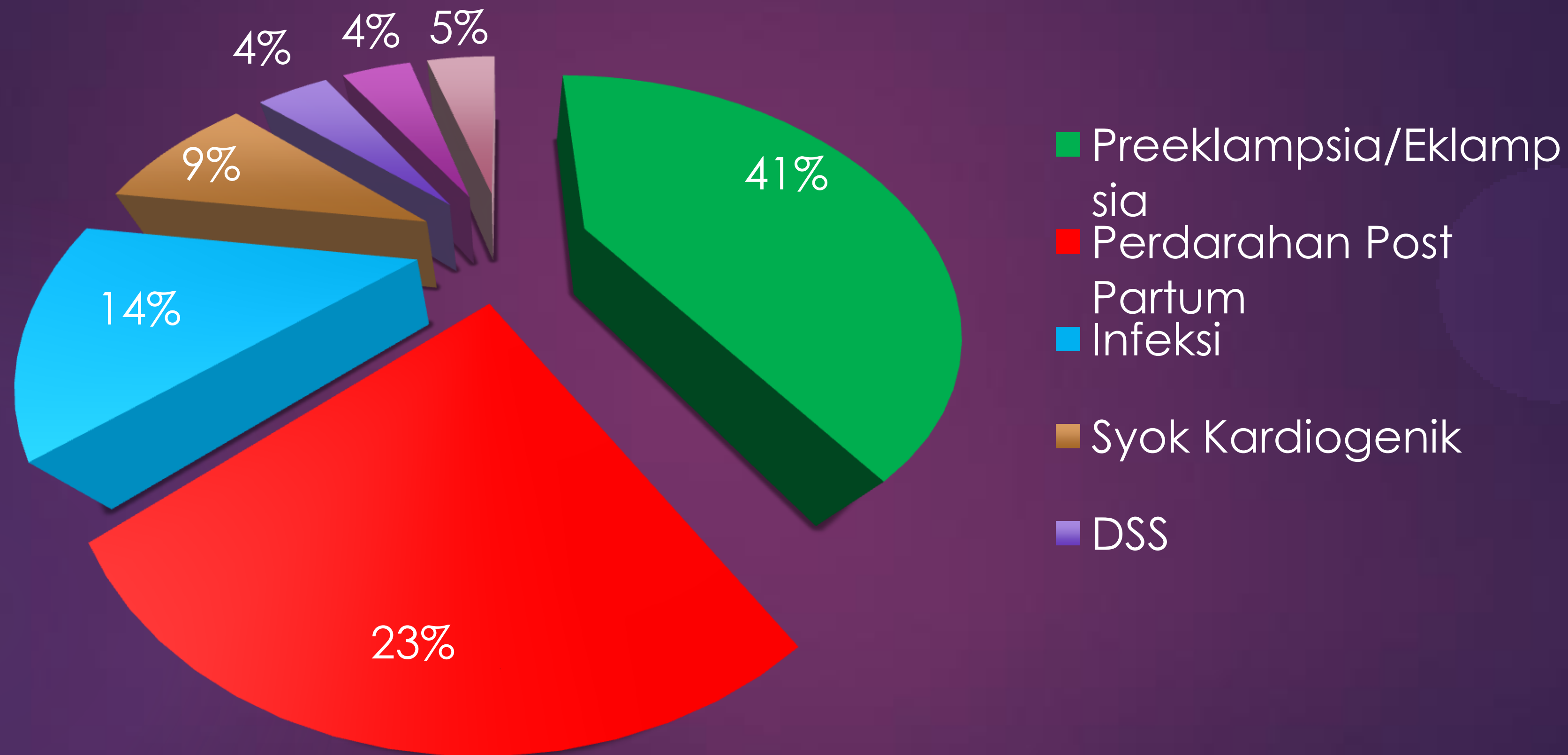
Early Detection of Preeclampsia

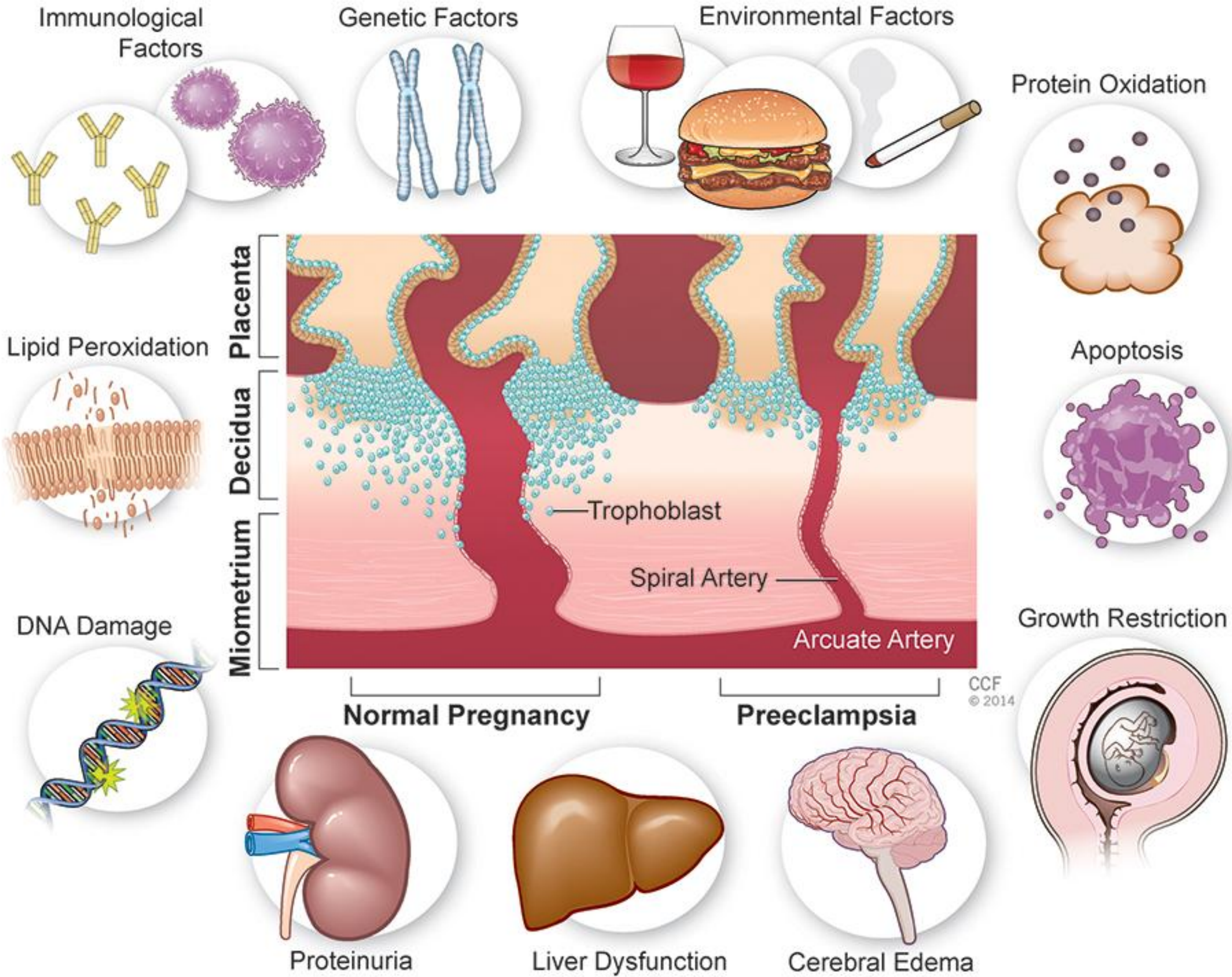
Dr. dr. Efendi Lukas, SpOG (K)

AKI 359 / 100.000 pertahun, berarti jumlah ibu yang meninggal = 359/100.000 x 4,5 juta = 16.155
Kapasitas pesawat @ 400 penumpang

Artinya setiap tahun di Indonesia ada 40 pesawat jumbo jet Boeing 777 yang jatuh, dan penumpangnya adalah ibu hamil/melahirkan

PENYEBAB KEMATIAN IBU DI RS WAHIDIN SUDIROHUSODO MAKASSAR TAHUN 2014 -2015





Immunological Factors
Genetic Factors
Environmental Factors
Protein Oxidation
Lipid Peroxidation
Apoptosis
Placenta
Decidua
Miometrium
Trophoblast
Spiral Artery
Arcuate Artery
DNA Damage
Growth Restriction
CCF © 2014
Normal Pregnancy
Preeclampsia
Proteinuria
Liver Dysfunction
Cerebral Edema

Contoh kasus

- Seorang wanita usia 25 thn G1P0 gravid 36 minggu, ANC teratur pada SpOG, dan pemeriksaan terakhir 1 minggu yang lalu, disampaikan bahwa kondisi ibu baik, tbj 2000g, namun 1 minggu kemudian pasien ke SpOG lain, didapatkan Tensi 220/150 Hg , tbj 1400 gr, dirujuk ke RS Wahidin Sudirohusodo, dan diagnosis : Preeklamsia berat (impending eklamsia)+ Pertumbuhan janin terhambat
- Tindakan : Seksio sesaria
- Bayi : 1345 gram, 42 cm, NA : 7/9

Kasus 2

- Ibu 28 th, infertil 6 thn, G1P0 gravid 36 minggu , dirujuk ke RS Wahidin Sudirohusodo dengan T = 180/110 mmHg, D/ Preeklamsia berat + KJDR
- ANC di bidan desa, ketahuan hipertensi sejak bulan lalu dan tidak dirujuk
- Tindakan : terminasi kehamilan pervaginam
- Lahir bayi : 3000 gr, 48 cm, NA ; 0

Tidak ukur tekanan darah dan periksa lab saat memeriksa ibu hamil
Bu bidan dan dokter : Yang kamu lakukan ke aku itu jahat

PCCI
6.05
GEDI
610
ELWI
12
SIAP
PAKAI

Table 3: Proposed maternal biochemical markers for the prediction of preeclampsia.

A disintegrin and metalloprotease 12 (ADAM12)	L-Arginine
Activin-A	L-Homoarginine
Adiponectin	Leptin
Adrenomedullin	Magnesium
Alpha fetoprotein	Matrix metalloproteinase-9
Alpha-1-microglobulin	Microalbuminuria
Ang-2 angiopoietin-2	Microtransferrinuria
Antiphospholipid antibodies	N-Acetyl-β-glucosaminidase
Antithrombin III	Neurokinin B
Atrial natriuretic peptide	Neuropeptide Y
Beta2-microglobulin	Neutrophil gelatinase-associated lipocalin
C-reactive protein	P-Selectin
Calcium	Pentraxin 3
Cellular adhesion molecules	**Placenta growth factor**
Circulating trophoblast	Placental protein 13
Corticotropin release hormone	Plasminogen activator inhibitor-2
Cytokines	Platelet activation
Dimethylarginine (ADMA)	Platelet count
Endothelin	**Pregnancy associated plasma protein-A**
Estriol	Prostacyclin
Ferritin	Relaxin
Fetal DNA	Resistin
Fetal RNA	Serum lipids
Free fetal hemoglobin	Soluble endoglin
Fibronectin	Soluble fms-like tyrosine kinase
Genetic markers	Thromboxane
Haptoglobin	Thyroid function
Hematocrit	Total proteins
Homocysteine	Transferrin
Human chorionic gonadotropin	Tumor necrosis factor receptor-1
Human placental growth hormone	Uric acid
Inhibin A	Urinary calcium to creatinine ratio
Insulin-like growth factor	Urinary kallikrein
Insulin-like growth factor binding protein	Vascular endothelial growth factor
Insulin resistance	Visfatin
Isoprostanes	Vitamin D

Screening

- Maternal biophysical markers
- Maternal biochemical markers
- Cell free DNA
- Maternal history

4 potensially useful test to screen preeclampsia :

1. Measurement of blood pressure
2. Measurement the blood flow in the maternal blood vessels that supply the uterus (uterine artery PI)
3. Quantification of PAPP-A
4. Quantification of PIGF

Review Article

Early Prediction of Preeclampsia

Leona C. Poon and Kypros H. Nicolaides

Harris Birthright Research Centre of Fetal Medicine, King's College Hospital, Denmark Hill, London SE5 9RS, UK

Correspondence should be addressed to Leona C. Poon; chiu_yee_leona.poon@kcl.ac.uk

Received 27 March 2014; Accepted 25 June 2014; Published 17 July 2014

Academic Editor: Irene Rebelo

Copyright © 2014 L. C. Poon and K. H. Nicolaides. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

First-trimester uterine artery PI has been shown to be affected by gestational age at screening, maternal weight, racial origin, and history of preexisting diabetes mellitus, and consequently it should be expressed as multiple of median (MoM) after adjustment for these factors. The MoM value of uterine artery PI is significantly increased at 11–13 weeks' gestation in women who subsequently develop PE and there is a significant negative linear correlation between the uterine artery PI MoM with gestational age at delivery [12]. Estimated

pregnancies. Contrary to the findings with biophysical markers, the MoM values of PAPP-A and PlGF are significantly reduced at 11–13 weeks' gestation in women who subsequently develop PE. There is a significant positive linear correlation between the MoM values of these biochemical markers with gestational age at delivery [13]. This observation further confirms that PE is a single pathophysiological entity with a wide spectrum of severity manifested in gestational age at which delivery becomes necessary for maternal and/or fetal indications.

Table 1. Estimated detection rates of all preeclampsia and preeclampsia requiring delivery before 37 and 34 weeks gestation, at false positive rates of 5 and 10%.

Screening test	FPR (%)	Detection rate, % (95% CI)		
		PE <34 weeks	PE <37 weeks	All PE
Maternal characteristics plus	5	42 (33–51)	36 (30–42)	30 (27–33)
	10	58 (49–67)	50 (44–56)	41 (38–44)
Ut-PI	5	57 (47–66)	46 (40–53)	33 (30–36)
	10	70 (61–78)	59 (53–65)	44 (41–47)
MAP	5	49 (40–58)	45 (39–52)	35 (31–37)
	10	65 (56–73)	60 (54–66)	48 (45–51)
PAPP-A	5	48 (38–57)	42 (36–48)	31 (28–34)
	10	60 (51–69)	55 (49–61)	44 (40–47)
PlGF	5	57 (48–66)	50 (44–56)	35 (32–38)
	10	73 (64–81)	66 (60–72)	47 (43–50)
MAP and Ut-PI	5	63 (54–72)	53 (47–59)	38 (35–41)
	10	80 (71–86)	70 (65–76)	52 (49–55)
PAPP-A and PlGF	5	57 (48–66)	49 (43–56)	33 (30–36)
	10	77 (69–84)	67 (61–73)	48 (45–51)
Ut-PI, MAP and PAPP-A	5	67 (58–75)	56 (50–62)	38 (34–40)
	10	80 (71–86)	68 (62–74)	52 (48–55)
Ut-PI, MAP and PlGF	5	80 (72–87)	66 (60–72)	42 (38–45)
	10	89 (81–94)	77 (71–82)	54 (51–57)
Ut-PI, MAP, PAPP-A and PlGF	5	76 (68–83)	63 (57–69)	40 (36–43)
	10	88 (81–93)	75 (69–80)	54 (50–56)

FPR: False positive rate; MAP: Mean arterial pressure; PE: Preeclampsia; Ut-PI: Uterine artery pulsatility index.

Source :Neil O'Gorman, Kypros H Nicolaides& Liona CY Poon. 2016 .The use of ultrasound and other markers for early detection of preeclampsia. ***Womens Health***

Maternal History

Box 1. Recognized maternal risk factors for preeclampsia.

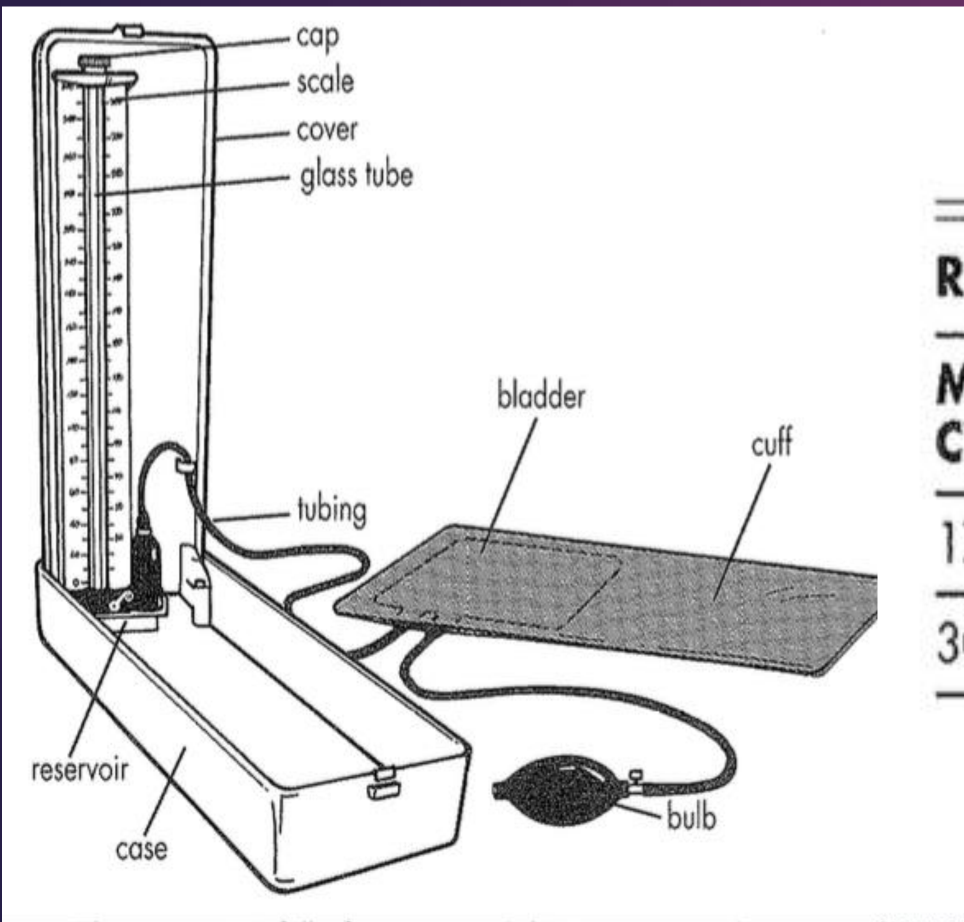
- Previous preeclampsia (PE)
- Previous early onset PE and preterm delivery at <34 weeks gestation
- PE in more than one prior pregnancy
- Chronic kidney disease
- Autoimmune disease such as systemic lupus erythematosis or antiphospholipid syndrome
- Heritable thrombophilias
- Type 1 or Type 2 diabetes
- Chronic hypertension
- First pregnancy
- Pregnancy interval of more than 10 years
- New partner
- Reproductive technologies
- Family history of PE (mother or sister)
- Excessive weight gain in pregnancy
- Infection during pregnancy
- Gestational trophoblastic disease
- Multiple pregnancy
- Age 40 years or older
- Ethnicity – Nordic, black, South Asian or Pacific Island
- Body mass index of 35 kg/m^2 or more at first visit
- Booking systolic blood pressure >130 mmHg or diastolic blood pressure >80 mmHg
- Increased pre-pregnancy triglycerides
- Family history of early onset cardiovascular disease
- Lower socioeconomic status
- Cocaine and methamphetamine use
- Nonsmoking

Data taken with permission from [11–14].

Blood Pressure

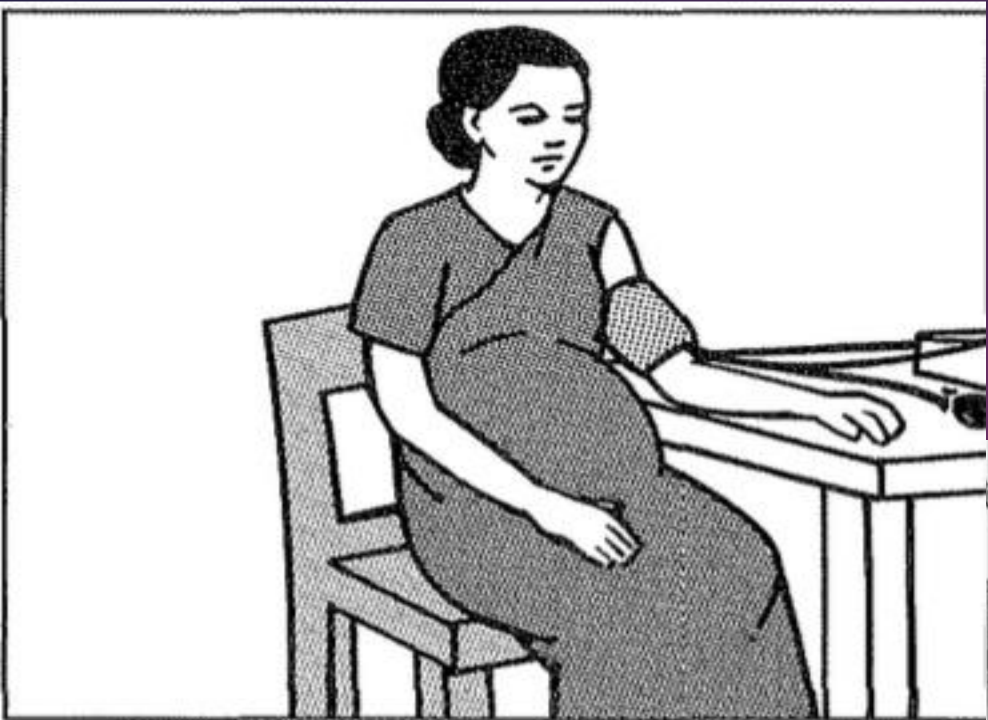
- Women that destined to develop PE will have elevated BP in the first and second trimesters of pregnancy.
- MAP is significantly better than systolic BP or diastolic BP in predicting PE

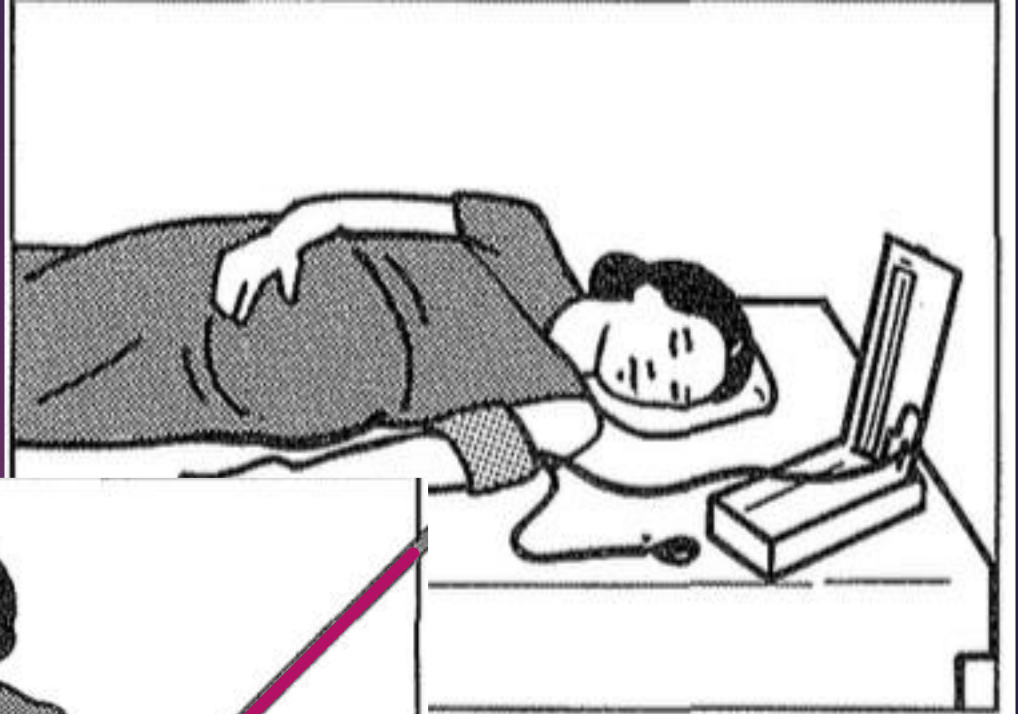
You must have the correct equipment to do your job properly

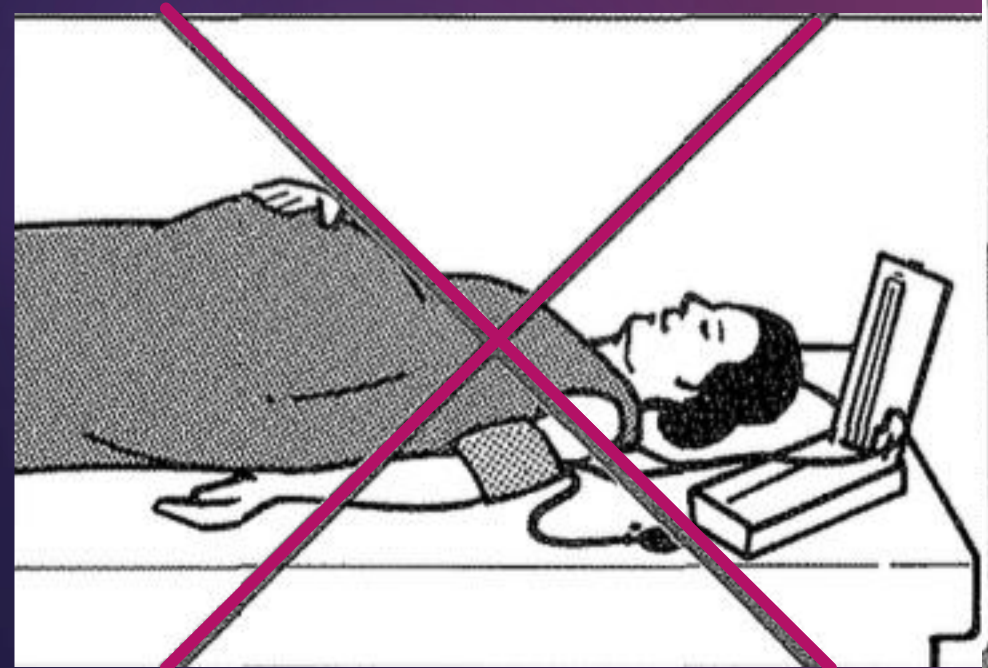


RECOMMENDED SIZE OF BLADDER

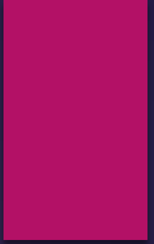
Mid-arm Circumference (cm)	Bladder width (cm)	Bladder length (cm)
17-29	11	23
30-42	12.5	35

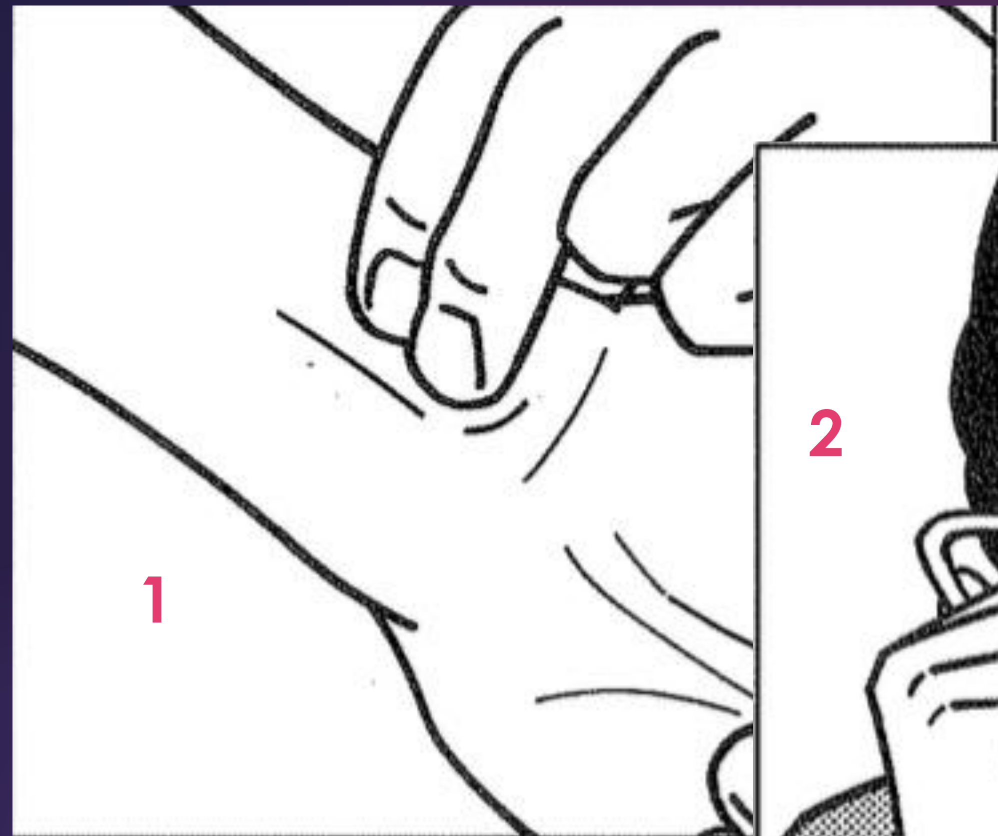


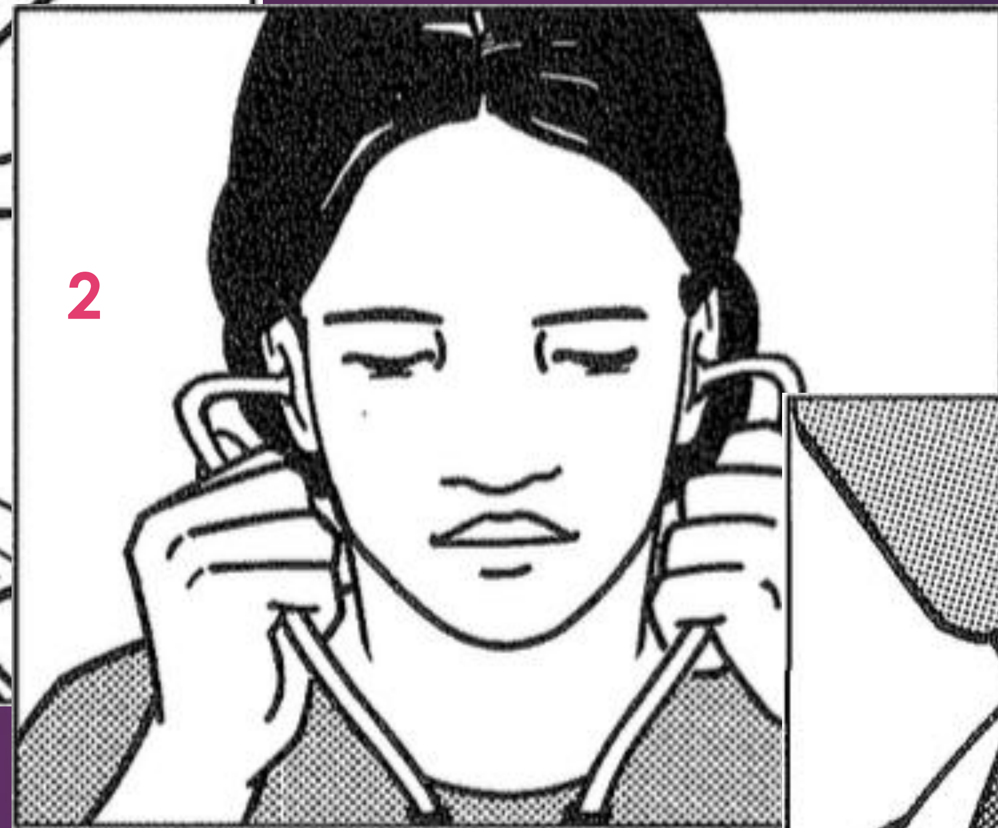


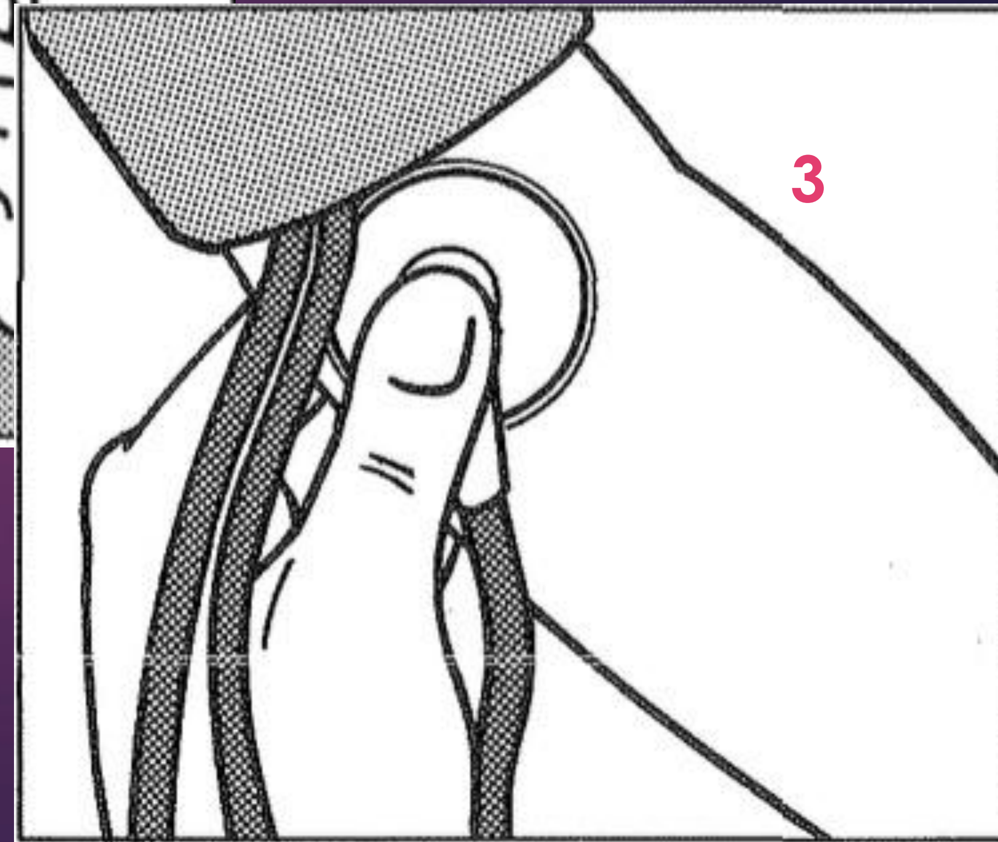


Posisi ibu

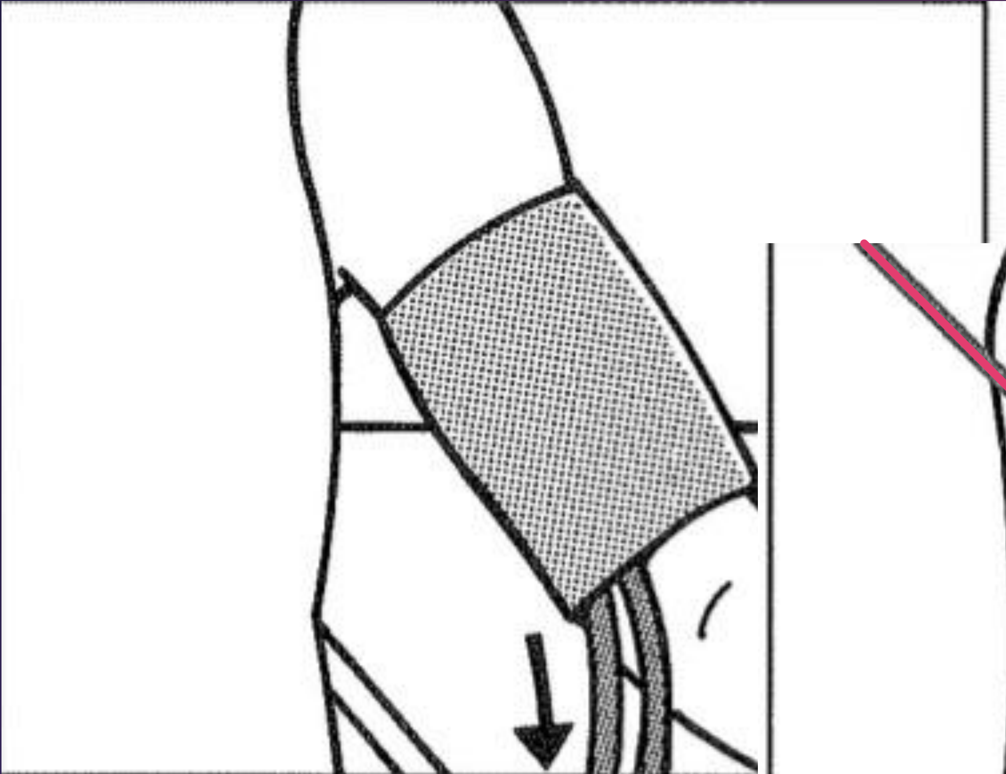


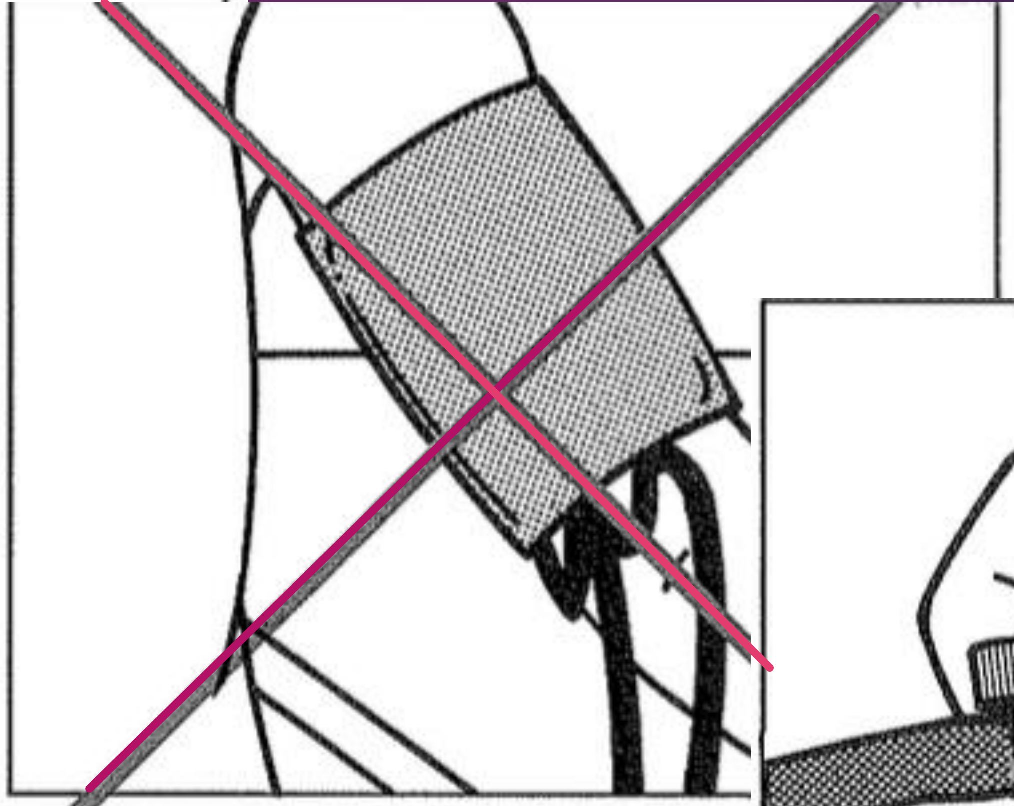

1

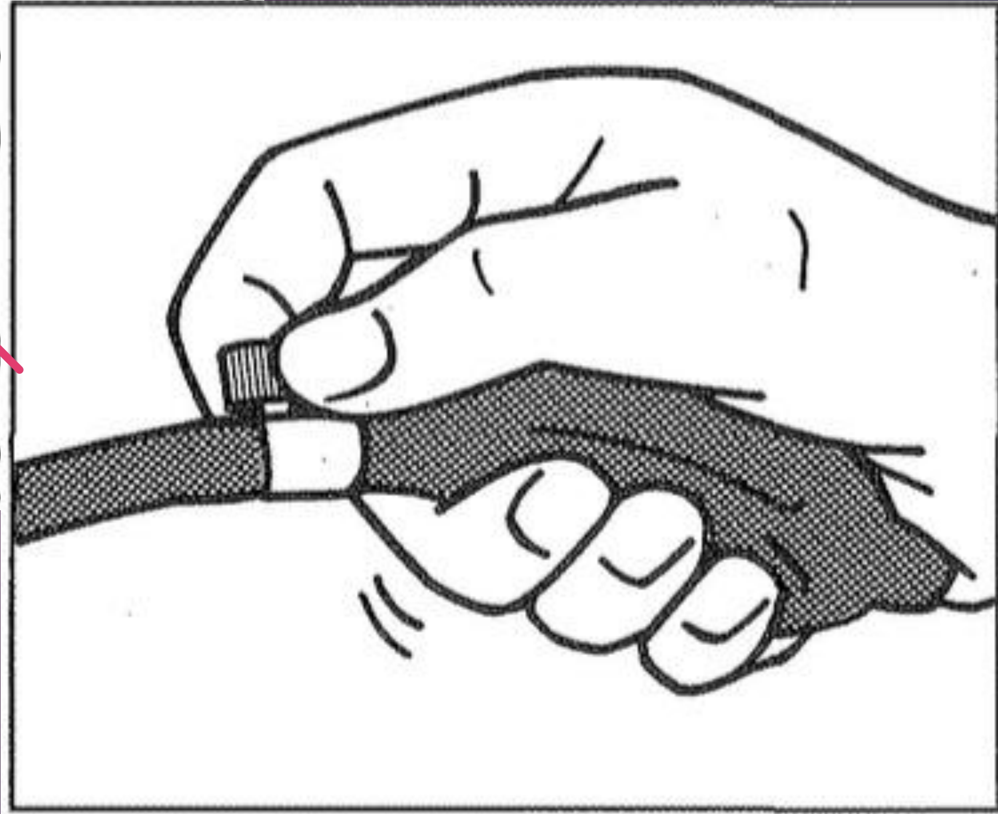

2


3

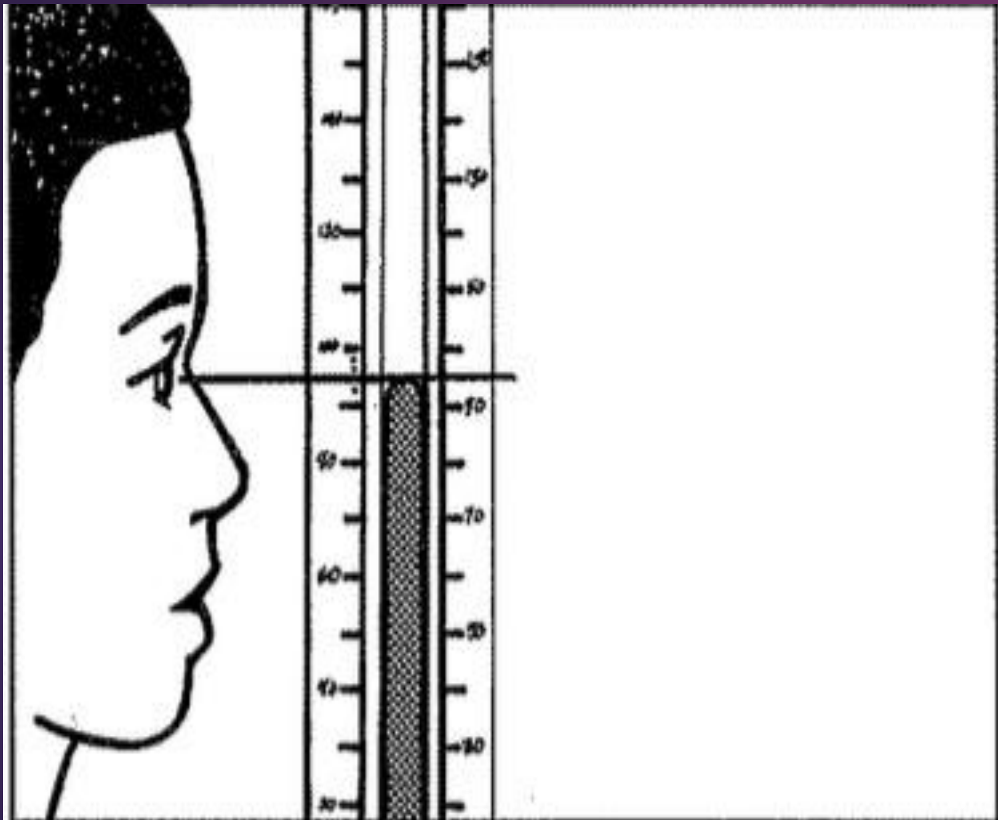
Posisi lengan dan cuff

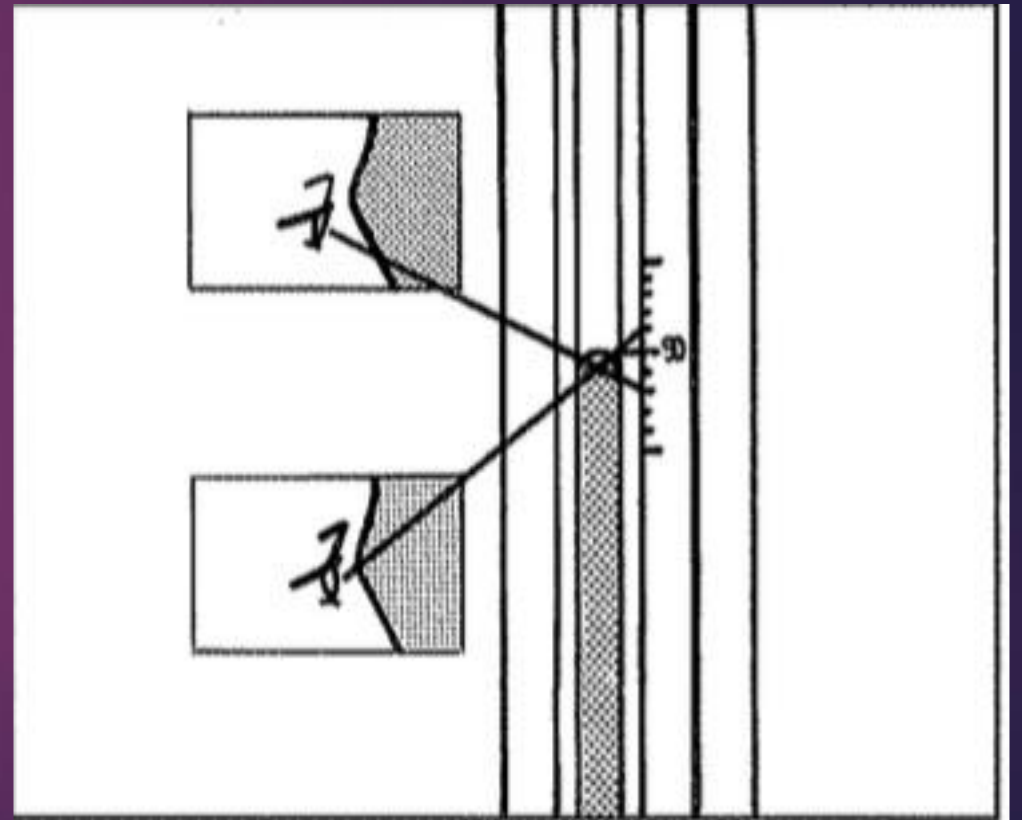






Posisi mata





Maternal Biophysical Marker

Uterine artery Doppler

- Mechanism for development of PE → impaired trophoblastic invasion
- Non invasive method
- Poor placental perfusion → ↑ uterine artery PI, associated with development PE.
- Uterine artery PI is influenced by gestasional age at screening, maternal age, weight, racial origin and history of PE
- Higher at 11-13 weeks gestasion in those who subsequently
- develop PE and there is a significant negative linear correlation between the uterine artery PI and gestational age at delivery

MEDISON

17-11-2015-0007

Dr.dr.Efendi Lukas SpOG(K)

C2-6IC / 1st Trimester / FR 10Hz

MI 0.48

TIs 1.8

17-11-2015

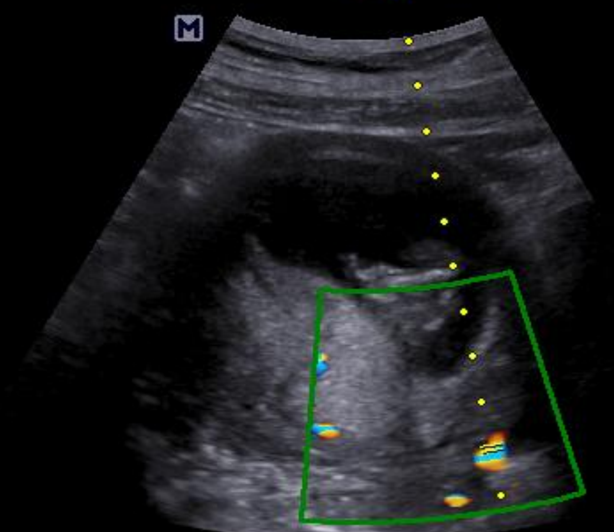
20:30:18

2D G50/DR100dB/FA2/P90/Frq Res./11.0cm

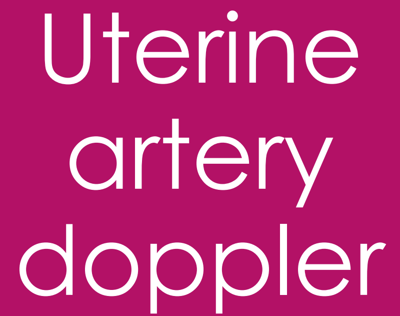
C G50/2.00kHz/F1/FA7

PW G50/5.00kHz/F1/ 1.0mm:0°@9.2cm

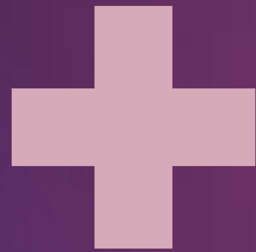
LMP	01/09/2015
GA	11w0d
[Rt. Uterine A]	
PSV	56.64 cm/s
EDV	14.65 cm/s
S/D	3.87
RI	0.74
PI	1.52



-50
-25
cm/s
–25
–50



Uterine artery doppler



Blood pressure

Estimated detection rates of all PE and PE requiring delivery before 37 and 34 w are 38, 58, 63%

Maternal Biochemical Markers

PAPP-A

IGF binding protein secreted by syncytiotrophoblast that plays an important role in placental growth and development.

PE associated with a low level of circulating PAPP-A → reduced availability of unbound IGFs to ful fil their functional role.

In normal pregnancies → PAPP-A value is only present 8-23 % in PE women

Alone, not accurate as predictive test

PIGF

Secreted by trophoblastic cells and is part of the angiogenic VEGF family.

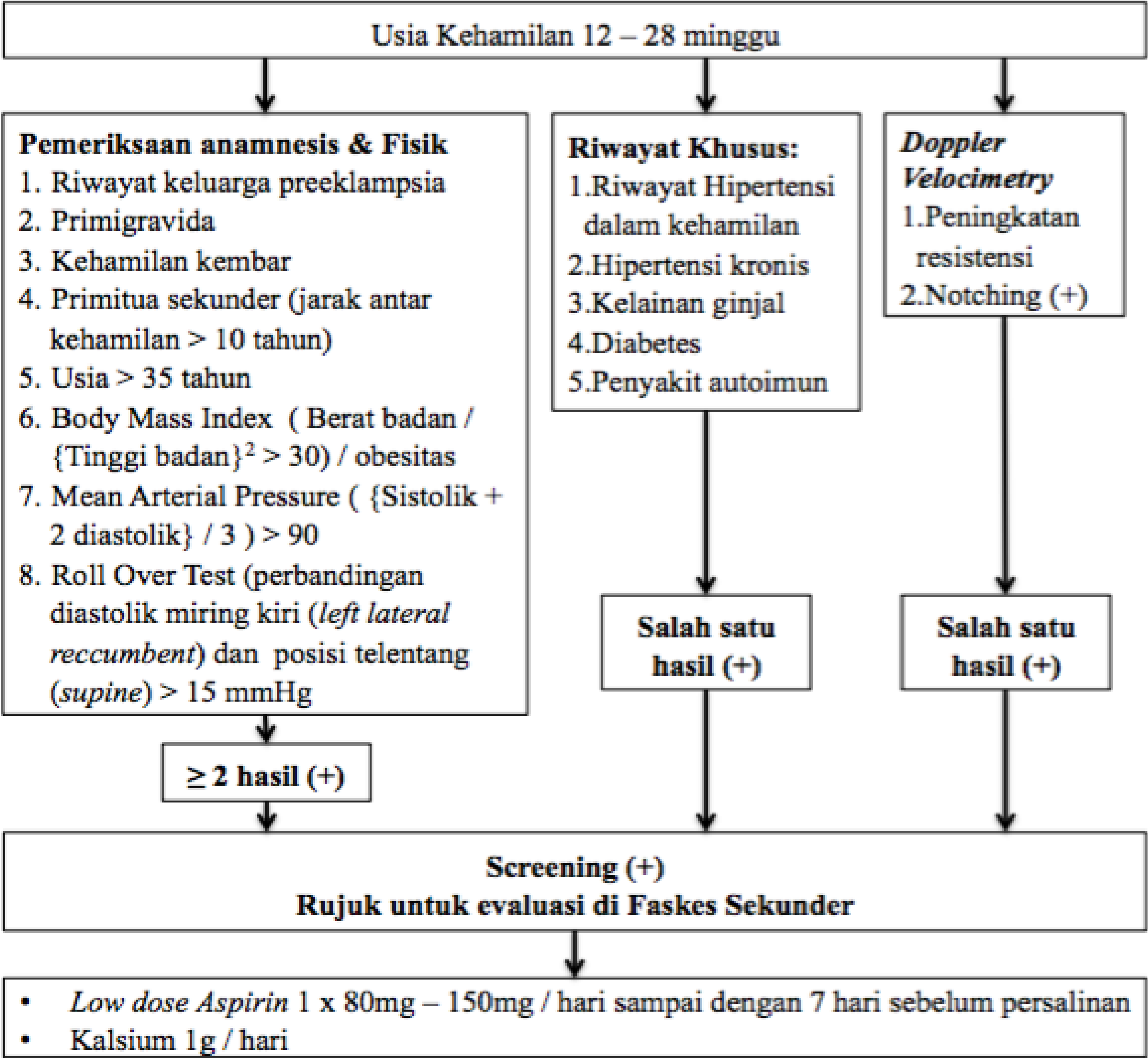
First- second trimesters of pregnancy a reduced concentration of serum PIGF → precede the clinical onset of PE

Cell free DNA

- Women with establish PE, the plasma or serum concentrations of both total and free-cell DNA are higher than in normotensive and the increase is particularly marked in those severe PE.
- attributed to accelerated apoptosis of trophoblastic cells resulting from placental ischemia and reduced clearance of the cfDNA from the maternal circulation in women with PE
- At 11–13 weeks gestation, in pregnancies that subsequently develop early PE, the median maternal plasma concentration of total cfDNA is increased and fetal fraction is reduced.

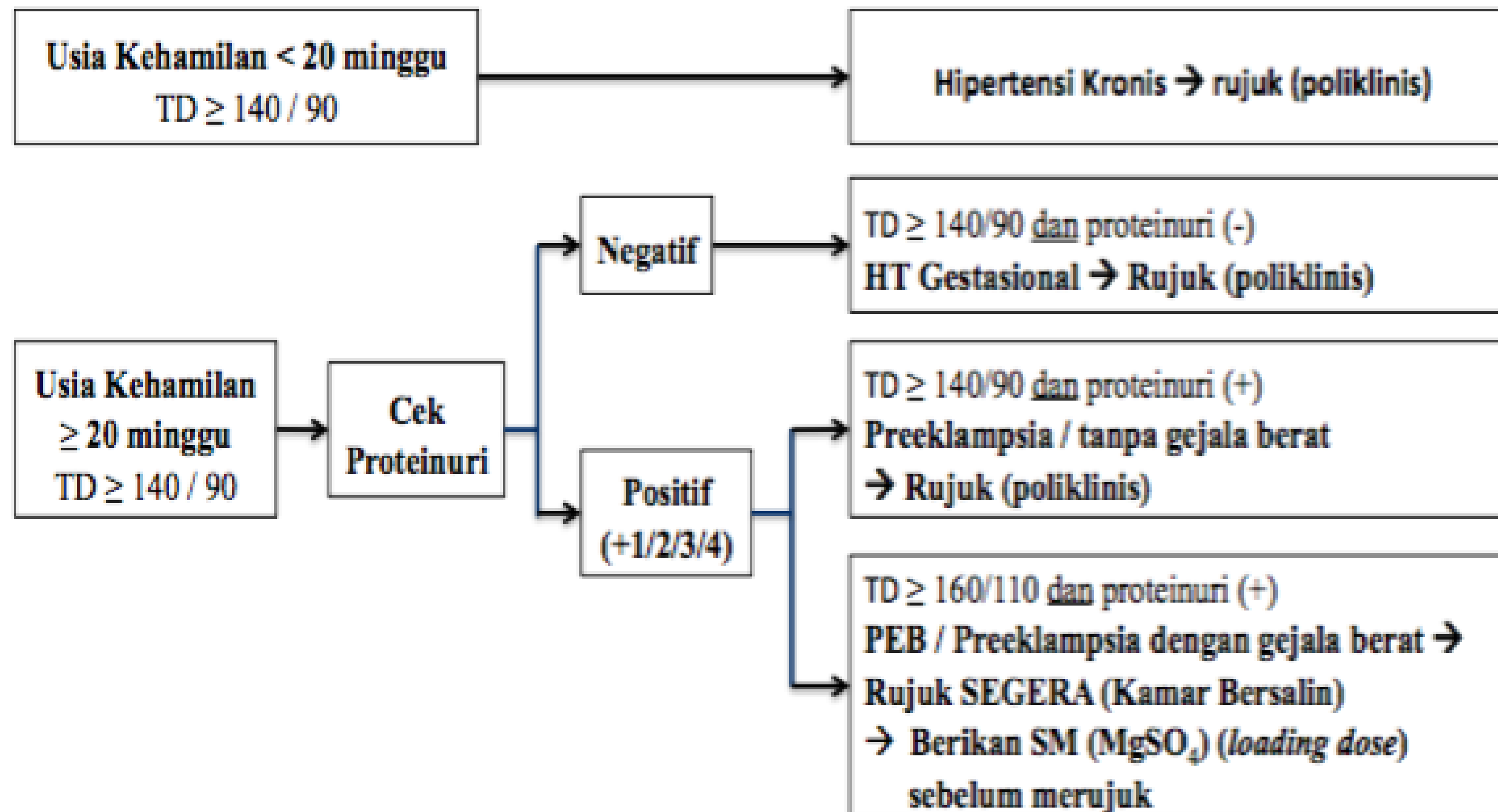
What should w [illegible] n Indonesia ??

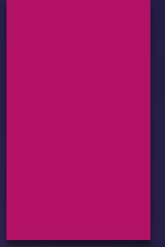
BPJS



Usia Kehamilan 12 – 28 minggu
Pemeriksaan anamnesis & Fisik
1. Riwayat keluarga preeklampsia
2. Primigravida
3. Kehamilan kembar
4. Primitua sekunder (jarak antar kehamilan > 10 tahun)
5. Usia > 35 tahun
6. Body Mass Index (Berat badan / {Tinggi badan}2 > 30) / obesitas
7. Mean Arterial Pressure ({Sistolik + 2 diastolik} / 3) > 90
8. Roll Over Test (perbandingan diastolik miring kiri (left lateral reccumbent) dan posisi telentang (supine) > 15 mmHg
≥ 2 hasil (+)
Riwayat Khusus:
1.Riwayat Hipertensi dalam kehamilan
2.Hipertensi kronis
3.Kelainan ginjal
4.Diabetes
5.Penyakit autoimun
Salah satu hasil (+)
Doppler Velocimetry
1.Peningkatan resistensi
2.Notching (+)
Salah satu hasil (+)
Screening (+)
Rujuk untuk evaluasi di Faskes Sekunder
• Low dose Aspirin 1 x 80mg – 150mg / hari sampai dengan 7 hari sebelum persalinan
• Kalsium 1g / hari

ALUR PENANGANAN HIPERTENSI DALAM KEHAMILAN DI FASKES PRIMER





Thank U