

Pregnancy at the extremes of maternal age

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Disclosures

No conflicts of interest to report.

Objectives

- 1) Predict and prepare for unique risk factors that affect women at the extremes of maternal age.
- 2) Adapt routine prenatal and post partum care to accommodate the unique needs of adolescents and women over the age of 40.
- 3) Counsel patients at extremes of maternal age on what to expect in labour and arrange for appropriate referrals for intrapartum care.

ADOLESCENT PREGNANCY

Pregnancy from 10 to 19 years old

National stats often define as pregnancies in the 15-19 year old age group

Adolescent Pregnancy - Generalizations

- Globally, declining in frequency (~2.8% of pregnancies in Canada).
- More than 70% of teen pregnancies in Canada are unintended and 51% undergo induced abortion.
- Associated adverse pregnancy outcomes (mostly from American data):
 - More preterm birth, low birth weight, SGA, low 5-minute Apgar.
 - More perinatal mortality, neonatal mortality, infant mortality.

Adolescent Pregnancy - Generalizations

- Associated with future disparities for both the adolescent and their child:
 - Adolescent: more likely to live in poverty, have lower educational achievement, fewer employment opportunities, poorer mental health, less social support, higher rates of substance abuse.
 - Child: greater risk for less educational achievement and lower level of life satisfaction.

Youngest pregnant teens (aged 10-14)

- In the USA in 2003, 15.8% of pregnant adolescents aged 10-14 had no prenatal care or care started after the 2nd trimester.
- 4-fold increase in stillbirth when compared to adults.
- Younger the patient, the greater the risk of infant mortality.
- Highest risk of poor perinatal outcome is in pregnancy conceived within 2 years of menarche.

Prevalence of Low Birth Weight, Premature Birth, and Stillbirth Among Pregnant Adolescents in Canada: A Systematic Review and Meta- Analysis

N. DeMarco et al. J Pediatr Adolesc Gynecol 34 (2021) 530-537

- For LBW: 6 studies, 26,240 teens : 562,066 adults.
 - OR 1.56 (95% CI 1.24, 1.97)
- For PTB: 8 studies, 38,809 teens : 674,033 adults.
 - OR 1.23 (95% CI 1.06, 1.42)
- For stillbirth: 3 studies, 32,806 teens : 586,822 adults.
 - OR 1.20 (95% CI 1.05, 1.37)

Prevalence of Low Birth Weight, Premature Birth, and Stillbirth Among Pregnant Adolescents in Canada: A Systematic Review and Meta- Analysis

N. DeMarco et al. J Pediatr Adolesc Gynecol 34 (2021) 530-537

- High heterogeneity between studies.
- Some studies did not adjust for confounding variables.
- Mean age in most studies was 17-18 years old.
- Not able to investigate the influence of socio-economic status or substance use “which we suspect are important considerations in the association between adolescent pregnancies and adverse birth outcomes”.
- Correlation between adolescent pregnancy and adverse birth outcome was weaker than in data from the United States.

Social determinants of health and adverse maternal and birth outcomes in adolescent pregnancies: A systematic review and meta-analysis

Amjad et al. Paediatr Perinat Epidemiol. 2019;33:88-99

- Meta-analysis of 31 studies.
- African American and Aboriginal teens had increased rates of preterm birth and low birthweight compared to White adolescents.
- Rural residence was consistently linked with increased preterm birth.
- Low maternal socio-economic status and illiteracy were found to increase the rate of adolescent maternal mortality and LBW infants.

Social determinants of health and adverse maternal and birth outcomes in adolescent pregnancies: A systematic review and meta-analysis

Social determinant of health	Outcome	Sample size (number of studies)*	Point estimate (95 % Confidence interval)*	
African American race	Low birthweight	40 774 (4) ^{16,18,23,25}	pOR 1.53 (1.45, 1.62) ^{16,18,23,25}	
	Preterm birth	40 297 (4) ^{16,19,23,25}	pOR 1.67 (1.59, 1.75) ^{16,19,23,25}	
Indigenous status	Neonatal mortality	5074 (1) ¹⁷	1.88 (0.65, 5.43) ¹⁷	
	Low birthweight		1.92 (1.54, 2.40) ¹⁷	
	Preterm birth		1.87 (1.50, 2.33) ¹⁷	
Low socioeconomic status	Low birthweight	55 237 (5) ^{24,38,42,44,45}	a1.28 ²⁴	
			1.55 (1.25, 1.93) ⁴²	
	Maternal mortality	59 421 000 (1) ²¹	Not reported	
Poor educational attainment	Maternal mortality	59 425 564 (2) ^{21,40}	Not reported	
Rural residence	Preterm birth	114 532 (3) ^{25,30,31}	1.13 (1.06, 1.20) ²⁵	
			3.37 (1.54, 7.36) ³¹	
	Small for gestational age	21 880 (1) ³¹	2.12 (1.33, 3.40) ³¹	
Low social capital	Low birthweight	8112 (4) ^{18,20,29,41}	1.90 (1.10, 3.30) ¹⁸	

Antenatal Care in an Adolescent Pregnancy

JL Marino et al. Aust Fam Phys 45 (2016)

HK Leftwich & MV Ortega Alves. Pediatr Clin N

Am 64 (2017) 381-388

- Make diagnosis of pregnancy as early as possible
- Provide non-judgmental support and counseling, including all options.
- Screen for sexual abuse and exploitation, particularly among younger adolescents
- Assess nutritional adequacy.
- Screen for STIs (at least first visit, third trimester and PP) and also treat the partner.

Antenatal Care in an Adolescent Pregnancy

JL Marino et al. Aust Fam Phys 45 (2016)
HK Leftwich & MV Ortega Alves. Pediatr Clin N Am 64 (2017) 381-388

- Screen for alcohol and substance use.
- See patient more often than adult patients.
- Provide access to smoking cessation
- Treat iron deficiency anemia.
- Teach about signs and symptoms of preterm labour.
- Discuss contraception before delivery.
- Encourage and facilitate breastfeeding.

Intrapartum Care

JL Marino et al. Aust Fam Phys 45 (2016)
HK Leftwich & MV Ortega Alves. Pediatr Clin N Am 64
(2017) 381-388

- **Intrapartum:**
- Education ahead of time.
- Partner, family, friends present depending on the adolescent's wishes
- Robust supportive care in labour; experienced bedside nursing/midwifery
- Access to analgesia options
- Mode of delivery by Obstetrical indications, vaginal delivery usually achievable even in younger adolescents.

Postpartum Care

JL Marino et al. Aust Fam Phys 45 (2016)
HK Leftwich & MV Ortega Alves. Pediatr Clin N Am 64
(2017) 381-388

- **Postpartum:**
- Encourage return to school and continuing healthy lifestyle changes made in pregnancy.
- Facilitate public health nurse visits to the home.
- Screen regularly for alcohol and substance use, violence and depression.
- Assess nutritional adequacy, especially if breastfeeding.
- Provide access to smoking cessation.
- Review contraceptive options (ideally LARC) and safer sex.

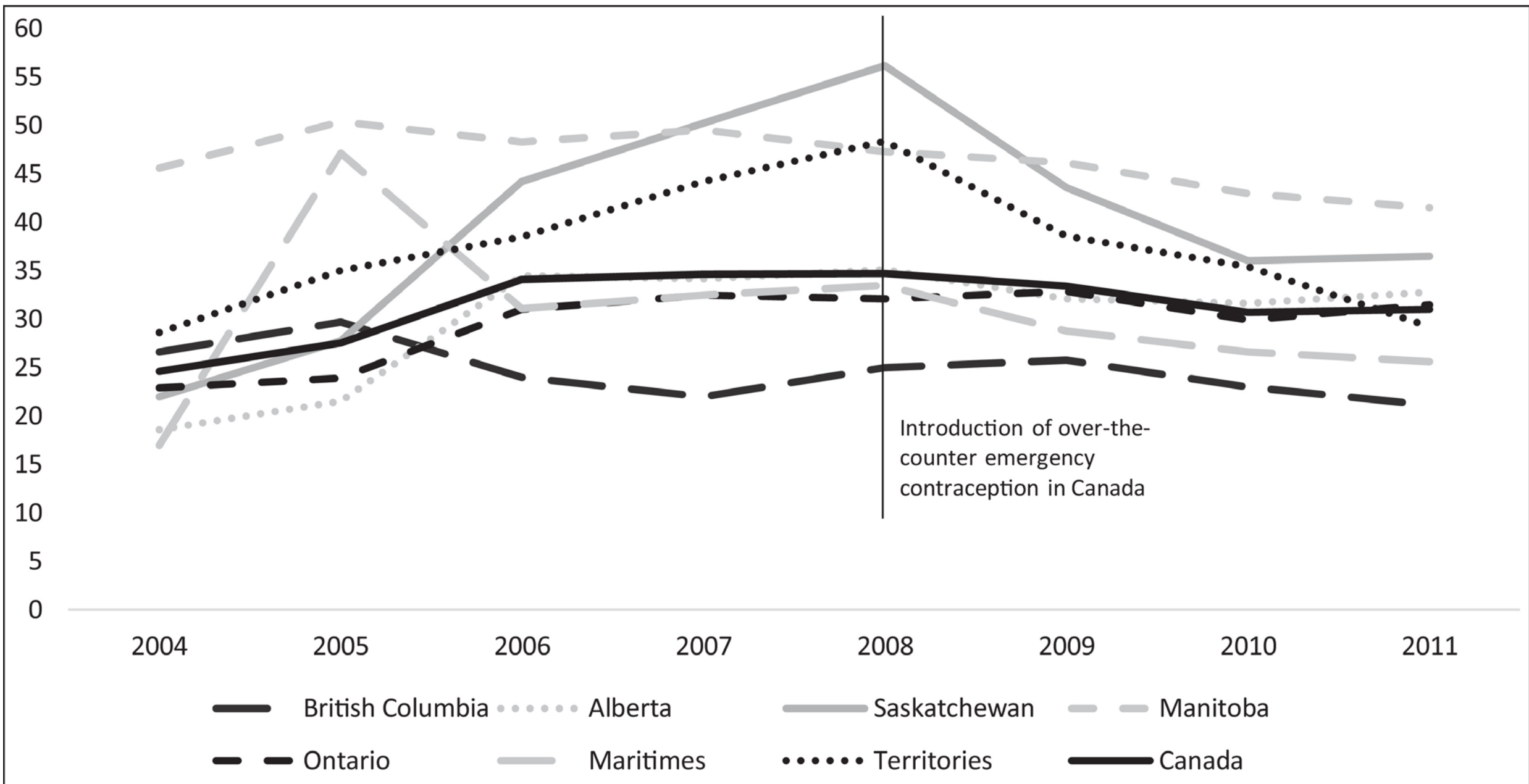
Multidisciplinary Care

- Nursing (health education)
- Social work (finances, housing, relationships, school, transportation, childcare)
- Dietician (nutrition supplements, diet counseling)
- Psychologist (trauma history, stress, anxiety, depression)
- Peer support, group prenatal education
- Addiction resources
- Lactation consultant/breastfeeding clinic
- Public Health nursing
- Include partner where possible

Trends in Adolescent Rapid Repeat Pregnancy in Canada

K. Ramage et al. J Obstet Gynaecol Can 2021;(5)589-595

- Rapid repeat pregnancy (RRP) is defined as a birth occurring within 33 months of a previous birth (conceive within 24 months PP).
- Authors looked at hospitalizations across Canada (excluding Quebec) for fiscal years 2004/5 to 2014/5.
- Captured 67,957 adolescent pregnancies.
- 32.9% had a RRP (more common in 18-19 y old than 15-17 y old).
- Generally, rates of maternal or neonatal morbidity were similar in the second pregnancy.



Trends in adolescent rapid repeat pregnancy, 2004–2011, by province

Tips from Dr. A. Morris/MB experience

- Most teens that are pregnant are **afraid** > try to make them feel safe/cared for.
- Use language they can understand. Listen/be approachable.
- Teach them about their anatomy, what to expect (first pelvic exam, labour and delivery). Prepare them.
- Encourage going to school while pregnant (they may be embarrassed)
- May be an opportunity to try and improve quality of life/make changes.
- Frequent intimate partner violence and food insecurity.
- Marijuana use almost universal but other drug use uncommon.
- Many patients of Aboriginal background.
- SGA/LBW not as common as reported in the literature.
- Monitor for proteinuria as a herald to pre-eclampsia (HTN may be a later and acute/severe development)
- Post-partum contraception so important (try to reduce the rate of multiples under age 20)

Take-aways re: Adolescent Pregnancy



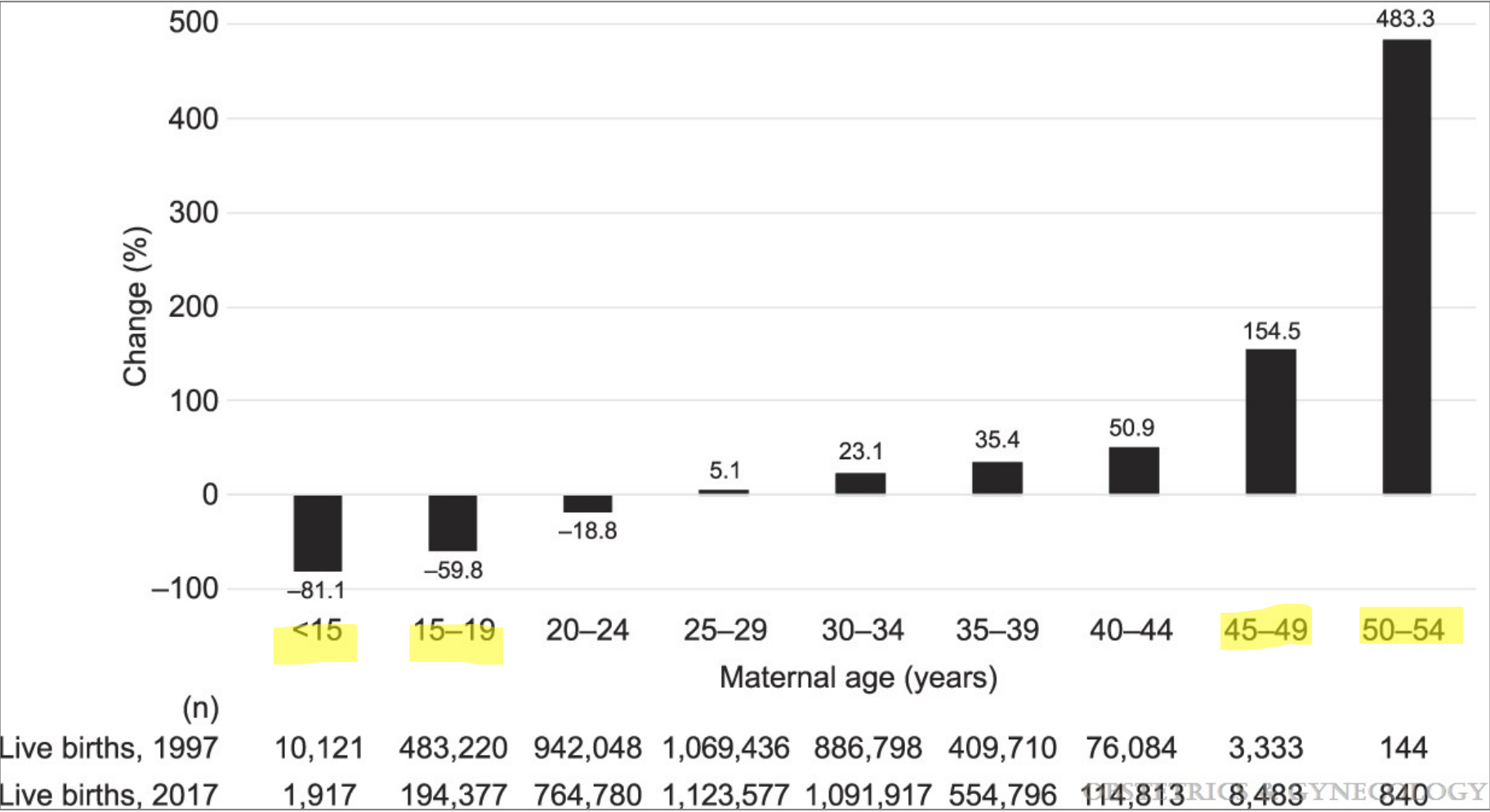
PREGNANCY AT ADVANCED MATERNAL AGE

ADVANCED MATERNAL AGE: OVER AGE 35 (?AGE 40)

VERY ADVANCED MATERNAL AGE: OVER AGE 45

POST-MENOPAUSAL PREGNANCY: OVER AGE 50

Fig. 1.



[Postmenopausal Pregnancy in the Era of Assisted Reproductive Technologies](#)

Moutos, Christopher P.; Rasouli, Melody A.; Phelps, John Y.
Obstetrics & Gynecology136(1):154-160, July 2020.
doi: 10.1097/AOG.00000000000003877

Percent change in total live births by maternal age group, 1997–2017 (USA)

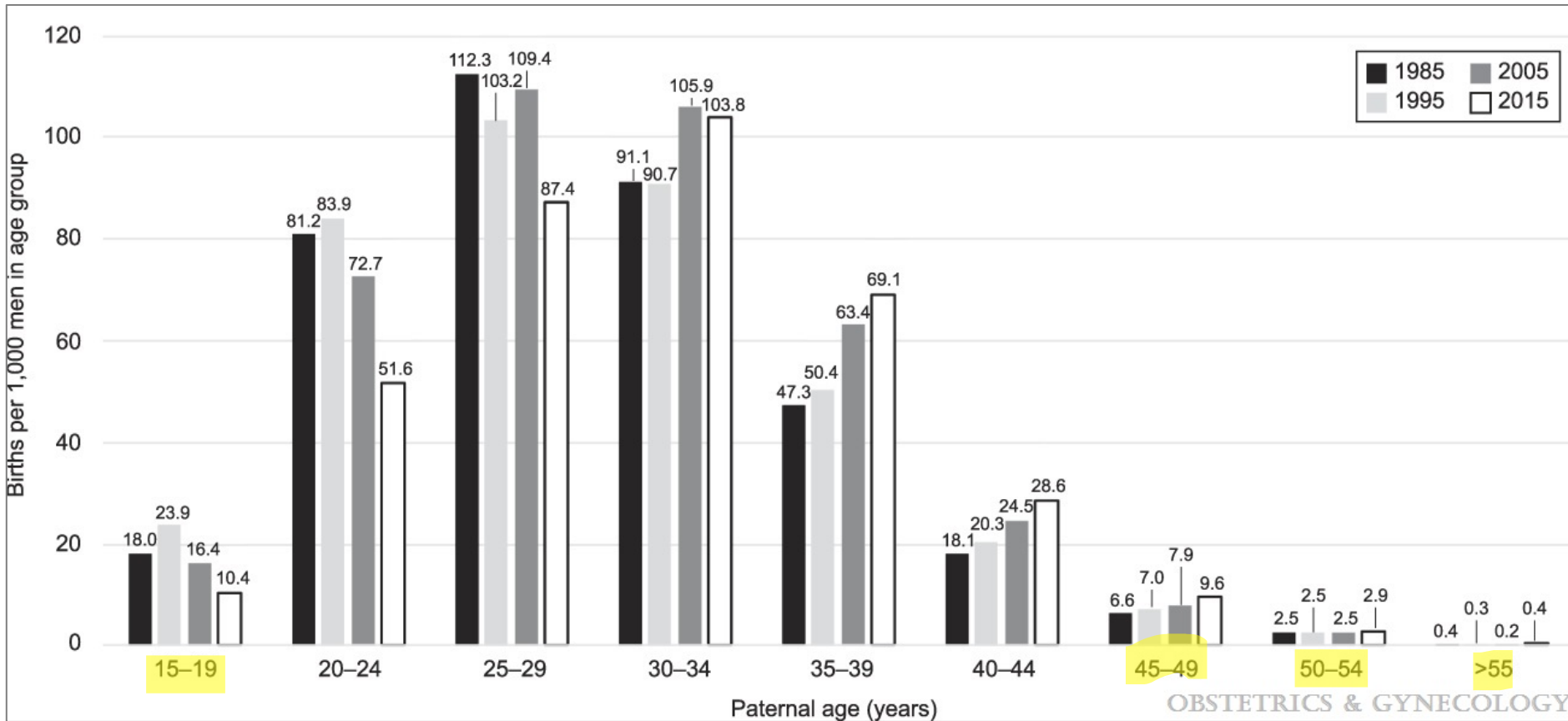
Fig. 2.

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Trends in birthrate by paternal age group, 1985–2015, USA



Complications of pregnancy associated with increased maternal age

Table 1

Summary of risks of select adverse pregnancy outcomes at advanced maternal age.

Adverse Outcome	Age 35-39		Age >40	
	Absolute Risk (%)	aORs	Absolute Risk (%)	aORs
Pregnancy Loss				
First Trimester Miscarriage	17	—	34–54	—
Second Trimester Miscarriage	1.0–1.5	1.3–2.0	1.7–2.2	2.4–3.1
Stillbirth	0.3–0.6	1.4	0.4–0.9	2.12
Fetal Complications				
Chromosomal Abnormalities	0.8–1.3	2.5–4.0	1.9–3.8	7.4–9.9
Fetal Growth Restriction	4.7	1.2–1.6	5.9	1.4–3.9
Maternal Complications				
Pre-eclampsia	2.3	1.2–1.6	3.3	1.5–2.4
Gestational Diabetes	2.4	1.6–2.0	3.1	1.9–3.8

aORs-adjusted odds ratios. Adapted from Refs. [4,6,7,9,15].

Table 1

Summary of pregnancy outcomes in relation to advanced maternal age.

Conception issues	Decreased fertility OR 2 [8] Increased demand for assisted reproduction technologies OR 1.5–2.5 [8]
Early pregnancy complications	Increased risk for: ectopic pregnancy OR 4–8 [13,14] spontaneous abortion OR 1.5–2 [8] pregnancy involving multiples OR 2 [34] chromosomal aberrations and birth defects OR 2 [17]
Late pregnancy complications	Increased risk for: hypertension OR 2–4 [20] pregestational and gestational diabetes OR 3–6 [20] placenta previa OR 10 [21] low birth weight and preterm delivery OR 1.2–1.9 [31] stillbirth OR 1.32–1.88 [32] cesarean section OR 1.5–3 [22]
Postpartum complications	Increased risk for: postpartum fever OR 2.6 [20] postpartum hemorrhage OR 1.95 [2] thrombosis OR 3.47 [2] hysterectomy OR 1.83 [7]

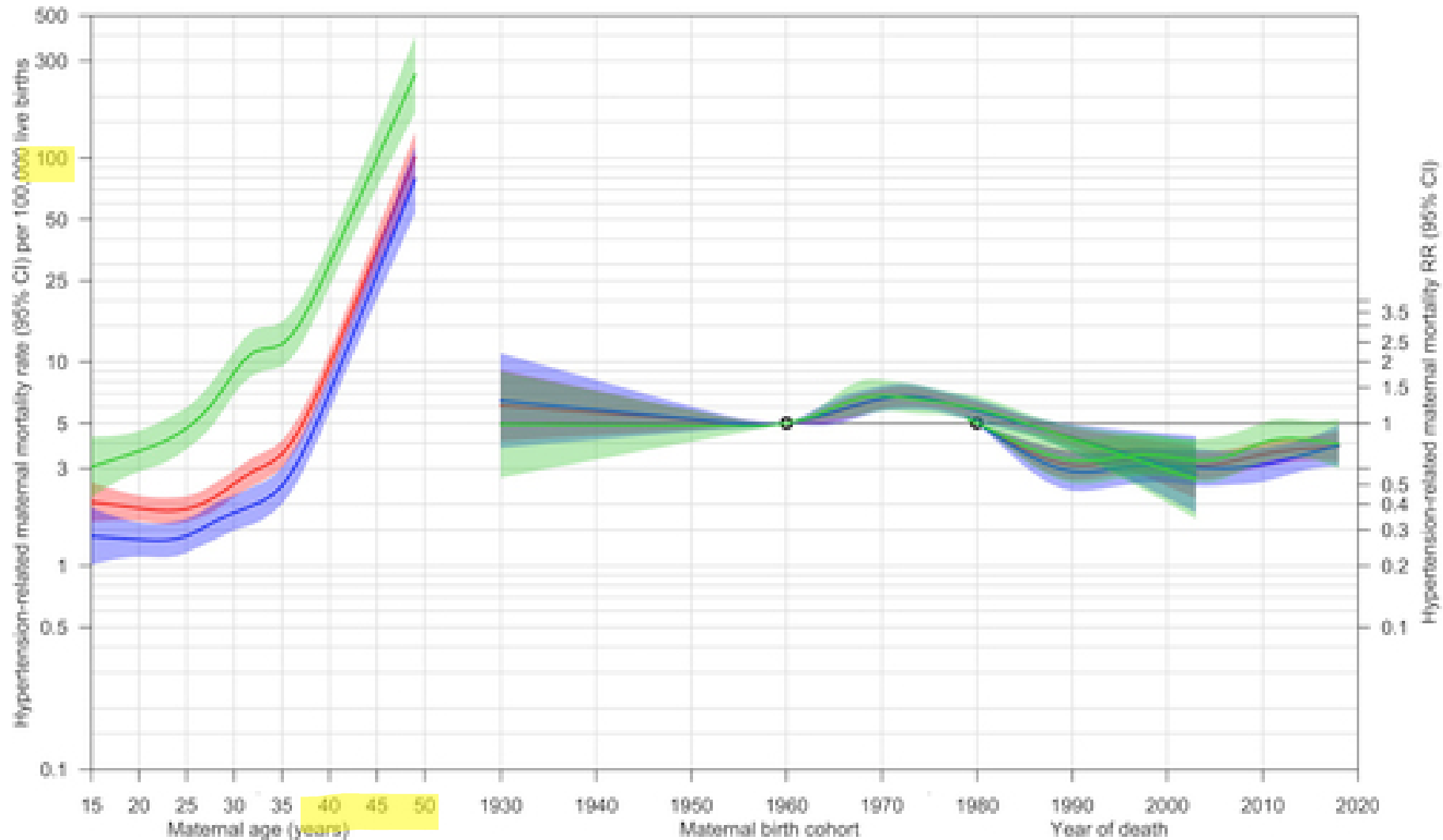


Strategies to mitigate maternal and fetal risk

Table 2

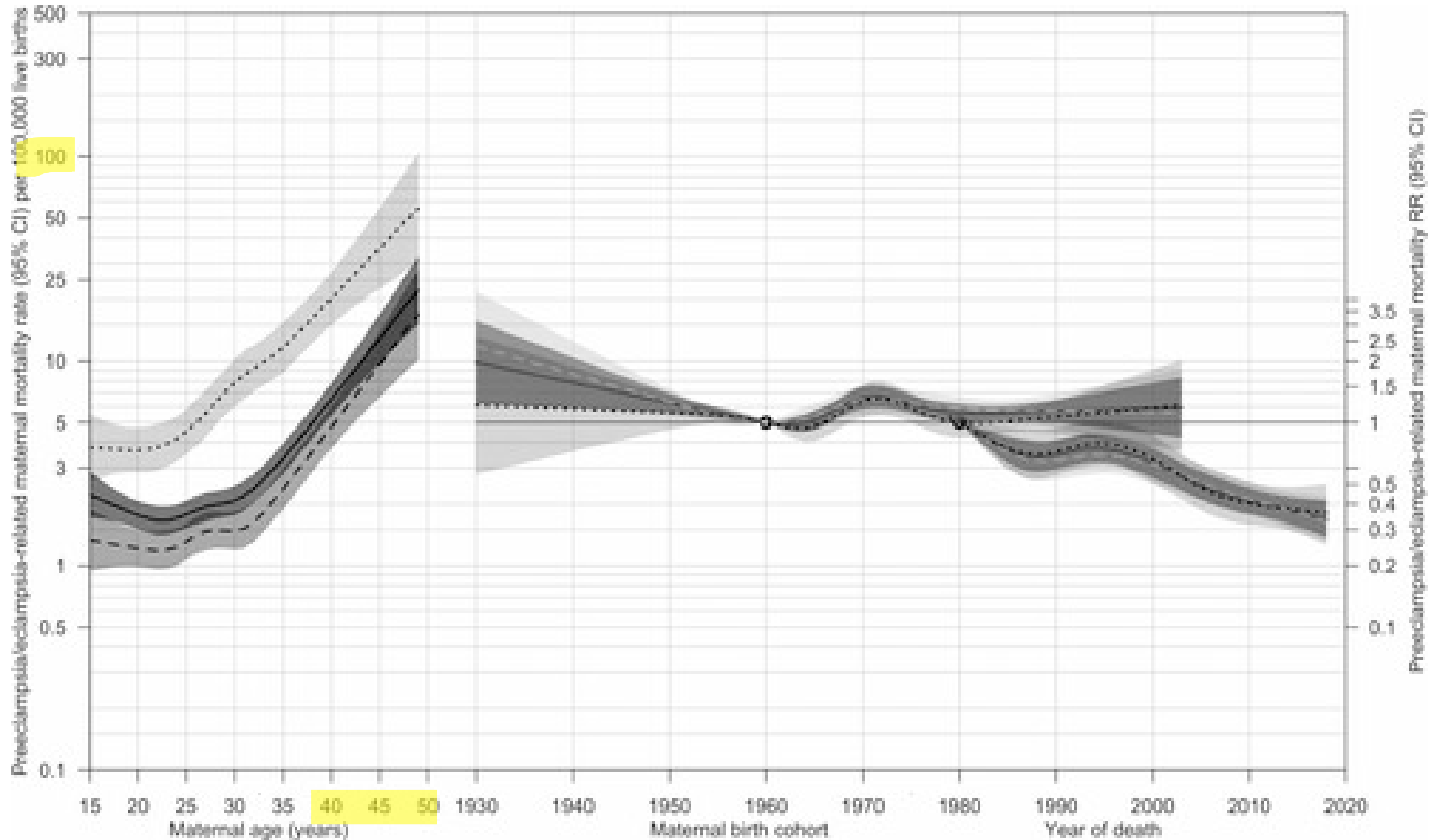
Recommendation for pregnancy management in elderly women.

Period	Issue	Recommendation
Preconception	Chronic diseases	<ul style="list-style-type: none"> • Advice for healthy diet and regular activity • Treat, adapt treatment for pregnancy (eg ACEi) • Screen high risk population for occult T2DM • Screen high risk population for micro and macrovascular complications (ophthalmologist consult, proteinuria and echo-cardiography)
1st Trimester	ART	<ul style="list-style-type: none"> • Limit multiple pregnancy
	Ectopic Pregnancy	<ul style="list-style-type: none"> • Early US for determine location • Active management
2nd Trimester	Chromosomal aberration and congenital anomalies.	<ul style="list-style-type: none"> • Non-Invasive Screening • US for detection of fetal anomalies • Consider fetal echocardiography • Invasive Screening
	Gestational Diabetes	<ul style="list-style-type: none"> • Screen for GDM
3rd Trimester	Hypertension	<ul style="list-style-type: none"> • Screen for hypertension and proteinuria
	Placenta	<ul style="list-style-type: none"> • US for placental location
	Fetal Growth	<ul style="list-style-type: none"> • US for estimated fetal weight at 32, 34 and 36 G A
	Stillbirth	<ul style="list-style-type: none"> • Consider induction of labor at 39 GA.
	Mode of Delivery	<ul style="list-style-type: none"> • Controversial – some evidences advocate for planned vaginal delivery [30].
	Post-partum hemorrhage	<ul style="list-style-type: none"> • Manage actively 3rd stage of labor. • Not enough evidence for tranexamic acid prophylaxis treatment.



Cande V. Ananth. Hypertension. Historical and Recent Changes in Maternal Mortality Due to Hypertensive Disorders in the United States, 1979 to 2018, Volume: 78, Issue: 5, Pages: 1414-1422, DOI: (10.1161/HYPERTENSIONAHA.121.17661)





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Table 2. Documented Rate of Aspirin Use for the Prevention of Preeclampsia in Ontario, Canada, From April 1, 2018, to December 31, 2020

	Aspirin use for the prevention of preeclampsia among 371 237 hospital livebirths and stillbirths	
	No./total	% (95% CI)
Did not have diabetes, obesity, or chronic hypertension ^a	9479/293 052	3.2 (3.2-3.3)
Had diabetes only	981/5711	17.2 (16.2-18.2)
Had obesity only ^a	4991/72 120	6.9 (6.7-7.1)
Had chronic hypertension only	1084/3927	27.6 (26.2-29.0)
Had diabetes and obesity ^a	490/2203	22.2 (20.5-24.0)
Had diabetes and chronic hypertension	145/396	36.6 (31.9-41.6)
Had obesity and chronic hypertension ^a	596/1845	32.3 (30.2-34.5)
Had diabetes, obesity, and chronic hypertension ^a	104/268	38.8 (32.9-44.9)

^a Obesity was defined as a prepregnancy body mass index greater than 30.

Aspirin Use for Preeclampsia Prevention Among Women With Prepregnancy Diabetes, Obesity, and Hypertension. JAMA 2022 (327) 388-390

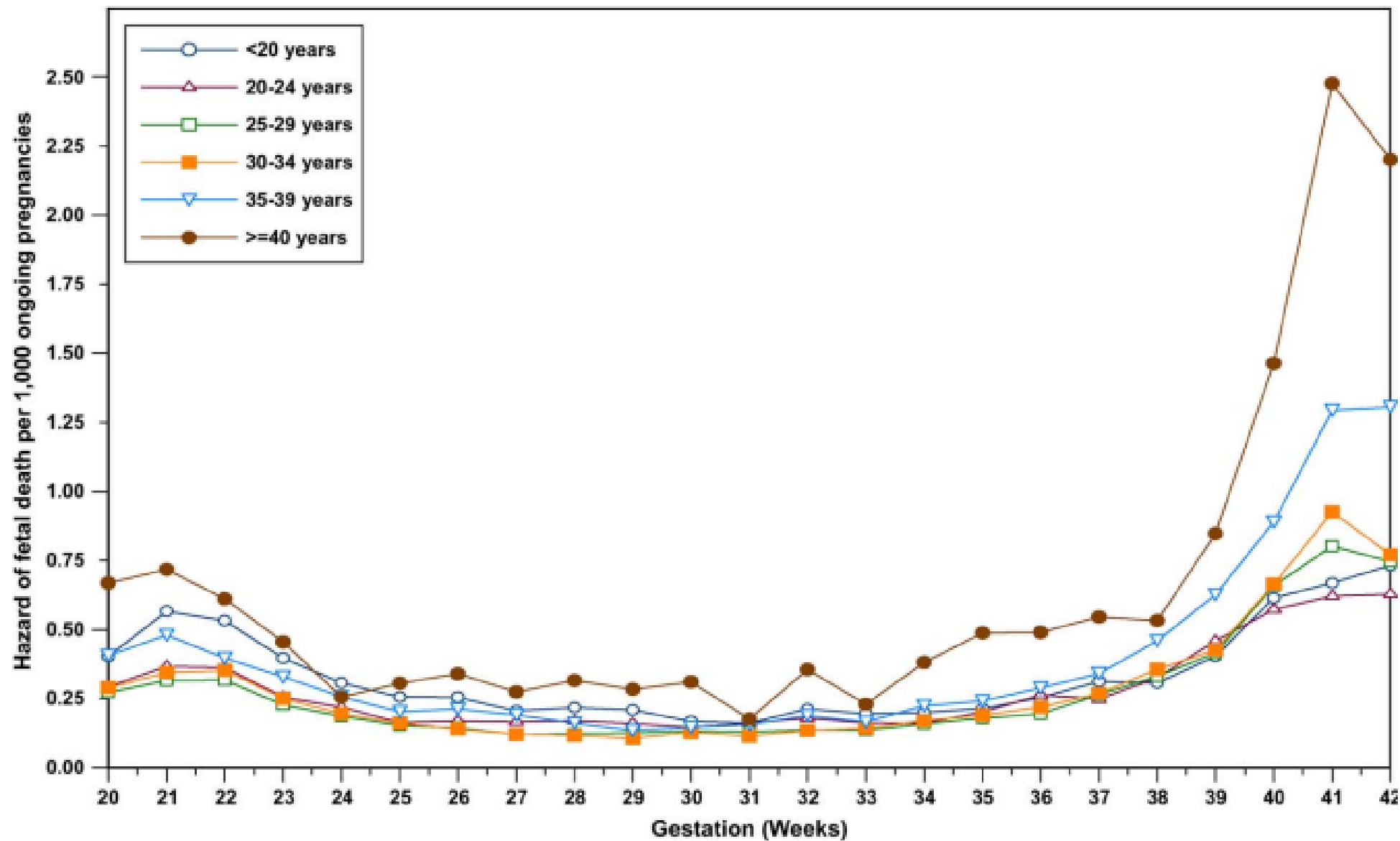


Figure Hazard (risk) of stillbirth for singleton births without congenital anomalies by gestational age, 2001-2002.

Management of Delivery

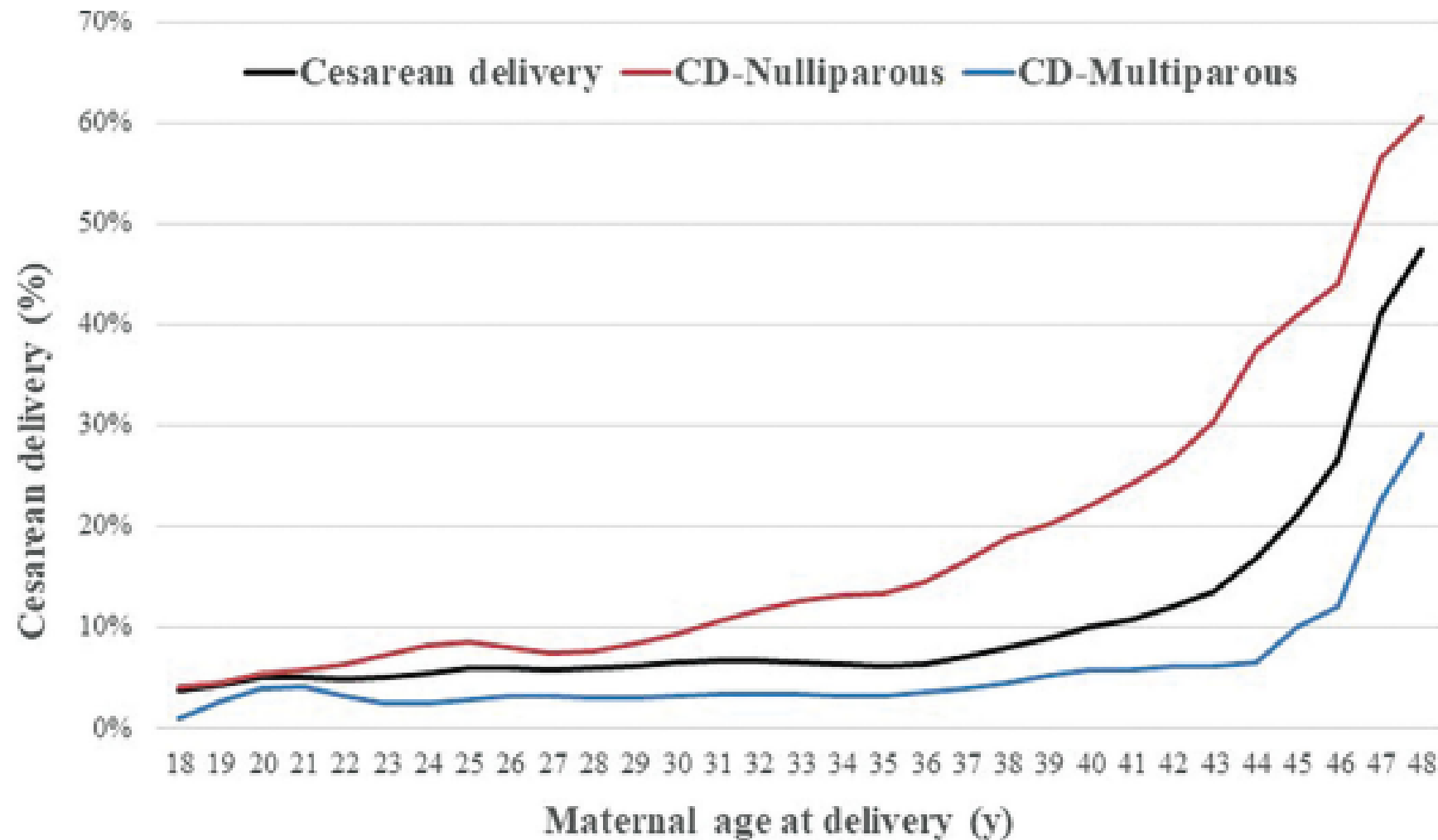


Figure 3. Intrapartum cesarean delivery rate as a function of maternal age stratified by parity. The overall rate of intrapartum cesarean delivery (black line), and among nulliparous (red line) and multiparous (blue line) women (Chi-square for trend; $p < .001$, for all). CD: cesarean delivery.

E. Attali et al (2021): The risk of intrapartum cesarean delivery in advanced maternal age, The Journal of Maternal-Fetal & Neonatal Medicine.

Table 2 Maternal outcomes

Outcomes	Type of planned delivery, <i>n</i> (%)		Adjusted OR (95 % CI)	<i>p</i> value
	Cesarean ^a 35,170 %	Vaginal 406,897 %		
In-hospital death	25.6/100,000	4.4/100,000	5.63 (2.52–12.55)	<0.01
Severe morbidity ^b	4.91	4.68	1.06 (1.00 ^c –1.02)	<0.05
Hemorrhage requiring hysterectomy	0.09	0.05	1.81 (1.25–2.61)	<0.01
Any hysterectomy	0.16	0.08	1.81 (1.36–2.40)	<0.01
Postpartum hemorrhage	1.11	2.52	0.44 (0.39–0.48)	<0.01
Disseminated intravascular coagulation	0.24	0.11	2.13 (1.69–2.69)	<0.01
Transfusion	0.92	0.44	2.07 (1.84–2.34)	<0.01
Uterine rupture	0.01	0.03	0.30 (0.10–0.94)	<0.05
Anesthetic complications	0.55	0.31	1.78 (1.53–2.07)	<0.01
Obstetric shock	0.17	0.13	1.29 (0.98–1.69)	NS
Chorioamnionitis	1.37	1.33	1.06 (0.96–1.16)	NS
Cardiac arrest	0.56	0.10	5.39 (4.54–6.38)	<0.01
Postpartum cardiomyopathy	0.02	0.01	1.97 (0.82–4.71)	NS
Acute renal failure	10.03	0.01	3.39 (1.78–6.46)	<0.01
Assisted ventilation or intubation	0.11	0.02	4.81 (3.27–7.08)	<0.01
Obstetrical embolism	0.05	0.01	4.58 (2.56–8.21)	<0.01
Amniotic fluid embolism	0.01	0.00	2.17 (0.63–7.45)	NS
Deep vein thromboembolism	0.02	0.01	1.87 (0.84–4.18)	NS
Major puerperal infection	0.41	0.19	2.21 (1.85–2.65)	<0.01
Sepsis	0.04	0.02	2.27 (1.25–4.14)	<0.01
In-hospital wound dehiscence	0.16	0.02	8.69 (6.13–12.32)	<0.01
Obstetrical wound hematoma	0.01	0.01	1.09 (0.34–3.57)	NS
Hospital stay, mean difference (95 % CI)				
Length, days, mean (SD)	3.26 (1.64)	2.23 (1.08)	1.03 (1.02–1.05)	<0.01
Cost, \$, mean (SD)	14,794.5 (12,135.6)	9892.2 (8685.2)	4902.3 (4771.3–4033.4)	<0.01

Post-menopausal pregnancy

RJ Paulson et al. JAMA 2002;288:2320-2323
S Antorini et al. Reprod BioMed Online Dec 2002
T MacArthur et al. Menopause. 2016;23:799-802

- Age limits (? Age 50-54)
- Exclusion of patients with **any** significant co-morbid condition (especially hypertension, obesity and cardiovascular disease).
- Suggested workup: CXR, ECG, PFTs, exercise stress test, biochem/CBC/lipid panel/TSH/DM testing
- Avoid multiple pregnancy.
- IVF with donor oocytes.
- Clinical pregnancy rates ~ 40% > livebirth rate ~30% (miscarriage rate 1/4).
- High rates of pre-eclampsia (26% under age 55y, 60% if 55y or older)
- Gestational DM (13% under age 55y; 40% if 55y or older)
- Increased fetal morbidity and mortality.
- High rate of CS delivery (~75%)

Take-aways re: Pregnancy after age 40

