European Congress of Clinical Microbiology and Infectious Diseases
Amsterdam, Netherlands 13-16 April 2019

Starting a Sepsis Team at your Institution

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Know the risk, spot the signs …

WHO DOES SEPSIS RECOGNITION ?

ED physicians ?

Intensivists ?

ID physicians ?

Nurses ?

Microbiologists ?

Pharmacists ?

YOU !

Know the risk, spot the signs, act fast (?)

The sepsis mantra …

"Each hour's delay in initiating antibiotics costs lives"

… is it definitely true ?

Empiric Antibiotic Treatment Reduces Mortality in Severe Sepsis and Septic Shock From the First Hour: Results From a Guideline-Based Performance improvement Program.

Ferrer R et al, Crit Care Med 2014; 42:1749-1755

28,150 [illegible]s

Time to Treatment and Mortality during Mandated Emergency Care for Sepsis.

Seymour CW et al, N[illegible];376:2235-2244

49,331 patients

The Timing of Antibiotics and Hospital Mortality in Sepsis

Am J Respir Crit Care Med 2017; 196:856-863

35,000 randomly selected inpatients

Door-to-Antibiotic Time and Long-term Mortality in Sepsis.

Peltan ID et al Chest. 2019 Feb 16.

10,811 eligible patients

each hour of time to the completion of the 3-hour bundle and antibiotic administration is associated with higher mortality

Know the risk, spot the signs, act fast (?)

The sepsis mantra … **"Each hour's delay in initiating antibiotics costs lives"**

… is it definitely true ?

The cited studies, like the majority of studies supporting the immediate treatment, are based on retrospective analysis of databases usually collected for other reasons.

Efforts to improve detection may include less critically ill patients, thereby potentially overestimating the overall prevalence of sepsis and biasing mortality measures.

Pivotal items are usually underreported or lacking, such as confirmation of infection, quality of source control, adequacy of antibiotic choice and antibiotic dosing in relation to the site of infection, the site of acquisition, the timing of presentation.

The evidence is built only around timing of administration, but not least is the appropriateness.

Without a right evaluation of the prescription quality, a blanket policy of throwing antibiotics at every patient on "suspicion" of sepsis could carry unintended and potentially far more harmful consequences

Impact of time to antibiotics on survival in patients with severe sepsis or septic shock in whom early goal-directed therapy was initiated in the emergency department

Gaieski DF et al, Crit Care Med 2010; 38:1045–1053

Design: Retrospective, observational, single-center cohort study.

Setting: The ED of an academic tertiary care center from 2005 through 2006.

Patients: Two hundred sixty-one patients undergoing early goal-directed therapy.

Measurements: Effects of different time cutoffs from triage to antibiotic administration, qualification for early goal-directed therapy to antibiotic administration, triage to appropriate antibiotic administration, and qualification for early goal-directed therapy to appropriate antibiotic administration on in-hospital mortality were examined.

The mean age of the 261 enrolled patients was 59 ± 16 yrs; 41% were female. In-hospital mortality was 31% for the cohort as a whole; it was 35.1% for culture-positive patients vs. 25.7% (*p* .11) for culture-negative patients.

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Table 4. In-hospital mortality: Triage to ED antibiotics

				Adjusted			
Cutoffs	Number	Mortality, %	Difference, %	OR	95% CI	*p*	Probability of Death
≤1 hr	46	26.1	6.0	0.51	0.21–1.22	.13	.20 vs. .28
>1 hr	215	32.1					
≤2 hrs	136	30.9	0.3	0.72	0.38–1.37	.30	.25 vs. .28
>2 hrs	125	31.2					
≤3 hrs	187	29.4	5.7	0.64	0.32–1.29	.21	.25 vs. .31
>3 hrs	74	35.1					
≤4 hrs	217	30.0	6.4	0.80	0.35–1.84	.59	.27 vs. .29
>4 hrs	44	36.4					
≤5 hrs	237	32.1	−11.2	0.86	0.56–6.15	.31	.28 vs. .16
>5 hrs	24	20.8					

matching mortality with timing of atb, no correlation with time from triage to atb was found

Impact of time to antibiotics on survival in patients with severe sepsis or septic shock in whom early goal-directed therapy was initiated in the emergency department

Gaieski DF et al, Crit Care Med 2010; 38:1045–1053

Table 6. In-hospital mortality: Time from triage to appropriate antibiotics

				Adjusted			
Cutoffs	Number	Mortality, %	Difference, %	OR	95% CI	*p*	Probability of Death
≤1 hr	41	19.5	13.7	0.30	0.11–0.83	.02	.13 vs. .29
>1 hr	220	33.2					
≤2 hrs	124	28.2	5.4	0.54	0.29–1.03	.06	.22 vs. .31
>2 hrs	137	33.6					
≤3 hrs	172	27.9	9.2	0.53	0.27–1.01	.05	.23 vs. .34
>3 hrs	89	37.1					
≤4 hrs	200	28.5	10.8	0.62	0.31–1.24	.18	.25 vs. .34
>4 hrs	61	39.3					
≤5 hrs	218	30.7	1.8	0.82	0.37–1.79	.62	.27 vs. .29
>5 hrs	43	32.6					

Impact of time to antibiotics on survival in patients with severe sepsis or septic shock in whom early goal-directed therapy was initiated in the emergency department

Gaieski DF et al, Crit Care Med 2010; 38:1045–1053

Table 7. In-hospital mortality: Time from qualification for early goal-directed therapy to appropriate antibiotics

				Adjusted			
Cutoffs	Number	Mortality, %	Difference, %	OR	95% CI	*p*	Probability of Death
≤1 hr	144	25.0	13.5	0.50	0.27–0.92	0.03	.20 vs. .35
>1 hr	117	38.5					
≤2 hrs	201	28.4	11.6	0.57	0.27–1.15	0.12	.24 vs. .38
>2 hrs	60	40.0					
≤3 hrs	220	28.6	15.3	0.47	0.22–1.01	0.05	.24 vs. .43
>3 hrs	41	43.9					
≤4 hrs	232	29.3	15.5	0.49	0.20–1.18	0.11	.25 vs. .42
>4 hrs	29	44.8					
≤5 hrs	238	29.8	13.7	0.48	0.18–1.25	0.13	.25 vs. .43
>5 hrs	23	43.5					

Infectious Diseases Team for the Early Management of Severe Sepsis and Septic Shock in the Emergency Department. *Viale P et al, Clin Infect Dis. 2017;65:1253-1259*

Study design: **quasi-experimental pre-post study.**

During the pre phase, the ED physicians were entirely responsible for patient management with the possibility to ask for an ID consultation. During the post phase patients with SS/SS were managed in collaboration with a dedicated Rapid Response ID team.

Setting: **ED of our 1420-bed teaching hospital in Northern Italy**

Population: **adult patients accessing the ED with severe sepsis/septic shock.** *Criteria of SS/SS were assessed at presentation according to a preestablished protocol based on 2012 SSC guidelines that were shared with all medical ED staff before study onset .*

Study period: **July 2013 – October 2015**

Infectious Diseases Team for the Early Management of Severe Sepsis and Septic Shock in the Emergency Department. *Viale P et al, Clin Infect Dis. 2017;65:1253-1259*

Aim of the study :To assess the impact of the systematic timely involvement of an Infectious Diseases specialist in the management of critically ill patients with infections in the ED on …

1. **14-day mortality (primary objective)**
2. **Compliance with SSC recommendations**
3. **Appropriateness * of microbiological work-up and antibiotic therapy**

**Appropriateness was assessed by an independent expert, blinded to the study, according to microbiological data, site of infection and epidemiology (CA or HCA infection)*

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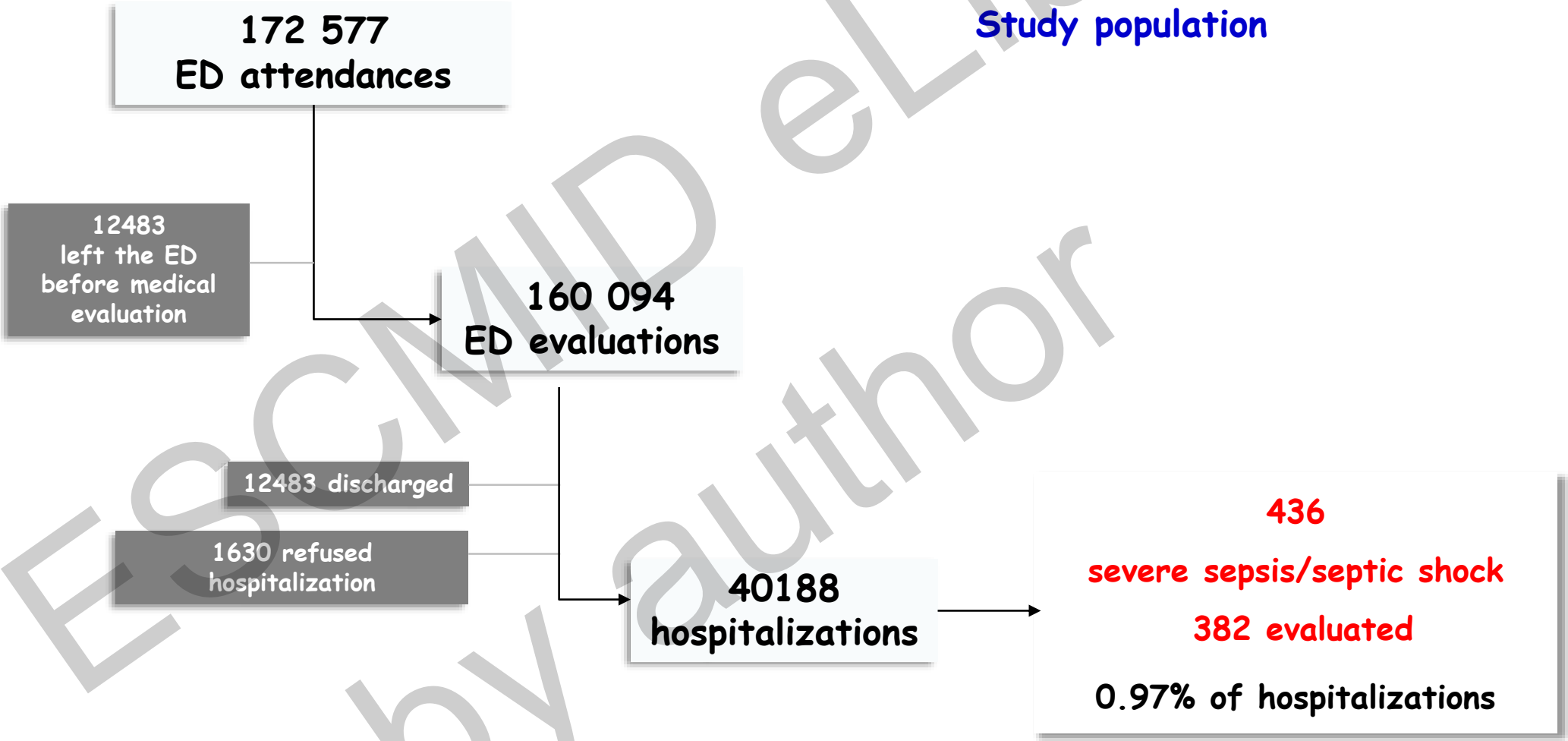


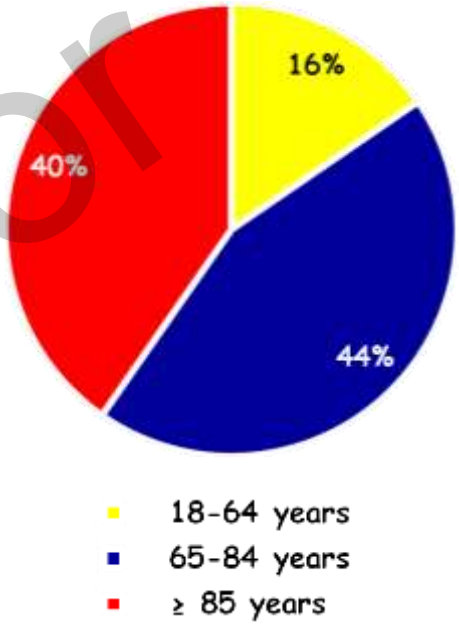
Infectious Diseases Team for the Early Management of Severe Sepsis and Septic Shock in the Emergency Department. *Viale P et al, Clin Infect Dis. 2017;65:1253-1259*

Demographics

382 patients: 195 in the *pre*, 187 in the *post* phase

Median age 82 years (IQR 70-88)

Median Chalrson index 6 (IQR 5-8)



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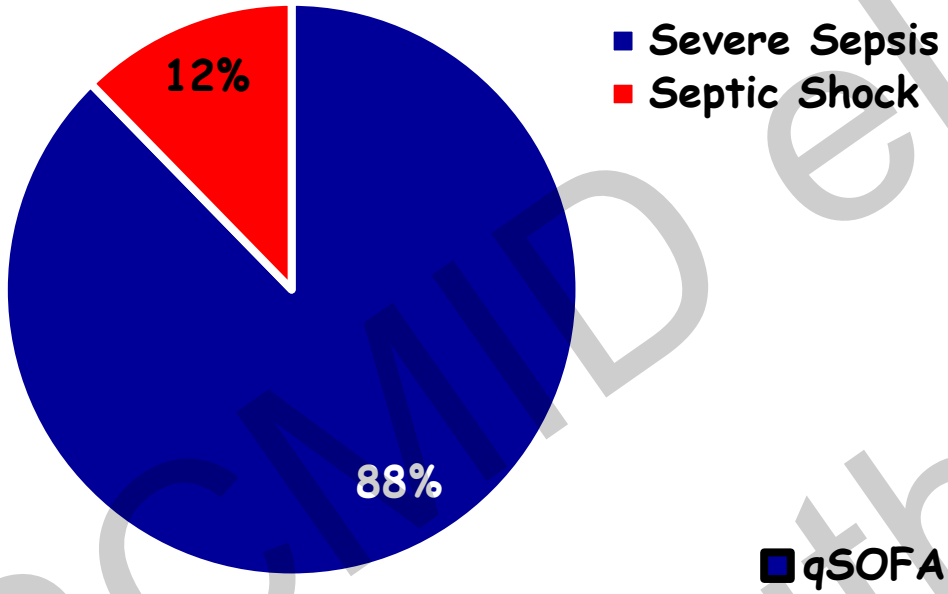
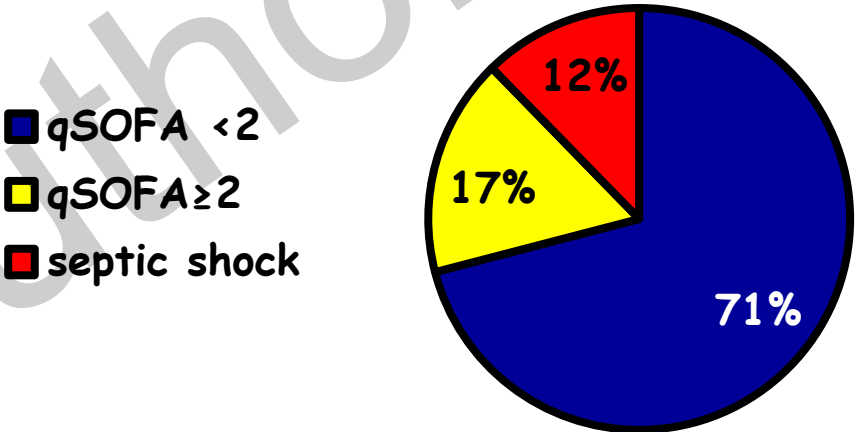
Clinical severity



The Third International Consensus Definitions for Sepsis and Septic Shock (Sepsis -3). Singer M et al, JAMA 2016



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During the pre-phase the ED physicians asked for an ID consultation in only 15 cases.

All-cause 14 - and 30-day mortality rates in patients with and without ID advice in the pre phase were 13% vs 41% (*P* = .06) and 26% vs 47% (*P* = .30), respectively.

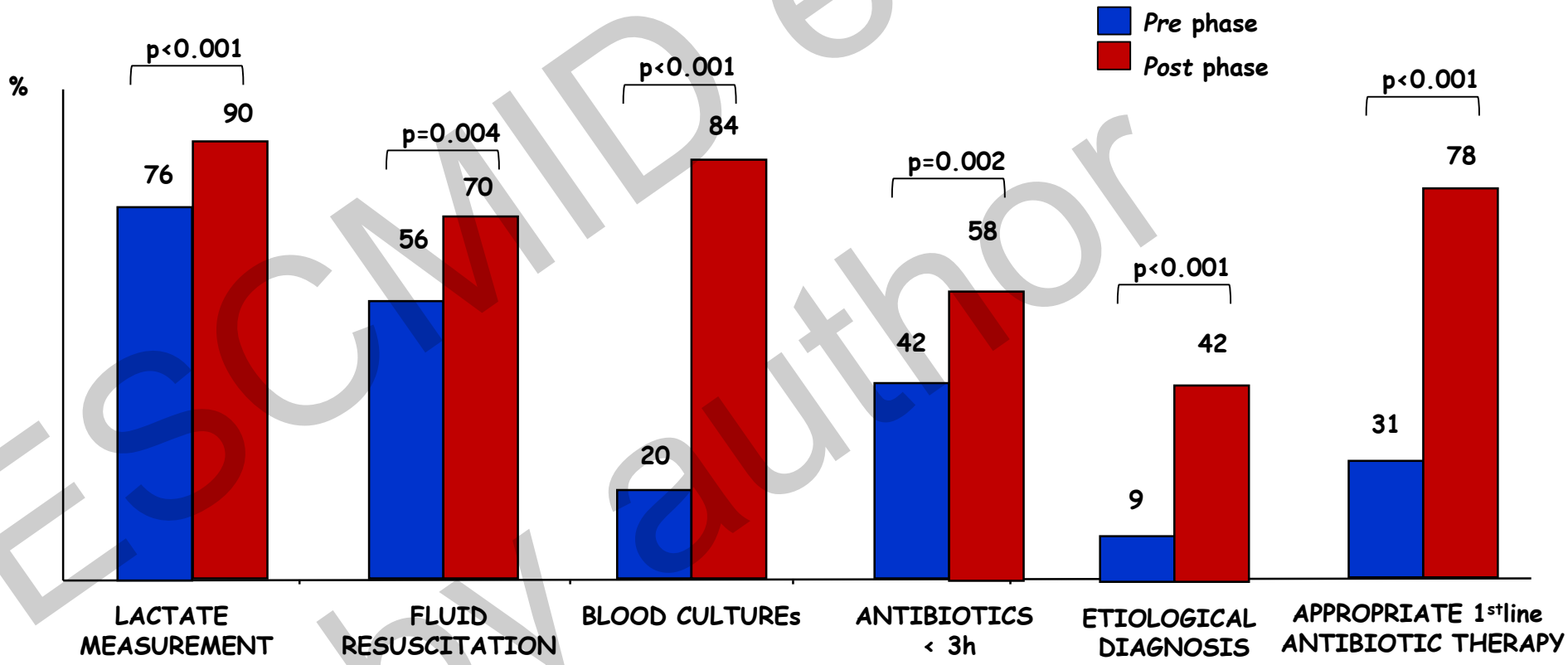
Infectious Diseases Team for the Early Management of Severe Sepsis and Septic Shock in the Emergency Department. *Viale P et al, Clin Infect Dis. 2017;65:1253-1259*

Comparison between *pre* and *post* phase

	All patients (N=382)	Pre phase (N=195)	Post phase (N=187)	p	
Age (years) – median (IQR)	82 (70-88)	84 (73-89)	80 (67-87)	0.009	★
Male sex – n°(%)	190 (49.7)	97 (49.7)	93 (49.7)	0.998	
Charlson index – median (IQR)	6 (5-8)	7 (6-8)	5 (4-7)	<0.001	★
Infection site – n°(%)					
Lung	164 (43)	75 (38.5)	89 (48)		
Urinary tract	67 (17)	41 (21)	26 (14)		
Intra-abdominal	30 (8)	14 (7)	16 (9)	0.317	
Skin and soft tissue	20 (5)	11 (5.5)	9 (5)		
Other sites	18 (5)	7 (4)	11 (4.8)		
Unknown	83 (22)	47 (24)	36 (19.2)		
SIRS criteria – n°(%)					
Body temperature > 38.3	128 (33.5)	72 (37)	56 (30)	0.149	
HR > 90 bpm	218 (56.5)	112 (57)	106 (56)	0.879	
RR > 20/min	145 (38)	66 (34)	80 (43)	0.091	
WBC > 12000 or < 4000/mmc	254 (66.5)	126 (65)	128 (68)	0.427	
Altered mental status – n°(%)	141 (37)	76 (39)	65 (35)	0.393	
Serum lactate > 2 mmol/L – n°(%)	237 (62)	106 (54)	131 (70)	0.002	
Septic shock – n°(%)	47 (12)	14 (7)	33 (17.6)	0.002	★

Infectious Diseases Team for the Early Management of Severe Sepsis and Septic Shock in the Emergency Department. *Viale P et al, Clin Infect Dis. 2017;65:1253-1259*

SSC bundle compliance



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Comparison between *pre* and *post* phase

	All patients (N=382)	Pre phase (N=195)	Post phase (N=187)	p	
Septic shock – n°(%)	47 (12)	14 (7)	33 (17.6)	0.002	
ICU admission – n°(%)	213 (56)	93 (48)	120 (64)	0.001	
Switch to targeted therapy – n°(%)	196 (13)	26 (13)	51 (43.6)	0.004	★
Length of atb therapy (days) – median (IQR)	10 (4-15)	8 (3.5-13.5)	11 (6-19)	0.002	
Length of stay (days) – median (IQR)	9.5 (3-17)	7 (2-13.5)	12 (6-21)	<0.001	
14-day mortality – n°(%)	130 (34)	77 (39)	53 (29)	0.02	★
30-day mortality – n°(%)	157 (41)	88 (45)	69 (37)	0.102	
Discharged to LTCF – n°(%)	60 (29)	35 (36)	25 (23)	0.04	

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Univariate and multivariate Cox regression analysis of risk factors for 14-days mortality

	HR (95%CI)	p	aHR (95%CI)	p
Age	1.03 (1.01-1.04)	<0.001	1.01 (1.00-1.03)	0.05
Male sex	0.79 (0.56-1.11)	0.18		
Charlson index	1.14 (1.06-1.22)	0.001	1.01 (0.91-1.12)	0.80
SIRS pos (≥ 2 criteria)	0.89 (0.63-1.28)	0.55		
Body temperature >38.3 or <36°C	0.53 (0.35-0.80)	0.003		
HR > 90 bpm	1.04 (0.73-1.48)	0.80		
RR > 20/min	1.06 (0.75-1.52)	0.71		
WBC > 12000 or < 4000/mmc	1.03 (0.71-1.49)	0.85		
qSOFA ≥ 2	2.09 (1.46-3.00)	<0.001	1.68 (1.15-2.45)	0.007
Altered mental status	2.01 (1.42-2.83)	<0.001		
RR > 20/min	1.06 (0.75-1.52)	0.71		
SBP < 100 mmHg	1.76 (1.25-2.48)	0.001		
Serum lactate > 2 mmol/L	2.37 (1.57-3.56)	<0.001	2.13 (1.39-3.25)	<0.001
Septic shock	2.01 (1.30-3.12)	0.002	1.33 (0.83-2.14)	0.23
Source of infection				
Lung	0.87 (0.62-1.24)	0.45		
Urinary tract	0.55 (0.32-0.94)	0.03		
Intra-abdominal	0.63 (0.29-1.35)	0.24		
Skin and soft tissue	0.52 (0.19-1.40)	0.19		
Other	0.76 (0.31-1.87)	0.56		
Unknown	2.53 (1.76-3.62)	<0.001	2.07 (1.42-3.02)	<0.001
Compliance with SCC bundle	0.75 (0.46-1.22)	0.24		
ICU admission	0.94 (0.66-1.32)	0.73		
Appropriate initial antibiotic therapy	0.84 (0.60-1.19)	0.35		
Post phase	0.67 (0.47-0.95)	0.03	0.64 (0.43-0.94)	0.026

Know the risk, spot the signs …

WHO DOES SEPSIS RECOGNITION ?

ED physicians ?

Intensivists ?

ID physicians ?

Nurses ?

Microbiologists ?

Pharmacists ?

YOU !

Know the risk, spot the signs, act fast

WHO DOES ANTIMICROBIALS' MANAGEMENT FOR SEPSIS ?

ED physicians ?

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ID physicians ?

Nurses ?

Microbiologists ?

Pharmacists ?

A SKILLED DEDICATED TEAM

Infectious Diseases Team for the Early Management of Severe Sepsis and Septic Shock in the Emergency Department. *Viale P et al, Clin Infect Dis. 2017;65:1253-1259*

STRENGTHS

- Relatively large sample size
- Prospective data collection
- Real-life perspective

LIMITATIONS

- Single centre design
- Very old study population
- Reproducibility ?

What about the near future?

1. Extend the sepsis team activity to the whole hospital, involving the fast track microbiology service, to improve the level of appropriateness

2. Improving the screening sensitivity at any level, involving also nurses

3. Limit the sepsis team engagement

    a. Moving toward a multifaceted and larger team, training and enrolling different professionals

    b. Increasing the opportunity for a right basic approach at every level by a mobile application, helping in diagnosis and antibiotic choice

    c. Accordingly verify the opportunity for the use of the ID sepsis team as a second opinion resource.

Early, Nurse-Directed Sepsis Care

Ferguson A et al, Am J Nurs. 2019;119:52-58

In 2012 a single center, multiyear quality improvement initiative designed to promote early recognition and treatment of sepsis, was started.
The goal of this quality improvement initiative was to promote very early recognition and treatment of sepsis through the establishment of a multidisciplinary team that leveraged nursing skills and expertise.
The early intervention strategy incorporated a nurse-directed ED Code Sepsis, based on the characterization of sepsis as a SIRS.
In the second step for any patient who met SIRS criteria, the nurse independently initiated Power Hour through the electronic health record order set, which called for point-of-care lactate level measurement, two sets of blood cultures, and delivery of a 500-mL bolus of normal saline.
The process could proceed without prescriber input until the lactate result was available for further diagnosis and care planning, at which point the sepsis-related Rapid Response Team was responsible for making a final sepsis diagnosis and ordering antibiotics and the remaining 1,500-mL fluid bolus.

To gauge the effects of the QI initiative, a retrospective, interrupted times series cohort evaluation over the course of the seven-year pre- to post-intervention was conducted using the in-hospital sepsis related mortality rate as the primary outcome.

Early, Nurse-Directed Sepsis Care

Ferguson A et al, Am J Nurs. 2019;119:52-58

Sepsis Patient Outcomes

	Preintervention	Postintervention		
Hospital discharges	N 40,545	15,838		
Outcomes	**Preintervention**	**Postintervention**	**Adjusted Effect Size % points (CI)**	**p**
Sepsis-related deaths/ sepsis discharges	12.5%	8.4%	-4.5 (-1.8 -7.2)	<.001
Sepsis-related deaths/ hospital discharges	1.05%	0.78%	0.33 (-0.07-0.59)	.015
Sepsis discharges / hospital discharges	8.4%	9.4%		0.43
Sepsis-related RRT calls /hospital discharges	2.2%	0.85%	-1.4 (-1.2 -1.6)	<.001

qSOFA ≥ 2