Benefits of a Sepsis Program.

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Benefits of a Sepsis Program

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Introduction

- The mortality rate of admission for sepsis stands around 8 times that of the general hospital mortality rate, about 16%.[1]
- In 2011 it was the single most expensive medical condition to treat, costing $20 billion nationally.[2]
- Significant increases in the sepsis mortality rate started appearing at the Lehigh Valley Health Network (LVHN) in 2014. Sepsis mortality rate was targeted as a priority for the network.
- Organized interventions to improve sepsis management at LVHN started May 1, 2016 in the emergency departments.
- This project attempted to determine the effects of the Sepsis Task Force's quality improvement interventions on sepsis management.
- This project also took advantage of the availability of sepsis management data at LVHN to look into two dimensions of quality: (1) equity across personal characteristics and (2) consistency of management across disease presentations.

Methods

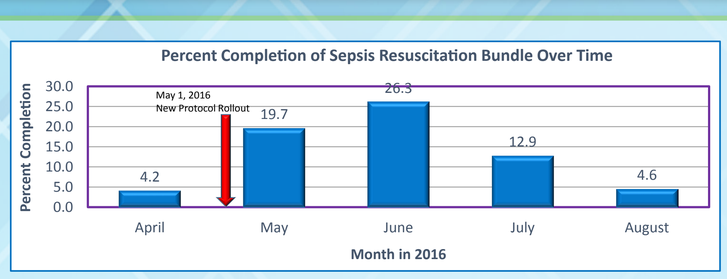
- Data was gathered from EPIC for 599 patients who were documented to have sepsis in LVHN Emergency Departments from April through August 2016 (see Table 1).
- Adherence to sepsis resuscitation was evaluated as a bundle – a selected set of actions that, as a group, "have an effect on outcomes beyond implementing the individual elements alone". [3]
- Each of the following were performed for a bundle to be considered completed:
  1. triage to lactate drawn <90 min,
  2. triage to blood cx <90 min,
  3. adequate fluid resuscitation,
  4. correct initial antibiotics selected,
  5. antibiotics administered <90 min.
- To investigate changes correlating with the network's sepsis interventions, bundle performance was calculated by month.
- To investigate consistency of sepsis management, bundle performance was calculated based on subgroups of age (in decades), sex, day of the week, type of primary diagnosis, and severity of presenting diagnosis

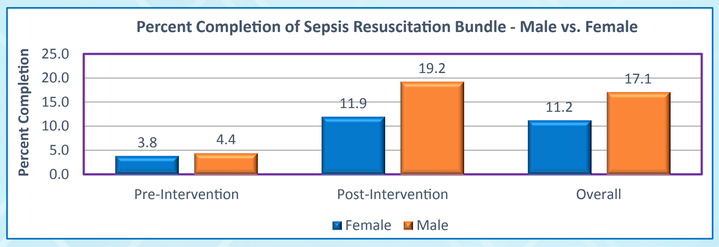
Table 1. Number of Patients for All Categories

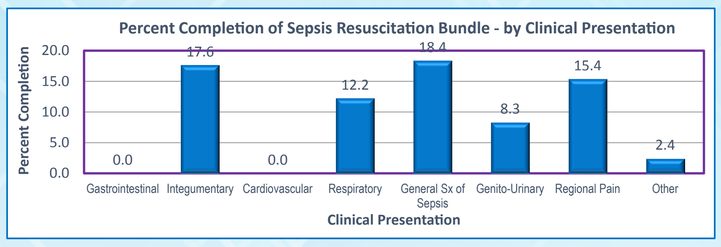
Variable	# Patients		
	Total	Pre-Interven-tion	Post-Interven-tion
Female	286	26	261
Male	310	45	265
<20 y.o.	6	1	5
20-29 y.o.	34	2	32
30-39 y.o.	29	3	26
40-49 y.o.	49	4	45
50-59 y.o.	98	12	86
60-69 y.o.	127	16	112
70-79 y.o.	113	12	101
80-89 y.o.	95	12	83
90-99 y.o.	44	8	36
>99 y.o.	1	1	0
April	71	71	n/a
May	137	n/a	137
June	118	n/a	118
July	140	n/a	140
August	131	n/a	131
Monday	85	8	77
Tuesday	101	77	89
Wednesday	79	13	66
Thursday	91	14	77
Friday	84	8	76
Saturday	63	4	59
Sunday	93	12	81
Gastrointestinal	22	Unable to Calc.	
integumentary	17	Unable to Calc.	
Cardiovascular	10	Unable to Calc.	
Genito-Urinary	48	Unable to Calc.	
General Sepsis Sx	343	Unable to Calc.	
Respiratory	98	Unable to Calc.	
Regional Pain	13	Unable to Calc.	
Other	41	Unable to Calc.	
Organ Dysfunction, no SIRS	18	11	7
Severe Sepsis	270	37	233
SIRS or Sepsis	191	16	175
17th St ED	29	0	29
Cedar Crest ED	408	49	357
Muhlenberg ED	161	22	139

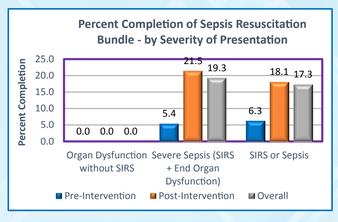
*Pre- and post-intervention numbers wre too complicated to calculate for primary diagnosis tiven that it was out of the scope of the question that this project sought to answer.

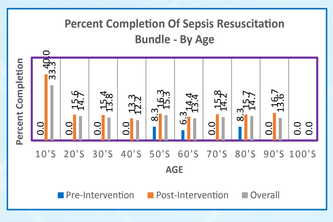
Results

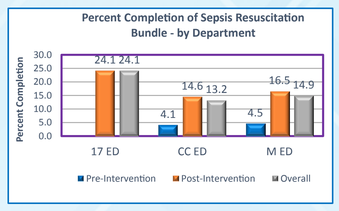












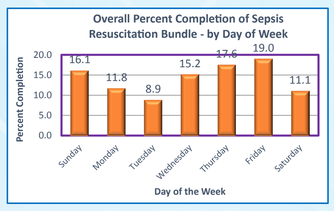


Table 2. Data Characteristics

	Bundle Performed	Bundle Not Performed	Percent of Patients with Full Bundle Performance
Pre-Intervention (April 2016)	3	68	4.2
Post-Intervention (May - August 2016)	82	443	15.6
Increase in rate of bundle follow-through from the pre-intervention period to the post-intervention period is very statistically significant (p = 0.0065)			

Table 3. Overall Bundle Follow-Through by Demographics, Disease Characteristics, Day, and Location

Patient Category	# Patients for Whom Bundle was Performed	# Patients for Whom Bundle was Not Performed	Percent of Patients with Full Bundle Performance
Age - Intergroup differences are not statistically significant (p = 0.985)			
10's	2	4	33.3
20's	5	29	14.7
30's	4	25	13.8
40's	6	43	12.2
50's	15	83	15.3
60's	17	110	13.4
70's	16	97	14.2
80's	14	81	14.7
90's	6	38	13.6
100's	0	1	0
Sex - Sex is significantly associated with bundle follow-through (p = 0.046)			
Female	53	257	11.2
Male	32	254	17.1
Disease Severity - Intergroup differences are not statistically significant (p = 0.096)			
SIRS or Sepsies	33	158	17.3
Severe Sepsis	52	218	19.3
Organ Dysfunction without SIRS	0	18	0
Primary Diagnosis by Type - Type of Primary Diagnosis is significantly associated with bundle follow-through (p = 0.012)			
Gastrointestinal	0	28	0
Integumentary	3	14	17.6
Cardiovascular	0	10	0
Respiratory	12	86	12.2
General Symptoms of Sepsis	63	280	18.4
Genitourinary	4	44	8.3
Regional P ain	2	11	15.4
Other	1	41	2.4
Department - Intergroup differences are not statistically significant (p = 0.247)			
17th Street	7	22	24.1
Cedar Crest	54	354	13.2
Muhlenberg	24	137	14.9
Day of the Week - Intergroup differences are not statistically significant (p = 0.420)			
Sunday	15	78	16.1
Monday	10	75	11.8
Tuesday	9	92	8.9
Wednesday	12	67	15.2
Thursday	16	75	17.6
Friday	16	68	19.0
Saturday	7	56	11.1

Discussion

- There was a large increase in the rate of bundle performance after the intervention period started, which was not explained by normal variation (p = 0.0065). Baseline performance was 4.2%. The post-intervention average was 15.6%, within the established range found at other institutions (see Table 2).
- Men and women experienced 17.1% and 11.2% bundle follow-through, respectively. This difference was found to be statistically significant (p = 0.046) (Table 3).
- General Symptoms of Sepsis (18.4%), Integumentary System (17.6%), and Regional Pain (15.8%) received better care, while Gastrointestinal (0%) and Cardiovascular (0%) diagnoses received poorer care. The influence of primary diagnosis on treatment was found to be statistically significant (p = 0.012) (Table 3).
- There was no association between bundle performance and subcategories of age (p = 0.985), disease severity (p = 0.096), emergency department (p = 0.247), and day of the week (p = 0.420) (Table 3).

Conclusions

1. The sepsis quality improvement interventions were effective.
2. A patient's sex was found to influences their treatment.
3. A patient's primary diagnosis was found to influence their treatment.
4. There was no association between bundle performance and subcategories of age, disease severity, emergency department, and day of the week.

Implications:

- Maintaining and expanding the Sepsis Task Force quality improvement interventions will continue to yield benefits for patients and the network.
- There may be system or provider biases based on sex and primary diagnosis. A more detailed investigation into these discrepancies is warranted.

References:

1. Hall MJ, Williams SN, DeFrances CJ, Golosinskiy A. (2011). Inpatient Care For Septicemia Or Sepsis: A Challenge For Patients And Hospitals. National Center for Health Statistics. Page last reviewed: November 6, 2015. https://www.cdc.gov/nchs/products/databriefs/db62.htm
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