Feasibility and efficacy of sepsis management guidelines in a pediatric intensive care unit in Saudi Arabia: a quality improvement initiative

Presenter

Dr Gamal Mohamed Hasan Ahmed

Associate Professor of Pediatrics

Consultant Pediatric Intensivist

King Saud University Medical City-Riyadh-KSA

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Patient Safety
By Informa Markets

Dubai-UAE
October 24-26
2019

Objectives

- Patient safety and clinical practice guidelines
- Our hypothesis
- Background
- Goals
- Project methodology and approach
- Implementation
- Results
- Conclusions
- Saudi Araba and Patient Safety

CPG Could Overcome Individuals Variation

CPG Could Bridge System's Gaps

Clinical Practice Guidelines | **Common & Serious Disease**

↓

Improved Outcome

Background

- The estimated mortality rate among patients with sepsis has been reported in the range of 17–50% [1].
- Early diagnosis coupled with appropriate treatment is the corner-stone to improving outcomes [2–7].
- Surviving Sepsis Campaign (SSC)-CPGs, was published in 2004, and then updated in 2007, 2012, and 2016 [8–10].
- The adaptation and implementation of these guidelines may potentially improve outcomes in clinical practice and their use is strongly encouraged [11].

Hypothesis

- Adaptation and implementation of the SSC-CPGs for management of sepsis in children at our institute might result in an evidence based standardized practice for management of children with sepsis/septic shock, and improve outcome by reducing sepsis related mortality.


Goals

Goals

- To check the feasibility of adaptation and implementation of the SSC-CPGs through AGREE instrument and ADAPTE process within our institute.
- Standardization of the management approach and treatment of children with sepsis and septic shock.
- To disseminate this project to be implemented at the national level.

Project Approach and Methodology

- Initially, QIP for adaptation of the SSC-CPGs for managing severe sepsis (2008) using the ADAPTE Collaboration (2009) has been formulated.
- We ended with an adapted SSC-CPGs for management of sepsis and septic shock in children.
- At the same time, medication turn round time QIP was initiated.

Project Approach and Methodology

- A QI initiative (Plan-Do-Check-Act cycles) to implement and monitor the guidelines.
- Educational campaigns, brochures, and rolls up were disseminated to different areas of the Pediatric Department.
- Resources setup:
  - ✓ Antibiotic round time delivery.
  - ✓ Point of care testing e.g. blood gas analyzers.
  - ✓ Vascular access devices e.g. peripheral venous catheters, CVC, and IO needles.

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CLINICAL PRACTICE GUIDELINES COMMITTEE

Evidence-Based Clinical Practice Guideline for

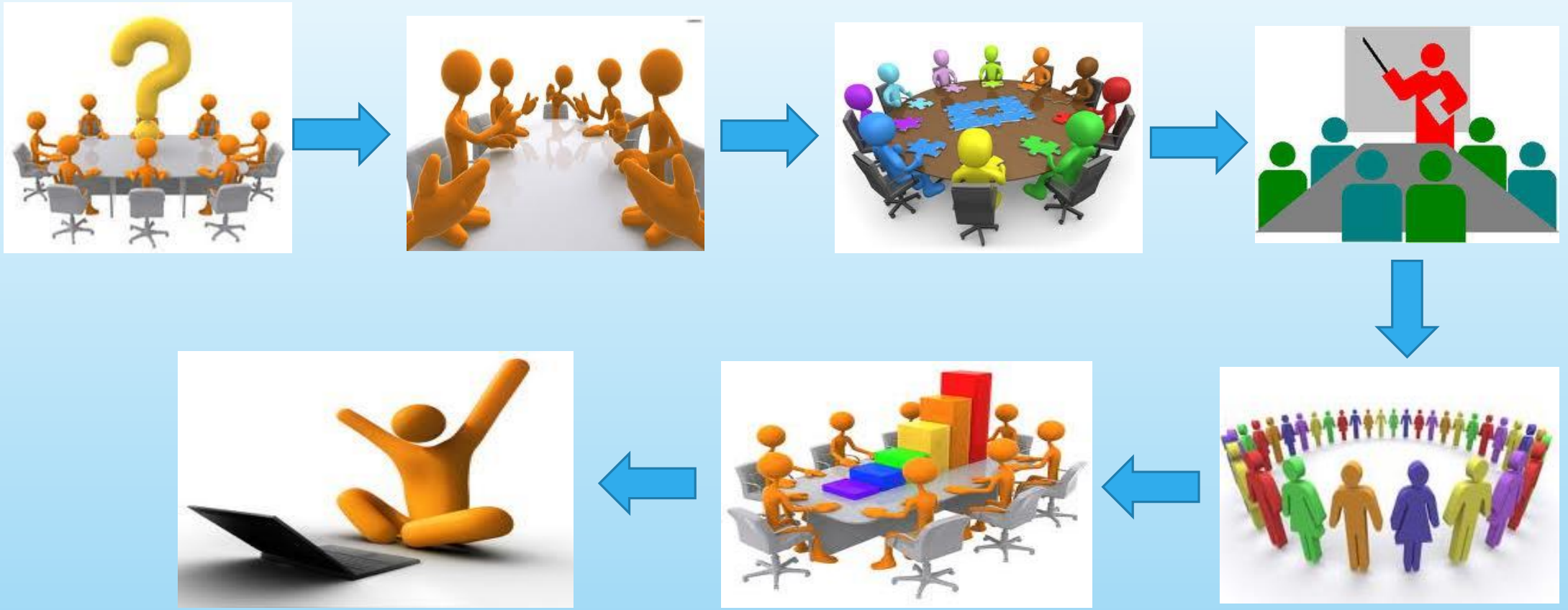
Management of Severe Sepsis and Septic Shock in Infants and Children

MC-CPG-PED-01

Adapted from Source CPG:
International Surviving Sepsis Campaign Guidelines on Management of Severe Sepsis and Septic Shock.
3rd Edition 2012

First Edition 2014
Revised August 2016

Quality Improvement Project



- Later, these guidelines has been updated to the latest published version of SSC-CPGs (2016).


Implementation
SUCCESS
Creativity
Business Performance
VALUE
STRATEGY
Motivating
STRATEGY
MANAGEMENT
STRATEGY
Performance
IDEAS
STRATEGIC
FUTURE
Solutions
Results
IDEAS
BUSINESS PLAN
SUCCESS
GOALS
Manage
TEAM
GOALS
INNOVATION
VALUE-ADD
Improve
PROBLEM SOLVING
Progressive
DYNAMIC
PLAN
IDEA
FUTURE
MISSION
ACTIVITIES

Implementation Tools

Sepsis Screening Form

PEDIATRIC SEPSIS/SEVERE SEPSIS SCREENING

Patient Name: _____

File Number: _____ **Age:** _____ **Sex:** _____

Unit: _____ **Date of Screening:** _____ **Time:** _____ **Screening Sequence:** _____

Step A:

Are any two of the following symptoms and signs infection both present and new to the patient?

SIGN	CHECK	SIGNS	CHECK
Hyperthermia (Temp ≥ 38.3°C)		Tachypnea	
Hyperthermia (Temp < 36°C)		Leukocytosis (WBCs> 12000 uL/L)	
Acutely altered mental status		Leucopenia(WBCs < 5000 uL/L)	
Chills with rigors		Hyperglycemia in absence of diabetes	
Tachycardia or bradycardia		Hypoglycemia	
Metabolic acidosis			

If answer is YES (Possible infection) → Proceed to the next step

Step B:

Is the patient's history suggestive of new infection?

INFECTION SITE	CHECK	INFECTION SITE	CHECK
Pneumonia/Empyema		Bone/Joint Infection	
Urinary tract Infection		Blood Stream Catheter Related Infection	
Acute Abdominal Infection		Endocarditis	
Meningitis		Implantable Device infection	
Skin/Soft Tissue Infection		Other Infections	
Wound Infection			

If answer is YES (Patient has Sepsis) → Bold investigations are must and others per the patient condition.

a) **Obtain: lactic acid, blood cultures, CBC with differential, basis chemistry, bilirubin, urine analysis, chest x-ray, ABG, CRP CT Scan, etc....**
b) **Proceed to the next step**

Step C:

Are any of the following organ dysfunction criteria present at a site remote from the site infection that is NOT considered to be chronic conditions?

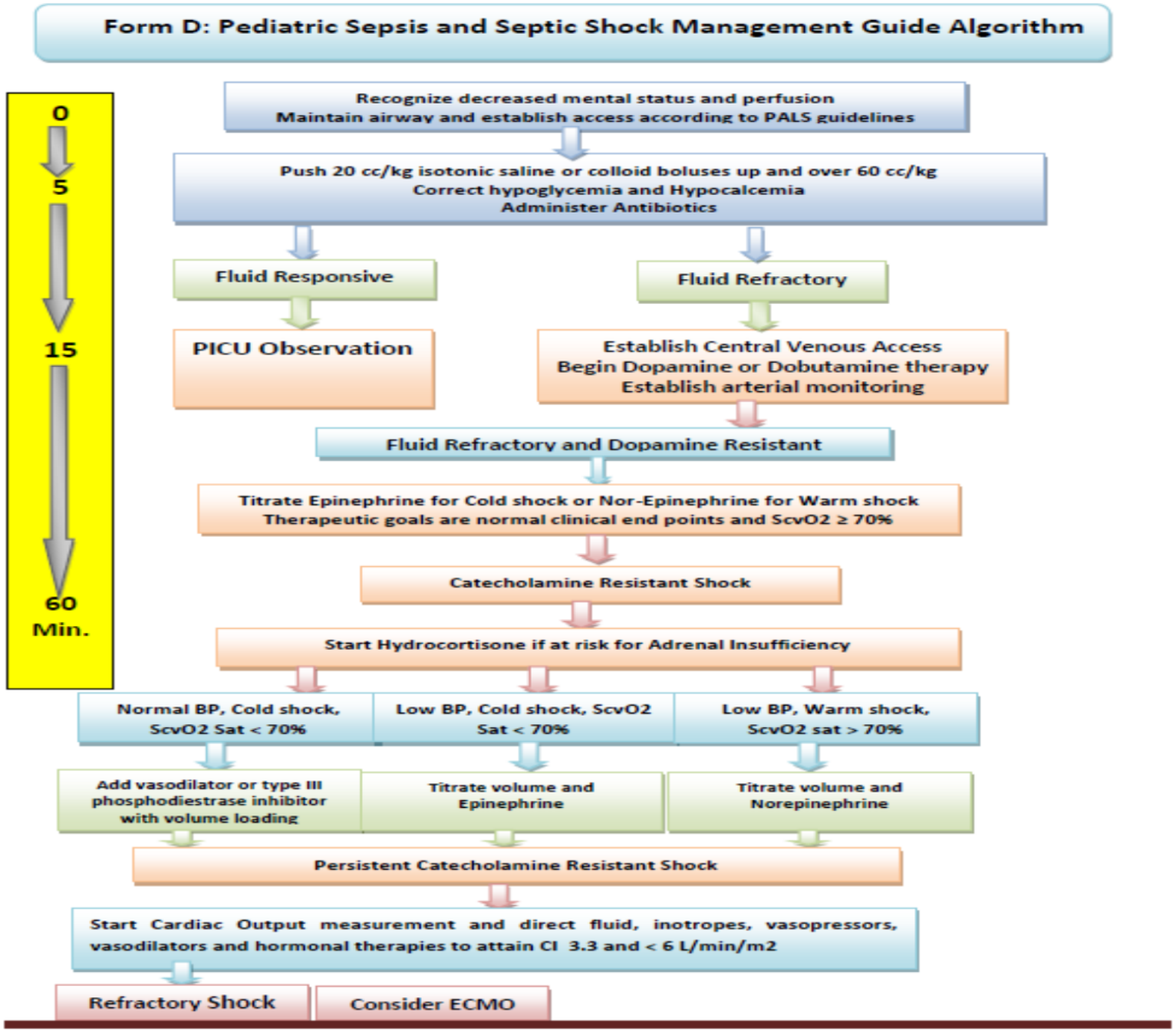
INFECTION SITE	CHECK	INFECTION SITE	CHECK
SBP (see chart on back)			
Coagulopathy (INR> 1.5 or PTT > 60 secs)			
Lactate > 2 mmol/L (18.0 mg/dl)			
Platelet count < 100,000			

If the answer is yes for the above 3 questions, severe sepsis is present.

1. **Serum lactate level ordered? {Yes: _____ Level: _____ No: _____ Why? _____}**
2. **Blood culture taken? {Yes: _____ No: _____ Why? _____}**
3. **Antibiotics administered? {Yes: _____ Type: _____ No: _____ Why? _____}**
4. **Management Algorithm started to be implemented? {Yes: _____ No: _____ Why? _____}**

Implementation Tools

Sepsis Management Algorithm

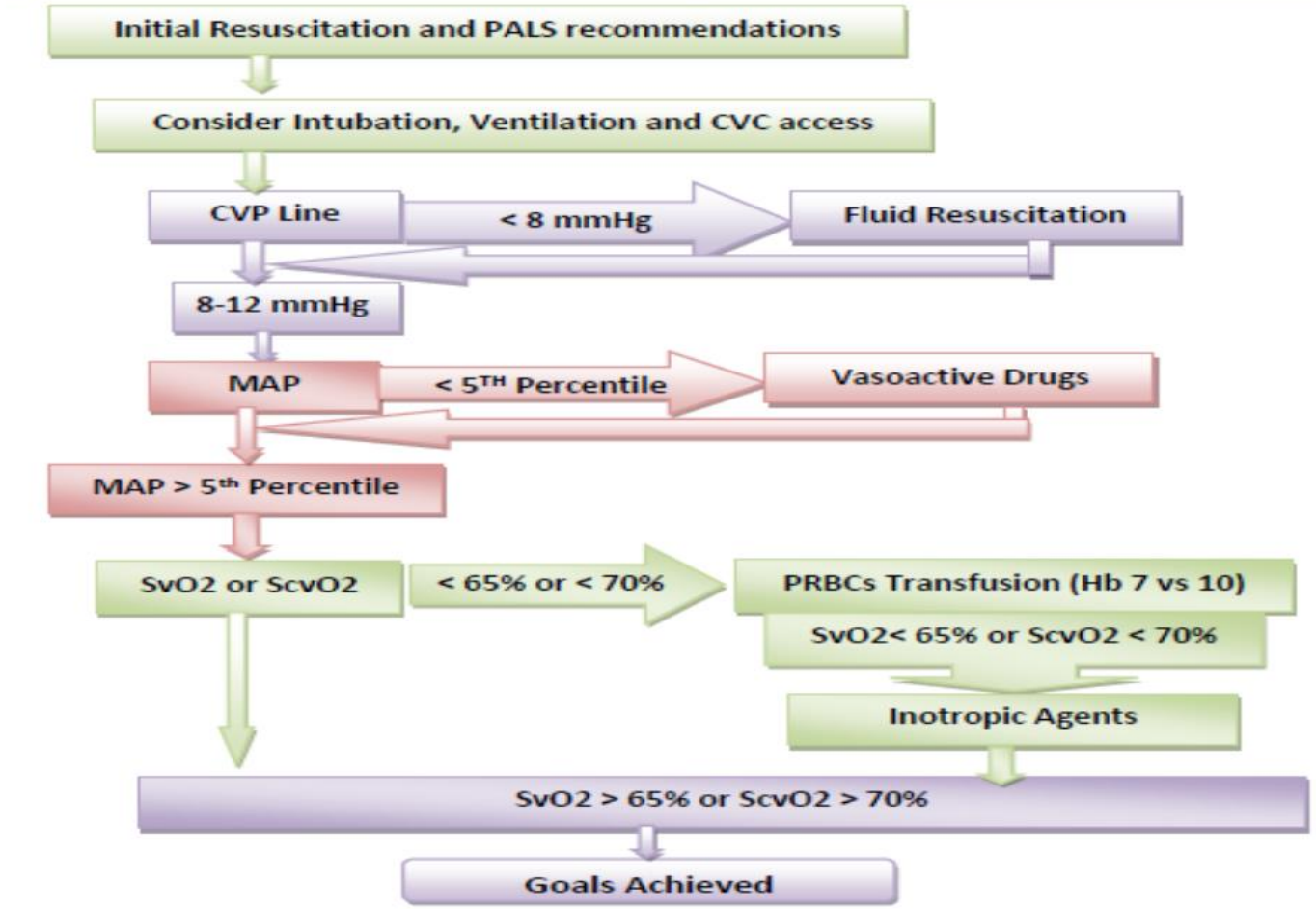


Pediatric Sepsis Research Project Data Collection Forms

Implementation Tools

Goals Directed Therapies

Form E: Pediatric Sepsis and Septic Shock Goals Directed Therapies Guide



Age appropriate limits for HR, RR and BP

Age Groups	Heart Rate		Respiratory Rate (Tachypnea)	Systolic BP (mmHg)	
	Tachycardia	Bradycardia			
0 day-1 mo	>180	<100	>60	0 day-1 mo	≤ 60
1 mo-1 yr	>180	<90	>40	1 mo – 1 yr	≤ 70
2yr-5yrs	>140	<60	>2	1 yr - 10 yrs	≤ 70+ (2×age in yrs)
6yrs -12 yrs	>130	<60	>18	≥ 10 yrs	< 90
13yrs -18 yrs	>110	<60	>14		

Pediatric Sepsis Research Project Data Collection Forms

Implementation Tools

Implementation Compliance Monitoring

Pediatric Sepsis and Septic Shock Management Compliance

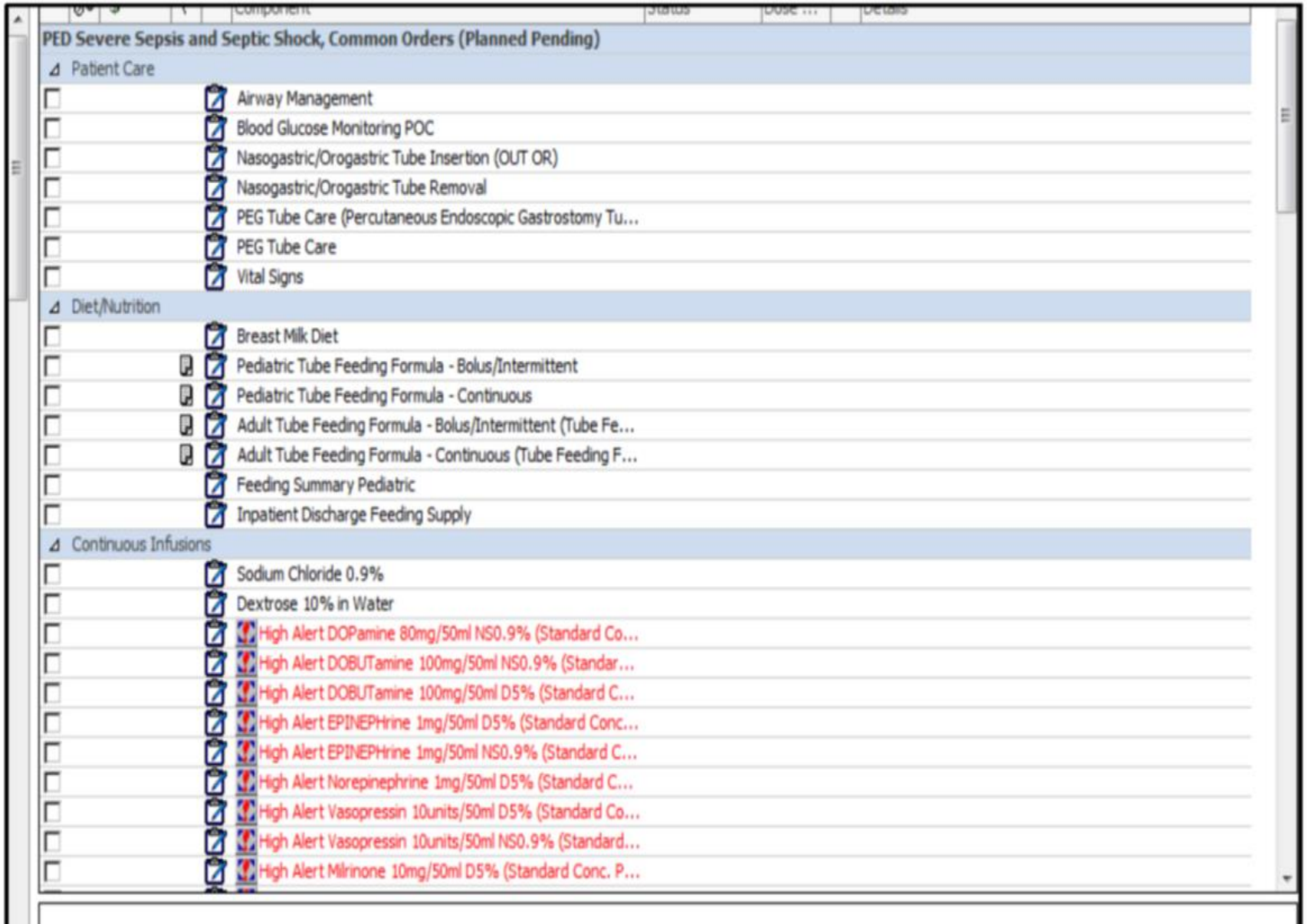
Management Algorithm				Therapeutic End Points		
Timing	Management Steps	Achievement		Goals Directed Therapies	Achievement	
		Yes/Time	No		Yes/Time	No
0 minute	Recognition of hypoperfusion state, PALS recommendations for airway management and vascular access.	----------	-----	HR normal for age and sex	----------	-----
Up to 5 minutes	1- Fluid boluses with normal saline or colloid. 2- Blood lactate, Blood culture, and other studies. 3- Antibiotic ordered/administered. 4- Correct hypoglycemia and hypocalcaemia if present.	---------- ---------- ---------- ----------	----- ----- ----- -----	CRT < 2 seconds	----------	-----
Reassess up to 15 minutes	Fluid responsive → Observation and PICU admission. Fluid refractory → Refer to the management algorithm: 1- Establish CVC and start Dopamine/Dobutamine. 2- Insert arterial line for IBP monitoring.	---------- ---------- ---------- ----------	----- ----- ----- -----	UOP ≥ 0.5 ml/kg/hr MAP > 5th percentile for age and sex	---------- ----------	----- -----
Reassess up to 60 minutes	Responsive → Continue observation at PICU. Fluid refractory and dopamine resistant → 1- Add epinephrine for cold or nor-epinephrine for warm shock and titrate as per response. 2- Still catecholamine resistant → start hydrocortisone if at risk for adrenal insufficiency.	---------- ---------- ---------- ---------- ---------- ----------	----- ----- ----- ----- ----- -----	CVP 8 - 12 mmHg	----------	-----
Reassess up to 6 hours	Responsive → Continue observation at PICU. Still not responsive; reassess: 1- Normal BP and cold shock with ScvO2 < 70% → Add vasodilator or type II PDI with volume loading. 2- Low BP and cold shock with ScvO2 < 70% → Titrate volume and epinephrine. 3- Low BP and warm shock with ScvO2 > 70% → Titrate volume and nor-epinephrine.	---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------	----- ----- ----- ----- ----- ----- ----- -----	Inspiratory plateau pressure < 25 mmHg ScvO2 > 70% or SvO2 > 65%	---------- ----------	----- -----
Reassess up to 24 hours	1- Persistent catecholamine resistant shock: Start COP measurement and direct fluids, inotropes and vasodilators to attain CI 3.3 and < 6 L/min/m^2. 2- Refractory shock → Consider ECMO.	---------- ---------- ---------- ----------	----- ----- ----- -----	Maintain glycemic control.	----------	-----

Implementation Tools

E-SIHI Utilization

eSIHI PowerPlan

PED Severe Sepsis and Septic Shock, Common Orders

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Data Collection

Form H: Data Collection Form

Pediatric Sepsis and Septic Shock Data Collection Form

Patient name: _____ File Number: _____
Date of hospital admission: _____ Date of PICU admission: _____
Date of hospital discharge: _____ Date of PICU discharge: _____
Length of hospital stay: _____ days Length of PICU stay: _____days
Institute Name: _____ Institute Code: _____

Part I:

A. Participating Center Characteristics:

[Refer to Participating Institute Data Form (E)]

B. Patient Eligibility/Exclusion Criteria:

- **Eligibility criteria:**
  - Patient/guardian signed consent for participation in the study [Yes] – [No]
  - Patient is fulfilling the International Sepsis Definitions Conference[1] [Yes] – [No]

  [Refer to Pediatric Sepsis and Septic Shock Screening Tool (Form B)]

[1] *[Levy MM, Fink MP, Marshall JC, Abraham E, Angus D, Cook D, Cohen J, Opal SM, Vincent JL, Ramsay G. 2001 SCCM/ESICM/ACCP/ATS/SIS International Sepsis Definitions Conference. Crit Care Med. 2003; 31(4):1250-6]*

- **Exclusion criteria:**
  - Patient/guardian refused to participate in the study [Yes] – [No]
  - Patient who are signed or eligible for Do Not resuscitate Order [Yes] – [No]

C. Demographic Data:

Age: _____ [Years – Months] Sex: [M] – [F] Residence: _____

Date of admission: ___/___/____ Time of sepsis recognition: _____Hours (Military Time)

Weight: _____ Kg Height: _____ cm Nationality: [Saudi]-[Non-Saudi]

Admission Source: [ER – Pediatric Ward – Surgical Ward - Another hospital]

Surgical Case: [Yes – No] - [Neurosurgery – Cardiovascular – Thoracic – Abdominal - Urologic – Ophthalmology - ENT – Orthopedic - Plastic]

Part II: Patient Background:

A- Co morbidities:

- Type: [Neurological – Cardiac – Respiratory – Gastrointestinal – Renal – Hematological – Oncological – Genetic – Immunological – Orthopedic – Metabolic – Endocrine - Others]
- Specify: ----------
- Functional status: Motor [Normal – Delayed] Mental:[Normal – Delayed]

B- Immunological status: [Competent – Compromised :(----------)]

C- Vaccination status: [Up to date – Delayed - Unknown]

D- Nutritional status: [Average – Malnourished - Obese]

E- Medications:

- Drug allergy: [Yes: (----------)] - [No]
- Chronic medications: [Yes: (----------)]- [No]
- Ongoing antimicrobials: [Yes: (----------)] - [No]

Part III: Initial Assessment (Upon sepsis recognition)

A- Scores:

PELOD 2 score: ---------- PIM 2 score: ----------

B- Vital Signs:

Temp.: --------- 0ºC HR: ----------b/min RR: ----------breath/min

SBP: ----------mmHg DBP: ----------mmHg MAP: ----------mmHg

sPO2: -----I------% [with: Room air – NC O2– Face Mask O2 – NRBM O2- NIV – MV - HFOV]

C- Central Nervous System:

Glasgow Coma Scale: [Best: ---------]

Pupils: Right: [Size: ------mm Shape: ---------- Reaction to light: ----------]

Left: [Size: ------mm Shape: ---------- Reaction to light: ----------]

D- Cardiovascular:

CRT: --------seconds CVP: ---------cmH2O ScVO2:----------

Cardiomegaly: [Yes - No] Gallop rhythm: [Yes - No] Arrhythmias: [Yes - No]

E- Respiratory:

Respiratory support: [Yes: (NIV – MV – HFOV)] - [No]

Respiratory distress: [Yes: (Mild – moderate – Severe)] – [No]

Blood gases: (ABG – VBG-CBG): PaO2: -------mmHg PaCO2: ------- mmHg

FiO2: ------- PaO2/FiO2:----------

Part IV: Therapeutics

SYSTEM	Yes (Specify)	No
CNS	[Carbamazemine – Phenobarbitone – Phenytoin – Valproic Acid – Lamitrogen – Kepra – Lorazepam – Diazepam – Midazolam – Dexmedtomidine - Resperidone]	
CVS	Antihypertensives:---------- Inotropes: (Dopamine – Dobutamine) – Pressors: (Epinephrine – Norepinephrine – Vasopressin) – Enodilators: (Milrinon)	
Respiratory	Nebulizations: (Salbutamole – Ipratropium bromide – Steroid) Mucolytics: (N-Acetylcysteine)	
GIT	H2 receptors antagonists; ----------; PPI:---------- Motility regulator; ----------; Anti-emetics: ----------	
Renal	Diuretics:(Furosemide – Metalozone – Spironolactone – Bumetanide)	
Hematology	Anti-coagulant therapy (Heparin IV – LMW heparin) ; Factor VII ; Protamine sulphate; Others: ----------	
Oncology	Chemotherapeutic agents: ----------	
Allergy/Immunology	Anti-allergic therapies: ---------- Immunosuppressive:----------	
Antimicrobials	Antibiotics: ---------- Antiviral: ---------- Antifungal:---------- Others: ----------	
Electrolyte therapy	Sodium – Potassium – Calcium – Magnesium - Phosphate	
Endocrine/Metabolic	Hormonal replacement therapy: ---------- Metabolic therapies:----------	
Corticosteroids	----------	
Others	---------- ---------- ----------	

Part V: Resuscitation and Management Bundles:

First 6 hours bundle elements:

A- Measurement of blood lactate:

Initial: [Yes: (Time from recognition: ------minutes; Level: ------mmol/L] – [No]: why? --------]

Repeat [Yes: (Time from Initial: -------minutes; Level: ------mmol/L]- [No: why? ----------]

B- Obtaining blood culture prior to antibiotic administration:

[Yes]: Time of ordering blood culture: ---------Time of sampling for blood culture: ----------

[No]: why? ----------

C- Administration of antibiotics within 1 hour of sepsis recognition:

Antibiotic(s) used: [----------]

Time of ordering: (----------hour) Time of administration: (----------hour)

D- Treat (hypoperfusion/hypotension/elevated lactate) initially with fluid resuscitation:

Time started: ----- hour Time stopped: ----- hour Total duration: ------ minutes

Fluid(s) given: [0.9%NS – Lactated Ringer – H. Albumin 5% - Others: ----------

--]

Why? [Improvement – Volume overload]

Total amount given: ----------Duration: ----------hours

Subsequent 18 hours bundle elements:

E- Continued management of hypotension refractory to fluid resuscitation with inotropes:

Time: ----------hour

CVC* insertion: [No] why: ----------]

[Yes]: (Type: Internal jugular- Femoral – Subclavian – Others: ----------)

(Time of insertion: ----------hours)

Inotropic support: Yes: [Dopamine-Dobutamine] - [Maximum dose: ----------]

[Time: ----------hours/min]

No: [Why? ----------]

Arterial line insertion: Yes: [Type: (Radial- Post.Tibial - Dorsalis Pedis - Femoral)]

[Time: ----------hours/min]

No: [Why? ----------]

F- Maintain adequate CVP/maintain adequate central venous oxygen saturation in cases which are fluid refractory and Dopamine resistant:**

Catecholamine started: [Yes: Epinephrine - Nor-epinephrine]

Time: -------hours/min

Maximum dose [----------]

[No]: why? ----------

CVP Measured Yes: [-------- cmH2O - Time: ----------hours]

No: [why? ----------]

SvO2*** Measured: Yes: [Percentage: ------% - Time: ----------hours]

No: [Why? ----------]

Reassessment****: [Catecholamine Responsive] – [Catecholamine Resistant]

G- In case of catecholamine resistant shock:

Random Cortisol blood level obtained before starting hydrocortisone therapy:

[Yes] Dose: [----------mg/kg/dose]

[No] why? ----------

H- Subsequent management:

Normal BP with cold shock and ScVO2 <70% or SvO2 < 65%:

Vasodilator started: [Yes: Milrinon - Others; ----------] – [No: why? ----------]

Volume titrated: [Yes] – [No]: why? ----------]

Low BP with cold shock and ScVO2 <70% or SvO2 < 65%:

Volume titrated: [Yes] – [No]

Epinephrine titrated: [Yes] – [No]

Low BP with warm shock and ScVO2 >70% or SvO2 < 65%:

Volume titrated: [Yes] – [No]

Nor-Epinephrine titrated: [Yes] – [No]

I- Reassessment**:**

Persistent catecholamine resistant shock: [Yes] – [No]

COP measurement: [Yes]-[No: why? ----------]

ECMO: [available and implemented] – [Non-available].

Part VI: Daily follow-up:

To be filled on daily base at fixed time (e.g. morning time/noon time)

Insert ND (Not Done) whenever applicable

Variables	Day 1	Day 3	Day 5	Day 7	Day 14	Day 28
PELOD 2 score						
Vital Signs:						
Temp						
HR						
RR						
SBP						
DBP						
MAP						
SPO_2						
Central Nervous System						
Best GCS						
Pupils Rt. Lt.						
Cardiovascular						
CRT						
CVP						
$ScVO_2$						
Cardiomegaly						
Arrhythmias						
Inotropes						
Pressor						
Respiratory						
Respiratory Distress						
Respiratory support (MV)						
Blood Gases: (ABG-VBG-CBG) P_aO_2 P_aCO_2 FiO_2 P_aO_2/FiO_2						
Abdominal and Gastrointestinal						
Bleeding Feeding Intra-abdominal Pressure						

Continuation: Daily follow up:

To be filled on daily base at fixed time (e.g. morning time/noon time)

Insert ND (Not Done) whenever applicable

Variables	Day 1	Day 3	Day 5	Day 7	Day 14	Day 28
Renal:						
UOP						
AKI						
RRT						
Diuretics Furosemides boluses Furosemide IV infusion Albumin infusion Others						
Net fluid balance during last 24 hours						
Hematology/Oncology						
Bleeding						
Blood product transfusions						
Factor VII						
Anticoagulation therapy						
Chemotherapy						
Immunology						
IVIG Therapy						
Anti-Inflammatory therapy						
Infectious						
Septic focus						
Foreign devices						
System support						
MV						
RRT						
ECMO						
Antimicrobials						
Antibiotics						

Continuation: Daily follow up:

To be filled on daily base at fixed time (e.g. morning time/noon time)

Insert ND (Not done) whenever applicable

Variables	Day 1	Day 3	Day 5	Day 7	Day 14	Day 28
Antifungal						
Antiviral						
Others						
Surgical cases:						
Type						
Wound Infection						
Complications						
Metabolic/Endocrine therapies						
Insulin therapy						
Hypoglycemia						

Part VII: Laboratory and Radiological Data

To be filled on daily base at fixed (e.g. morning time/ noon time)

Insert ND (Not Done) whenever applicable.

Record the most daily abnormal result upon time of data collection.

Study	Initial	Day 1	Day 3	Day 5	Day 7	Day 14	Day 28
Blood Sample taken							
Hematological							
WBC							
Hb							
Hct							
Platelets							
Neutrophils							
Lymphocytes							
Band cells							
PT							
INR							
aPTT							
D-Dimer							
Fibrongen							
ESR							
ASOT							
Protein-C							
Protein-S							
Anti-thrombin III							

Liver function tests and Serum Electrolytes							
Serum bilirubin Total/ Direct							
AST							
ALT							
ALP							
GGT							
Total Proteins							
Serum Albumin							
Blood ammonia							
Blood lactate							
Kidney function test and Serum Electrolytes							
Serum creatinine							
Blood Urea							
Serum Sodium							
Serum Potassium							
Serum Chloride							
Serum Calcium							
Serum Phosphate							
Serum Magnesium							
Acid Base: Blood gases analysis							
Type of blood gas	(A-V-C)	(A-V-C)	(A-V-C)	(A-V-C)	(A-V-C)	(A-V-C)	(A-V-C)
PH							
P_aO_2							
P_aCO_2							
$ScVO_2$							
HCO_2 act							
Base excess							
Base deficit							
Lipid profile							
Triglycerides							
Cholesterol							
LDL							
HDL							
Metabolic/endocrine							
Blood Glucose							
Serum Cortisol							
Thyroid functions T_3 T_4 TSH							
Others							

Biomarkers							
C-Reactive Protein							
Procalcitonin							
Others							
Immunological and Collagen vascular							
S. immunoglobulins							
Lymphocytes markers							
Rheumatoid factor							
ANA							
ASMA							
Radiological							
CXR Pneumonic infiltrates	Yes-No	Yes-No	Yes-No	Yes-No	Yes-No	Yes-No	Yes-No

Part VIII: Microbiology:

To be filled on daily base at fixed (e.g. morning time/ noon time)
Insert ND (Not done) whenever applicable.
Record the most daily abnormal result upon time of data collection.

Study	Done (Results)						ND
	Initial	Day 1	Day 3	Day 5	Day 7	Day 14	
Surface swabs							
Blood culture: Organism Sensitivity							
BM C/S							
Urine Analysis Culture: Organism Sensitivity							
CSF: Analysis Culture: Organism/Sen. PCR: HSV Enteroviruses							
NPA: Virology Multiplex PCR H1N1 Corona Virus							
Tracheal aspirate Gram statin C/S							
BAL: C/S							
Wound C/S							
Body fluids Pleural Peritoneal Pericardial							
PCR: CMV EBV HIV							
Mannan Test							

Part IX: Other supportive therapies:

To be filled and collected at the end point of the patient management
(E.g. transfer from PICU or death)

A- Mechanical ventilation:

[No]
[Yes]: (NIV- Conventional MV – HFOV); PaO2/FiO2: -----; Max.PEEP: ------MAP :------)]
MV Duration: ------ days

B- Stress ulcer prophylaxis:

[No]
[Yes: (H2 receptor antagonist e.g. Ranitidine – PPI e.g. Pantoprazole)]

C- DVT prophylaxis: [Yes] – [No] – [Contraindicated: DIC; Bleeding]

D- Renal Replacement Therapy:

[No]

[Yes]: (PD- CRRT – HD)

Indication: [Volume overload – AKI – Electrolyte disorder - Acid base imbalance]

Start date: ---------- End date: ---------- Total duration: ----- days

E- Glycemic control:

Hyperglycemia: [No]

[Yes: -------- mmol/L] *(Average of random blood glucose level of high readings)*

[Number of days being hyperglycemic with or without insulin therapy: ----]

IV Insulin infusion: [Yes] - [No]

Hypoglycemia: [Yes] - [No]

[Number of hypoglycemic episodes: ----------]

F- Sedation/analgesia and muscle relaxants:

Sedation: [Yes: (Midazolam- Dexmedtomidine – Others: ----------] – [No]

Analgesia: [Yes: (Fentanyl– Ketamine)] – [No]

Muscle paralysis: [Yes: (Cisatracrium – Atracurium - Others: ----------] – [No]

G- Blood products transfusion:

[Yes: (PRBCs: ---------; Platelets: ---------; FFP: -------; Cryopt: -------; IVIG: ---------)] – [No]

H- ECMO:

Indicated: [Yes] – [No]

Implemented: [Yes – No – Not available]

Duration: ------ days

Part X: Outcome:

	Alive	Died
Patient outcome		
	PICU	Hospital
Length of stay		

Part XI: Achievement of Goals Directed Therapies:

Time of sepsis recognition: _____ hours.

Implementation started on ------ / ------ / --------- at --------- hours.

Goals	Time achieved	Time Interval to achieve (Minute/Hours)
Conscious improved		
Heart Rate normal or near normal for age and sex		
CRT < 2 seconds		
UOP > 0.5 ml/Kg/hr.		
MAP > 5th Percentile for age and sex		
Blood lactate < 2 mmol/L		
CVP > 8 mmHg		
ScvO2 > 70% or SvO2 > 65%		

Form I: Pediatrics Sepsis and Septic Shock Management Check List

Tick box whenever completed/achieved or Non Applicable (NA) whenever needed.

PICU Days	Day 1	Day 3	Day 5	Day 7	Day 14	Day 28
Screening tool fulfilled						
Sepsis Management Implementation form						
Consent Obtained						
Data Collection Sheet						
Part I A - Participating Center Data Form B — Patient Eligibility/Exclusion Criteria C — Demographic Data	_____ _____ _____					
Part II: Patient Background						
Part III: Initial Assessment*						
Part IV: Therapeutics						
Part V: Resuscitation and Management						
Part VI: Daily follow up						
Part VII: Laboratory and Radiological						
Part VIII: Microbiological						
Part IX: Other supportive therapies						
Part X: Outcome	Data to be collected by the end of the patient course/management (discharge or death)					
Part XI: Achievement of goals	Data to be collected by the end of the patient course/management (discharge or death)					

Initial assessment* = upon sepsis recognition and start of its management

Management of severe sepsis and septic shock in infants and children

CPG Implementation Showcase

Report

2016/2017

Prepared by

Dr. Gamal Hasan

Consultant, Pediatric Intensivist

Member, CPG Departmental Committee, Pediatrics DQT, Pediatrics Department

Member, Critical Care DQT

Dr. Yasser Amer

CPG Methodologist, Quality Management Department

General Coordinator, MCW-CPG Steering Committee

Member, CPG Departmental Committee, Pediatrics DQT, Pediatrics Department

Reviewed by

Dr. Ayman Aleyadhy

Head, Pediatric Intensive Care Unit

Consultant Pediatric Intensivist,

Associate Professor of Pediatrics, Pediatrics Department

Project Approach and Methodology

- Children <13 years of age, admitted with suspected or proven sepsis/severe sepsis, and treated according to the adapted SSC-CPGs (post-guideline implementation group).
- Comparison made to patients admitted to the PICU with the diagnosis of sepsis/severe sepsis prior to implementation of the adapted guidelines (pre-guidelines implementation group).
- Outcome measures were sepsis related mortality and PICU-LOS.


RESULTS

Results

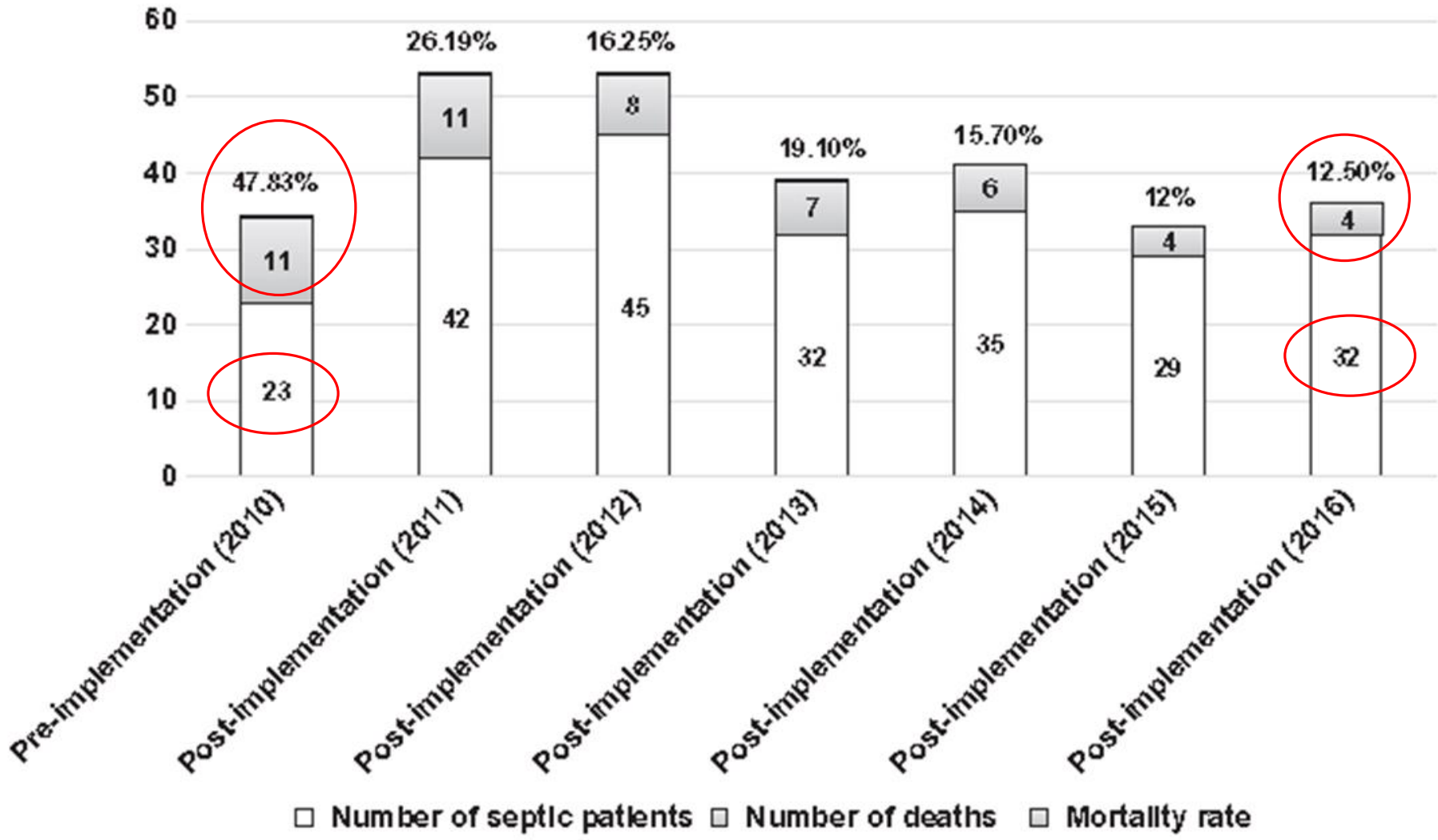


Figure 2 Pre and post guideline implementation mortality rate.

Results

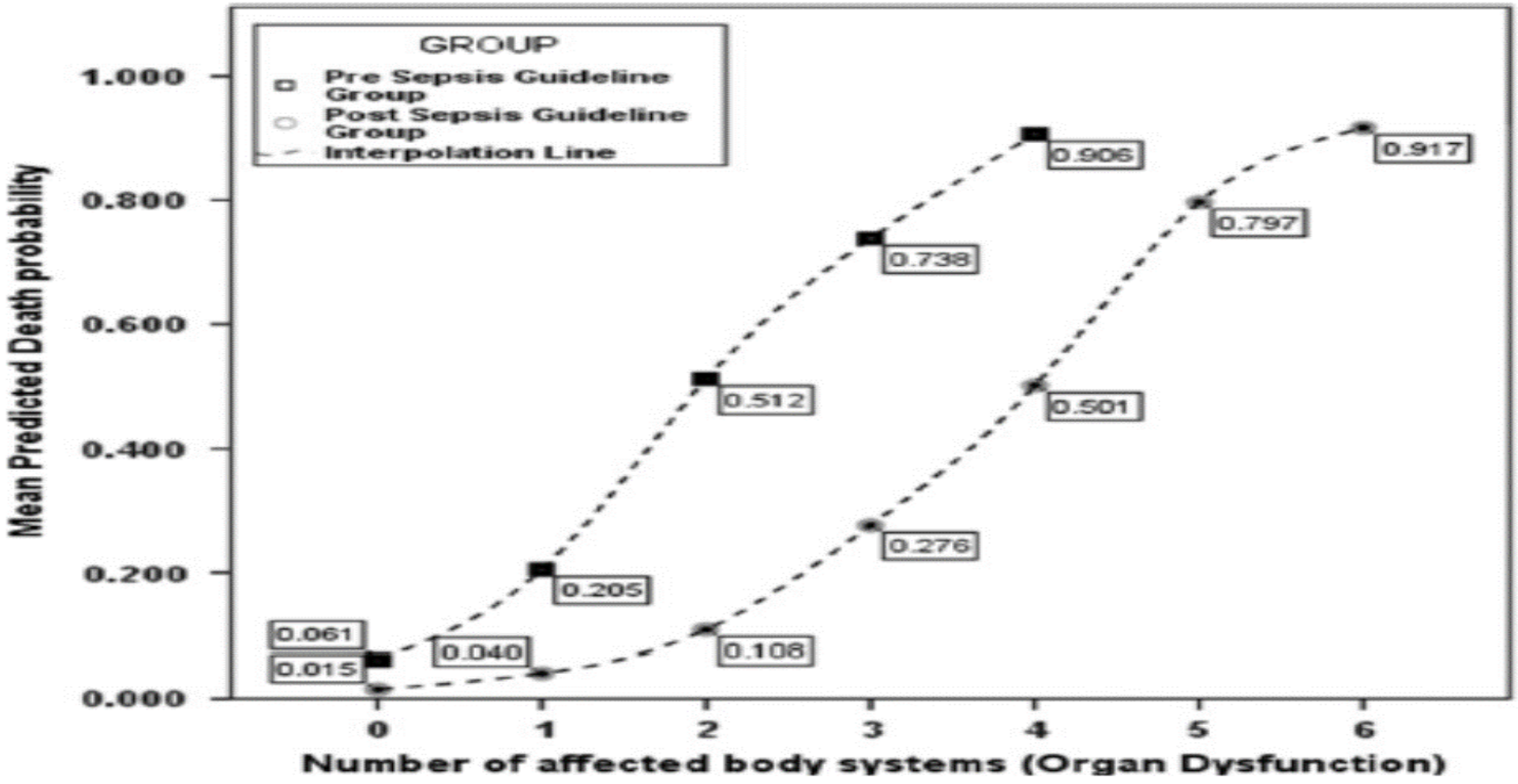


Figure 1 Death probability in relation to the total number of failing organs among the studied groups.

Results

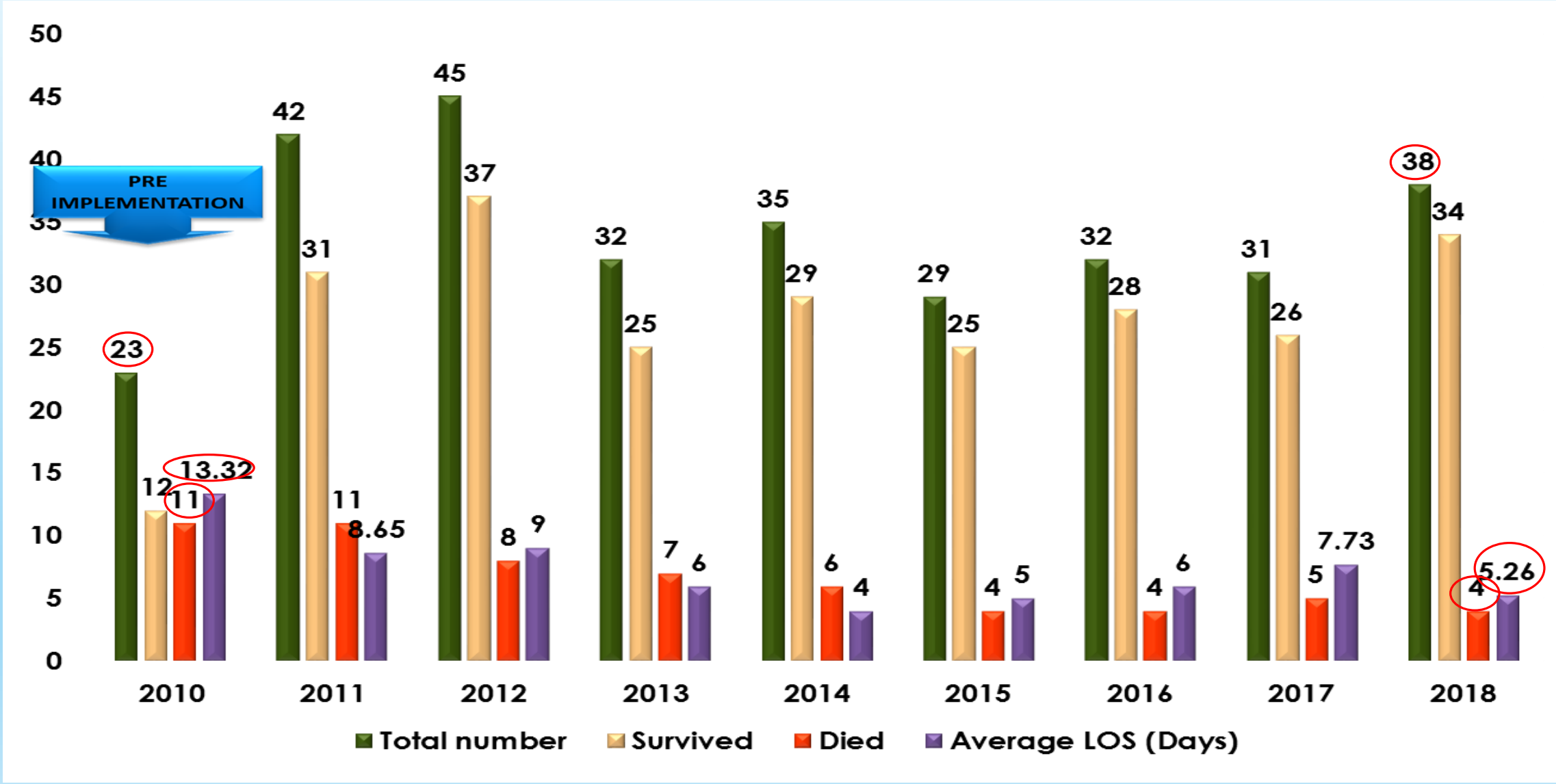
Table 3 Multivariate logistic regression analysis of death among studied groups as a primary outcome

Predictor	OR	95% CI		*P*-value
		Lower	Upper	
Use of SSC-CPGs in management	0.109	0.022	0.534	0.006
Number of failing organs	3.250	1.610	6.558	0.001
Non-immunocompromised	0.474	0.074	3.026	0.430
Blood lactate level >2 mmol/l	2.032	0.336	12.290	0.440
Constant	0.065			0.002

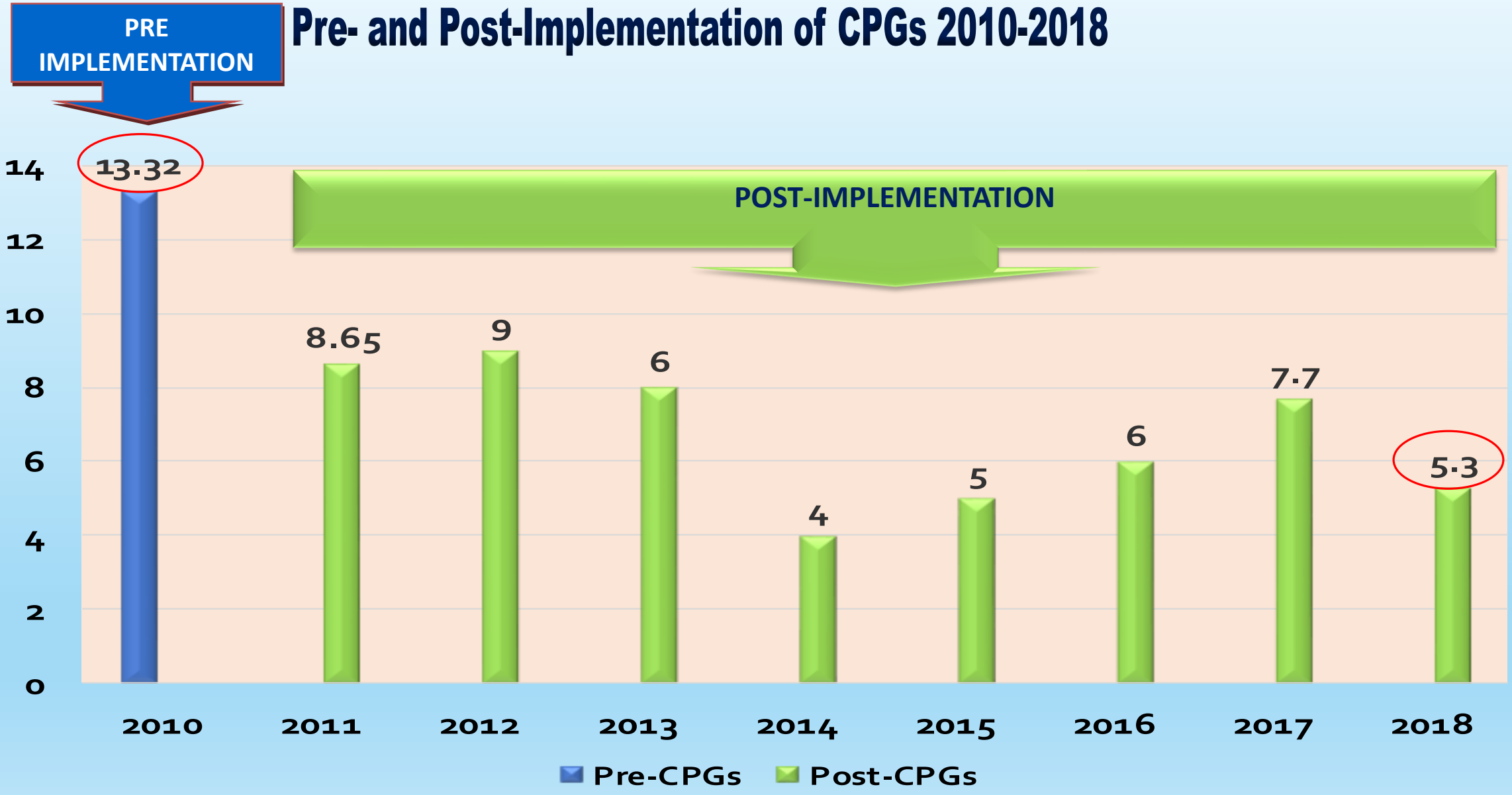
OR, odds ratio; SSC CPGs, Surviving Sepsis Campaign Clinical Practice Guidelines

Differences were statistically significant at $P < 0.05$.

Implementation of Sepsis-CPGs at the PICU 2010-2018



Sepsis Related LOS (Days) at PICU
Pre- and Post-Implementation of CPGs 2010-2018




CONCLUSION

Conclusions

- QIP initiative to adapt and implement SSC-CPGs in our setting was feasible.
- Larger multicenter prospective study is recommended to explore more about the compliance for the detailed bundle elements implementation and areas of improvement related to SSC-CPGs implementation in Saudi Arabia.

Strengths

- The first work for SSC-CPGs adaptation and implementation in the Gulf Region and Arab countries.
- Provided an evidence for feasibility of SSC-CPGs implementation in our settings.
- Enriched the evidence for the low sepsis associated mortality with SSC-CPGs implementation.

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Article

Article

Feasibility and efficacy of sepsis management guidelines in a pediatric intensive care unit in Saudi Arabia: a quality improvement initiative†

GAMAL M. HASAN[1,2], AYMAN A. AL-EYADHY[1], MOHAMED-HANI A. TEMSAH[1], ALI A. AL-HABOOB[1], MOHAMMAD A. ALKHATEEB[1], and FAHAD AL-SOHIME[1]

[1]Intensive Care Unit, Department of Pediatrics, King Khalid University Hospital and College of Medicine, King Saud University, Riyadh 11461, Saudi Arabia, and [2]Intensive Care Unit, Department of Pediatrics, Faculty of Medicine, Assiut University Children Hospital, Assiut University, Assiut, Egypt

Address reprint requests to: Ayman Abdulrahman Al-Eyadhy, Pediatric Intensive Care Unit, Department of Pediatrics, College of Medicine, King Saud University, PO Box 2925, Riyadh 11461, Kingdom of Saudi Arabia. Tel: +966 (11) 4692001; Fax: +966 (11) 4692185; E-mail: aleyadhy@ksu.edu.sa

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Saudi Arabia and Patient Safety

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