Implement of Sepsis Performance Improvement Programs

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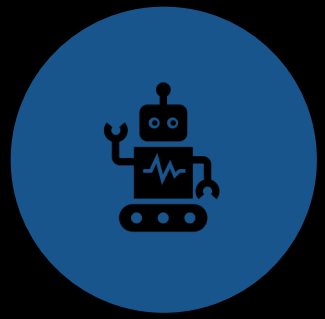
Surviving Sepsis Campaign

Basic Assumption

Intelligent

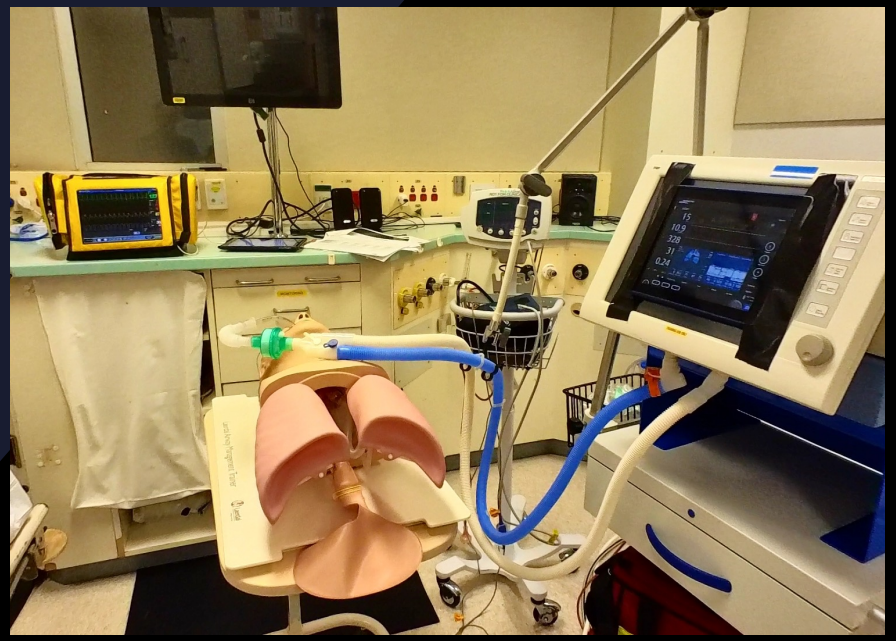


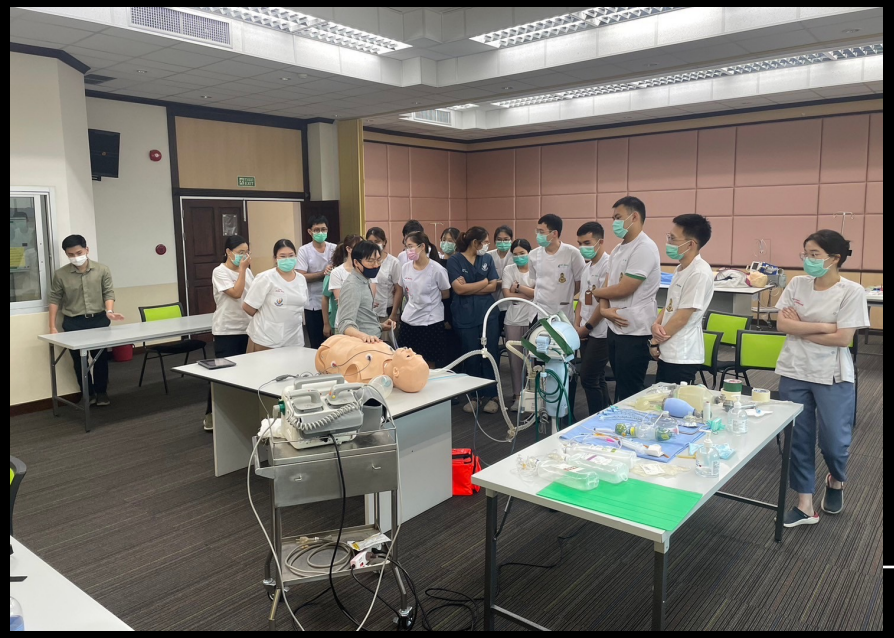
Capable

Doing their best

Want to improve

My Experiences:
Certificate of Simulation Fellowship Program, Mater Education, Brisbane, QLD, Australia





My current practice and goal: Improve Patient Safety with Translational Simulation

Sepsis performance improvement program

- Sepsis screening tool
- Sepsis education and program implementation
- Measurement of sepsis bundle performance
- Monitor sepsis mortality
- Identification opportunities to improve

Surviving Sepsis Campaign: International Guidelines for Management of Sepsis and Septic Shock 2021.

Current update in SSC 2026

Key message: Sepsis performance improvement program includes screening, standard treatment procedures, and quality improvement strategies.

- QI initiatives are recommended as part of a systems-based approach to improving sepsis management.

Practical note: Programs should be adapted to local resources, staffing, infrastructure, and usual care quality.

Surviving Sepsis Campaign: International Guidelines for Management of Sepsis and Septic Shock 2026.

Strategies for building up Sepsis performance improvement

Public awareness

Quality improvement with multiprofessional teams

Cognitive aids

Reporting outcomes

Key success for better performance in sepsis care

- Early recognition of sepsis
- Sepsis 1-hour bundle of care
- Achieving a target of tissue perfusion
- High quality of communication and team-performance

Sepsis performance program with simulation

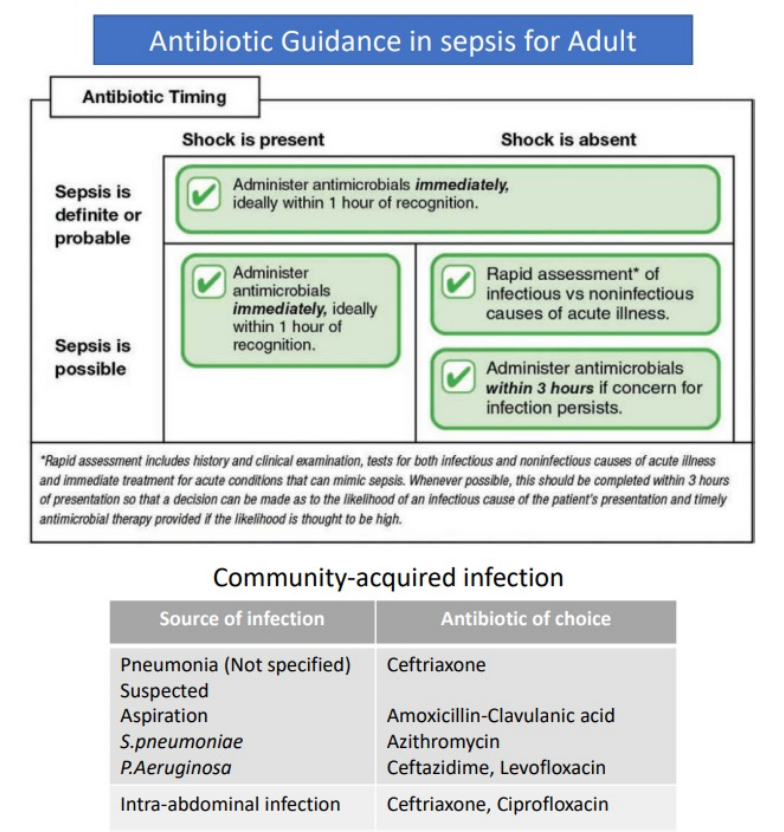
Establish administrative organization and education

From CPG to implement protocol in screening, bundle of care, and rapid response system for the local context

Evaluation the protocol with simulation – tool for assessment and education the team, Data collection for revise the protocol

Evaluation of the clinical outcome in real-world: process and result

Cognitive aids: Antibiotic guide, Sepsis bundle of care, and Resuscitation flow: 1st draft



Antibiotic Guidance in sepsis for Adult

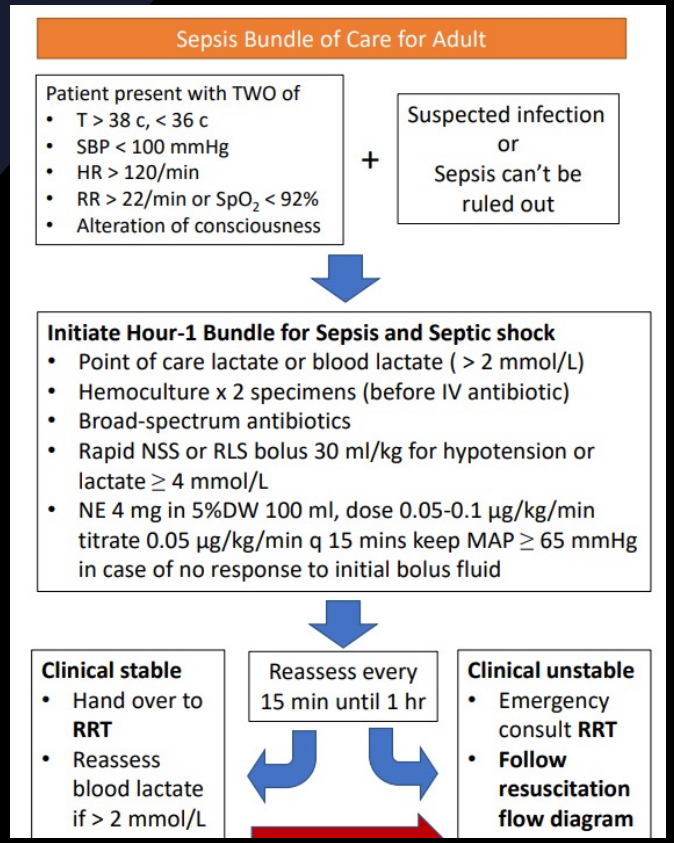
Antibiotic Timing

	Shock is present	Shock is absent
Sepsis is definite or probable	✔ Administer antimicrobials ***immediately,*** ideally within 1 hour of recognition.	
Sepsis is possible	✔ Administer antimicrobials ***immediately,*** ideally within 1 hour of recognition.	✔ Rapid assessment* of infectious vs noninfectious causes of acute illness. ✔ Administer antimicrobials ***within 3 hours*** if concern for infection persists.

**Rapid assessment includes history and clinical examination, tests for both infectious and noninfectious causes of acute illness and immediate treatment for acute conditions that can mimic sepsis. Whenever possible, this should be completed within 3 hours of presentation so that a decision can be made as to the likelihood of an infectious cause of the patient's presentation and timely antimicrobial therapy provided if the likelihood is thought to be high.*

Community-acquired infection

Source of infection	Antibiotic of choice
Pneumonia (Not specified) Suspected Aspiration *S.pneumoniae* *P.Aeruginosa*	Ceftriaxone Amoxicillin-Clavulanic acid Azithromycin Ceftazidime, Levofloxacin
Intra-abdominal infection	Ceftriaxone, Ciprofloxacin



Sepsis Bundle of Care for Adult

Patient present with TWO of
- T > 38 c, < 36 c
- SBP < 100 mmHg
- HR > 120/min
- RR > 22/min or SpO_2 < 92%
- Alteration of consciousness

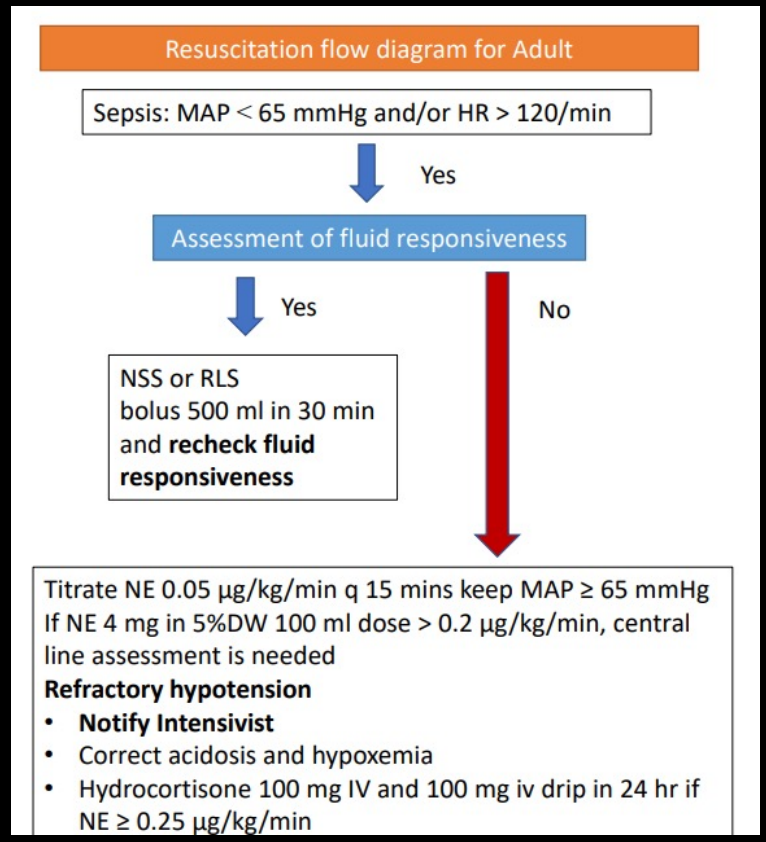
\+ Suspected infection or Sepsis can't be ruled out

Initiate Hour-1 Bundle for Sepsis and Septic shock
- Point of care lactate or blood lactate (> 2 mmol/L)
- Hemoculture x 2 specimens (before IV antibiotic)
- Broad-spectrum antibiotics
- Rapid NSS or RLS bolus 30 ml/kg for hypotension or lactate ≥ 4 mmol/L
- NE 4 mg in 5%DW 100 ml, dose 0.05-0.1 µg/kg/min titrate 0.05 µg/kg/min q 15 mins keep MAP ≥ 65 mmHg in case of no response to initial bolus fluid

Clinical stable
- Hand over to **RRT**
- Reassess blood lactate if > 2 mmol/L

Reassess every 15 min until 1 hr

Clinical unstable
- Emergency consult **RRT**
- **Follow resuscitation flow diagram**



Resuscitation flow diagram for Adult

Sepsis: MAP < 65 mmHg and/or HR > 120/min

Yes

Assessment of fluid responsiveness

Yes

NSS or RLS bolus 500 ml in 30 min and **recheck fluid responsiveness**

No

Titrate NE 0.05 µg/kg/min q 15 mins keep MAP ≥ 65 mmHg
If NE 4 mg in 5%DW 100 ml dose > 0.2 µg/kg/min, central line assessment is needed

Refractory hypotension
- **Notify Intensivist**
- Correct acidosis and hypoxemia
- Hydrocortisone 100 mg IV and 100 mg iv drip in 24 hr if NE ≥ 0.25 µg/kg/min

Create the operation flow of RRT in MNRH

Activate RRT when met criteria

→

RRT Nurse working with GPs and nurse

within 30 min

→

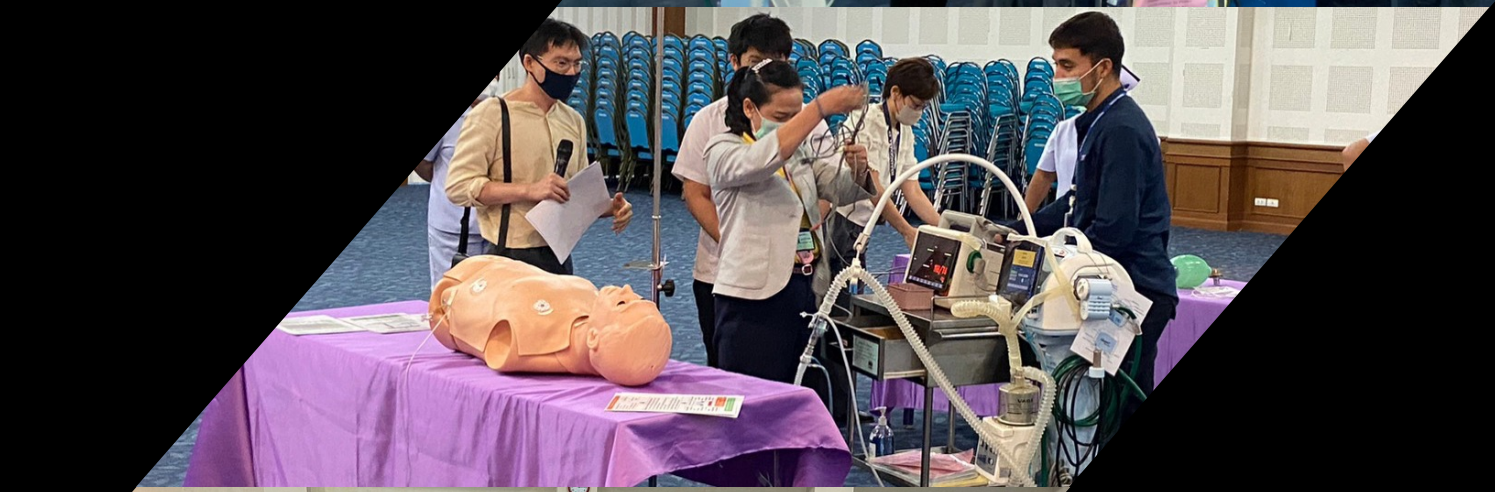
RRT Nurse cooperates with critical care team for standby transfer to ICU or support in ward

RRT include resident, fellow and critical care expert

→

RRT Nurse follow until 6 hour or transfer to ICU

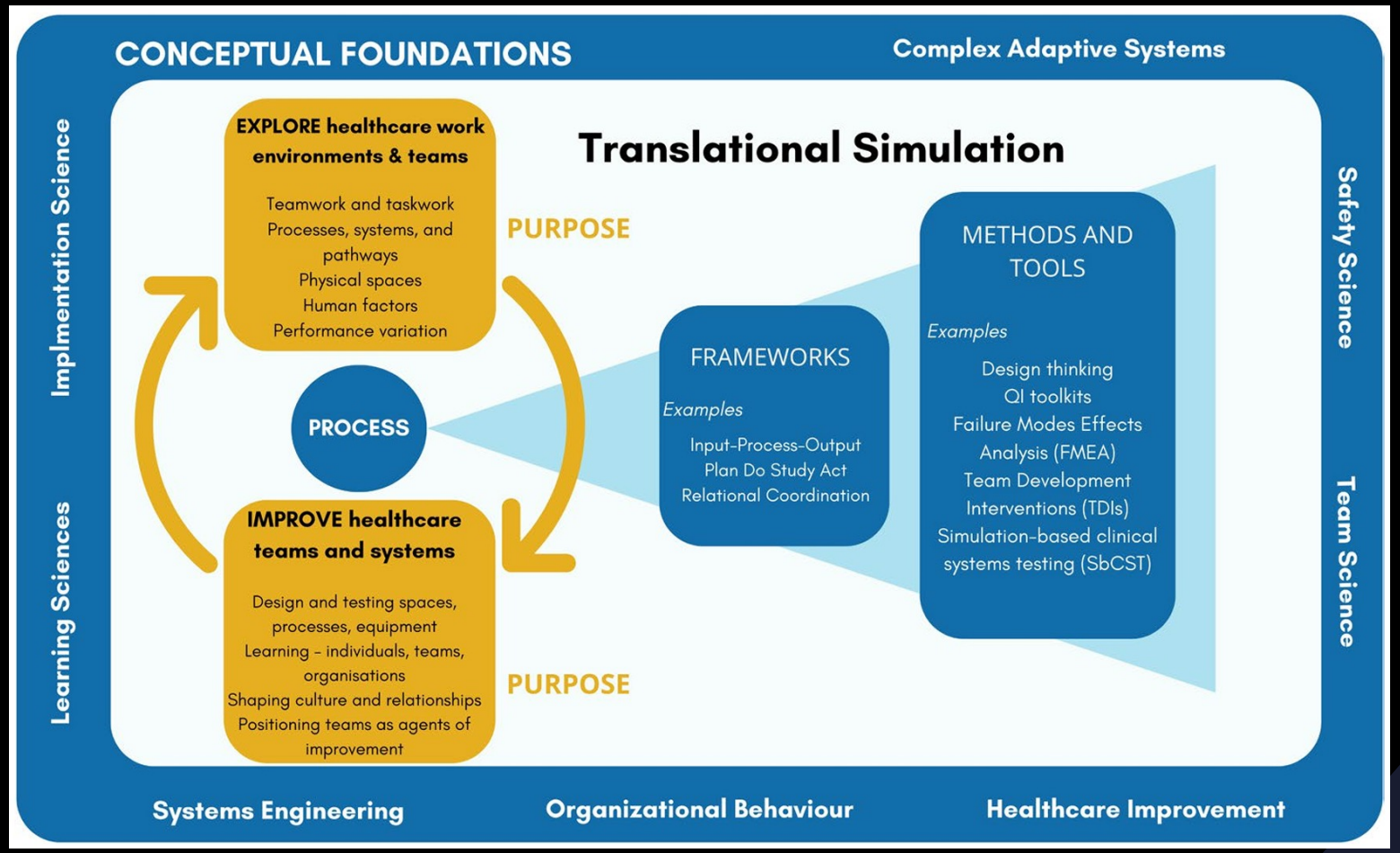
Activate RRT in new case of worsening patients suspected from sepsis except End of life care



Simulation-based intervention for improving performance in sepsis team

Translation Simulation: Contribution of simulation to healthcare quality and safety

- From Simulation to Practice
- Achieve required competencies
- Building teamwork and communication
- Entrust stakeholders in health system



Challenges in designing a **simulated environment**
To improve working in the **actual world**

Simulation as a tool for

Testing the systems

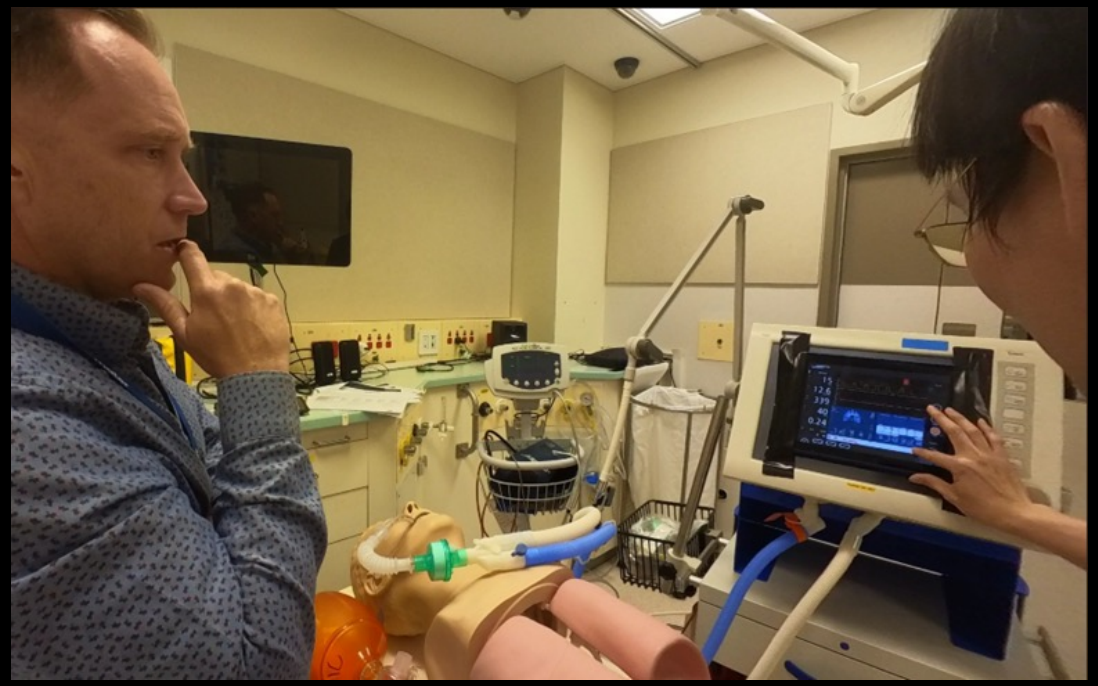
Providing education and training

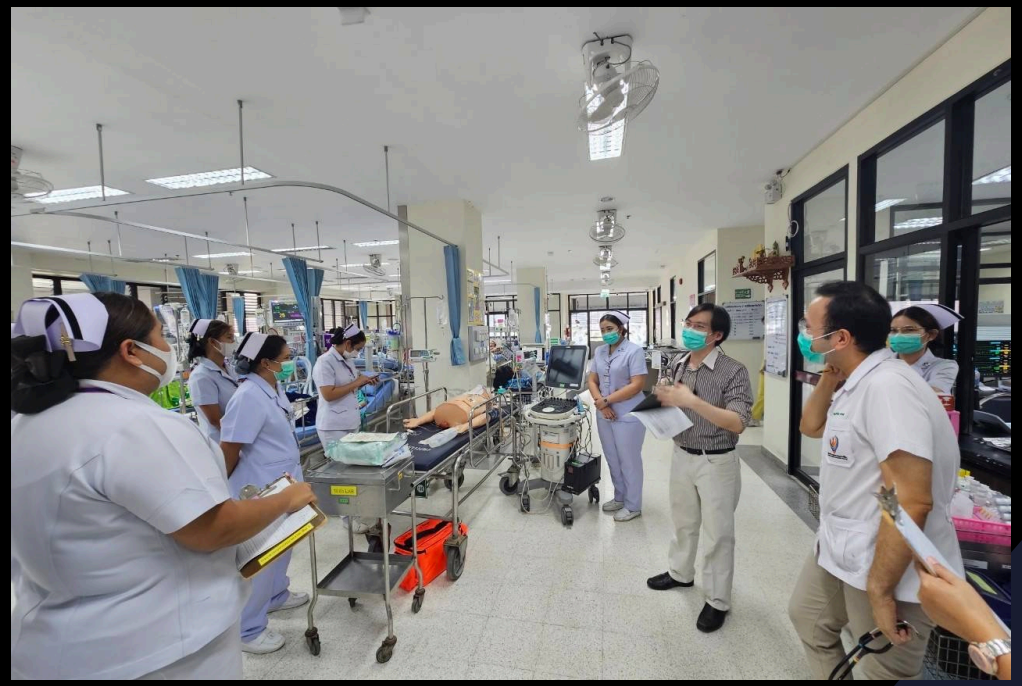
Facilitating event debriefing, analysis, and discussion

Piloting the program in a small site or simulation

- Tests on a small scale
- Promotes feedback from frontline staff
- Modifies and adapts before spreading to general

Design sepsis protocol from expert, stakeholders and healthcare system



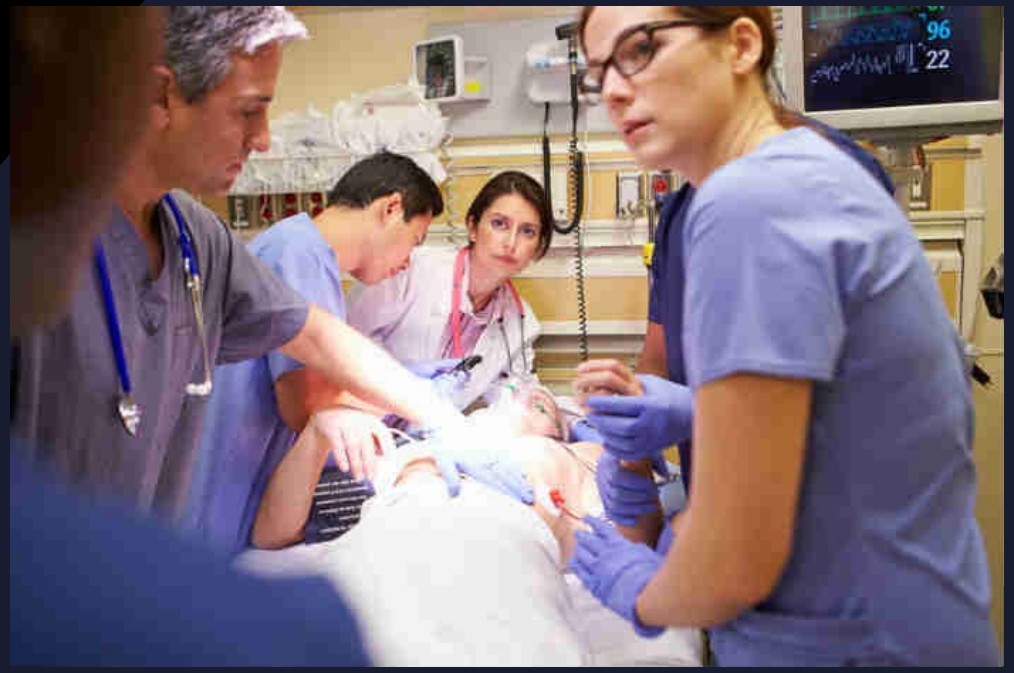


Set objectives for sepsis simulation training

- Building the team familiar with the screening tool and bundle of care
- Non-technical skills in sepsis care (Crisis Resource Management)
- Finding the gaps for improving the sepsis protocol in healthcare

Non-technical skills
Crisis Resource Management training via simulation

- Know your environment
- Anticipate the plan
- Call for help
- Effective leadership
- Communicate effectively
- Use all available information
- Distribute the workload
- Effective team membership



Benefits of CRM in team performance

1

Better team performance

2

Better outcome of emergency response

3

Avoid medical errors and more patient safety

Follow-up: impact on clinical outcomes

- Number of sepsis diagnoses from discharge summary
- Completion of the bundle and process targets

  MAP ≥ 65 mmHg within 6 hours

  Serum lactate decrease ≥ 10 % within 6 hour

Evaluation of sepsis performance improvement program with translational simulation to process of sepsis care achievement

Review the data before & after program implementation

Sepsis simulation-based scenario

- 30-minute in-situ simulation focused on

  Compliance bundle of care

  Interprofessional communication

  The important of a rapid response system.
- Debriefing aiming to analyze performance gaps, reinforce training
- The protocol was implemented in May 2023 following the in-situ simulation from September to December 2023.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Results

30 simulation-based training sessions were conducted in 12 internal medicine wards within 4 months.

- 127 registered nurses and 24 physicians were involved

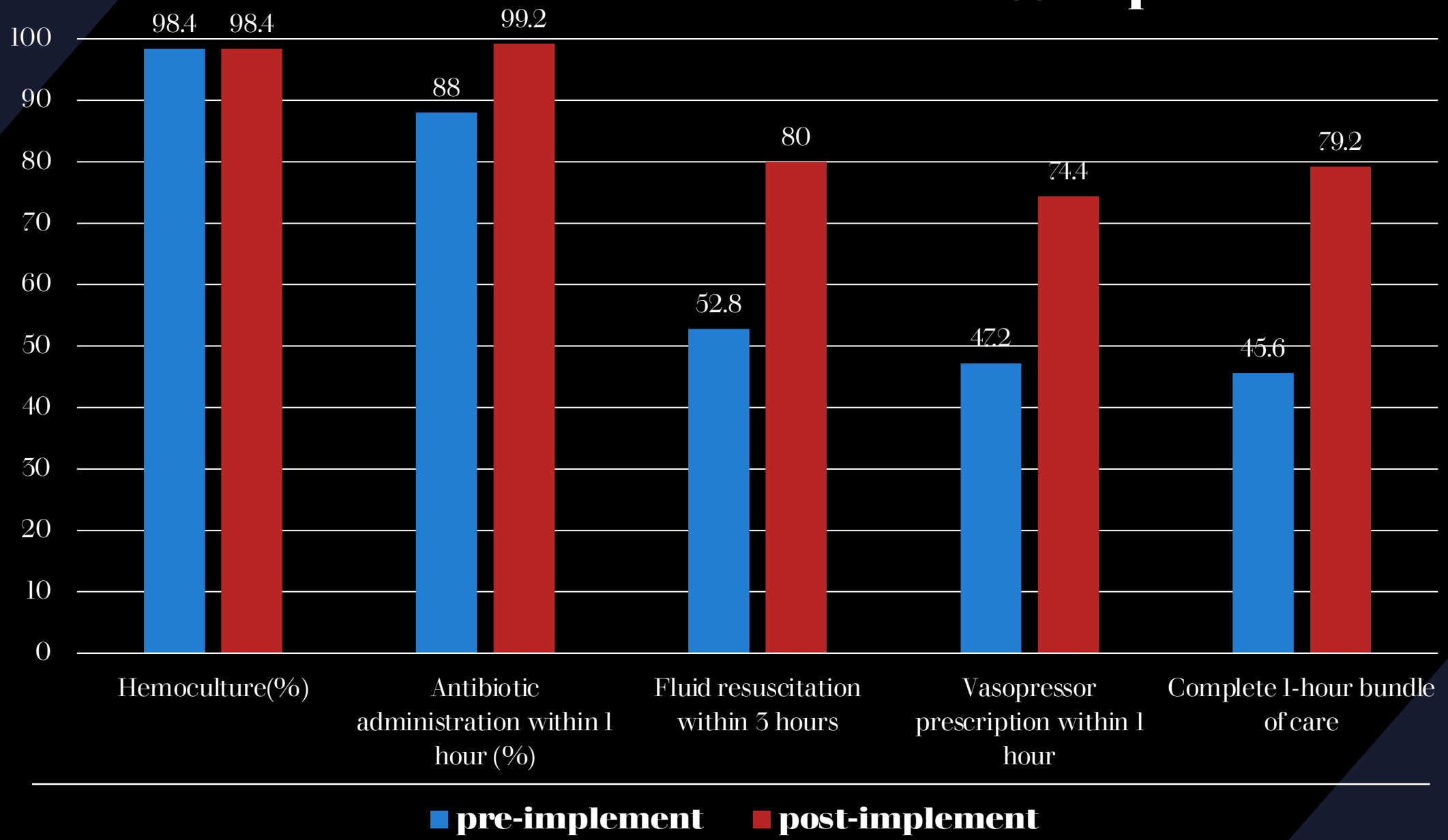
Process improvement

- Compliance with a 1-hour bundle of care from 45.6% to 79.2% ($p < 0.01$)
- Increase fluid resuscitation by at least 30 ml/kg in 3 hours (52.8% vs 80%) and vasopressor use within the first hour (47.2% vs 74.4%)

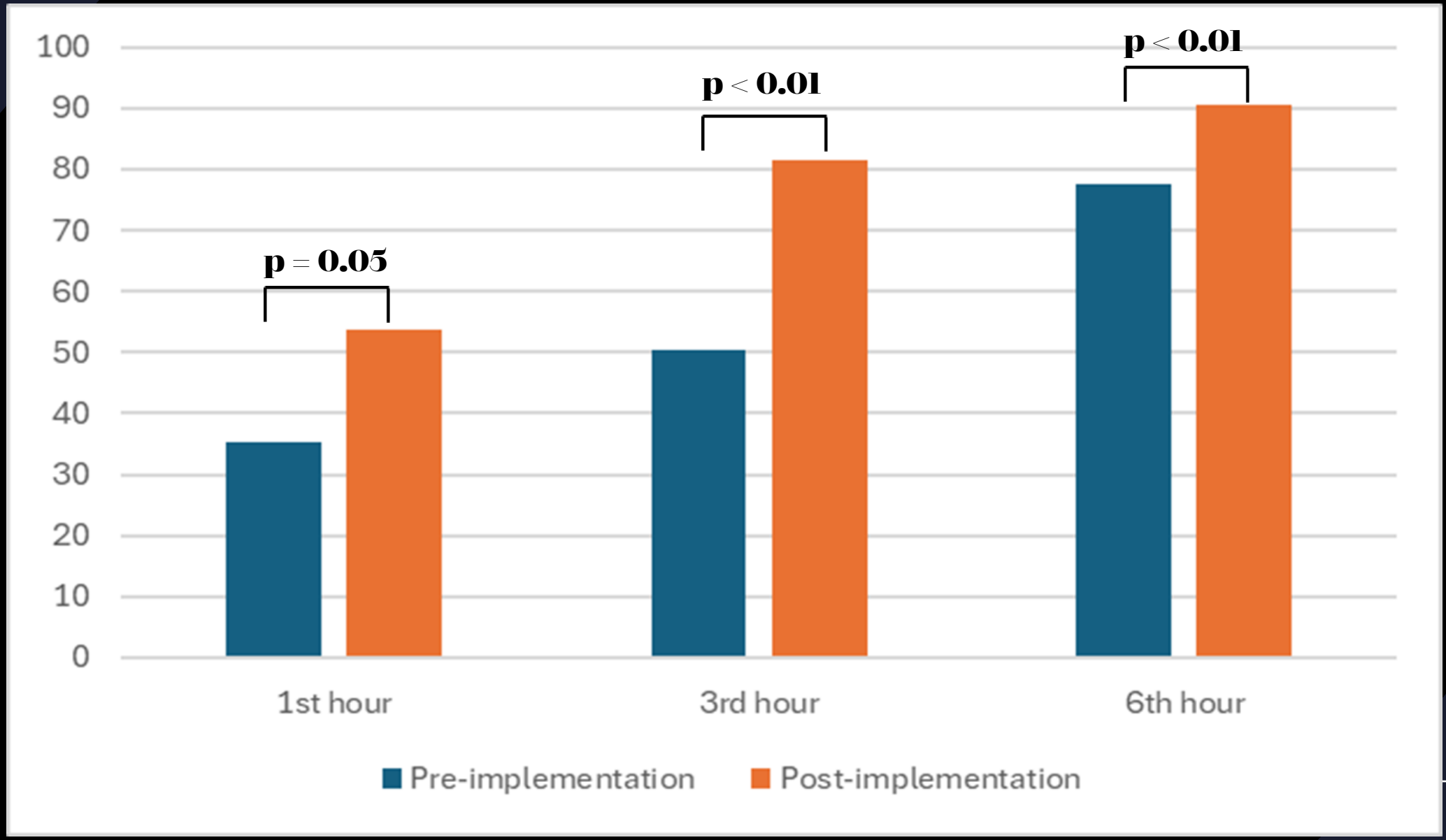
Outcome improvement

- Achieving MAP ≥ 65 mmHg within 6 hours from 77.6% to 90.4% ($p < 0.01$)
- Reduce 28-day mortality (44.0% vs 24.0%) and length of hospital stay (6 days vs 4 days)

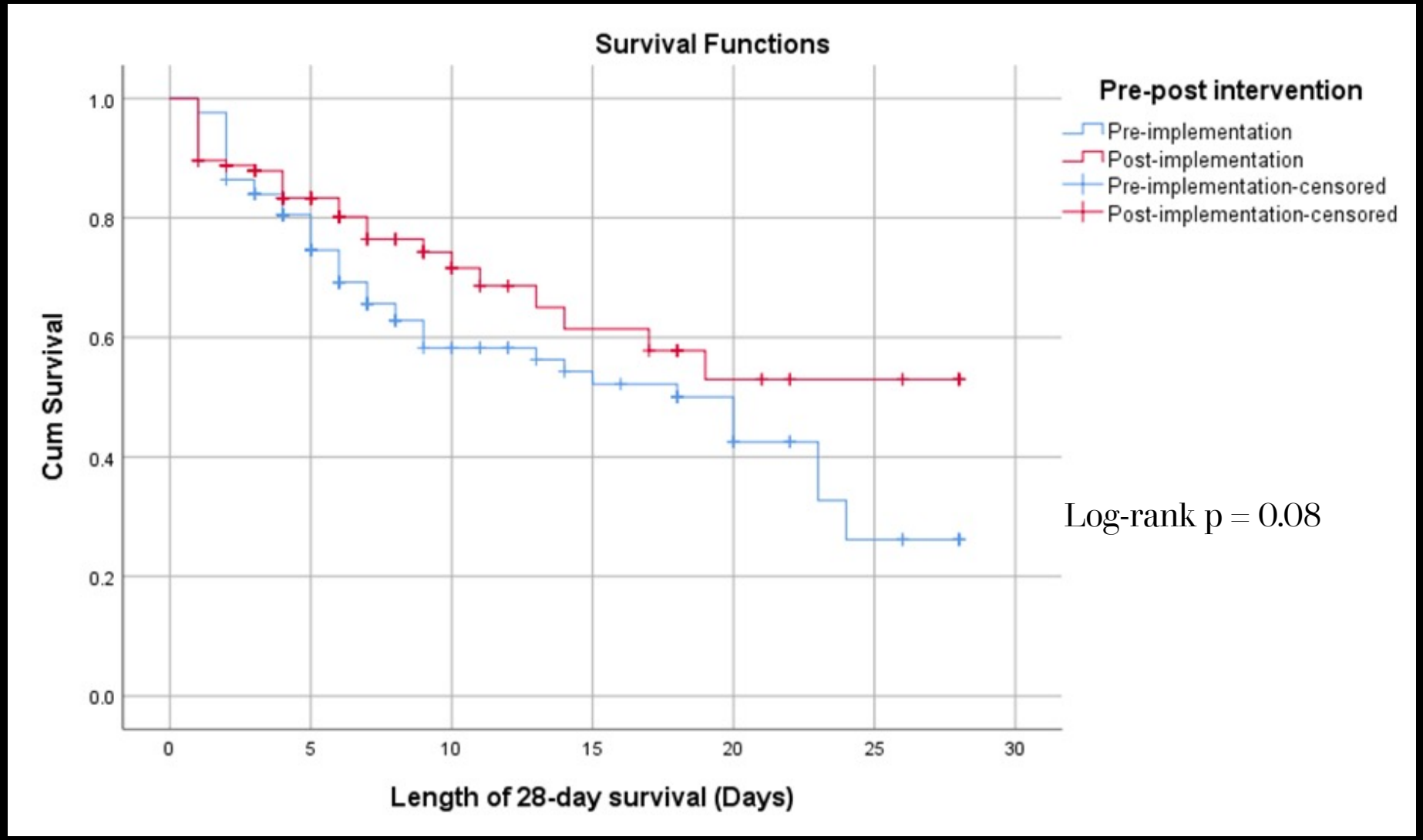
Process improvement



Percentage of patients achieve MAP ≥ 65 mmHg in 1st, 3rd , and 6th hour



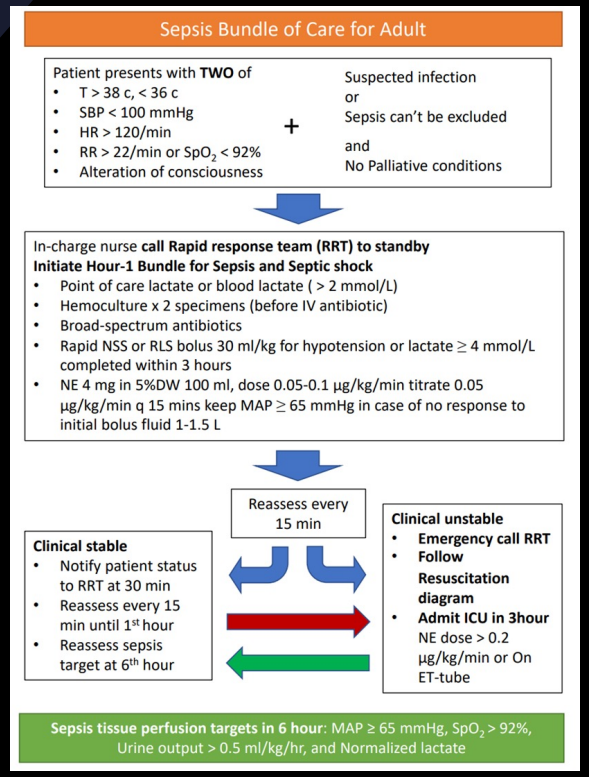
Trend to lower 28-day mortality after sepsis performance improvement program

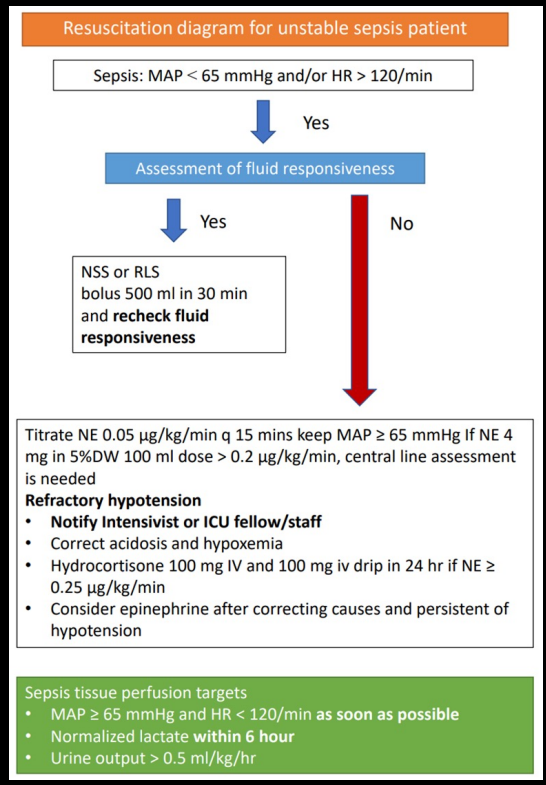


Keep on moving 2024

Keep on moving 2025

Development of a new version of cognitive aids
Antibiotic guide, Sepsis bundle of care, and Resuscitation flow





Norepinephrine (Levophed® 4mg/4ml)

Solution: D5W only

Dosing Instruction:

Infusion: 0.02-3 µg/kg/min or 0.5-30 µg/min

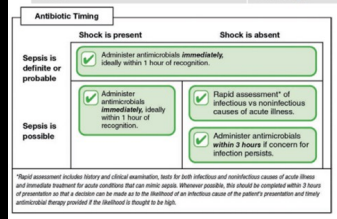
Titrate dose by 0.05 µg/kg/min q 15 mins to achieve a MAP of ≥65 mmHg.

Dose (µg/kg/min)	Norepinephrine 4 mg in D5W 100 mL (40 mcg/ml) Body weight (Kg)										
	40	45	50	55	60	65	70	75	80	85	90
	Drip rate (µd/min or ml/hr)										
0.05	3	3	4	4	5	5	5	6	6	6	7
0.1	6	7	8	8	9	10	11	11	12	13	14
0.2	12	14	15	17	18	20	21	23	24	26	27
0.3	18	20	23	25	27	29	32	34	36	38	41
0.4	24	27	30	33	36	39	42	45	48	51	54
0.5	30	34	38	41	45	49	53	56	60	64	68
0.6	36	41	45	50	54	59	63	68	72	77	81
0.7	42	47	53	58	63	68	74	79	84	89	95
0.8	48	54	60	66	72	78	84	90	96	102	108
0.9	54	61	68	74	81	88	95	101	108	115	122
1	60	68	75	83	90	98	105	113	120	128	135

Concentration > 32 mcg/mL (e.g. 8 mg in D5W 100 ml): Infuse via central line only to avoid extravasation

Antibiotic Guidance in sepsis for Adult

Source of infection	Antibiotic of choice
Pneumonia - No risk MDR and No risk Melioidosis/ *P.aeruginosa* - No risk MDR with risk Melioidosis/ *P.aeruginosa* - Severe CAP - Risk of MDRO	Ceftriaxone or Amoxicillin-Clavulanic acid + Azithromycin or Doxycycline Ceftazidime + Azithromycin or Levofloxacin Ceftriaxone or Ceftazidime + Azithromycin or Levofloxacin Piperacillin/tazobactam or Imipenem or Meropenem + Azithromycin or Levofloxacin
Intra-abdominal infection	Ceftriaxone ± Metronidazole (cover Anaerobe)
Urinary tract infection - No risk ESCR - Risk of ESCR with no risk *P.aeruginosa* - Risk of ESCR and *P.aeruginosa*	Ceftriaxone or Amikacin Ertapenem Imipenem or Meropenem
Soft tissue infection - Cellulitis - Necrotizing fasciitis (NF)	Cefazolin or Cloxacillin Ceftriaxone + Clindamycin
Suspected organism Leptospirosis Scrub typhus *A.baumanii*, CRE ESBL MRSA	Ceftriaxone Doxycycline or Azithromycin Colistin-based regimen Carbapenem (prefer Ertapenem*) Vancomycin



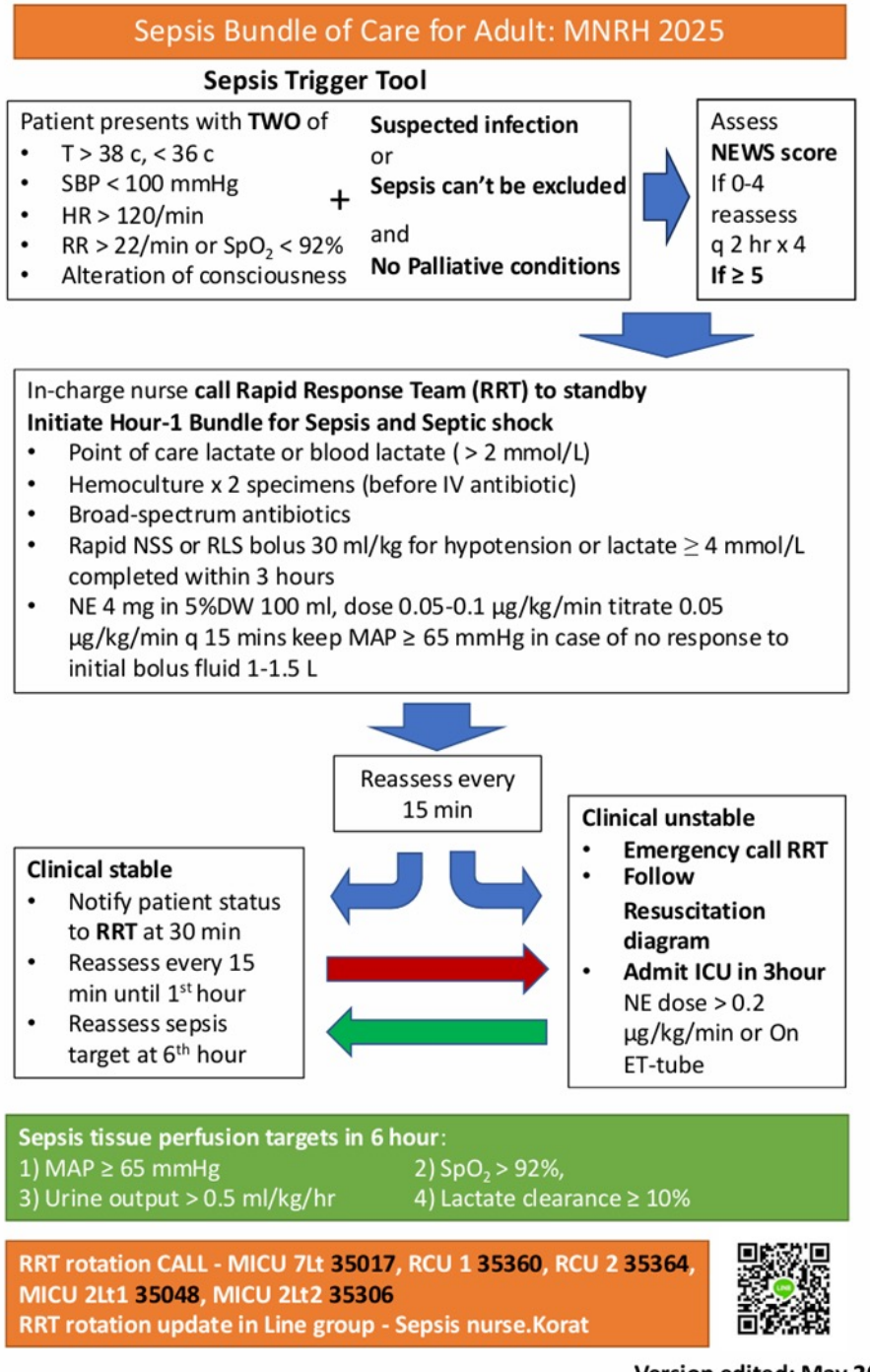
High risk Melioidosis: Hx. Soil/water exposure with at least one criterion; Comorbidity: DM, CKD, Thalassemia, Malignancy, Chronic lung disease
High risk *P.aeruginosa*: Spectrum (broad spectrum IV antibiotic within 90 days), Steroid use (on prednisolone 15 mg/day > 15 days), Structural lung disease(COPD มีเสมหะ tube), Starvation/ Severe malnutrition, Prior respiratory isolation of *P.aeruginosa* within 90 days
Risk Drug Resistance Organism: Prior antibiotic use within 90 days, Hospitalization within 90 days, ESBL/CRE/MRSA colonization within 1 year

- **Low risk for MDR organisms**, we suggest against using two gram-negative agents for empiric treatment.
- Rapidly identifying or excluding a specific anatomical diagnosis of infection that requires emergent source control such as abscess, empyema, necrotizing fasciitis.

For suspected MDR-organisms
- Antibiotic selection depends on local prevalence
- Adjust regimen and dose of antibiotic and **record DUE form**
- Require organism identification to de-escalation antibiotic

* Ertapenem has narrower spectrum of activity than 2nd generation carbapenem (Imipenem, Meropenem)

Current Practice Maharat Sepsis Screening Tool (SST) with Bundle of Care



MNRH Sepsis Screening Tool

Design a new tool for more practical use in a real situation

- Easy to remember and recognize
- Standardize and evidence-based support
- Early detection of sepsis and guidance to management

Sepsis Trigger Tool

Patient presents with **TWO** of

- T > 38 c, < 36 c
- SBP < 100 mmHg
- HR > 120/min
- RR > 22/min or SpO_2 < 92%
- Alteration of consciousness

+

Suspected infection

or

Sepsis can't be excluded

and

No Palliative conditions

→

Assess **NEWS score**

If 0-4 reassess q 2 hr x 4

If ≥ 5

Summary

A sepsis performance program is a key success in improving sepsis survival outcome

Well-designed sepsis care system along with effective team performance should be recognized

Simulation as a tool for improving the healthcare system and patient safety through system testing, training the team, and learning from each other