

Overview of CDC's Sepsis Activities

WHO Sepsis Technical Expert Meeting

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Diseases**

INFECTIONS AND SEPSIS: RISK FACTORS AND OPPORTUNITIES FOR PREVENTION

PATHOGENS

IDENTIFIABLE PATHOGEN PREVENTION

- Support vaccine development and promotion
- Antimicrobial stewardship
- Disease surveillance
- Outbreak response
- Infection prevention for healthcare-associated infections
- Advanced diagnostic techniques

**PATHOGEN NOT IDENTIFIED IN
>50% SEPSIS**



HOST SUSCEPTIBILITY

DEMOGRAPHICS

(e.g., age, socioeconomic status, access to care)

HEALTH BEHAVIORS

(e.g., smoking)

MICROBIOME

IMMUNE AND GENETIC FACTORS

COMORBIDITIES

(e.g., chronic obstructive pulmonary disease, congestive heart failure, cancer, diabetes)

HEALTH FACTORS

(e.g., indwelling devices)

INFECTION

SEPSIS

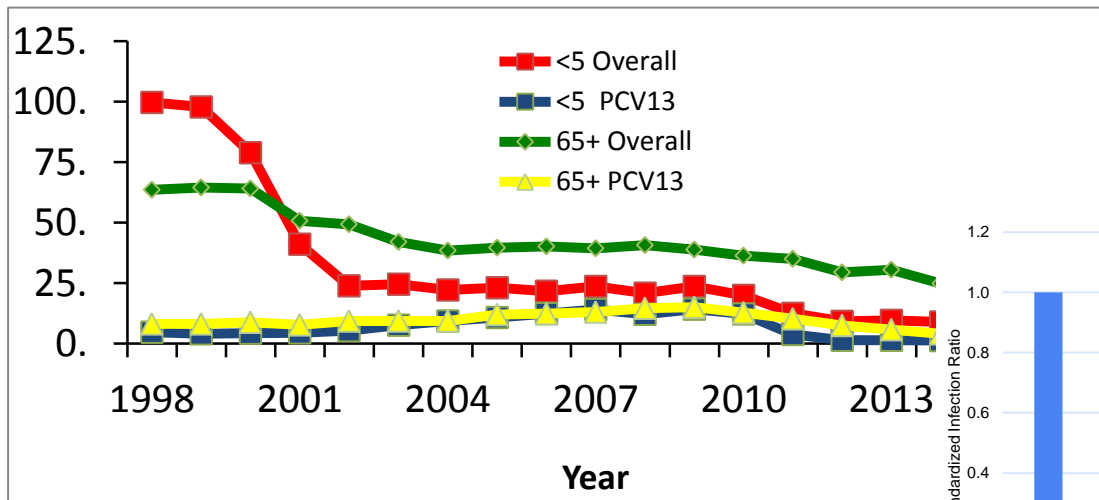
DEATH

CDC's Strategic Goals – Reducing the impact of sepsis

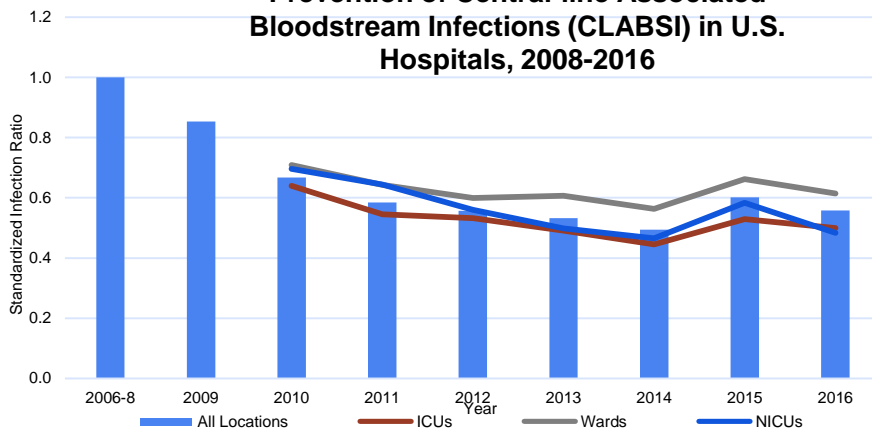
1. Describe **national sepsis burden** epidemiology in adults and children.
2. Establish and promote specific **prevention strategies** for reducing sepsis burden and mortality.
3. Promote sepsis **early recognition** among clinicians and awareness in the lay public.
4. Promote timely and appropriate antibiotic use in sepsis, **unifying with broader antibiotic resistance (AR) efforts at CDC and integrating antimicrobial stewardship** efforts with sepsis management.
5. Promote and expand the reach of CDC sepsis activities through **strategic partnerships** and ongoing promotion.

CDC's Prevention Activities in Community and Healthcare Settings

Incidence of Invasive Pneumococcal Disease (IPD) in children <5 and adults > 65 years



Prevention of Central-line Associated Bloodstream Infections (CLABSI) in U.S. Hospitals, 2008-2016



Sepsis Burden and Risk Factors in the United States based on CDC's Data

Morbidity and Mortality Weekly Report

Vital Signs: Epidemiology of Sepsis: Prevalence of Health Care Factors and Opportunities for Prevention

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On August 23, 2016, this report was posted as an MMWR Early Release on the MMWR website (<http://www.cdc.gov/mmwr>).

Abstract

Background: Sepsis is a serious and often fatal clinical syndrome, resulting from infection. Information on patient demographics, risk factors, and infections leading to sepsis is needed to integrate comprehensive sepsis prevention, early recognition, and treatment strategies.

Methods: To describe characteristics of patients with sepsis, CDC and partners conducted a retrospective chart review in four New York hospitals. Random samples of medical records from adult and pediatric patients with administrative codes for severe sepsis or septic shock were reviewed.

Results: Medical records of 246 adults and 79 children (aged birth to 17 years) were reviewed. Overall, 72% of patients had a health care factor during the 30 days before sepsis admission or a selected chronic condition likely to require frequent medical care. Pneumonia was the most common infection leading to sepsis. The most common pathogens isolated from blood cultures were *Escherichia coli* in adults aged ≥18 years, *Klebsiella* spp. in children aged ≥1 year, and *Enterococcus* spp. in infants aged <1 year; for 106 (33%) patients, no pathogen was isolated. Eighty-two (25%) patients with sepsis died, including 65 (26%) adults and 17 (22%) infants and children.

Conclusions: Infection prevention strategies (e.g., vaccination, reducing transmission of pathogens in health care environments, and appropriate management of chronic diseases) are likely to have a substantial impact on reducing sepsis. CDC, in partnership with organizations representing clinicians, patients, and other stakeholders, is launching a comprehensive campaign to demonstrate that prevention of infections that cause sepsis, and early recognition of sepsis, are integral to overall patient safety.

- Sepsis begins outside of the hospital for nearly 80% of patients.
- 7 in 10 patients with sepsis had recently interacted with healthcare providers or had chronic diseases requiring frequent medical care.
- Four types of infections were most often associated with sepsis: lung, urinary tract, skin, and gut.

Research

JAMA | Original Investigation

Incidence and Trends of Sepsis in US Hospitals Using Clinical vs Claims Data, 2009-2014

Chanu Rhee, MD, MPH; Raymund Dantes, MD, MPH; Lauren Epstein, MD, MS; David J. Murphy, MD, PhD; Christopher W. Seymour, MD, MSc; Theodore J. Iwashyna, MD, PhD; Sameer S. Kadri, MD, MS; Derek C. Angus, MD, MPH; Robert L. Danner, MD; Anthony E. Fiore, MD, MPH; John A. Jernigan, MD, MS; Greg S. Martin, MD, MSc; Edward Septimus, MD; David K. Warren, MD, MPH; Anita Karcz, MD, MBA; Christina Chan, MPH; John T. Menchaca, BA; Rui Wang, PhD; Susan Gruber, PhD; Michael Klompas, MD, MPH; for the CDC Prevention Epicenter Program

- Estimated 1.7 million cases of sepsis among adults patients and nearly 270,000 deaths.
- 22% of patients with sepsis did not survive their hospitalization or went to hospice. Sepsis was present in nearly 1/3 of all hospitalizations that culminated in death.
- Working with partners to figure out how to get a reliable assessment of pediatric burden of sepsis.

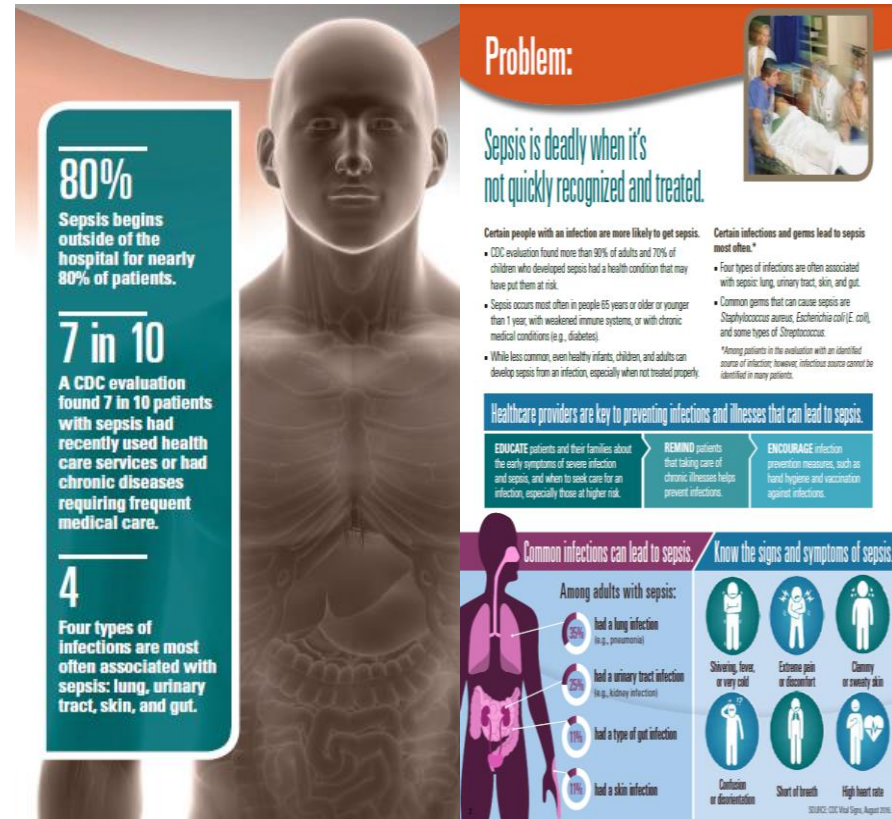
CDC's Collaborations for Tracking Sepsis in Hospitals

- Development of tools for hospital to monitor sepsis mortality and impact of sepsis programs
- Collaboration with Vermont Oxford Network to develop of a web-based tool for use by hospital NICU surveillance using National Healthcare Safety Network (NHSN) surveillance protocol for Late Onset Sepsis and Meningitis (LOS/Meningitis) in Neonates.

CDC Vital Signs Report 2015

Call to Action: Sepsis is a medical emergency.

- CDC called on healthcare providers to:
 - **Educate** patients and their families about symptoms and when to seek medical attention.
 - **Remind** patients that taking care of chronic illnesses helps prevent infections.
 - **Think sepsis** by knowing sepsis signs and symptoms to identify and treat patients early.
 - **Act fast** if sepsis is suspected.
 - **Reassess** patient management and antibiotic therapy.
- Focus on preventability, need for education, and early recognition.



CDC's *Get Ahead of Sepsis*, 2017

Goal

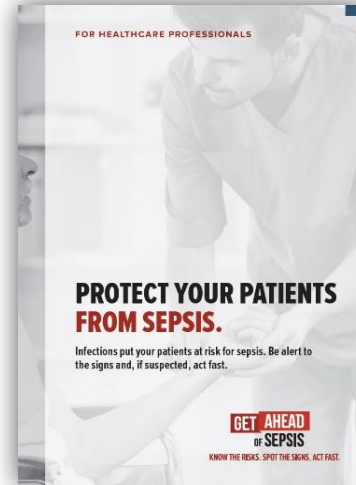
Emphasizes the importance of sepsis early recognition, timely treatment, reassessment of antibiotic needs, and prevention of infections that could lead to sepsis.

Objectives

- Increase awareness of need for early recognition and prompt treatment.
- Increase awareness of preventing infections that can lead to sepsis.

**GET AHEAD
OF SEPSIS**

KNOW THE RISKS. SPOT THE SIGNS. ACT FAST.



Core Messages – Healthcare Professionals

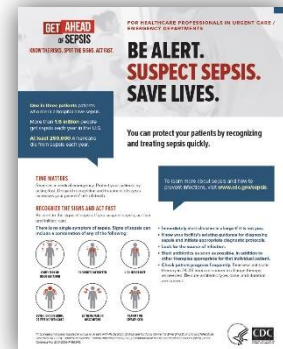
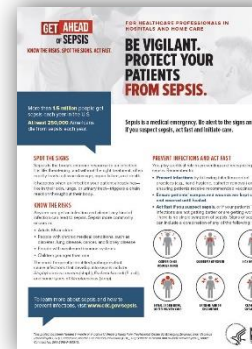
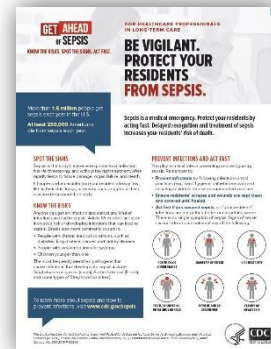
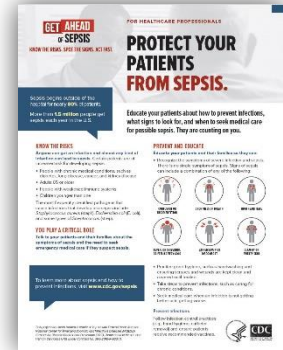
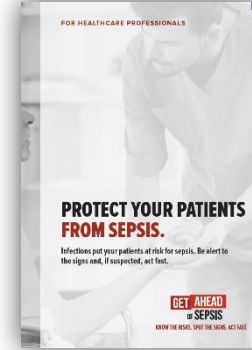
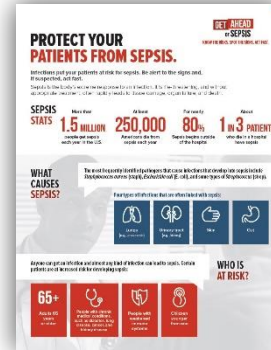
- You can protect your patients by recognizing and treating sepsis **quickly**.
- Know your facility's existing guidance for diagnosing and managing sepsis. If you suspect sepsis:
 - **Immediately** alert the clinician in charge if it is not you.
 - Start antibiotics **as soon as possible**, in addition to other therapies appropriate for that individual patient.
 - Check patient progress frequently. **Reassess antibiotic therapy** 24-48 hours to stop or change therapy as needed. Be sure antibiotic type, dose, and duration are correct.
- Sepsis is a medical emergency. Protect your patients by acting fast. Delayed recognition and treatment of sepsis increases your patients' risk of death.



Educational Materials – Healthcare Professionals

Materials for Healthcare Professionals

- **Infographic:** All healthcare professionals
- **Brochure:** All healthcare professionals
- **Fact Sheets:**
 - Primary care settings
 - Long-term care
 - Hospitals and home care
 - Emergency departments and urgent care
- **Poster:** All healthcare professionals
- **Pocket cards:** All healthcare professionals



Core Messages – Patients and Families

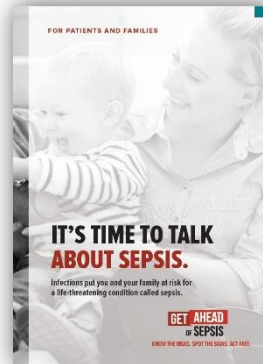
- Talk to your doctor or nurse about steps you can take to prevent infections. Some steps include taking **good care of chronic conditions and getting recommended vaccines.**
- **Practice good hygiene**, such as handwashing, and keeping cuts clean until healed.
- Know the symptoms of sepsis.
- **ACT FAST.** Get medical care **IMMEDIATELY** if you suspect sepsis or have an infection that's not getting better or is getting worse.
- Always remember, sepsis is a medical emergency. Time matters. If you or your loved one suspects sepsis or has an infection that's not getting better or is getting worse, ask your doctor or nurse, "Could this infection be leading to sepsis?"



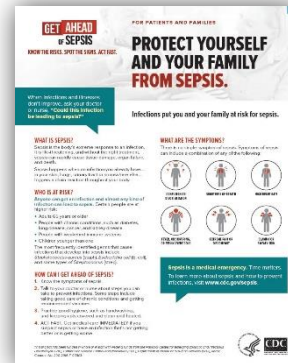
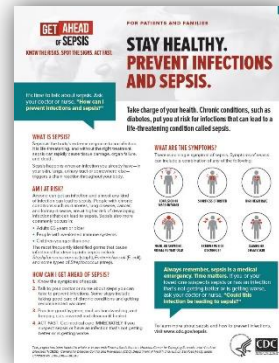
Educational Materials – Patients and Families

Materials for Patients and Families

- **Brochure:** All patients and families
- **Video:** All patients and families
- **Fact Sheets:**
 - People living with chronic conditions
 - Aging adults, their caregivers, and mothers of young children
- **Conversation starter:** All patients and families
- **Infographic:** All patients and families
- **Posters:** All patients and families



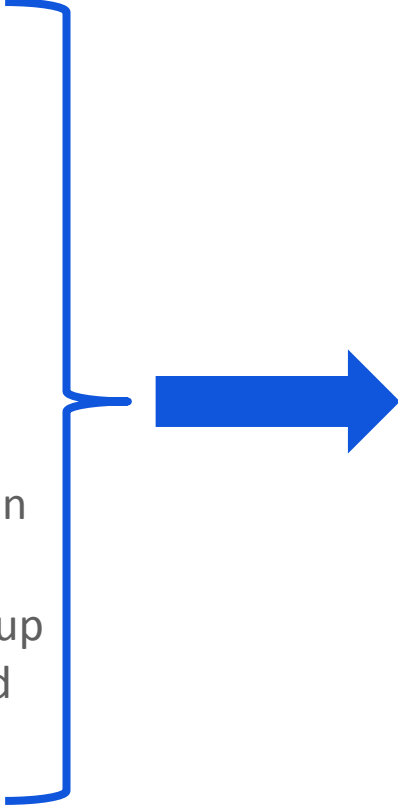
The Domino Effect



Integrating Sepsis Goals with other CDC work

- Emerging Infections Program (EIP)
 - Comprehensive tracking and risk factor studies of leading causes (*S. aureus*, *C. difficile*, resistant gram negative bacteria, group A and B streptococcus, pneumococcus, influenza, etc.)
- Applied Research
 - Appropriate use of antibiotics during sepsis care
 - Microbiome disruption as risk for subsequent infection/sepsis
 - SEP-1 (CMS early intervention measure) compliance measurement
 - Evaluation of Medicare data and variability of mortality across hospitals in the US
- Educational activities
 - Sepsis messages included in prevention and antibiotic stewardship communication efforts and vice-versa

CDC's Collaborative International Vaccine Work is Critical to Prevent Sepsis

- Pneumococcal Conjugate Vaccine (PCV) introduction
 - Surveillance
 - Vaccine effectiveness
 - Neonatal sepsis
 - Aetiology of Neonatal Infections in South Asia (ANISA), SANISA
 - Group B *streptococcus* vaccine
 - Child Health and Mortality Prevention Surveillance (CHAMPS)
 - MenAfriNet, meningococcal serogroup A conjugate vaccine introduction and evaluation in Africa meningitis belt.
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Goals

- Build capacity
- Understand etiologies
- Support prevention policies
- Prevent disease and death

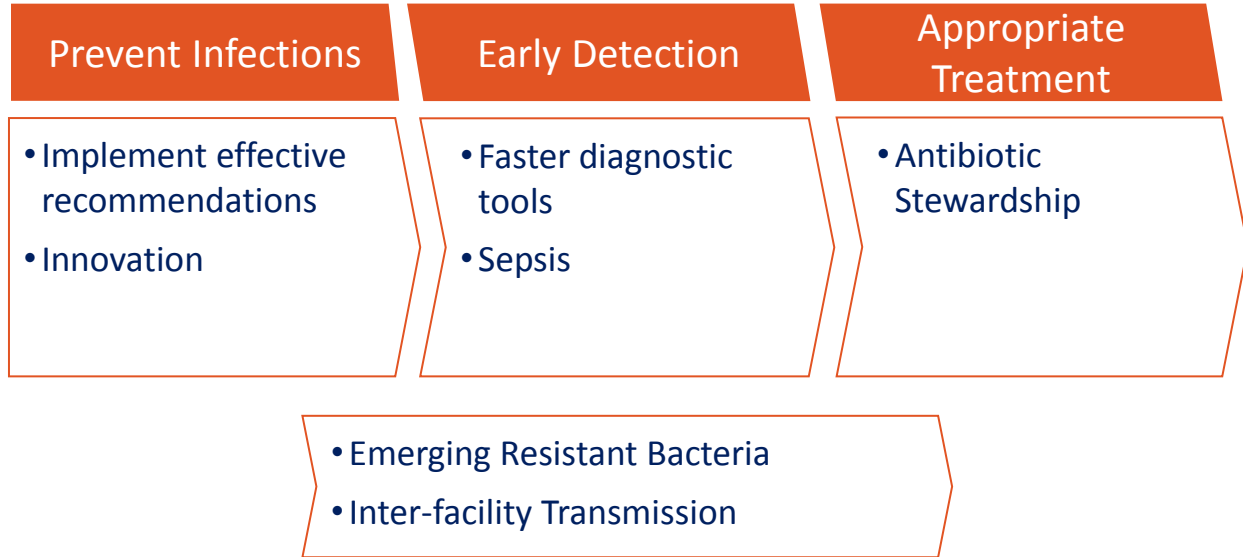
Targeting Prevention: why is GBS important?

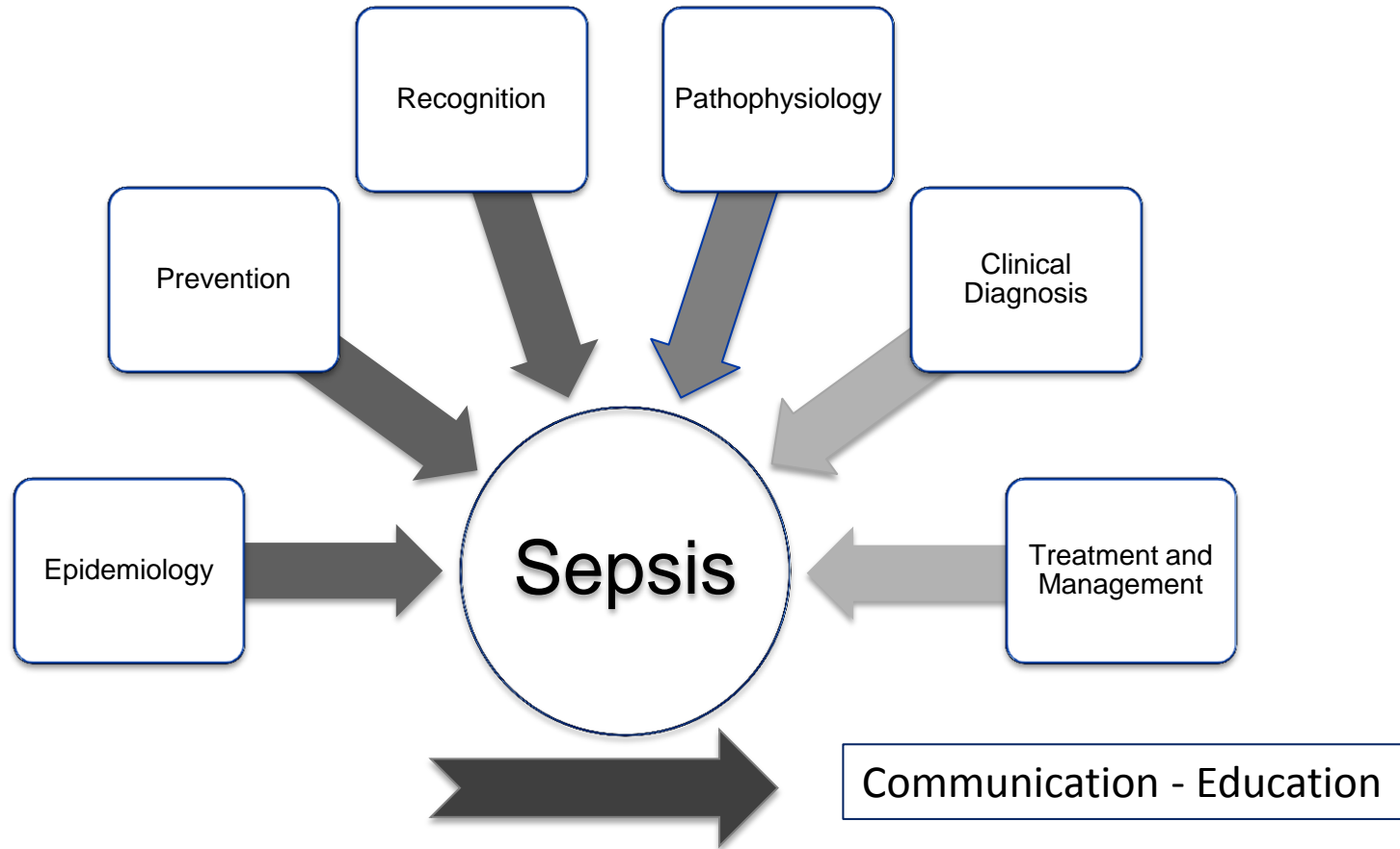
- Leading cause of neonatal sepsis and meningitis.
 - Perinatal screening and treatment strategy to prevent disease in <7 day olds
- Important and increasing cause of severe disease in adults.
- Vaccines are under development.

Example of CDC's International Sepsis Work in Hospitals

- Collaborating with John Hopkins University to study bloodstream infections (BSIs) occurring in newborn infants in NICUs in India. The goals are to:
 - Better understand how newborns in NICUs contract BSIs in order to target prevention strategies for maximum impact, and
 - Develop and evaluate innovative strategies to prevent BSI in newborns that balance cost, feasibility, acceptability while saving lives.

Thinking Holistically to Protect Patients





Partners are critical to our work

Protecting patients from sepsis is our goal and our responsibility.

