Every Hour Counts: The Evolution of Sepsis Care

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NW Regional Hospital Medicine Conference

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Disclosures

- None

Learning Objectives

- Identify the definition and heterogenous nature of sepsis
- Recognize the impacts of social determinants of health on sepsis identification and outcomes
- Review the evolution of management recommendations in sepsis
- Integrate the recent updates and recommendations in sepsis management
- Discuss the future focus of sepsis care

“Sepsis is a syndrome of life-threatening, acute organ dysfunction due to a dysregulated response to infection”

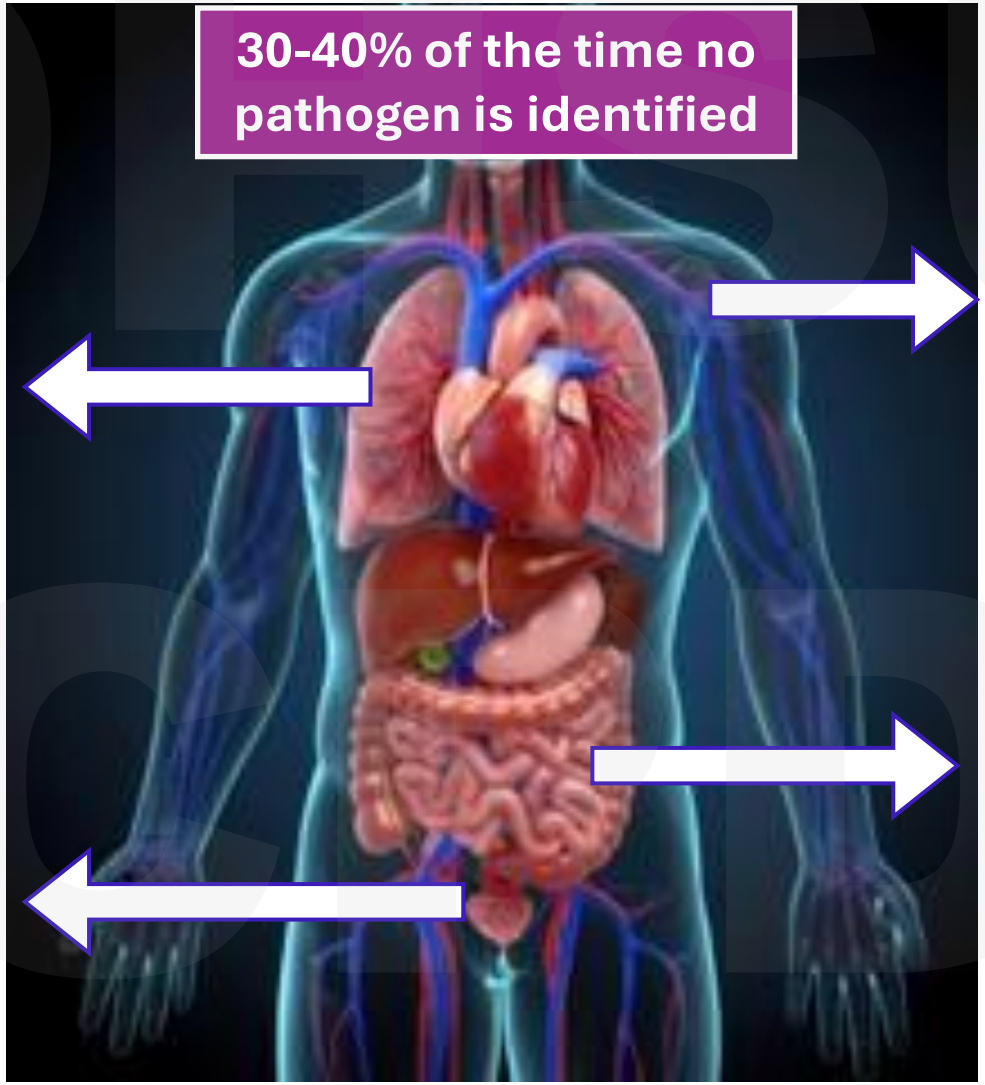
Clinical Impact of Sepsis

> 40% cases from sub-Saharan Africa

> 33% of hospital deaths
Costs > 52 billion

- ~6,500 cases
- ~1,300 deaths

Common Etiologies of Infection



Defining Sepsis

Sepsis 1
1991

SIRS → Sepsis → Severe Sepsis → Septic Shock

Sepsis 2
2001

Infection/ Trauma → SIRS → Sepsis → Severe Sepsis → Septic Shock

Sepsis 3
2016

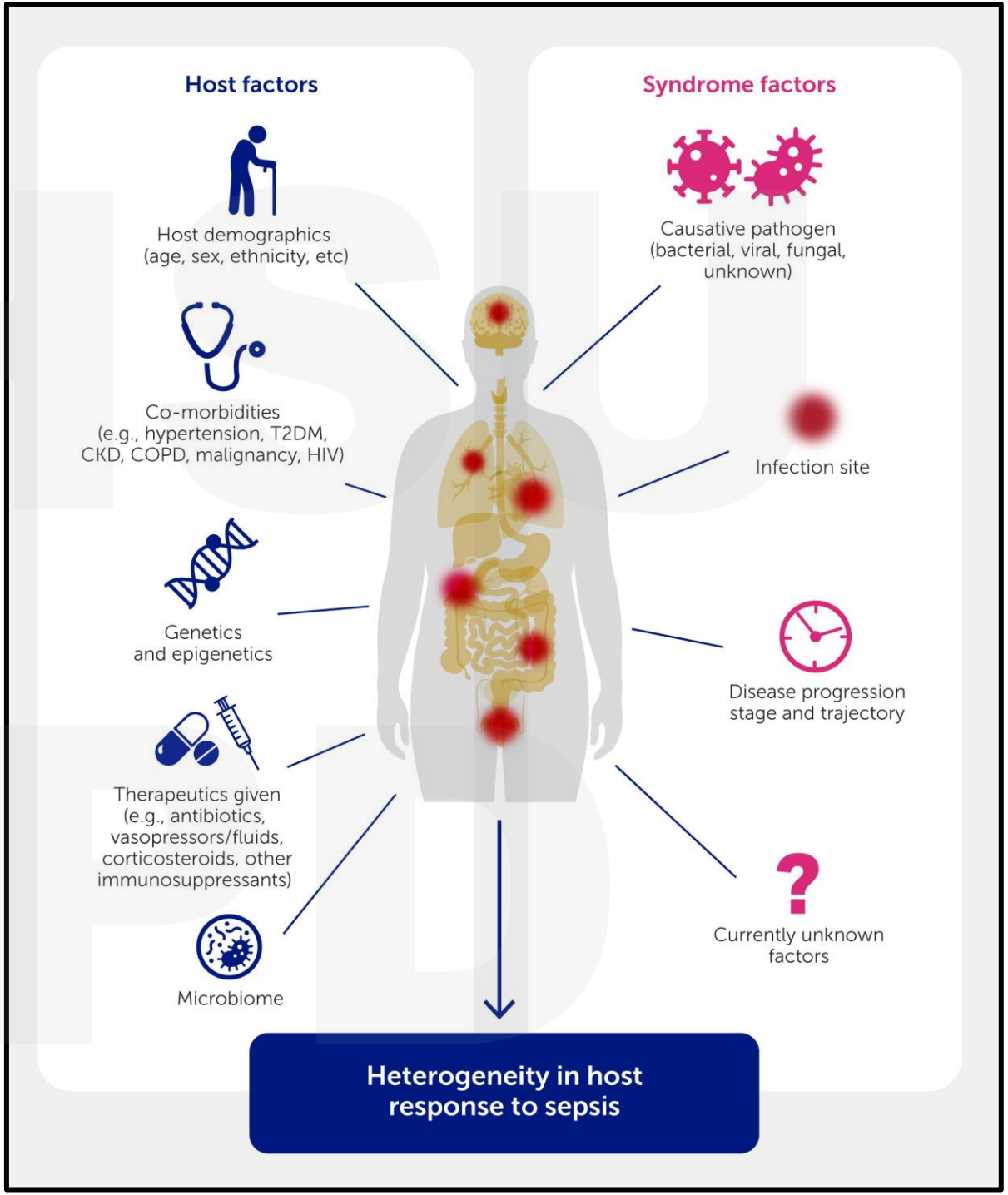
Infection/ Trauma → Early Sepsis → Sepsis → Septic Shock

Sepsis Coding & Documentation

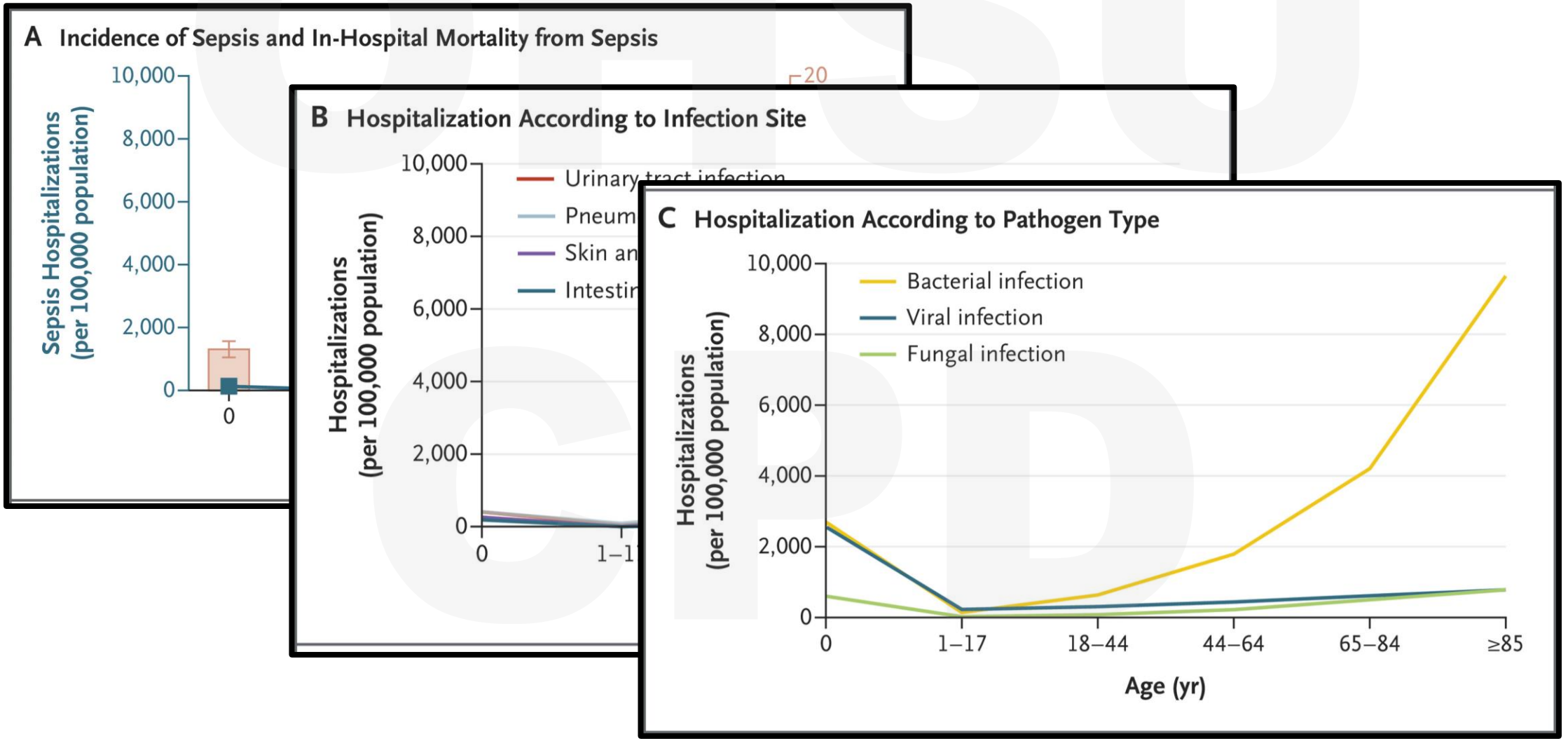
- Most frequent principal diagnosis for hospitalizations ***AND*** most expensive to treat

- Varied definitions used by insurance and clinicians
  - CMS uses Sepsis-2 definition
  - 3rd party payers use Sepsis-3 definition

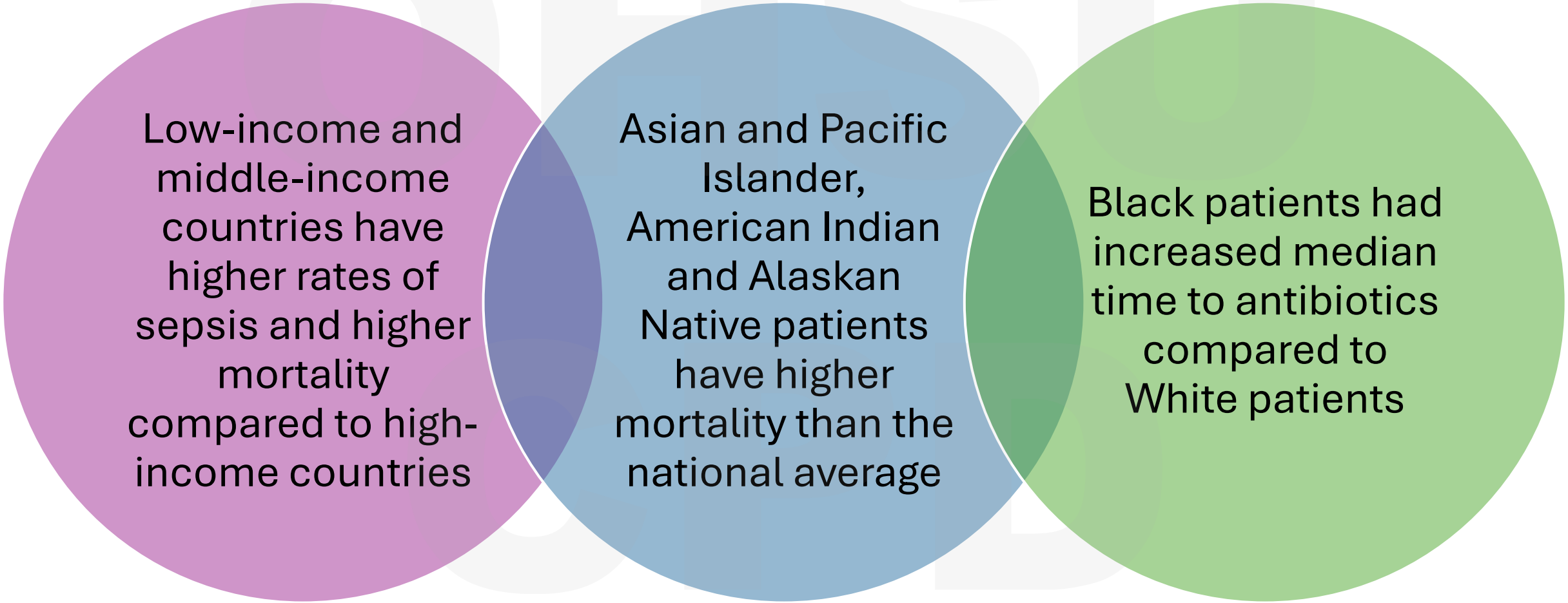
The Heterogeneity of Sepsis



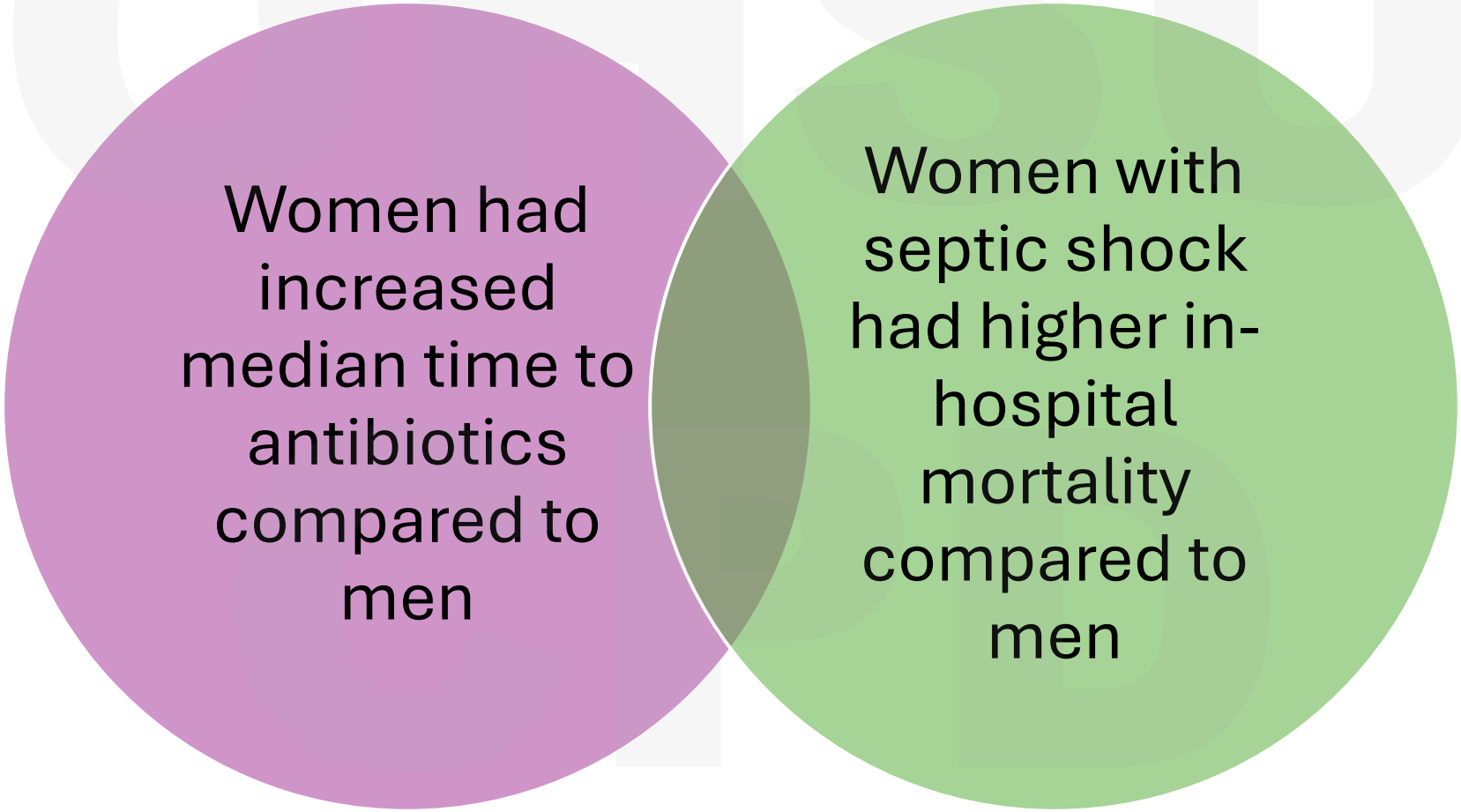
Age & Sepsis


A Incidence of Sepsis and In-Hospital Mortality from Sepsis
Sepsis Hospitalizations (per 100,000 population)
10,000
8,000
6,000
4,000
2,000
0
0
20
B Hospitalization According to Infection Site
Hospitalizations (per 100,000 population)
10,000
8,000
6,000
4,000
2,000
0
0
Urinary tract infection
Pneum
Skin an
Intestin
C Hospitalization According to Pathogen Type
Hospitalizations (per 100,000 population)
10,000
8,000
6,000
4,000
2,000
0
Bacterial infection
Viral infection
Fungal infection
0
1–17
18–44
44–64
65–84
≥85
Age (yr)

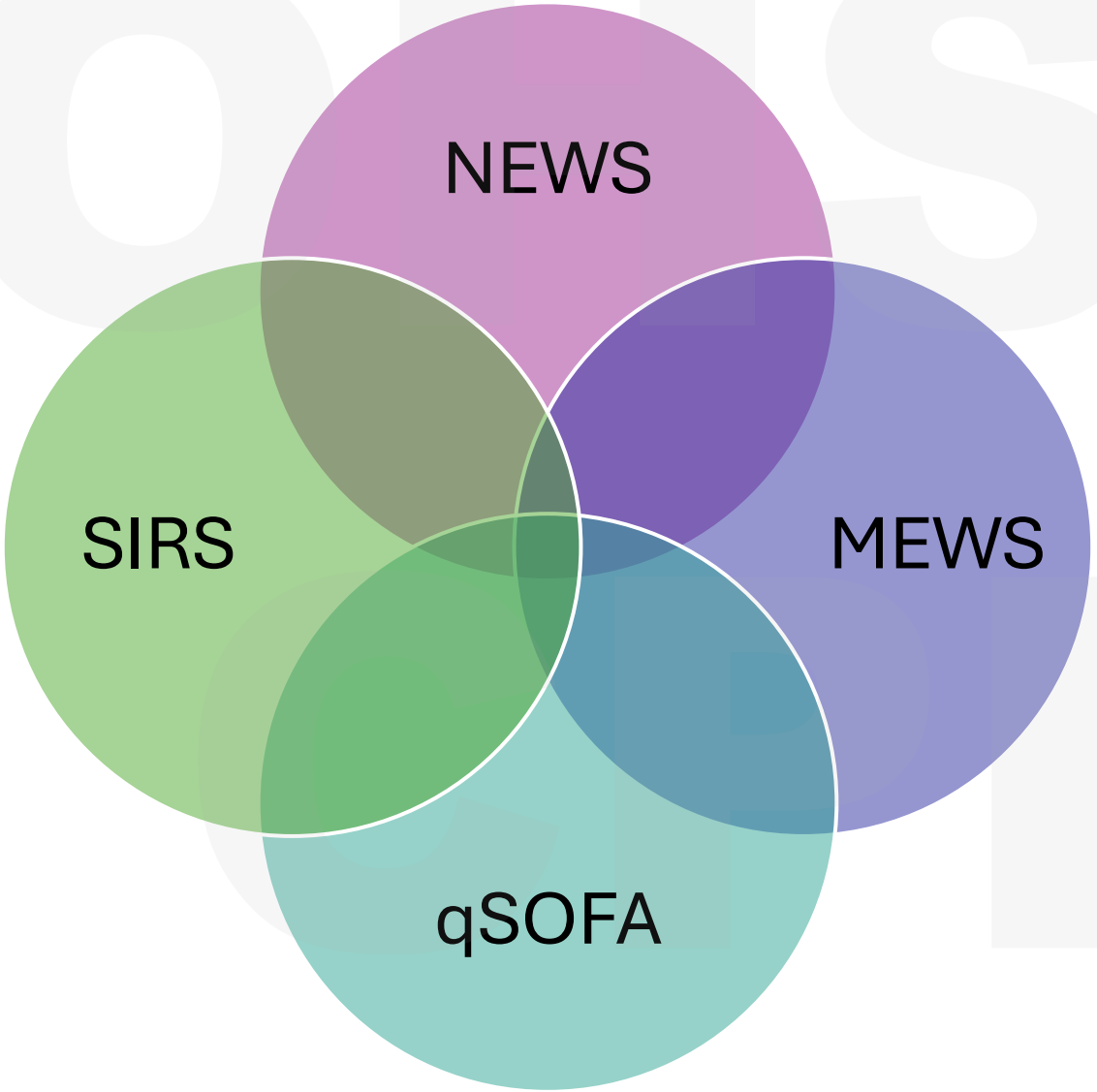
Healthcare Disparities & Sepsis



Healthcare Disparities & Sepsis

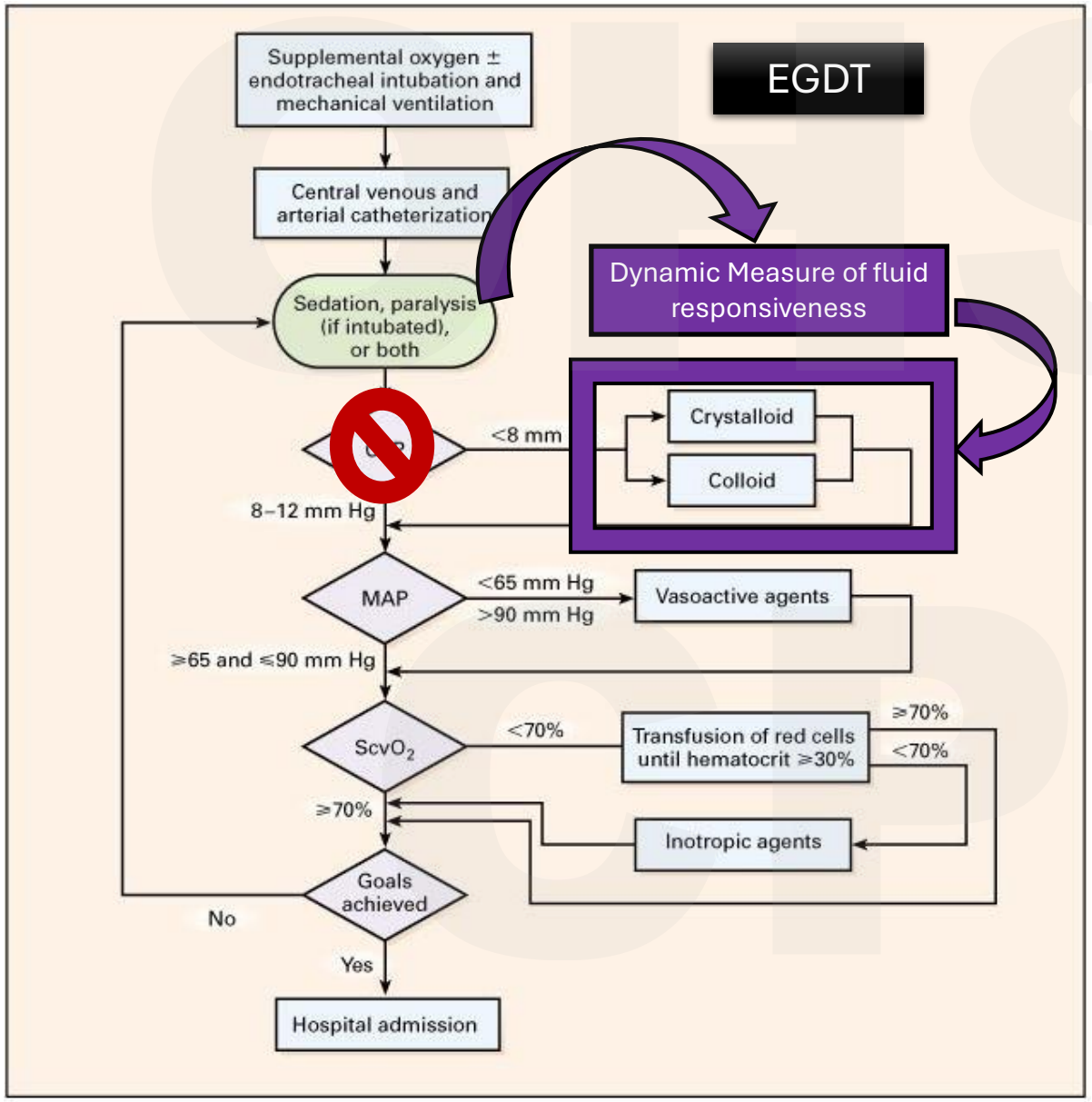


So Many Screening Tools…What do I use?



NEWS is more accurate than qSOFA, SIRS, and MEWS for predicting clinical deterioration, sepsis, and mortality!

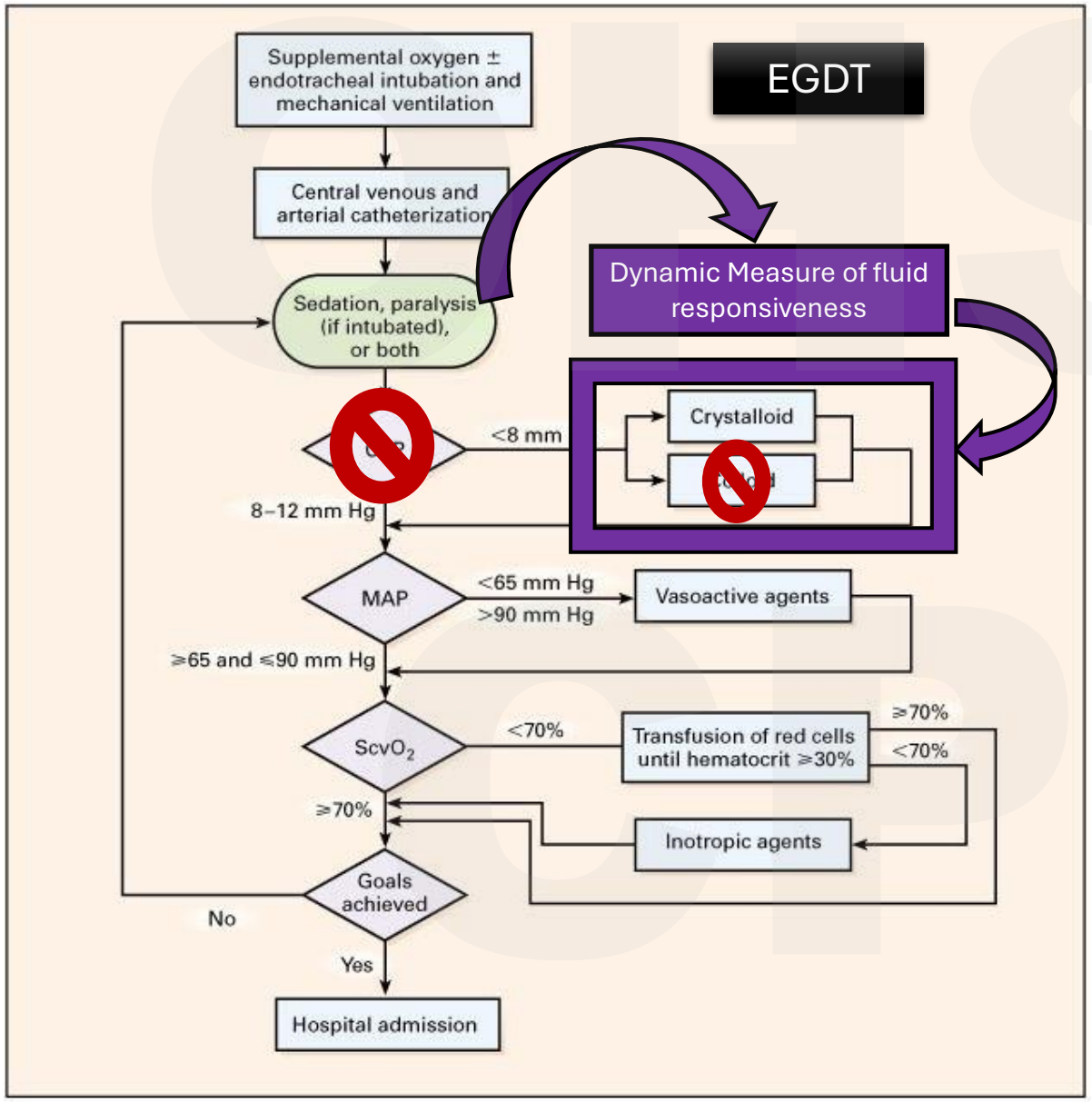
The Evolution of Sepsis Management



- 2001 – Early Goal Directed Therapy, Dr. Rivers

- ProCESS 2014
- Arise 2014
- ProMISe 2015

The Evolution of Sepsis Management

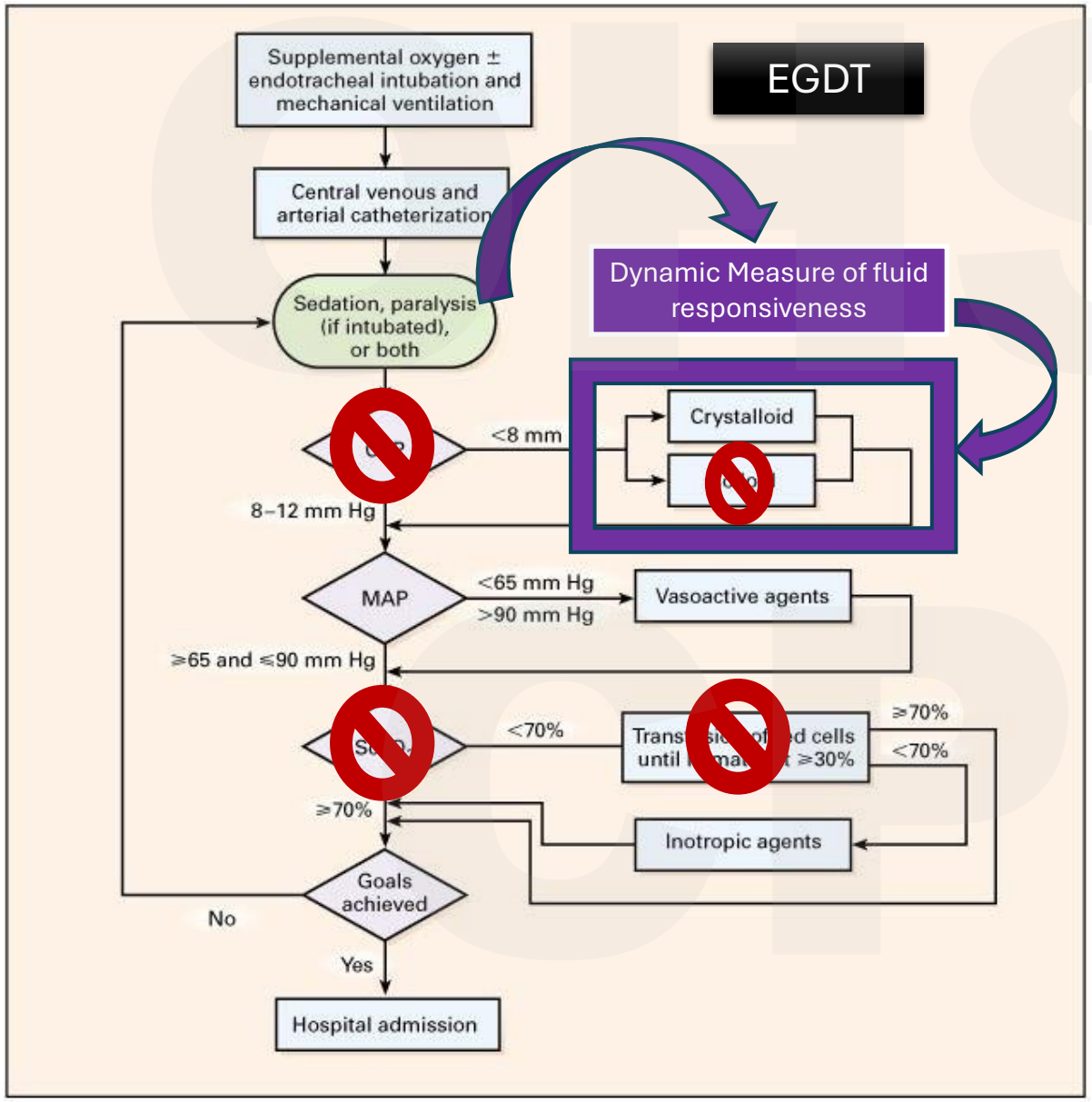


- 2001 – Early Goal Directed Therapy, Dr. Manny Rivers

- ProCESS 2014
- Arise 2014
- ProMISe 2015

- SAFE 2004
- CRISTAL 2013
- ALBIOS 2014
- Balanced Crystalloids vs Saline 2018

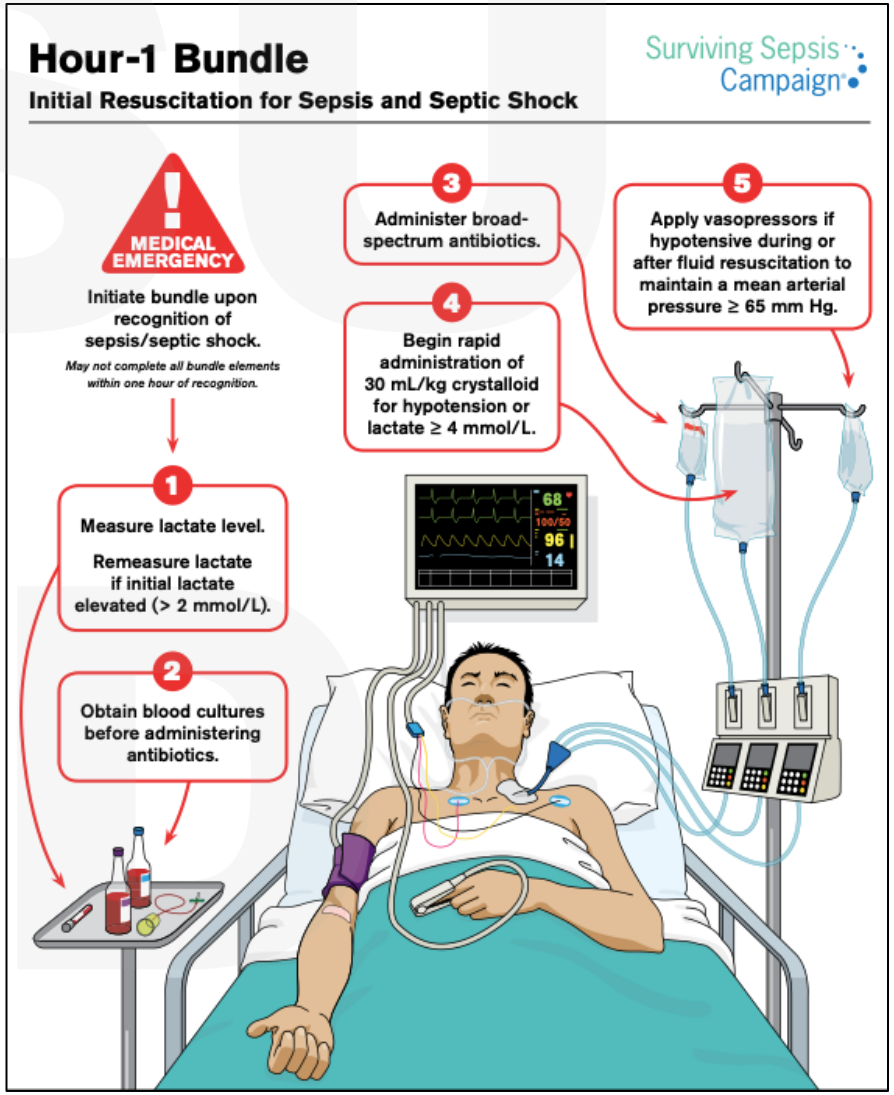
The Evolution of Sepsis Management



- High vs low BP target
  - MAP 65-70
  - MAP 80-85
- LACTATES
  - Lactic clearance vs ScvO2

Surviving Sepsis Campaign

- Created by SCCM and ESICM in 2004
- Updates published in 2008, 2012, 2016 and 2021
- 93 total statements/recommendations
  - 15 are best practice
  - 15 are strong and have moderate or high quality evidence
  - 54 are weak
  - 9 declare no recommendation



The Sepsis Bundle

1 HOUR

- Lactate Level and repeat if > 2
- Blood Cultures
- Antibiotics
- IVF (30ml/kg) if MAP < 65 or lactate > 4
- Vasopressors if MAP < 65

3 HOUR

- Lactate Level
- Blood Cultures
- Antibiotics
- IVF (30ml/kg) if MAP < 65 or lactate > 4

6 HOUR

- Repeat Lactate
- Reassess volume status and tissue perfusion
- Vasopressors if MAP < 65

Best Practice Statements

- Sepsis & septic shock are medical emergencies

- Rapid assessment and reassessment
  - If possible sepsis but NO shock quickly determine the likelihood of sepsis
  - If suspected sepsis or septic shock but NO confirmed infection continue to reassess for alternate diagnosis

- Prompt removal of indwelling intravascular devices after establishing other vascular access

Best Practice Statements

- Antibiotics
  - If high risk for MRSA use empiric MRSA coverage
  - Optimize dosing strategies based on specific drug properties
  - If high risk for fungemia use empiric fungal coverage

- Palliative Care
  - Recommend goals of care conversations
  - Address patient symptoms and suffering

Best Practice Statements

- Discharge Planning
  - Screen for economic and social supports
  - Shared decision making and discharge planning should occur
  - **Reconcile medications at both ICU and hospital discharge**
  - **Include information in their discharge about sepsis and common impairments after sepsis**

- Post ICU Care
  - If new physical, cognitive or emotional impairments persist recommend referral to a Post ICU or Post Sepsis clinic on hospital discharge

Updated Recommendations – 2021

Recommendation	Quality of Evidence
Recommend against using qSOFA for screening; Use MEWS, NEWS or SIRS instead	Moderate
≥ 30ml/kg IV balanced crystalloid should be given within 3 hours and repeat assessment of volume status	Low
If ongoing vasopressor requirement would suggest hydrocortisone	Low
Recommend against Vitamin C in sepsis and septic shock	Moderate

Updated Recommendations – 2021

Recommendation	Quality of Evidence
If on norepinephrine and MAP < 65 then would add vasopressin instead of only increasing norepi	Moderate
If on norepinephrine and vasopressin with MAP < 65 would add epinephrine	Low
Recommend against terlipressin and levosimendan	Low
If septic cardiomyopathy with hypoperfusion despite adequate IVF and MAP > 65 would add either: Dobutamine + Norepi OR Epinephrine	Low

Updated Recommendations – 2021

Recommendation	Quality of Evidence
Add empiric MRSA coverage if patient is at high risk of MRSA	Low
Add empiric fungal coverage if patient is at high risk of fungal infection	Low
Adult sepsis survivors are recommended to have follow up for physical, cognitive and emotional problems after discharge	Low

Early Restrictive vs Liberal Fluid Management

- Hurricane Maria in 2017 → IV fluid shortage
  - Real world evaluation of restrictive vs liberal fluid strategies
  - Shorter ventilator days and ICU LOS if less IVF given

- CLOVERS Trial:
  - Restrictive group had less IVF used; more and higher doses for longer of vasopressors
  - No difference in 90 day mortality

- Hurricane Helene 2024 → IV fluid shortage
  - Again, real world assessments of IVF use in sepsis with no change in overall outcomes with less IVF use

Vitamin C in Sepsis

Intravenous Vitamin C in Adults with Sepsis in the Intensive Care Unit

François Lamontagne, M.D., Marie-Hélène Masse, M.Sc., Julie Menard, Ph.D., Sheila Sprague, Ph.D., Ruxandra Pinto, Ph.D., Daren K. Heyland, M.D., Deborah J Cook, M.D., Marie-Claude Battista, Ph.D., Andrew G. Day, M.Sc., Gordon H. Guyatt, M.D., Salmaan Kanji, Pharm.D., Rachael Parke, R.N., M.H.Sc., Ph.D., et al., for the LOVIT Investigators and the Canadian Critical Care Trials Group*

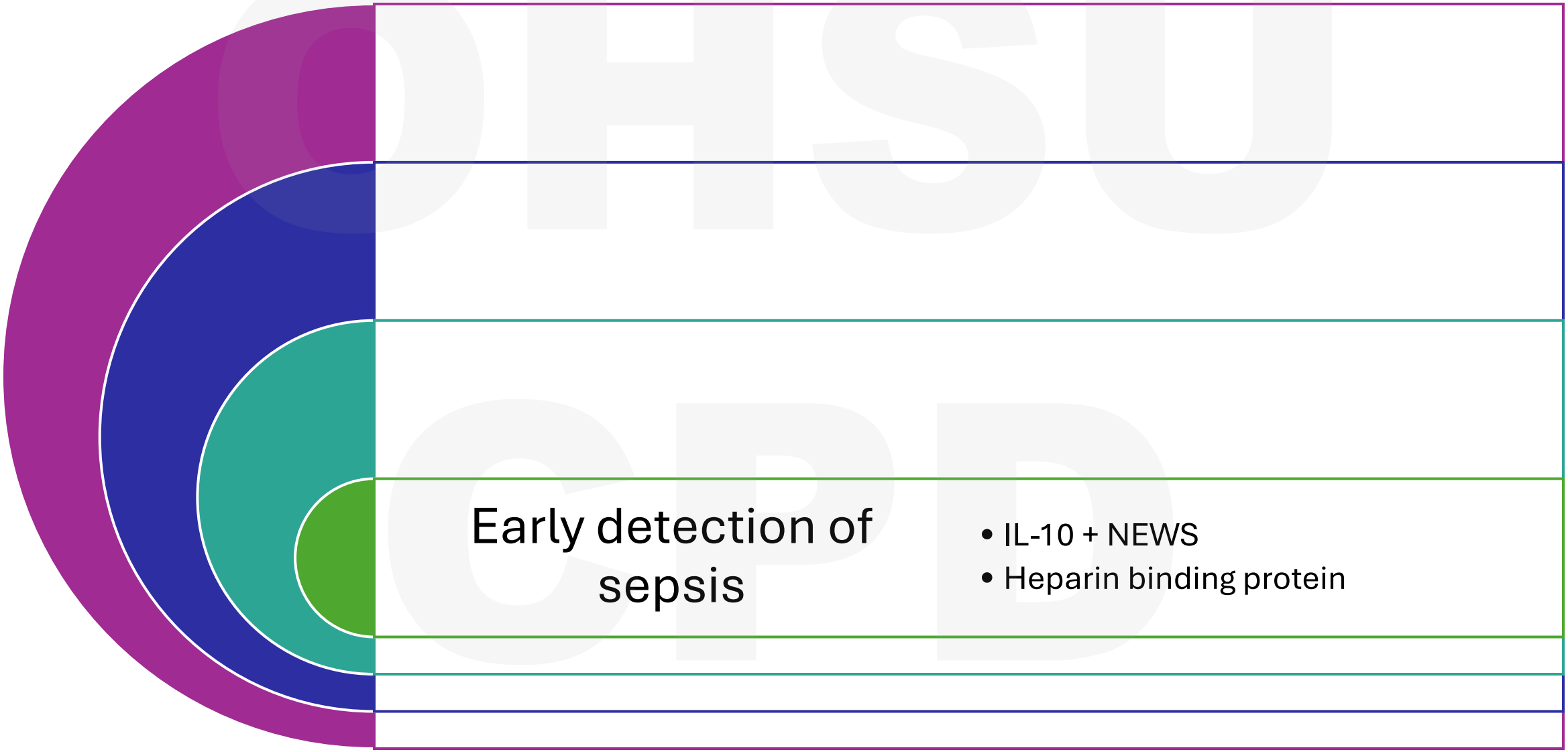
- 2017 Study showed huge mortality benefit to receiving hydrocortisone, ascorbic acid and thiamine
  - 8.5% in treatment group
  - 40.4% in control group

- Unable to be replicated by many other large trials

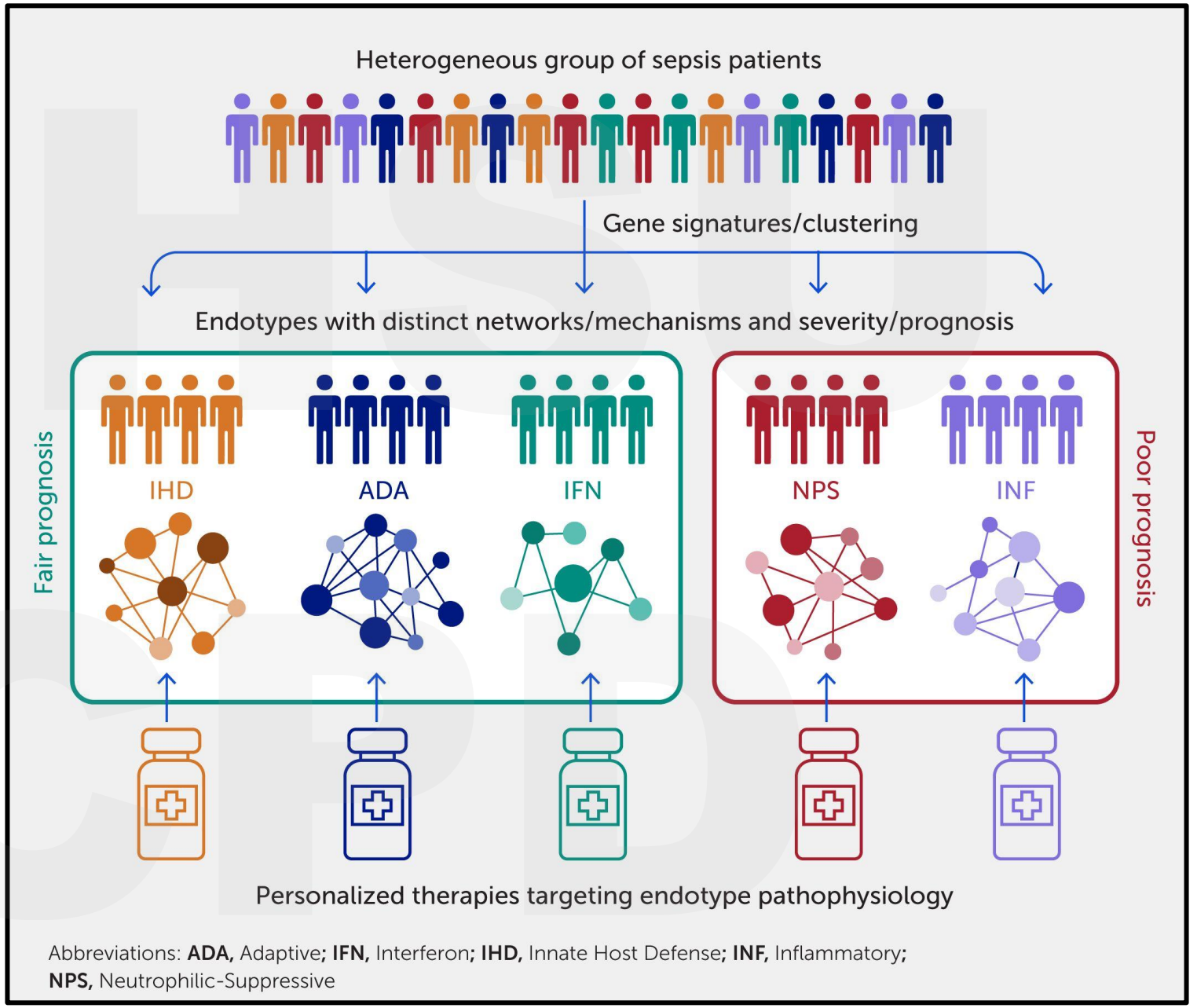
- More recently in adults of high/middle income countries with sepsis on vasopressors → IV vitamin C had a higher risk of death or persistent organ dysfunction at 28 days compared to placebo

The Future of Sepsis Care

Using Biomarkers in Sepsis



Endotypes & Phenotypes in Sepsis



Take Home Points

- Early recognition is key! MEWS / NEWS scores are preferred
- Balanced crystalloid is preferred and has mortality benefit
- Early target of MAP > 65 improves outcomes
- Early appropriate spectrum antibiotics based on risk factors and culture history reduces mortality
- Future aim to improve individualization and precision of sepsis management

Questions?

Thank you