Sepsis Bundle Compliance and the Utilization of Sepsis Checklist in the Emergency Department: A Program Evaluation

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INTRODUCTION

- **Sepsis -** SIRS + s/s of infection
  - Leading cause of death worldwide
    - 50% of in hospital deaths
      - 1/3 could be prevented
  - Costliest in-hospital condition
    - $40,000-$70,000/case

- **SEP-1 bundle**
  - Prescriptive and Time sensitive
  - All or nothing
  - Compliance = reported publicly
    - 50% nation wide

- **Components**
  - 3 hour = CBC, CMP, lactic acid, ABX blood cultures, 30ml/kg,
  - 6 hour = 2nd Lactic acid & vasopressors

(Paoli et al., 2018)
(Rhee et al., 2019)
(Rudd et al., 2020)
(Townsend et al., 2022)

▪Why is this important?

▪Compliance in the SEP-1 bundle leads to

▪Reduction in LOS

▪Reduction in mortality

▪Reduction in cost of care

▪Increased public score card

▪Increased staff satisfaction

BACKGROUND & SIGNIFICANCE

(Delawder & Hulton, 2020)

(Gripp et al., 2021)

(Maciolek & Dawson, 2021)

(Moore et al., 2019)

(Sonis et al., 2020)

(Threatt, 2020)

PURPOSE STATEMENT

- Evaluate sepsis program

- Focus on new documentation tool

Goals

- Increase SEP-1 sepsis bundle compliance

- Reduce sepsis mortality

- Reduce hospital length of stay

- Increase provider/nurse satisfaction

- Be cost effective

- Adjust program with recommendations from literature

CLINICAL QUESTIONS

Will a nurse driven protocol utilizing a paper SEP-1 bundle documentation tool

1. Increase SEP-1 compliance

2. Reduce sepsis mortality and hospital length of stay

3. Increase nursing satisfaction

4. Increase provider satisfaction

5. Be cost effective

At Ascension Macomb's Warren campus's Emergency Department when compared to pre-existing measures?
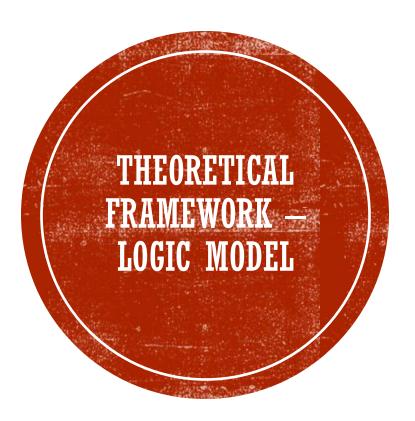
LITERATURE REVIEW

- (CINAHL), PubMed, and SAGE

- Six studies met inclusion criteria

- Common interventions
  - Sepsis checklist
  - Sepsis education
  - Multidisciplinary sepsis teams

- Differences in interventions
  - Nursing sepsis checklist
  - Physician sepsis checklist
  - Bedside sepsis team

- Results
  - Increased SEP-1 compliance
  - Quicker sepsis identification
  - Timely antibiotic administration

- (Delawder & Hulton, 2020; Gripp et al., 2021; Maciolek & Dawson, 2021; Moore et al., 2019; Sonis et al., 2020; Threatt, 2020)

THEORETICAL FRAMEWORK – LOGIC MODEL

Contextual Factors

- Poor compliance, score card, use of existing tools, and sepsis competence
- High ED acuity & volume

Assumptions

- Model is correct
- Adequate resource support

THEORETICAL FRAMEWORK – LOGIC MODEL

Inputs

- Bedside staff
- Non-bedside staff (leadership)
- Teamwork
- Behavior change

Activities

- Education,
- "Code sepsis"
- Advanced protocols
- Power plans
- Documentation tool

Outputs

- Activating sepsis protocols
- Power plan use
- Sepsis Dx orders
- Sepsis Tx orders
- Documentation tool use

THEORETICAL FRAMEWORK – LOGIC MODEL

Short-Term

- Increase confidence, competence, Satisfaction
- Power plan / tool use

Intermediate

- Behavior change
- Standardize tool use
- Increased sepsis Tx

Long-term

- Meet Benchmark
- Reduce mortality, LOS, cost
- Improve scorecard

ORGANIZATIONAL ASSESSMENT - SWOT

Strengths

Nurse accountability

Seasoned nurses

Experienced nursing manager

Leadership support

Department change

Weaknesses

30-40% travel contract nurses

Majority nurses under two years

No full-time quality ED personnel

Few process for sepsis improvement

39% bundle compliance

0 % use of previous tool

ORGANIZATIONAL ASSESSMENT - SWOT

Opportunities

Hiring nine fulltime RNs

Newly hired ED CNS - in training

Leadership support

Threats

Low score card

Underinsured patients

Competing institutions w/ lesser wait times

Competing institutions quality teams

SETTING & SAMPLE

Setting

55 bed Community ED in Metro Detroit

160-220 patients / day

Sample

ED Sepsis sample = 10%

Convenience sample of ED RNs

Convenience sample of ED Providers

METHOD & DESIGN

- Quality Improvement - Program Evaluation

- Multidisciplinary team

- Mixed methods pre-post analysis
  - Pre-implementation – 3 months
  - Post-implementation - 3 months
  - Blind questionnaires to nurses and providers
    - Likert scale & Open-ended questions

- Retrospective chart analysis
  - SEP-1 completion, mortality, LOS, cost of care, sepsis documentation tool

- Review of the literature on opportunities for improvement and suggestions

EVALUATION PLAN

SEP-1 compliance, sepsis mortality, & LOS data analyzed from random retrospective chart analysis

- Pre-implementation Vs. Post-implementation
- Post-implementation completed tools Vs. Post-implementation incomplete tools

Nursing questionnaire

- Determined understanding of program, documentation tool, & satisfaction with tool/program
- Open ended statements

Provider questionnaire

- Determined understanding of program, documentation tool, & satisfaction with tool/program
- Open ended statements

DATA ANALYSIS PLAN

Category	Measurement	Times measured	Test
LOS - Interval	# of hours	1	Unpaired student t test
Completion of SEP-1 bundle -Nominal	Y or N	1	Chi Squared
Cost of Care - Ratio	LOS - Hours	1	Unpaired student t test
Mortality- Nominal	Y or N	1	Chi Squared
Confidence & Satisfaction- Qualitative	Survey Answers	1	Descriptive statistics & Percentages

ETHICS

- Fast-tracked
- Cleared Ascension IRB (2/2023)
- Cleared UDM's IRB (3/2023)
- Oversight by academic and clinical staff

- Limited risk on human subjects
  - Quality improvement / Program evaluation

RESULTS

- Bundle completion-
  - Pre implementation – 8/31
  - Post Implementation – 39/42
    - 2 partially completed
  - 388% increase in completion
  - chi-square test statistically significant (P=0.0036).
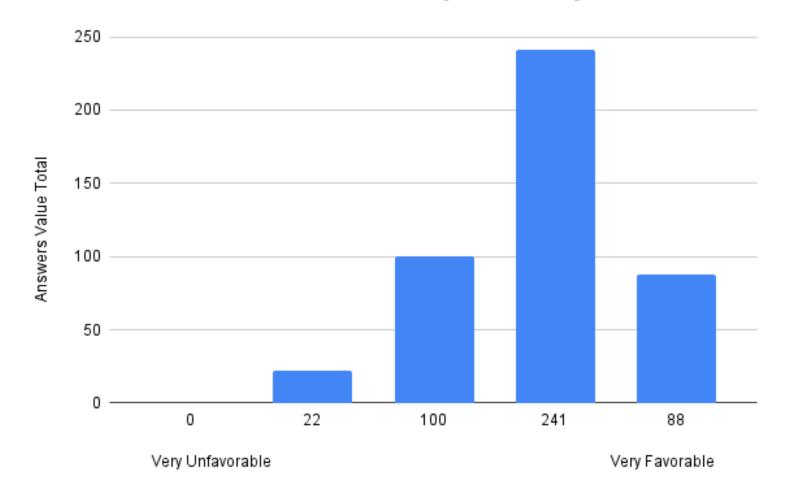
- Mortality
  - Pre implementation – 8/31
  - Post Implementation – 3/42
    - 2 partially completed = 0 mortality
  - 73% decrease
  - Chi-square test statistically insignificant (P=0.06).

- LOS & Cost of care
  - Pre implementation – 254 combined average hours
  - Post Implementation – 310.7 combined average hours
  - 22% increase & assumed increase in cost
  - Student t-test statistically insignificant (P=0.386)
  - Partially completed = 90 hours

SURVEY RESULTS — NURSE

Unfavorable to Favorable Nurse Sepsis Survey Answers

N=41

Tool Support
Easier to use	(70%)
Helped timeliness SEP-1	(73%)
Assisted in tracking SEP-1	(79%)
Increased knowledge	(75%)
Increased confidence	(83%)
Increased consistency	(80%)

SEP-1 Support
Reduces Morality	(66%)
Reduces LOS	(63%)
Reduces Cost	(59%)

Open ended comments (N=10

- Increase provider/nurse communication (N=4)
- Decrease nursing-patient ratio (N=3)
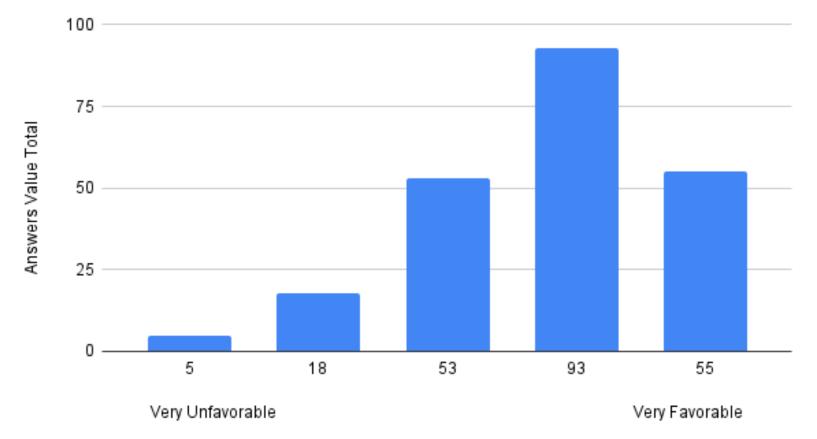- Sepsis code team (N=1)
- Education (N=1)
- SEP-1 Distrust (N=1)

SURVEY RESULTS - PROVIDER

Unfavorable to Favorable Provider Sepsis Survey Answers

- **N = 16**
- Familiar with SEP-1 bundle   (81%)
- Familiar with RN protocol   (50%)
- Documentation tool would be useful (75%)
- SEP-1 Reduces Morality   (75%)
- SEP-1 reduces LOS   (56%)
- SEP-1 reduces Cost   (63%)
- Sepsis reference sheet support   (38%)
- Better care past 3 months   (44%)
- Provider Care algorithm creation   (81%)

- **Open ended comments**   (N=8)
  - Better Communication   (N=2)
  - Uncertainty in order fulfilment   (N=2)
  - Ordering/Documenting support (N=2)
  - SEP-1 Education   (N=2)

DISCUSSION – BUNDLE COMPLETION

- Bundle completion (N=39/41)
  - 388% increase
  - Chi-square, P=0.0036
  - Education, sepsis protocol, & documentation tool = >SEP-1 bundle completion

- Fallouts & Recommendations (N=3)
  - Provider not ordering SEP-1 bundle
  - Diagnosis of sepsis outside SEP-1 window
  - Nurse missed repeat lactic acid

(Henry et al., 2022)

DISCUSSION - MORTALITY

- Mortality
  - 73% decrease
  - Chi-square, P=0.06
  - Clinically significant
    - Just one life saved has clinical significance
  - Low risk + reduction in mortality = tool support

- Recommendation
  - Lower ABX timeframe from 3 hours to 1 hour

(Im et al., 2022)

DISCUSSION – LOS & COST OF CARE

- **LOS & Cost of care**
  - 22% increase
  - Student t-test, P=0.386
  - Median value of 216 hours each
- Outliers cause for increased LOS & cost
  - Mean W/o = 231 hours
    - 23 hours less than pre-implementation data
    - Comorbidity analysis

DISCUSSION – NURSE SURVEY RESPONSES

- **Tool Support**
  - 77% Tool satisfaction

- **Program satisfaction**
  - 79% Program Satisfaction

- **Moderate SEP-1 Support**
  - 63% SEP-1 support
  - Lack of SEP-1 confidence may increase uncertainty and burden of bundle

DISCUSSION — PROVIDER SURVEY

- **Strong Support**

- Documentation tool would be useful

- SEP-1 Reduces Morality

- Provider Care algorithm creation

- **Moderate-low Support**

- SEP-1 reduces LOS

- SEP-1 reduces Cost

- Orders Bundle every time

- Sepsis reference sheet

- Better care in past 3 months

- **Program Satisfaction**
  - 66% Program Satisfaction

PROGRAM MODIFICATIONS

1. Pre-filled order-set
2. Comparative literature review
3. Create accountability
4. Create documentation template tool (macro) for providers
5. Use artificial intelligence
6. Digitize push notification
7. Face-to-face closed loop communication
8. Development of sepsis team
9. Antibiotic treatment from 3 hours to 1
10. Launching nursing internship/clinical

(Henry et al., 2022)
(Im et al., 2022)

SUSTAINABILITY

▪ Hand off to Sepsis Multidisciplinary Quality Committee

▪ Capacity for enforcement & growth
▪ Will implement recommendations
▪ Verbalized acceptance of hand-off

Conclusion

- Utilization of the sepsis documentation tool
  - Increased SEP-1 compliance from 26% to 93%
  - Decreased sepsis mortality from 26% to 7%
  - Increased length of stay & cost of care by 22%
  - Partially completed checklists correlated with SEP-1 fallouts
- Surveys
  - Support for program
  - 77% nursing satisfaction rating
  - 66% provider satisfaction rating
- Key interventions
  - Staff education
  - Provider accountability
  - Digital order-set and documentation tool

LIMITATIONS & BIAS

1. 10% sample size

2. Convenience sampling

3. Retrospective chart analysis = level III evidence.

4. Comorbidities nor advanced directives analyzed

5. Inability to acquire actual cost of sepsis care

6. Medical providers contribution to low compliance rate
   Nurses cannot be liable for completion of the SEP-1 bundle if it is not ordered

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