



University
of Glasgow

A WORLD
TOP 100
UNIVERSITY

Epidural analgesia and severe maternal morbidity



WORLD
CHANGING
GLASGOW

Rachel Kearns

University of Glasgow

Princess Royal Maternity Unit

THE SUNDAY TIMES
THE SUNDAY TIMES

GOOD
UNIVERSITY
GUIDE
2024

SCOTTISH
UNIVERSITY
OF THE YEAR

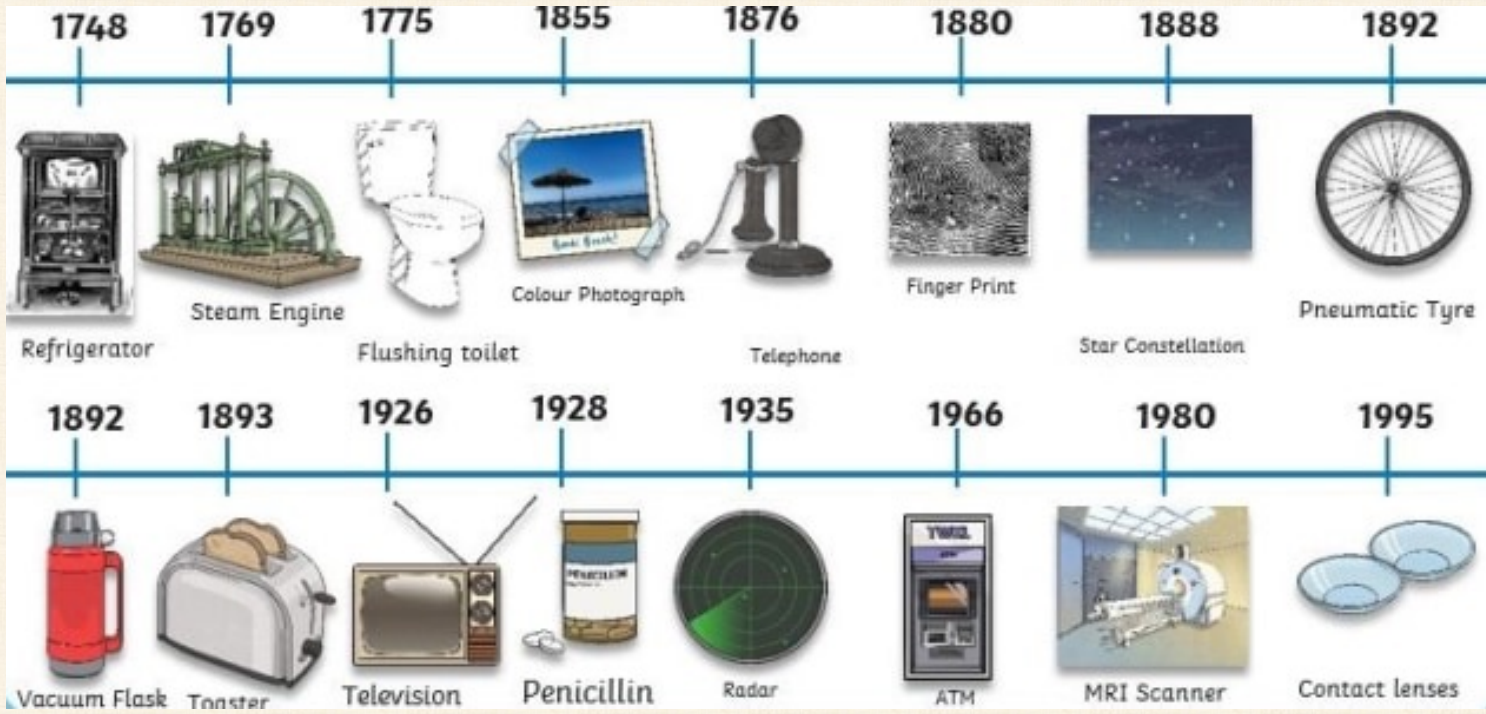




Population 5 million;
50,000 births pa



Population 10 million;
100,000 births pa



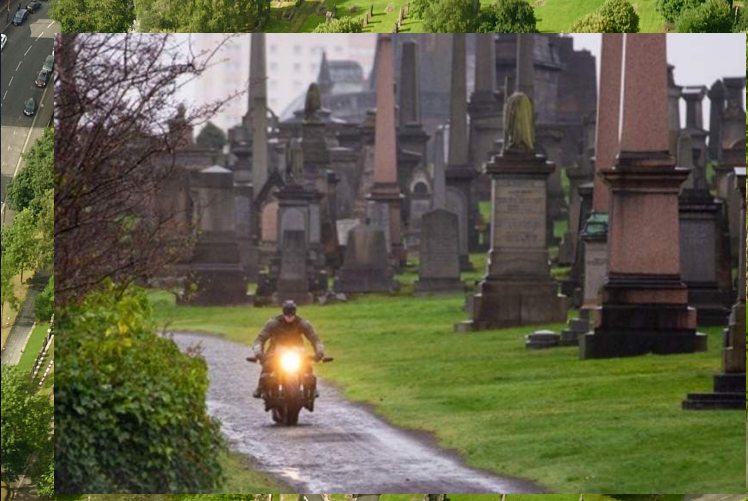
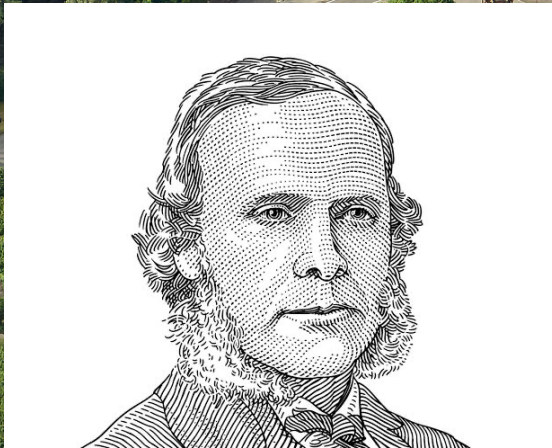
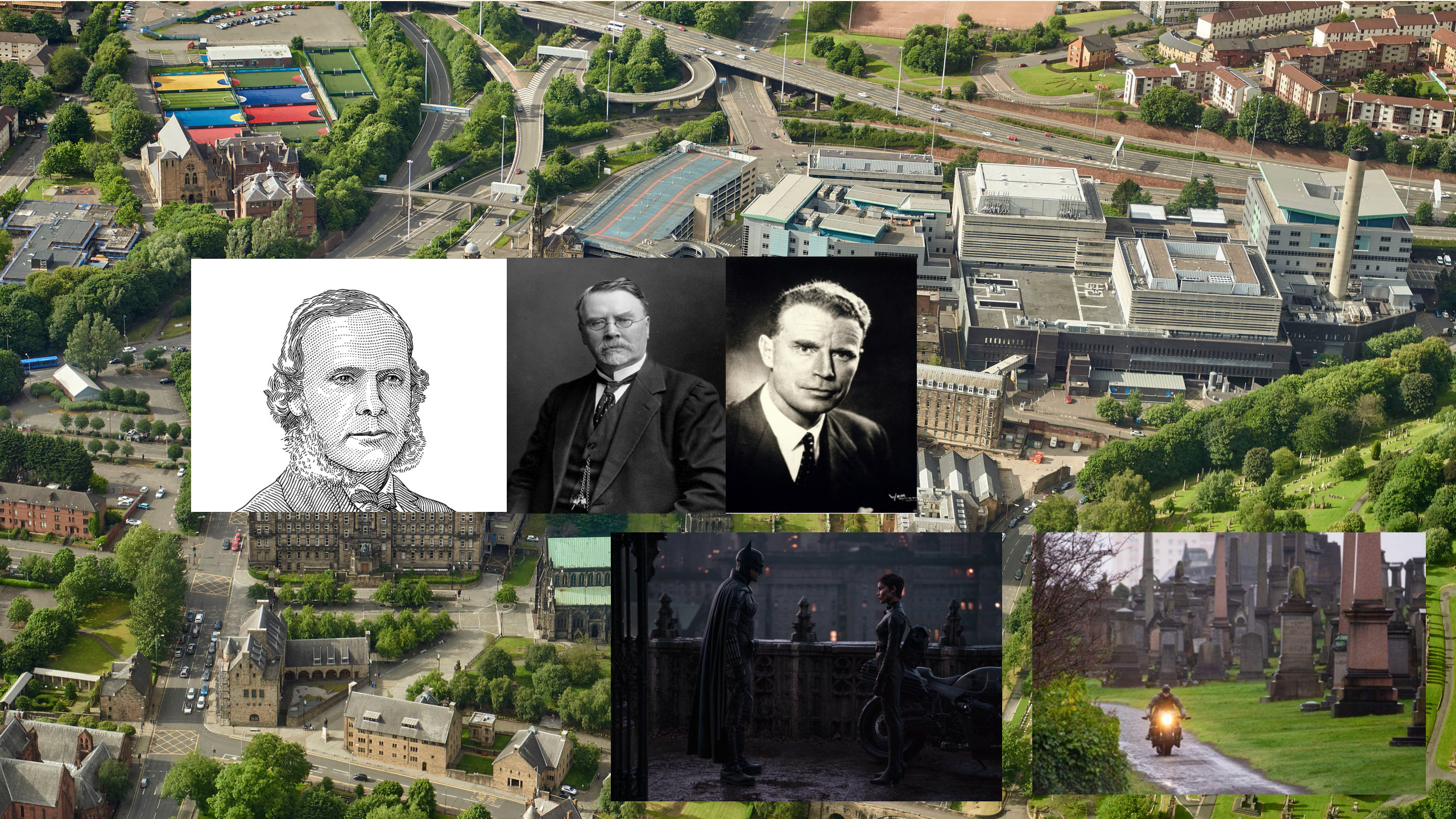
SWEDISH INVENTIONS

DYNAMITE	ZIPPER	ADJUSTABLE	PACEMAKER
THREE-POINT SEATBELT	TETRA PAK	BLUETOOTH	SPOTIFY
ULTRASOUND	ARTIFICIAL RESPIRATOR	SAFETY MATCHES	CELSIUS
ATLAS COPCO	LOSEC		PROPELLER IMPROVEMENTS

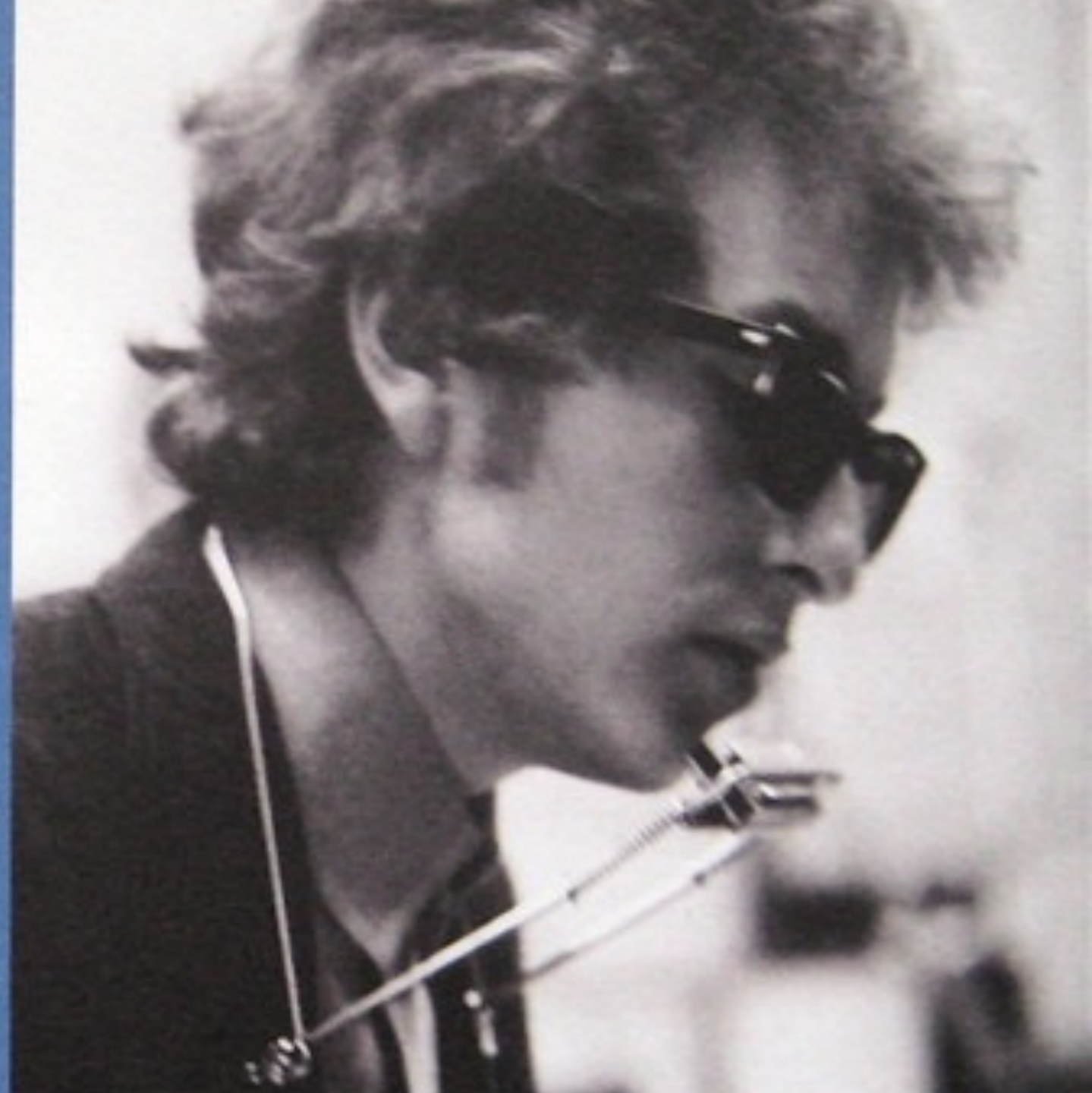
WIE

DATA

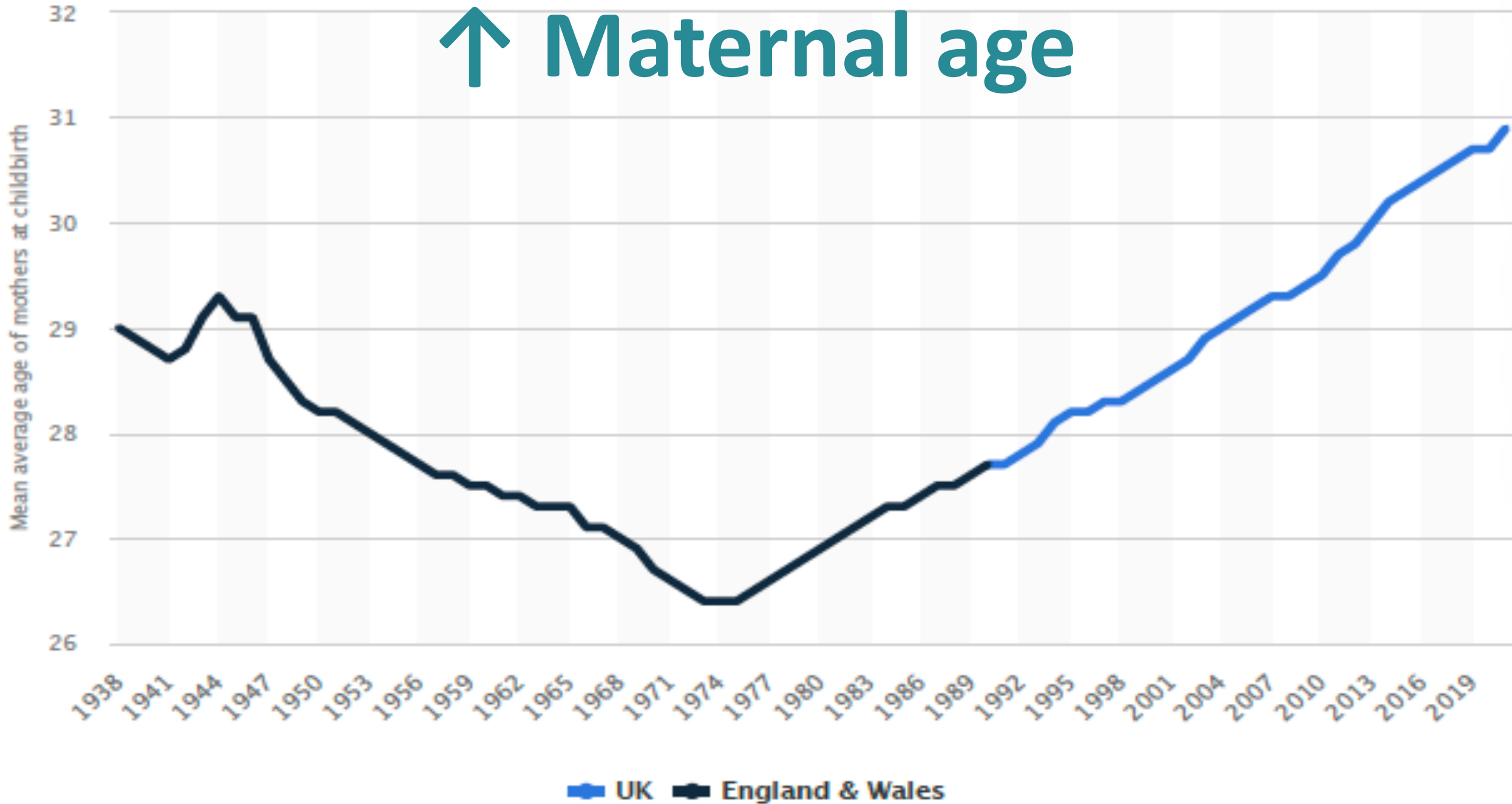




BOB DYLAN
THE TIMES
THEY ARE A-
CHANGIN'

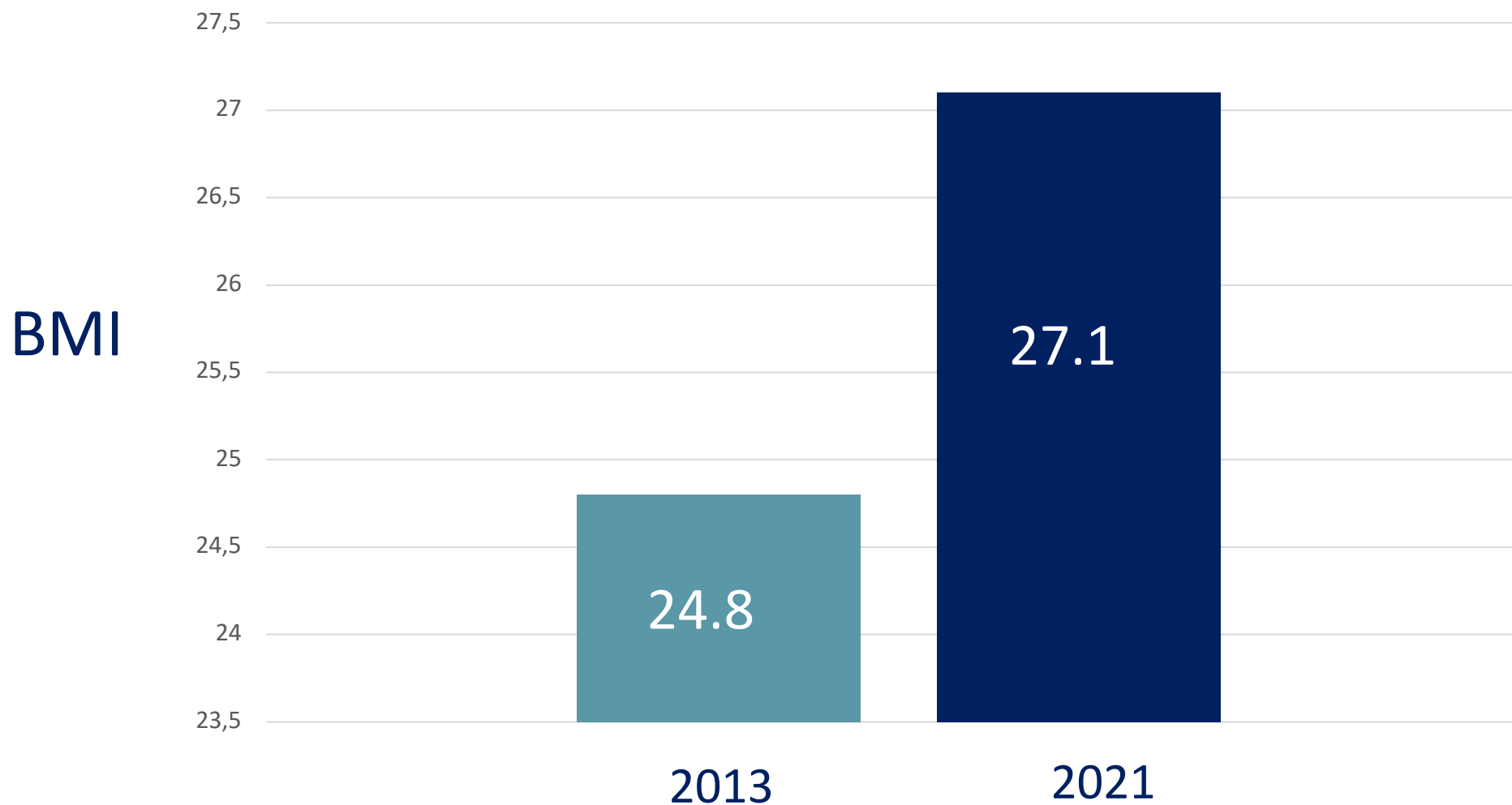


↑ Maternal age



NAP 7: ↑ Maternal BMI

Overweight; 46% → 61%



↑ Maternal comorbidities

Lee et al 2022

UK population-based study
71,522 births

Pre-
conception
multi-
morbidity

Multi-
morbidity in
1yr pre-
conception

Multimorbidity prevalence

Death

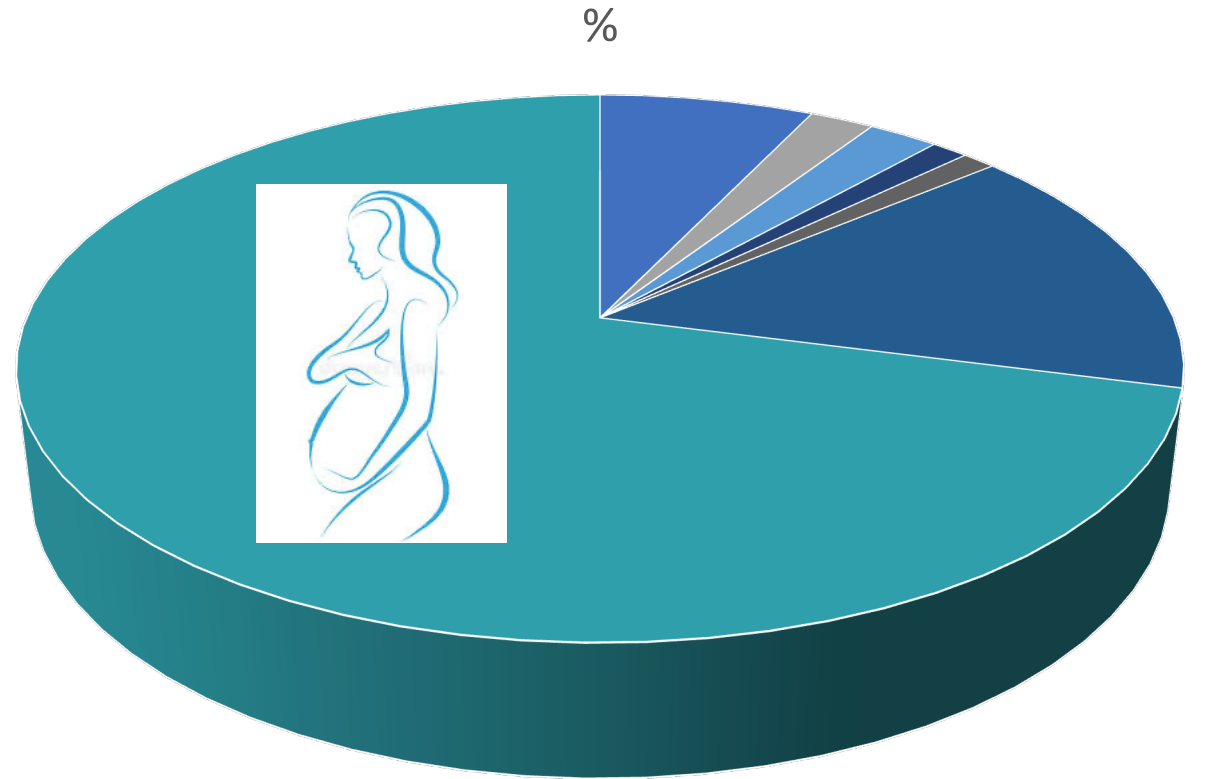
SMM

- 2 in 5 had pre-existing multi-morbidity
- 1 in 5 had multi-morbidity in previous year
- Mental health conditions highly prevalent

Uncomplicated childbirth

NAP 7 : Obs = 70% of night workload

1/3 obstetric units in remote location



■ Gen surg

■ Ortho trauma

■ Urology

■ Gyn

■ ENT

■ Other

■ Obs

sky news

MATERNITY DEATHS HIT 20-YEAR HIGH

BREAKFAST





NEAR MISS



What is severe maternal morbidity?



SMM Definition



Blood transfusion



Pulmonary edema / Acute heart failure



Sepsis



Adult respiratory distress syndrome



Air and thrombotic embolism



Eclampsia



Puerperal cerebrovascular disorders



Acute Renal Failure

Definitions differ

WHO '*near miss*'

Organ
dysfunction

Relies on lab
tests

CDC

21 indicators /
procedures

EMMOI

26 morbid events

↑ SMM 10/1000 x 2000 mortality risk

Masterson et al 2022

UK population-based study
762,918 births
2005-2018
SMM conception – 42d PN

SMM
n=7947

No SMM
n=754,971

Incidence / associations



Highest risk in prev ventilation, PET, severe mental health, surgical, CVS or cerebrovascular complications

Tsamantioti et al 2026

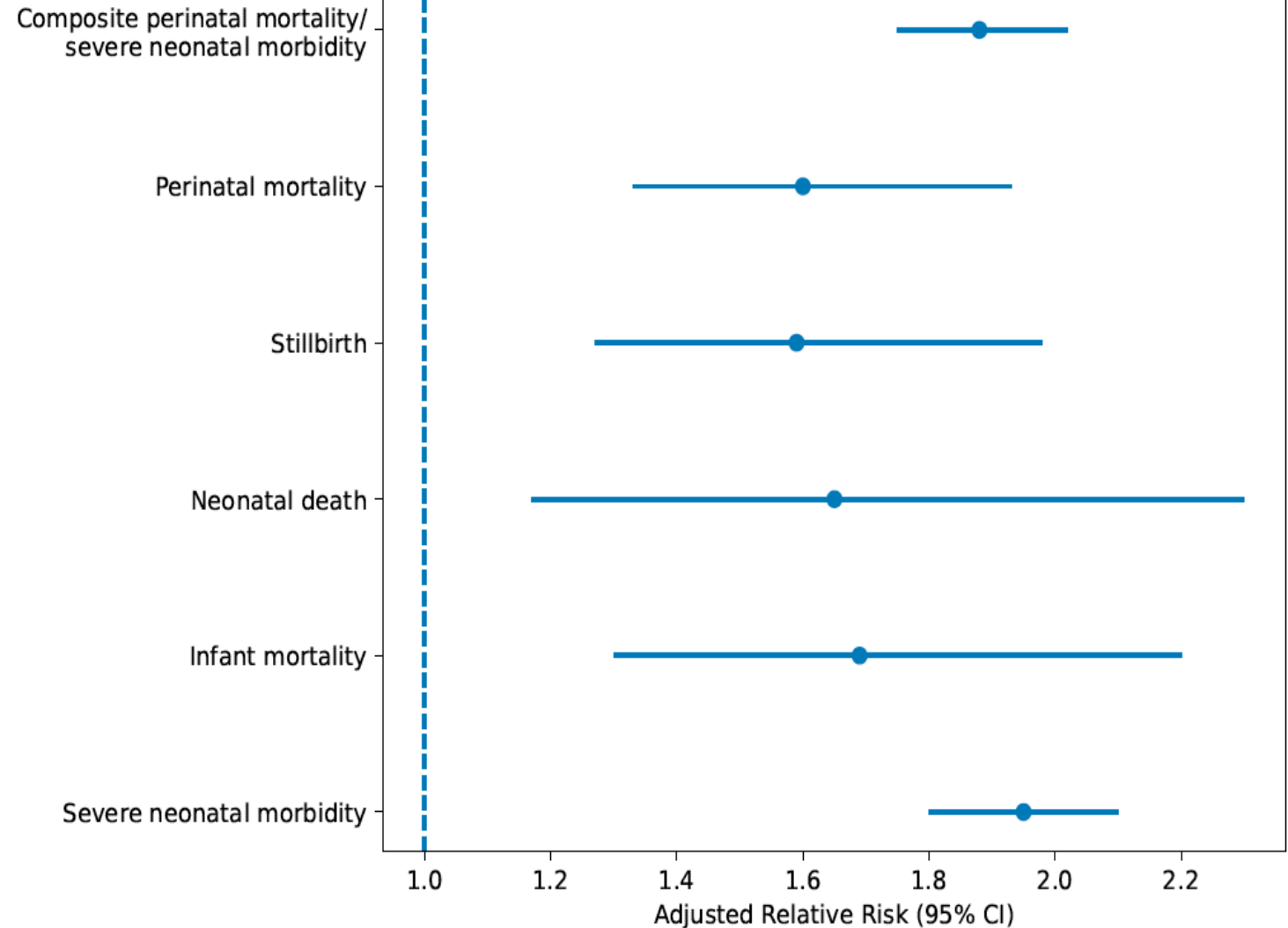
Swedish + BC population-based study

SMM in 1st pregnancy

No SMM in 1st pregnancy

Perinatal death, severe neonatal morbidity, SMM, PET, abruption, APH, PPH

Neonatal Outcomes: Adjusted Relative Risks

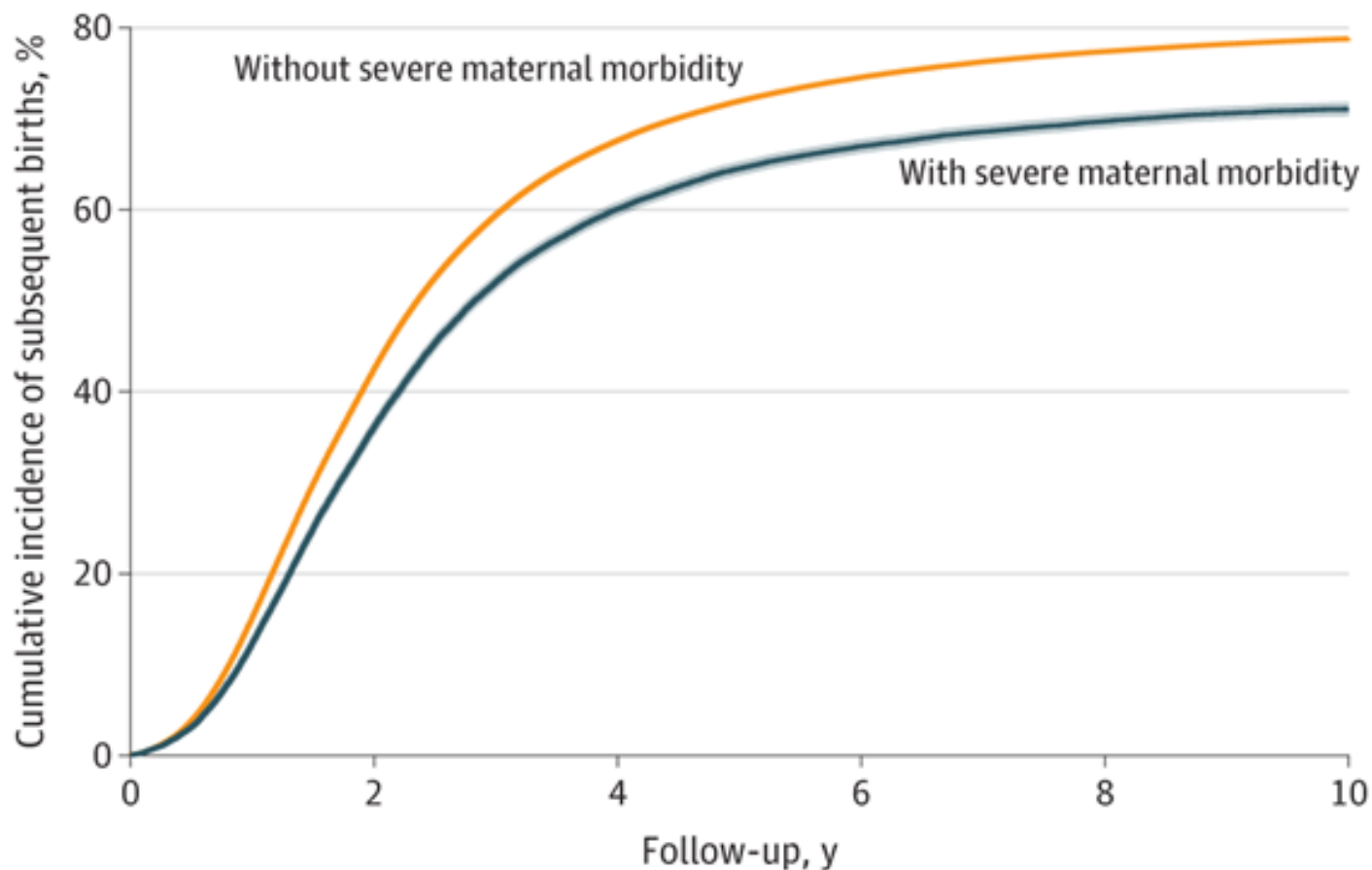


Greater reduction uterine rupture, CVS, cerebrovascular & severe mental health conditions

Swedish birth cohort
1,046,974 women
1999-2021

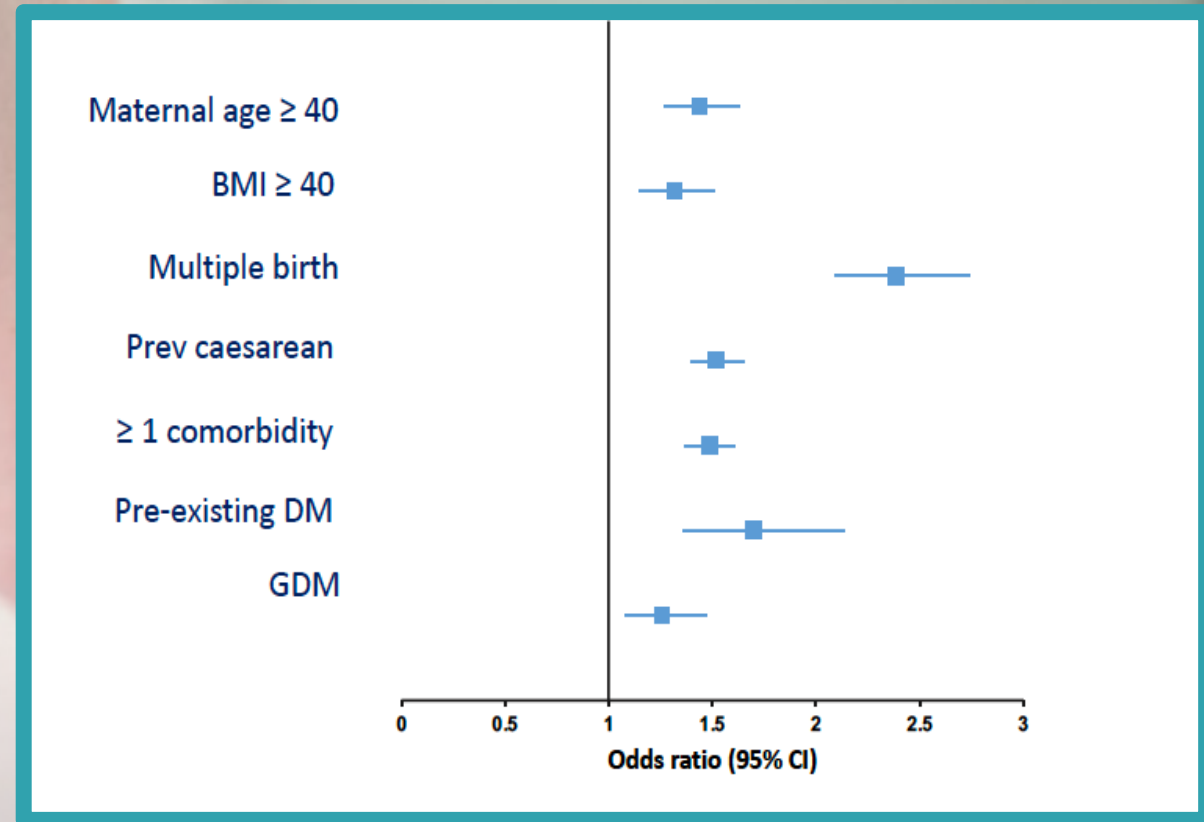
3.5% SMM

AdjHR 0.88 (0.87-0.89)



No. at risk	0	2	4	6	8	10
Without severe maternal morbidity	1 010 184	516 353	250 707	169 648	128 778	101 327
With severe maternal morbidity	36 790	21 201	11 644	8 430	6 683	5 374

Can epidural analgesia protect against severe maternal morbidity??



Who would you like to have the epidural?



27-year old prim

BMI 24

No significant PMH

Non-smoker

Normal pregnancy

Spont labour at 40 weeks



44-year old para 2

BMI 45

PMH – asthma

Smoker

GDM + PET

Induced labour at 32 weeks gestation





Risk factors for severe morbidity



BUT evidence limited...

Early Insertion of a Neuraxial Catheter for Complicated Parturients.

Literature Findings: The literature is insufficient to assess whether, when caring for the complicated parturient, the early insertion of a neuraxial catheter with immediate or

- Consider early insertion of a neuraxial catheter for obstetric (*e.g.*, twin gestation or preeclampsia) or anesthetic indications (*e.g.*, anticipated difficult airway or obesity) to reduce the need for general anesthesia if an emergent procedure becomes necessary.

The image features two dice, one in the foreground and one slightly behind it to the left. Both dice are light gray with black circular pips. The background is solid black. The text "Can epidural analgesia modify risk?" is centered over the dice in a white, sans-serif font.

Can epidural analgesia modify risk?

Studies including all delivery modes and postnatal period required

Guglielminotti et al 2022

US population based study
575,524 vaginal births
2010-2017

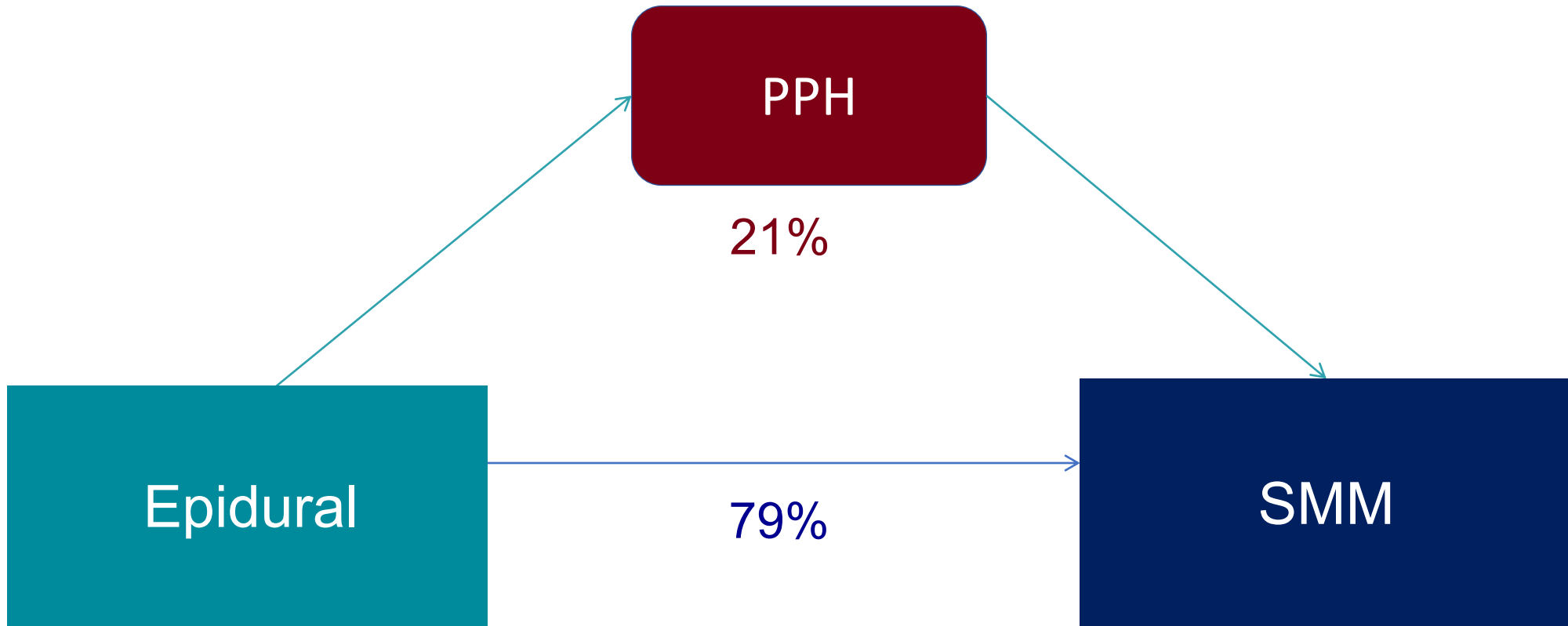
Epidural
(n=272,921)

No epidural
(n=302,603)

Primary endpoint
SMM at time of birth

	Adjusted OR (95% CI)
SMM (all women)	0.86 (0.82-0.90)
SMM (ethnic minority)	0.92 (0.78-0.87)
SMM (low risk)	0.93 (0.87-0.98)
SMM (high risk)	0.79 (0.74-0.85)

21% mediated through ↓ risk of PPH



Interpretation limited by poor sensitivity of blood TF recording on birth certificates

Guglielminotti et al 2023

US population-based study
12,503,042 vaginal and UCB
2015-2018

Epidural
(n=9,479,291)

No epidural
(n=3,023,751)

Primary endpoint
Maternal blood transfusion

Type of Delivery	Adjusted Odds Ratio (95% CI) for Blood Transfusion with Labor Neuraxial Analgesia
Intrapartum cesarean and vaginal	0.87 (0.82, 0.91)
Subgroup analysis	
Intrapartum cesarean	0.55 (0.48, 0.64)
Vaginal	0.93 (0.88, 0.98)



University of Glasgow

A unique cohort linking mums, babies and all healthcare interactions



Maternal Health Data



Community Health Index



Offspring Health Data

~2 million mother-infant pairs over 40 years with annual updates

SMM in 4.3 per 1000 pregnancies

Kearns et al

UK population-based study
567,216 births
2007-2019

Epidural
N=125,024

No Epidural
N=442,192

Indication vs no Indication

SMM by gestational age
Birth to 42d PN

“Indications” for epidural

- ✓ CVS / Resp disease
- ✓ Pre-eclampsia
- ✓ Previous caesarean
- ✓ Breech
- ✓ Multiple pregnancy
- ✓ Morbid obesity

Statistics

- Missing data – imputation
- Cluster robust Poisson regression modelling
- Adjustment for confounders using DAGs
- R Foundation for Statistical Computing



Epidural assoc with 35% ↓ risk SMM

Kearns et al

UK population-based study
567,216 births
2007-2019

Epidural
N=125,024

No Epidural
N=442,192

Indication vs no Indication

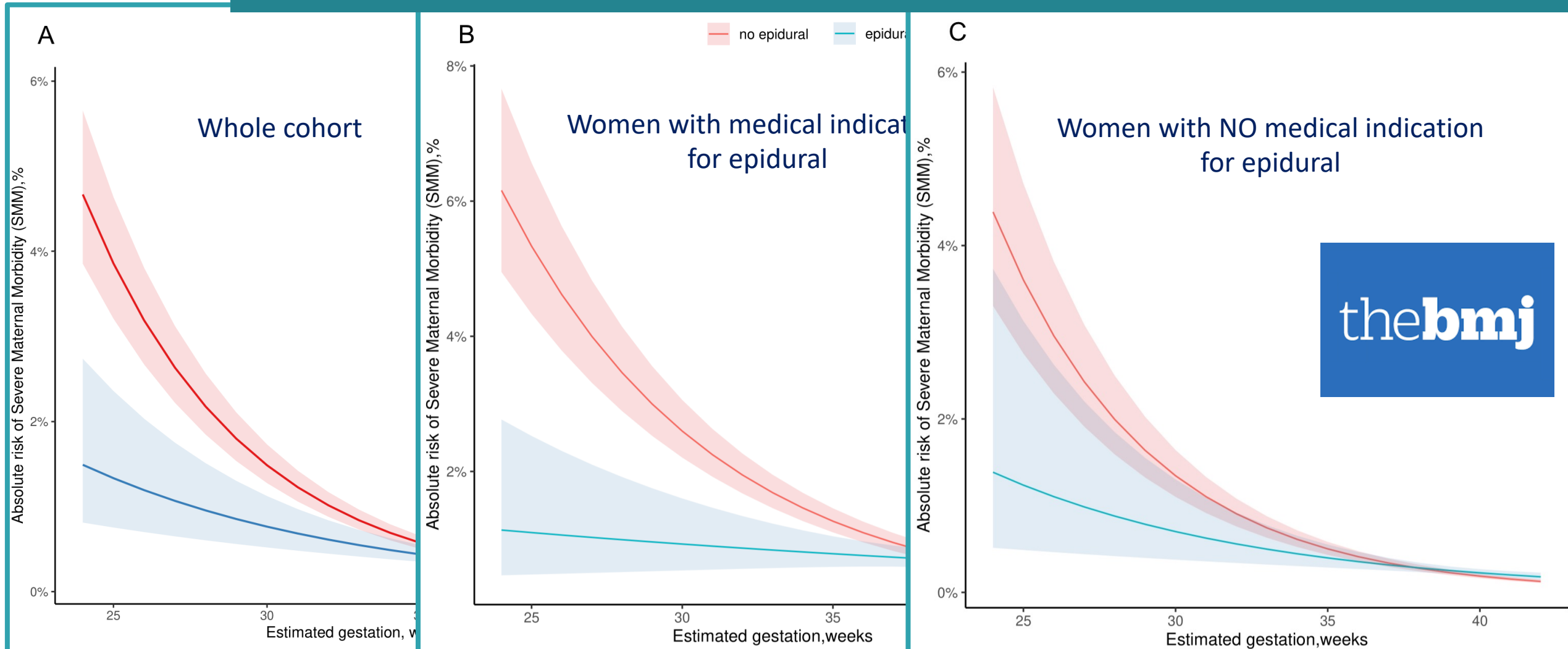
SMM by gestational age
Birth to 42d PN

	Adjusted RR (95% CI)
SMM (all women)	0.65 (0.50-0.85); p 0.001
SMM (high-risk women)	0.50 (0.34 to 0.72); p <0.001
SMM (premature)	0.53 (0.37 to 0.76); p <0.001

Particularly in high risk / preterm

Outcome	Adjusted RR (95% CI); P value		P-value for between subgroup difference
	Medical indication N = 77,439	No medical indication N = 411,907	
SMM	0.50 (0.34 to 0.72); <0.001	0.67 (0.43 to 1.03); 0.071	<0.0001
	Preterm birth N = 39,601	Term / post-term birth N = 527,615	
SMM	0.53 (0.37 to 0.76); <0.001	1.09 (0.98 to 1.21); 0.097	<0.0001
	Medical indication and preterm birth N = 12,797	No medical indication and term/post-term birth N = 391,813	
SMM	0.36 (0.24 to 0.53); <0.001	1.14 (0.99 to 1.31); 0.063	<0.0001

Only 25% of women with an indication for an epidural actually got one...



Consistent throughout sensitivity analyses

By WHO category of preterm birth / spontaneous and iatrogenic

Complete case / non-imputed data

E-values to measure uncontrolled confounding not explanatory

Epidural analgesia during labour and severe maternal morbidity: population based study

Rachel J Kearns,^{1,2} Aizhan Kyzayeva,² Lucy O E Halliday,² Deborah A Lawlor,^{3,4} Martin Shaw,^{2,5}
Scott M Nelson²

“Encouraging the adoption and enhancing accessibility to epidural analgesia for women in these higher risk categories could be instrumental in improving maternal health outcomes.”

But what about YOUR patient??

The Guardian
News provider of the year

Epidural in labour can reduce risk of serious complications by 35%, study finds

Researchers say expanding access to treatment may reduce risk of serious health outcomes and ensure safer childbirths



📷 Epidurals were also more effective in women who went into labour prematurely, or who had previous medical or obstetric conditions. Photograph: Montgomery Martin/Alamy

The Telegraph

Epidural cuts risk of post-birth complications by a third

Women who choose pain relief jab during labour are much less likely to develop life-threatening conditions, study finds

Michael Searles, HEALTH CORRESPONDENT
23 May 2024 • 7:33am



Epidurals - a spinal nerve block - is administered in about 30 per cent of deliveries | CREDIT: ChaNaWT/Stockphoto

“The patient in room 4 wants an epidural...”

27-year old prim

BMI 24

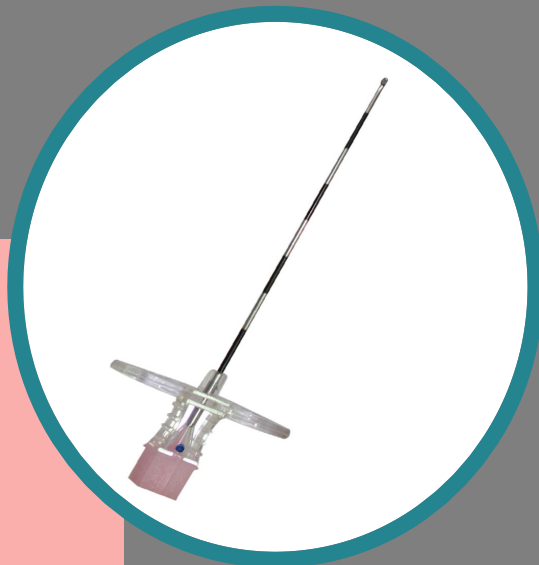
No significant PMH

Normal pregnancy

Non-smoker

Spont labour at 40 weeks





Risk of SMM 0.2%



Risk of SMM 0.2%

“The patient in room 4 wants an epidural...”

44-year old para 2

BMI 45

PMH – asthma

Smoker

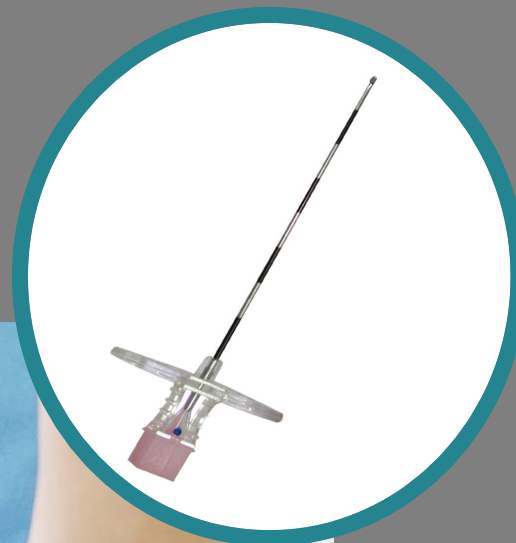
PET + GDM

Induced labour at 32 weeks gestation





High Risk
Pregnancy



Risk of SMM 8%

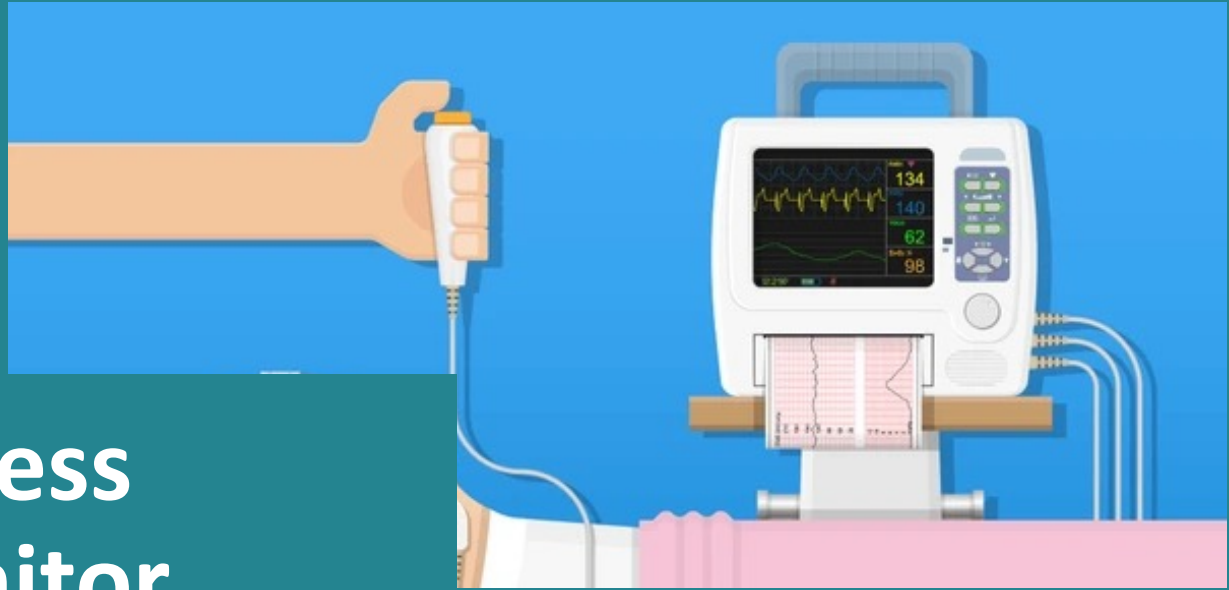


Risk of SMM 13%



The image features a bright yellow background with the word "CAVEATS" centered in a bold, dark blue, sans-serif font. Four short, dark blue horizontal dashes are positioned around the text: two above and two below, one on the left and one on the right side of the word.

CAVEATS



**Assess
Monitor
Risk modification
Intervention**





40-60%



20-30%



75%



PREMIUM

SCIENCE

MIND, BODY, WONDER

Epidurals may do more than relieve pain—they could save lives

New research links epidurals to a 35 percent lower risk of serious complications from childbirth, including blood clotting and sepsis. But doctors say it's still okay to opt out.

By Daryl Austin

May 24, 2024





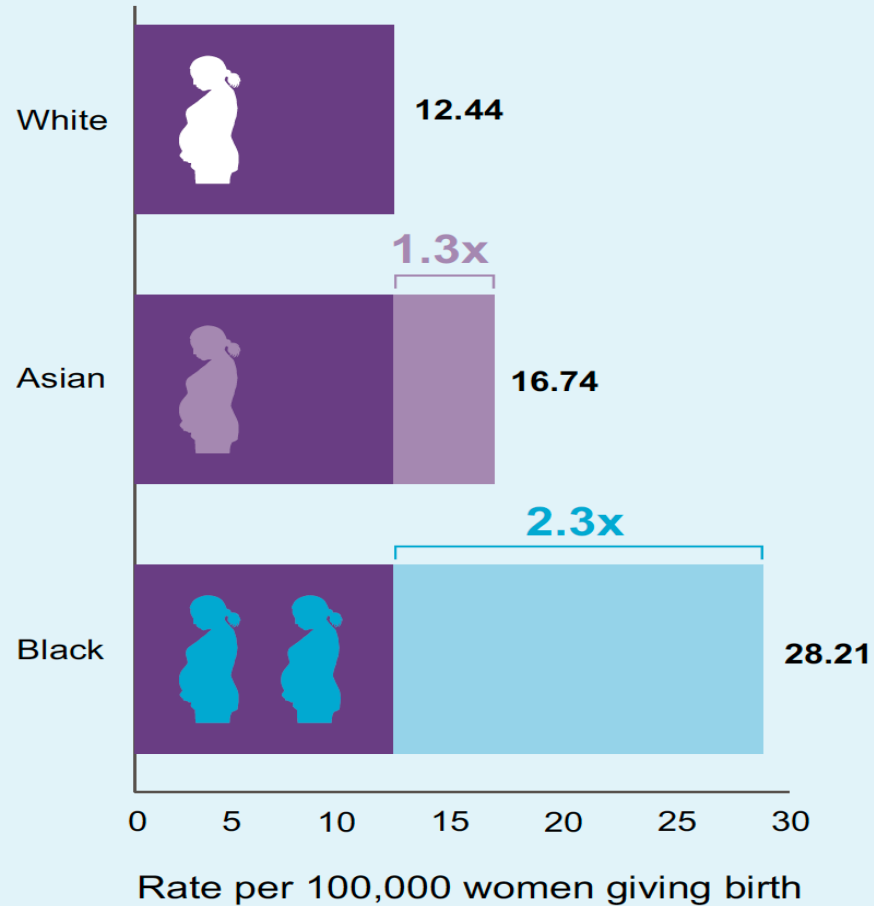
University
of Glasgow

A photograph showing four hands of different skin tones (light, medium, and dark brown) clasped together in a supportive grip. The hands are arranged in a circle, with each hand resting on the wrist of another. The background is plain white.

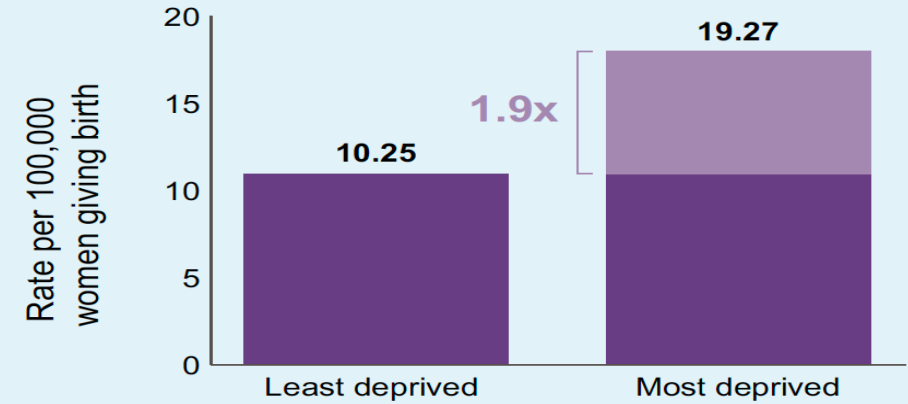
Are we providing equity in our care?

Inequalities in maternal mortality

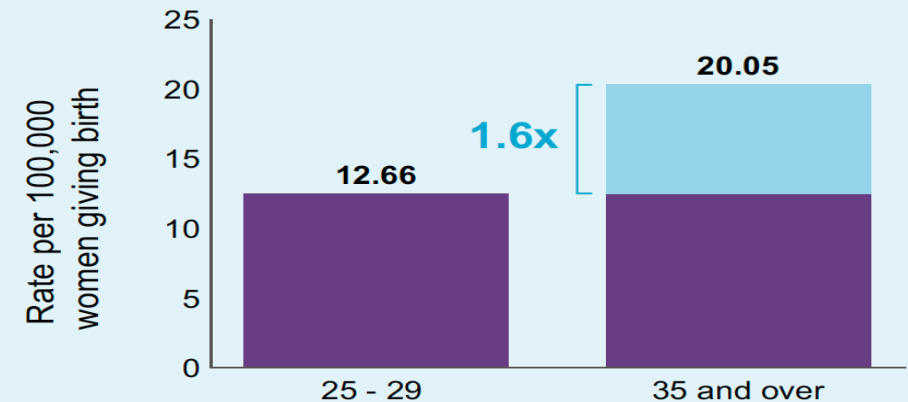
Ethnic group



Deprivation



Age



Most deprived 16% less likely to receive epidural than least deprived

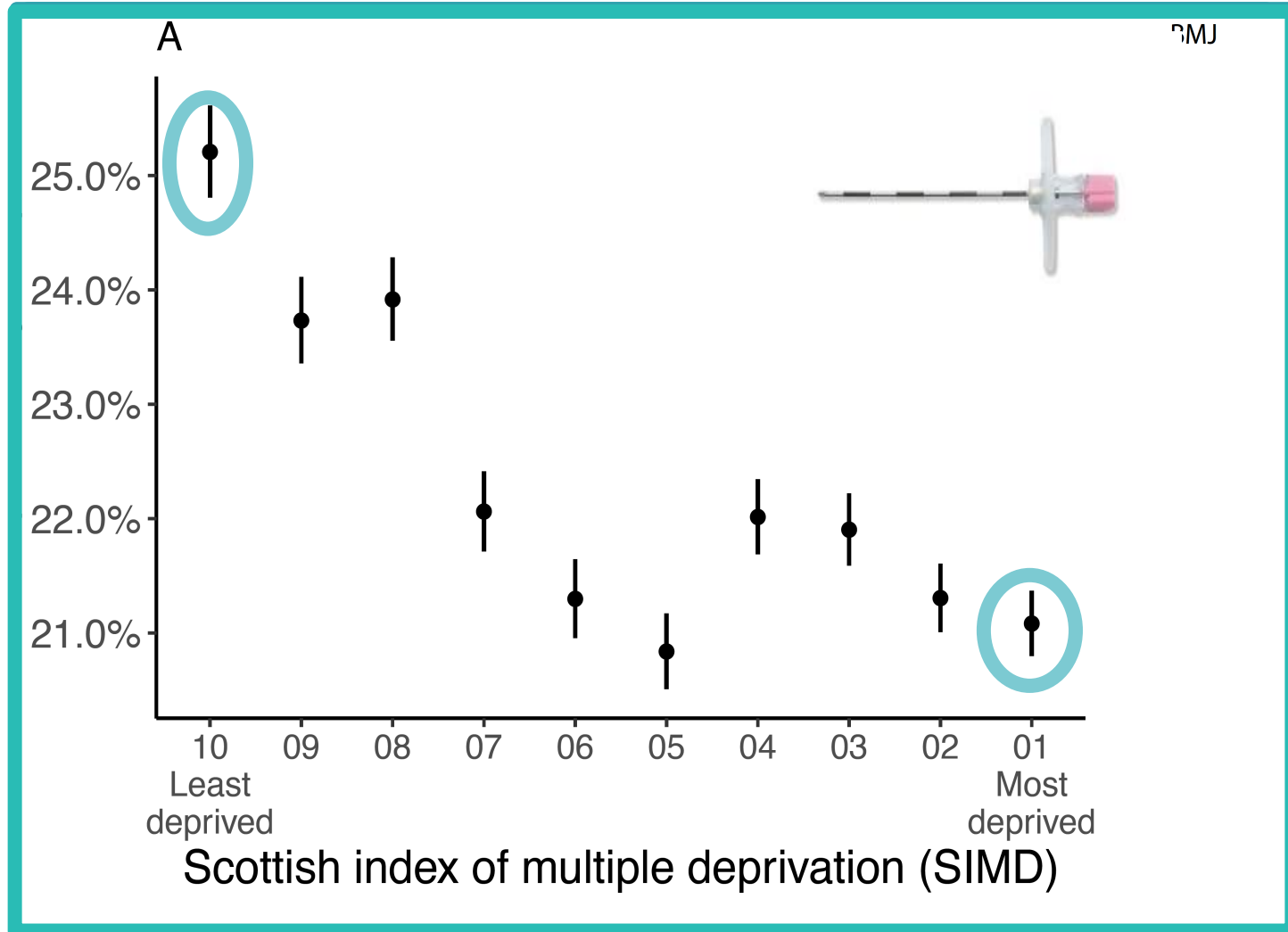
Halliday et al 2023

Population based cohort study
2007-2020
593,230 patients in labour

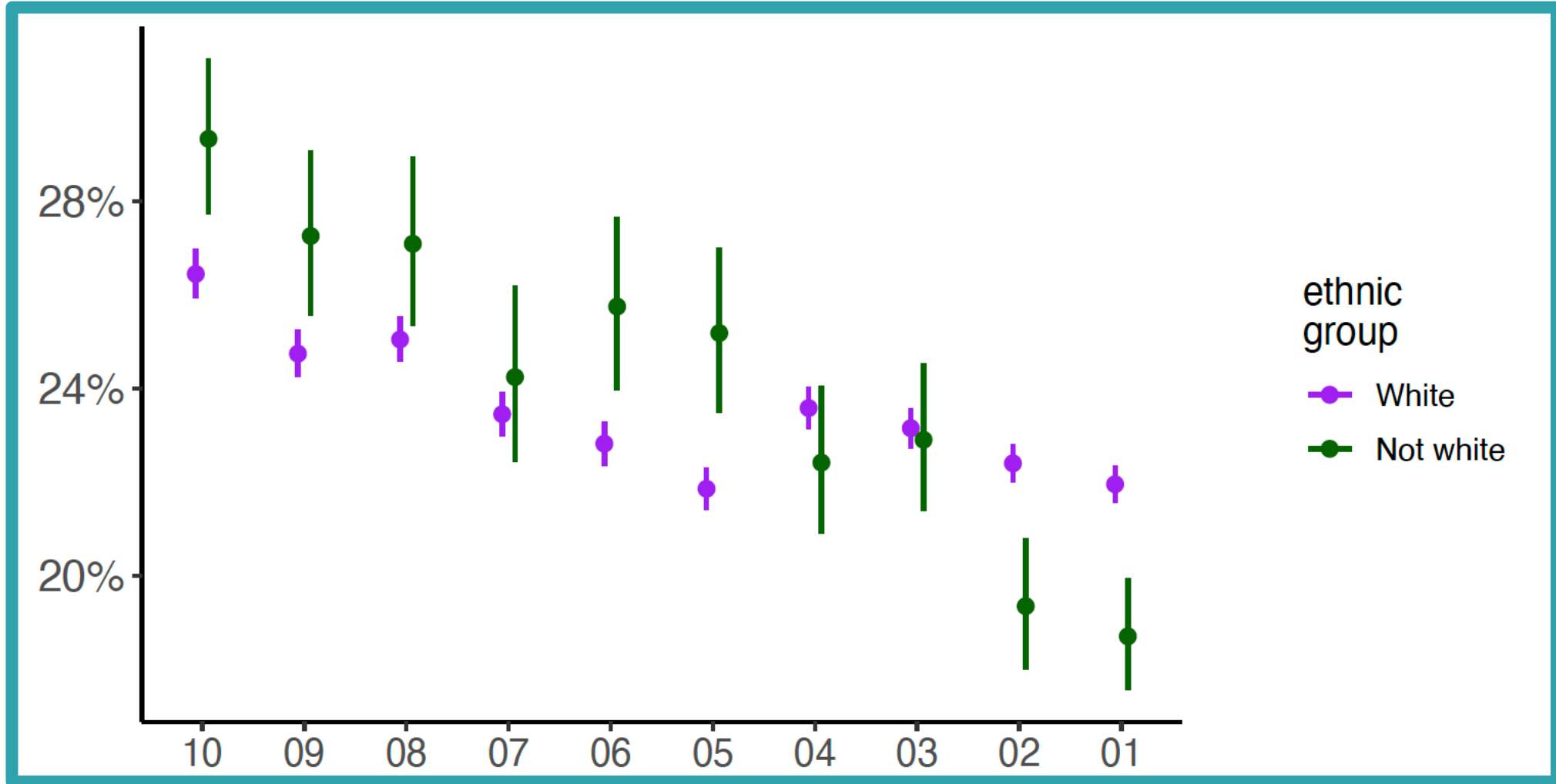
SIMD
Ethnic group

Stratified by
'medical
indication'

Epidural use in labour



Differences persisted across ethnic groups



News

Women from more deprived backgrounds are less likely to have an epidural, finds study

BMJ 2024 ; 384 doi: <https://doi.org/10.1136/bmj.q411> (Published 16 February 2024)

Cite this as: *BMJ* 2024;384:q411

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Zosia Kmietowicz

[Author affiliations ▾](#)

Rates increased if partner was Swedish native

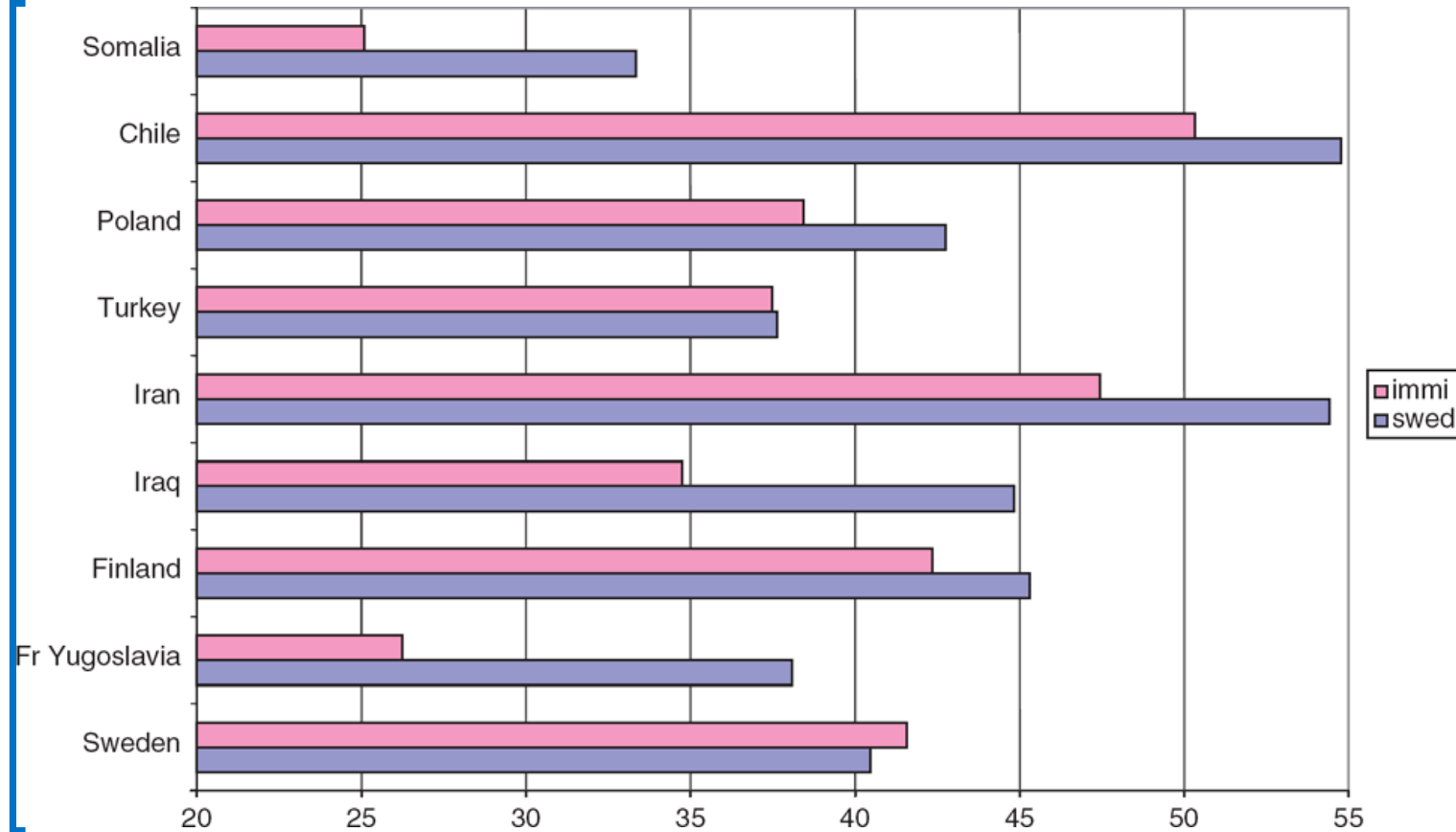
Ekeus et al 2010

Swedish population-based study
455,274 births
2015-2018

Swedish
natives

Non-nationals

Epidural use in labour



The background consists of a repeating pattern of green Monopoly money bills. The bills are oriented horizontally and feature the word 'MONOPOLY' at the top, the number '100' in a large circle in the center, and smaller '100' values in the corners. The bills are slightly offset from each other to create a sense of depth.

**MILLION
DOLLAR
QUESTION**

Mismatch between patient expectation & doctor communication

Foulon J et al 2026

Qualitative study
Minoritised ethnic groups
Six focus groups
34 women, 10 partners

6 focus groups
Thematic analysis

Experiences of labour analgesia

Communication

“Sometimes you feel like you ain’t got a choice, even for people [...] quite educated on the matter, but you feel like you... they know best and, you know, if they’re giving me it, it’s probably best for me”

Knowledge of pain relief options

“I think, the options were given to me, and... but like friends and family helps me choose, yeah”

Attitudes towards epidurals

“Whatever it is, I will die, die, but don’t put me epidural”

Cultural and social support networks

“[I] felt like I had let everyone down”

“But I kinda wish she’d believe me because this is my fourth pregnancy now, I’ve had children before, I know what I’m talking about, so please believe me when I tell you these are painful”

“No, I don’t want epidural. Because I am alone in this country who will look after the kid? No one will help me. See, if I have back pain, who [will help]. Because if you put an epidural lifetime—back pain.”

“I would say for them, the doctors and midwives, be more... be human first”

“I did take the epidural and I felt... a lot of pressure not to take it... I’ve heard comments from people: ‘Oh, you’re too soft. You couldn’t handle the pain,’ and... it made me feel like I was a failure.”

“I’m in labour and they’re not believing what I’m saying.”

“It’s not like anyone said anything, but there was so much pressure throughout my whole pregnancy, that after the birth, it mentally affected me for two years. I still think about it.”

Strengthening trust

Empathy and kindness

Awareness and trust in lived experience

Listening, communication, believing

Better explanation of pathways of pain relief

Explanation of side effects and benefits

Availability of translated materials and interpreter services

Multiple educational and informational formats

Inclusion of partners and families

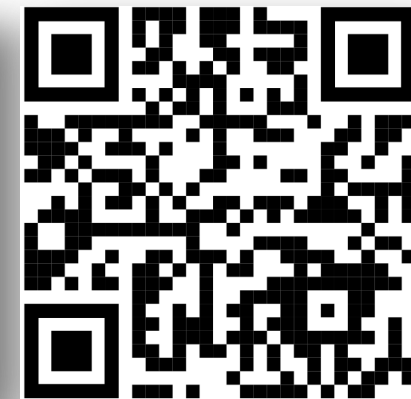
Accurate antenatal information is VITAL

For all women, discuss their preferences and choices for care during labour and birth as early as possible in their pregnancy, and record these

NICE



oaa_info
labourpainsoaa
<https://www.labourpains.org>



Did you know?

↓

- ✓ An epidural may take up to 40 minutes to work.
- ✓ An epidural should not make you feel drowsy or sick.
- ✓ An epidural will have very little effect on you or your baby.

LabourPains

Conclusions



- EPIDURAL POTENTIALLY MODIFIABLE RISK FACTOR FOR SMM
- PARTICULARLY IN HIGHER RISK WOMEN



- ? MECHANISM - BUNDLE OF CARE
- FURTHER WORK REQUIRED



- UK EPIDURAL RATE LOW CW OTHER COUNTRIES
- OPPORTUNITY TO IMPROVE OUTCOMES
- ACCURATE, INDIVIDUALISED ANTENATAL INFORMATION VITAL



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