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A Prospective Study of Emergency Room Quality Assurance Policy in a Multi-Bedded Super Speciality Center in India

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Abstract

Background: In emergency medicine, for sepsis, pain management and many other conditions the right interventions at the right time are essential. Patients with sepsis must be given antibiotics promptly. Likewise, effective pain relief enhances patient comfort and reduces complications.

Although ED has quality assurance programs that ensure prompt care, scanty research investigates their efficiency in multi-bedded super specialty centers managing complex cases. These settings have high patient volumes and variable caseloads making it difficult to follow time-sensitive protocols.

This study aims at analyzing the effectiveness of our existing QA policy of ED's in our multi-bedded super specialty centre with a major focus on ensuring the timely administration of antibiotics for septicemia patients. In addition, we shall also assess how efficient the ED is by looking at two main time measures; medical practitioners' initial assessment time and time from pain recognition to appropriate analgesic administration. We anticipate this will help identify gaps within the QA policy and general practices to enhance faster and better services offered across these critical areas within our emergency department.

AIM: Study to evaluate the effectiveness of the existing QA policy within our multi-bedded super specialty center ED, with a primary focus on ensuring timely antibiotic administration for sepsis patients

Analyze the ED's performance regarding two key time metrics:

1. Initial assessment time by medical practitioners.
2. The time interval for appropriate pain medication administration.

Materials and Methods: Prospective cohort study was conducted at Amrita Institute of Medical Sciences and Research Centre Kochi, India for this includes sixty two patients

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for primary objective. The aim is to evaluate the quality of emergency department (ED) care using direct observation of essential time intervals. Meticulous observation will be employed to collect data from patient encounters in the ED between [11/2023] to [06/2024]. This study aims at capturing and analyzing time intervals like initial assessment, ED arrival to antibiotic administration in sepsis and septic shock cases and ED arrival to analgesic administration. Patients observed would be eligible if they had presented to the ED within that period as per inclusion criteria. Patients who refuse treatment / Patients who are indecisive with regards to their care or family members denying them care will be excluded based on exclusion criteria.

Result: Examining ED quality assurance, we found that 85.5% of sepsis cases received antibiotics within the recommended time frame, with mean times of 105.66 minutes for sepsis and 53.03 minutes for septic shock. In pain management, 81.5% of cases received analgesics within guidelines, with mean times of 25.36 minutes for mild pain and 15.69 minutes for severe pain. Initial patient assessments met timeliness standards in 98.3% of cases.

Conclusion: The study shows that the Emergency Department (ED) strictly follows clinical guidelines for sepsis, septic shock, as well as pain treatment by presenting high adherence to antibiotic administration, and analgesic delivery. Besides, prompt and adequate initial patient evaluations show the ED's commitment to the provision of quality healthcare services. These results uncover a strong framework for fostering ongoing improvements which means continuous efforts should be made towards optimizing ED performance to increase better results on patients' side.

Keywords: Emergency Room Policy; Quality assurance policy; Initial assessment time; Door to antibiotic time in sepsis and septic shock; Pain management in ED; Emergency Care; Emergency Medical Technology.

INTRODUCTION

To enable better outcomes for patients is critical that care offered in the emergency department is quick and efficient. Health facilities always follow certain rules and regulations to start treatment at the right time as well as reduce any waiting time for all those who come for assistance during emergencies or otherwise.

SEPSIS & SEPTIC SHOCK

Definition

"Sepsis is defined as a life-threatening organ dysfunction caused by a dysregulated host response to infection. Septic shock should be considered a subset of sepsis in which underlying circulatory, cellular, and metabolic abnormalities contribute to a greater risk of mortality than that posed by sepsis alone".[1]

Recognizing Sepsis and Septic Shock Patients: It is important to diagnose sepsis and septic shock early in order to treat them effectively and improve patient outcomes. Early recognition helps to make sure treatment is given on time to reduce the chances of dying of these fatal illnesses. This has seen the development of several clinical instruments and rating systems that are all meant to facilitate speed identification. In clinical practice, quick Sequential Organ Failure Assessment (qSOFA) alongside full Sequential Organ Failure Assessment (SOFA) score for sepsis is the most commonly used amongst them. (Fig. 1).

qSOFA: (Bedside Quick Assessment Tool): The qSOFA score assesses patients who may be predisposed to sepsis to permit fast bedside analysis. It has three clinical criteria:

1. Altered Mental Status - Glasgow Coma Scale score less than 15
2. Respiratory Rate - greater than or equal to 22 breaths per minute
3. Systolic Blood Pressure - less than or equal to 100 mm Hg

Each standard or measure gains a score of 1 whereas 2 points or more show a higher risk of having bad effects involved in sepsis. The qSOFA has the advantage of being simple and quick hence can be used to screen in different healthcare facilities such as emergency rooms and hospital medical wards.

SOFA Score: Confirmation and Comprehensive Assessment: qSOFA is for fast screening; SOFA score establishes patient condition diagnosis confirming the presence of sepsis and septic shock codes. The SOFA score is calculated based on the degree of dysfunction of 6 organ systems each scored between 0 and 4

1. Respiratory System (PaO2/FiO2 ratio)
2. Cardiovascular System (mean arterial pressure or administration of vasopressors)
3. Hepatic System (bilirubin levels)
4. Coagulation System (platelet count)
5. Renal System (creatinine levels or urine output)
6. Neurological System (Glasgow Coma Scale score)

The total sum for all individual organ systems provides the overall SOFA score. A sepsis diagnosis is made based on an increase of at least two points in this value per Sepsis-3 definitions. Increased risk of death corresponds directly with higher SOFA scores.

Implementing the 1-Hour Sepsis Bundle: Once sepsis or septic shock has been identified using tools such as qSOFA and SOFA, immediate intervention is crucial. "The Surviving Sepsis Campaign (SSC) 2021"[2] update emphasizes the importance of the 1-Hour Sepsis Bundle (Fig. 2), a set of evidence-based interventions designed to be initiated within the first hour of recognizing sepsis or septic shock. This bundle aims to reduce mortality by ensuring rapid and effective treatment.

Components of the 1-Hour Sepsis Bundle 2:

1. Measure Lactate Level:

- Rationale: Elevated lactate levels can indicate tissue hypoperfusion and are associated with worse outcomes in septic patients. Measuring lactate helps assess the severity of sepsis and guides resuscitation efforts.
- Action: Obtain a blood sample to measure lactate levels as soon as sepsis is suspected. Repeat lactate measurement if the initial level is elevated (>2 mmol/L).

2. Obtain Blood Culture Before Administration of Antibiotic:

- Rationale: Identifying the causative pathogen is crucial for targeted antibiotic therapy. Blood cultures should be drawn before antibiotic administration to avoid contamination and ensure accurate results.
- Action: As soon as somebody identifies sepsis or septic shock, two blood cultures must be taken, one to identify anaerobic and another for aerobes organism, from two different areas.

3. Administer Broad-Spectrum Antibiotics:

- Rationale: Early administration of antibiotics significantly reduces mortality in septic patients. Broad-spectrum antibiotics are used initially to cover a wide range of potential pathogens.
- Action: Administer the first dose of broad-spectrum antibiotics within the first hour of recognizing sepsis or septic shock. Adjust the antibiotic regimen based on culture results and clinical judgment.

4. Begin Rapid Administration of 30 mL/kg Crystalloid for Hypotension or Lactate ≥4 mmol/L:

- Rationale: Fluid resuscitation helps restore intravascular volume, improve tissue perfusion, and maintain blood pressure. A standard initial fluid bolus helps achieve these goals.
- Action: Administer 30 mL/kg of crystalloid solution (e.g., normal saline or lactated Ringer's) rapidly if the patient is hypotensive or has a lactate level of 4 mmol/L or higher.

5. Apply Vasopressors if Hypotensive During or After Fluid Resuscitation to Maintain Mean Arterial Pressure (MAP) ≥ 65 mm Hg:

- Rationale: Vasopressors are necessary when fluid resuscitation alone is insufficient to maintain adequate blood pressure and perfusion. Maintaining a MAP of 65 mm Hg or higher is critical for ensuring organ perfusion.

Initiate vasopressor therapy if the patient remains hypotensive despite fluid resuscitation. Norepinephrine is typically the first-choice vasopressor.

Focus on Antibiotic Administration in the 1-Hour Sepsis Bundle:

Early recognition of sepsis and septic shock

is essential, but immediate intervention is what saves lives. Among the various components of the 1-Hour Sepsis Bundle, timely administration of broad-spectrum antibiotics is critically important. For our study, we will focus on the practices related to the rapid administration of antibiotics in sepsis management.

The existing recommendations have grouped the use of antimicrobials according to the chances of getting sepsis and occurrence of shock. For example, in suspected cases of septicemia or in cases of shock believed to be as a result of septicemia (likely), the guidelines suggest that they should be given immediately after detection, or at least within one hour. On the other hand, when there are no symptoms indicating shock for example among those likely suffering from sepsis; these guidelines advise on an early diagnosis to distinguish between infections and non-infectious diseases. Moreover when there is some concern for infections after conducting a quick focused study; thereby requiring antibiotics within three hours since first diagnosed as having infectious tissue. Lastly but not least on this list are people with a very little probability of having infection and hence no shock where by the guidelines recommend that they do not use antimicrobials but keep observing these patients carefully.

INITIAL ASSESSMENT

Simultaneously, upon arrival at the ED, patients undergo triage, a process that categorizes them based on the severity of their condition. Patients are classified into three categories: red, yellow, and green, indicating the urgency of their medical needs. Following triage, a rapid initial assessment is conducted to promptly evaluate patients' conditions and initiate appropriate interventions. Initial assessment as per local guidelines must be finished in three minutes for patients assigned the red category, five minutes for those classified as yellow and fifteen minutes for those under the green category. These timely and precise initial assessments guarantee that patients obtain timely interventions thus enhancing their chances for better outcomes.

PAIN MANAGEMENT

In the realm of emergency department (ED) care, the timely management of pain stands as a crucial component in enhancing patient comfort and expediting recovery. The Royal College of Emergency Medicine's policies guide the administration of analgesics to be prioritized for patients who complain of pain. The severity of pain is assessed with a standardized numeric pain rating scale (Figure 3), nd then matched with appropriate interventions by a health provider. By protocol; those patients experiencing severe pain must receive their analgesics within 15 minutes of arrival and those having moderate to mild pain are treated in half an hour.

OBJECTIVE

Primary Objective:

- Assess the emergency room's quality assurance policy at a multi-bedded super specialty center specifically concerning the timely administration of antibiotics to patients diagnosed with sepsis and septic shock.

Secondary Objective:

To analyse the ,

- Initial assessment time in ER by the registered medical practitioner.
- The time interval of appropriate analgesic administration for those who present with pain in the ER

REVIEW OF LITERATURE

Timing of Treatment During Mandated Emergency Care for Sepsis

Introduction

Effective and prompt management is very important for sepsis since it can lead to several negative consequences. Care bundles, particularly 3-hour sepsis bundles, have been a crucial aspect of protocols for emergency treatment. This retrospective study titled "Time to Treatment and Mortality During Mandated Emergency Care for Sepsis published in 2017" [4]serves as a basis for this review that looks at the timing of sepsis management.

Study Overview

In order to evaluate the timing of critical care interventions focusing mainly on antibiotics used and completion of 3-hour sepsis bundles, a study was carried out in 2017 where they analyzed data

drawn from 49,331 sepsis patients

Key Findings

1. **Completion of the 3-Hour Bundle:** Of the 49,331 patients, 40,696 (82.5%) completed the 3-hour bundle within the 3-hour window. The 3-hour bundle contains actions like measuring lactate levels, taking blood cultures, starting broad-spectrum antibiotics and providing intravenous fluids.
2. **Timing Metrics:** The median time to completion of the 3-hour bundle was 1.30 hours. The median time to the administration of antibiotics was 0.95 hours.

CONCLUSION

In 2017, there was a study carried out on sepsis care timings to show how the emergency departments are effective in treating timely. The substantial compliance with the 3-hour bundle and the rapid administration of antibiotics is crucial for optimizing sepsis management. It emphasizes the need for maintaining as well as improving timely intervention protocols in emergency care settings.

"Initial Assessment Time in Emergency Departments"

Introduction: Efficient initial assessment in emergency departments (ED) is critical for patient care. The study "Improving the Wait Time to Triage at the ED (2020)"[5] aimed to reduce triage wait times.

Secondary Objective Analysis: In this anticipated interventional study, patients were classified into four categories (P1, P2, P3, P4) driven by their urgency. The baseline wait time was 18 minutes.

Results: After the intervention, the average waiting time was about 13 minutes, thus establishing notable enhancement of triage efficiency

Conclusion: This study proves that anticipating structured interventions will help decrease the time spent on initial evaluations at emergency departments, which will encourage prompt and efficient patient care.

"Pain Management Practices in Emergency Departments"

Introduction: Effective pain management in emergency departments (ED) is essential for patient comfort and care. The subject was investigated in a multi-center cross-sectional observational research entitled "Pain Management Practices in the Emergency Department in Turkey (2021)".[6]

Secondary Objective Analysis: Ten emergency doctors worked on this project together while dealing with 740 patients. The median pain score at admission, both at triage and in the ED, was 7.

Results: In the first 10-30 minutes after being admitted to the ED, about 50% (366 patients) out of 732 were given analgesics.

Conclusion: It has been found that it's possible to manage pain quickly in emergency departments which improves the quality of care as well as patient results. Further efforts are needed to ensure all patients receive prompt pain relief.

METHODOLOGY

Study Design: Prospective cohort study.

Sample Size: 62 patients.

Study Period: November 2023 to June 2024.

Study Place: Department of Emergency, Amrita Institute of Medical Sciences and Research Centre, Kochi, India.

Inclusion Criteria:

1. All the patients who came and encountered in ER
2. Patient who diagnosed with sepsis and septic shock.
3. All the patients who present or complaint of pain in ER

Exclusion Criteria:

1. Refusal of care
2. Denying decisions by the patient, and their family.

Data and Variables:

1. The demographic profile:
   - Name
   - Age
   - Gender
2. Sepsis & Septic shock :
   - Mental status - GCS
   - Vital signs - Heart rate, Respiratory Rate, Blood Pressure, Temperature
   - Point of care - WBC Total count , Platelet level.
   - ABG - Lactate level, creatinine, bilirubin Total
   - Use of Vasopressor

- ED arrival time & Antibiotic time.

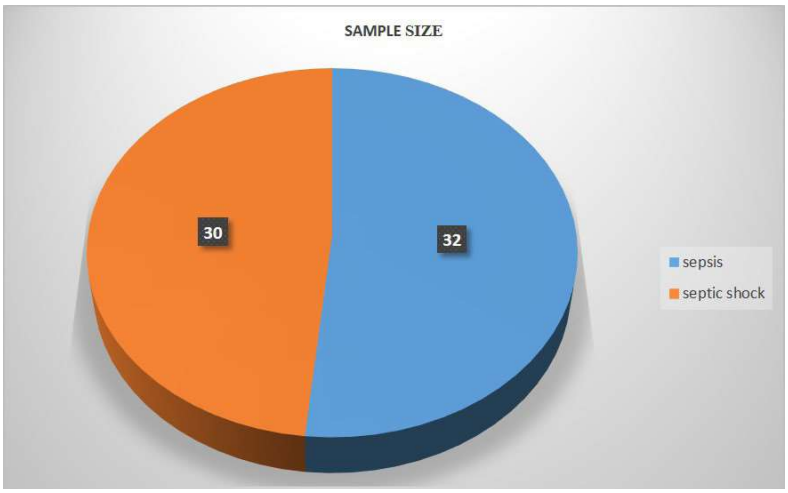
3. Initial assessment:
   - ED arrival time
   - Triage
   - Initial assessment time in ER by the registered medical practitioner

4. Analgesic time:
   - ED arrival time
   - Assessment (Pain scoring system)
   - Analgesic time

ANALYSIS

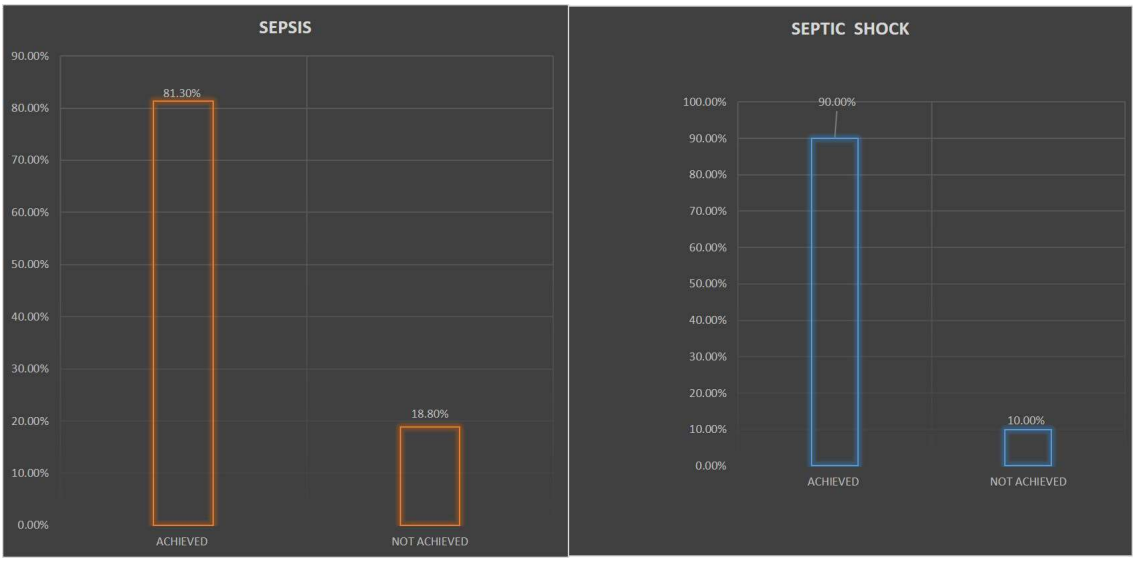
SEPSIS & SEPTIC SHOCK

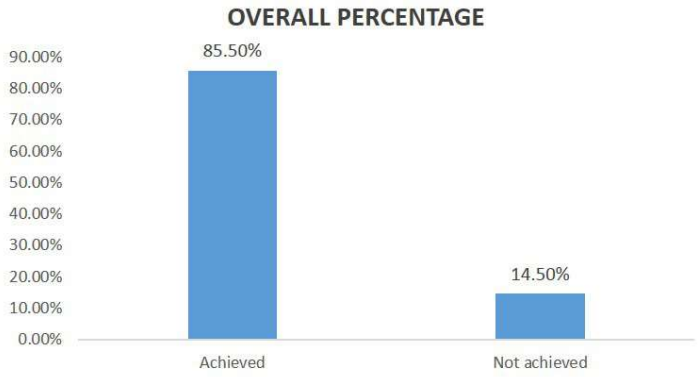
Sample Size



	Frequency	Percent	Valid Percent	Cumulative Percent
Sepsis	32	51.6	51.6	51.6
Septic Shock	30	48.4	48.4	100.0
Total	62	100.0	100.0	

Initiation of Antibiotic Within the Time Interval



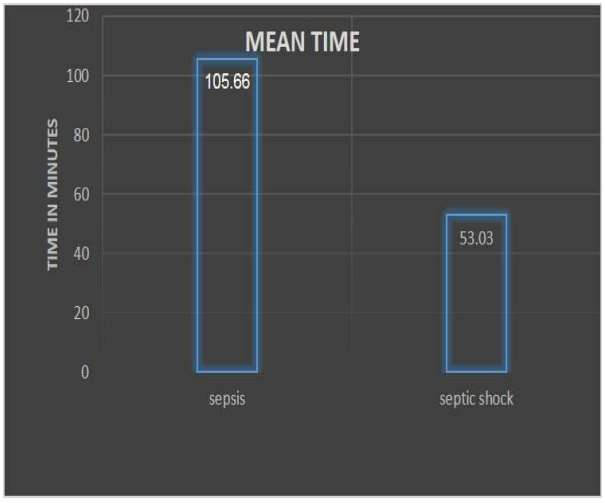


			STAT		Total
			Achieved	Not achieved	
Sepsis / Septic Shock	Sepsis	Count	26	6	32
		% within SEPSIS / Septic Shock	81.3%	18.8%	100.0%
	Septic Shock	Count	27	3	30
		% within SEPSIS / Septic Shock	90.0%	10.0%	100.0%
Total		Count	53	9	62
		% within SEPSIS / Septic Shock	85.5%	14.5%	100.0%

Chi-Square Test:

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.955[a]	1	.328		
Continuity Correction[b]	.380	1	.537		
Likelihood Ratio	.974	1	.324		
Fisher's Exact Test				.475	.270
Linear-by-Linear Association	.940	1	.332		
No. of Valid Cases	62				

Time:



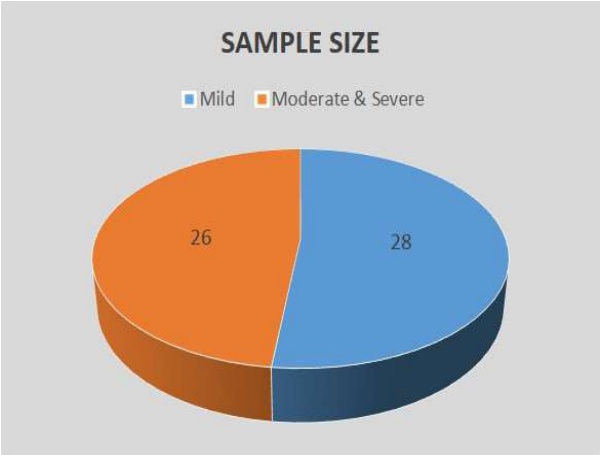
Sepsis	**N**	**Valid**	**32**
		Missing	**0**
	Mean		105.66
	Std. Deviation		82.560
	Percentiles	25	40.00
		50	75.00
		75	165.00
Septic Shock	**N**	Valid	30
		Missing	0
	Mean		53.03
	Std. Deviation		70.334
	Percentiles	25	30.00

	50	40.00
	75	50.00

Mann-Whitney Test:

	Time
Mann-Whitney U	273.000
Wilcoxon W	738.000
Z	-2.924
Asymp. Sig. (2-tailed)	.003

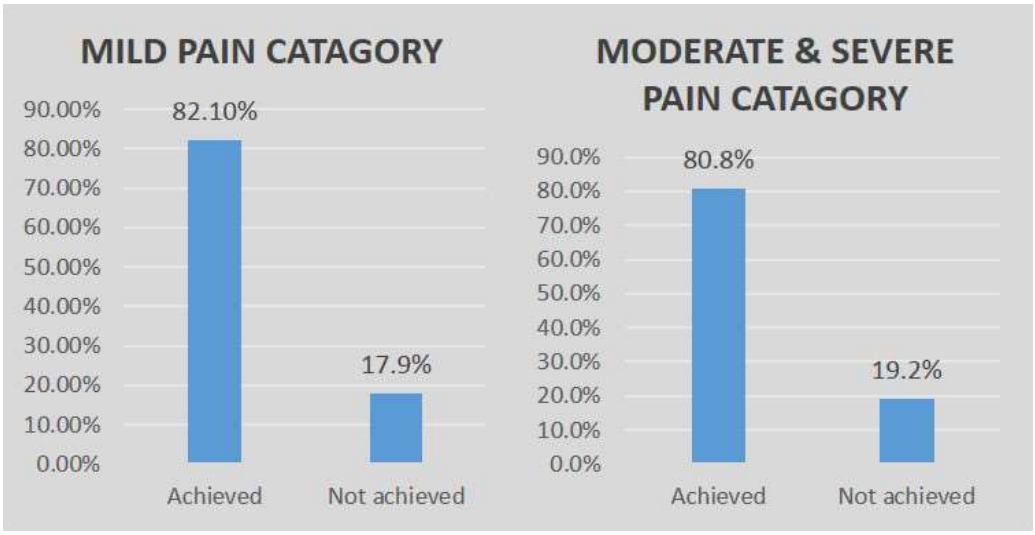
Sample Size:

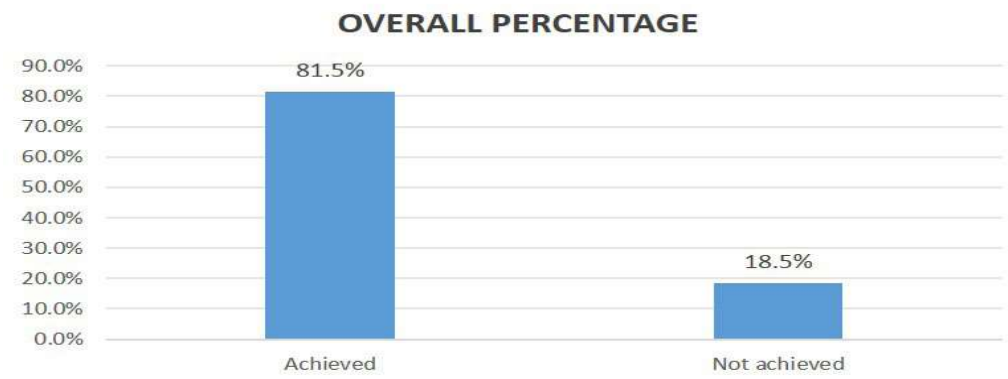


Pain Management - Analgesic Time

	Frequency	Percent	Valid Percent	Cumulative Percent
Mild	28	51.9	51.9	51.9
Moderate & Severe	26	48.1	48.1	100.0
Total	54	100.0	100.0	

Initiation of Analgesic within the Time Iterval:



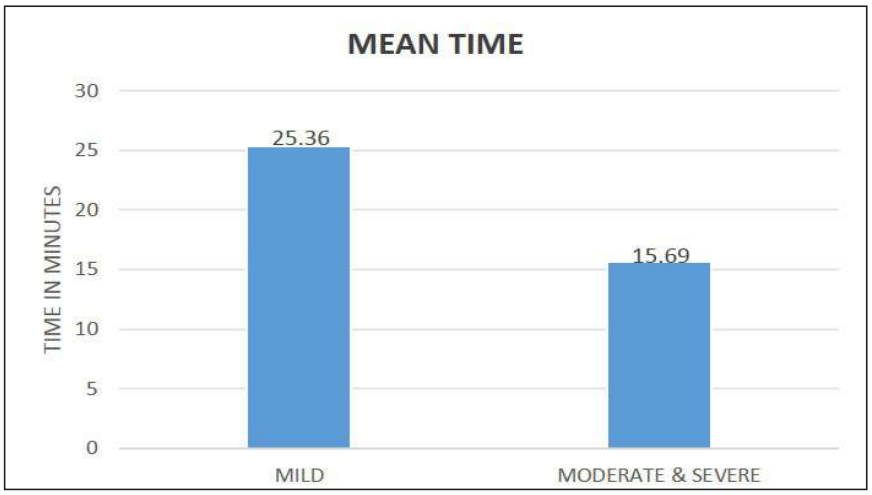


			STAT		Total
			Achieved	Not achieved	
Score	**Mild**	**Count**	23	5	28
		% within Score	82.1%	17.9%	100.0%
	Moderate/Severe	**Count**	21	5	26
		% within Score	80.8%	19.2%	100.0%
Total		**Count**	44	10	54
		% within Score	81.5%	18.5%	100.0%

Chi-Square Test:

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.017[a]	1	.897		
Continuity Correction[b]	0.000	1	1.000		
Likelihood Ratio	.017	1	.897		
Fisher's Exact Test				1.000	.586
Linear-by-Linear Association	.017	1	.898		
No of Valid Cases	54				

Time:



Mild	N	Valid	28	Moderate/ Severe	N	Valid	26
		Missing	0			Missing	0
	Mean		25.36		Mean		15.69
	Std. Deviation		11.864		Std. Deviation		12.191
	Percentiles	25	15.00		Percentiles	25	10.00
		50	23.50			50	12.50
		75	30.00			75	16.25

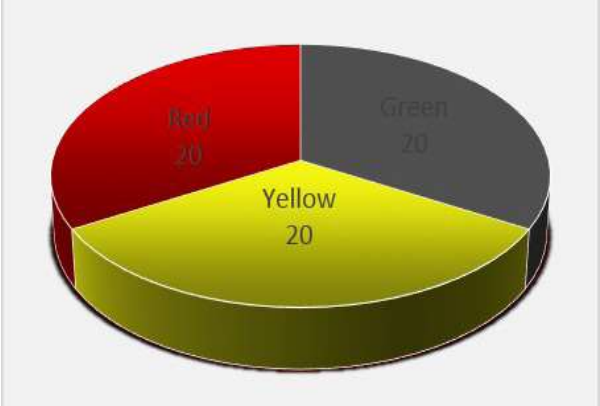
Mann-Whitney Test:

	Time Difference
Mann-Whitney U	160.000
Wilcoxon W	511.000
Z	-3.557
Asymp. Sig. (2-tailed)	<0.001

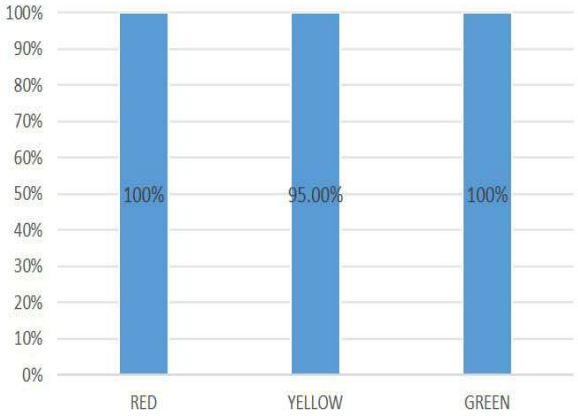
	Frequency	Percent	Valid Percent	Cumulative Percent
Red	20	33.3	33.3	33.3
Yellow	20	33.3	33.3	66.7
Green	20	33.3	33.3	100.0
Total	60	100.0	100.0	-

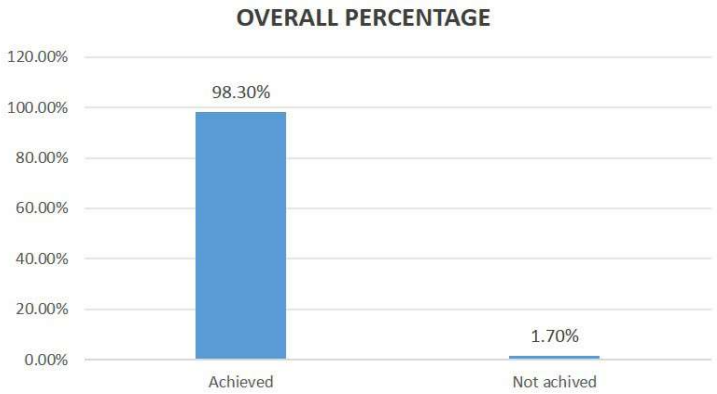
Initial Assessment Time

Sample Size:



Achievement of Initial Assessment Time:

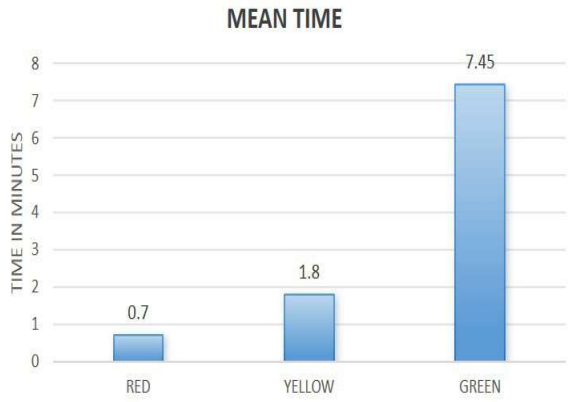




			STAT		Total
			Yes	No	
Triage	**Red**	**Count**	20	0	20
		% within Triage	100.0%	0.0%	100.0%
	Yellow	**Count**	19	1	20
		% within Triage	95.0%	5.0%	100.0%
	Green	**Count**	20	0	20
		% within Triage	100.0%	0.0%	100.0%
Total		**Count**	59	1	60
		% within Triage	**98.3%**	1.7%	100.0%

Chi-Square Tests:

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	2.034[a]	2	.362
Likelihood Ratio	2.231	2	.328
Linear-by-Linear Association	0.000	1	1.000
N of Valid Cases	60		



Red	N	Valid	20
		Missing	0
	Mean		.70
	Std. Deviation		1.129
	Minimum		0
	Maximum		3
Yellow	N	Valid	20
		Missing	0
	Mean		1.80
	Std. Deviation		2.191
	Minimum		0
	Maximum		7
Green	N	Valid	20
		Missing	0
	Mean		7.45
	Std. Deviation		5.276
	Minimum		0
	Maximum		15

Kruskal-Wallis Test:

	Time Difference
Chi-Square	24.504
df	2
Asymp. Sig.	**<0.001**

DISCUSSION

The main aim of this research was to assess the quality assurance in the emergency room (ER) particularly focusing on managing sepsis, septic shock, pain control, and initial assessment of patients. Results show that compliance with established clinical guidelines is good across all examined variables although there are some areas likely needing improvement.

Sepsis and Septic Shock Management: For the management of sepsis and septic shock, the guideline stipulates the administration of antibiotics within 3 hours and 1 hour respectively. Our data show that in 85.5% of cases, antibiotics were administered at the required time, with mean times of 105.66 minutes for sepsis and 53.03 minutes for septic shock respectively. This high compliance rate indicates that generally, the ER is adequate in managing these cases within time. However, the mean times of administration particularly for sepsis leave much room for improvement. Bringing the meantime closer to what it is supposed to be would help improve patient outcomes and reduce mortality rates due to these infections.

Pain Management: The secondary objective of this study was to administer analgesics promptly to patients who presented with pain. Guidelines state that analgesics must be given within 30 minutes for mild pain and within 15 minutes for severe pain. Our study consisted of 44 patients, of which 81.5% were given analgesics within the correct time frame. The average administration times were 25.36 minutes for mild pain while it was 15.69 minutes for severe one. Despite these rates being quite high, the average times for both types of pain show that even though the ER does its work satisfactorily well, there is still room to improve pain management further.

Initial Assessment Time: Initial patient assessment is crucial for triaging and managing patient flow in the ER. According to the guidelines, patients who are triaged under the red category should be assessed in less than 3 minutes, likewise, yellow and green category patients should be assessed within 5 minutes and 15 minutes respectively. Our analysis shows that for 60 patients (20 from each group) the percentage compliance was found to be 98.3% while the mean times were 0.70 minutes for red; 1.80 minutes for yellow and 7.45 minutes for green. This demonstrates an efficient triage and evaluation process about severity making sure that timely and appropriate care is given to patients.