Resuscitation in the Emergency Department

Jutamas Saoraya
Department of Emergency Medicine
King Chulalongkorn Memorial Hospital

What are the tasks of Emergency department doctor?

Identify SICK patients

- Emergency Severity Index (ESI)
- MEWS score
- PEWS score
- primary assessment
- special population : geriatric, immunocompromise, psychiatric, pregnant patients

Primary survey and resuscitation

- A airway
- B breathing
- C circulation
- D disability
- E exposure

Monitoring and Reassessment

ALERT™

ACUTE LIFE-THREATENING EVENTS RECOGNITION AND TREATMENT

A- Airway

- Airway obstruction is a medical emergency
- common causes of airway obstruction
  - tongue
  - vomit, secretions, blood, gastric fluid
  - tissue swelling from trauma, allergy, or infection
  - laryngeal edema, spasm, secretion obstruction

Airway maneuver

- Head tilt, chin lift
- Jaw thrust
- suction
- airway adjuncts
  - oropharyngeal airways
  - nasopharyngeal airways
- Supraglottic airway

Decision to intubate

- protect airway
- assist ventilation
- anticipated clinical course

Intubation

- Crash airway : direct intubation
- not crash airway : sedation needed
- for emergency physician
    - evaluate difficult airway
    - rapid sequence intubation -> RSI

How to intubate

- Preparation
- Preoxygenation
- Preintubation optimization
- Sedation
- Positioning
- Placement with proof
- Postintubation management

Sedation before intubation for GP

ชื่อยา	dose (mg/kg)	onset (นาที)	duration (นาที)	ข้อดี	ผลข้างเคียง
Midazolam	*0.2-0.3*	1-2	15-30	amnesia	BP, HR ลด paradoxical agitation
fentanyl	1-3 mcg/ kg	2-3	30-60	analgesia	BP, HR ลด Rigid chest syndrome
Diazepam	0.1 mg/ kg	1-5	15-60	availability	BP, HR ลด paradoxical agitation

Foreign body obstruction

- incomplete airway obstruction
- complete airway obstruction
- loss of consciousness

B- Breathing

- cause of breathing problem
    - suppression of respiration due to drugs
    - asthma
    - pulmonary edema
    - tension pneumothorax

Treatment Breathing

- positioning of the patients
- giving oxygen supplement keep O2 sat ≥ 94%
- considered positive pressure ventilation
- considered EKG 12 leads and EKG monitoring
- treatment according to the cause
    - bronchodilators for COPD
    - needle decompression for tension pneumothorax
    - nitroglycerin for acute pulmonary edema
    - naloxone for opioid induced respiratory depression

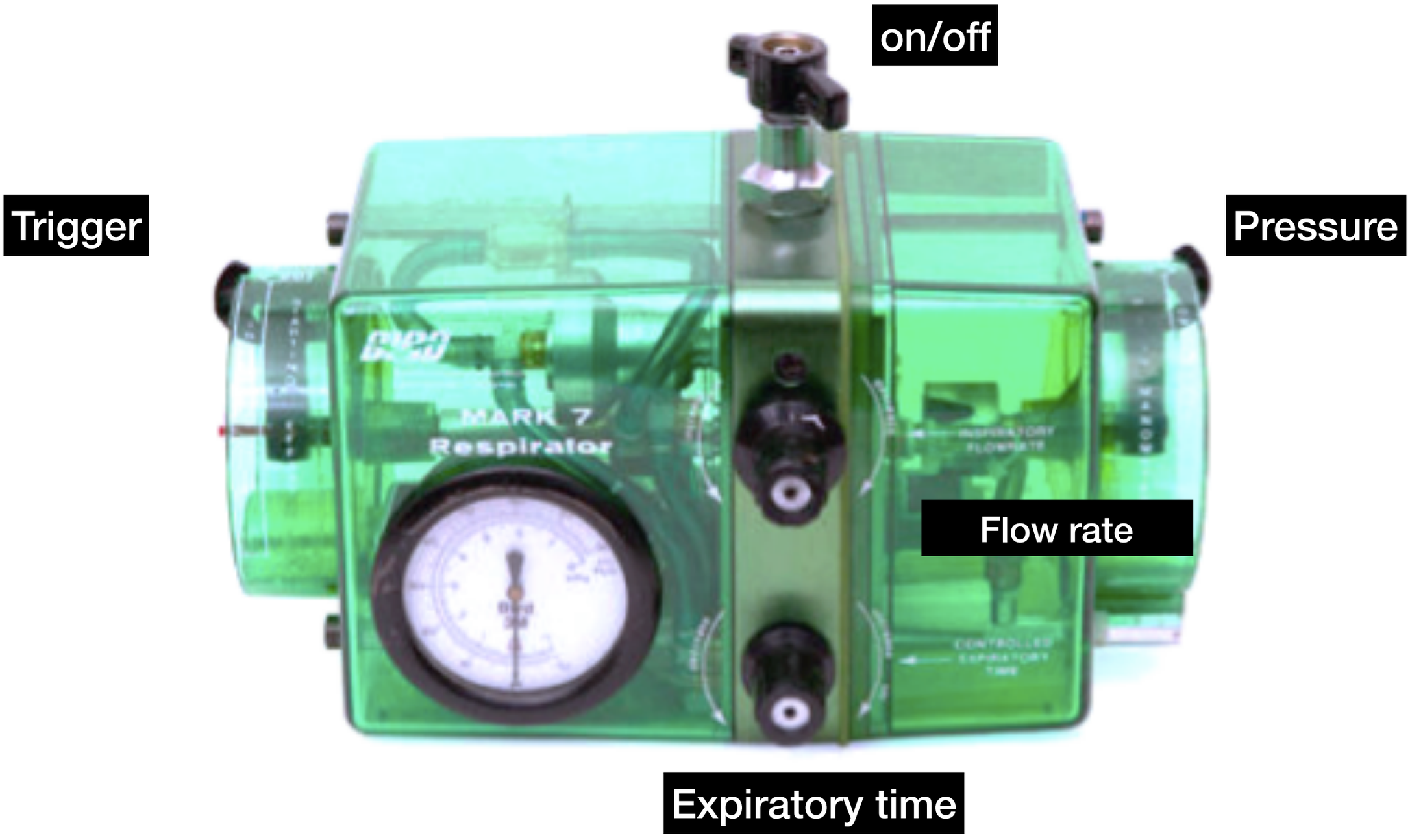
oxygen supplementation

- nasal cannula
- O2 mask
- non rebreather mask with bag

positive pressure ventilation

- When depth or rate not enough
- bag-valve-mask (Ambu bag)
    - PEEP valve
- CPAP and BIPAP
- intubation with mechanical ventilation

Initial setting of mechanical ventilator



Initial setting of mechanical ventilator

TABLE 29-11 Initial Ventilator Settings and Goals

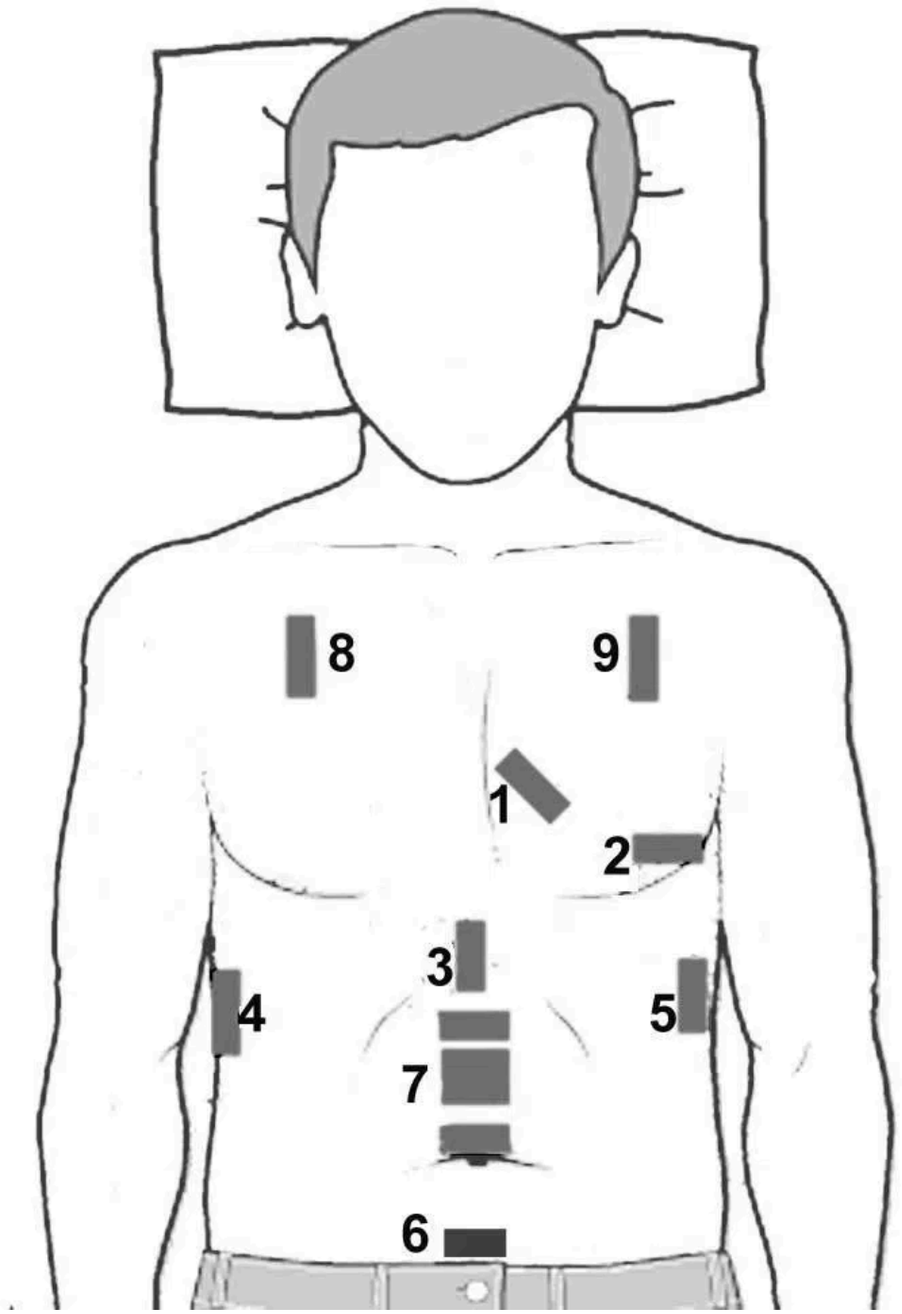
Ventilator Parameters	Ventilator Settings
Mode	Assist-control
FIO_2	Begin with 100% oxygen
Tidal volume	6 mL/kg (ideal body weight) to start
Respiratory rate	12 breaths/min
Inspiratory flow rate	60 L/min
Inspiratory:expiratory ratio	1:2 or 1:3 ratio
Positive end-expiratory pressure	Begin with 5 cm H_2O, titrate to 10 cm H_2O
Ventilation goals	PaO_2: 60–90 mm Hg $PaCO_2$: 40 mm Hg pH: 7.35–7.45 FIO_2 of 40%–60% Inspiratory peak pressure <35 cm H_2O

Abbreviations: FIO_2 = fraction of inspired oxygen; $PaCO_2$ = partial pressure of arterial carbon dioxide; PaO_2 = partial pressure of arterial oxygen.

C - circulation

- Causes of inadequate circulation
    - hypovolemia
    - septic
    - cardiogenic
    - obstructive

Ultrasound to evaluate cause of shock



RUSH(ed) Exam Sequencing

1. Parasternal Long Cardiac View
2. Apical Four-Chamber Cardiac View
3. Inferior Vena Cava View
4. Morison's with Hemothorax View
5. Splenorenal with Hemothorax View
6. Bladder View
7. Aortic Slide Views
8. Pulmonary View
9. Pulmonary View

Use Curvilinear Array for all Views
Add in a search for Ectopic Pregnancy and DVT depending on clinical circumstances

Treatment - C

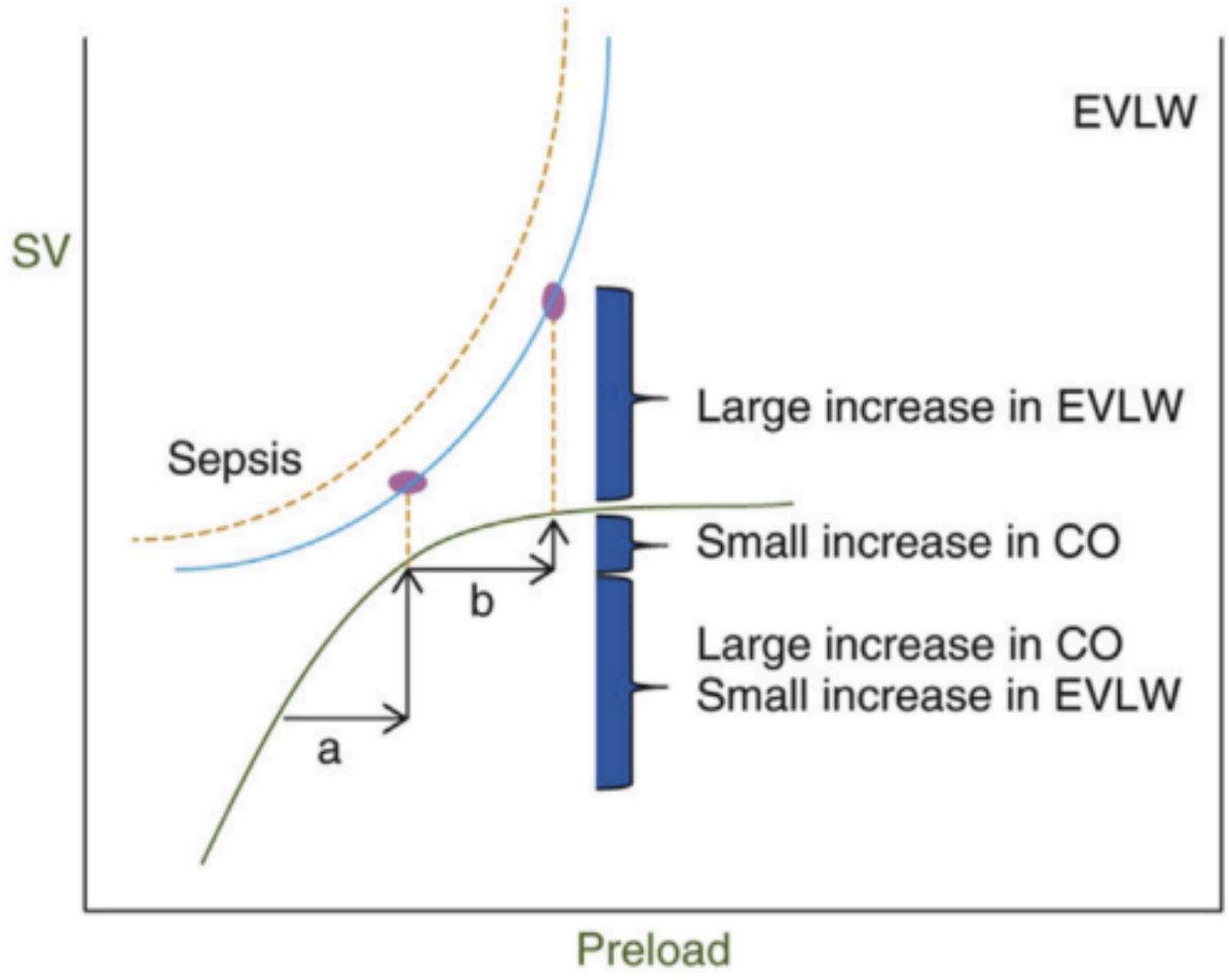
- Hemorrhage control
- Venous access
- Take blood
- rapid fluid challenge
    - 500 ml over 15 minutes
    - patients with known cardiac failure : bolus 250 ml and close monitoring
- Reverse the cause of shock : needle decompression, pericardiocentesis, vasopressor or inotrope

difficult vascular access

- peripheral IV
    - u/s guided
- external jugular vein
- IO access
- central venous catheter
- cutdown

fluid resuscitation

- why and how
- type of fluid
    - colloid
    - crystalloid
- how much fluid to give
- when to resuscitate fluid
    - fluid responsiveness



Frank-Starling and Marik-Phillips curves

Blood product

- Crucial in trauma cases
- Massive transfusion protocol
    - ABC score (2/4): SBP < 90, HR >120, FAST +, penetrating mechanism
- “limited resuscitation”

Table 2. Classification of Hemorrhagic Shock.*

Shock Class	Blood Loss†	Heart Rate	Blood Pressure	Pulse Pressure	Respiratory Rate	Mental Status
	ml (%)	*beats/min*			*breaths/min*	
I	<750 (15)	<100	Normal	Normal	14–20	Slightly anxious
II	750–1500 (15–30)	100–120	Normal	Narrowed	20–30	Mildly anxious
III	1500–2000 (30–40)	120–140	Decreased	Narrowed	30–40	Anxious, confused
IV	>2000 (>40)	>140	Decreased	Narrowed	>35	Confused, lethargic

* Data are from the American College of Surgeons Committee on Trauma.[42]
† Blood-loss volume and percentage of total blood volume are for a male patient with a body weight of 70 kg.

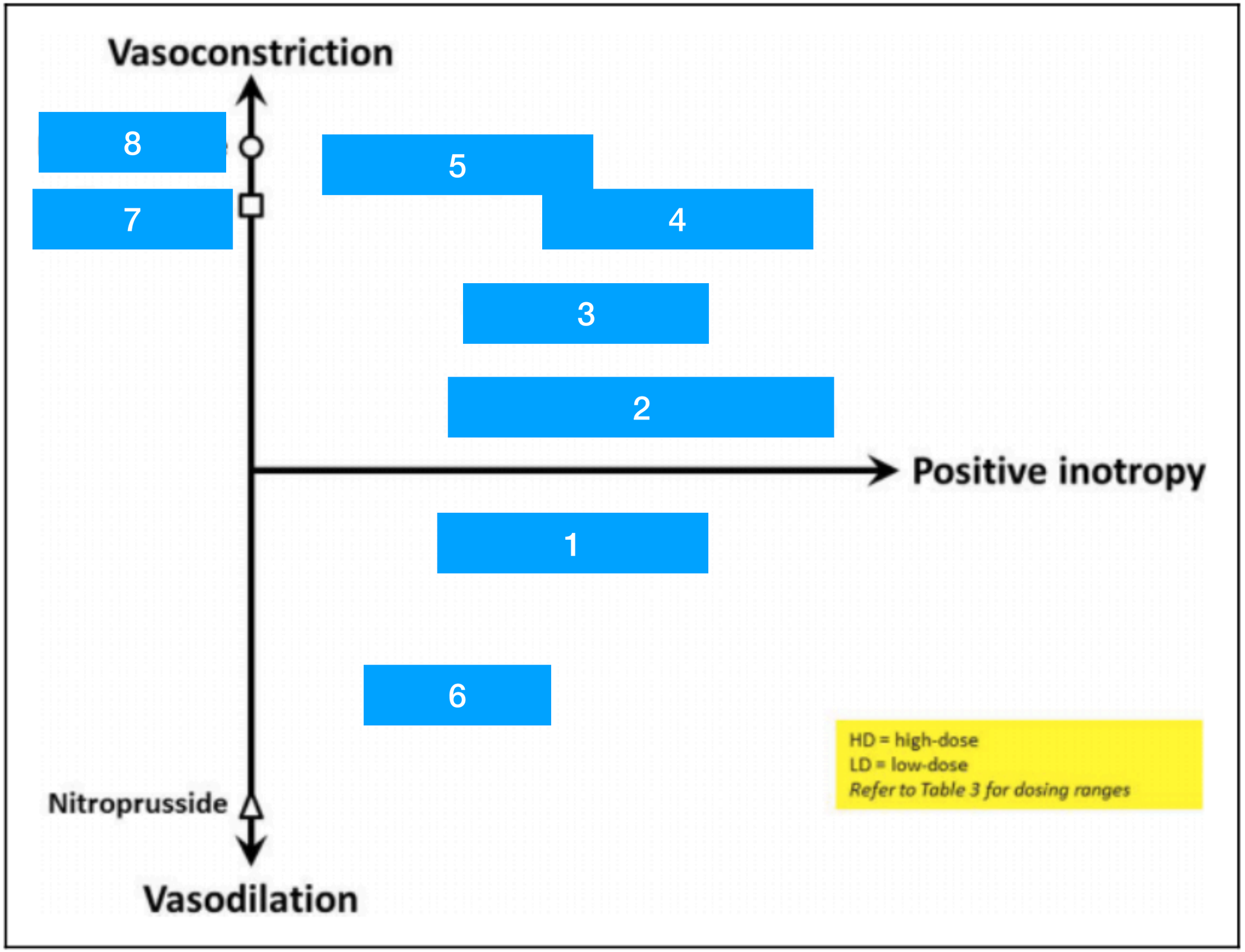


Figure 2. Vascular response to vasoactive medications.

J Cardiovasc Pharmacol Ther. 2015;20(3):249-260

D - disability & DTX

- cause of disablilities
- indirect cause due to derangement of A, B, C
- direct cause such as hypoglycemia, head trauma, drugs, stroke

Treatment

- Recovery position : to protect airway
- coma cocktail
  - Glucose : 50 ml of 50% glucose solution
  - Thiamine
  - Naloxone
  - (flumazenil)

E - Exposure and EKG

- Temperatures

- EKG

secondary survey

- Signs and symptoms
- Allergies
- Medication
- Past medical history
- Last meal
- Events

IMMEDIATE ASSESSMENT

A AIRWAY

B BREATHING

C CIRCULATION

D DISABILITY

E EXPOSURE

REMEMBER

- airway adjuncts
- oxygen
- bag-valve-mask ventilation
- fluids
- recovery position
- blood glucose
- monitoring

CALL FOR HELP

FULL PATIENT ASSESSMENT

- Review patient's notes and charts ☑
- Obtain patient history ☑
- Perform a systematic examination ☑
- Review results of routine investigations ☑

CALL FOR HELP

DECISIONS & PLANNING

IS THE PATIENT IMPROVING?

NO/UNSURE

Reassess
A B C D E's

CALL FOR HELP

YES

Do you have a diagnosis?

NO

Special Investigations?

CALL FOR HELP

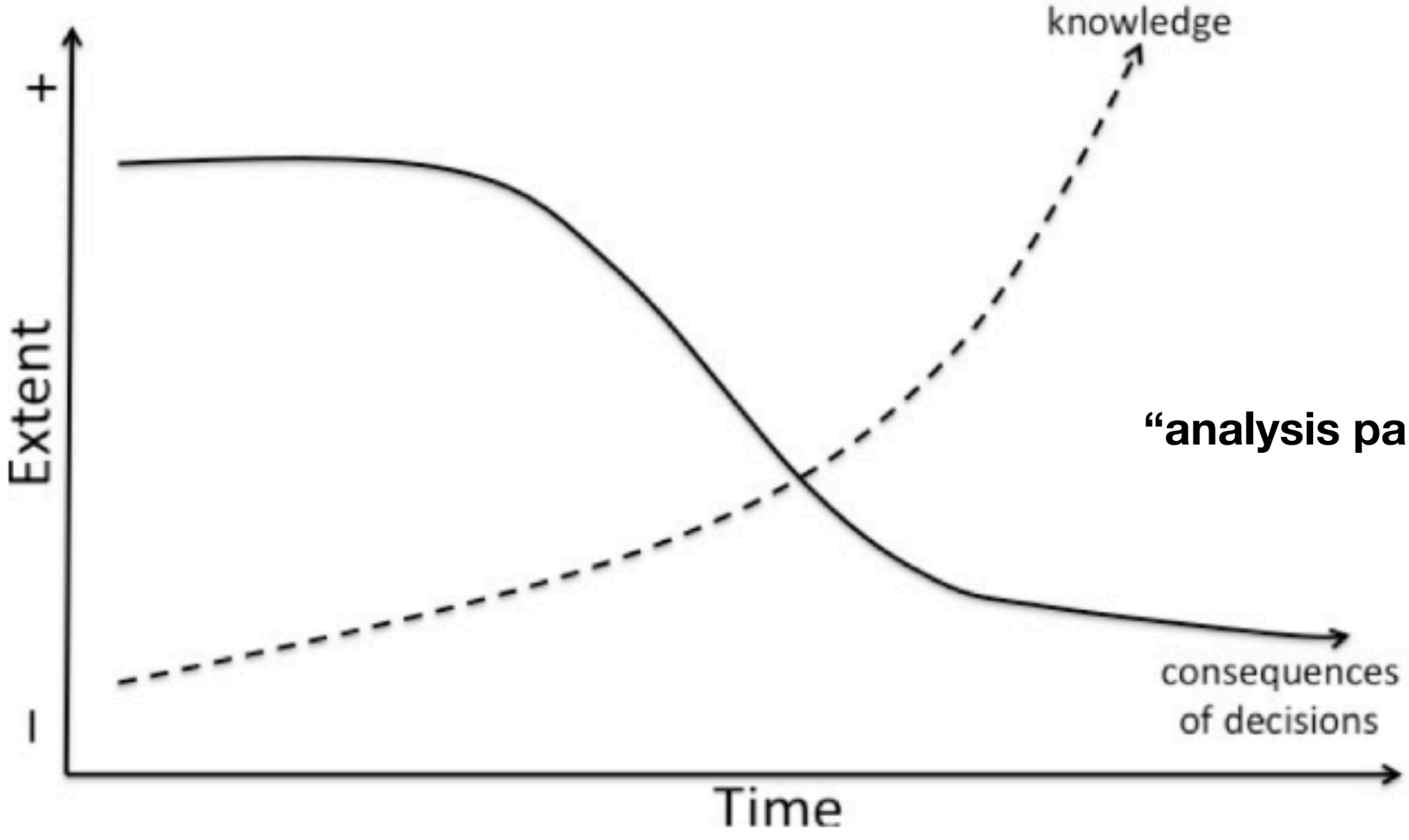
DEFINITIVE CARE

YES

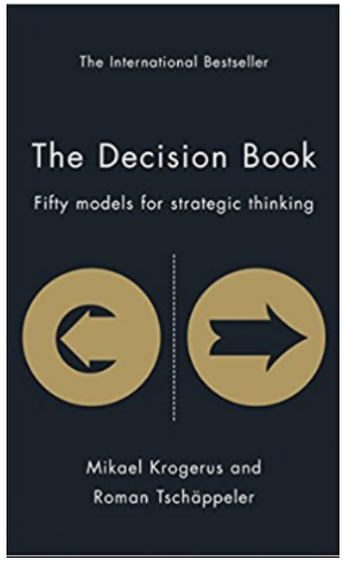
MANAGEMENT PLAN

ALERT™
ACUTE LIFE-THREATENING EVENTS RECOGNITION AND TREATMENT

The consequences model



“analysis paralysis”



Case

- ชาย 60 ปี U/D chronic alcohol drinking มาด้วยอาเจียนเป็นเลือด 1 hr ก่อนมารพ.

Summary

- Tasks of emergency physicians

- primary survey and resuscitation.