Sepsis

Identifying and Preventing a Life-Threatening Illness

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Agenda

- Knowledge Assessment

- Statistics

- Sepsis-3 Definition

- Program Accomplishments

- Sepsis Initiatives

- Knowledge Assessment Answers

- Prevention and Early Identification

- Appendix

Knowledge Assessment

1. The Sepsis-3 definition describes sepsis as a life-threatening organ dysfunction caused by a bacterial infection of the blood.
   a. True
   b. False

2. How often are deaths recorded from sepsis?
   a. One person every 20 minutes
   b. One person per day
   c. One person every two minutes

3. Sepsis cases are most likely on the rise due to:
   a. Decreased adherence to infection control measure in a long-term care (LTC) setting
   b. Coding abuse using non-specific definitions of sepsis
   c. Antibiotic resistance in high-risk patients

4. Sepsis is a disease and there are specific immunizations to prevent infection.
   a. True
   b. False

5. What is the percentage of hospital readmissions after an index hospitalization for sepsis?
   a. 40 percent
   b. 18 percent
   c. 65 percent

Statistics

Sepsis is a complication caused by the body's overwhelming and life threatening response to infection. It can lead to tissue damage, organ failure and death[1].

- 1.7 million adult sepsis cases occur annually in the United States[2].

- 750,000 sepsis hospitalizations result in 1 in 3 hospital deaths, 1 person every two minutes[2].
- 20 percent of sepsis cases occur during hospitalization.
- 80 percent of sepsis cases begin outside the hospital.
- Average cost per stay for sepsis cases was $18,000 in 2013 – 70 percent more expensive than the average stay[3].

Who and When	Multiple Paths

Sepsis most often occurs in:
• Adults > age 65
• Children < age 1
• Patients with a weakened immune system
• Patients with chronic medical conditions
 	
Infections leading to sepsis include:
• Pneumonia 35% • UTI 25%
• Gut 11% • Skin 11%
	• Community-acquired and health care associated sepsis accounts for 80 percent of cases
	• Hospital cases drive significant cost
	  – Hospital cases: $38,000 median cost
	  – Health care associated: $9,000 median cost
	  – Community acquired: $7,000 median cost

[1]CDC Vital Signs 2016-August
[2]Clinical Infectious Diseases, Volume 67, Issue 8, 28 September 2018, Pages 1300–1302, https://doi.org/10.1093/cid/ciy342
[3]sepsis.org/sepsis-alliance-news/new-u-s-government-report-reveals-annual-cost-of-hospital-treatment-of-sepsis-has-grown-by-3-4-billion/

Sepsis-3 Definition – Timeline

	Sepsis-1 (1991) Broad definition to create awareness.	Sepsis-2 (2004) Broad definition with expansion of SIRS criteria to correlate to infection more than Sepsis-1.	Sepsis-3 (2016) Defined as: Life-threatening organ dysfunction caused by host immunologic response to infection. Organ dysfunction is reflected in a Sequential Organ Failure Assessment (SOFA) score of > two points above baseline.
Sepsis	Systemic Inflammatory Response Syndrome (SIRS)	Known/suspected infection and > two SIRS criteria	Use two or more SIRS criteria to identify sepsis
Severe Sepsis		Sepsis and end organ dysfunction	Not a category
Septic Shock		Sepsis and refractory hypotension	Vasopressors and lactate > 2 mmol/L

Source: Healthcare Cost and Utilization Project (HCUP) and the Agency for Healthcare Research and Quality (2016)

Sequential Organ Failure Assessment (SOFA) Score

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Please use the following chart to identify patients with sepsis.

SOFA Score	1	2	3	4
PaO2/FIO2 (mm Hg) ratio	<400	<300	<220	<100
SaO2/FIO2	221-301	142-220	67-141	<67
Platelets ×103/mm3	<150	<100	<50	<20
Bilirubin (mg/dL)	1.2-1.9	2.0-5.9	6.0-11.9	>12.0
Hypotension	MAP <70	Dopamine ≤5 or dobutamine (any)	Dopamine >5 or norepinephrine ≤0.1	Dopamine >15 or norepinephrine >0.1
Glasgow Coma Score	13-14	10-12	6-9	<6
Creatinine (mg/dL) or urine output (mL/d	1.2-1.9	2.0-3.4	3.5-4.9 or <500	>5.0 or <200

Sepsis-3 Adoption

Sepsis-3 is defined as a life-threatening organ dysfunction caused by host immunologic response to underlying infection.
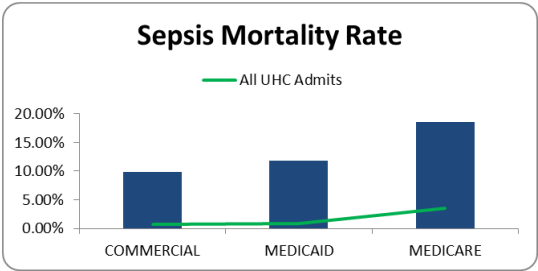
- Increases in sepsis diagnoses are partially due to increased coding of sepsis based on outdated definitions of sepsis.
    - Starting Jan. 1, 2019, UnitedHealthcare adopted the Sepsis-3 definition in our post-payment claim reviews
- We also use the Surviving Sepsis Campaign International Guidelines for Management of Sepsis and Septic Shock[1] (SSC) to assess member care
    - The SSC guidelines were developed in 2016 by a consensus committee of 55 international experts representing 25 international organizations
- Adherence to management guidelines can result in improved clinical outcomes
    - Reduces the relative risk of death by 46.6%
    - 1 additional life saved for every 5 care episodes
    - Mortality reduced from 44% to 20%

[1]Surviving Sepsis Campaign: International Guidelines for Management of Sepsis and Septic Shock: 2016: www.survivingsepsis.org/guidelines
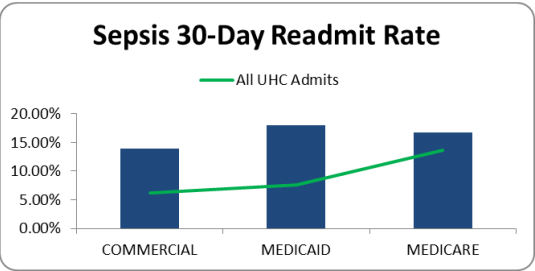
Statistics – UnitedHealthcare Data

Line of Business	Sepsis Admissions	Sepsis Admission Rate	Non-POA[1] Sepsis Count	Non-POA[1] Sepsis Rate
Commercial	18,743	1.87%	2,505	13.36%
Medicaid	10,218	2.14%	1,348	13.19%
Medicare	32,863	5.40%	4,257	12.95%
Overall	**123,648**	**2.96%**	**16,220**	**13.12%**

Sepsis Mortality Rate

— All UHC Admits

20.00%
15.00%
10.00%
5.00%
0.00%

COMMERCIAL   MEDICAID   MEDICARE

15% mortality rate (1.6%)

Sepsis 30-Day Readmit Rate

— All UHC Admits

20.00%
15.00%
10.00%
5.00%
0.00%

COMMERCIAL   MEDICAID   MEDICARE

16% 30-day readmit rate (8.2%)

Sepsis Admission Cost

— All UHC Admits

$80,000
$60,000
$40,000
$20,000
$0

COMMERCIAL   MEDICAID   MEDICARE
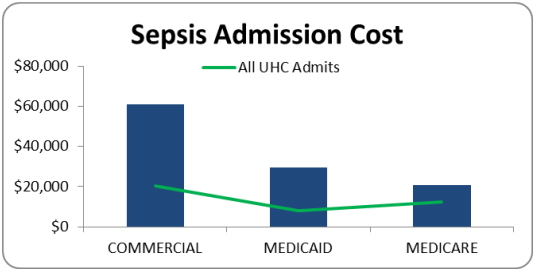
3% inpatient admissions related to sepsis
Average cost $34,000/admission ($15,000)

Source: Healthcare Cost and Utilization Project (HCUP) and the Agency for Healthcare Research and Quality (2016)
[1]Present on admission

Program Accomplishments

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Initiatives	Sub-Initiatives	Sepsis Cases Prevented
Immunizations	Vaccine (Flu and Pneumonia) Campaign Buy Up by *Commercially Insured/Employer Clients*	471
	Member Communication (Medicare & Retiree) – Patient education on sepsis awareness	134
Sepsis-3 Definition Deployment	Post-Pay Post-Service Clinical Audit Review – Adopting the Sepsis-3 clinical criteria in a practice guideline to align and assist in the clinical review of sepsis cases that may be inappropriately documented as sepsis.	10% increase in accuracy due to Sepsis-3 adoption

Sepsis Initiatives

Initiatives	Sub-Initiatives
Immunizations	1. Communications to educate on sepsis awareness and the importance of immunizations
	2. Transitional care management collaboration to ensure appropriate vaccination(s) prior to discharge
Post-Hospitalization Care and Potential Prevention of Re-Hospitalization	3. Observational study: Biometric device monitoring of members discharged from hospitals with sepsis diagnosis
Population Health Management	4. Focused outreach for high-risk sepsis
Predictive Modeling of Sepsis	5. Condition based analysis – Identify splenectomy population
Sepsis Hospital Recognition	6. Value-based care initiative

Population Health Management

Top priorities for management/communication for at-risk UnitedHealthcare Medicare members include:

- Ensure vaccinations are updated
- Provide education on sepsis prevention:
  - Hand washing
  - Hygiene
  - Wound management
  - Chronic disease management
- Ensure routine care provider follow up
- Ensure members are aware of sepsis signs and symptoms requiring immediate evaluation
- Assess member for recurrent infections and risk management (e.g., if a member with chronic obstructive pulmonary disease (COPD) has recurrent pneumonia and bronchitis, ensure they're educated on management and prevention of underlying infection, if they smoke, advise they discontinue tobacco, etc.)

Immunizations

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- Transitional Care Management team to ensure post-acute and LTC populations all receive appropriate vaccinations prior to discharge
- Integrate sepsis into Advanced Care Planning within the Medicare population

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Predictive Modeling of Sepsis

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A sepsis condition-based analysis is currently being used to identify and manage high-risk sepsis populations starting with the post-splenectomy population.
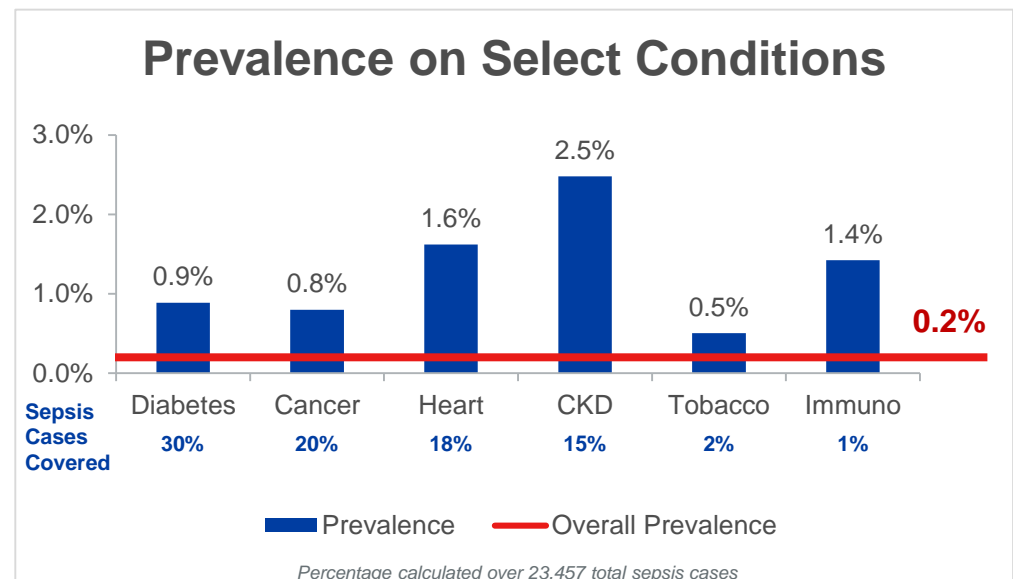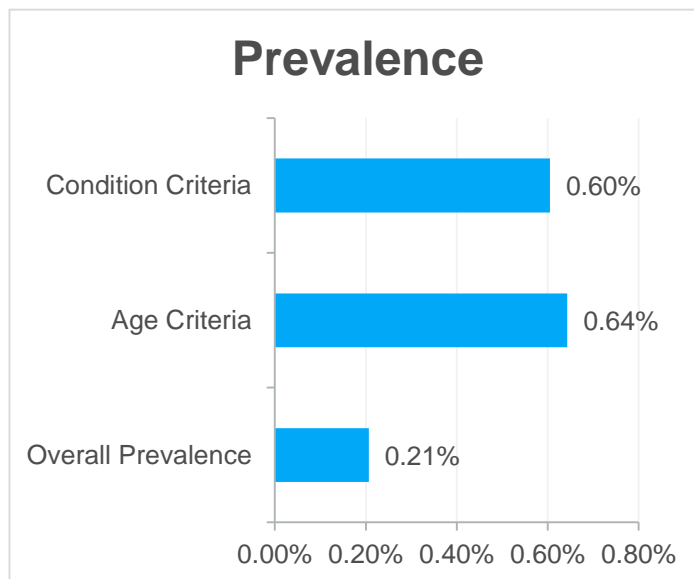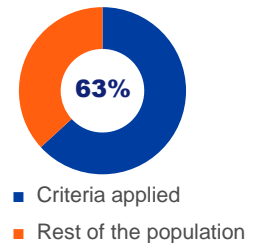
Suggested inclusion criteria* for performance boost in sepsis predictive model:

1. Select Conditions

- Diabetes
- Cancer (Active)
- Heart Disease
- Chronic Kidney Disease
- Tobacco Use
- Immunosuppressive Medication

2. Age (< 4 or ≥ 65)

* Applied criteria for 2016

63%

- ■ Criteria applied
- ■ Rest of the population

Prevalence

Condition Criteria	0.60%
Age Criteria	0.64%
Overall Prevalence	0.21%

0.00% 0.20% 0.40% 0.60% 0.80%

Prevalence on Select Conditions

	Diabetes	Cancer	Heart	CKD	Tobacco	Immuno
Prevalence	0.9%	0.8%	1.6%	2.5%	0.5%	1.4%
Sepsis Cases Covered	**30%**	**20%**	**18%**	**15%**	**2%**	**1%**

0.2%

■ Prevalence — Overall Prevalence

Percentage calculated over 23,457 total sepsis cases

Hospital Recognition

This program helps hospitals create programs to improve sepsis quality and outcomes

CY 2017 Data
SEPSIS MS DRG : 870, 871, 872
Overall Summary:

Plan	Total Admits	Total Sepsis Admits	Sepsis %	Sepsis Readmit Rate as a% of Total Sepsis	Total Sepsis Paid Amount	Total Paid Amount for 30 Day Readmission of Sepsis Cases
MCR	772,704	62,975	8.1%	13.8%	$713.94M	$101.23M

- Pilot value-based care with high sepsis volume hospital provider systems to improve quality outcomes
- Institutional Special Needs Plans (ISNP) Data

Post-Hospitalization Care & Prevention

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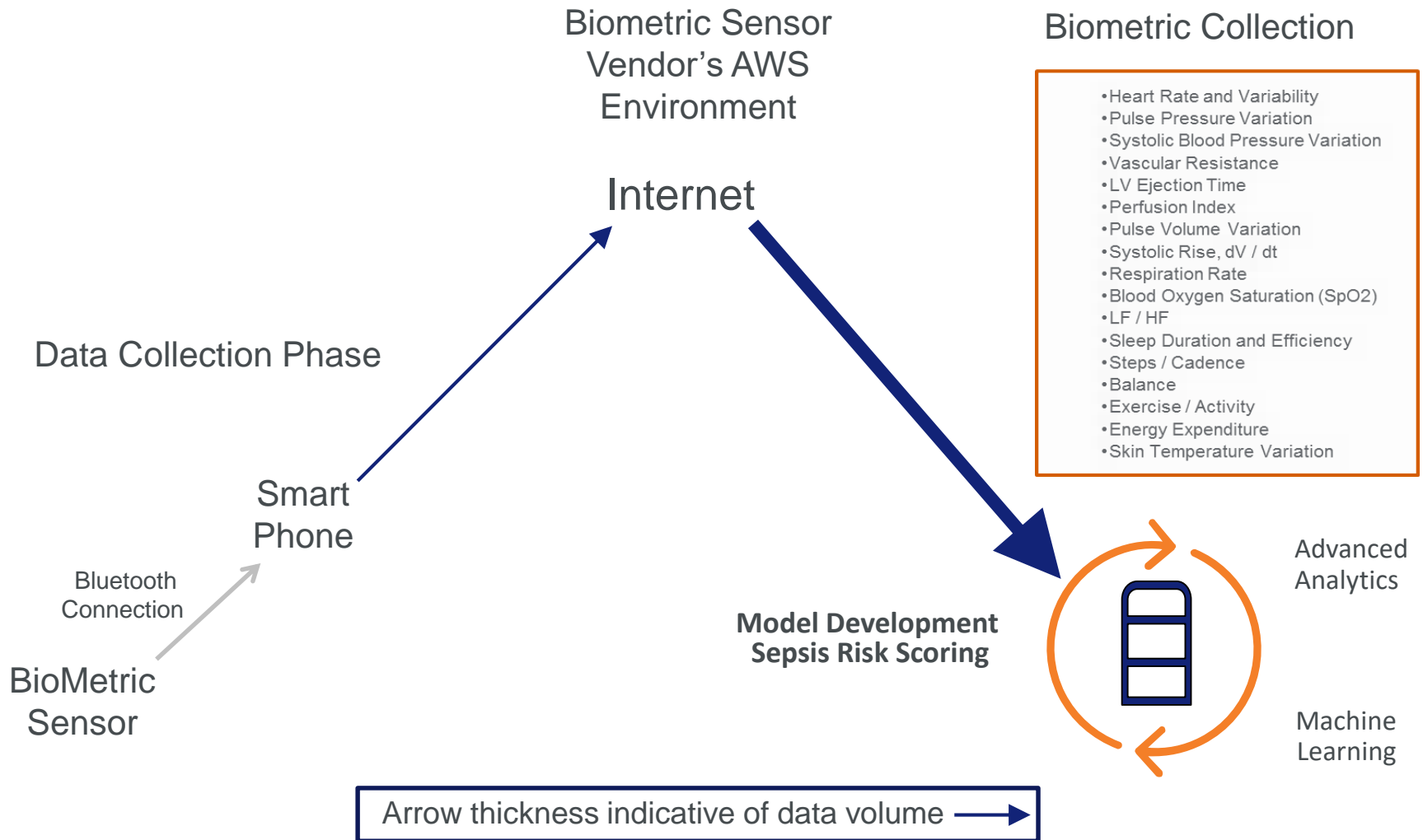**Biometric Device Observational Research Study**

- Premise: The Journal of the American Medical Association 2015 stated 40 percent of hospital readmissions after an index hospitalization for sepsis are preventable.

Sepsis Readmission Rates

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5044864/
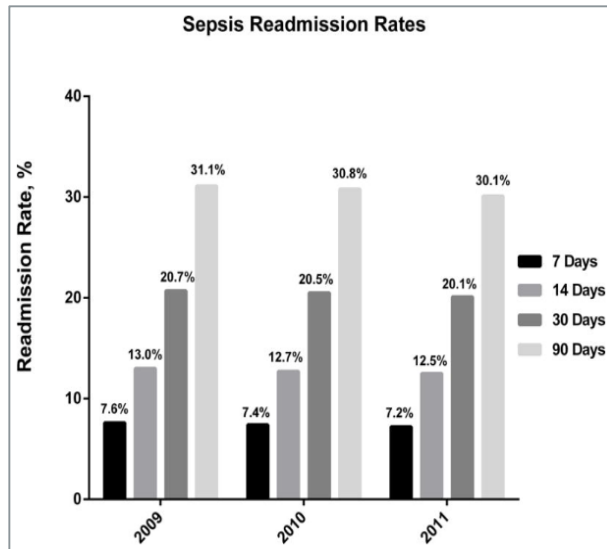
- Observational study: Biometric device monitoring of discharged with sepsis diagnosis to collect and develop a rich biometric data set for model development.

Post-Hospitalization Care and Prevention Initiative (cont.)

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Biometric Sensor Vendor's AWS Environment

Biometric Collection

- Heart Rate and Variability
- Pulse Pressure Variation
- Systolic Blood Pressure Variation
- Vascular Resistance
- LV Ejection Time
- Perfusion Index
- Pulse Volume Variation
- Systolic Rise, dV / dt
- Respiration Rate
- Blood Oxygen Saturation (SpO2)
- LF / HF
- Sleep Duration and Efficiency
- Steps / Cadence
- Balance
- Exercise / Activity
- Energy Expenditure
- Skin Temperature Variation

Internet

Data Collection Phase

Smart Phone

Bluetooth Connection

BioMetric Sensor

Model Development
Sepsis Risk Scoring

Advanced Analytics

Machine Learning

Arrow thickness indicative of data volume

Prevention and Early Identification

Sepsis is a marker for high-risk mortality, and therefore prevention and early identification is key to successful management. Key aspects of sepsis prevention and early identification include:

- Creating protocols regarding early sepsis identification and management in LTC settings

- Vaccination and infection control in post-acute care settings

- Educating long-term and post-acute care personnel on sepsis identification and early management

- Identifying an advanced care plan to determine appropriate sepsis management in the appropriate setting (i.e., hospital versus LTC)

Knowledge Assessment Answers

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   b. **False**

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Thank you.