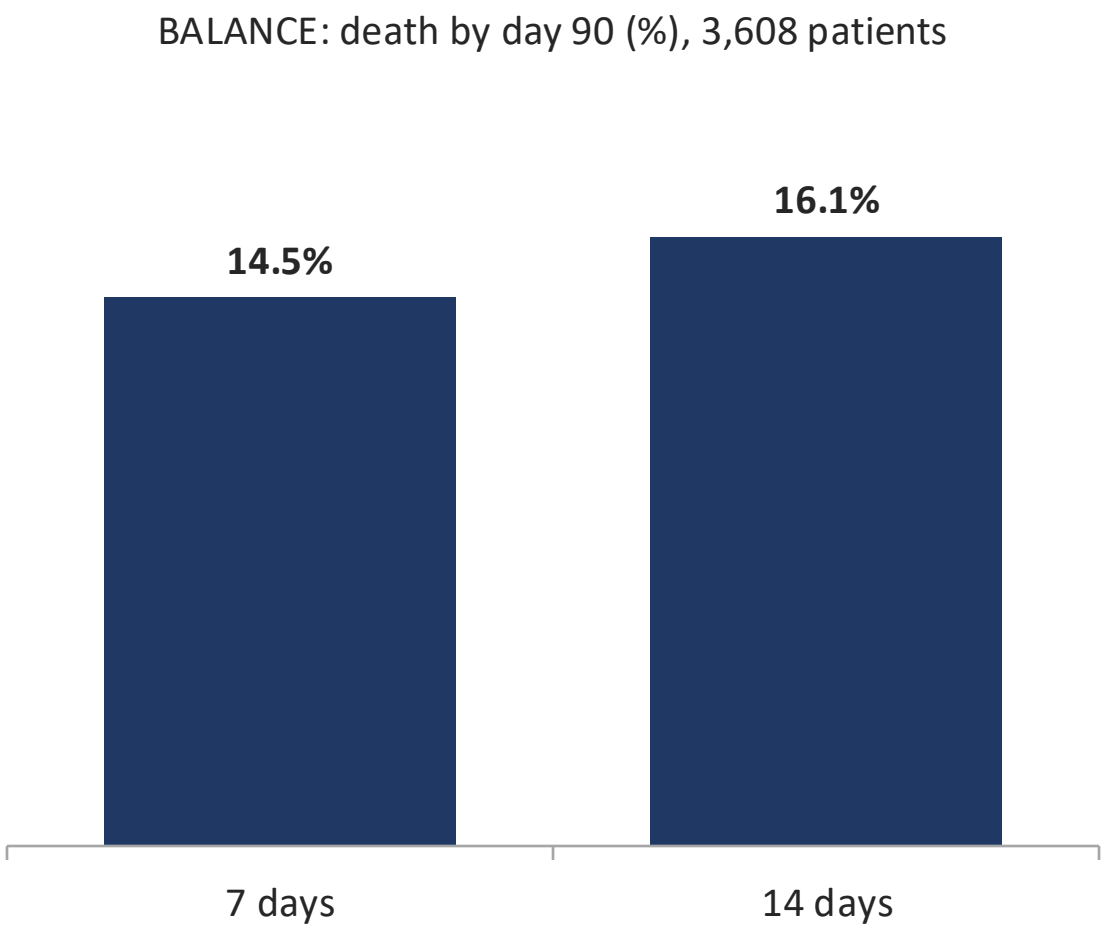
Trial	Result
11 RCTs (2,051)	1.8 more days off ventilator; 1.9 fewer ICU days
FACTT	14.6 vs 12.1 days off ventilator
RADAR-2	Removal possible; no outcome change

Start once shock is over.

Timing is the question.

Shao L. J Intensive Care Med 2026 · Silversides JA. Intensive Care Med 2017, 2022 · Wiedemann HP. NEJM 2006

Antibiotics: narrower, shorter, by mouth



Narrower

De-escalation after cultures: associated with lower hospital mortality (aOR 0.58)

Shorter

BALANCE: 7 d noninferior to 14 d in eligible bloodstream infection. PCT: 5 vs 7 d

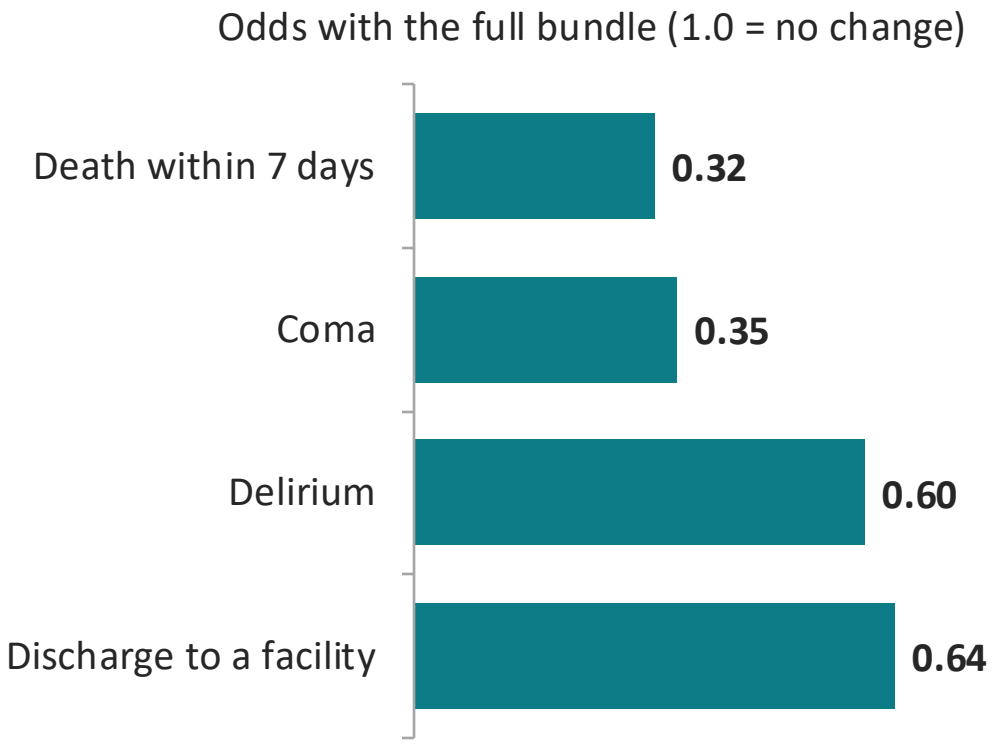
By mouth

Early oral switch in selected gram-negative bacteremia: growing supportive evidence

Daneman N. NEJM 2025 · Garnacho-Montero J. Intensive Care Med 2014 · de Jong E. Lancet Infect Dis 2016 · Rando E. Int J Infect Dis 2025

The ABCDEF bundle is sepsis care

A	Pain
B	Wake-up and breathing trials
C	Choice of sedation
D	Delirium
E	Early mobility
F	Family



15,226 adults in 68 ICUs: each extra part helped. Early PT/OT: 59% vs 35% independent at discharge.

Pun BT et al. Crit Care Med 2019 · Schweickert WD et al. Lancet 2009

Part 3

The family

Day 2. Linda has waited since midnight.
No one has said the word “sepsis” to her.

Prognosis · palliative care · goals in 72 hours · Z51.5



4 in 10 had hospice-eligible illness on arrival

40%

of sepsis deaths had a hospice-eligible condition on admission

- Most often: end-stage cancer, heart disease, dementia, lung disease
- Only **3.7%** of sepsis deaths were preventable
- Most deaths were unlikely to be preventable by better acute care
- Advanced illness was common: discuss prognosis and goals early

Rhee C et al. JAMA Netw Open 2019 · SSC 2026

Prognosis: what families hear

What predicts the course

- The trend: SOFA over 48–72 h (AUROC 0.75)
- Shock and lactate that do not clear
- Health before sepsis: frailty, cancer
- After discharge: needing help with daily tasks (OR 2.8), cancer (OR 3.7)

53%

of doctor–family pairs differed by 20+ points on the chance of survival

Families' reasons for hope: staying hopeful helps the patient, strengths we don't see, faith

Best case, worst case, most likely. Ranges, not points. Consider a time-limited trial when uncertainty remains.

Raith EP. JAMA 2017 · Shankar-Hari M. JAMA Netw Open 2019 · Courtright KR. JAMA Netw Open 2020 · White DB. JAMA 2016

Palliative care skills for every clinician

1 Give a range

"Days to weeks," not one number

2 Ask before you tell

"What is your understanding of how things are going?"

3 Ask what matters

"What would she say if she could hear us?"

4 Make a recommendation

"Based on what you told me, I RECOMMEND..."

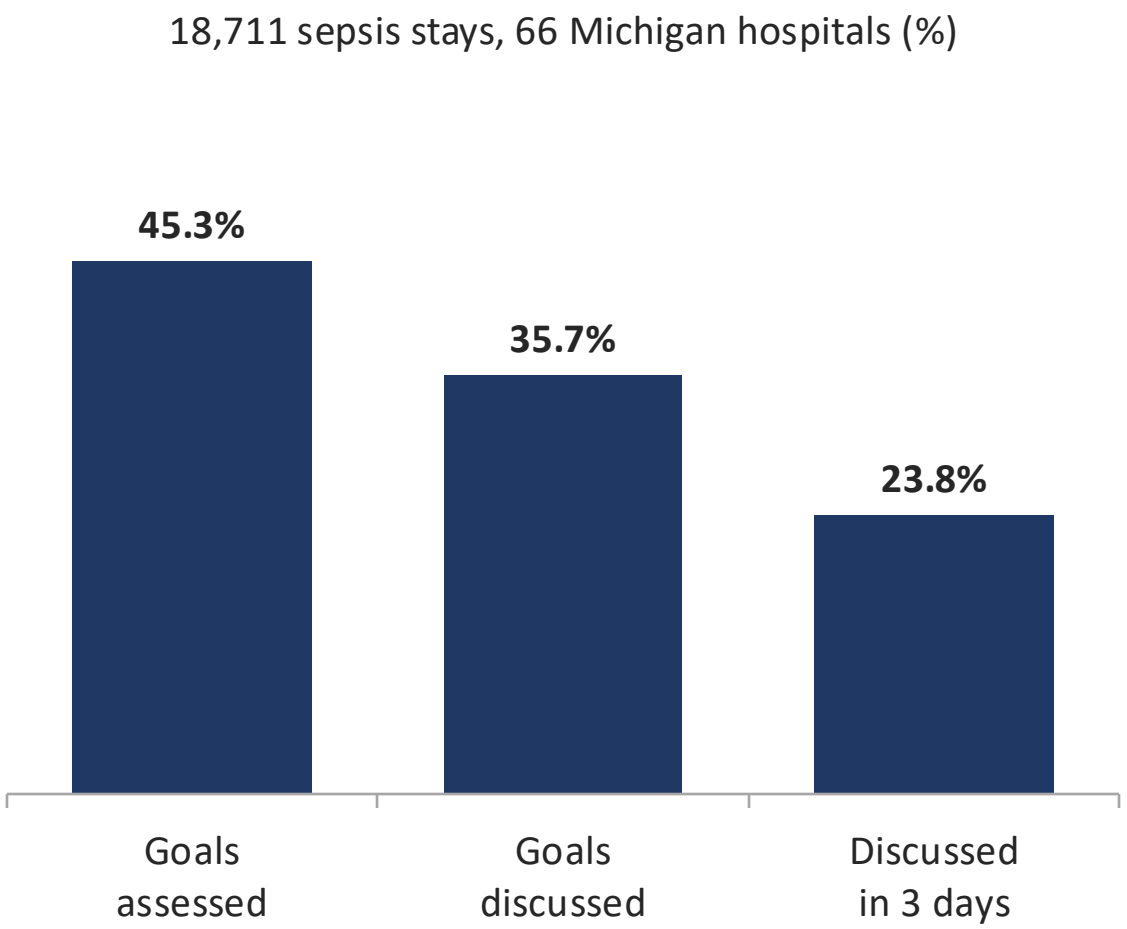
5 Treat symptoms now

Breathlessness, pain, thirst, fear

6 Say it plainly

"I am worried she is dying."

Early palliative care: what is new



Late costs more

Consults after day 4: more procedures, longer stays, higher cost

Default consults

Nearly 3 times more consults (43.9% vs 16.6%); same length of stay

Specialists are not enough

Palliative-led family meetings did not reduce family distress

Cagino LM. Ann Am Thorac Soc 2025 · Manfredi RA. Am J Emerg Med 2021 · Courtright KR. JAMA 2024 · Carson SS. JAMA 2016

Talk about goals within 72 hours

1 in 4

sepsis patients have a goals talk within 3 days

Evidence

- Family meeting within 72 hours of ICU admission
- Structured TLT implementation: meetings **60% → 96%**, ICU stay **8.7 → 7.4** days

The catch

- SSC 2026: insufficient evidence to recommend routine formal TLTs

Make it someone's job on rounds: a named person, a named day.

SSC 2026 · Lilly CM. Am J Med 2000 · Chang DW. JAMA Intern Med 2021 · Cagino LM. Ann Am Thorac Soc 2025

Z51.5: record the palliative care you give

When to use Z51.5

- Palliative care was actually given
- An order alone is not enough
- Comfort and end-of-life care count
- Exempt from POA reporting since FY2022
- Not the same as Z66 (DNR)

What to document

- Goals discussed, with whom, and the decision
- Symptoms treated and the goal of the plan
- Words agreed with your CDI team

Code accurately. The code records care. It does not replace it.

ICD-10-CM Official Guidelines · AHA Coding Clinic 3Q 2010 · CMS FY2022 POA-exempt list · Law AC et al. JAMA Netw Open 2024

Part 4

Days 4 to 6

Robert is walking with physical therapy.
Is he ready to go home? Is the system?

Length of stay · what shortens it · one model for the system



Sepsis stays are long and costly

$41.5B

US hospital cost (2018), the highest of any condition

7 days

average septicemia stay

#1

most common hospital diagnosis: 2.2M stays

2 days

could be saved per stay (planning target)

The opportunity: each sepsis day costs money and holds a bed.

One standard model on a shared EHR, in every hospital, beats site-by-site pilots.

HCUP Statistical Brief #277 (2018 data). The 2-day figure is a planning estimate. Check it against local data.

Where days can be saved

Step	When	Days saved
Fast recognition, antibiotics < 1 h in shock	ED, hours 0–3	Avoids 3–5 ICU days
Rapid pathogen ID plus stewardship	Day 1	0.5–1 day
Narrow antibiotics, switch to pills	Days 2–3	1–1.5 days
ABCDEF, mobility, delirium checks	Days 3–4	Avoids 2–4 days
Discharge criteria from day 1	Day 4	0.5–1 day
Follow-up within 7 days	Day 5	Keeps it safe

7 days → about 5 days, safely

Planning estimates from a system sepsis improvement plan. Check against local data.

What shortens a stay

Helps

- **Rapid pathogen ID + stewardship:** right drug sooner
- **Narrow, switch to pills:** fewer days
- **ABCDEF and mobility:** less delirium
- **Discharge criteria:** fewer delays
- **ML early warning:** 9.6–32% (vendor data)

Does not help

- **Rushing discharge:** more readmissions
- **Alerts with no response plan:** no gain
- **Remote monitoring alone:** no gain

Fix the process, and protect the shorter stay with follow-up.

McCoy A. BMJ Open Qual 2017 · Burdick H. BMJ Health Care Inform 2020 · Peri AM. Clin Infect Dis 2024 · Daneman N. NEJM 2025 · Pun BT. Crit Care Med 2019 · Yende S. JAMA Netw Open 2026

One standard model for the whole system

1 Standard recognition and stewardship

One sepsis screen, the SEP-1 bundle, rapid pathogen ID with stewardship

2 Narrowing and IV-to-oral protocol

Standard steps to narrow and switch to pills sooner

3 Complication prevention

ABCDEF, early mobility, delirium checks, infection prevention

4 Discharge plan and safety net

Plan from day 1. Follow-up visit within 7 days.

Build it once in the shared EHR. Use it in every hospital.

Part 5

The first week home

Day 6. Robert is home. Linda has new medicines, 4 appointments, and no idea what to watch for.

Readmissions · families · the nurse navigator

Sepsis drives readmissions

12.2%

of all medical readmissions follow sepsis (2× heart failure)

$10,070

average cost of one sepsis readmission

314,600

septicemia readmissions in 2018, the most of any condition

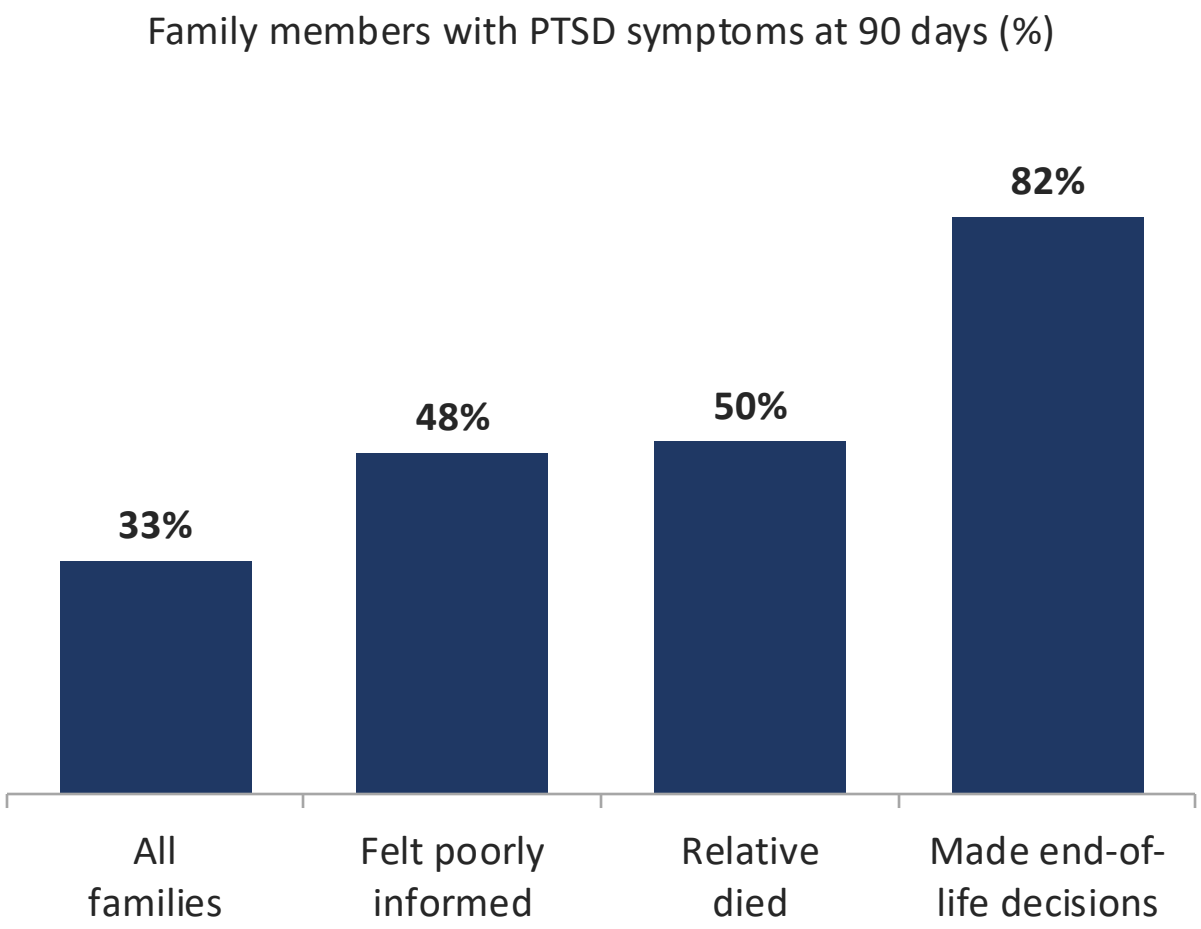
1 in 4

come back within 5 days (median 11)

Post-sepsis care is now a CDC Core Element and the target of a coming CMS measure.

Mayr FB et al. JAMA 2017 · HCUP 2018 · Gadre SK et al. Chest 2019

What families carry



- **1 in 4** ICU survivors need care at 6 months
- About **80%** of that care comes from family
- Half of caregivers say their own work suffers
- **1 in 3** households lose income

Family stress can persist for years.

How we talk in the ICU matters.

Azoulay E. AJRCCM 2005 · Griffiths J. Crit Care 2013 · McPeake J. Ann Am Thorac Soc 2026 · Davidson JE. Crit Care Med 2012

Families know the word, not the meaning

75%

of US adults know the word “sepsis” (2025)

35%

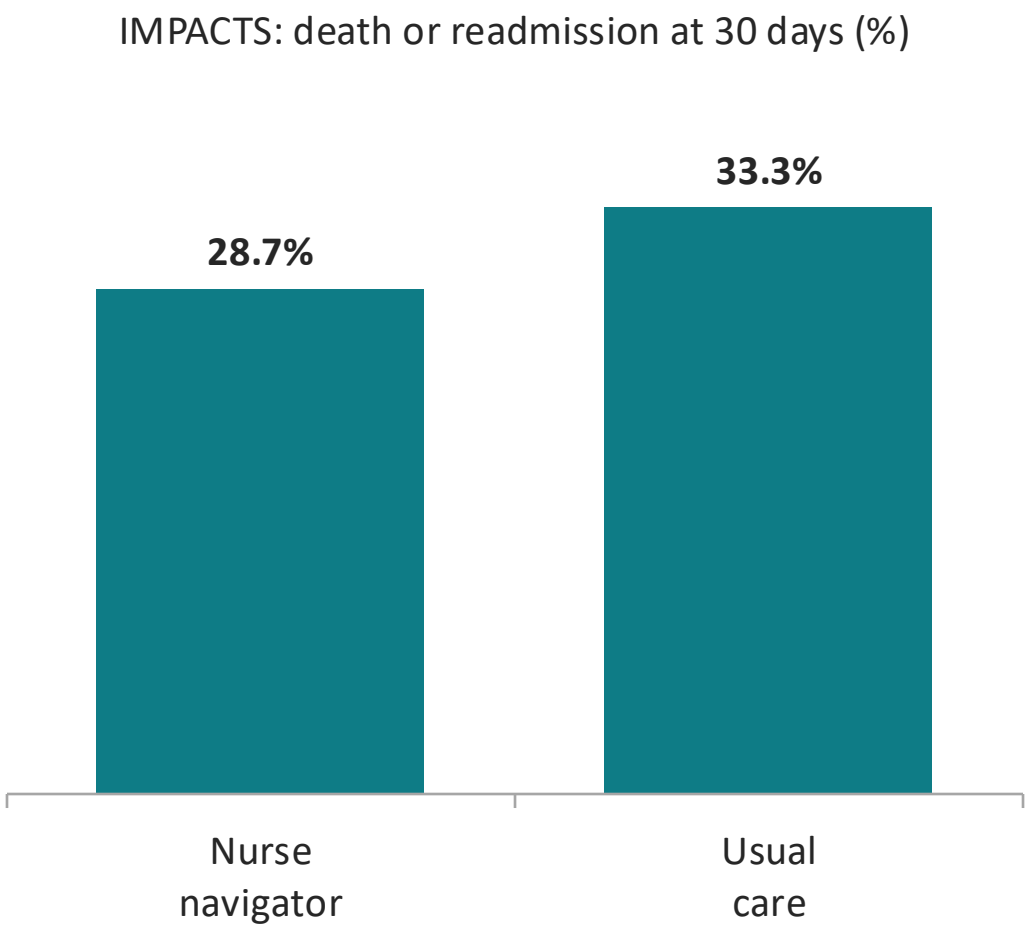
in a Korean national survey could define sepsis (93% could define stroke)

Before Robert goes home:

- **Say the word:** write “sepsis” on the discharge papers
- **Say what to expect:** weakness, poor sleep, memory, mood
- **Give a card:** diagnosis, antibiotics, warning signs, who to call
- **Ask the family** how they are doing

Sepsis Alliance / YouGov awareness survey 2025 · Park M et al. Clin Exp Emerg Med 2014

A nurse navigator improved outcomes



What the navigator did

- Sepsis teaching and a recovery plan
- Medicine review after discharge
- Checks for new problems
- Watched chronic illnesses
- Palliative approach when right

No drug. No device. No ICU bed.

One nurse, a phone, 30 days. Adjusted OR 0.80.

Taylor SP et al. Crit Care Med 2022 (IMPACTS, 691 patients, 3 hospitals)

Four care steps, and the first week

The 4 post-sepsis care steps

1. Review medicines
2. Screen for new problems
3. Watch for common causes of decline
4. Match care to goals

Only 11% got all 4. Getting 2 or more: OR 0.26 for readmission or death.

41%

fewer 30-day readmissions with a home visit in 2 days and a doctor visit in 7 (170,571 patients)

For Robert: a call on day 2, home visits on days 2 and 5, clinic by day 7, with Linda.

Taylor SP et al. Ann Am Thorac Soc 2020 · Deb P et al. Med Care 2019 · O'Connor M et al. BMC Palliat Care 2022

What works after discharge

Evidence is mixed

- **Nurse navigator:** IMPACTS 28.7% vs 33.3%
- **ENCOMPASS primary outcome:** 90-d death/readmission 48.2% vs 48.0% (NS)
- **Home health within 7 days:** associated with 41% fewer readmissions
- **Risk targeting:** 5 subtypes, 9% to 35% risk

Not enough alone

- **Remote monitoring:** no more days at home
- **Alerts with no response plan:** no better outcomes
- **One-time teaching:** helped only complex patients

Person-led programs can help. Effects vary by outcome and setting.

Taylor SP. Crit Care Med 2022 · Taylor SP. JAMA Intern Med 2025 · Deb P. Med Care 2019 · Taylor SP. Ann Am Thorac Soc 2022 · Yende S. JAMA Netw Open 2026

One standard program after discharge

1 **Code sepsis aftercare**

One EHR smart phrase. We cannot follow who we cannot find.

2 **Phone call by day 7**

Symptoms, medicines, follow-up. Covers the riskiest window.

3 **EHR risk flag**

5-subtype model. Most help to the highest-risk group (35%).

4 **Nurse navigator + home health**

30–90 days of support. Home visit within 7 days.

Build it once in the shared EHR. Use it in every hospital.

Part 6

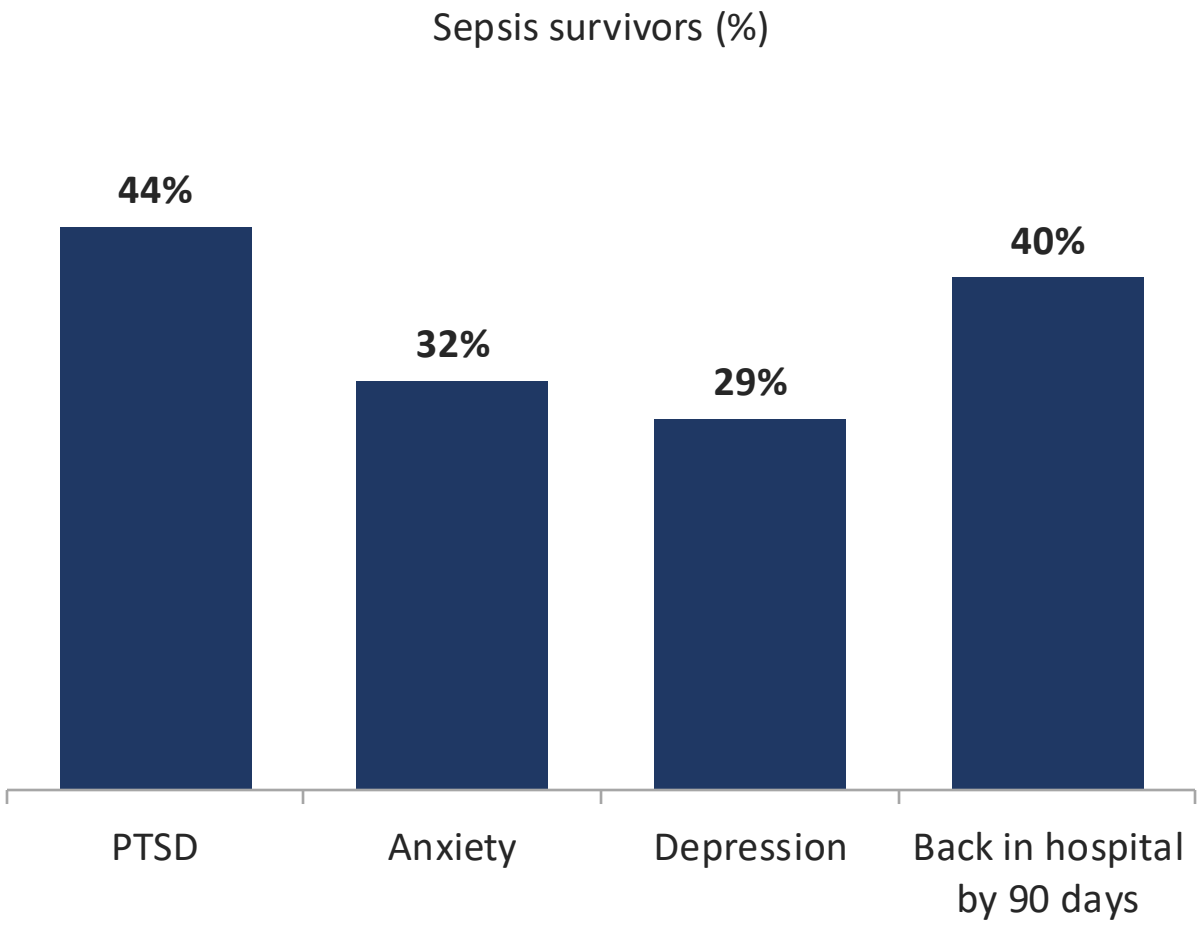
The long road

Day 90. Robert is home. He cannot climb the stairs, and he keeps losing words.

Post-sepsis syndrome · 1 and 5 years · rehab

1 Home | 2 ED | 3 Hospital and ICU | 4 Going home | 5 First week | **6 Recovery**

Life after sepsis



1 in 2 recover

1 in 3 die within a year

1 in 6 have severe lasting problems

- Memory problems: **6.1%** before, **16.7%** after
- 1 to 2 new limits in daily life

Prescott HC, Angus DC. JAMA 2018

1 year and 5 years after sepsis

1 year

15%

had died (England, 94,748 survivors), then 6–8% more each year

2 years

+22%

higher risk of death than matched peers

5 years

61%

had died (Scotland). 80% of survivors were happy with their quality of life

8 years

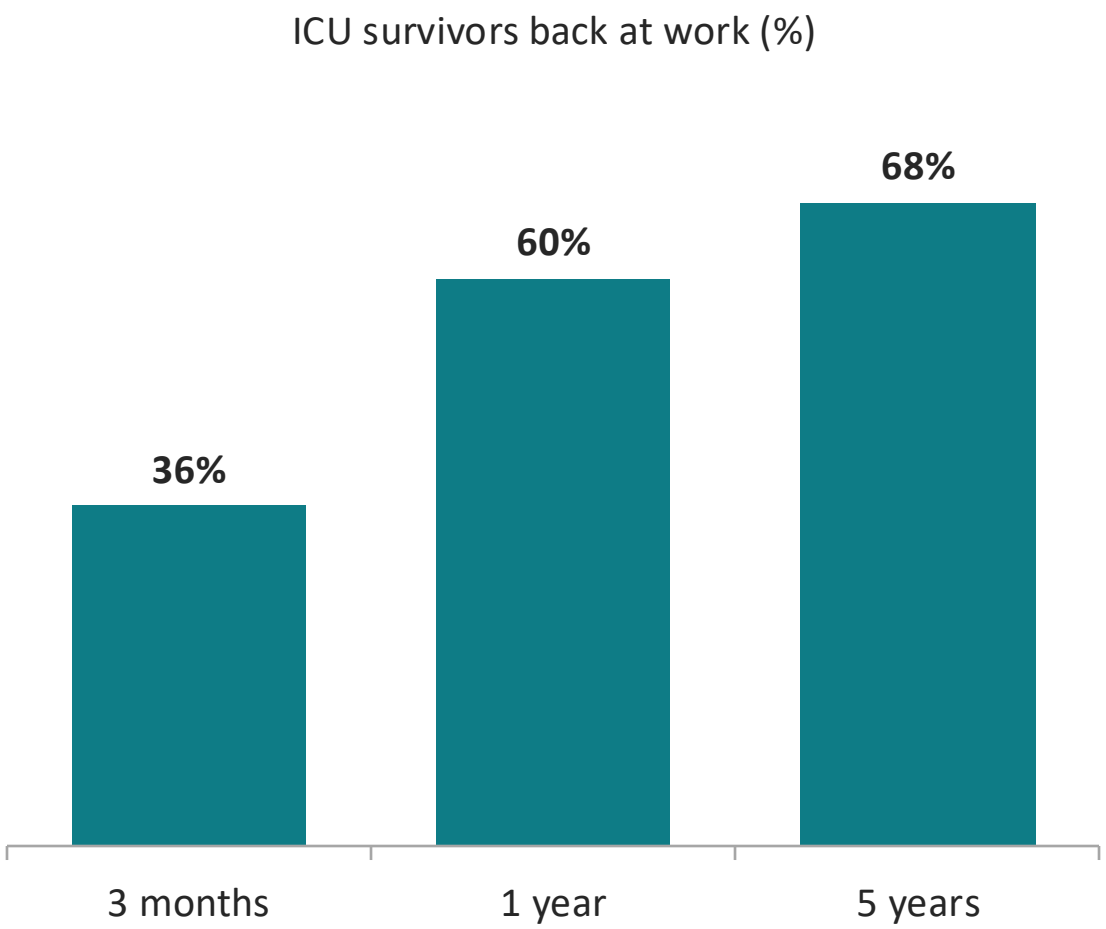
8+ yrs

memory and physical problems can last

Older adults: 28% of Medicare survivors sent home with home health died within 1 year.

Shankar-Hari M. JAMA Netw Open 2019 · Courtright KR. JAMA Netw Open 2020 · Prescott HC. BMJ 2016 · Cuthbertson BH. Crit Care 2013 · Iwashyna TJ. JAMA 2010

Rehab: back to normal life



Start in the ICU

Early PT/OT: 59% vs 35% independent at discharge

Be honest after discharge

General programs did not help (SMOOTH). Treat the problem you find.

For every survivor

PT/OT, swallow, memory and mood screens, slow return to work

Kamdar BB et al. Thorax 2020 · Schweickert WD et al. Lancet 2009 · Schmidt K et al. JAMA 2016

Three asks

At the bedside

- Check perfusion, not just BP
- Dynamic test before a bolus
- Get patients out of bed
- Say “sepsis” to the family

Writing orders

- Echo before the third liter
- Take fluid off after shock
- Narrow, shorten, switch to pills
- Goals of care by 72 hours

Running the system

- Measure time to ICU
- Code Z51.5 and sepsis aftercare
- Call survivors by day 7
- Fund a nurse navigator

Back to Robert

His bundle was perfect. Everything after it decided his outcome.

An ICU bed in time · a dynamic test and an echo · fluid off, antibiotics narrowed · out of bed · asked what he wanted · a call in the first week

The first hour. The next 72. And the rest of their life.



References (1 of 4)

- Rudd KE et al. Lancet. 2020;395(10219):200–11. doi:10.1016/S0140-6736(19)32989-7
- Rhee C et al. JAMA Netw Open. 2019;2(2):e187571. doi:10.1001/jamanetworkopen.2018.7571
- CDC. Hospital Sepsis Program Core Elements. Updated January 2025.
- Gadre SK et al. Chest. 2019;155(3):483–90. doi:10.1016/j.chest.2018.12.008
- Prescott H et al. Surviving Sepsis Campaign 2026. Crit Care Med. 2026. doi:10.1097/CCM.0000000000007075
- Singer M et al. JAMA. 2016;315(8):801–10. doi:10.1001/jama.2016.0287
- Shankar-Hari M et al. JAMA. 2016;315(8):775–87. doi:10.1001/jama.2016.0289
- Ait-Oufella H et al. Intensive Care Med. 2011;37(5):801–7. doi:10.1007/s00134-011-2163-y
- Hernández G et al. JAMA. 2019;321(7):654–64. doi:10.1001/jama.2019.0071
- Casserly B et al. Crit Care Med. 2015;43(3):567–73. doi:10.1097/CCM.0000000000000742
- Mikkelsen ME et al. Crit Care Med. 2009;37(5):1670–7. doi:10.1097/CCM.0b013e31819fcf68
- Jansen TC et al. Am J Respir Crit Care Med. 2010;182(6):752–61. doi:10.1164/rccm.200912-1918OC
- Jones AE et al. JAMA. 2010;303(8):739–46. doi:10.1001/jama.2010.158
- Nates JL et al. Crit Care Med. 2016;44(8):1553–602. doi:10.1097/CCM.0000000000001856
- Chalfin DB et al. Crit Care Med. 2007;35(6):1477–83. doi:10.1097/01.CCM.0000266585.74905.5A
- Churpek MM et al. J Hosp Med. 2016;11(11):757–62. doi:10.1002/jhm.2630
- Cha JH et al. Acute Crit Care. 2025;40(4):548–56. doi:10.4266/acc.003575
- Douglas IS et al. Chest. 2020;158(4):1431–45. doi:10.1016/j.chest.2020.04.025
- Marik PE et al. Chest. 2008;134(1):172–8. doi:10.1378/chest.07-2331
- Monnet X et al. Intensive Care Med. 2016;42(12):1935–47. doi:10.1007/s00134-015-4134-1
- Shapiro NI et al. N Engl J Med. 2023;388(6):499–510. doi:10.1056/NEJMoa2212663
- Meyhoff TS et al. N Engl J Med. 2022;386(26):2459–70. doi:10.1056/NEJMoa2202707
- Jorda A et al. Crit Care. 2024;28(1):231. doi:10.1186/s13054-024-05019-6
- Polyzogopoulou E et al. Medicina (Kaunas). 2023;59(6):1180. doi:10.3390/medicina59061180
- Geri G et al. Intensive Care Med. 2019;45(5):657–67. doi:10.1007/s00134-019-05596-z
- Paonessa JR et al. Crit Care. 2015;19:288. doi:10.1186/s13054-015-1012-8
- Bréchot N et al. Lancet. 2020;396(10250):545–52. doi:10.1016/S0140-6736(20)30733-9

References (2 of 4)

- Ling RR et al. Crit Care. 2021;25(1):246. doi:10.1186/s13054-021-03668-5
- Matthay MA et al. Am J Respir Crit Care Med. 2024;209(1):37–47. doi:10.1164/rccm.202303-0558WS
- Brower RG et al. N Engl J Med. 2000;342(18):1301–8. doi:10.1056/NEJM200005043421801
- Guérin C et al. N Engl J Med. 2013;368(23):2159–68. doi:10.1056/NEJMoa1214103
- Muller G et al. N Engl J Med. 2025;393(19):1875–88. doi:10.1056/NEJMoa2502136
- Bloos F et al. Crit Care. 2014;18(2):R42. doi:10.1186/cc13755
- Reitz KM et al. JAMA Surg. 2022;157(9):817–26. doi:10.1001/jamasurg.2022.2761
- Martínez ML et al. Crit Care Med. 2017;45(1):11–9. doi:10.1097/CCM.0000000000002011
- Inkinen N et al. Crit Care. 2022;26(1):401. doi:10.1186/s13054-022-04283-8
- Bouchard J et al. Kidney Int. 2009;76(4):422–7. doi:10.1038/ki.2009.159
- Wiedemann HP et al. N Engl J Med. 2006;354(24):2564–75. doi:10.1056/NEJMoa062200
- Gaudry S et al. N Engl J Med. 2016;375(2):122–33. doi:10.1056/NEJMoa1603017
- Barbar SD et al. N Engl J Med. 2018;379(15):1431–42. doi:10.1056/NEJMoa1803213
- Bagshaw SM et al. N Engl J Med. 2020;383(3):240–51. doi:10.1056/NEJMoa2000741
- Gaudry S et al. Lancet. 2021;397(10281):1293–300. doi:10.1016/S0140-6736(21)00350-0
- Malbrain MLNG et al. Ann Intensive Care. 2018;8(1):66. doi:10.1186/s13613-018-0402-x
- Boyd JH et al. Crit Care Med. 2011;39(2):259–65. doi:10.1097/CCM.0b013e3181feeb15
- Shao L et al. J Intensive Care Med. 2026. doi:10.1177/08850666261493365
- Silversides JA et al. Intensive Care Med. 2017;43(2):155–70. doi:10.1007/s00134-016-4573-3
- Silversides JA et al. Intensive Care Med. 2022;48(2):190–200. doi:10.1007/s00134-021-06596-8
- Daneman N et al. N Engl J Med. 2025;392(11):1065–78. doi:10.1056/NEJMoa2404991
- Garnacho-Montero J et al. Intensive Care Med. 2014;40(1):32–40. doi:10.1007/s00134-013-3077-7
- de Jong E et al. Lancet Infect Dis. 2016;16(7):819–27. doi:10.1016/S1473-3099(16)00053-0
- Levandowski R et al. J Yeungnam Med Sci. 2026;43:12. doi:10.12701/jyms.2026.43.12
- Rando E et al. Int J Infect Dis. 2025;156:107917. doi:10.1016/j.ijid.2025.107917
- Pun BT et al. Crit Care Med. 2019;47(1):3–14. doi:10.1097/CCM.0000000000003482
- Schweickert WD et al. Lancet. 2009;373(9678):1874–82. doi:10.1016/S0140-6736(09)60658-9

References (3 of 4)

- Raith EP et al. JAMA. 2017;317(3):290–300. doi:10.1001/jama.2016.20328
- White DB et al. JAMA. 2016;315(19):2086–94. doi:10.1001/jama.2016.5351
- Cagino LM et al. Ann Am Thorac Soc. 2025;22(7):1035–41. doi:10.1513/AnnalsATS.202410-1041OC
- Manfredi RA et al. Am J Emerg Med. 2021;50:773–7. doi:10.1016/j.ajem.2021.09.075
- Courtright KR et al. JAMA. 2024;331(3):224–32. doi:10.1001/jama.2023.25092
- Carson SS et al. JAMA. 2016;316(1):51–62. doi:10.1001/jama.2016.8474
- Lilly CM et al. Am J Med. 2000;109(6):469–75. doi:10.1016/s0002-9343(00)00524-6
- Chang DW et al. JAMA Intern Med. 2021;181(6):786–94. doi:10.1001/jamainternmed.2021.1000
- Law AC et al. JAMA Netw Open. 2024;7(5):e2412873. doi:10.1001/jamanetworkopen.2024.12873
- AHA Coding Clinic for ICD-10-CM/PCS, 3Q 2010 · CMS FY2022 POA-exempt code list
- HCUP Statistical Brief #277, 2018 data · HCUP septicemia readmissions, 2018
- McCoy A, Das R. BMJ Open Qual. 2017;6(2):e000158. doi:10.1136/bmjoq-2017-000158
- Burdick H et al. BMJ Health Care Inform. 2020;27(1):e100109. doi:10.1136/bmjhci-2019-100109
- Peri AM et al. Clin Infect Dis. 2024;79(2):502–15. doi:10.1093/cid/ciae234
- Ehrenzeller S, Klompas M. JAMA Intern Med. 2024;184(2):131–42. doi:10.1001/jamainternmed.2023.6638
- Yende S et al. JAMA Netw Open. 2026;9(6):e2616641. doi:10.1001/jamanetworkopen.2026.16641
- Mayr FB et al. JAMA. 2017;317(5):530–1. doi:10.1001/jama.2016.20468
- Taylor SP et al. Crit Care Med. 2022;50(3):469–79. doi:10.1097/CCM.0000000000005300
- Taylor SP et al. JAMA Intern Med. 2025;185(10):1238–46. doi:10.1001/jamainternmed.2025.3699
- Deb P et al. Med Care. 2019;57(8):633–40. doi:10.1097/MLR.0000000000001152
- Taylor SP et al. Ann Am Thorac Soc. 2022;19(8):1355–63. doi:10.1513/AnnalsATS.202109-1088OC
- Taylor SP et al. Ann Am Thorac Soc. 2020;17(1):89–97. doi:10.1513/AnnalsATS.201907-514OC
- O'Connor M et al. BMC Palliat Care. 2022;21(1):98. doi:10.1186/s12904-022-00973-w
- Azoulay E et al. Am J Respir Crit Care Med. 2005;171(9):987–94. doi:10.1164/rccm.200409-1295OC
- Griffiths J et al. Crit Care. 2013;17(3):R100. doi:10.1186/cc12745
- McPeake J et al. Ann Am Thorac Soc. 2026;23(4):575–83. doi:10.1093/annalsats/aaoaf050

References (4 of 4)

- Davidson JE et al. Crit Care Med. 2012;40(2):618–24. doi:10.1097/CCM.0b013e318236ebf9
- Sepsis Alliance / YouGov. Annual sepsis awareness survey, 2025
- Park M et al. Clin Exp Emerg Med. 2014;1(1):41–8. doi:10.15441/ceem.14.014
- Prescott HC, Angus DC. JAMA. 2018;319(1):62–75. doi:10.1001/jama.2017.17687
- Shankar-Hari M et al. JAMA Netw Open. 2019;2(5):e194900. doi:10.1001/jamanetworkopen.2019.4900
- Courtright KR et al. JAMA Netw Open. 2020;3(2):e200038. doi:10.1001/jamanetworkopen.2020.0038
- Prescott HC et al. BMJ. 2016;353:i2375. doi:10.1136/bmj.i2375
- Iwashyna TJ et al. JAMA. 2010;304(16):1787–94. doi:10.1001/jama.2010.1553
- Cuthbertson BH et al. Crit Care. 2013;17(2):R70. doi:10.1186/cc12616
- Kamdar BB et al. Thorax. 2020;75(1):17–27. doi:10.1136/thoraxjnl-2019-213803
- Schmidt K et al. JAMA. 2016;315(24):2703–11. doi:10.1001/jama.2016.7207
- Evans L et al. Crit Care Med. 2021;49(11):e1063–e1143. doi:10.1097/CCM.0000000000005337
- Chaudhuri D et al. Crit Care Med. 2024;52(5):e219–e233. doi:10.1097/CCM.0000000000006172
- Venkatesh B et al. N Engl J Med. 2018;378(9):797–808. doi:10.1056/NEJMoa1705835
- Annane D et al. N Engl J Med. 2018;378(9):809–18. doi:10.1056/NEJMoa1705716
- Teja B et al. Am J Respir Crit Care Med. 2024;209(10):1219–28. doi:10.1164/rccm.202310-1785OC
- Bosch NA et al. JAMA Intern Med. 2023;183(5):451–9. doi:10.1001/jamainternmed.2023.0258
- Annane D et al. JAMA. 2010;303(4):341–8. doi:10.1001/jama.2010.2
- Zhang L et al. Anesth Analg. 2023;137(4):850–8. doi:10.1213/ANE.0000000000006516
- Ahn S et al. Sci Rep. 2026;16. doi:10.1038/s41598-026-56521-6
- Lichtenstein DA, Mezière GA. Chest. 2008;134(1):117–25. doi:10.1378/chest.07-2800
- Volpicelli G et al. Intensive Care Med. 2012;38(4):577–91. doi:10.1007/s00134-012-2513-4
- McKaigney CJ et al. Am J Emerg Med. 2014;32(6):493–7. doi:10.1016/j.ajem.2014.01.045
- Chauvet JL et al. Crit Care. 2015;19:262. doi:10.1186/s13054-015-0980-z
- Parker MM et al. Ann Intern Med. 1984;100(4):483–90. doi:10.7326/0003-4819-100-4-483

Studies found through PubMed. Brief mentions of the 2026 Surviving Sepsis Campaign guidelines refer to the separate guideline session.