SEPSIS

DEFINITION

1. SUSPECTED / DOCUMENTED INFECTION

Infection is the starting point.

2. ORGAN DYSFUNCTION (SEPSIS)

Acute organ dysfunction caused by the infection.

Defined as:
Increase in **SOFA** score
≥ 2 points from baseline
(if known)

3. SEPTIC SHOCK

Sepsis with persistent circulatory and metabolic abnormalities.

Vasopressor therapy needed to maintain
MAP ≥ 65 mmHg

+

Serum lactate
> 2.0 mmol/L
despite adequate

Sequential [Sepsis-Related] Organ Failure Assessment (SOFA) Score

System	0	1	2	3	4
Respiration PaO2/FiO2, mmHg (kPa)	≥400 (53.3)	<400 (53.3)	<300 (40)	<200 (26.7) with respiratory support	<100 (13.3) with respiratory support
Coagulation Platelets, x10^3/uL	≥150	<150	<100	<50	<20
Liver Bilirubin, mg/dL (umol/L)	<1.2 (20)	1.2 - 1.9 (20 - 32)	2.0 - 5.9 (33 - 101)	6.0 - 11.9 (102 - 204)	>12.0 (204)
Cardiovascular	MAP ≥70mmHg	MAP <70mmHg	Dopamine <5 or Dobutamine (any dose)	Dopamine 5.1 - 15 or Epinephrine ≤0.1 or Norepinephrine ≤0.1	Dopamine >15 or Epinephrine >0.1 or Norepinephrine >0.1
CNS GCS Score	15	13 - 14	10 -12	6 - 9	<6
Renal Creatinine, mg/dL (umol/L) Urine Output, mL/d	<1.2 (110)	1.2 - 1.9 (110 - 170)	2.0 - 3.4 (171 - 299)	3.5 - 4.9 (300 - 440) <500	>5.0 (440) <200

*Catecholamine Doses = ug/kg/min for at least 1hr

SURVIVING SEPSIS 2026

1 PERFORMANCE IMPROVEMENT PROGRAM FOR SEPSIS CARE

For hospitals and health systems, we **recommend** using a performance improvement program for sepsis, including:

- ✓✓ ⊕⊕⊕○ | Screening
- ✓✓ ⊕○○○ | Standard operating procedures
- ✓✓ ⊕⊕⊕○ | Quality improvement strategies

Remark: Performance improvement programs and quality improvement strategies may vary by setting and in accordance with a hospital/health care system's ability to implement.

2021 STATEMENT

For hospitals and health systems, we **recommend** using a performance improvement program for sepsis, including sepsis screening for acutely ill, high-risk patients and standard operating procedures for treatment.

- ✓✓ ⊕⊕⊕○ | Screening
- ✓✓ ⊕○○○ | Standard operating procedures

Consistent processes. Better outcomes. Lives saved.

CODE SEPSIS AND SEPSIS HUDDLE

- Newer guidelines suggest the use of a sepsis code and a sepsis huddle protocol following a positive sepsis screening
- Sepsis code is activated when

  Suspected infection PLUS one or more of:

  Hypotension (SBP < 90 mmHg or MAP < 65 mmHg) , Lactate ≥2 mmol/L (especially ≥4 mmol/L) , qSOFA ≥2 or evidence of organ dysfunction , Persistent tachycardia or tachypnea , Altered mental status

- Sepsis huddle is multidisciplinary team consisting of Physician ,Nurse , ICU team (if required), Pharmacist , Laboratory staff

SCREENING TOOL

- In acutely ill hospitalized patients guidelines suggest the use of screening tools such as NEWS, NEWS2, MEWS or SIRS over qSOFA
- qSOFA has a sensitivity of 23%
- NEWS 2 is the best screening tool
- To be used every 4th hourly to assess the condition of the patient

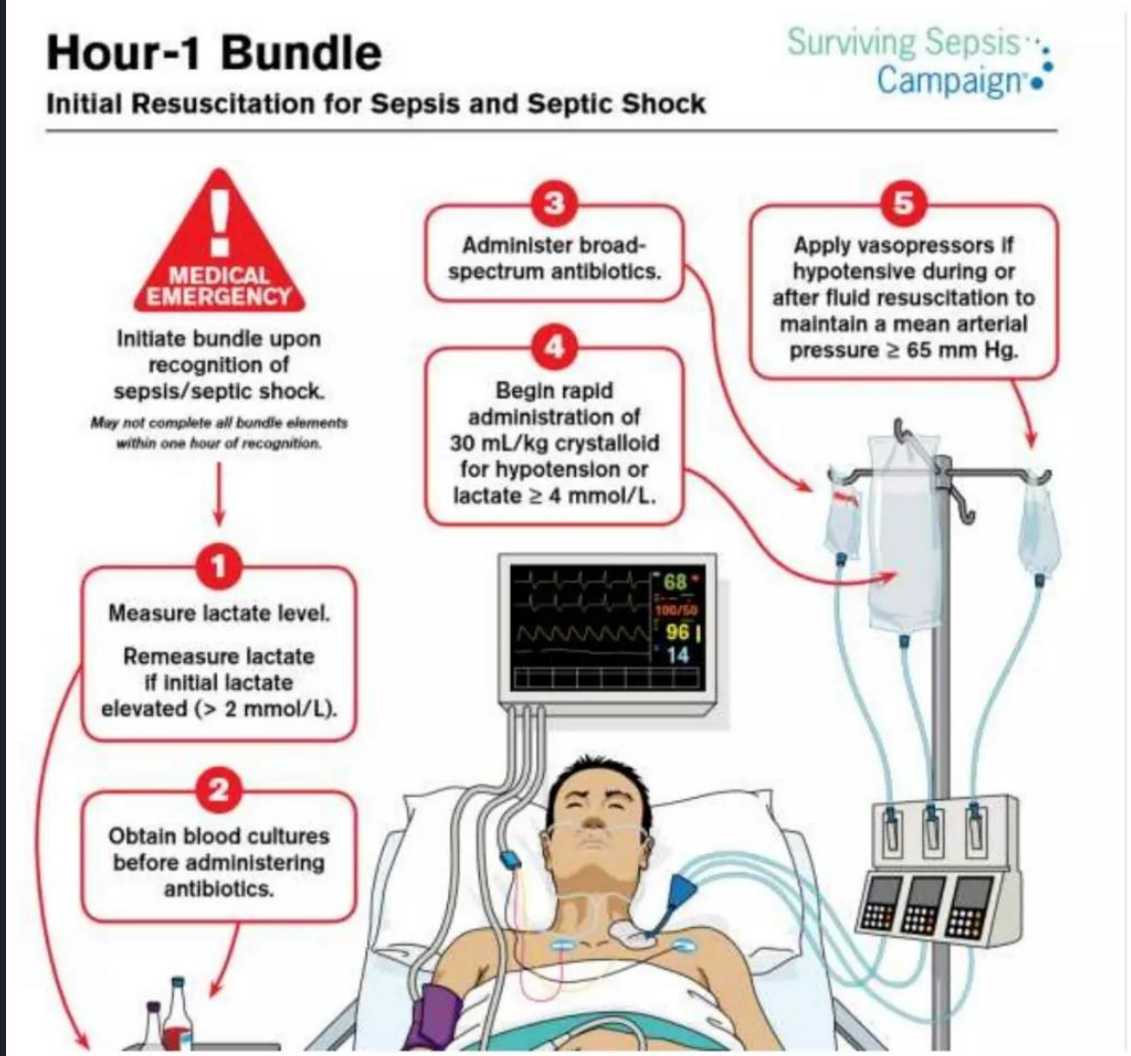
Chart 1: The NEWS scoring system

Physiological parameter	Score 3	2	1	0	1	2	3
Respiration rate (per minute)	≤8		9–11	12–20		21–24	≥25
SpO_2 Scale 1 (%)	≤91	92–93	94–95	≥96			
SpO_2 Scale 2 (%)	≤83	84–85	86–87	88–92 ≥93 on air	93–94 on oxygen	95–96 on oxygen	≥97 on oxygen
Air or oxygen?		Oxygen		Air			
Systolic blood pressure (mmHg)	≤90	91–100	101–110	111–219			≥220
Pulse (per minute)	≤40		41–50	51–90	91–110	111–130	≥131
Consciousness				Alert			CVPU
Temperature (°C)	≤35.0		35.1–36.0	36.1–38.0	38.1–39.0	≥39.1	

SEPSIS BUNDLE

- Lactate
- Blood cultures
- Urine output

- Antibiotics
- Crystalloids
- Vasopressors



LACTATE

- Lactate level should be calculated in the first hour itself
- It is a marker of tissue hypoperfusion
- >2mmol/L - hypoperfusion
- >4mmol/L - shock
- better predictor of severe sepsis and septic shock than white blood cell count, neutrophil count, and procalcitonin

BLOOD CULTURE

- at least 2 sets of blood cultures should be drawn (aerobic & anaerobic).
- Blood cultures should be drawn from 2 separate peripheral sites
- if the patient has an indwelling central catheter that is suspected to be infected, cultures should be performed through each lumen of the catheter, in addition to the peripheral site.
- blood cultures should be obtained prior to the initiation of antibiotics

INFECTION

- Septic shock or sepsis - antibiotics within 1hr
- Possible sepsis - within 3hrs
- If there is a delay in transfer of patient for more than 1hour antibiotics should be administered in ambulance
- Anatomical or source diagnosis within 6 hrs

INFECTION MANAGEMENT IN SEPSIS

Key Principles

EARLY ANTIBIOTICS

- Septic shock or sepsis – antibiotics within 1 hr
- Possible sepsis – within 3 hrs
- If delay in transfer >1 hr – give antibiotics in ambulance

SOURCE CONTROL

- Anatomical or source diagnosis within 6 hrs
- Drain abscess, remove infected lines, debride, relieve obstruction

RISK STRATIFICATION

- If high risk of MDR pathogen – use antimicrobial with MDR coverage
- No risk of anaerobic infection – anaerobic coverage not indicated
- Empirical antifungal not indicated in low-risk patients

REASSESSMENT

- Review daily and narrow therapy when possible
- De-escalate based on culture, sensitivity or alternate diagnosis

EMPIRICAL ANTIBIOTIC THERAPY – APPROACH

1. ASSESS PATIENT AND RISK FACTORS

- Site of infection
- Community vs Hospital acquired
- Prior antibiotics
- Local antibiogram
- Host factors

2. START EMPIRICAL ANTIBIOTICS EARLY

- Within 1 hr (septic shock)
- Within 3 hrs (possible sepsis)
- Do not delay for cultures (>45 min)

3. SOURCE CONTROL

- Identify source
- Drain / Debride / Remove
- Within 6–12 hrs

4. REVIEW & DE-ESCALATE

- Daily review
- Tailor to culture & sensitivity
- Shorten duration when appropriate

OBTAIN MICROBIOLOGICAL SAMPLES (BEFORE ANTIBIOTICS IF NO DELAY)

- Blood cultures x 2 (from different sites)
- Culture from suspected focus: urine, sputum/ET aspirate, CSF, pus, body fluids
- Do not delay antibiotics >45 minutes

Site of infection	Potential bacteria	%	Suggested empirical treatment
 Urinary tract infections (severe acute pyelonephritis)	**Enterobacteriaceae** including: • *Escherichia coli* • *Pseudomonas aeruginosa* • *Enterococcus sp.* • *Staphylococcus sp.*	60–70 40 8 15 4	Ceftriaxone IV or ceftazidime (if suspicion of *P. aeruginosa*) ± aminoglycoside
 Intra-abdominal sepsis	**Gram-negative bacilli** including: • *Escherichia coli* • *Pseudomonas aeruginosa*	60 40 30	Ertapenem (if no risk of *P. aeruginosa*) Piperacillin–tazobactam
	Gram-positive cocci including: • *Enterococcus sp.* • Anaerobes including • *Bacteroides sp.* • Fungi	30 20 30 20 20	Third- or fourth-generation cephalosporin (active against *P. aeruginosa*) + metronidazole Imipenem or doripenem (high-risk patients) ± fluconazole ± aminoglycoside (if shocked)
 Nosocomial pneumonia	• *Enterobacteriaceae* • *Pseudomonas aeruginosa* • *Staphylococcus aureus* • *Streptococcus pneumoniae* • *Haemophilus influenzae*	30–40 17–30 7–15 3–5 4–6	β-lactam (active against *P. aeruginosa*) ± aminoglycoside ± glycopeptide or linezolid if MRSA is suspected

 **Pneumonia without risk factors for MRP**	• *Staphylococcus aureus* • *Streptococcus pneumoniae* • *Haemophilus influenzae* • Alternative Gram-negative bacilli • Anaerobes	45 9 20 20 4	Third-generation cephalosporin without activity against *P. aeruginosa* ± Macrolide (if intracellular bacteria are suspected)
 **Skin infections**	• *Streptococcus sp.* • *Staphylococcus sp.* • Anaerobes • Gram-negative bacilli	40 30 30 10–20	β-lactam + β-lactamase inhibitor Piperacillin/tazobactam Second-generation cephalosporins (such as cefoxitin) Carbapenems
 **Catheter-related bloodstream infection**	• *Staphylococcus sp.* • *Enterobacteriaceae* • *Pseudomonas aeruginosa*	50 30 10–15	Glycopeptide or linezolid + β-lactam with activity against *P. aeruginosa*
 **Nosocomial meningitis**	**Gram-negative bacilli** including *Acinetobacter sp.* • *Staphylococcus sp.* • *Streptococcus sp.* • *Neisseria meningitidis*	60 30 20 10 1	Meropenem + glycopeptide or linezolid

ONGOING MANAGEMENT & OPTIMIZATION

Beta-lactam infusions preferred over bolus for maintenance therapy

TDM (Therapeutic Drug Monitoring) should be used

De-escalation to narrow spectrum (antigen specific) when microbiological diagnosis / susceptibility or alternate diagnosis obtained

If optimal duration is unclear – PCT + clinical evaluation can be used for de-escalation

Consider SDD (Selective Digestive Decontamination) in septic patients on mechanical ventilation (as per ICU policy)

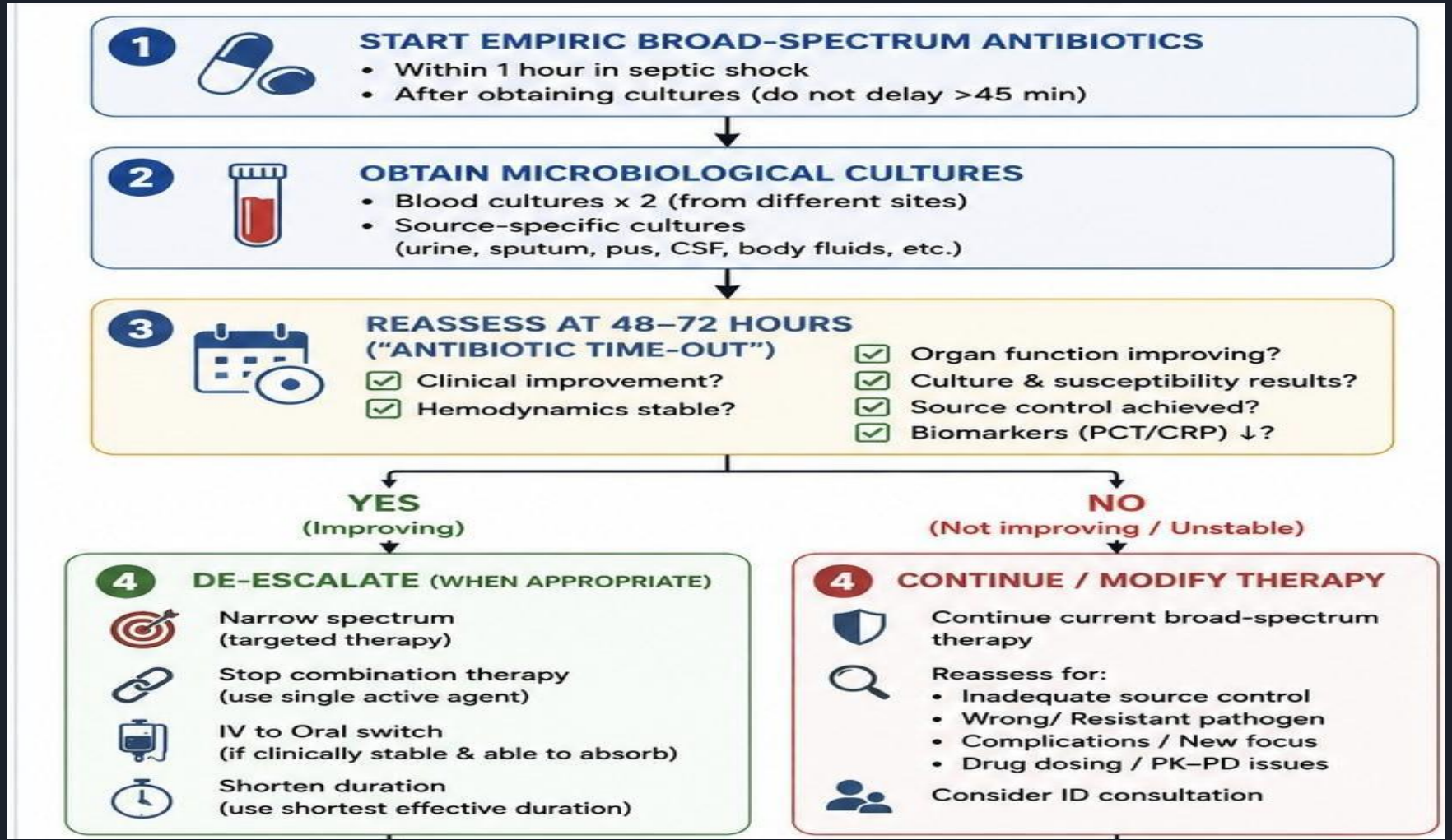
Candidal biomarkers should NOT be used to guide initiation or de-escalation of antifungal therapy

DURATION OF THERAPY (Usual Guidance)

- Uncomplicated infections: 7–10 days
- With adequate source control: 5–7 days
- Complicated / deep-seated / immunocompromised: 10–14 days or more
- Reassess daily and stop when infection controlled

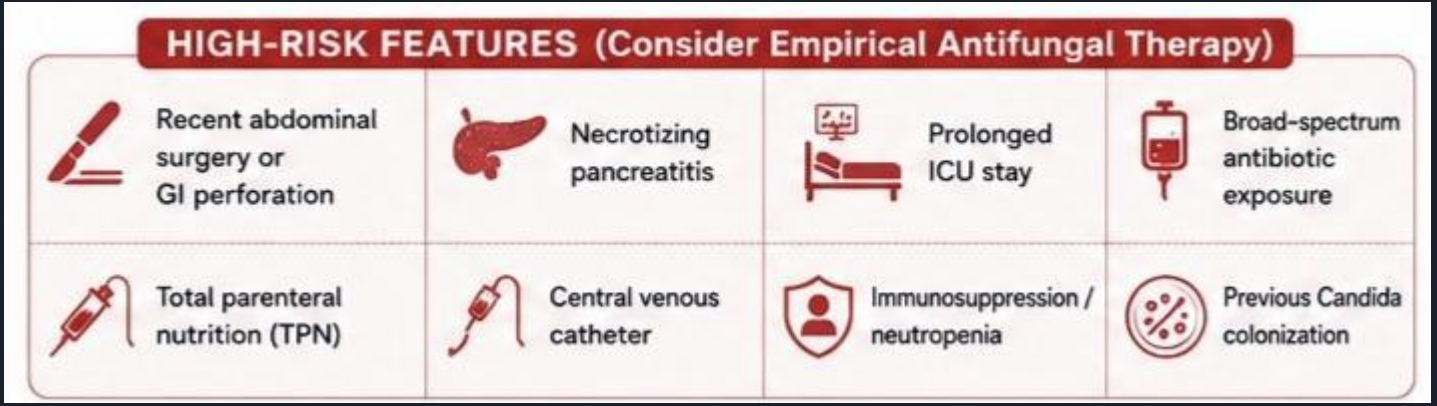
PEARLS

- Early antibiotics save lives
- Source control is as important as antibiotics
- Reassess daily and de-escalate whenever possible
- Use local antibiogram and stewardship principles


1
START EMPIRIC BROAD-SPECTRUM ANTIBIOTICS
• Within 1 hour in septic shock
• After obtaining cultures (do not delay >45 min)
2
OBTAIN MICROBIOLOGICAL CULTURES
• Blood cultures x 2 (from different sites)
• Source-specific cultures
(urine, sputum, pus, CSF, body fluids, etc.)
3
REASSESS AT 48–72 HOURS
("ANTIBIOTIC TIME-OUT")
Clinical improvement?
Hemodynamics stable?
Organ function improving?
Culture & susceptibility results?
Source control achieved?
Biomarkers (PCT/CRP) ↓?
YES
(Improving)
NO
(Not improving / Unstable)
4
DE-ESCALATE (WHEN APPROPRIATE)
Narrow spectrum
(targeted therapy)
Stop combination therapy
(use single active agent)
IV to Oral switch
(if clinically stable & able to absorb)
Shorten duration
(use shortest effective duration)
4
CONTINUE / MODIFY THERAPY
Continue current broad-spectrum therapy
Reassess for:
• Inadequate source control
• Wrong/ Resistant pathogen
• Complications / New focus
• Drug dosing / PK–PD issues
Consider ID consultation

ANTIFUNGALS IN SEPSIS

- Empirical antifungal should not be given in patient with low risk of fungal infection
- When to consider



- Candidal biomarkers should not be used to guide neither initiation nor deescalation of antifungal therapy

FLUID RESUSCITATION

- Initial target 30ml/kg in 3hrs (should be individualised)
- Reassessment should be done after each bolus dose
- Maintenance fluid , if oral intake is poor - 1-1.5ml/kg/hr
- Reassess after every bolus dose

- Dynamic measures to guide fluid resuscitation over static and physical measures.

1. Stroke volume
2. Stroke volume variation
3. Pulse pressure
4. Pulse pressure variation

- Serial lactate measures can be used to guide fluid resuscitation in patients with septic shock
- Capillary refill time can also be used in septic shock

END POINT OF RESUSCITATION

Stop fluids when any of the 3 met :

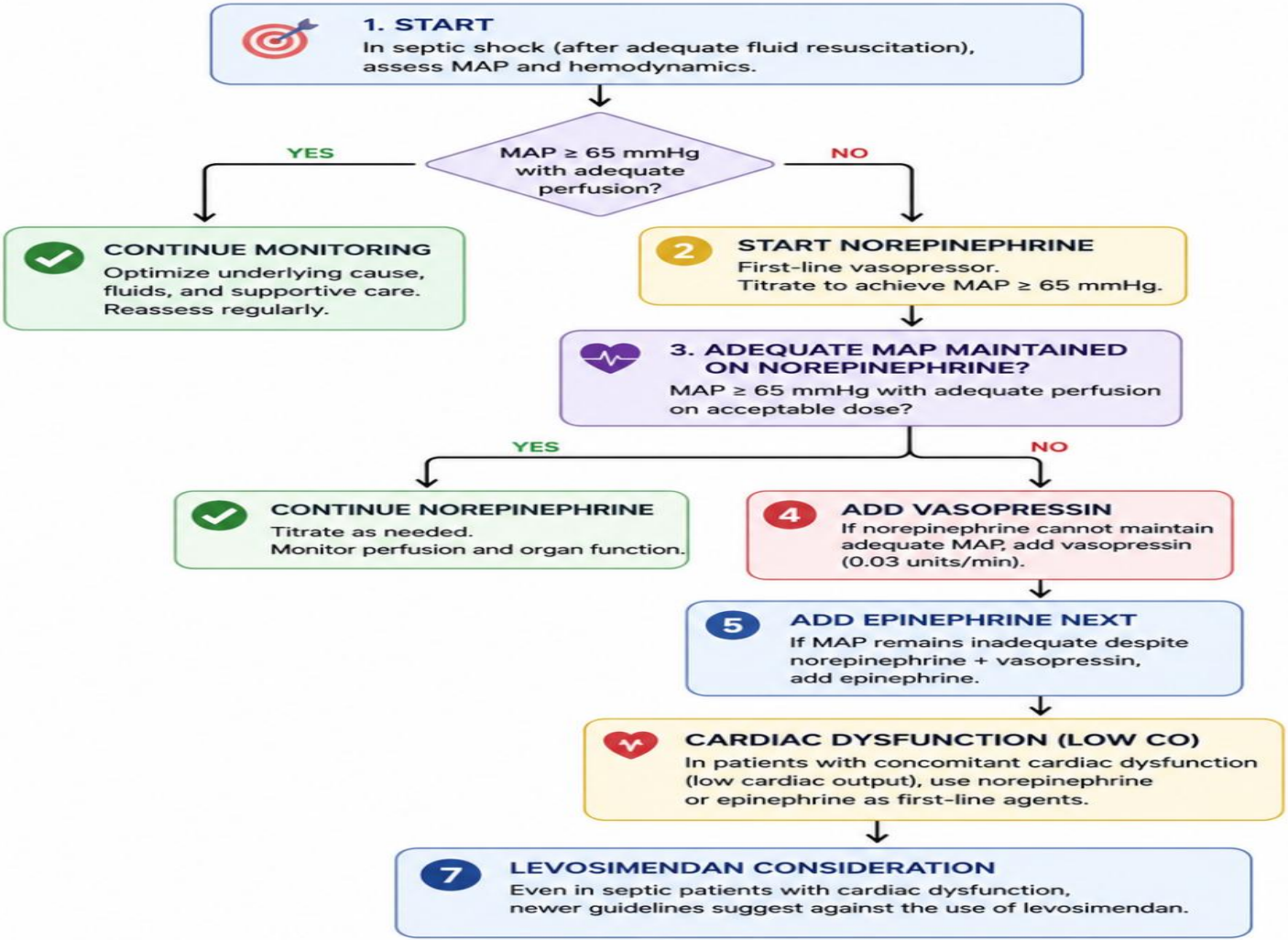
1. CVP - 8-12mmHg
2. IVC collapse with <50% with breathing
3. Passive leg raise = no BP increase

PREFERRED FLUIDS

- Bp monitoring - either invasive or non invasive
- Fluid - balanced crystalloids > normal saline

Balanced crystalloids > balanced crystalloids with albumin

- Albumin can be considered in patients who has already received large amount of crystalloids
- Avoid starch and gelatin
- Fluid resuscitation after initial bolus of 30ml/kg , should be personalized according to the patient factors


1. START
In septic shock (after adequate fluid resuscitation), assess MAP and hemodynamics.
MAP ≥ 65 mmHg with adequate perfusion?
YES
NO
CONTINUE MONITORING
Optimize underlying cause, fluids, and supportive care. Reassess regularly.
2
START NORepinephrine
First-line vasopressor. Titrate to achieve MAP ≥ 65 mmHg.
3. ADEQUATE MAP MAINTAINED ON NOREPINEPHRINE?
MAP ≥ 65 mmHg with adequate perfusion on acceptable dose?
YES
NO
CONTINUE NOREPINEPHRINE
Titrate as needed. Monitor perfusion and organ function.
4
ADD VASOPRESSIN
If norepinephrine cannot maintain adequate MAP, add vasopressin (0.03 units/min).
5
ADD EPINEPHRINE NEXT
If MAP remains inadequate despite norepinephrine + vasopressin, add epinephrine.
CARDIAC DYSFUNCTION (LOW CO)
In patients with concomitant cardiac dysfunction (low cardiac output), use norepinephrine or epinephrine as first-line agents.
7
LEVOSIMENDAN CONSIDERATION
Even in septic patients with cardiac dysfunction, newer guidelines suggest against the use of levosimendan.

Respiratory support

- Measurement of oxygenation : ABG > Pulsoximeter
- Target SpO2 - 90% - 96%
- Sepsis patient with acute hypoxemic respiratory failure HFNC preferred over NIPPV
- Awake proning - non intubated patients
- Sepsis with ARDS

  Tidal volume - 6ml/kg (low TV)

  PEEP - High

  Plateau pressure of 30cmH2O

  Prone ventilation> 12hrs

ADJUNCTIVE THERAPIES

- Corticosteroids are used in pressor refractory shock - >4hrs
- Hydrocortisone 200mg/day
- Not used in sepsis
- ADRENAL or APROCCHSS TRIAL

- Not recommended

VIT C / ivig / hemoperfusion/ PLEx / VIT D

STRESS ULCER PROPHYLAXIS

- Prophylaxis should be given for patients high risk of GI bleeding
- High risk factors

1. Coagulopathy
2. Cirrhosis / CLD
3. Shock

- Mechanical ventilation alone is not considered as a major risk factor for gi bleeding
- Other factors include : AKI / Uremia / TBI / high dose corticosteroids

NUTRITION IN SEPSIS

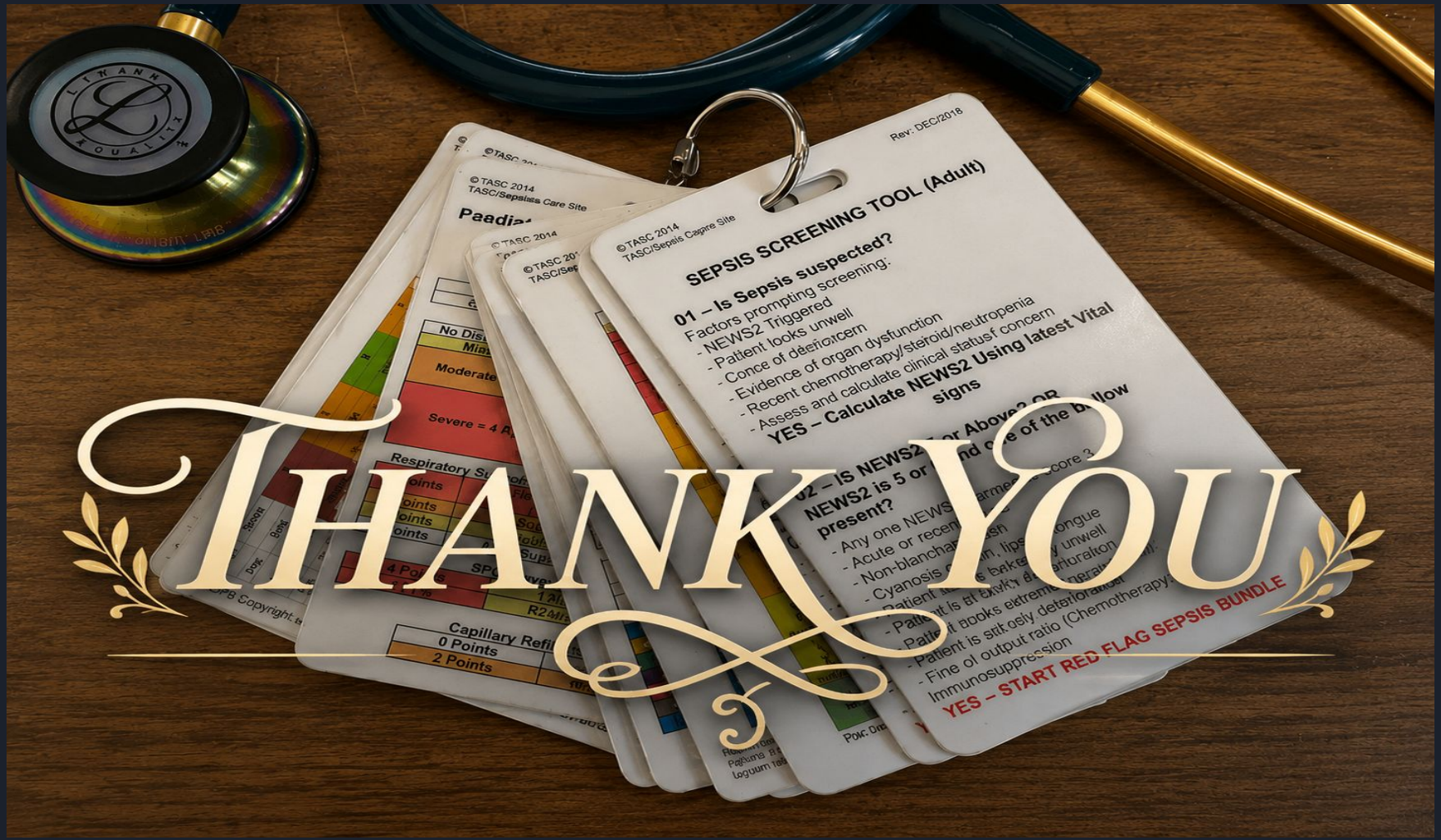
- Early initiation of enteral nutrition within 72hrs
- NG / OG Tube is the preferred mode
- Post pyloric feeding is considered if high risk of aspiration
- Calorie : 25-30Kcal/kg/day
- Protein : 1.2-2g/kg/day

GLYCEMIC CONTROL

- Blood glucose should be maintained in between 140-180mg/dl
- According to NICE - SUGAR trial : a tight glycemic control will increase the mortality
- Use insulin if glucose >180mg/dl
- Avoid hypoglycaemia <70
- Loose control is better than tight control
-

ANEMIA

- No routine transfusion is indicated if Hb >7g/dl
- Transfuse symptomatic anemia
- REALITY Trial


THANK YOU
SEPSIS SCREENING TOOL (Adult)
Rev: DEC/2018
©TASC 2014
TASC/Sepsis Care Site
01 – Is Sepsis suspected?
Factors prompting screening:
- NEWS2 Triggered
- Patient looks unwell
- Concern of deterioration
- Evidence of organ dysfunction
- Recent chemotherapy/steroid/neutropenia
- Assess and calculate clinical status
YES – Calculate NEWS2 Using latest Vital signs
YES – START RED FLAG SEPSIS BUNDLE