

Emergency Department Crowding Is Associated With Delayed Antibiotics For Sepsis

Ithan D. Peltan, MD, MSc*; Joseph R. Bledsoe, MD; Thomas A. Oniki, PhD; Jeffrey Sorensen, MStat; Al R. Jephson, BA;
Todd L. Allen, MD; Matthew H. Samore, MD; Catherine L. Hough, MD, MSc; Samuel M. Brown, MD, MSc

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Introduction

Adult patients presenting to emergency departments (EDs) with sepsis or septic shock each year represent nearly 1% of all ED visits.

Sepsis is fatal for 15% to 20% of these patients.

Door to antibiotic time is a key determinant of sepsis mortality and morbidity.

Antibiotics initiation for sepsis within 3 hours is important.

International guidelines now recommend antibiotics initiation within 1 hour.

GOALS

In this multicenter cohort, we sought to determine the association of ED crowding with antibiotic delay among patients presenting to the ED with sepsis. We also sought to identify potential mechanisms linking ED crowding to antibiotic delays.

Materials And Methods

We performed a retrospective cohort study of ED sepsis patients presenting to 4 hospitals :

- *2community hospitals
- * a regional referral hospital
- *and a tertiary teaching hospital

between July 2013 and September 2015.

These patients were eligible for inclusion if they were age 18 years or older, exhibited clinical sepsis while in the ED, and had a hospital discharge diagnosis confirming sepsis.

Number of patients:3572

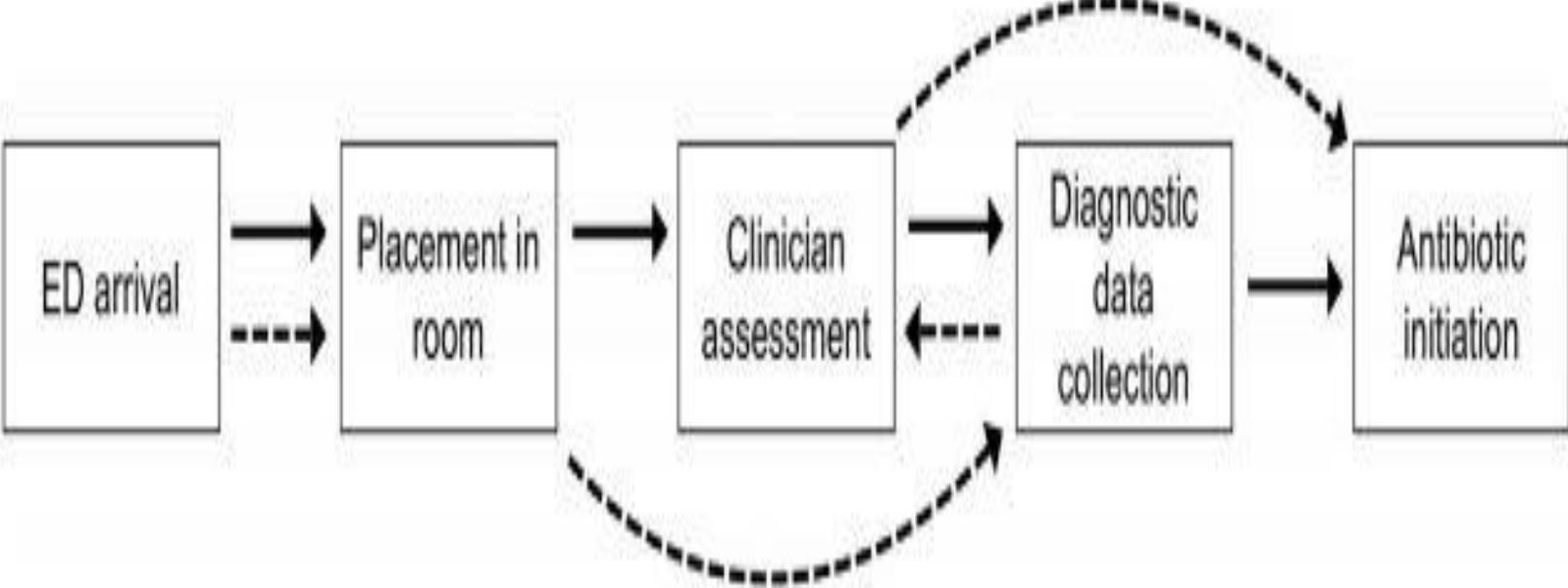


Table 1. Demographic and clinical characteristics of ED sepsis patients by ED overcrowding at patient arrival.

	ED Occupancy Rate <1 (N = 3,075)		ED Occupancy Rate ≥1 (N = 497)	
Female sex, No. (%)	1,680	(54.6)	262	(52.7)
Age, median (SD)	64.6	(17.5)	63.7	(17.9)
Hispanic or nonwhite race, No. (%)	480	(15.6)	89	(17.9)
Married, No. (%)	1,565	(50.9)	237	(47.7)
Type of insurance, No. (%)				
Private	675	(22.0)	121	(24.4)
Medicare	1,863	(60.6)	275	(55.3)
Medicaid	280	(9.1)	63	(12.7)
Uninsured	257	(8.4)	38	(7.7)
Nighttime ED arrival, No. (%)	361	(11.8)	4	(0.8)
Weekend ED arrival, No. (%)	899	(29.4)	78	(15.7)
Received medical care out-of-hospital, No. (%)	1,149	(37.4)	163	(33.8)
Weighted Elixhauser score, median (SD)	8.3	(13.1)	8.3	(14.0)
ED acuity score, median (SD)	2.4	(0.5)	2.3	(0.5)
ED admission data				
Systolic blood pressure, median (SD), mm Hg	125	(28)	124	(28)
Pulse rate, median (SD), beats/min	102	(24)	102	(22)
Respiratory rate, median (SD), breaths/min	20.9	(5.7)	21.2	(6.0)
Temperature, median (IQR), °C [°F]	37.5 [99.5]	(36.6–38.5) [97.9–101.3]	37.7 [99.9]	(36.8–38.6) [98.2–101.5]
First Glasgow Coma Scale score, median (SD)	14.6	(1.8)	14.7	(1.5)
Lactate >2 mmol/L, No. (%)	1,351	(43.9)	203	(40.8)
WBC count, median (SD) (1,000/dL)*	13.6	(8.2)	13.1	(7.0)
ED management data				
Time to antibiotic initiation, median (IQR), min	154	(106–212)	183	(129–250)
Antibiotic initiation ≤3 h, No. (%)	1,929	(62.7)	240	(48.3)
MEDS score, median (SD)	5.4	(3.4)	5.1	(3.5)
Initial SOFA score, median (SD)	5.3	(2.9)	5.4	(3.0)
Hospital mortality, No. (%)	189	(6.2)	26	(5.3)
ED length of stay, median (IQR), min	259	(205–334)	289	(229–362)

RESULTS

* Among **3,572** eligible sepsis patients, **70%** arrived when the ED occupancy rate was greater than or equal to 0.5 and **14%** arrived to an overcrowded ED.

*Median door-to-antibiotic time was **158** minutes.

*When the ED was overcrowded, 46% of patients received antibiotics within 3 hours of ED arrival compared with 63% when it was not .

*After adjustment, each 10% increase in ED occupancy rate was associated with a 4.0-minute increase in door-to-antibiotic time and a decrease in the odds of antibiotic initiation within 3 hours

Table 2. Adjusted association of ED crowding with door-to-antibiotic time.

Measure of ED Crowding (Exposure Format)	Observed Range	Median (Interquartile Range)	Adjusted Change in Door-to-Antibiotic Time per Unit Increase in ED Crowding Measure (95% CI)s	Adjusted OR for Antibiotic Initiation Within 3 Hours of ED Arrival (95% CI)
Primary measure of ED crowding				
Model 1: ED occupancy rate (continuous, reported per 10% increase in ED occupancy rate)*	0 to 1.53	0.68 (0.44 to 0.89)	4.0 (2.8 to 5.2)	0.90 (0.88 to 0.93)
Secondary measures of ED crowding				
Model 2: ED occupancy rate, quartiles				
1	0 to 0.44	NA	1 [Reference]	1 [Reference]
2	0.45 to 0.68	NA	10.8 (2.9 to 18.6)	0.69 (0.56 to 0.86)
3	0.69 to 0.89	NA	16.9 (8.2 to 25.6)	0.64 (0.51 to 0.80)
4	0.90 to 1.53	NA	27.4 (18.2 to 36.7)	0.46 (0.36 to 0.59)
Model 3: ED overcrowding (binary, yes/no)	NA	NA	18.0 (9.1 to 26.8)	0.65 (0.53 to 0.81)
Model 4: patient-to-nurse ratio (continuous)*	0 to 5.8	2.25 (1.82 to 2.67)	15.1 (10.8 to 19.4)	0.70 (0.63 to 0.78)
Model 5: patient-to-physician ratio (continuous)*	0 to 16.7	6.67 (5.00 to 8.13)	4.5 (3.1 to 5.9)	0.90 (0.87 to 0.93)
Model 6: No. of patients arriving at ED within 30 min of subject patient (continuous)*	0 to 29	9 (4 to 14)	1.74 (0.96 to 2.52)	0.96 (0.94 to 0.98)
Model 7: No. of ED boarders (continuous)*	0 to 9	1 (0 to 2)	0.5 (-1.5 to 2.4)	0.95 (0.90 to 1.00)
Model 8: EDWIN score (continuous)*	0 to 2.5	0.46 (0.36 to 0.62)	34.3 (22.4 to 46.3)	0.39 (0.28 to 0.54)

EDWIN, Emergency Department Work Index score; NA, not applicable.

Conclusion

ED crowding was associated with increased sepsis antibiotic delay. Hospitals must devise strategies to optimize sepsis antibiotic administration during periods of ED crowding