Kegawatdaruratan Sistem Saraf & Manajemen TIK

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*Ners Spesialis di RS Pusat Otak Nasional
**Ketua Umum Himpunan Perawat Neurosains Indonesia

Kegawatdaruratan Sistem Saraf

- Peningkatan TIK & Kejang pada kasus: **Stroke, Cedera Kepala,** Infeksi Saraf Pusat, Tumor Otak
- Kelumpuhan Otot pernapasan pada kasus: Myasthenia Gravis & Guellin Barre Syndrome

Definisi Stroke

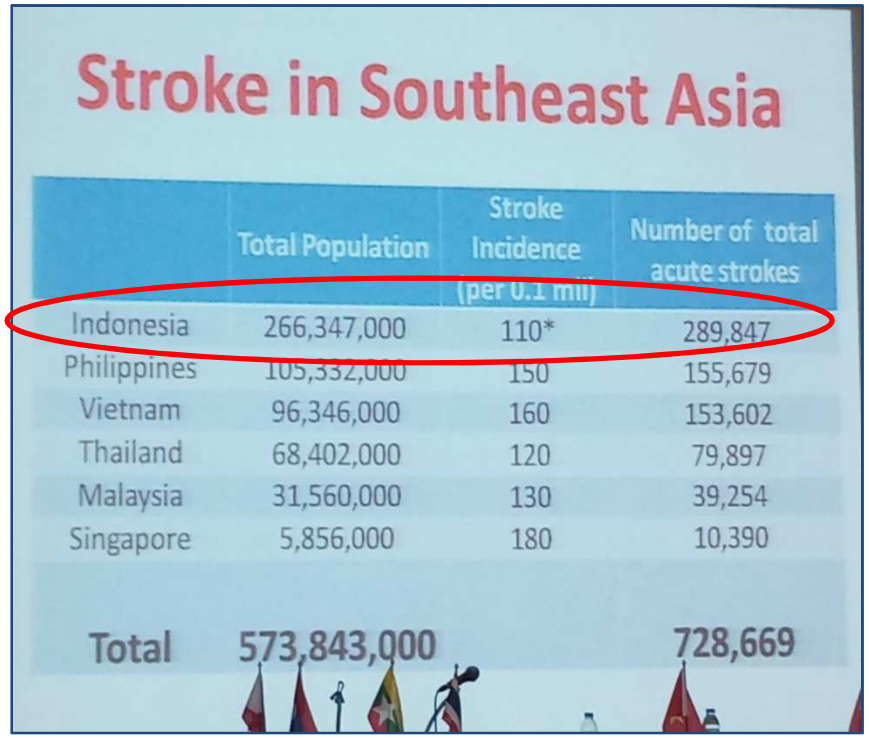
- Stroke adalah suatu keadaan terputusnya atau terhentinya aliran darah ke otak secara tiba-tiba, yang mengakibatkan terjadinya kerusakan atau gg fs pergerakan, perasaan, memori, perabaan, dan bicara yg bersifat sementara atau menetap

  (Hickey, 2014)

GLOBAL BURDEN OF STROKE

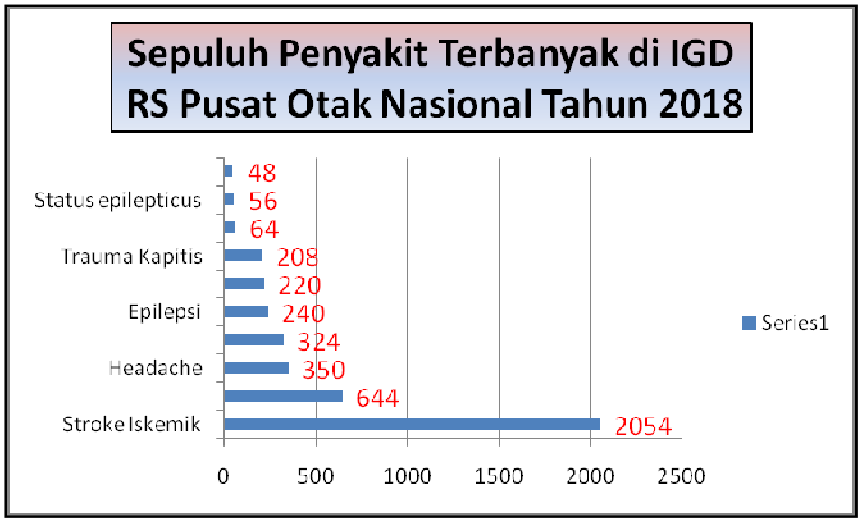
- 3rd leading cause of death in the USA and 2nd leading cause of death worldwide.
- Major cause of long-term disability.
- 795.000 new cases and 200.000 recurrent cases of stroke occur each year in the USA (AHA 2016)

Insiden Stroke



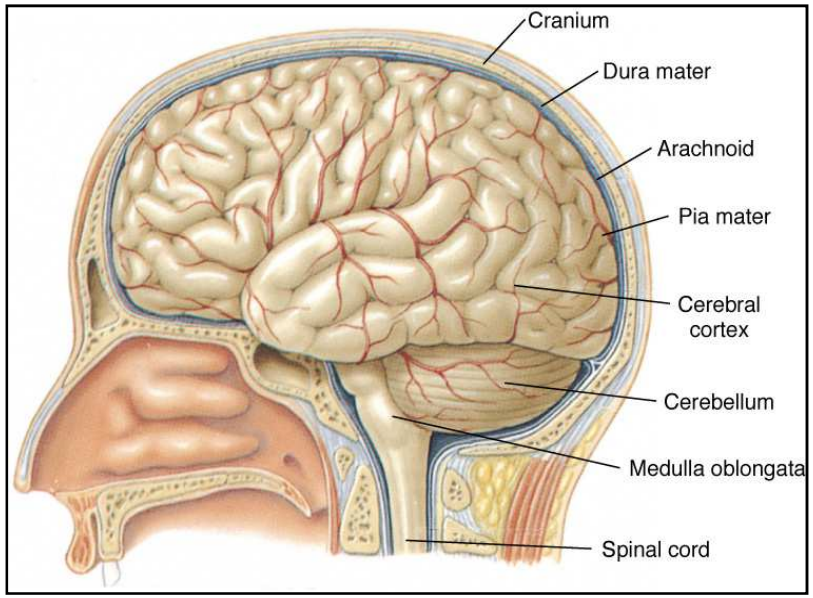
Stroke in Southeast Asia

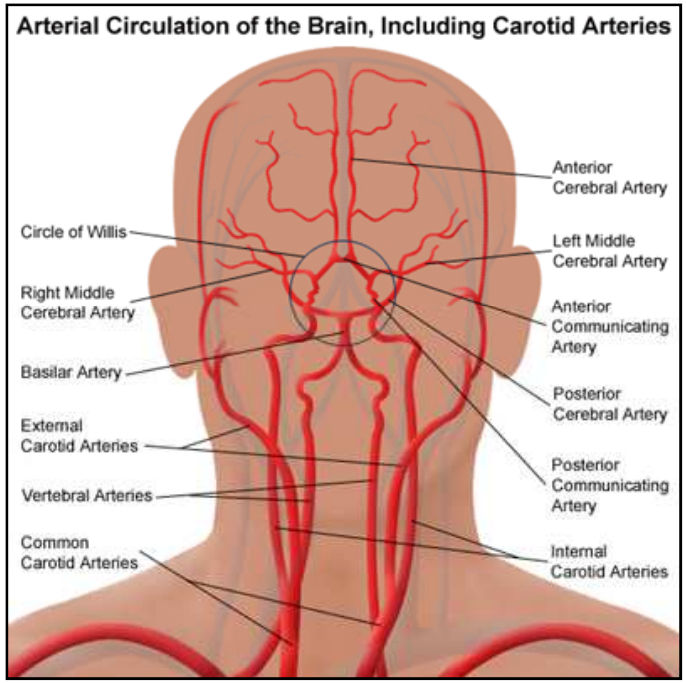
	Total Population	Stroke Incidence (per 0.1 mil)	Number of total acute strokes
Indonesia	266,347,000	110*	289,847
Philippines	105,332,000	150	155,679
Vietnam	96,346,000	160	153,602
Thailand	68,402,000	120	79,897
Malaysia	31,560,000	130	39,254
Singapore	5,856,000	180	10,390
Total	573,843,000		728,669

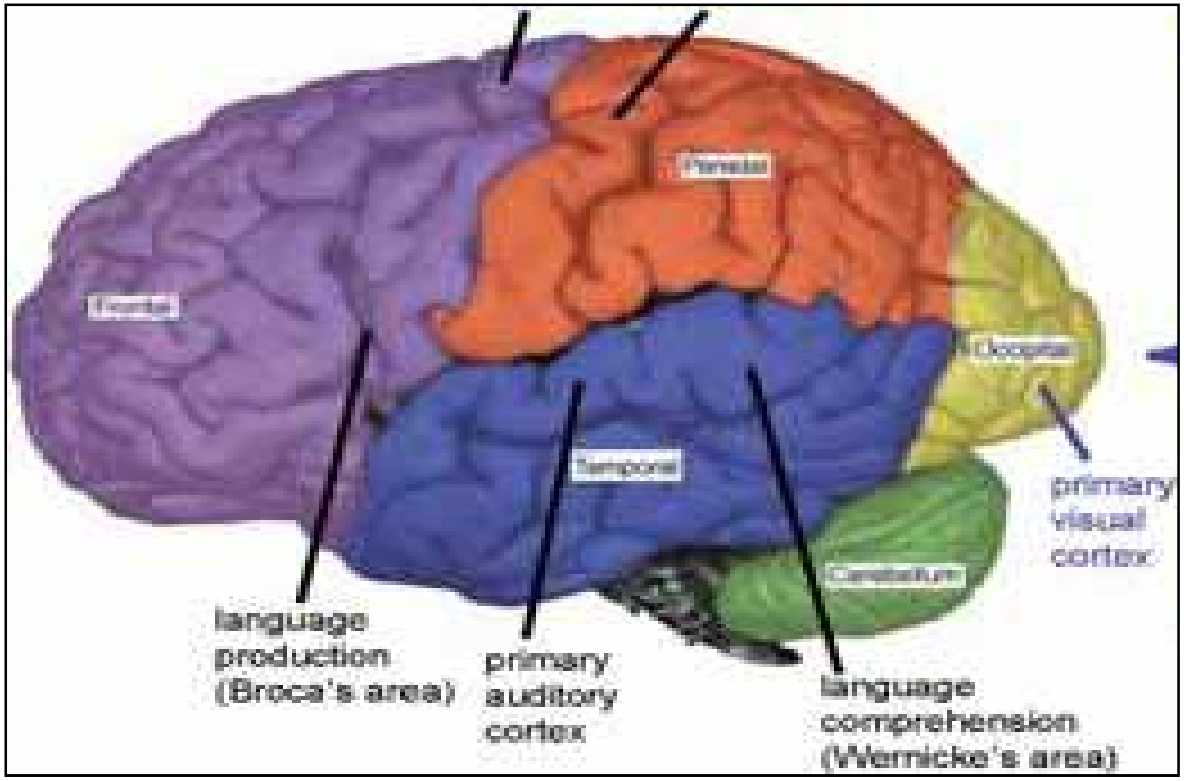


Remember: ***Time is Brain***

Topografi Otak & Pembuluh Darah serebral

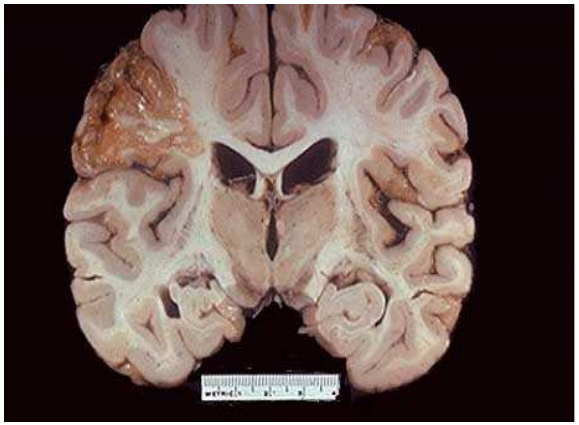




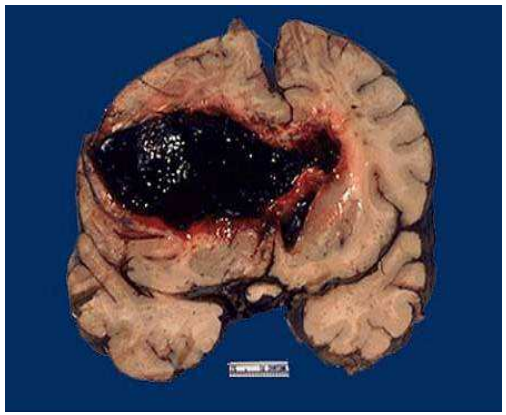

primary visual cortex
language production (Broca's area)
primary auditory cortex
language comprehension (Wernicke's area)

Klasifikasi Stroke

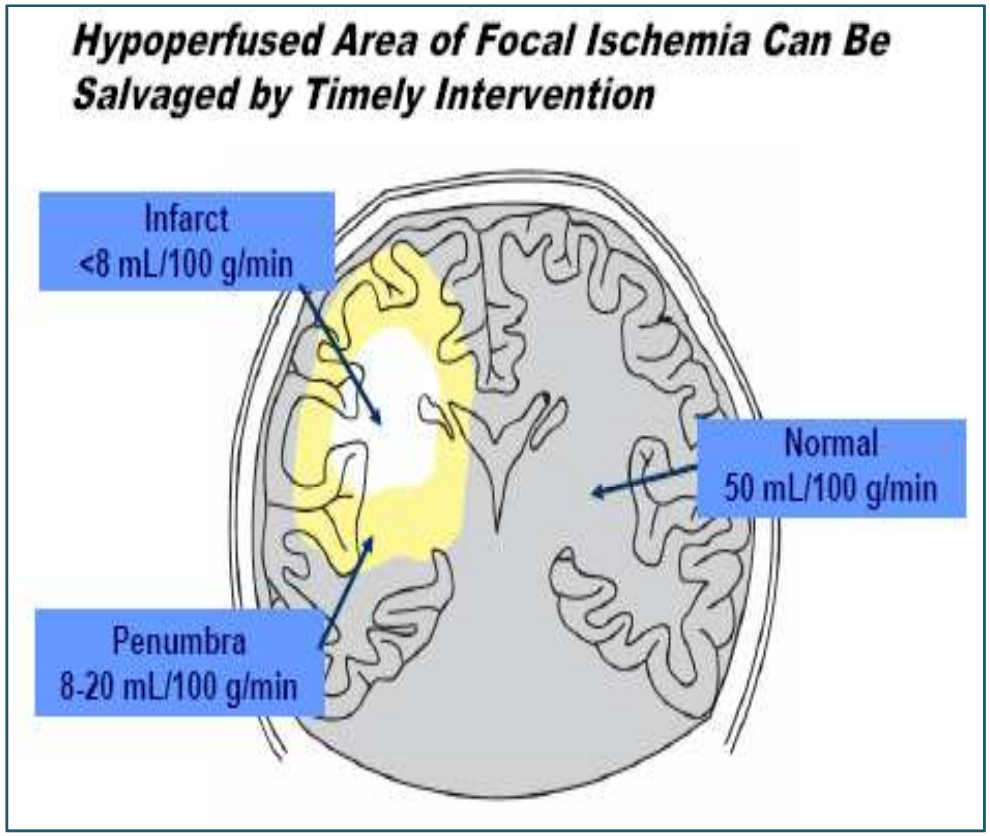
Iskemik (Infak)
Karena penyumbat



Perdarahan
karena pecahnya pembuluh darah



- Both cause clinically very similar symptoms but need opposing treatment from the coagulation perspective



Ahmed SH,et al. In: Fisher M,ed. Stroke Therapy. 2nd ed. Butterworth Heinmann;2001

MANIFESTASI KLINIS STROKE:
tergantung lokasi dan luas lesi

- Penurunan tingkat kesadaran
- Ggn penglihatan
- Ggn memori
- Ggn lapang pandang
- Ggn menelan

- Ggn sensori persepsiGangguan bicara dan bahasa
- Ggn sensibilitas
- Ggn fungsi kandung kemih
- Ggn keseimbangan

Stroke Care Management

- **Hyperacute phase**
- Acute Phase
- Subakut phase (recovery)
- Chronic phase/ adaptation/rehabilitation

In hyper acute stroke care….

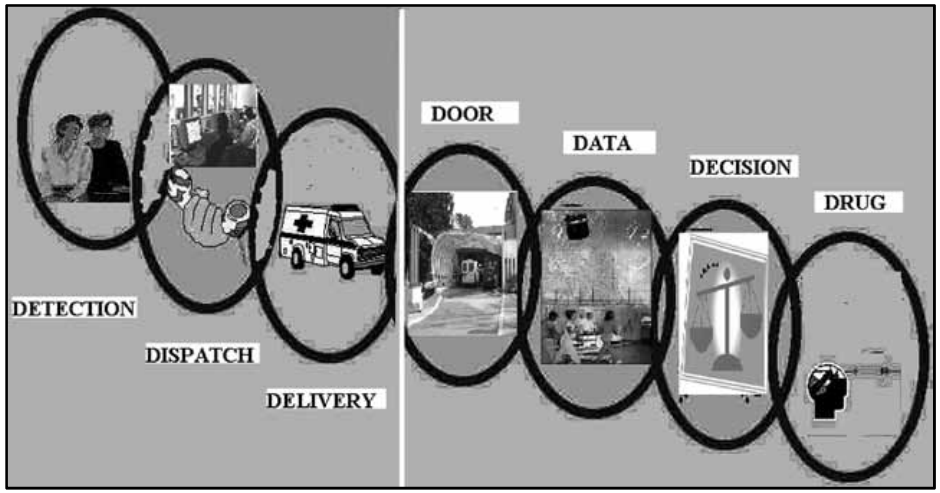
- *Time is of the utmost importance*
- ***"therapeutic window"***
- Perlu keterlibatan pasien, klg & tim kes
- *Stroke management protocols: well known, rehearsed (trained),easy to follow, should be in place.*

STROKE IS A BRAIN ATTACK

- Kedaruratan medik
- Intervensi dini dpt mengurangi “sequel”
- Penanganan yg komprehensif dan terkoordinir dari tim stroke.
- ***Starting with pre hospital and emergency department care***

A stroke "Chain of survival"

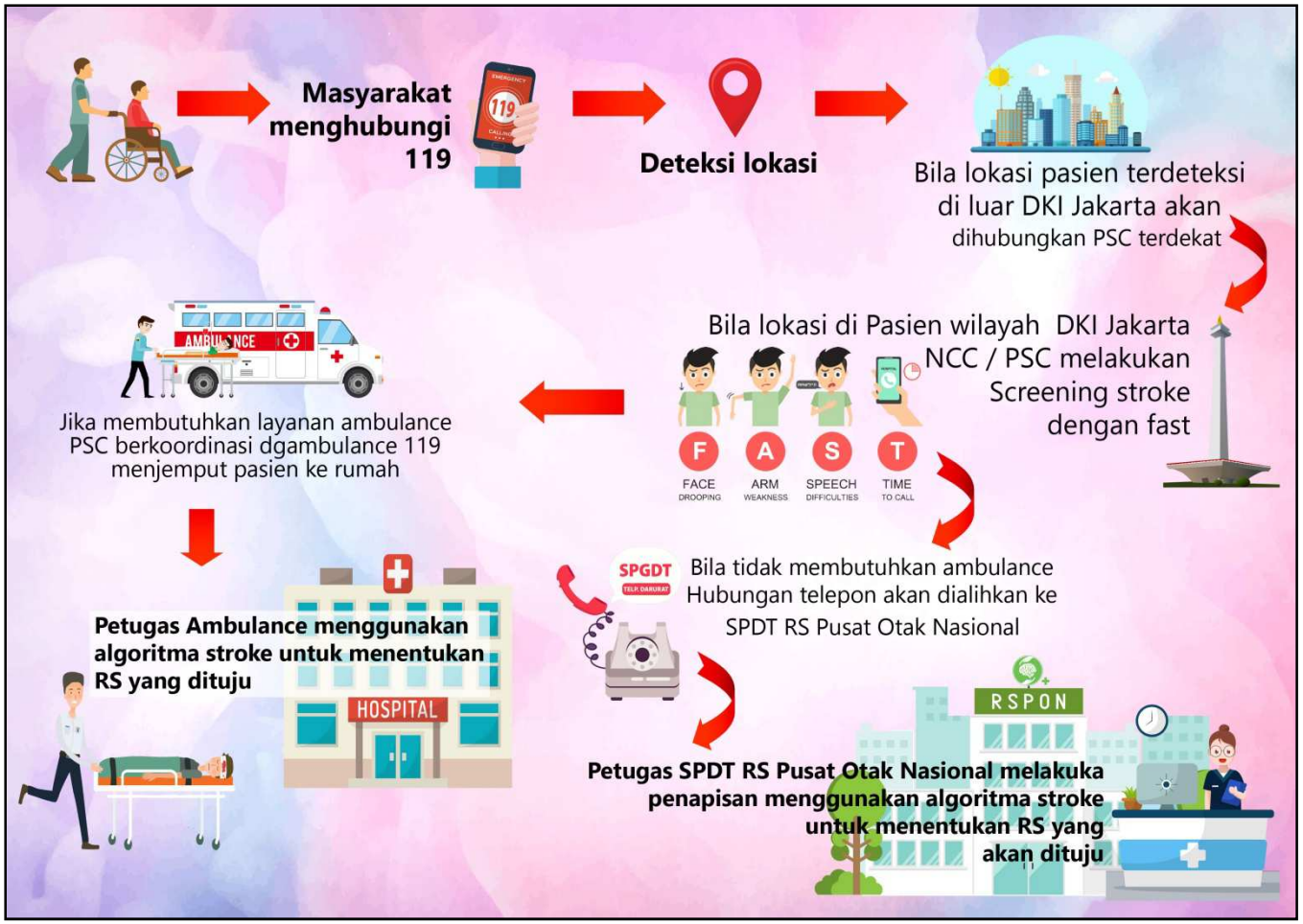
- *Detection*
- *Dispatch*
- *Delivery*
- *Door*
- *Data*
- *Decision*
- *Drug*



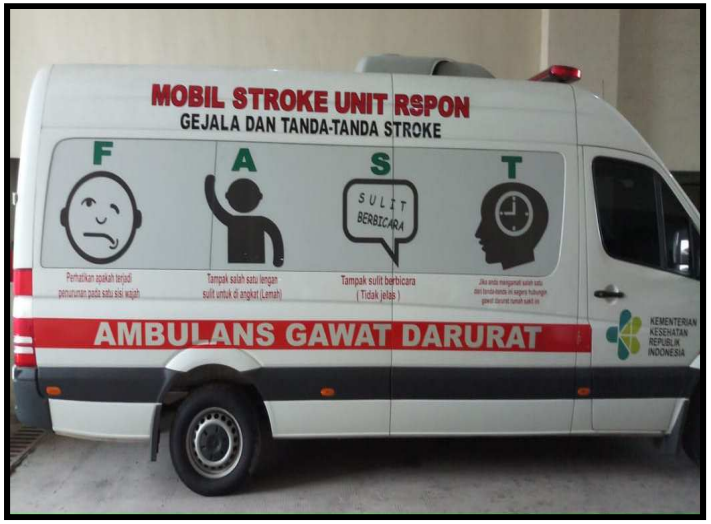
Detection

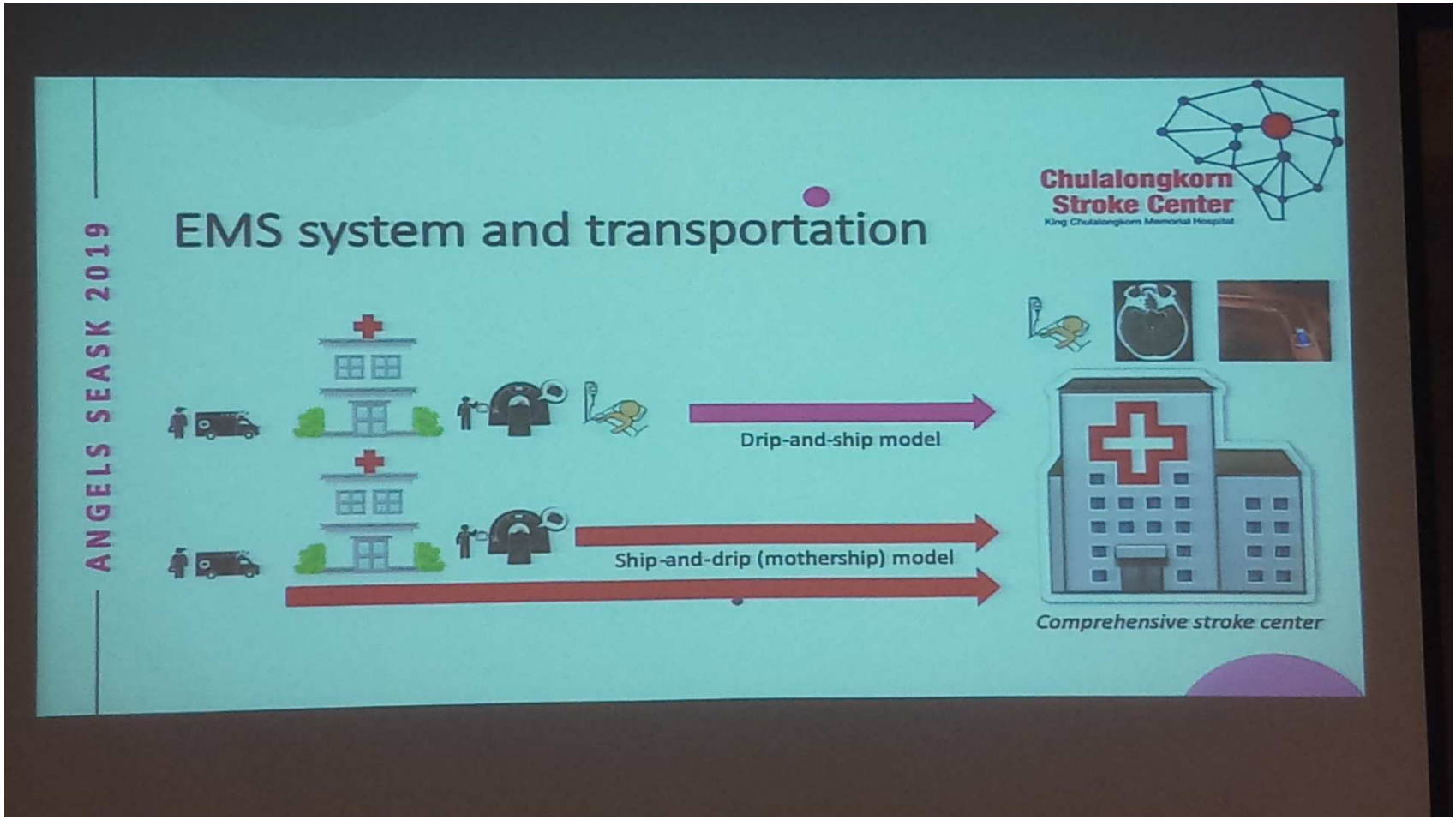

How do you know if someone's having a stroke? Think...
F. A. S. T.
Check their FACE. Has their mouth drooped?
Can they lift both ARMS?
What? I don't know what you mean. Could youu dsjkgh? Ewngl argn
Is their SPEECH slurred? Do they understand you?
TIME is critical. If you see any of these signs, call 000 now!
Think F.A.S.T. Act FAST! CALL 000
strokefoundation
Victoria The Place To Be
For more info call 1800 787 653 or visit strokefoundation.com.au.

Flow Chart Stroke DKI Jakarta



Dispatch & Delivery




ANGELS SEASK 2019
EMS system and transportation
Chulalongkorn
Stroke Center
King Chulalongkorn Memorial Hospital
Drip-and-ship model
Ship-and-drip (mothership) model
Comprehensive stroke center

En route…EMS personal should

- Pastikan onset
- Terakhir kali pasien terlihat normal
- Kaji adanya kejang / trauma
- Riwayat kesehatan pasien
- Riwayat pengobatan pasien

Intervensi perawat selama di Ambulance

- **ABC**
- **Pemeriksaan neurologi menggunakan FAST**
- **Intervensi khusus**

- **Tinggikan posisi kep 15-30 derajat**
- **Periksa Saturasi Oxygen**
- **Berikan Oxygen 2 L/ mnt**
- **Pasang infus & berikan cairan isotonik**
- **Ukur kadar gula darah**
- **Berikan glukosa bila hipoglikemi**
- ***NPO/ NBM***

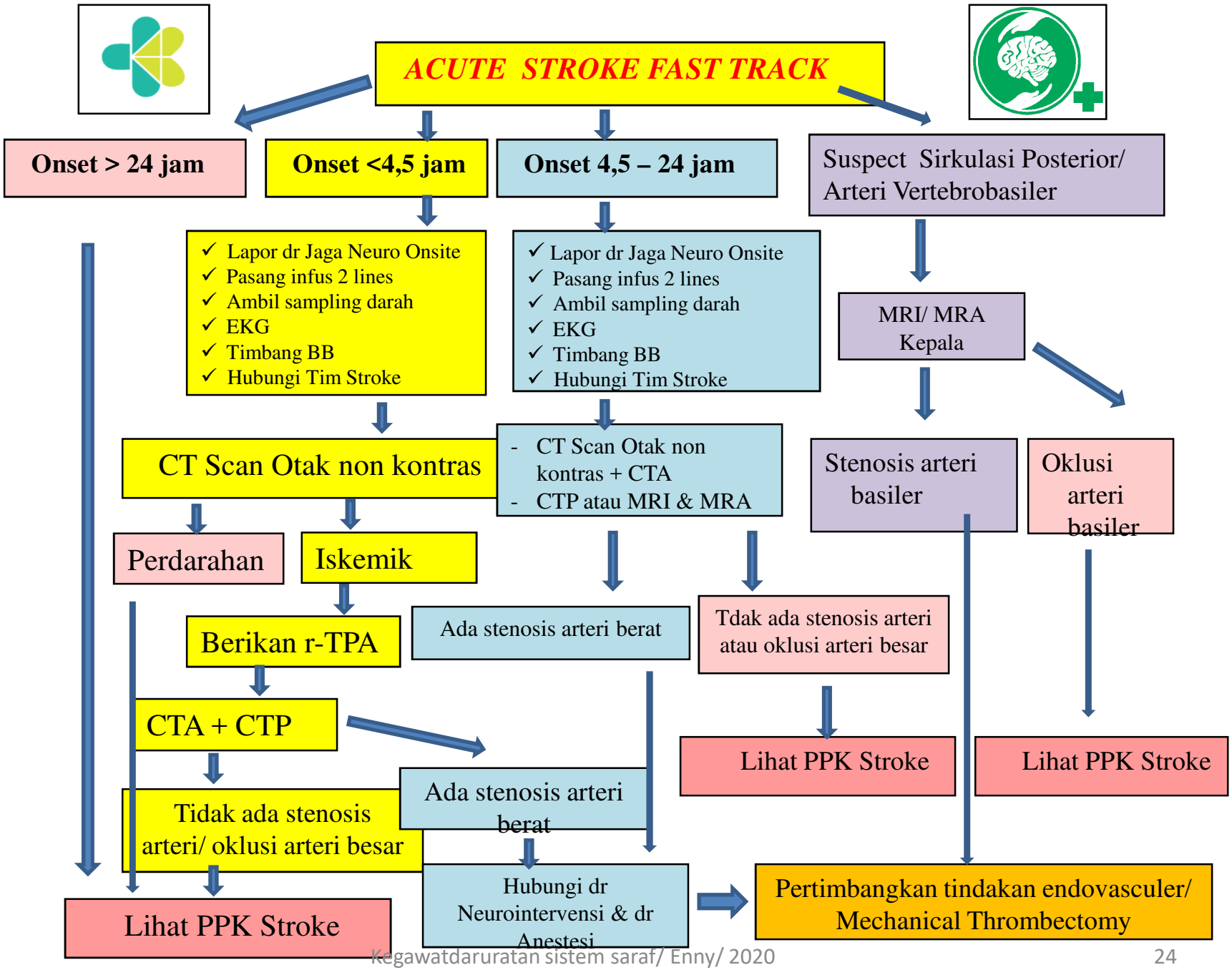
DOOR – Emergency Room

Emergency Dept Evaluation

- Time is of the essence of stroke care
- receive the highest triage priority
- Rapid assessment & treatment
- Stroke CP or protocol should be in place
- A collaborative team approach

Neurological examination

- ***Vital sign***
- ***GCS***
- ***Kekuatan motorik***
- ***Pupil***
- ***Other neurological dysfunction***


ACUTE STROKE FAST TRACK
Onset > 24 jam
Onset <4,5 jam
Onset 4,5 – 24 jam
Suspect Sirkulasi Posterior/ Arteri Vertebrobasiler
✓ Lapor dr Jaga Neuro Onsite
✓ Pasang infus 2 lines
✓ Ambil sampling darah
✓ EKG
✓ Timbang BB
✓ Hubungi Tim Stroke
✓ Lapor dr Jaga Neuro Onsite
✓ Pasang infus 2 lines
✓ Ambil sampling darah
✓ EKG
✓ Timbang BB
✓ Hubungi Tim Stroke
MRI/ MRA Kepala
CT Scan Otak non kontras
- CT Scan Otak non kontras + CTA
- CTP atau MRI & MRA
Stenosis arteri basiler
Oklusi arteri basiler
Perdarahan
Iskemik
Berikan r-TPA
Ada stenosis arteri berat
Tdak ada stenosis arteri atau oklusi arteri besar
CTA + CTP
Lihat PPK Stroke
Lihat PPK Stroke
Ada stenosis arteri berat
Tidak ada stenosis arteri/ oklusi arteri besar
Hubungi dr Neurointervensi & dr Anestesi
Pertimbangkan tindakan endovasculer/ Mechanical Thrombectomy
Lihat PPK Stroke

Stroke / Brain Attack Team

- Nursing
- Neurology
- Neurosurgery
- Radiology
- Pharmacy
- Clinical laboratory personel

DATA:

Laboratory

- ***Glucose & electrolytes***
- ***Complete blood cell count***
- ***PT/ aPTT***
- ***Cardiac enzyme***
- ***ABG***

Neuron imaging

- CT Scan
- MRI
- MRA
- CT Angiography
- DSA

Phycical examination

- Be strategic & directed toward:
- ABC's
- Vital signs: especially BP
- Tanda SAH: kaku kuduk, nyeri kepala
- Neurologic examination

- *Level of consciousness*
- *Visual function*
- *Motor function*
- *Sensation & neglect*
- *Cerebellar function*
- *language*

Decision


Stroke Team Trolley
Please do not remove tPA box from trolley
G66

Blood pressure management

Tekanan darah sebaiknya jangan diturunkan kecuali:

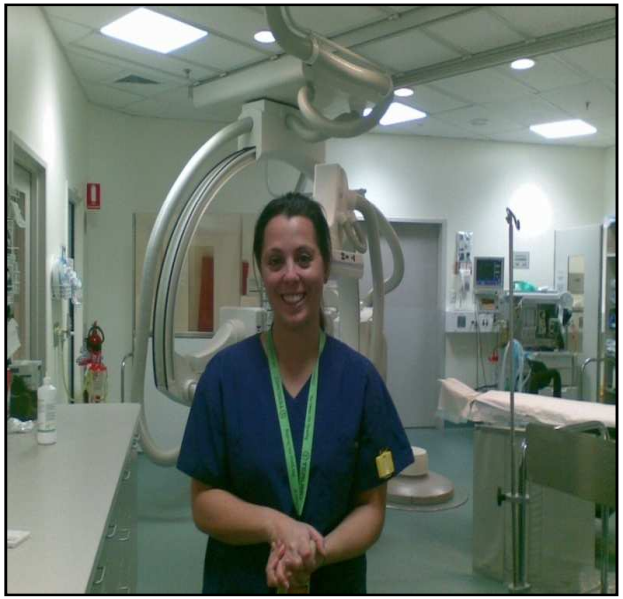
- Bila sistolik >220 mmHg, Diastolik > 120mmHg (2x pengukuran) atau MABP >130mmHg – 140mmHg.
- Terdapat AMI, gagal jantung/ ginjal akut

- Stroke berdarah, tensi dapat diturunkan sedikit (maks. 20%)
- Hipotensi harus dilakukan koreksi.

Fase Hiperakut: TerapiTrombolitik

- *Acute Ischemic Stroke.*
- *The administration of recombinant tissue plasminogen activator (t-PA) improves the outcome after stroke when given very early, and* ***within 4,5 hours of onset of stroke in carefully selected persons.***

Neurological Intervention



- *DSA*
- ***Mechanical Trombectomy***
- *Coiling*
- *Ballooning*
- *Stent*

Peran Perawat pada Kedaruratan Cedera Kepala

Reality…

Pendahuluan

- Cedera kepala mrpkn masalah yg kompleks
- Kerusakan primer & sekunder
- Cedera kepala merupakan sebuah *“neuro-critical care disease”*
- Tujuan utama keperawatan adalah mempertahankan perfusi serebral dan meningkatkan aliran darah ke serebri untuk mencegah iskemi serebral dan injury sekunder tehadap otak.

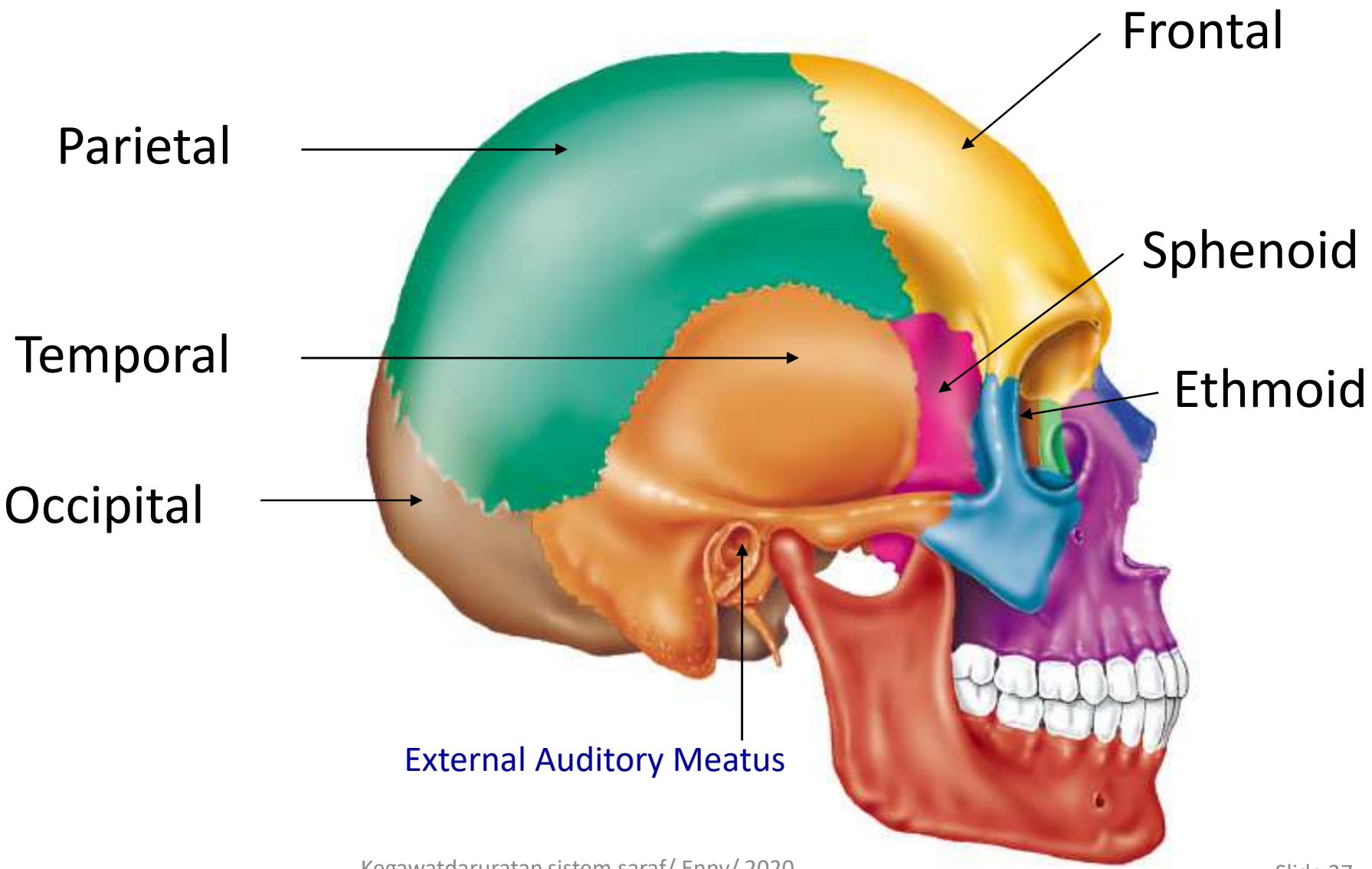
Epidemiologi

- Cidera kepala sbg penyebab utama kematian pada usia dewasa (15-40)
- Cidera kepala dapat menyebabkan kecacatan
- Lebih sering menyerang laki-laki
- Faktor Risiko: usia, **transportasi** (motor) & alkohol
- Di USA: sekitar 1,5 juta pasien baru cidera kepala/ tahun
- Di Indonesia???

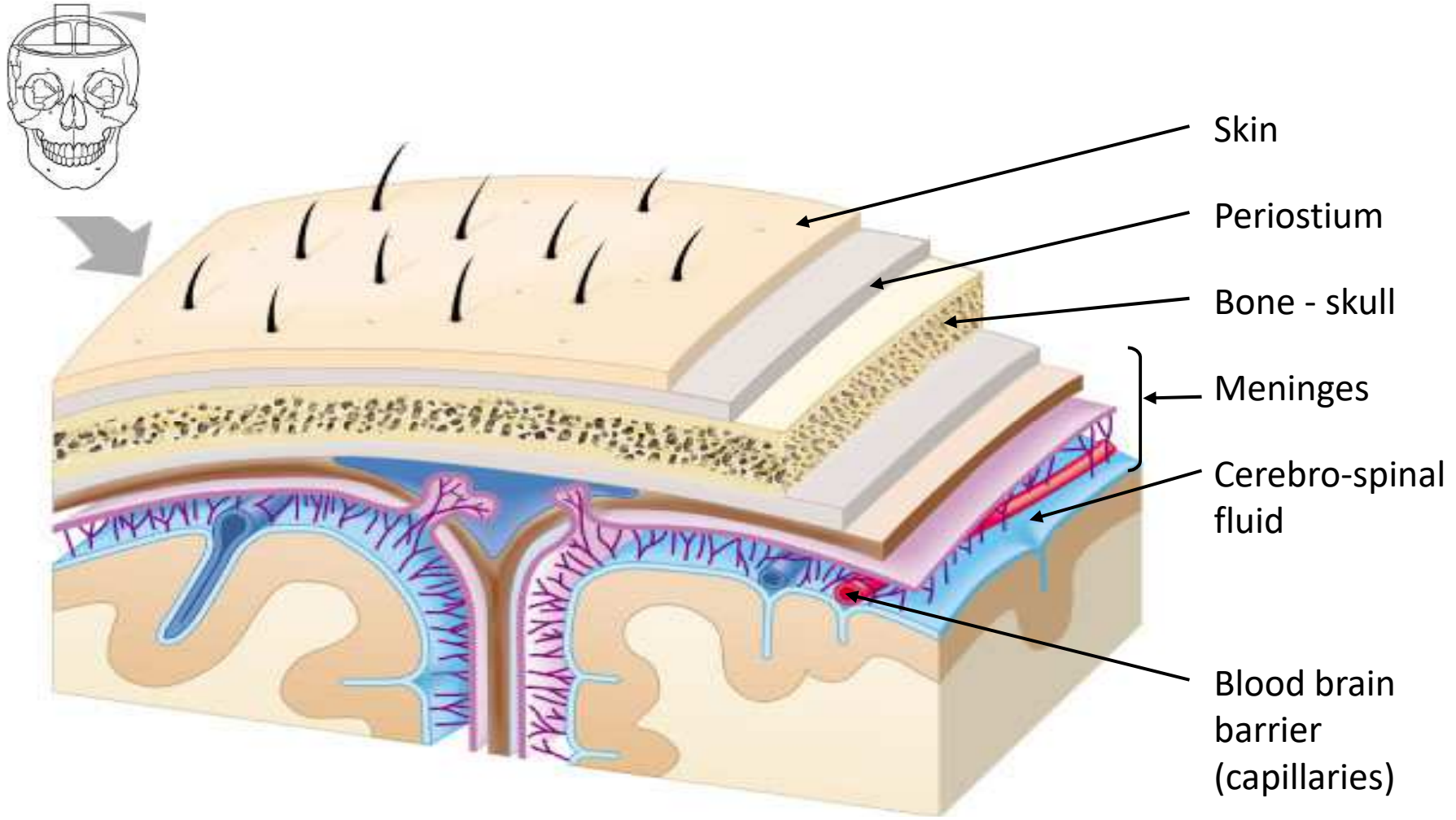
Cedera Kepala

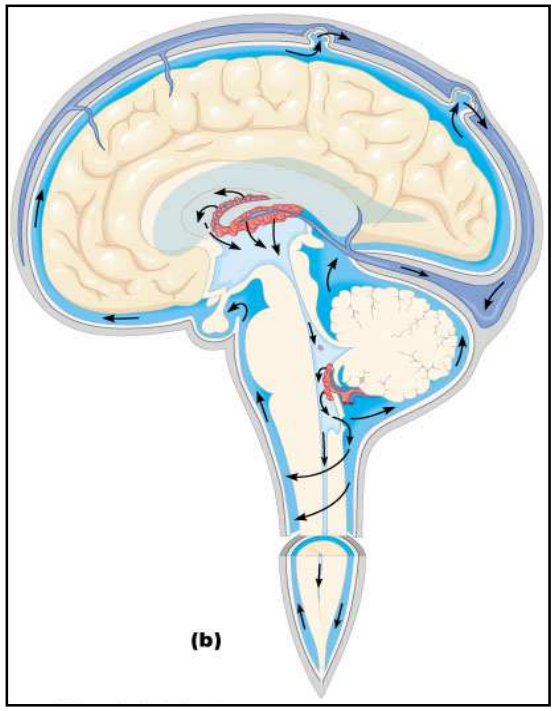
- Cedera, dari rahang bawah s/d puncak kepala.
- Kerusakan pada kulit kepala, tulang tengkorak, jaringan otak.
- Kerusakan struktur/ fungsi
- Vaskular, neuron, tulang

Bones of the CRANIUM



Protection of the CNS

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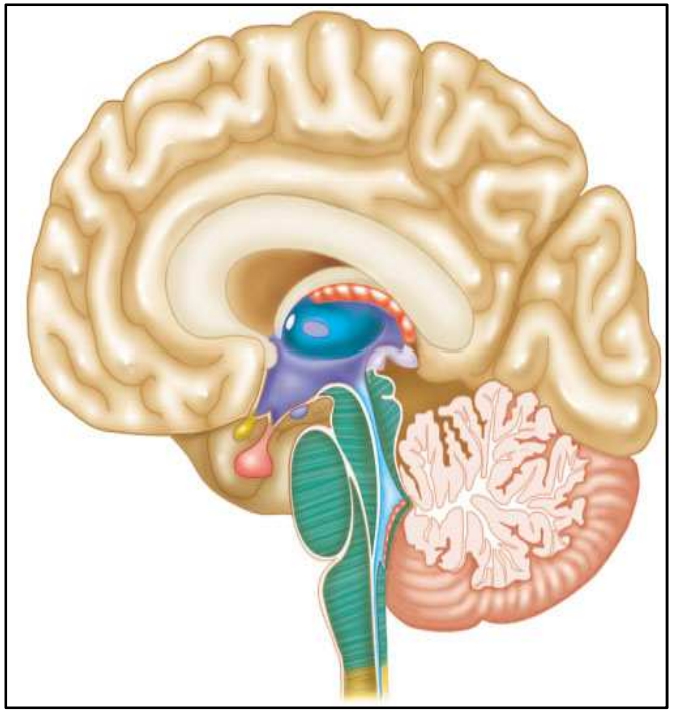


Patologi

- **Proses primer:**

  proses kerusakan otak tahap pertama akibat benturan/ proses mekanik yg membentur kepala. Tergantung kuat benturan, arah, kondisi kepala, percepatan/ perlambatan.

  Akibat: fraktur, robek serabut saraf, kematian neuron.

- Fokal: laserasi kulit kepala, fraktur tl tengkorak, laserasi & kontusio serebri, epidural hematoma, subdural hematoma, intra serebral hematoma.
- Difus…..Difuse Axonal Injury (DAI)

Proses sekunder

- Proses kerusakan biokimia: edema sitotoksik akibat kerusakan pompa natrium, kerusakan membran dan sitoplasma, inhibisi sintesa protein
- Kerusakan BBB….edema vasogenik
- Perluasan daerah edema.

- Proses intra kranial:

  peningkatan TIK….penurunan perfusi serebral….hipoxia otak.
- Proses sistemik:

  perdarahan intra kranial…penurunan TD…penurunan perfusi serebral.

Secondary Injury

- Graham (1978) : ischemic brain damage in 92% of 151 head injury victim at autopsy.
- Consequences of post-injury hypotension, hypoxia, and intracranial hypertension.

Graham DI et.al. J Neurol Neurosurg Psychiatry 1989;52:346-350

The role of 3 important determinant in secondary brain injury:

1. Cerebral perfussion (Cerebral Blood Flow (CBF), CPP and blood pressure (MAP).
2. Brain tissue oxygenation (Oxygen Delivery).
3. Intracranial pressure.

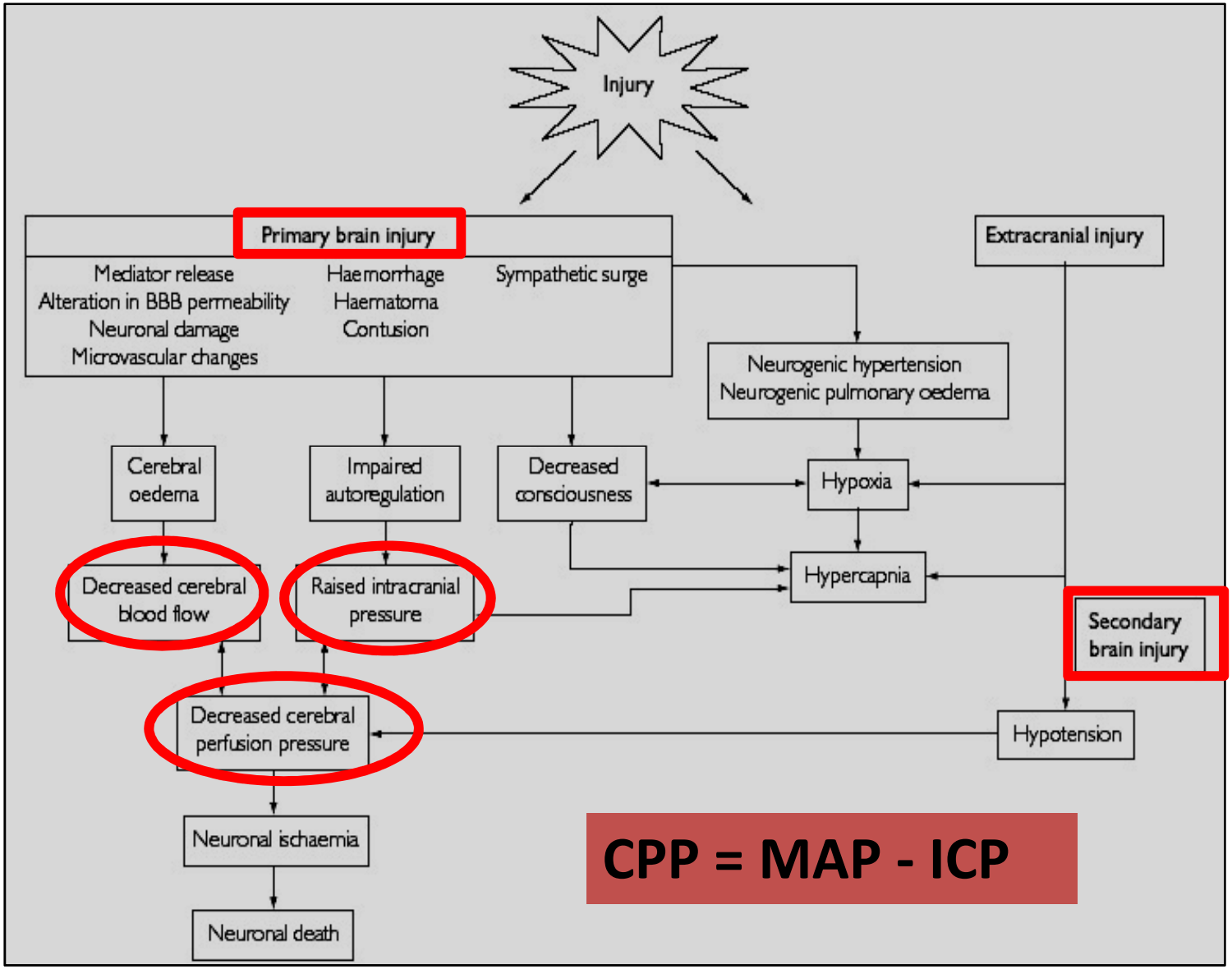
Klasifikasi: Patofisiologi

- Komotio serebri: tdk ada jar otak yg rusak, pingsan < 10 mt, amnesia pasca trauma.
- Kontusio serebri: defisit neurologi sesuai dg kerusakan otak, pingsan > 10 mt, lesi neurologik jelas.
- Laserasi otak: jaringan otak robek disertai fraktur tl tengkorak terbuka.

Klasifikasi: ringan/ berat

- Ringan: GCS 13-15, pingsan < 30 mt, tidak ada defisit neurologik.
- Sedang: GCS 9-12, pingsan 2-5 jam, disorientasi ringan, dapat mengalami fraktur tl tengkorak.
- Berat: GCS < 8, pingsan > 24 jam, meliputi kontusio serebri, laserasi atau hematoma/ edema serebri

Pathophysiology of TBI



Pem Diagnostik & Tatalaksana Medik

Pem Diagnostik:

- Foto tulang tengkorak
- CT Scan Kepala
- MRI Kepala
- Lab

Tatalaksana Medik:

- Medikamentosa
- VP Shunting
- Decompression craniotomy

Pengkajian Keperawatan

- Umum: ABCDE
- Tanda vital
- Status neurologik: GCS, pupil, fungsi batang otak, fungsi motorik.
- Wajah & tulang kepala

Diagnosa Keperawatan

1. Perubahan perfusi jaringan serebral
2. Resiko tinggi pola napas tidak efektif
3. Perubahan persepsi sensori
4. Perubahan proses pikir
5. Kerusakan mobilitas fisik
6. Resiko tinggi infeksi
7. Resiko perubahan nutrisi kurang dari kebutuhan tubuh
8. Kurang pengetahuan mengenai kondisi dan kebutuhan pengobatan

Nursing management

- Pertahankan jalan napas
- Monitor tanda peningkatan TIK
- Monitor keseimbangan cairan & elektrolit
- Pertahankan asupan nutrisi
- Cegah *disused syndrome*
- Kontrol nyeri
- Kontrol suhu
- Kontrol kejang

Pra-hospital Management

- Protect yourself.
- Stabilization: A-B-C.
  - Priorities of Assessment: Airway → Breathing → Circulation → Head/Spinal Injury → Limb
- Emergency treatment
- Transportation

Emergency general management

- Make sure the airway smoothly
  - Be careful of possible cervical fractures
  - Be careful if doing suction (Leading to elevated ICP)
- Give oxygen according to need, the initial average give with nasal cannula 2-3 liter / minute.
- Fluid resuscitation.

Fluid Resuscitation

- Maintain the cardiac output and adequate BP (SBP 100 – 160 mmHg, CPP >70 mmHg).
- Ensure adequate circulation. Avoid hypotonic solution. I.V. NS 0,9% *
- When it remains hypotensive: inotrope/vasopressor agent.

CT indication of adult head trauma

- GCS <13
- GCS <15, assessed 2 hours from injury
- Suspected open/depressed fracture
- Sign of basal fracture
- Post traumatic seizure
- Focal neurological deficit
- >1 episode of vomiting
- Retrograde amnesia >30 minutes

www.nice.org.uk

Epidural Hematoma (EDH)

- Fraktur linear… laserasi arteri serebri media
- Menyerang anak & dewasa muda.
- Perburukan yang cepat *" talk and die syndrome"*

…… Lucid interval

- Perburukan yang cepat
- Dilatasi pupil ipsilateral
- Perubahan kesadaran
- Motorik: hemaperese ringan s/d dekortikasi/ deserebrasi kontralateral
- Pengobatan….*surgical removal of clot.*

Indications of surgery on Traumatic Brain Injury(1)

- Epidural Hematoma
  - > 40 cc in temporal/frontal/parietal with midline shifting and brainstem function is still good.
  - > 30 cc in posterior fossa with the signs of brainstem suppression or and brainstem function is still good.
  - Progressive EDH.

Subdural Hematoma

- Perdarahan vena dari korteks atau *bridging veins.*
- Perjalanan penyakit……..perlahan.
- Akut: 24-72 jam pertama..op segera.
- Subakut: 72 jam-2 minggu…awasi peningkatan TIK & herniasi.
- Operasi..tgt ukuran & konsistensi bekuan.

- ❖ Gejala perlahan
- ❖ Mirip dimentia
- ❖ Sering terjadi pada lansia
- ❖ Burr holes, irigasi, insersi kateter.
- ❖ Bila darah sangat kental…kraniotomi.

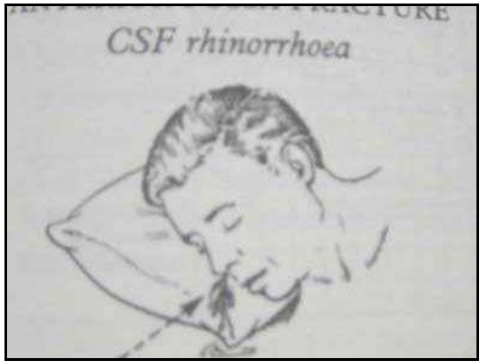
Intra cerebral hematoma

- Masuknya darah ke parenkhim otak.
- Penyebab tersering: KLL/ jatuh
- Defisit neurologi tgt lokasi lesi.
- Operasi…bila bekuan besar & mudah dijangkau.
- Mortalitas: 25-60%

Fr basis kranii: Fraktur fossa anterior

- Umumnya melibatkan tl frontal, sinus ethmoid & sinus frontalis.
- Tanda: Ecchymosis periorbital bilateral (*raccoon eye*), anosmia, rhinorrhoea.
- Intervensi kep:

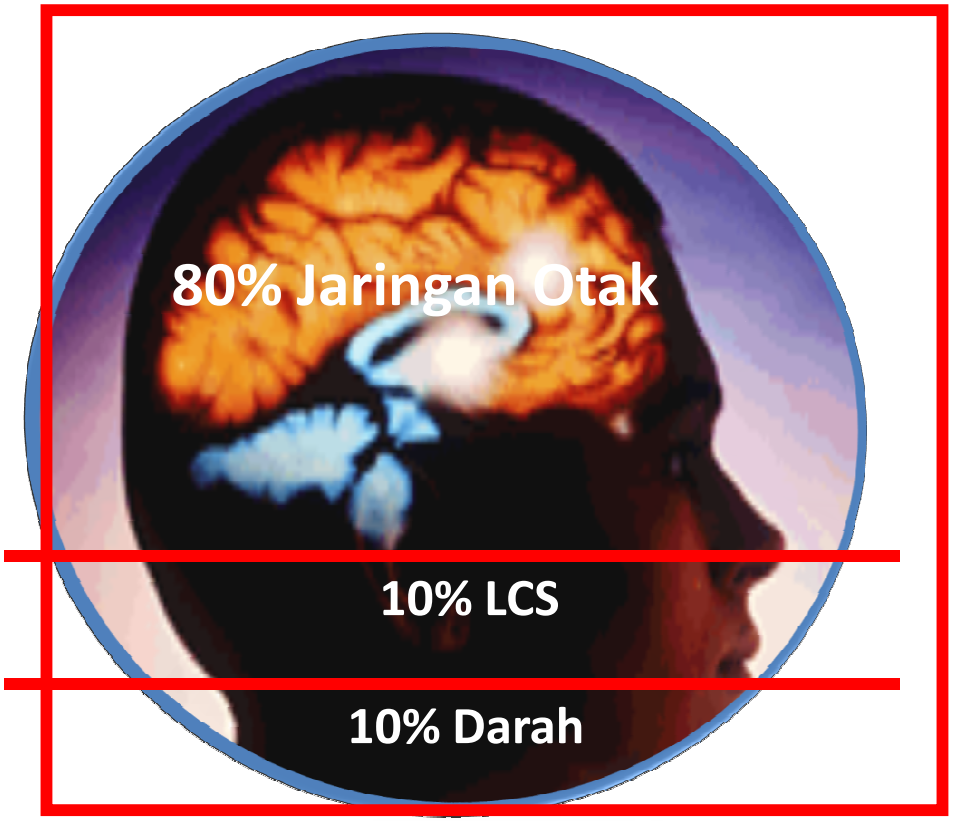
  Elevasi posisi kepala 30 derajat



Fr basis kranii: Fraktur fossa media

- Echymosis diatas mastoid di belakang telinga (*battle sign*), otorrhoe (ruptur membran timpani).
- injuri CN VII & CN VIII…*facial drop, dizzines, tinitus, hearing loss*
- Jangan pasang NGT (gunakan oro-gastric tube).

Tekanan Intrakranial

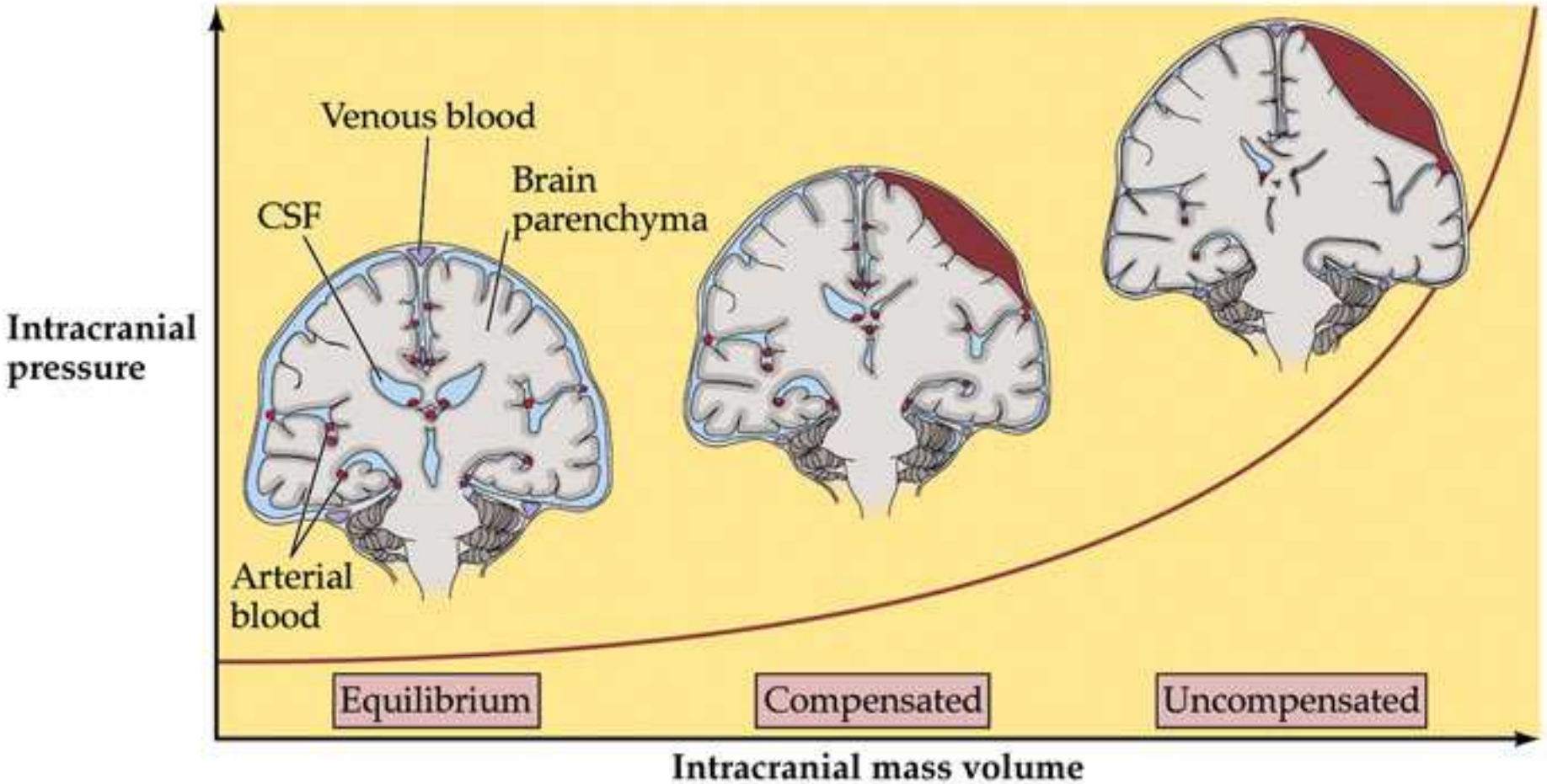


- Normal : fontanella cranium sudah menutup
- Volume total intracranial dewasa: 1475 ml.
- TIK Normal : < 15 mmHg (0-10 mmHg)

Doktrin Monroe-Kellie

- Doktrin Monroe-Kellie: volume intrakranial adalah konstan.
- Tengkorak tidak dapat melebar dan menyusut.
- Setiap penambahan volume salah satu komponen di intrakranial akan menyebabkan:
  - Penurunan volume komponen lain.
  - Peningkatan tekanan dalam ruang intrakranial, atau
  - Kombinasi keduanya.

Mekanisme Kompensasi TIK



Tujuan keperawatan pasien PTIK

1. Meningkatkan/ **Mempertahankan perfusi serebral**
2. **Deteksi dini peningkatan TIK**
3. **Kontrol peningkatan TIK**
4. Cegah & Deteksi dini komplikasi
5. Terapi suportif
6. Beri dukungan emosi pasien & klg

Tata laksana perawatan umum

- Rencanakan tata laksana spy tidak menambah PTIK
- Tinjau kembali hasil pemeriksaan lab
- Cek adanya darah di faeces
- Pantau kadar gula darah

- Pantau kadar obat anti konvulsi
- Perhatikan prosedur mencegah kejang
- Kenakan pasien stocking untuk cegah DVT
- Laksanakan tindakan hygiene standar untuk cegah komplikasi akibat immobilisasi

Tanggung jawab perawat

- Pantau status neurologis
- Pantau tanda vital
- Pertahankan suhu tubuh dlm batas normal

- Pantau pola & frekuensi nafas
- Pantau kulit apkh ada sianosis
- Lakukan auskultasi dada
- Lakukan suction (tdk lebih dr 15 dtk)
- Hiperventilasi dg Oxygen 100% selama 1 mt sebelum suction
- Berikan Oxygen & pantau AGD

Mengatur posisi & latihan mobilisasi

- Tinggikan kepala tt 15-45 derajat
- Hindari posisi telungkup, trendelenburg, fleksi leher berlebihan, fleksi panggul ekstrem.
- Rubah posisi setiap 2 jam

- ❖ Pasien yg masih mengerti perintah sederhana, anjurkan pasien untuk menghembuskan nafas saat prwt membalik atau memindahkan pasien.
- ❖ Bantu pasien bergerak di tt, hindari pasien mendorong dirinya dg telapak kaki.
- ❖ Latih ROM pasif

POSITIONING

- Tinggikan kepala tempat tidur pasien 30^{o}
- Hindari fleksi, ekstensi, atau rotasi ekstrem leher
- Pantau kekencangan *Cervical collars* atau ikatan trakheostomi …. **Jangan terlalu kencang**
- Hindari fleksi panggul ekstrem >90^{o}

Mempertahankan Perfusi Serebral

Pasien dengan GCS < 8:

must be intubated and ventilated

- *for airway protection*
- *Maintain adequate oxygenation*
  - PO_2>90mmHg
  - SPO_2>95%

- Pertahankan PCO_2 : 35 - 45mmHg
- Jika TIK tinggi, pertahankan PCO_2 : 30-35mmHg

Hypercapnia harus segera dikoreksi

- Menyebabkan asidosis dan vasodilatasi
- Menyebabkan peningkatan TIK dan kerusakan otak

HYPERVENTILATION ???

not advisable

- Memicu vasokonstriksi pembuluh darah otak
- Memperburuk situasi…. Aliran darah ke otak berkurang dan transport Oksigen tidak adekwat.

Tatalaksana Hemodinamik

Tujuan:

- ❖ Mempertahankan aliran darah ke otak dan mencegah kerusakan otak lanjut akibat iskemia otak.
- ❖ Termasuk kontrol tekanan darah dan resusitasi volume darah ke otak yang efektif.

- CPP = MAP – ICP
  MAP= Dyastol + (syst-dyas: 3)

- Pertahankan

CPP : 60 - 70mmHg

MAP : 70 - 90mmHg

ICP : ≤ 20mmHg

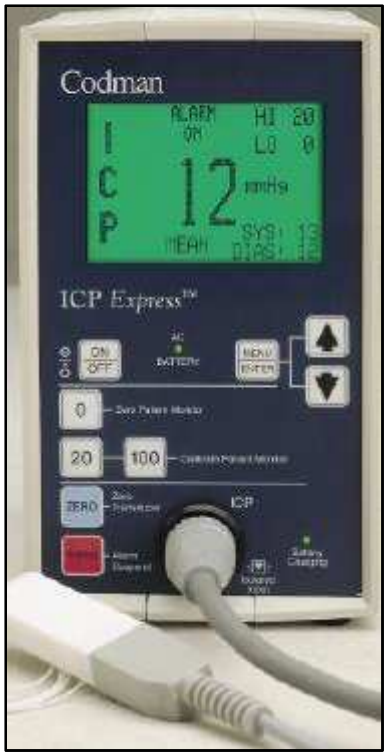
Monitor Hemodinamik

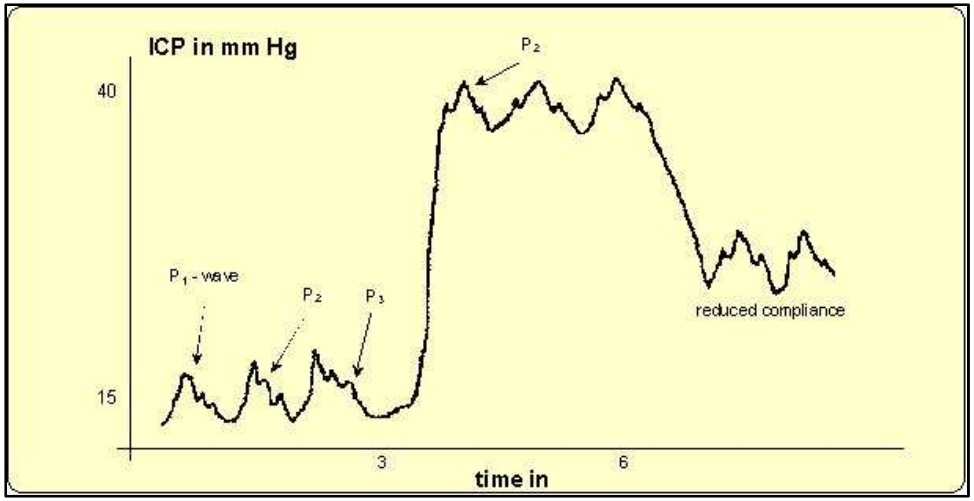
- *Drainage of CSF if ICP >20mmHg*
- Jika MAP / CPP tidak tercapai diberikan inotropik positif
- Pertahankan CVP 8 – 10 mmHg

Monitor vital sign:

- Setiap 15 menit pada 4 jam I
- Setiap 30 menit 4 jam berikutnya
- Setiap jam pada 2 jam berikutnya
- Setiap 2 jam sesuai kondisi pasien.

Alat Monitoring TIK





Terapi Mannitol 20%

- ***Indicated for ↑ICP:*** *an Osmotic Diuretic*

  Dosis : 0.25- 1g/kg BB

  Monitor ketat:

❖ Tanda Vital

❖ Urine output : 0.5 – 1ml/kg BB

❖ CVP : 8 -10 mmHg

❖ Monitor Osmolalitas

2(Na+K) + glukosa/ 18 + BUN/2,8

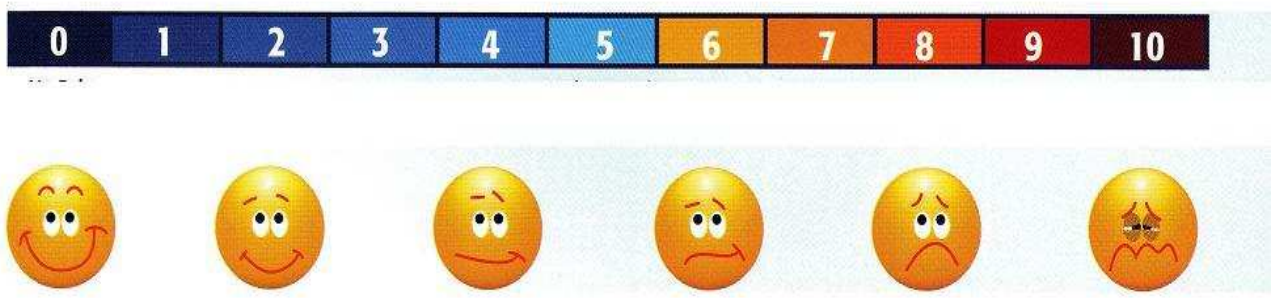
Efek mannitol: menarik cairan dari intra sel otak ke intra-vaskuler, akibatnya:

- Perubahan S*troke Volume* (SV)
- Perubahan C*ardiac Output* (CO)
- Perubahan resistensi vaskuler sistemik dan tekanan darah
- Perubahan produksi urin

Pain Management

- Monitor nyeri
- Sedasi / analgetik – IV Midazolam & Morphine

  Adequate sedation to reduce the cerebral metabolic rate of oxygen consumption & facilitate mechanical ventilation



Brain Gut Axis Phenomenon

- ***H_2 Antagonist / Proton pump inhibitors***

  Untuk mencegah *stress ulcer* (misalnya: Rantin, Ranitidin, Zantac, Omeprazole)

Seizure Prophylaxis

- *Compression of brain tissue impairs function, which might result in seizures*
- *Seizure activity ↑ cerebral metabolic rate and tissue hypoxia leading to cellular death.*
- Obat anti kejang yang sering digunakan: Phenytoin Sodium 100 mg (3 kali sehari)

Pulmonary Care

- Suctioning melalui ETT dapat me-stimulasi refleks batuk, hypoxia & hypercapnia ↑tekanan vena jugularis ↑ TIK
- Hiper oxygenasi pasien sebelum suctioning
- Pastikan pasien mendapat sedasi adekwat
- Batasi durasi suction (<10 detik)

NORMOTHERMIA

Pertahankan suhu tubuh pasien normal (37^{o}C)

Elevation in body temp ↑ metabolic rate & cerebral O_2 consumption and contribute to ↑ O_2 demand worsen cellular hypoxia

Obat antipiretik, kompres hangat, *cooling blanket*

Pertahankan kadar gula darah

- *Hyperglycaemia ↑ cerebral ischemia (by ↑ osmotic pressure)*
- *Hypoglycaemia starves neurones of fuel needed to produce energy.*
- *Maintain level at 80–120 mg/dl; use continuous glucose infusion or insulin drip as needed*

Terapi Insulin:

- Monitor kadar gula darah ketat sesuai protokol
- Insulin drip sesuai kebutuhan
- Monitor kadar gula darah menggunakan Dextrostix setiap jam bila mendapat terapi insulin drip

Pertahankan kadar elektrolit normal

- **Hiponatremia:**

  Hyponatraemia ↓ plasma osmolality and may cause brain swelling.

- Bila penyebabnya SIADH….. *Fluid restriction*
- Bila CSWS ……saline

SIADH VS SWS

SIADH

- *Hematocrit N or low*
- *Well hydrated*
- *Avg day of appearance 8th day*
- *Heart rate slow/N*
- *Urea or creatinine N/low*
- *GFR increased*

CSWS

- *N or high*
- *Dehydrated*
- *4-5th day*
- *Tachycardia or N*
- *Urea or creatinine N or high*
- *GFR decreased*

James Springate. Cerebral Salt-Wasting Syndrome eMedicine Journal, November 1 2001, Volume 2, Number 11

Cegah DVT (Deep Vein Thrombosis)

- *DVT pump*
- *Passive exercise*
- *Tidak direkomenasikan compression stocking pada sisi yang parese*
- *Terapi LMWH*

A= Airway, Assessment (Toh, 2011)

Observasi:

- GCS.. Identifikasi adanya perubahan
- Fungsi Motorik
- Refleks pupil

OBSERVATION MEANS…ACTIVE MANAGEMENT

B= Breathing

- OPT
- ETT
- Tracheostomy…tube obstruction
- Suction....jangan lebih dari 10 dtk

C= Circulation, CPR, CPP, communication, complication, confidence & competence

CPP = MAP-TIK

- Sedation..remain sedated vs awakening
- *Elevation bed.....30 degree*
- *Head position...neutral*
- *Chest physiotherapy*
- Glukosa
- *Communication….> don't assume*

C= Complication

Prevention

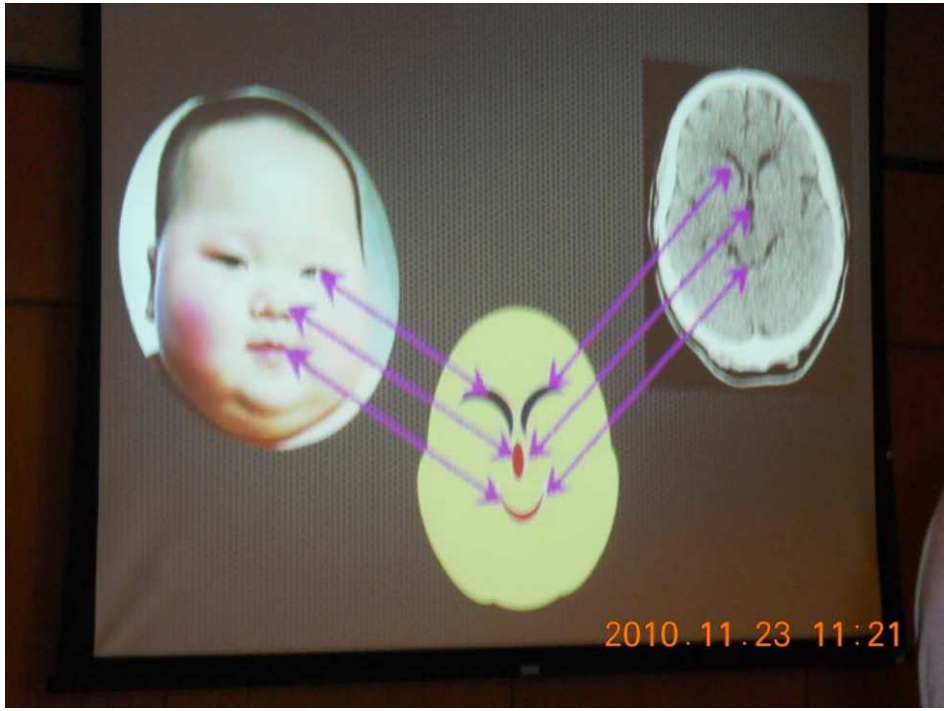
- *Infection*
- *CSF overdrainage*
- *EVD care*
- *Pressure sore*
- *DVT*
- *Hypoxia*
- *Hyper/ hypocapnia*
- *Nutrition*

Detection

- *GCS detereoretion*
- *Limbs power worsening*
- *Hemodynamics stability*
- *Electrolyte*
- *CSF leak*
- *EVD blocked*
- *Pouring urin*

D= Drug, Diagnostic tools, Detect life threatening situation, Documentation

CT SCan



Drug

Preparation, administration, side effect (phenytoin, mannitol, dexametazon)

E= Ethic & legal, Elective admission, Education

Nurse…remain to be competent and knowledgeable

- A wide range of procedure, from cranial cases to spinal cases.
- Baseline blood investigation
- Scalp preparation
- Imaging requirement
- Allergies history
- Medication


THANK
YOU