產婦重大生產事故與死亡之原因分析與處置建議

2023/8/12

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大綱

- 引言
- 2022年生產事故救濟報告
- 林口長庚醫院近五年之產婦重大生產事故案例彙總
- 案例分享

112年度TAOG年會專用

Trends in maternal mortality 2000 to 2020

Estimates by WHO, UNICEF, UNFPA, World Bank Group and UNDESA/Population Division

World Health Organization

unicef for every child

UNFPA

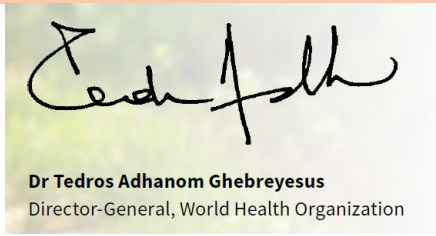
WORLD BANK GROUP

United Nations

Trends in maternal mortality 2000 to 2020

- https://www.who.int/publications/i/item/9789240068759
- 發布於2023/2/23
- 由聯合國國際組織共同出版
  - WHO(世界衛生組織)
  - UNICEF(聯合國兒童基金會)
  - UNFPA(聯合國人口基金會)
  - World Bank Group(世界銀行集團)
  - UNDESA(聯合國經濟與社會事務部)
- 共納入185個國家或地區

Trends in maternal mortality 2000 to 2020



- *Childbirth should be a time of life, not death.*

  生產應該是迎接生命的時刻，而不是迎接死亡

- *And yet, by the time you have finished reading this foreword, at least one woman will have died due to complications of pregnancy and childbirth.*

  然而，在你讀完這篇序言的同時，這世界上又有至少一位婦女死於懷孕或生產的併發症

- *Every death is in low- and middle-income countries, and nearly every death is preventable.*

  幾乎所有生產相關的死亡都是發生在低或中收入國家，而那些幾乎都是可以避免的

The Sustainable Development Goals (SDGs)

- 聯合國永續發展目標
- SDG 3: Ensure healthy lives and promote well-being for all at all ages **確保健康的生活方式，促進各年齡人群的福祉**
  - Reduce the global MMR to less than 70 maternal deaths per 100,000 live births by 2030
    - **2030年以前將MMR降至70/十萬**
  - By 2030, no country should have an MMR greater than 140
    - **2030年前，沒有任何國家MMR超過140/十萬**

MMR: maternal mortality ratio (一年內每十萬名活產中，在懷孕期間或懷孕中止42天內之婦女死亡數)

Fig. 4.1 Maternal mortality ratio (MMR) estimates, by country, 2020

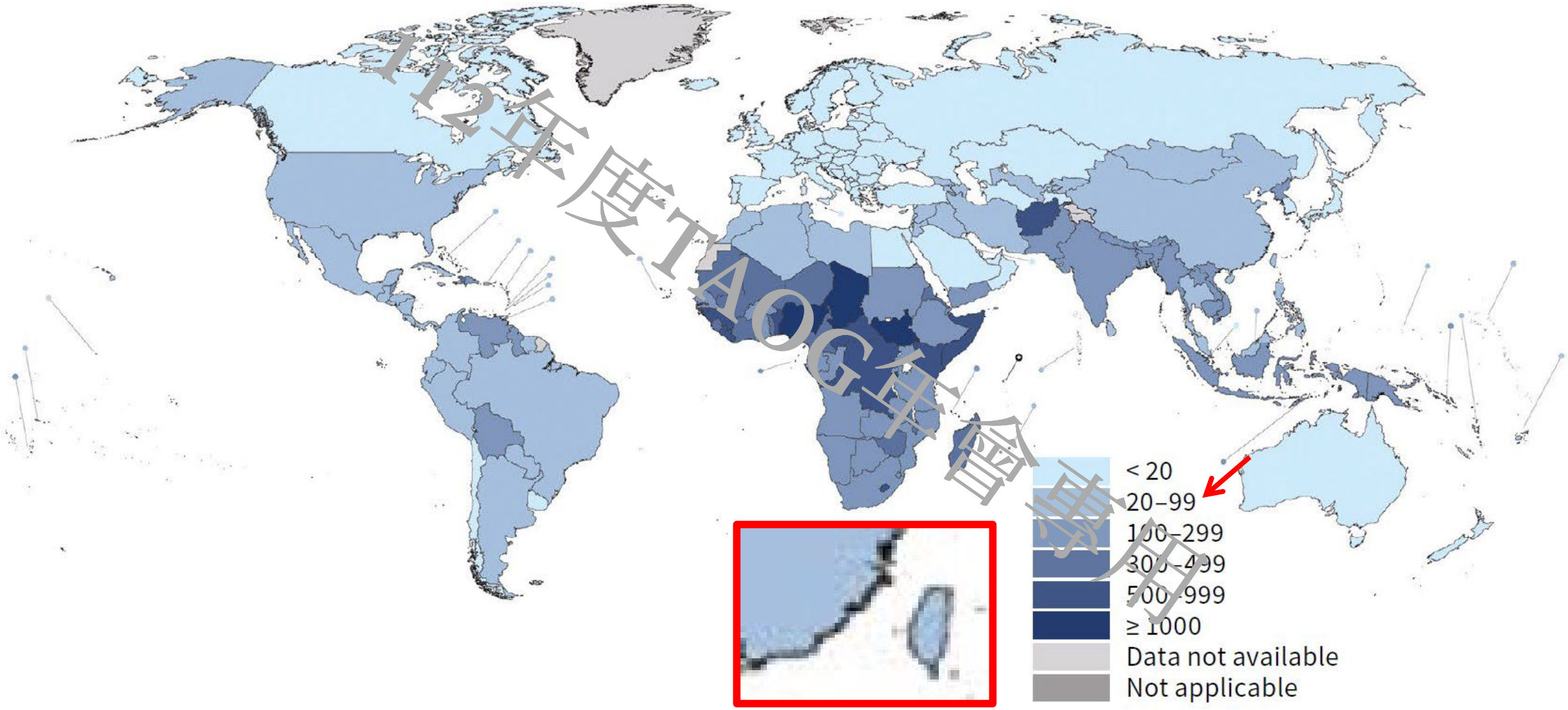
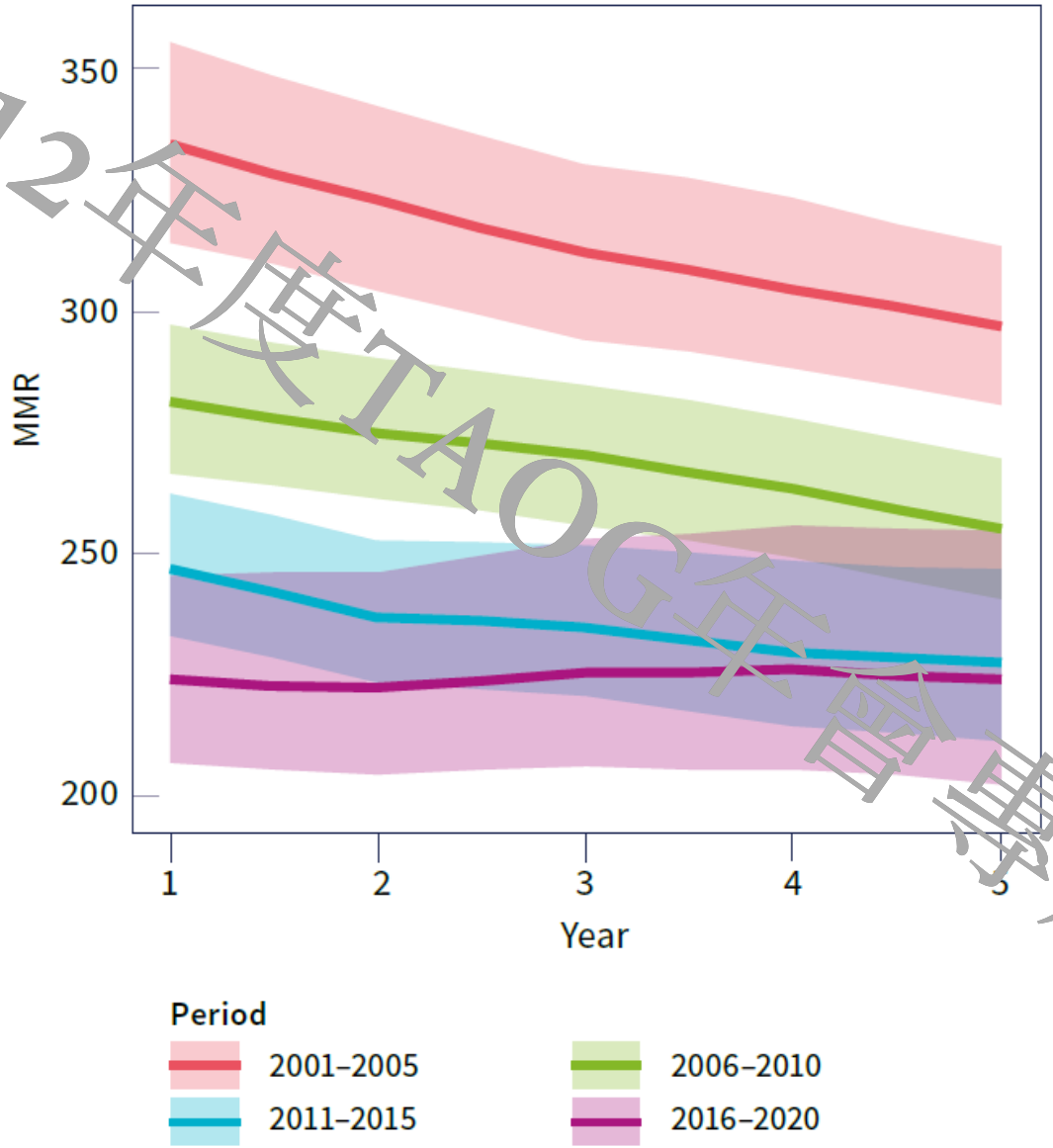


Fig. 4.2 Global MMR stratified by five-year time period, 2000–2020



Annex 8.

Trends in estimates of maternal mortality ratio (MMR), by UNICEF region, 2000–2020

UNICEF region and subregion	MMR[a] point estimate					Average ARR in MMR between 2000 and 2020 (%)	Average ARR in MMR between 2000 and 2015 (%)	Average ARR in MMR between 2016 and 2020 (%)	Overall change in MMR between 2000 and 2020 (%)
	2000	2005	2010	2015	2020				
East Asia and Pacific	121	106	84	73	74	2.5	3.4	-1.5	39.0
Europe and Central Asia	27	20	16	13	13	3.5	5.0	-2.5	49.9
Eastern Europe and Central Asia	43	32	22	17	19	4.1	6.0	-3.5	56.0
Western Europe	9	8	7	6	6	1.8	2.5	-0.2	29.8
Latin America and Caribbean	90	85	79	75	88	0.2	1.2	-3.4	3.0
Middle East and North Africa	106	85	68	58	56	3.2	4.0	0.3	47.3
North America	12	13	14	17	20	-2.8	-2.5	-2.9	-73.3
South Asia	417	323	224	172	138	5.5	5.9	4.4	66.9
Sub-Saharan Africa	802	711	657	587	536	2.1	2.1	2.0	33.7
Eastern and Southern Africa	712	601	500	392	324	4.0	4.0	3.5	54.7
West and Central Africa	890	817	807	766	724	1.1	1.1	1.4	20.0
World	**339**	**296**	**254**	**227**	**223**	**2.1**	**2.7**	**0.0**	**34.3**

ARR: annual rate of reduction.
Negative numbers in the last four columns indicate increase in MMR, rather than reduction.
Countries in each UNICEF region are listed at: https://data.unicef.org/regionalclassifications/.
[a] MMR (maternal deaths per 100 000 live births) estimates have been rounded to the nearest 1.

Annex 16.

Trends in estimates of maternal mortality ratio (MMR), by country and territory, 2000–2020

Country and territory	MMR[a] point estimate					Overall change in MMR between 2000 and 2020 (%)[b]	Average annual rate of reduction[c] (ARR) point estimate and range of uncertainty interval on ARR between 2000 and 2020 (UI: 80%) (%)		
	2000	2005	2010	2015	2020		Lower UI	Point estimate	Upper UI
Australia	7	5	5	5	3	55.9	3.0	4.1	5.2
Austria	6	6	6	6	5	16.5	-1.6	0.9	3.1
Belgium	8	7	6	5	5	41.2	1.6	2.7	4.4
Canada	9	11	12	12	11	-17.6	-2.5	-0.8	0.6
China	58	46	33	26	23	60.1	3.8	4.6	5.8
Denmark	8	7	7	6	5	42.6	1.1	2.8	4.0
Egypt	79	58	38	27	17	79.0	6.0	7.8	9.6
Finland	7	8	7	7	8	-12.4	-3.2	-0.6	1.8
France	9	9	9	8	8	16.0	-0.5	0.9	2.0
Greece	4	3	3	5	8	-101.1	-6.2	-3.5	-0.9
Iceland	5	4	3	3	3	47.8	1.3	3.3	7.1
Ireland	10	9	7	6	5	53.8	2.1	3.9	5.0
Israel	9	4	3	3	3	66.7	3.4	5.5	7.6
Italy	10	8	7	7	5	54.3	2.7	3.9	5.4
Japan	9	7	6	5	4	49.0	2.1	3.4	4.8
Netherlands	13	10	6	5	4	66.8	3.9	5.5	7.3
New Zealand	11	10	10	9	7	35.8	1.1	2.2	4.1
Norway	6	6	4	2	2	70.8	3.5	6.1	8.9
Republic of Korea	16	12	8	6	8	47.7	2.7	3.2	4.2
Singapore	15	13	8	8	7	48.5	1.8	3.3	5.6
United States of America	12	13	14	17	21	-77.9	-4.2	-2.9	-1.6

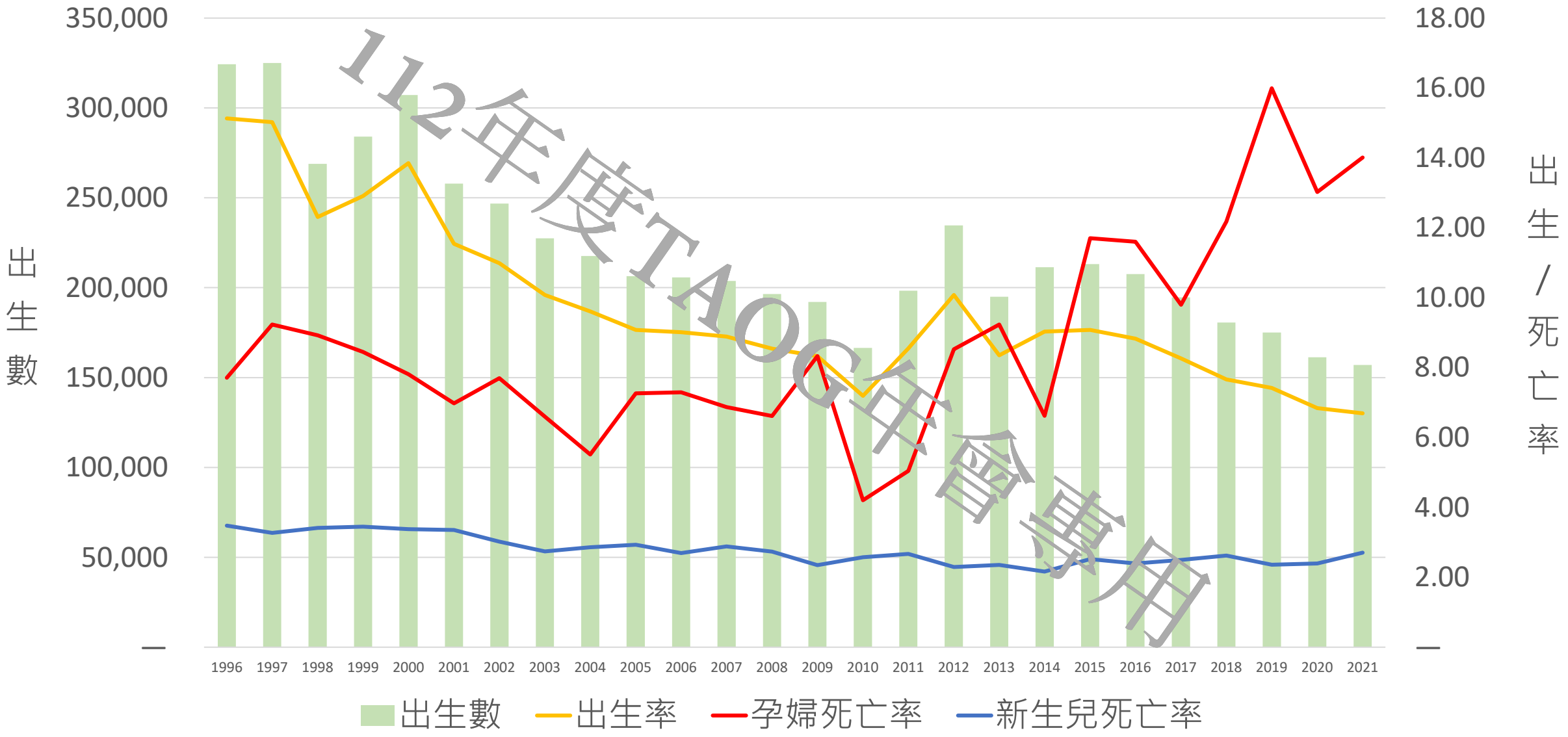
資料來源：內政部戶政司

表32　歷年新生兒、嬰兒及孕產婦死亡概況

年別	新生兒				嬰兒				孕產婦	
	計(人)	男(人)	女(人)	死亡率(每千活產)	計(人)	男(人)	女(人)	死亡率(每千活產)	死亡數(人)	死亡率(每十萬活產)
民國85年	1,129	621	508	3.5	2,169	1,183	986	6.7	25	7.7
民國86年	1,064	578	486	3.3	2,071	1,123	948	6.4	30	9.2
民國87年	918	546	372	3.4	1,784	1,015	769	6.6	24	8.9
民國88年	980	554	426	3.4	1,721	977	744	6.1	24	8.4
民國89年	1,038	575	463	3.4	1,789	992	797	5.8	24	7.8
民國90年	865	485	380	3.4	1,559	863	696	6.0	18	7.0
民國91年	745	415	330	3.0	1,325	721	604	5.4	19	7.7
民國92年	624	324	300	2.7	1,105	574	531	4.9	15	6.6
民國93年	623	358	265	2.9	1,146	645	501	5.3	12	5.5
民國94年	605	343	262	2.8	1,026	563	463	5.0	15	7.3
民國95年	554	307	247	2.7	943	524	419	4.6	15	7.3
民國96年	588	342	246	2.9	959	547	412	4.7	14	6.9
民國97年	538	291	247	2.7	897	496	401	4.6	13	6.6
民國98年	452	233	219	2.4	778	417	361	4.0	16	8.3
民國99年	429	246	183	2.6	705	403	302	4.2	7	4.2
民國100年	530	293	237	2.7	832	452	380	4.2	10	5.0
民國101年	538	312	226	2.3	860	485	375	3.7	20	8.5
民國102年	459	252	207	2.4	767	426	341	3.9	18	9.2
民國103年	458	258	200	2.2	761	446	315	3.6	14	6.6
民國104年	539	291	248	2.5	881	490	391	4.1	25	11.7
民國105年	505	289	216	2.4	811	439	372	3.9	24	11.6
民國106年	486	267	219	2.5	772	412	360	4.0	19	9.8
民國107年	474	257	217	2.6	752	416	336	4.2	22	12.2
民國108年	413	237	176	2.4	671	379	292	3.8	28	16.0
民國109年	387	210	177	2.4	586	333	253	3.6	21	13.0
民國110年	425	237	188	2.7	647	359	288	4.1	22	14.0

附　註：本表資料自民國97年起死因分類為ICD-10。

臺灣近25年新生兒出生及孕產婦死亡概況



資料來源：內政部戶政司、行政院性別平等會

2022年生產事故救濟報告

110年度生產事故救濟案件

- 共318件
  - 284件核定救濟，通過率89.3%
- 分布
  - 新生兒死亡及重大傷害、胎兒死亡：201件
  - 孕產婦死亡：26件
  - 孕產婦重大傷害：57件
    - 子宮切除：53件
    - 中度以上身心障礙 (缺血缺氧性腦病變)：4件

表2-2　105～110 年度年度孕產婦死亡審定救濟案件原因分析

事故原因	案件次（註1）	百分比（註2）
子宮收縮不良 / 產後大出血 / 瀰漫性血管內凝血症（DIC）	39	31.0%
羊水栓塞	33	26.2%
血管栓塞 / 肺栓塞	25	19.8%
妊娠高血壓	24	19.0%
不明原因心跳停止 / 突發性休克	15	11.9%
心血管疾病 / 心臟病變	13	10.3%
顱內出血	12	9.5%
感染（如產後傷口感染、子宮感染）	7	5.6%
HELLP 症候群（註3）	7	5.6%
胎盤早期剝離	5	4.0%
敗血性休克	3	2.4%
植入性胎盤	3	2.4%
子宮破裂	3	2.4%
前置胎盤	2	1.6%
疾病相關	2（註4）	1.6%

註1：生產事故案件大多為多重原因導致之結果，「案件次」之統計為複選。
註2：以105～110 年度孕產婦死亡審定救濟案件數為母數計算。（N = 128）
註3：HELLP 症候群是溶血、肝臟酵素升高、血小板低下之綜合症候群，為子癲前症的嚴重併發症。
註4：此2 案分別為血癌及再生不良性貧血。

↓均為缺血缺氧性腦病變

表2-3　110 年度孕產婦重大傷害審定救濟案件原因分析

事故原因	案件次 (註1)	百分比 (註2)
妊娠高血壓	2	50.0%
子宮收縮不良 / 產後大出血 / 瀰漫性血管內凝血症（DIC）	1	25.0%
血管栓塞 / 肺栓塞	1	25.0%
腦梗塞	1	25.0%

註1：生產事故案件大多為多重原因導致之結果，「案件次」之統計為複選。

註2：以110 年度孕產婦重大傷害審定救濟案件數為母數計算。（N=4）

表2-4　110 年度孕產婦子宮切除審定救濟案件原因分析

事故原因	案件次（註1）	百分比（註2）
子宮收縮不良 / 產後大出血 / 瀰漫性血管內凝血症（DIC）	28	52.8%
植入性胎盤	26	49.1%
前置胎盤	11	20.8%
羊水栓塞	2	3.8%
妊娠高血壓	2	3.8%
子宮破裂	1	1.9%

註1：生產事故案件大多為多重原因導致之結果，「案件次」之統計為複選。

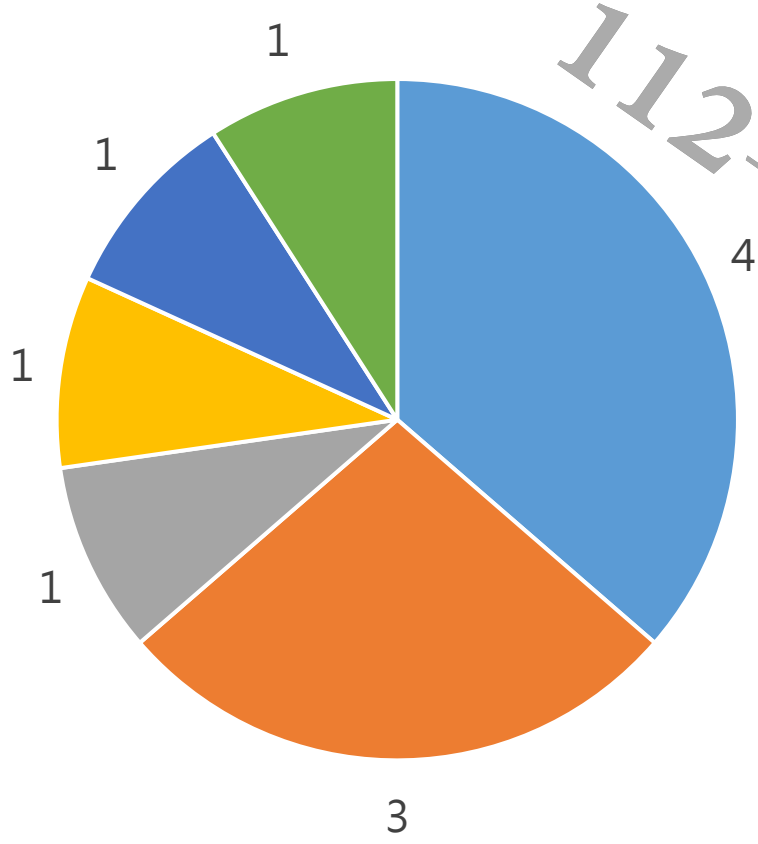
註2：以110 年度孕產婦子宮切除審定救濟案件數為母數計算。（N=53）

林口長庚醫院近五年之產婦重大生產事故案例彙總

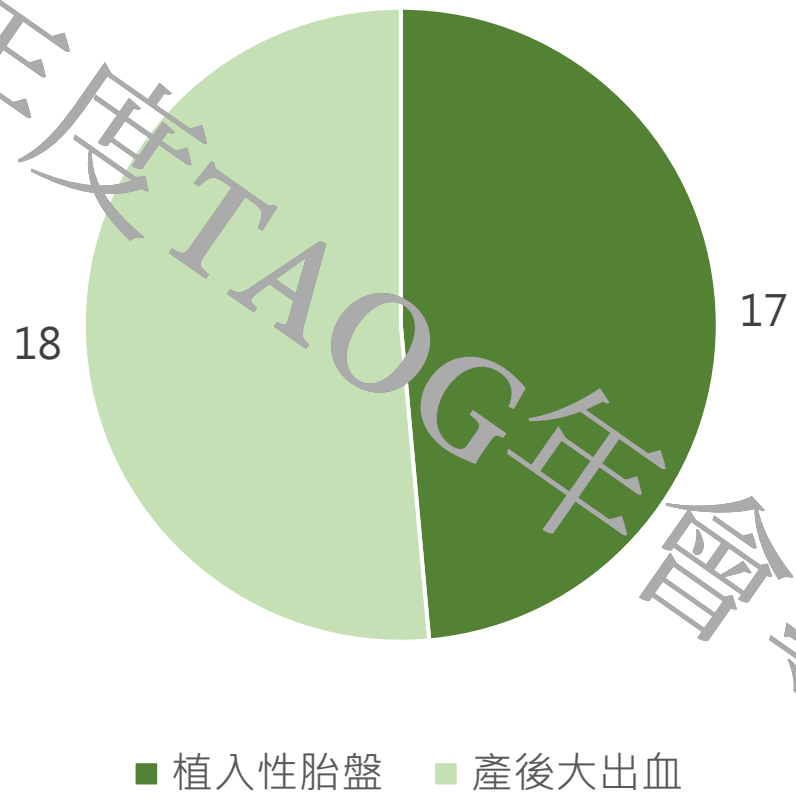
林口長庚近五年之孕產婦重大生產事故

年次	孕產婦死亡	孕產婦切除子宮	孕產婦腦傷	胎兒死亡
2018	2	8	1	17
2019	2	11	0	6
2020	0	6	1	4
2021	3	4	0	5
2022	4	6	2	4
合計	**11**	**35**	**4**	**36**

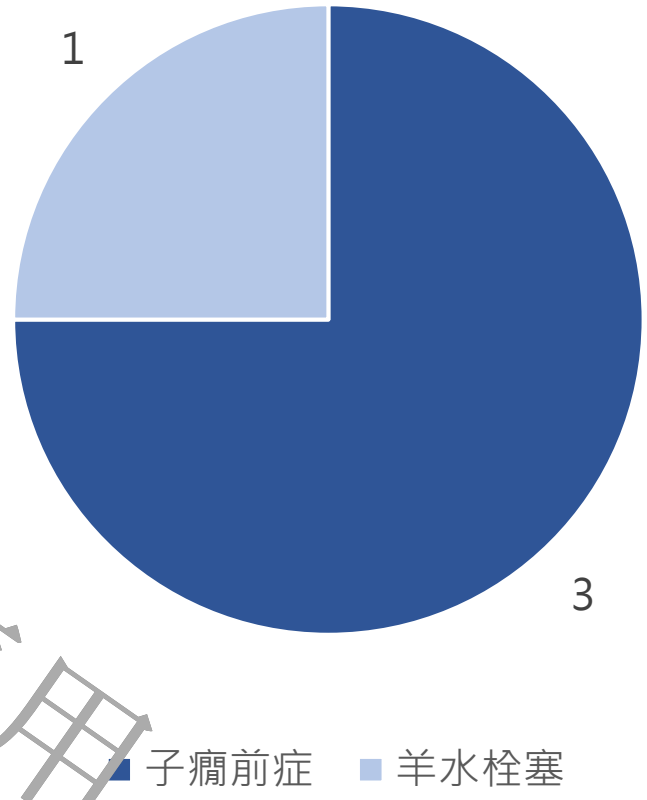
孕產婦死亡



子宮切除



孕產婦腦傷



羊水栓塞

- 病患於2021年5月25日01時於外院診所自然產，當時因胎心音不穩定故以真空吸引協助生產，**產後出血約500cc**，**隨即發生IHCA(院內心跳停止)**，經CPCR後ROSC(恢復自發心律)，後隨即安排救護車送至本院急診。病患於5月25日凌晨03時20分抵達本院急診，到院時無心跳故再次CPCR後ROSC。經輸血急救後血壓稍穩，即於06時00分安排血管栓塞止血。然而08時30分**再次發生大出血及心跳停止**，經CPCR後送緊急手術開腹切除子宮。術後病患送至加護病房，但仍有嚴重休克併發腎衰竭，於2021年5月27日21時10分再次發生心跳停止，經急救30分鐘後無效，於2021年5月27日21時40分**宣告死亡**。

肺栓塞

- 產婦於2017年02月23日於外院**因前胎剖腹行剖腹生產**，**產後隔日突發性喘併意識喪失，無脈搏**，施行心肺復甦術並轉院至本院，於本院急診經急救三十分鐘後，**放置葉克膜**，**電腦斷層報告顯示疑肺栓塞**，於內科加護病房照護過程中，仍因瀰漫性血管內凝血異常、低血壓，於02月25日施行心肺復甦術，**同日死亡**。

嚴重子癇前症

- 產婦35歲G1P0，本胎於本院產檢，**30週**起出現高血壓、蛋白尿、胎兒生長遲滯(小兩週)，給予血壓藥物、阿斯匹靈，並安排入院抽血及監測，完成類固醇肺泡成熟針後情況穩定出院。**33週**因自覺胎動減少、雙腳水腫至本院產房，檢查發現胎兒心跳變異性差、血壓偏高(150/104mmHg)、臍帶血流不佳(AEDV)，給予保護寶寶腦部的MgSO4後安排緊急剖腹產，於2022/05/05 21:53產出一男嬰1290gm，Apgar score 5轉7，送新生兒加護病房。產婦產後繼續使用血壓藥控制、MgSO4預防癲癇，**術後血壓陸續上升(最高至251/154mmHg)**，注射降血壓藥物效果不佳，於10:17**意識改變**E1V1M2，**電腦斷層確認腦出血**，緊急連絡神經外科安排開顱手術，術後加護病房照護，5/7意識恢復至E3VeM6，6/1出院，出院時仍有肌無力、複視、垂眼等症狀，需攙扶輪椅走路

突發性心跳停止

- 產婦36歲G4P3，於外院診所產檢，2022/11/14因懷孕39週**前胎剖腹併進入產程**，於外院診所接受剖腹生產，16:06產出一女寶寶 2400gm，**術中出血含羊水700ml**，**術後於病房19:00發現病人叫不醒、血壓量不到**，立即開始CPCR並轉送至林口長庚醫院，續急救仍未恢復心跳，超音波顯示無心跳、無心包膜積液、少量腹水，於20:12宣告死亡。

突發性心跳停止

- 產婦於外院規則產檢，產檢過程中無特殊異常，05/31因**前胎剖腹接受剖腹生產**，在**06/02時因自覺呼吸喘及胸悶**，轉診至本院急診，在救護車上心跳停止，進行心肺復甦，抵達急診之後，持續心肺復甦以及急救，然而急救無效，於下午四點三十三分**死亡**。

當病人突然collapse時...

- 叫叫CABUD - fetal monitoring
  - **叫**喚病人
  - **叫**團隊 (產房、麻醉科、急診、開刀房、心臟內科、心臟外科 or 轉診)
  - **C**irculation：壓胸
  - **A**irway：插管
  - **B**reathing：壓ambu
  - **U**terine displacement：子宮左推
  - **D**efibrillation：電擊去顫
- 建立管路：中央靜脈導管(CVC or large bore)、輸血line、尿管
- Consider perimortem cesarean section (4-5 minute rule)

該怎麼想？

- 先問underlying disease
  - Ex: 甲狀腺風暴、DKA、子宮手術史
  - Gestational hypertension → preeclampsia → severe features or eclampsia
  - 所有的孕婦都是thromboembolism高危險群 (尤其是臥床安胎、CS術後、子癲前症)
  - 用藥史 (Ritodrine, MgSO4, nerve block...)
  - 麻醉史 (high neuroaxial block, failed intubation...)
- 腦心肺血

腦	心	肺	血
• Stroke • ICH	• Heart failure • PPCM • Arrhythmia • Myocardial infarction	• Pulmonary embolism • Pulmonary edema	• Hypovolemia shock • PPH • Uterine rupture • Hemoperitoneum • Retroperitoneal hematoma
NE Brain CT	2D cardiac echo TEE EKG	CTA CXR	4T for PPH POCUS

腦	心	肺	血
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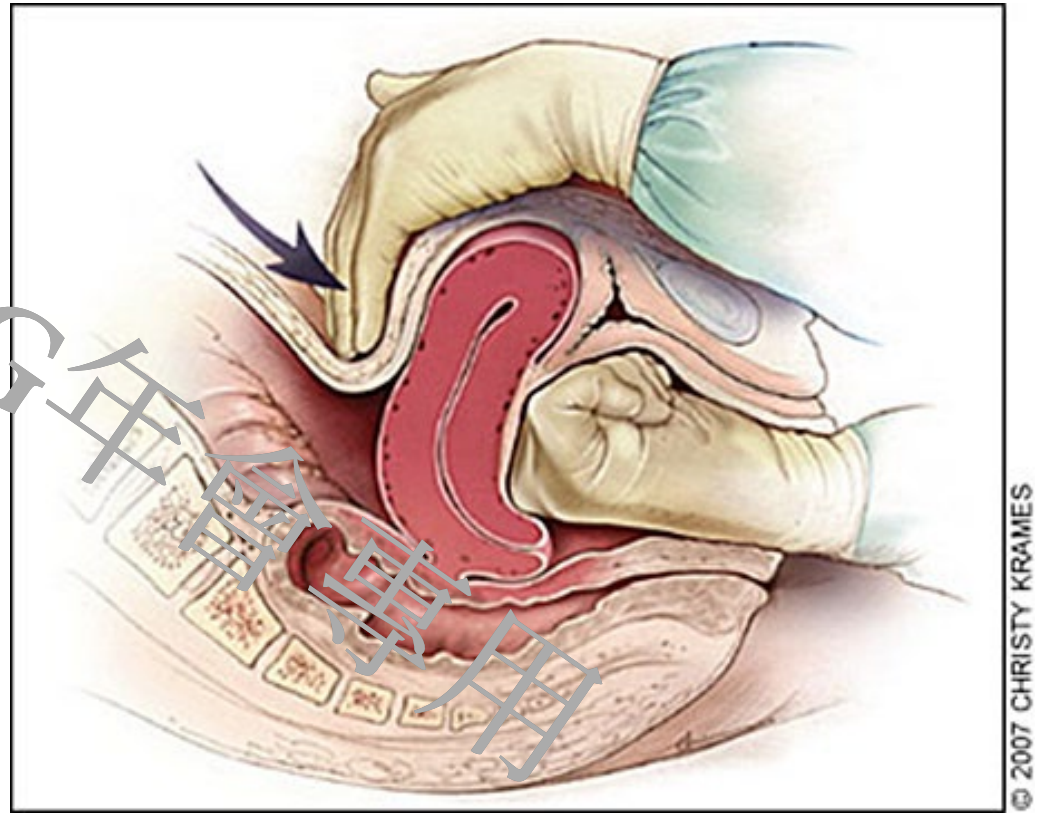
NE Brain CT	2D cardiac echo TEE EKG	CTA CXR	**4T for PPH** **POCUS**

第一步要做的檢查

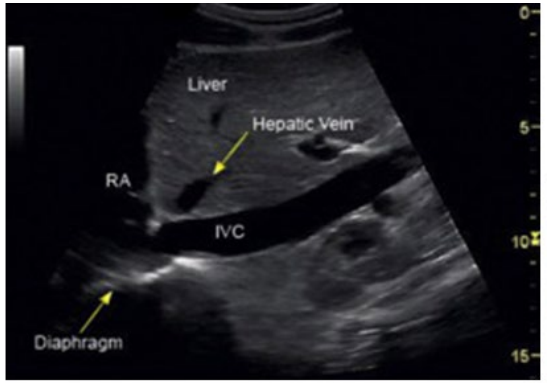
第一步要做的檢查

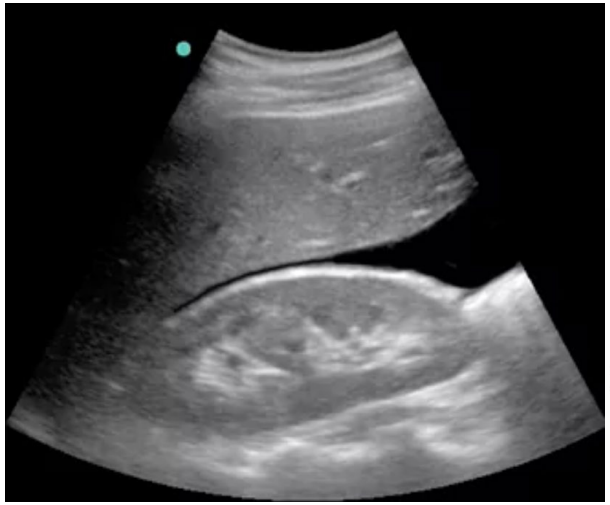
- 4T of PPH
  - Tone by PE
  - Tract by PV
  - Tissue by ultrasound
  - Thrombin by lab

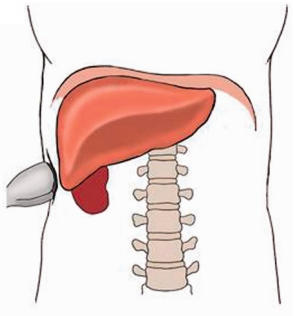


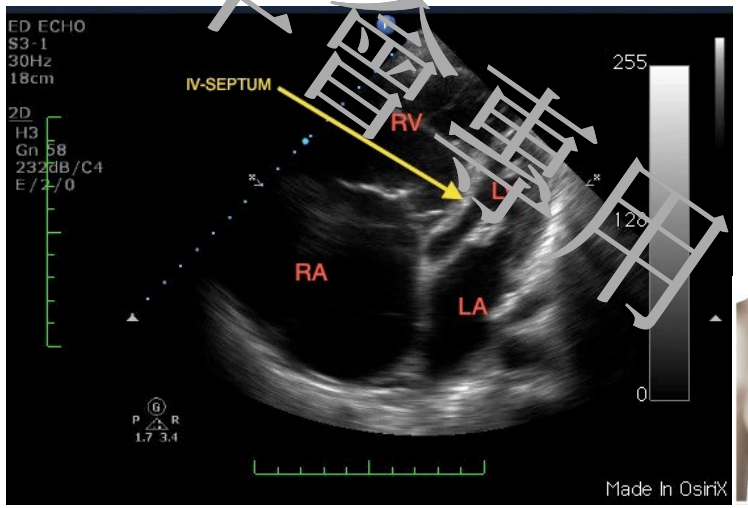
第一步要做的檢查

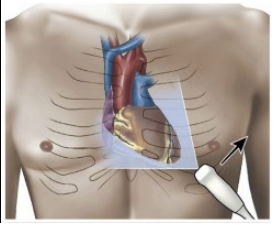
- POCUS (Point-of-care Ultrasound)
  - IVC (r/o hypovolemia)
  - Morrison pouch (r/o hemoperitoneum)
  - Signs of uterine rupture (羊水變少, 胎兒移位)
  - Right heart strain (r/o pulmonary embolism)









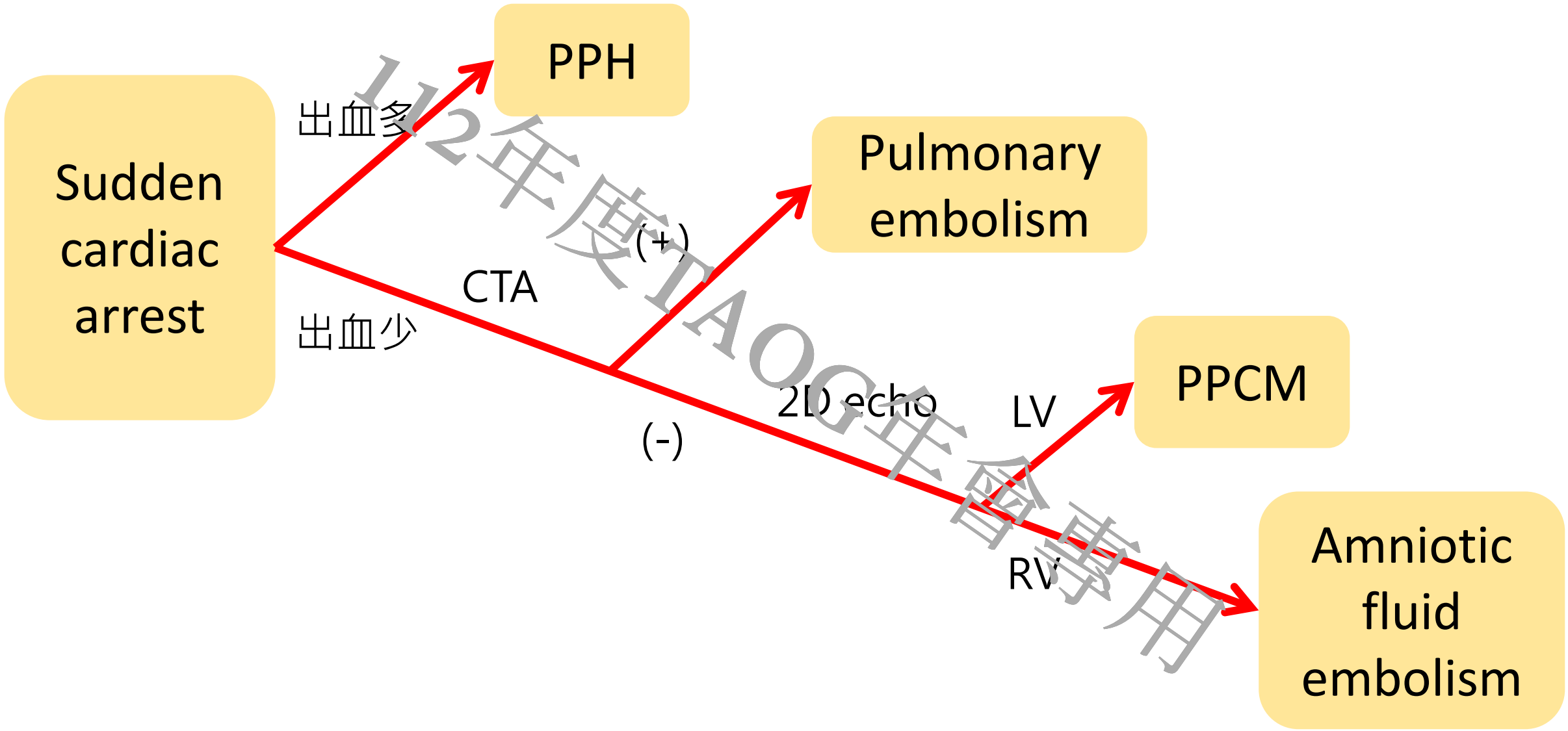


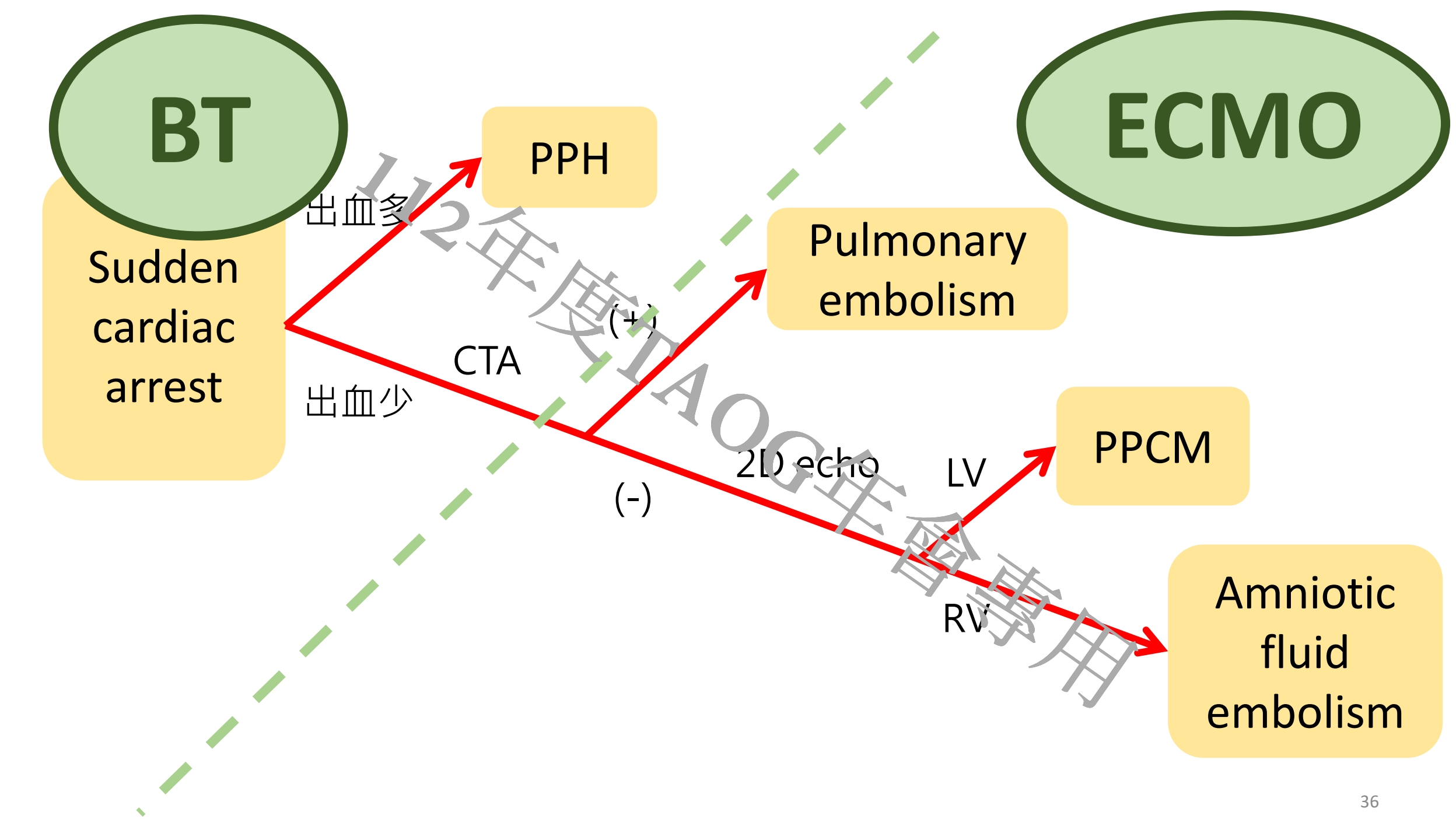
第一步要做的檢查

腦	心	肺	血
• Stroke • ICH	• Heart failure • PPCM • Arrhythmia • Myocardial infarction	• Pulmonary embolism • Pulmonary edema	• Hypovolemia shock • PPH • Uterine rupture • Hemoperitoneum • Retroperitoneal hematoma
NE **Brain CT**	**2D cardiac echo** **TEE** **EKG**	**CTA** **CXR**	4T for PPH POCUS

第二步要做的檢查

- CTA
  - For pulmonary embolism
- 2D heart echo/TEE
  - For PPCM, heart failure, right heart strain
- EKG
  - S1Q3T3 → pulmonary embolism
- CXR
  - For pulmonary edema
- Brain CT
  - For ICH




BT
ECMO
Sudden cardiac arrest
出血多
PPH
CTA
(+)
Pulmonary embolism
出血少
2D echo
(-)
LV
PPCM
RV
Amniotic fluid embolism
112年度TAOG年會專用

Indication/Contraindication of ECMO

Table 1: Indications and Contraindications for VA ECMO

Indications	Contraindications
Cardiogenic shock: • Acute MI • Fulminant myocarditis • Acute on chronic decompensated left, right or biventricular dysfunction • Peripartum cardiomyopathy • Stress cardiomyopathy • Sepsis-induced cardiomyopathy • Post-cardiotomy shock • Primary graft failure after cardiac transplant • Bridge to cardiac transplant • Myocardial contusion • Massive pulmonary embolism **Refractory ventricular arrhythmias** **Severe hypothermia** **Refractory cardiac arrest; ECPR** **Medication overdose** **Amniotic fluid embolism**	**Absolute:** • Life expectancy <1 year or severe systemic illness • DNR/DNI advanced directives • Inability to cannulate due to peripheral vascular disease **Relative:** • Aortic dissection • Moderate to severe aortic insufficiency • Active uncontrollable bleeding **Specific to ECPR:** • Unwitnessed cardiac arrest/lack of bystander CPR • CPR >1 hour • Non-shockable presenting rhythm • Severe metabolic perturbations, e.g. lactate >15–18 mmol/l); PaO_2 <50 mmHg • Advanced age (>70–75 years)* • End tidal CO_2 <10 mmHg

*Advanced age as a contraindication has a variable threshold dependent on comorbities and frailty. CPR = cardiopulmonary resuscitation DNR/DNI = do not resuscitate/do not intubate; ECPR = extracorporeal cardiopulmonary resuscitation.

!!DIC就不能放ECMO了!!

https://www.radcliffecardiology.com/image-gallery/27400/17042/indications-and-contraindications-for-va-ecmo

處置建議

- 叫叫CABUD **呼叫團隊**
- Perimortem cesarean section
- 建立管路
- 4T for PPH + POCUS
- --------轉院--------
- Advanced survey
- Massive BT, TAE, hysterectomy, ECMO, ICU...

案例分享

Case Presentation

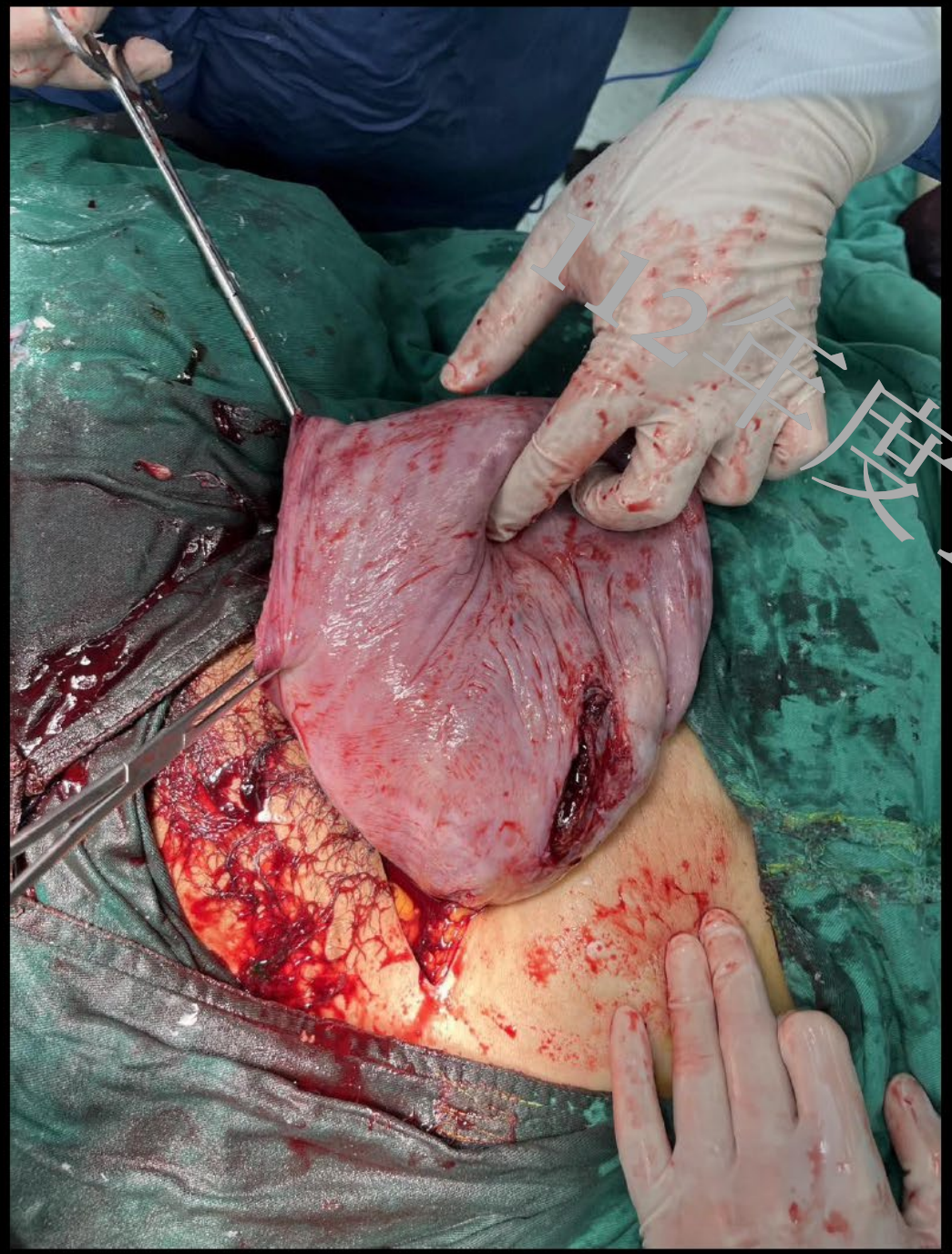
- 44 y/o female, G3P1E1
  - P1 s/p termination due to fetal anomaly
- Pregnancy with IVF twins at GA 34+6 weeks
- BH: 167cm, BW: 108kg, BMI: 38.72
- Past history
  - Chronic hypertension history under Aspirin and anti-hypertensive medication*3
- 2023/5/1
  - CC: undetectable BP at home, anxiety, call 119 to ER

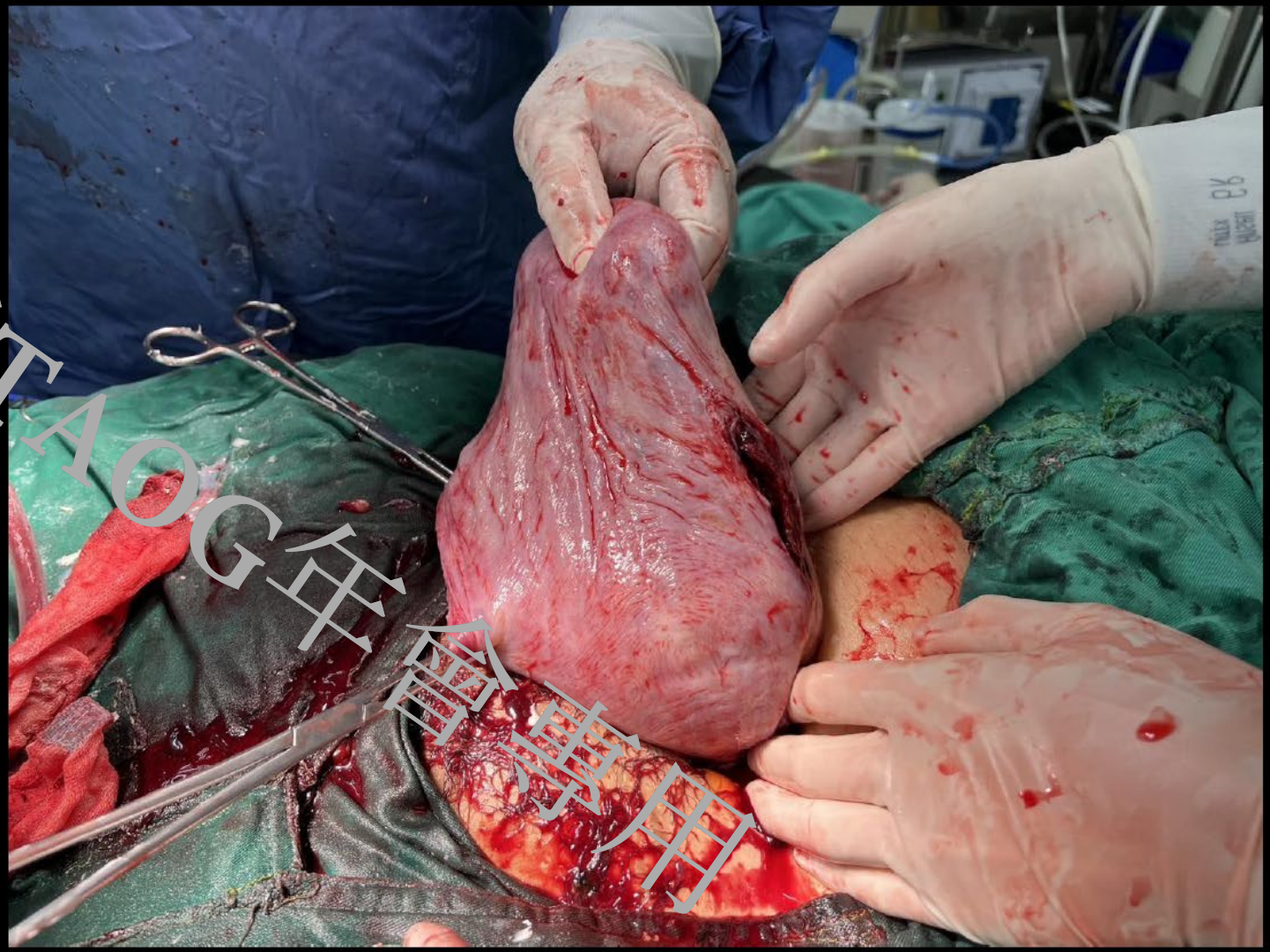
Case Presentation

- 2023/5/1
  - 19:56 at ER triage, T: 35.8’C, P: 88, R: 20, **BP: undetectable**, E4V5M6
    weak, dyspea, diplopia
    denied abdominal pain, vaginal bleeding, watery discharge
    PE: no abdominal tender point
  - 20:15 suspect ICH, arrange brain CT
    CT: negative for ICH
    CXR: no pneumothorax, no pulmonary edema, no pneumonia
  - 20:18 consult GYN
  - 20:31 complained abdominal pain → sent to DR for NST
  - 20:38 severe pain with urinary incontinence, then conscious change

Case Presentation

- 2023/5/1
  - 20:39 PEA, INCA → CPCR, epinephrine 3pc
  - 20:42 asystole → CPCR
  - 20:43 intubation, CPCR
  - 20:45 CPCR, **Hb: 7.6** (10.6 at antenatal visit), sent to CS room for **emergent CS**
  - 20:48 ROSC at DR
  - 20:52-23:19 emergent CS, **hemoperitoneum 2100 cc**
    - 20:54 twins delivered (A: F/2310gm/Apgar score 0-1; B: M/2320gm/Apgar score 0-1)
    - **21:01 P: 135, BP: 63/35 mmHg**
    - 3cm uterine rupture at left posterior wall



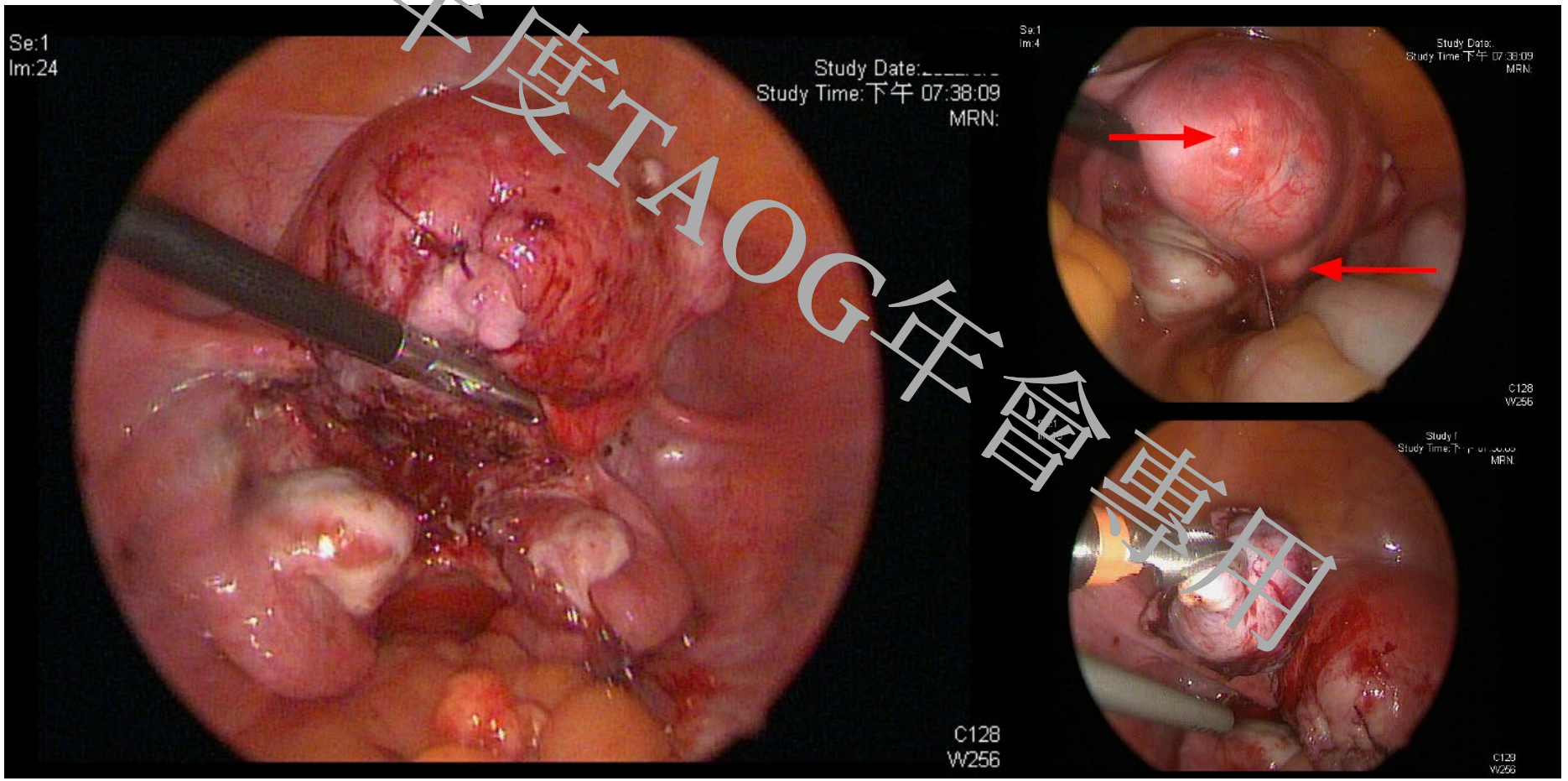


Case Presentation

- 2023/5/1
  - 22:10 Intra-CS massive transfusion LPR 8U + FFP 8U + LPP 24U + cryo 24U
  - 23:19 CS done, transferred to ICU
  - 23:30 P: 92, BP: 115/77 mmHg, E4VeM6
- 2023/5/2 extubation, remove NG, sip water
- 2023/5/3 transfer to ordinary ward
- 2023/5/9 discharge, P: 79, BP: 144/74 mmHg, E4V5M6
- 2023/5/14 **twins expired** at postnatal day 14
- 2023/5/17 CV: EKG normal sinus rhythm, 2D echo normal LV function

Discussion

- 44 y/o female, G3P1**E1 (cornual pregnancy s/p cornuostomy in 2022)**



Discussion

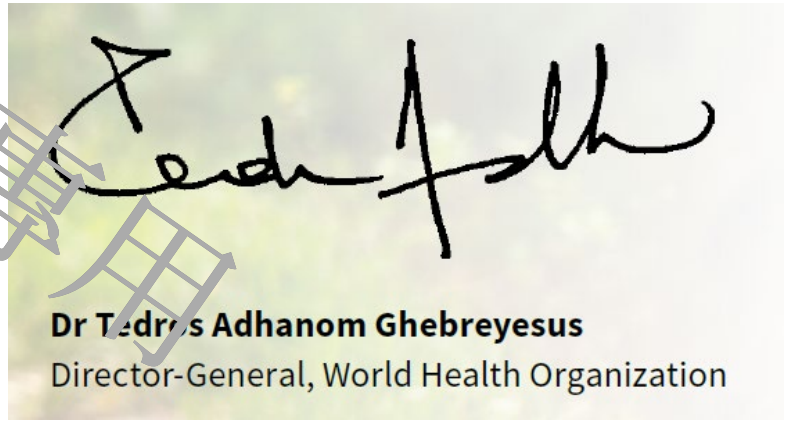
- Undetectable BP
  - Too high to be detected or too low to be detected??
  - 看起來實在太像severe preeclampsia了
  - **PE!**
  - **POCUS!**
- Perimortem cesarean section
  - Defined as CS after CPR has been initiated
  - “Resuscitation hysterotomy”
    - Only perimortem cesarean birth within 10 minutes and in-hospital arrest were predictive of maternal survival
    - Overall neonatal survival was 64 percent in singleton pregnancies

Discussion

- 如果這是個外院轉診的case?
  - 沒有血庫
  - 沒有小兒科stand by for prematurity
  - 無法執行perimortem CS in 15 minutes
  - 機會渺茫

結語

- *We must start by recognizing where our health systems are failing. We must invest in fortifying our health workforce with the people, tools and training they need to deliver the quality care that will make a difference. Health systems must be held accountable for providing quality, respectful and equitable care through a well trained and supported workforce and well-stocked shelves.*
- 檢討檢討檢討
- 訓練訓練訓練
- 擴充系統&資源



Thank You for Attention!

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Appendix

聯合國永續發展目標

MMR by WHO region

Annex 6.

Trends in estimates of maternal mortality ratio (MMR), by WHO region, 2000–2020

WHO region	MMR[a] point estimates					Average ARR in MMR between 2000 and 2020 (%)	Average ARR in MMR between 2000 and 2015 (%)	Average ARR in MMR between 2016 and 2020 (%)	Overall change in MMR between 2000 and 2020 (%)
	2000	2005	2010	2015	2020				
African Region	788	696	647	581	531	2.0	2.1	1.9	33.2
Region of the Americas	68	64	60	58	68	< 0.1	1.1	-3.5	0.6
Eastern Mediterranean Region	356	296	231	196	179	3.5	4.0	2.3	50.2
European Region	26	20	15	12	13	5.5	5.0	-2.6	50.1
South-East Asia Region	372	289	197	148	117	5.8	6.2	4.6	68.5
Western Pacific Region	76	63	49	42	44	2.7	4.0	-2.9	42.1
World	**339**	**296**	**254**	**227**	**223**	**2.1**	**2.7**	**0.0**	**34.3**

ARR: annual rate of reduction.
Negative numbers in the last four columns indicate increase in MMR, rather than reduction.
A list of WHO Member States in each of the six WHO regions can be found at https://www.who.int/countries/ (filter by region).
[a] MMR (maternal deaths per 100 000 live births) estimates have been rounded to the nearest 1.

所有國家的MMR

Country and territory	MMR[a] point estimate					Overall change in MMR between 2000 and 2020 (%)[b]	Average annual rate of reduction[c] (ARR) point estimate and range of uncertainty interval on ARR between 2000 and 2020 (UI: 80%) (%)		
	2000	2005	2010	2015	2020		Lower UI	Point estimate	Upper UI
Afghanistan	1 346	1 103	899	776	620	52.9	0.4	3.8	6.4
Albania	14	11	9	7	8	42.7	-0.4	2.8	6.3
Algeria	159	144	112	89	78	51.1	0.6	3.6	6.2
Angola	860	550	367	2[illegible]	22[illegible]	73.3	4.9	6.7	8.7
Antigua and Barbuda	51	34	31	27	21	59.1	2.3	4.5	6.7
Argentina	72	63	55	39	45	37.0	1.3	2.3	3.3
Armenia	50	38	33	25	27	46.7	0.4	3.1	4.8
Australia	7	5	5	5	3	55.9	3.0	4.1	5.2
Austria	6	6	6	6	5	16.5	-1.6	0.[illegible]	3.1
Azerbaijan	56	44	33	29	41	27.0	-1.0	1.6	4.2
Bahamas	61	74	79	84	77	-25.0	-4.0	-1.1	1.9
Bahrain	24	21	20	16	16	34.1	1.1	2.1	3.3
Bangladesh	441	376	301	212	123	72.5	4.6	6.5	8.1
Barbados	48	43	53	49	39	17.4	-1.1	1.0	3.8
Belarus	24	11	3	1	1	95.5	13.0	15.5	18.1
Belgium	8	7	6	5	5	41.2	1.6	2.7	4.4
Belize	86	72	33	49	130	-51.3	-3.4	-2.1	-0.7
Benin	469	509	598	591	523	-9.9	-2.5	-0.5	0.9
Bhutan	305	186	117	74	60	79.5	6.7	7.9	10.3
Bolivia (Plurinational State of)	284	230	184	165	161	44.8	0.3	3.0	5.0
Bosnia and Herzegovina	16	11	8	7	6	62.6	3.3	4.9	7.2
Botswana	182	201	156	184	186	-1.5	-1.5	-0.1	1.4
Brazil	68	70	64	62	72	-5.4	-1.5	-0.3	0.9
Brunei Darussalam	50	46	42	45	44	6.5	-1.0	0.3	2.9
Bulgaria	22	14	10	8	7	67.8	3.6	5.7	8.0
Burkina Faso	506	417	357	295	264	47.9	1.3	3.3	5.4
Burundi	874	713	608	514	494	43.8	1.0	2.9	4.5
Cabo Verde	125	77	54	47	42	64.5	3.5	5.2	8.0
Cambodia	606	382	276	209	218	64.0	2.9	5.1	7.0
Cameroon	651	573	527	447	438	34.6	0.3	2.1	3.3
Canada	9	11	12	12	11	-17.6	-2.5	-0.8	0.6
Central African Republic	1 315	1 158	1 052	909	835	37.2	0.1	2.3	4.9
Chad	1 366	1 241	1 303	1 125	1 063	24.5	-1.0	1.4	2.7
Chile	33	27	23	16	15	53.9	2.9	3.9	4.8
China	58	46	33	26	23	60.1	3.8	4.6	5.8
Colombia	93	82	71	70	75	19.5	0.3	1.1	1.8
Comoros	456	360	316	261	217	52.7	1.4	3.7	5.8
Congo	660	488	389	360	282	58.3	2.0	4.4	6.1
Costa Rica	39	31	27	20	22	42.8	1.9	2.8	4.1
Côte d'Ivoire	473	540	604	530	480	-0.7	-2.0	< 0.1	1.9
Croatia	11	9	7	6	5	56.3	2.4	4.1	6.0
Cuba	47	43	41	39	39	16.7	0.2	0.9	1.6
Cyprus	33	27	27	42	68	-107.0	-6.8	-3.6	-0.5
Czechia	8	5	4	4	3	57.4	2.4	4.3	6.5
Democratic People's Republic of Korea	186	122	130	108	107	43.3	0.3	2.8	5.4
Democratic Republic of the Congo	668	635	601	578	547	22.0	-2.1	1.2	2.7
Denmark	8	7	7	6	5	42.6	1.1	2.8	4.0
Djibouti	512	368	274	244	234	54.0	1.4	3.9	6.4
Dominican Republic	79	87	92	99	107	-36.0	-2.7	-1.5	-0.4
Ecuador	120	92	76	66	66	45.8	1.5	3.1	4.2
Egypt	79	58	38	24	17	79.0	6.0	7.8	9.6
El Salvador	49	35	36	44	43	12.2	-1.3	0.7	2.5
Equatorial Guinea	427	258	211	201	212	50.9	1.1	3.6	5.6
Eritrea	735	546	480	399	322	56.9	1.9	4.2	6.1
Estonia	25	13	8	6	5	79.0	5.2	7.8	10.7
Ethiopia	953	880	635	399	267	72.6	3.6	6.5	8.1
Fiji	49	45	42	39	38	21.2	-0.6	1.2	3.1
Finland	7	8	7	7	8	-12.4	-3.2	-0.6	1.8
France	9	9	9	8	8	16.0	-0.5	0.9	2.0
Gabon	249	239	193	21[illegible]	227	8.9	-1.7	0.5	2.6
Gambia	778	718	620	535	458	40.2	0.9	2.6	4.6
Georgia	53	45	41	30	28	48.5	1.7	3.3	4.5
Germany	7	7	6	[illegible]	4	38.0	1.4	2.4	3.5
Ghana	499	390	337	286	263	46.5	1.5	3.1	5.1
Greece	4	3	3	5	8	-101.1	-6.2	-3.5	-0.9
Grenada	42	32	27	23	21	50.6	1.3	3.5	5.7
Guatemala	152	149	123	107	96	37.3	1.8	2.3	2.9
Guinea	971	846	741	649	553	43.9	0.9	2.9	4.3
Guinea-Bissau	1 300	977	795	713	725	46.0	0.3	3.1	4.8
Guyana	190	172	148	128	112	40.0	1.4	2.6	4.3
Haiti	400	363	403	391	350	14.2	-1.8	0.8	2.5

[1] For countries included, refer to note "1" for **Annex 4**, and find lists of WHO Member States by region at: https://www.who.int/countries/.

所有國家的MMR

Country and territory	MMR[a] point estimate					Overall change in MMR between 2000 and 2020 (%)[b]	Average annual rate of reduction[c] (ARR) point estimate and range of uncertainty interval on ARR between 2000 and 2020 (UI: 80%) (%)		
	2000	2005	2010	2015	2020		Lower UI	Point estimate	Upper UI
Honduras	82	75	73	67	72	13.1	-0.7	0.7	1.8
Hungary	15	13	15	15	15	-3.1	-2.2	-0.2	1.9
Iceland	5	4	3	3	3	47.8	1.3	3.3	7.1
India	384	286	179	128	103	73.5	5	6.6	7.7
Indonesia	299	276	219	194	173	42.8	.5		4.4
Iran (Islamic Republic of)	44	30	32	20	22	48.9	1.5	3.4	6.0
Iraq	117	116	115	102	76	36.0	-0.4	2.2	.2
Ireland	10	9	7	6	5	53.8	2.1	3.	5.0
Israel	9	4	3	3	3	66.7	3.4	5.5	7.6
Italy	10	8	7	7	5	54.3	2.7	3.9	5.4
Jamaica	83	86	88	97	99	-19.1	-2.0	-0.9	0.3
Japan	9	7	6	5	4	49.0	2.1	3.4	4.8
Jordan	64	58	47	46	41	34.5	0.4	2.1	4.6
Kazakhstan	56	36	20	13	13	76.3	5.5	7.2	8.8
Kenya	564	503	476	483	530	7.7	-1.5	0.4	2.0
Kiribati	116	118	131	121	76	34.6	-0.4	2.1	5.1
Kuwait	10	10	9	7	7	30.2	-0.5	1.8	3.2
Kyrgyzstan	87	83	72	61	50	43.0	0.7	2.8	4.2
Lao People's Democratic Republic	579	442	284	184	126	78.7	5.5	7.7	9.1
Latvia	32	28	25	22	18	43.4	0.7	2.8	4.4
Lebanon	32	25	18	19	21	36.8	0.6	2.3	3.5
Lesotho	545	563	1040	728	566	-2.2	-2.3	-0.1	1.7
Liberia	777	676	634	686	652	18.7	-1.0	1.0	2.3
Libya	57	50	57	71	72	-26.3	-3.8	-1.2	1.4
Lithuania	18	11	10	8	9	50.4	0.8	3.5	6.1
Luxembourg	9	11	8	7	6	33.0	-1.0	2.0	3.7
Madagascar	658	568	497	482	392	41.7	1.0	2.7	3.7
Malawi	573	347	513	445	381	33.8	0.2	2.1	4.0
Malaysia	40	32	25	22	21	47.0	1.5	3.2	4.1
Maldives	114	79	60	57	57	51.7	1.1	3.6	5.4
Mali	742	560	547	494	440	41.7	1.2	2.7	4.0
Malta	10	8	5	4	3	71.3	4.4	6.2	9.1
Mauritania	684	652	586	510	464	33.5	-0.1	2.0	3.7
Mauritius	52	48	55	57	84	-62.1	-4.4	-2.4	-0.4
Mexico	57	53	51	52	59	-6.2	-1.3	-0.3	1.1
Micronesia (Federated States of)	60	57	46	64	74	-23.3	-3.5	-1.0	1.7
Mongolia	158	94	65	47	39	75.0	5.1	6.9	8.9
Montenegro	11	10	7	6	6	40.9	0.3	2.6	5.5
Morocco	244	194	134	97	72	69.9	4.6	6.0	8.0
Mozambique	532	404	322	226	127	76.1	6.0	7.2	8.4
Myanmar	371	321	293	243	179	52.7	0.8	3.7	5.6
Namibia	450	419	482	299	215	53.2	1.5	3.8	5.2
Nepal	504	380	349	252	174	66.5	2.6	5.5	7.0
Netherlands	13	10	6	5	4	66.8	3.9	5.5	7.3
New Zealand	11	10	10	9	7	35.8	1.1	2.2	4.1
Nicaragua	169	158	98	79	78	53.1	2.3	3.8	5.8
Niger	867	768	594	491	441	49.7	1.5	3.4	5.2
Nigeria	1 148	1 073	1 123	1 113	1 047	12.6	-2.3	0.7	1.9
Norway	6	6	4	2	2	70.8	3.5	6.1	8.9
Occupied Palestinian territory, including east Jerusalem[d]	62	54	43	26	20	67.3	3.2	5.6	8.1
Oman	20	20	18	15	17	14.4	-1.1	0.8	2.5
Pakistan	387	301	230	187	154	61.8	2.2	4.8	6.2
Panama	6	53	55	49	50	24.8	0.7	1.4	1.8
Papua New Guinea	312	314	289	208	192	39.7	0.3	2.5	4.3
Paraguay	14	127	100	80	71	51.9	2.5	3.7	5.3
Peru	3	97	76	65	69	39.4	1.6	2.5	3.4
Philippines	129	122	105	88	78	40.2	1.3	2.6	3.3
Poland	8	5		2	2	74.8	4.9	6.9	9.0
Portugal	11	9		1	12	-10.5	-2.9	-0.5	1.6
Puerto Rico	22	20	2		34	-55.9	-4.8	-2.2	-0.5
Qatar	28	19	10	7	8	71.4	4.8	6.3	9.1
Republic of Korea	16	12	8	6		47.	2.7	3.2	4.2
Republic of Moldova	49	30	18	17	12	5.0	5.0	6.9	8.8
Romania	50	37	22	15	10	79.	6.	8.0	9.8
Russian Federation	52	31	17	10	14	73	4.6	6.	8.7
Rwanda	1 007	533	386	312	259	74.3	4.4	5.8	8.7
Saint Lucia	87	82	73	80	73	16.8	-1.9	0.	.4
Samoa	75	62	62	58	59	20.7	-1.5	1.2	3.7
Sao Tome and Principe	179	160	160	139	146	17.6	-1.0	.0	3.
Saudi Arabia	22	17	15	16	16	22.9	< 0.1	1.3	3.
Senegal	638	519	450	321	261	60.7	2.4	4.7	5.
Serbia[e]	18	16	14	13	10	42.9	0.8	2.8	4.7
Seychelles	44	15	8	5	3	92.5	10.0	13.0	16.0
Sierra Leone	1 682	1 327	837	588	443	74.4	4.7	6.8	8.0
Singapore	15	13	8	8	7	48.5	1.8	3.3	5.6
Slovakia	9	7	5	5	5	42.5	1.4	2.8	4.6
Slovenia	12	9	6	5	5	62.6	2.8	4.9	6.6
Solomon Islands	150	153	147	141	122	19.8	-1.3	1.1	3.2
Somalia	1 097	1 080	963	761	621	42.9	0.8	2.8	5.4
South Africa	173	221	219	141	127	25.5	0.6	1.5	2.9
South Sudan	1 687	1 332	1 060	1 225	1 223	29.4	-0.9	1.7	4.1
Spain	5	4	4	4	3	33.1	0.7	2.0	2.9
Sri Lanka	61	44	37	30	29	52.7	2.4	3.7	4.8
Saint Vincent and the Grenadines	76	54	45	36	62	19.9	-1.0	1.1	3.0
Sudan	642	525	383	298	270	56.9	2.1	4.2	6.8
Suriname	278	190	138	125	96	65.4	3.4	5.3	7.7
Eswatini	588	678	672	338	240	61.0	1.8	4.7	6.4
Sweden	6	5	5	4	5	26.3	-0.4	1.5	2.9
Switzerland	8	9	8	6	7	7.5	-1.9	0.4	2.0
Syrian Arab Republic	34	23	21	30	30	14.6	-2.3	0.8	2.9
Tajikistan	68	44	32	20	17	75.2	4.0	7.0	10.0
United Republic of Tanzania	760	559	486	330	238	69.8	3.2	6.0	7.3
North Macedonia	12	9	6	5	3	75.4	4.0	7.0	10.8
Thailand	48	40	35	30	29	41.4	1.6	2.7	3.6
Timor-Leste	750	584	376	285	204	73.0	4.5	6.5	8.4
Togo	479	494	530	441	399	14.8	-0.7	0.8	3.2
Tonga	94	95	93	86	126	-32.7	-4.0	-1.4	1.1
Trinidad and Tobago	74	56	47	31	27	63.7	3.4	5.1	6.9
Tunisia	62	56	44	40	37	40.3	0.8	2.6	5.5
Turkiye	32	25	22	19	17	46.0	1.1	3.1	4.6
Turkmenistan	26	17	9	6	5	80.3	5.3	8.1	10.9
Uganda	461	435	372	319	284	38.7	-0.4	2.5	4.5
Ukraine	36	21	17	11	17	53.5	2.2	3.8	5.4
United Arab Emirates	22	13	9	9	9	57.0	2.3	4.2	6.4
United Kingdom of Great Britain and Northern Ireland	11	11	10	8	10	10.5	-0.6	0.6	1.7
United States of America	12	13	14	17	21	-77.9	-4.2	-2.9	-1.6
Uruguay	27	20	18	17	19	29.7	0.7	1.8	2.9
Uzbekistan	43	45	38	31	30	29.3	< 0.1	1.7	3.4
Vanuatu	109	98	93	92	94	11.9	-1.8	0.6	3.2
Venezuela (Bolivarian Republic of)	92	95	112	126	259	-182.8	-7.3	-5.2	-3.4
Viet Nam	97	78	88	109	124	-28.0	-4.2	-1.2	1.7
Yemen	275	196	157	164	183	30.7	0.3	1.8	4.4
Zambia	419	309	268	166	135	68.9	3.6	5.8	7.0
Zimbabwe	388	533	618	408	357	5.7	-0.7	0.3	2.5

孕婦ACLS流程

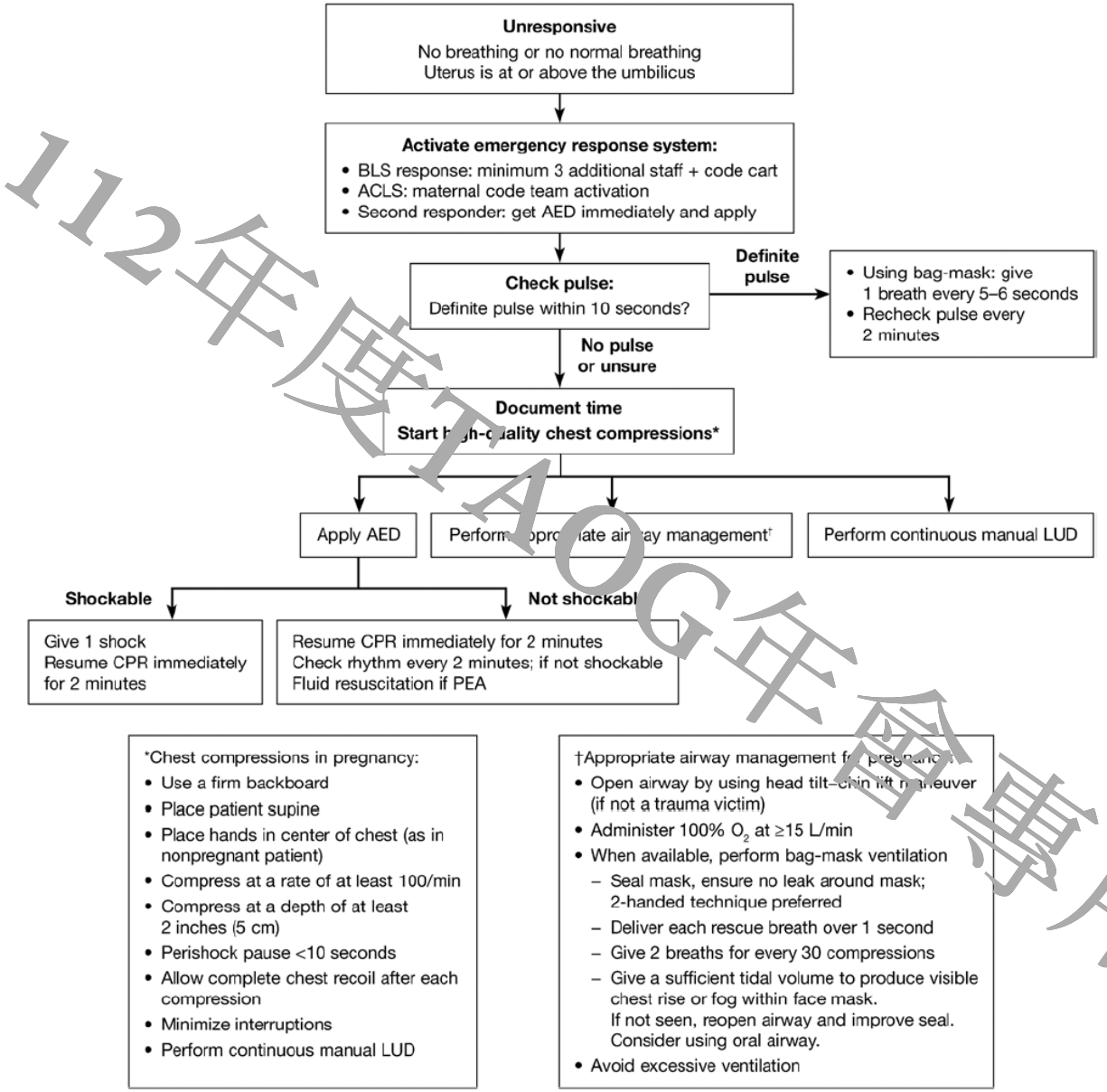

Figure 2. Cardiac arrest in pregnancy in-hospital basic life support (BLS) algorithm: simultaneous C-A-B-U (chest compressions/current-airway-breathing-uterine displacement). ACLS indicates advanced cardiovascular life support; AED, automated external defibrillator; CPR, cardiopulmonary resuscitation; LUD, left uterine displacement; and PEA, pulseless electric activity.

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IVC Diameter and Variability with Respiration – What the numbers mean?

The table below shows the relationship between IVC diameter, respiratory variation, and approximate CVP range

IVC diameter (cm)	Respiratory variation	CVP (cm H20)
<1.5	Total collapse	0-5
1.5 – 2.5	>50%	6-10
1.5 – 2.5	<50%	11-15
>2.5	<50%	16-20
>2.5	No change	>20

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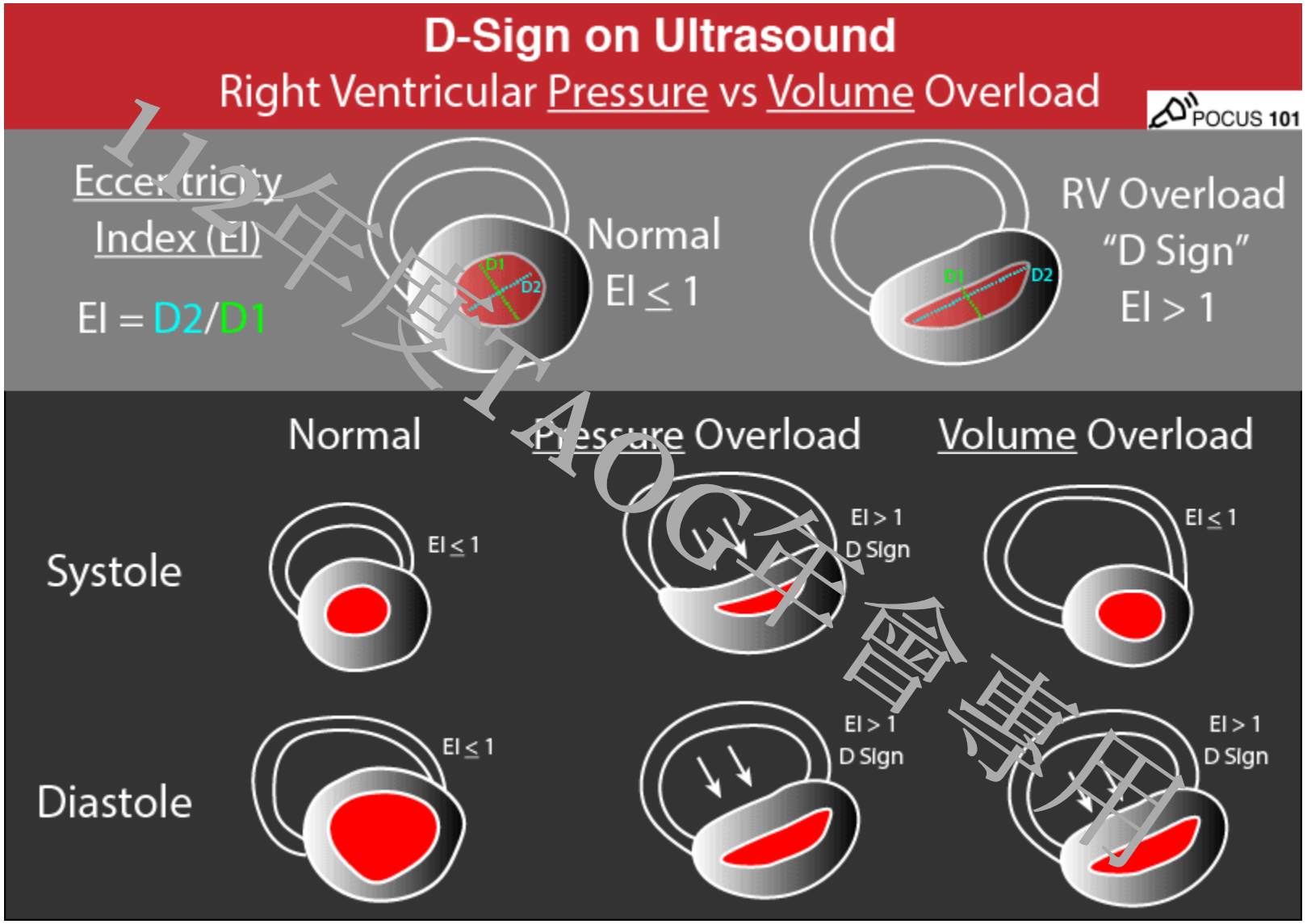
Sudden cardiac arrest and death in pregnancy

A through H mnemonic — The following A through H mnemonic was devised by the American Heart Association to help providers remember causes of SCA that should be considered in pregnant patients [20]:

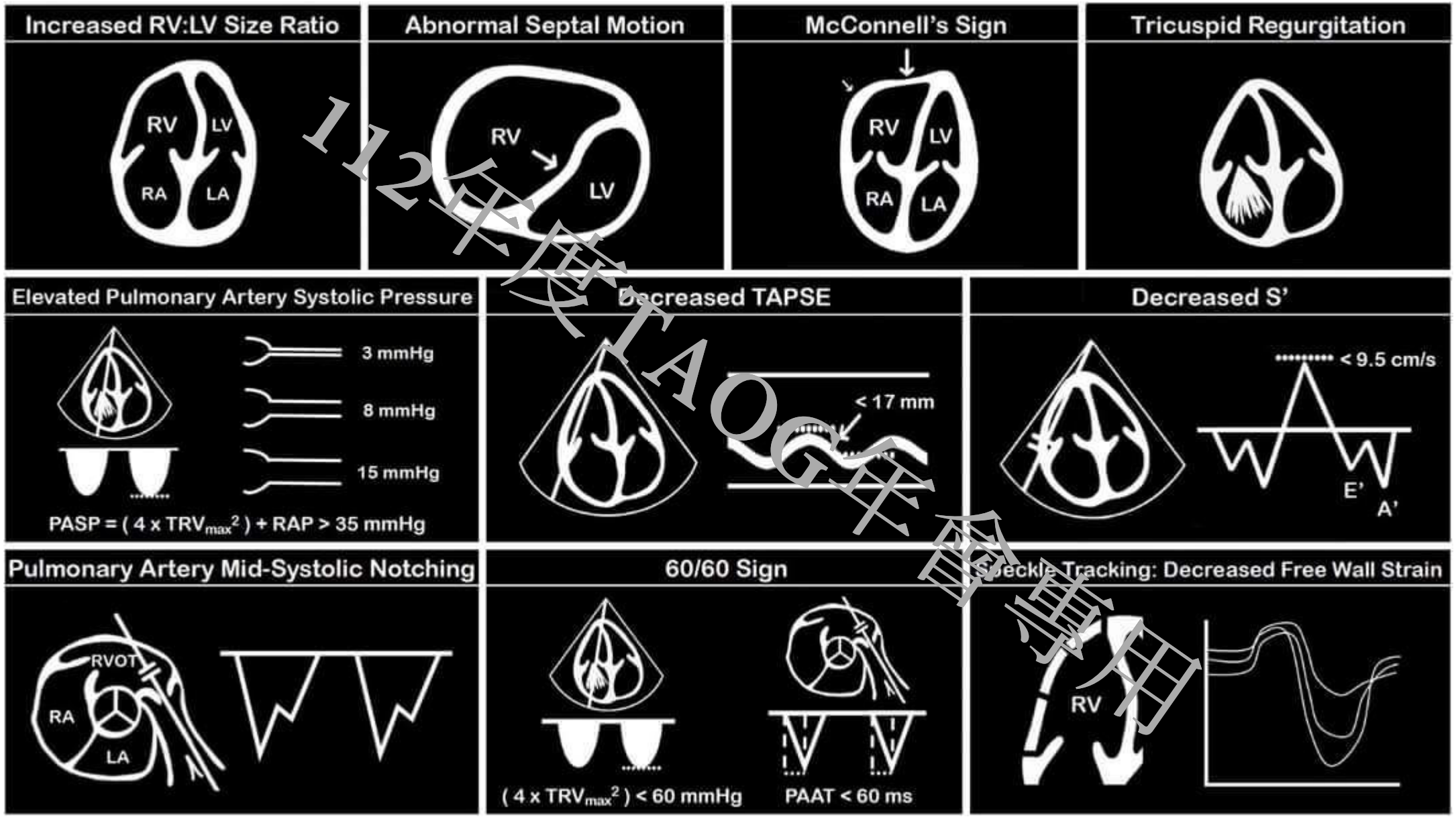
- A – Anesthetic complications, accident/trauma
- B – Bleeding
- C – Cardiac
- D – Drugs
- E – Embolic causes
- F – Fever
- G – General including hypoxia, electrolyte disturbances
- H – Hypertension

D-sign of right heart strain



https://www.grepmed.com/images/10191/pocus-cardiology-diagnosis-dsign-ultrasound

Signs of right heart strain



https://perfusfind.com/what-are-the-echocardiographic-findings-of-acute-right-ventricular-strain-that-suggest-pulmonary-embolism-2/