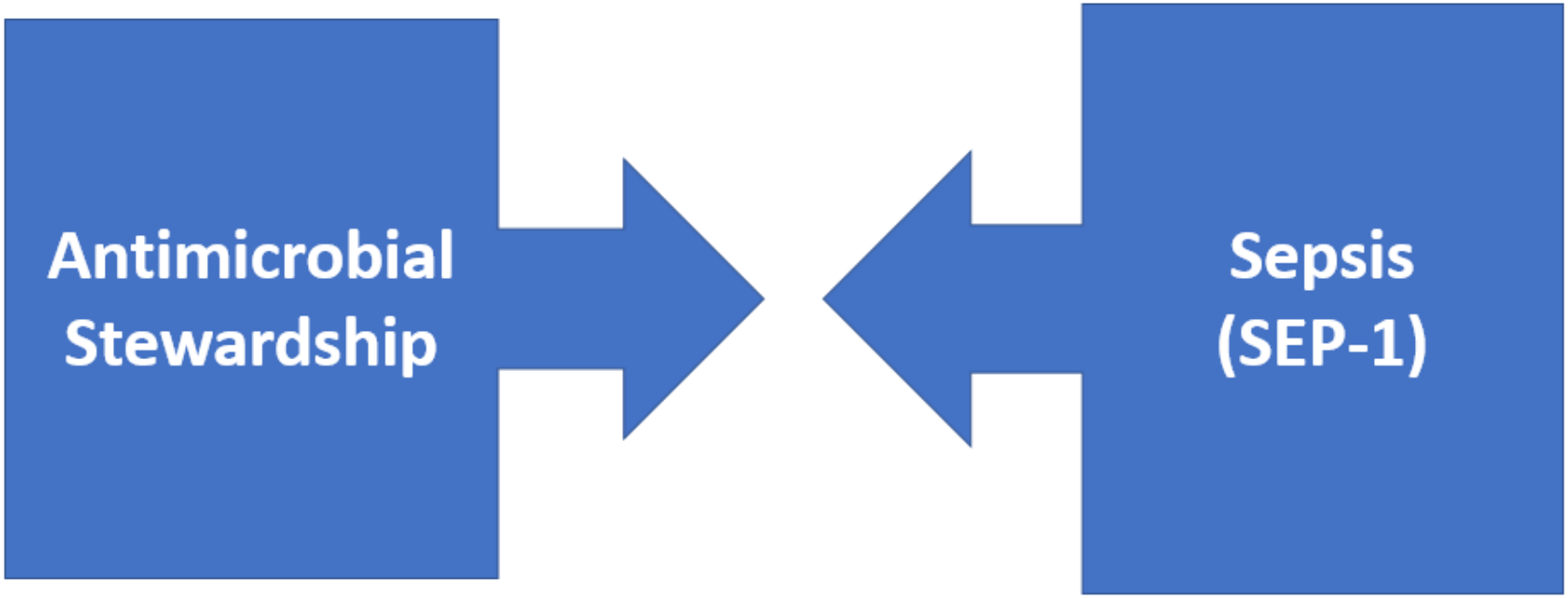
UWTASP

tele-antimicrobial stewardship program

April 12, 2022

Stewardship and Sepsis
Cases and discussion

Clash of Goals?



Clash of Goals?

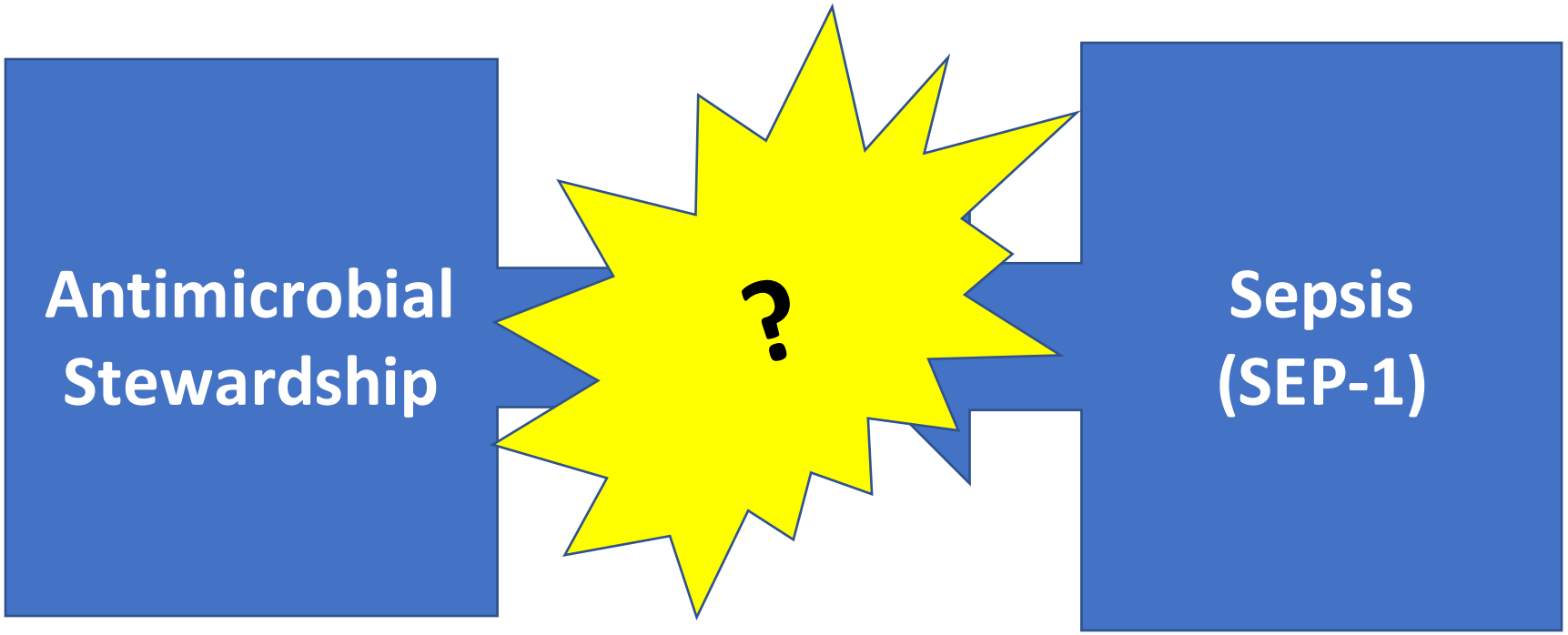


Image: Ministry of Health Singapore

Society of Critical Care Medicine

The Intensive Care Professionals

GUIDELINES | SURVIVING SEPSIS CAMPAIGN | SEPSIS

Surviving Sepsis Campaign Guidelines 2021

Surviving Sepsis Campaign Guidelines 2021 | SCCM

GUIDELINES | SURVIVING SEPSIS CAMPAIGN | SEPSIS

Surviving Sepsis Campaign Guidelines 2021

For adults with suspected sepsis or septic shock but unconfirmed infection, we recommend continuously re-evaluating and searching for alternative diagnoses and discontinuing empiric antimicrobials if an alternative cause of illness is demonstrated or strongly suspected.

Infection | Best Practice | Dx Infection

For adults with possible septic shock or a high likelihood for sepsis, we recommend administering antimicrobials immediately, ideally within 1 hour of recognition.
Quality of evidence: Low

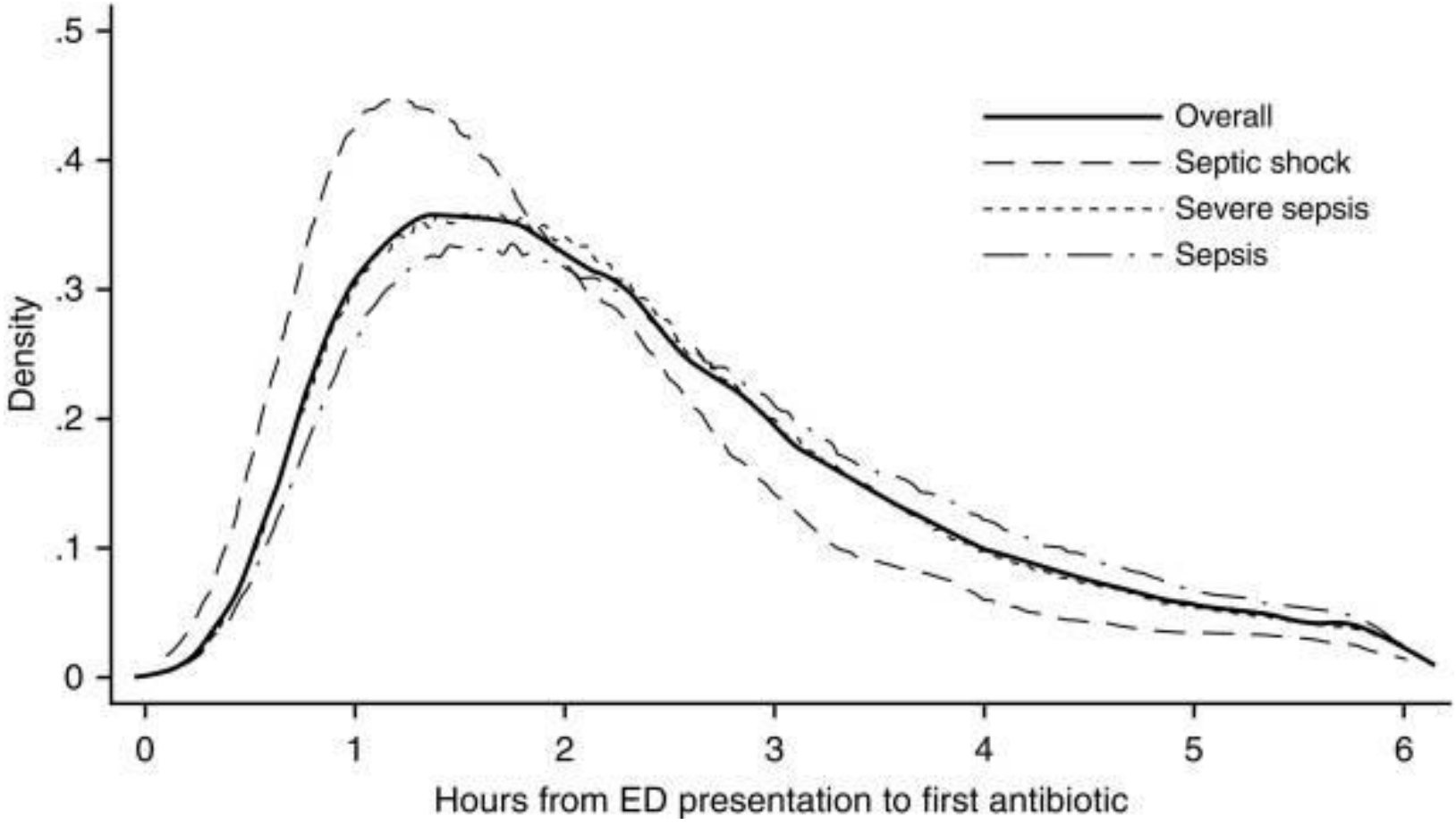
Infection | Strong | Time to Antimicrobials

For adults with possible sepsis without shock, we recommend rapid assessment of the likelihood of infectious versus noninfectious causes of acute illness.

Infection | Best Practice | Time to Antimicrobials

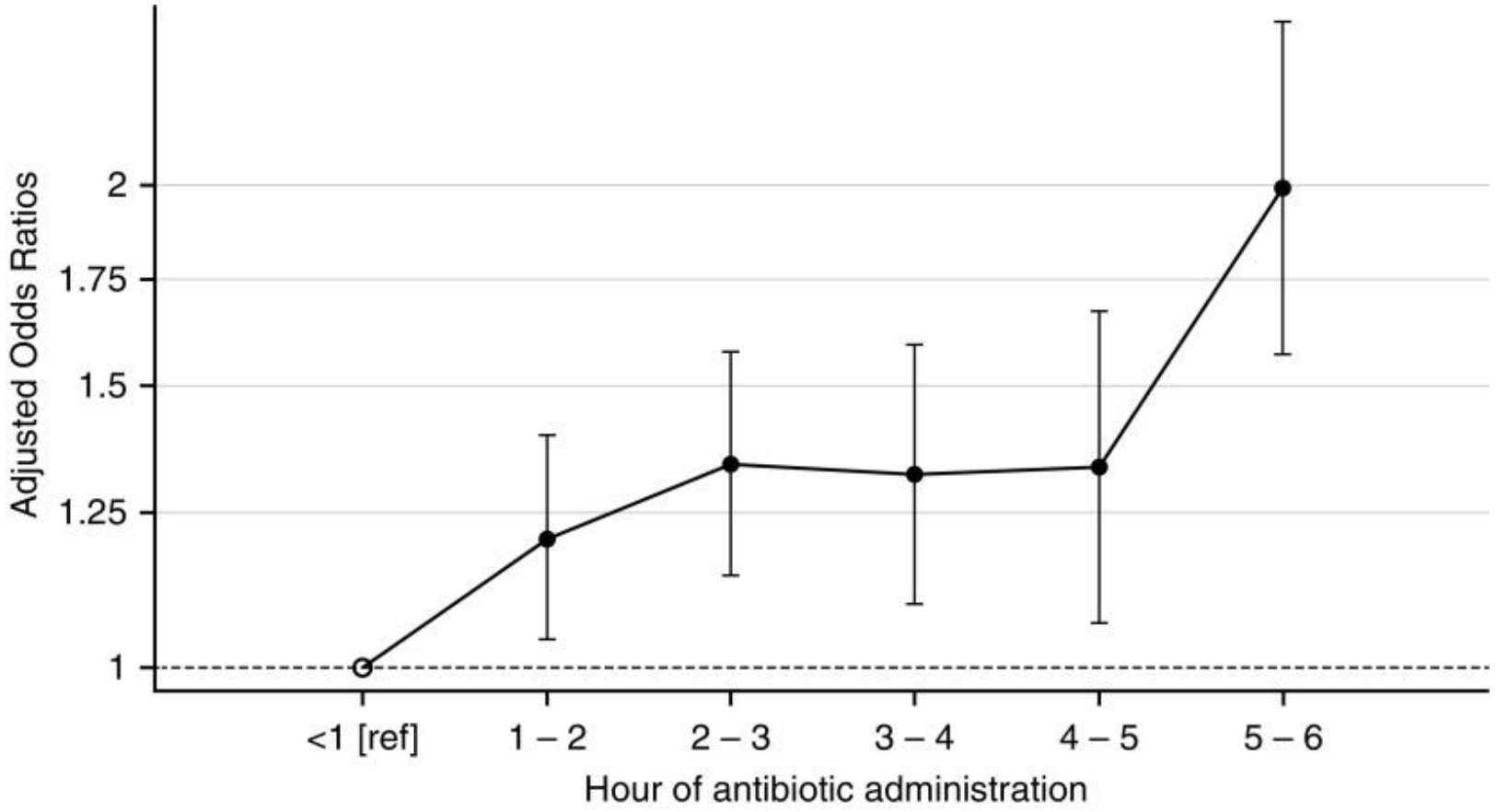
Surviving Sepsis Campaign Guidelines 2021 | SCCM

Right Timing



Liu, Am J Respir Crit Care Med, 2017

Right Timing



Liu, Am J Respir Crit Care Med, 2017

GUIDELINES | SURVIVING SEPSIS CAMPAIGN | SEPSIS

Surviving Sepsis Campaign Guidelines 2021

For adults with possible sepsis without shock, we suggest a time-limited course of rapid investigation and if concern for infection persists, the administration of antimicrobials within 3 hours from the time when sepsis was first recognized.
Quality of evidence: Very low

Infection | Weak | Time to Antimicrobials

For adults with a low likelihood of infection and without shock, we suggest deferring antimicrobials while continuing to closely monitoring the patient.
Quality of evidence: Very low

Infection | Weak | Time to Antimicrobials

For adults with suspected sepsis or septic shock, we suggest against using procalcitonin plus clinical evaluation to decide when to start antimicrobials, as compared to clinical evaluation alone.
Quality of evidence: Very low

Infection | Weak | Procalcitonin

Surviving Sepsis Campaign Guidelines 2021 | SCCM

GUIDELINES | SURVIVING SEPSIS CAMPAIGN | SEPSIS

Surviving Sepsis Campaign Guidelines 2021

For adults with sepsis or septic shock at high risk of MRSA, we recommend using empiric antimicrobials with MRSA coverage over using antimicrobials without MRSA coverage.

Infection | Best Practice | MRSA Coverage

For adults with sepsis or septic shock at low risk of MRSA, we suggest against using empiric antimicrobials with MRSA coverage, as compared with using antimicrobials without MRSA coverage.
Quality of evidence: Low

Infection | Weak | MRSA Coverage

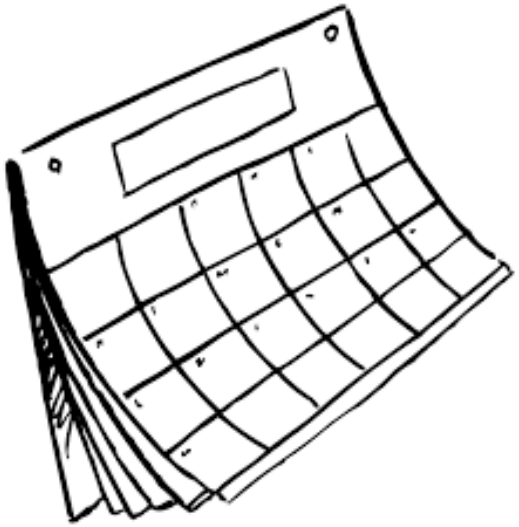
For adults with sepsis or septic shock and low risk for multidrug resistant (MDR) organisms, we suggest against using two gram-negative agents for empiric treatment, as compared to one gram-negative agent.
Quality of evidence: Very low

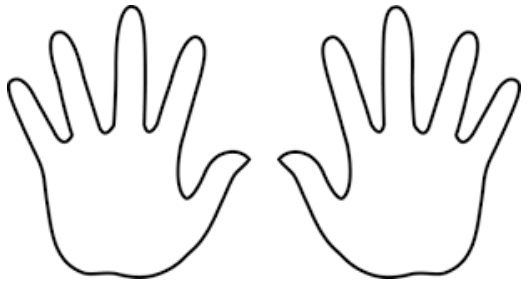
Infection | Weak | Multidrug Resistant Organisms

[Surviving Sepsis Campaign Guidelines 2021 | SCCM]

What drives duration of therapy?

History, the Solar System, and a Human Hand

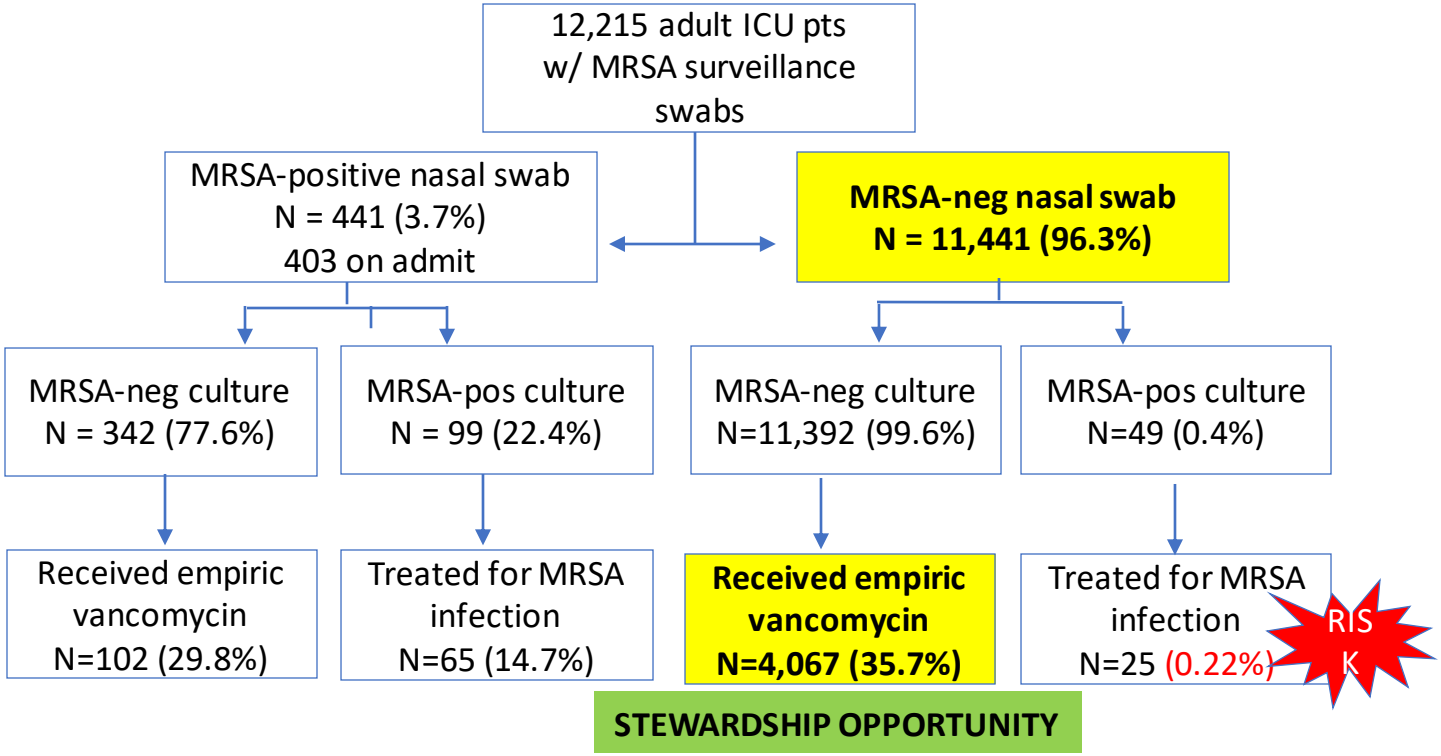




citations

MRSA nasal swabs:
If it doesn't grow, just say no

- Retrospective study x2 years, 6 ICUs in a single center



citations

GUIDELINES SURVIVING SEPSIS CAMPAIGN SEPSIS

Surviving Sepsis Campaign Guidelines 2021

For adults with sepsis or septic shock and high risk for multidrug resistant (MDR) organisms, we suggest using two antimicrobials with gram-negative coverage for empiric treatment over one gram-negative agent.
Quality of evidence: Very low

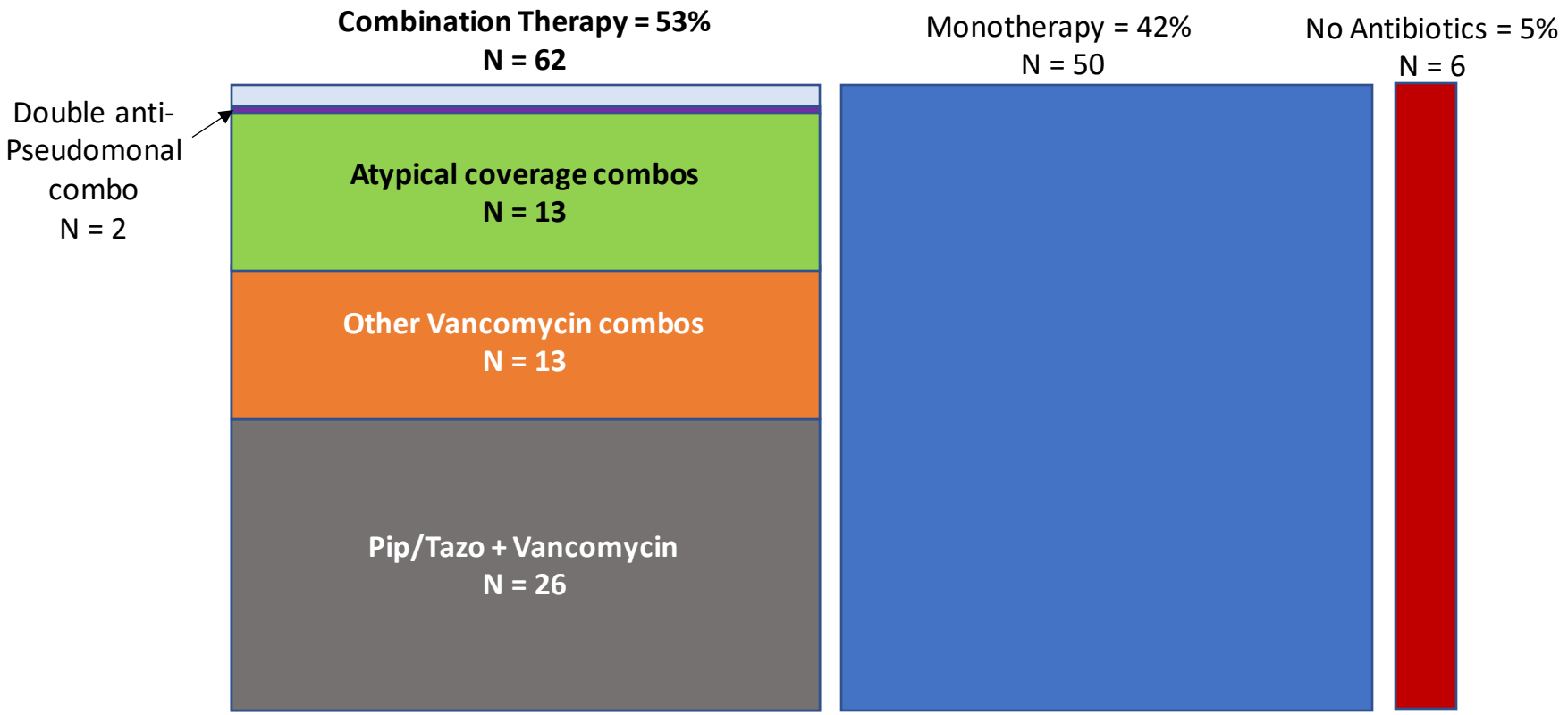
Infection Weak Multidrug Resistant Organisms

For adults with sepsis or septic shock, we suggest against using double gram-negative coverage once the causative pathogen and the susceptibilities are known.
Quality of evidence: Very low

Infection Weak Double gram-negative coverage

[Surviving Sepsis Campaign Guidelines 2021 | SCCM]

Combination Therapy



citations

Gram Negative Isolates
Percent susceptible

Organism	No. of Isolates	Ampicillin	Ampicillin/Sulbactam	Aztreonam	Cefazolin	Ceftriaxone	Gentamicin	Levofloxacin	Nitrofurantoin	Piperacillin/tazo	Trimethoprim/Sulfa	Cefepime	Ertapenem	Meropenem	Minocycline
Acinetobacter species	36						100	97		92	97	86		100	
Citrobacter freundii	62			85		85	89	94	97	89	76		100		
Citrobacter koseri	55			96		96	100	100	93	98	98		100		
Enterobacter aerogenes	72			88		88	100	97	21	82	99		100		
Enterobacter cloacae complex	134			89		90	98	97	48	90	90		98		
Escherichia coli	3540	56	65	94	85*	91	93	79	96	96	78		100		
Klebsiella oxytoca	105		61	90	59*	93	99	97	86	90	96		100		
Klebsiella pneumoniae	562		90	98	95*	98	98	94	37	97	92		100		
Morganella morganii	64			89		95	88	73		92	61		100		
Proteus mirabilis	420	80	90	100	94*	98	85	77		100	70		100		
Providencia rettgeri	11			91		100	91	100		100	100		100		
Providencia stuartii	8			100		100	0	13		100	88		100		
Pseudomonas aerugenosa	337			87			97	77		96		94		92	
Raoultella planticola	10		90	90		90	90	100	100	100	90		100		
Serratia marcescens	54			100		100	98	100		96	100		100		
Stenotrophomonas maltophilia	41							93			95				100

* Urine isolates only

citations

Gram Negative Isolates

Percent susceptible

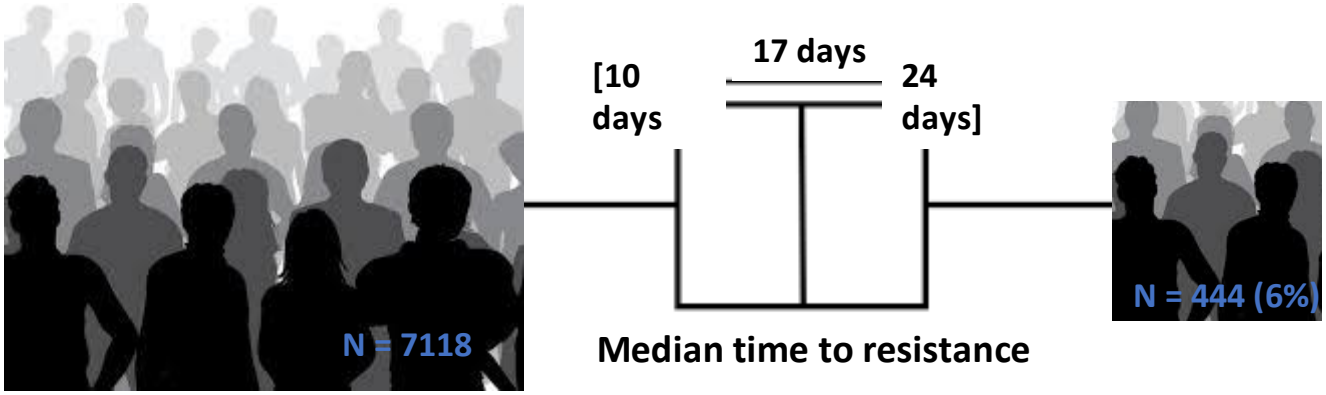
Organism	No. of Isolates	Ampicillin	Ampicillin/Sulbactam	Aztreonam	Cefazolin	Ceftriaxone	Gentamicin	Levofloxacin	Nitrofurantoin	Piperacillin/tazo	Trimethoprim/Sulfa	Cefepime	Ertapenem	Meropenem	Minocycline
Acinetobacter species	68						97	91		82	91	93		94	
Citrobacter freundii	118			81		77	97	90	97	82	86		100		
Citrobacter koseri	79			100		100	100	99	97	100	100		100		
Enterobacter aerogenes	144			80		76	100	97	24	77	99		99		
Enterobacter cloacae complex	226			79		76	97	96	61	80	87		93		
Escherichia coli	7032	56	63	95	89*	92	93	81	97	97	78		100		
Klebsiella oxytoca	137														
Klebsiella pneumoniae	1005														
Morganella morganii	126														
Proteus mirabilis	801	80	91	98	96*	97	82	74		100	70		100		
Providencia rettgeri	35			97		100	100	97		100	83		100		
Providencia stuartii	18			100		100	0	6		100	91		100		
Pseudomonas aeruginosa	706			84			94	74		86		94		92	
Raoultella planticola	19		89	89		89	95	100	100	100	74		100		
Serratia marcescens	119			100		100	100	97		99	100		100		
Stenotrophomonas maltophilia	42							86			81				100

P. aeruginosa isolates (N = 702)
one tenth the frequency of *E. coli* isolates (N = 7032)

* Urine isolates only

citations

Duration of Exposure to Antipseudomonal β-Lactam Antibiotics in the Critically Ill and Development of New Resistance



There was a **4% increased risk** of new resistance for **each additional day** of any antipseudomonal β-lactam exposure

citations

4% increased risk of new resistance for each additional day of ANY antipseudomonal β-lactam exposure

Increased risk of NEW resistance for each additional day of therapy

Cefepime n = 5274	8%
Piperacillin/ tazobactam n = 2463	8%
Meropenem n = 3625	2%

…When comparing a 7-day course with a 10-day course of therapy, the 10-day course is associated with a 24% increased risk of new resistance compared with the 7-day course

Pharmacotherapy 2019;39(3):261-268.

GUIDELINES SURVIVING SEPSIS CAMPAIGN SEPSIS

Surviving Sepsis Campaign Guidelines 2021

For adults with sepsis or septic shock, we suggest using prolonged infusion of beta-lactams for maintenance (after an initial bolus) over conventional bolus infusion.
Quality of evidence: Moderate

Infection Weak Beta-lactams

For adults with sepsis or septic shock, we recommend optimizing dosing strategies of antimicrobials based on accepted pharmacokinetic/pharmacodynamic (PK/PD) principles and specific drug properties.

Infection Best Practice Optomizing Antimicrobials

Surviving Sepsis Campaign Guidelines 2021 | SCCM

GUIDELINES SURVIVING SEPSIS CAMPAIGN SEPSIS

Surviving Sepsis Campaign Guidelines 2021

For adults with sepsis or septic shock, we suggest daily assessment for de-escalation of antimicrobials over using fixed durations of therapy without daily reassessment for de-escalation.
Quality of evidence: Very low

Infection Weak De-escalation of Antibiotics

For adults with an initial diagnosis of sepsis or septic shock and adequate source control, we suggest using shorter over longer duration of antimicrobial therapy.
Quality of evidence: Very low

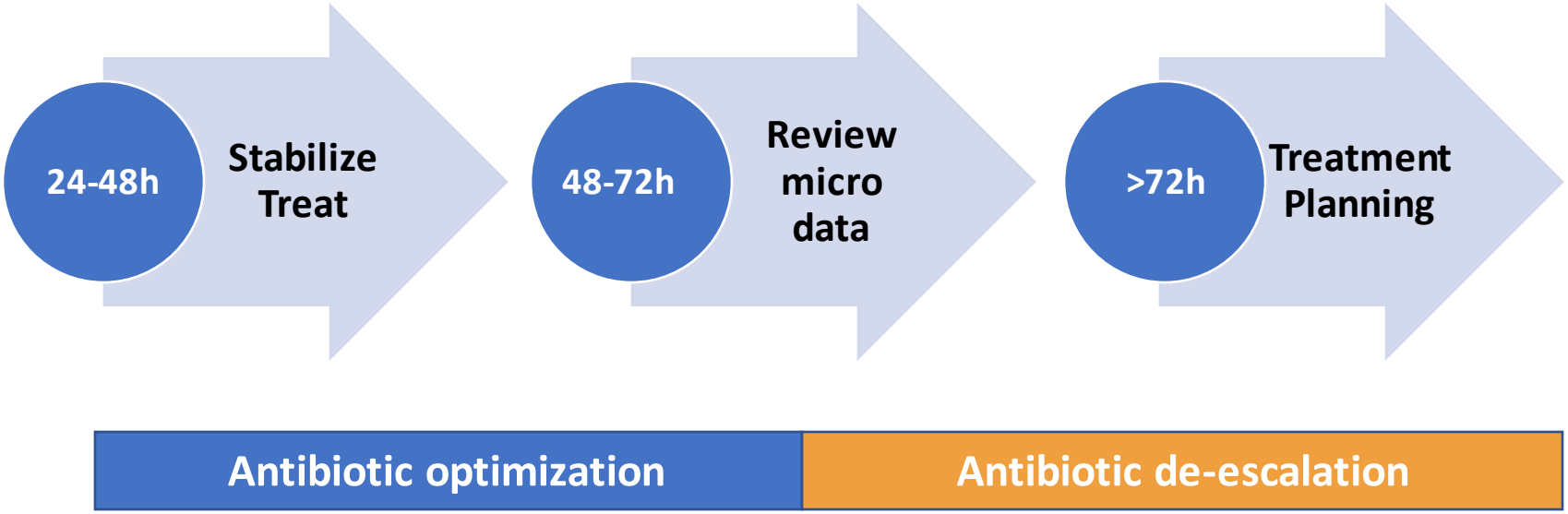
Infection Weak Duration of Antibiotics

For adults with an initial diagnosis of sepsis or septic shock and adequate source control where optimal duration of therapy is unclear, we suggest using procalcitonin AND clinical evaluation to decide when to discontinue antimicrobials over clinical evaluation alone.
Quality of evidence: Low

Infection Weak Procalcitonin

Surviving Sepsis Campaign Guidelines 2021 | SCCM

Stabilize…Diagnose…De-escalate



citations

EDITORIAL

The New Antibiotic Mantra—"Shorter Is Better"

Brad Spellberg, MD

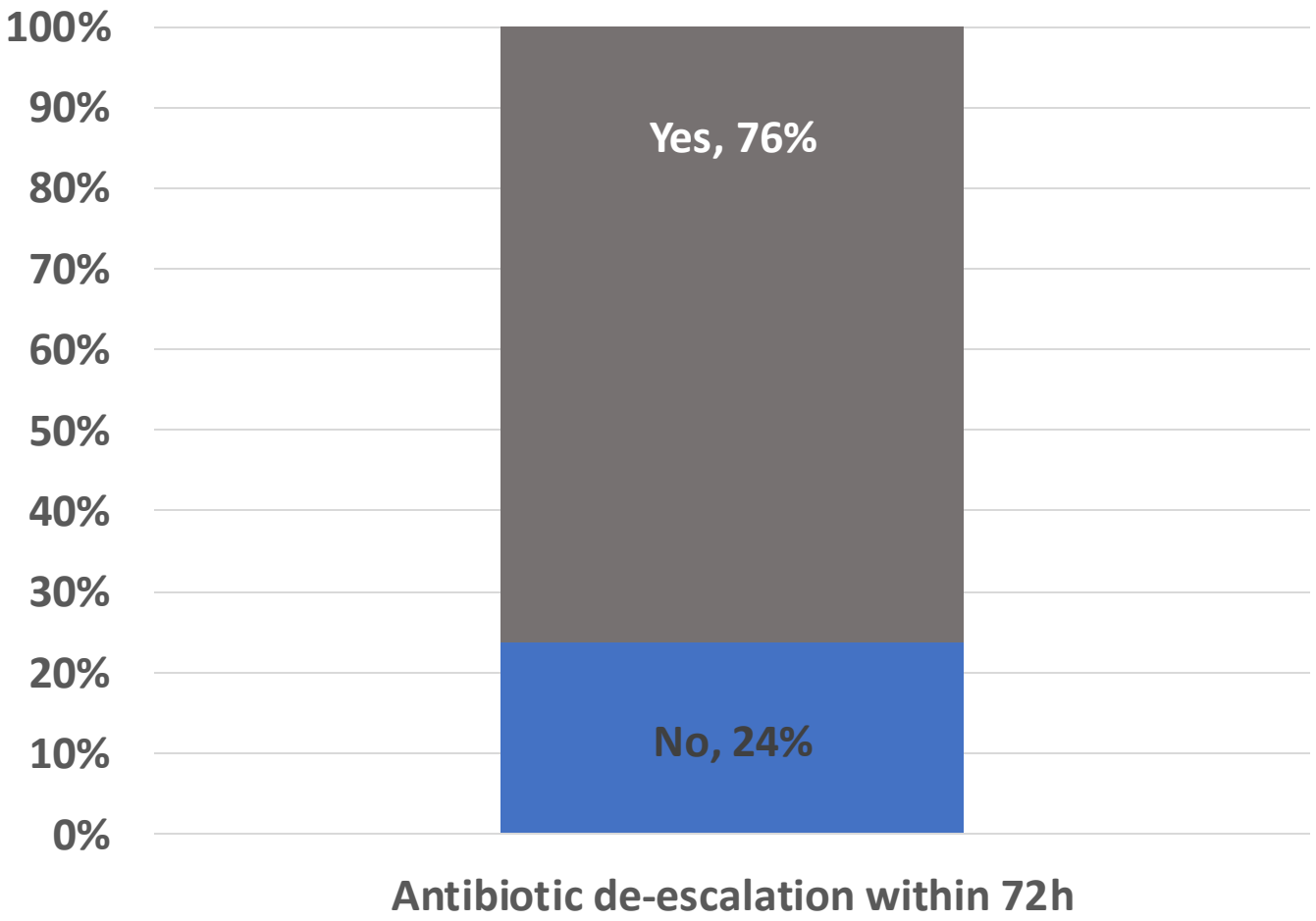
1254 JAMA Internal Medicine September 2016 Volume 176, Number 9

Disease	Treatment, Days	
	Short	Long
Community-acquired pneumonia	3 – 5	7 – 10
Nosocomial pneumonia	≤ 8	10 – 15
Pyelonephritis	5 – 7	10 – 14
Intraabdominal infection	4	10
Cellulitis	5 – 6	10

citations

VMC Sepsis Summary Data: July 13, 2018 – August 15, 2018

Stewardship Opportunities: De-escalation



citations

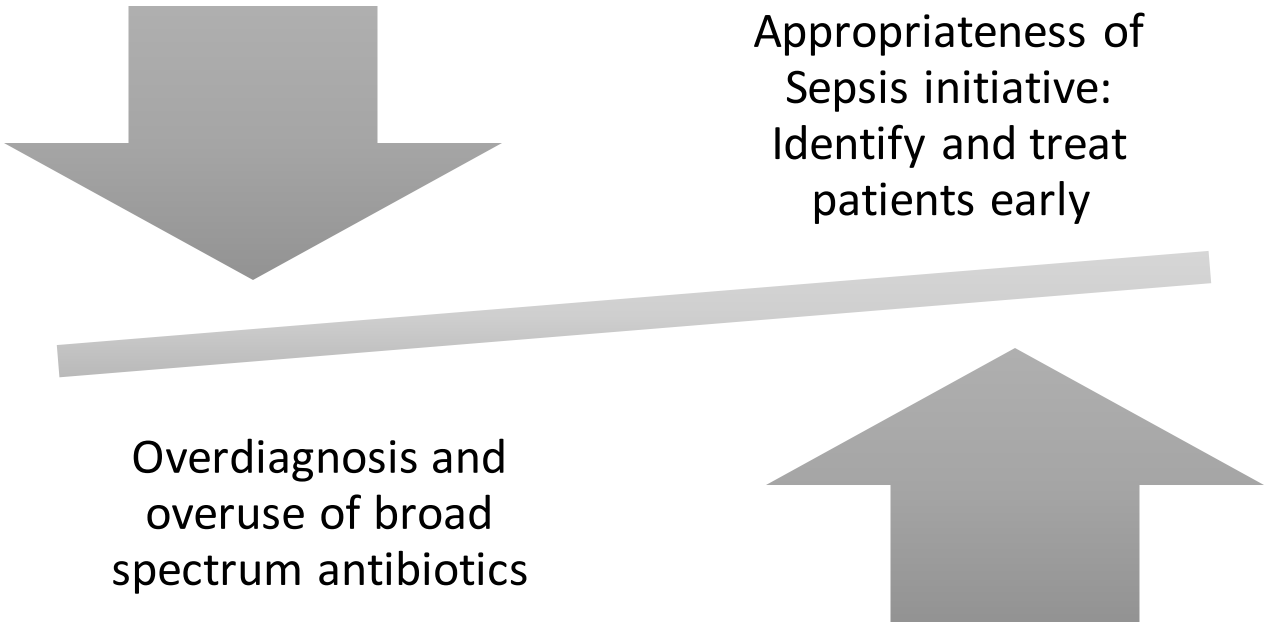
Right Allergies

A reported penicillin allergy is associated with:

- Increase time to antibiotic administration
- Increased breadth of antimicrobials administered
- Increased use of 2nd and 3rd line agents
- Increase morbidity
- Increased mortality
- Increased length of stay
- And…..is usually wrong!

Antimicrobial Stewardship & Sepsis:

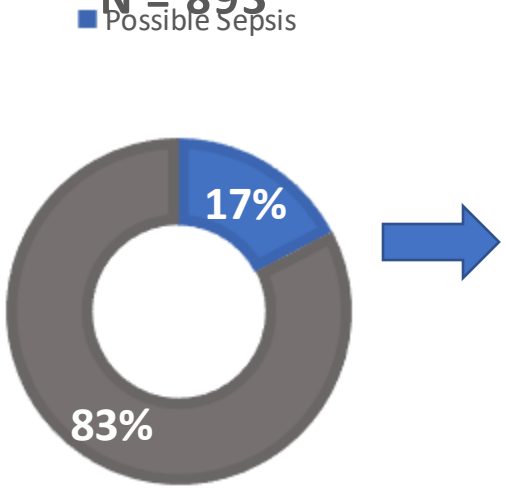
Balancing prompt & appropriate treatment vs. unnecessary and over-treatment



citations

Incorporating sepsis in the day-to-day workflow

SEPSIS AS A PERCENTAGE OF TOTAL ED ADMISSIONS
N = 893



MONTHLY SEPSIS CASES TO REVIEW
N = 155

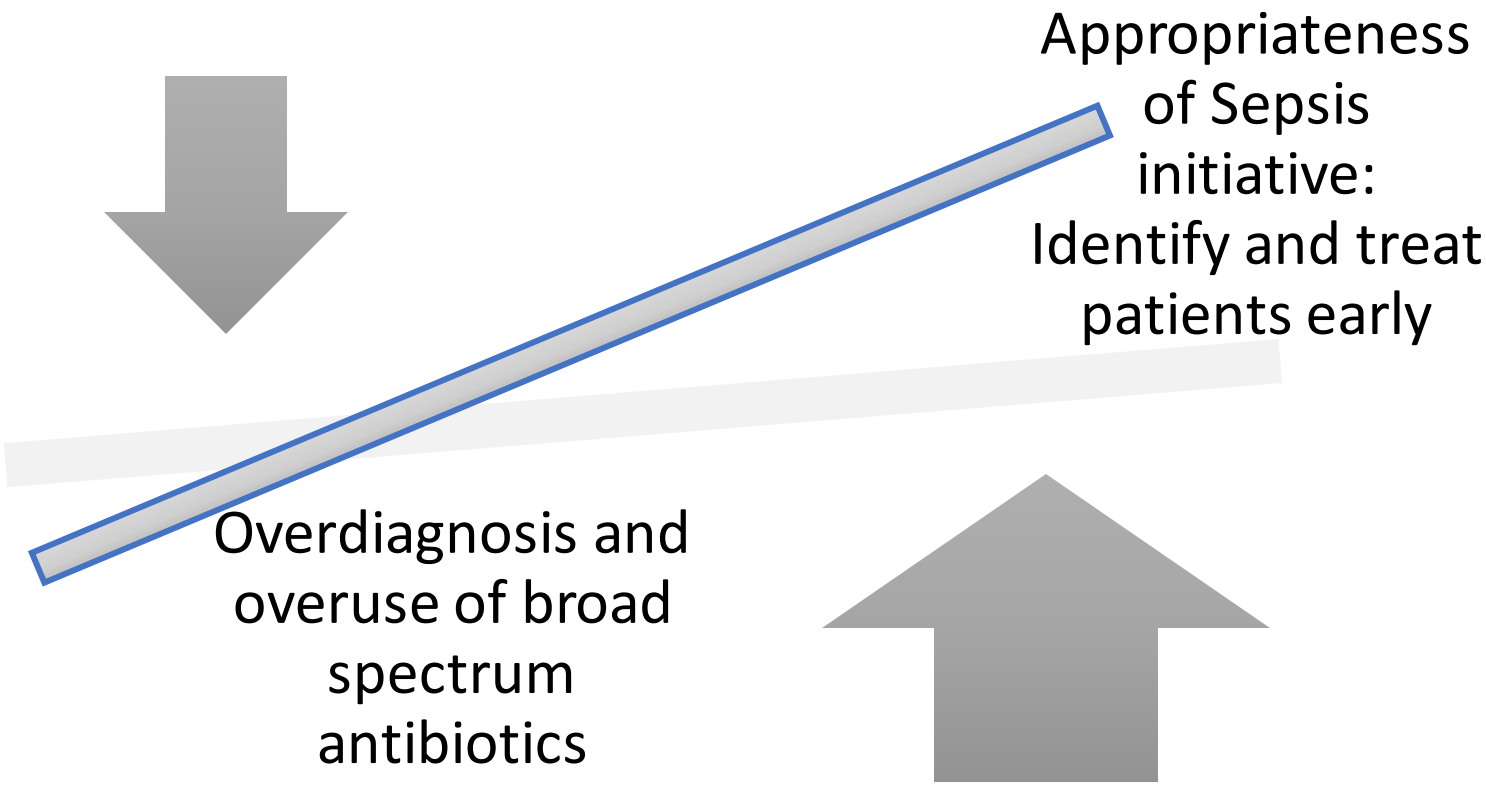
DAILY SEPSIS CASES TO REVIEW
N = 6

citations

WE ARE Valley
UW Medicine
VALLEY MEDICAL CENTER
Remarkable things happen here.

Antimicrobial Stewardship & Sepsis: Shift the Balance

Balancing prompt & appropriate treatment vs. unnecessary and over-treatment



citations

Acknowledgements

- Cameron Buck, MD
- Jennifer Carney, RN
- Thu Nguyen, PharmD
- Washington State Health Association (WSHA) Sepsis & AMS Workgroup

Meg Kilcup, Anjelica Armendariz, Valerie Aussem, Alice Ferguson, Will Hahn, Mary Jo Kelly, John Lynch, Laura Quinnan, Jessica Symank, Liza Vaezi, Julianna Van Enk

citations

Discussion, questions, comments?