Quality Improvement of Sepsis Care – the German Experience

K. Reinhart ML
Chair GSA
RSEM Meeting Jeddah 2017
Sepsis Mortality Among Different Countries Varies

• Australia 2000-2012: 35.0% → 18.5%
• England 2000-2012: 45.5% → 32.1%
• USA 2009-2014: 39.9% → 23.2%
• Germany 2010-2013: 47.8% → 43.6%
• Brazil 2015 → 55.7%
• Turkey 2015 → 62.6%
Mortality Differences of ICU Treated Severe Sepsis – Austr., UK and Germ.
Health Resources in OECD Countries

- Hospital Beds
- Nurses per 1000 Inhabitants
- Doctor’s Consultations
- Influenza Vaccination Rates
Variation in critical care services across North America and Western Europe*

Hannah Wunsch, MD, MSc; Derek C. Angus, MD, MPH; David A. Harrison, PhD; Olivier Collange, MD;
Characteristics of Countries with Low or Decreasing Mortality Rates

• Nationwide programs on infection prevention and control
• Nationwide standards for early detection of deteriorating patients – NEWS, RRTs
• Standing commissions and bodies to assure QI
• Mandatory sepsis quality indicators
• CDC, NHS, hospitals and patient advocacy groups drive sepsis awareness and QI campaigns
Early Detection of Patients at Risk or with Sepsis

The Resolution Acknowledges That:

• Each year, sepsis causes approximately six million deaths worldwide, most of which are preventable.

• Sepsis is a syndromic response to infection and the final common pathway to death from most infectious diseases.

• Sepsis is an emergency that requires time-critical actions improved training of health care professionals and laypeople.

• In the community, sepsis often presents as the clinical deterioration of common and preventable infections such as those of the respiratory, gastrointestinal and urinary tract, or of wounds and skin.

• Health care-associated infections represent a common pathway through which sepsis can place an increased burden on health care resources.

• Infections which may lead to sepsis can often be prevented through appropriate hand hygiene, access to vaccination programmes, improved sanitation and water quality.

„It is a tragedy that most of the 6 million deaths, among them one million babies are preventable!“
Sepsis Framework

- Awareness
- Prevention
- Early recognition
- Safe Quality Effective care
The majority of people have not heard the term sepsis in 2013.

**Sepsis Awareness**

Have you ever heard the term **“Sepsis”**?

<table>
<thead>
<tr>
<th>Country</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Germany</td>
<td>49%</td>
</tr>
<tr>
<td>USA</td>
<td>44%</td>
</tr>
<tr>
<td>UK</td>
<td>40%</td>
</tr>
<tr>
<td>Canada</td>
<td>29%</td>
</tr>
<tr>
<td>Sweden</td>
<td>21%</td>
</tr>
<tr>
<td>Brazil</td>
<td>7%</td>
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</table>
Lack of awareness on sepsis kills

- Delays recognition and treatment of sepsis by health care professionals
- Delays searching for care by lay people
- Contributes to poor adoption of measures for prevention
- Results in inadequate measures by health care authorities
We Demonstrated That Sepsis Awareness Can Be Improved 2013-2016

• USA 44% to 55%
• UK 40% to 67%
• Germany 49% to 62%
• Brasil 7% to 14%
Google hits as of January 2018 for the following World Health Days:

- **Sepsis** 9.4 Mio
- **AIDS** 15.7 Mio
- **Cancer** 17 Mio

1. World Sepsis Congress
   Patty Duke, Mohammed Ali,

NHS report child death UK

NHS apology child death

2012 First World Sepsis Day
Child death in US, Adult death miscarriage in Ireland

Contaminated sharps India

Representative Poll in Elderly in Germany on Sepsis and Vaccination

• Only 17% of respondents believe that vaccination is protective
• 23% are convinced that sepsis is an allergic reaction
• 30% sepsis is caused by „killer bugs“
• The majority believes that it is diagnosed by a red line that moves towards the heart
Effects of a large-scale intervention with influenza and 23-valent pneumococcal vaccines in adults aged 65 years or older: a prospective study

The total mortality was 57% lower in vaccinated than in unvaccinated individuals (15.1 vs 34.7 deaths per 1000 inhabitants).

Vaccination of 85,000 adults ≥65 years, in the Netherlands reduced Invasive Pneumococcal Disease and Pneumococcal Pneumonia by 75% and 45% respectively

M. Bonten et al NEJM, 2015

Lancet 2001; 357: 1008 – 11
Vaccination must also become standard for the adult at risk population

- Elderly above age 60
- Healthcare personnel
- Pregnant women
- Asplenic and immuno-compromised
- Diabetes
- Chronic lung, heart, liver and renal disease
- Chronic alcoholism
Treat sepsis 'the same as heart attacks'

By Smitha Mundasad
Health reporter

13 July 2016 | Health

Suspected sepsis in patients must be treated as an emergency in the same way as heart attacks are, England's health watchdog says.
Antimicrobials Were Delayed in 44% of Patients

<table>
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<tr>
<th>Outcome affected</th>
<th>Number 1</th>
<th>Number 2</th>
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<tbody>
<tr>
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<td>43</td>
<td>44.3</td>
</tr>
<tr>
<td>No</td>
<td>54</td>
<td>55.7</td>
</tr>
<tr>
<td>Suspected Sepsis</td>
<td>97</td>
<td></td>
</tr>
<tr>
<td>Insufficient Data</td>
<td>17</td>
<td></td>
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<tr>
<td>Total</td>
<td>114</td>
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A delay in antimicrobial therapy results in an increase of mortality by 2%
Any Delay in Sepsis Recognition and Therapy Beyond 1 Hour costs lives – USA; n= 35000
Impact of Door to Antibiotic Time on the Odds of Dying of Sepsis Patients Presenting to ED n=35 K
In Germany There is also a Huge Potential for Improvement

- Only 36.4% of patients received their first antimicrobial agent within one hour
- Each hour delay in administration of AT results in a 2% increase in 28 day mortality
- Delayed source control beyond 6hrs increased mortality rate from 28 to 36%

MEDUSA trial 40 hospitals patient n > 4100

Bloos et al ICM 2017
Effect of a multifaceted educational intervention for anti-infectious measures on sepsis mortality: a cluster randomized trial

Abstract

Purpose: Guidelines recommend reducing the time before initiating antibiotic therapy. The MEDUSA (Multifaceted Educational Intervention to Reduce the Mortality due to Sepsis) trial aimed to evaluate the impact of such an intervention on mortality.

Methods: The MEDUSA trial was conducted in Germany from July 2013 to 2016. Hospitals were randomized to either the intervention group, which received educational interventions on guideline adherence, or the control group, which received standard care. The primary outcome was the proportion of patients receiving antibiotics within 1 hour of diagnosis.

Results: Among the 1,200 enrolled patients, the intervention group had a lower proportion of patients receiving antibiotics within 1 hour compared to the control group (45.2% vs. 52.1%, p = 0.01). The mortality rate was also lower in the intervention group (10.3% vs. 13.2%, p = 0.041).

Conclusion: The multifaceted educational intervention was effective in reducing the time to antibiotic therapy and improving mortality in patients with sepsis.

Mortality remained unchanged!
Lack of Support By Key Stakeholders

• Lack of awareness and support by hospital board
• Lack of involvement of the whole institution and across all health care professions
• Failure to involve leadership of other departments (ED, surgery, internal medicine, microbiology and pharmacy)
• Lacking time resources for QI change teams
• General staff shortage

Bloos et al ICM 2017
SEPSIS KILLS: early intervention saves lives

Mortality reduction from 19.3% to 14.1% p<0.001
443 lives saved!
SEPSIS KILLS program:
reduce preventable harm to patients with sepsis

RECOGNISE:
Risk factors, signs and symptoms of sepsis and inform senior clinician

RESUSCITATE:
With rapid antibiotics and IV fluids within one hour

REFER:
To specialist care and initiate retrieval if needed

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R. Phillip Dellinger, MD\(^1\); Mitchell M. Levy, MD\(^2\); Andrew Rhodes, MB BS\(^3\); Djamila Annane, MD\(^4\); Henric Gerlach, MD, PhD\(^5\); Steven M. Opal, MD\(^6\); Jonathan E. Sevransky, MD\(^7\); Charles L. Sprung, MD\(^8\); Toru S. Douglas, MD\(^9\); Roman Jorisch, MD\(^10\); Tiffany M. Olszyn, MD, MPH\(^11\); Mark E. Nunnally, MD\(^12\); Sean R. Townsend, MD\(^13\); Konrad Reinhart, MD\(^14\); Ruth M. Kleinpell, PhD, RN-CS\(^15\)
Gouverneur Cuomo declares the fight against sepsis

Andrew M. Cuomo - Governor

Governor Cuomo Announces New York State to Lead the Nation in Fighting Sepsis – the #1 Killer in Hospitals – and Make Major Improvements in Pediatric Care Through "Rory's Regulations"

Department of Health to issue Sepsis and Pediatric Care Regulations That Deliver on State of the State Promise to Set a Gold Standard for Patient Care in New York

First-in-the-Country Sepsis Reforms Expected to Save 5,000 to 8,000 Lives in New York Each Year

Albany, NY (January 29, 2013)
New York State Mandated Public Reporting Study Results in Five Percent Reduction of Hospital Mortality

Figure 3: Risk adjusted hospital mortality over time by protocol initiation status.

Protocol initiated:
No (N = 17,064)  Yes (N = 74,293)

Risk-adjusted mortality improved in patients with a sepsis protocol initiated throughout the study period, but was stable for patients without a protocol initiated. The difference in mortality between patients treated with and without a sepsis protocol first became significant (p = 0.019) during the 3rd month of the study.
Time to Treatment and Mortality during Mandated Emergency Care for Sepsis

A 3-Hr Bundle

<table>
<thead>
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<th>Time to Completion of 3-Hr Bundle (hr)</th>
<th>In-Hospital Mortality (%)</th>
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<tr>
<td>1</td>
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<td>12</td>
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B Administration of Antibiotics

<table>
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<th>Time to Administration of Antibiotics (hr)</th>
<th>In-Hospital Mortality (%)</th>
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<tbody>
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Recognizing Sepsis as a Global Health Priority — A WHO Resolution

Konrad Reinhart, M.D., Ron Daniels, M.D., Niranjan Kissoon, M.D., Flavia R. Machado, M.D., Raymond D. Schachter, L.L.B., and Simon Finfer, M.D.

“...The public and political space is the space in which [sepsis] needs to be in order for things to change.”

Sir Liam Donaldson, Geneva; May 2017
We need to demonstrate that QI is also possible in every country.
„Sepsis Quality Improvement Initiatives: Prepare for the Marathon, Not the Sprint”

“It always seems impossible until it is done”

N. Mandela.
Variation of Standardized Mortality Rates in German Hospitals