Cardiopatie e Gravidanza

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Circulation

American Heart Association.

Poorly Understood Maternal Risks of Pregnancy in Women With Heart Disease

Karen Florio, Tara Banaszek Daming and Anna Grodzinsky

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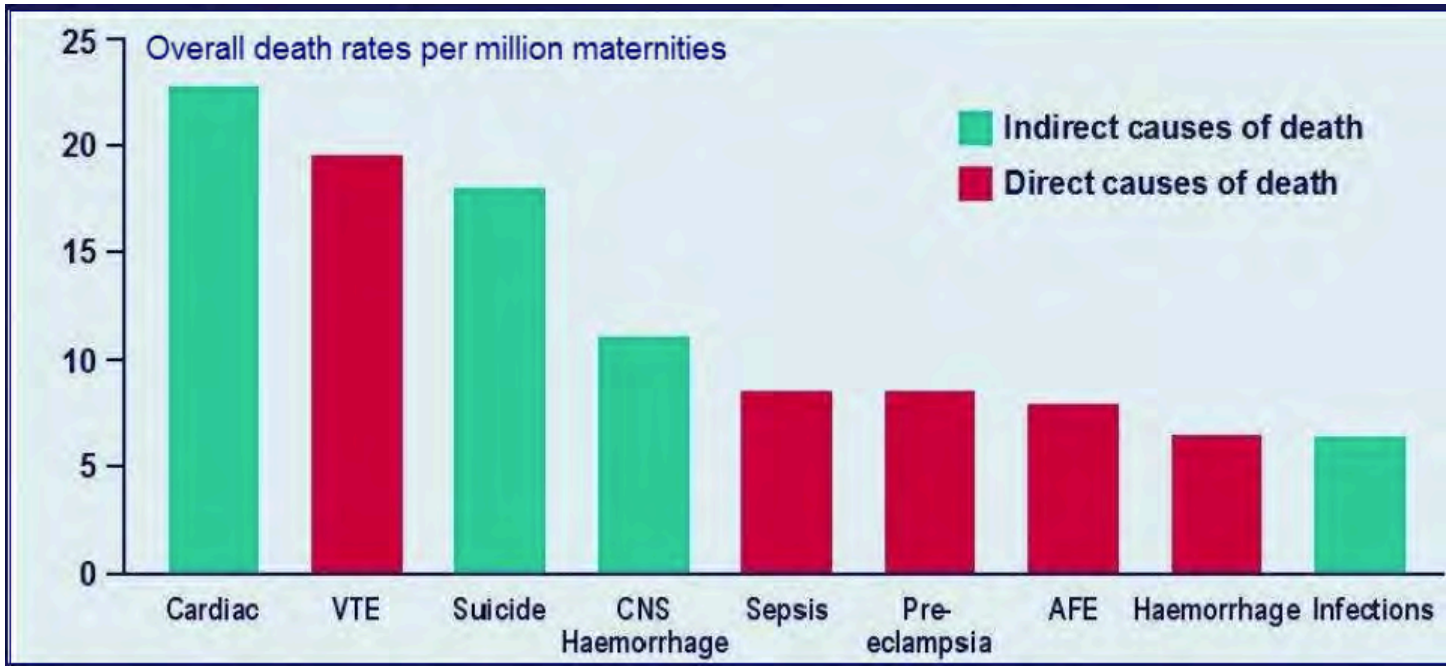
One of the most significant accomplishments of modern medicine worldwide is the dramatic 28% decrease in neonatal mortality during the past 20 years. However, although neonatal survival is improving and, for most of the world, maternal mortality is decreasing, this trend has not been seen in the United States. Neonatal survival has improved in the United States, whereas maternal mortality has increased from 7.2 deaths per 100 000 in 1989 to 17 deaths per 100 000 in 2013. In fact, the United States is the only developed nation with a rising maternal mortality rate. Maternal mortality is even higher for black women, approaching 4-fold that of their white, Asian, or Hispanic counterparts. **Although cardiac disease complicates a small number of all pregnancies, it has become a leading cause of maternal morbidity and mortality, surpassing both hemorrhage and embolic events….**

Gravidanze e cardiopatie

- Principale causa di morte in gravidanza è di origine cardiaca

dati UK 2003-2005



Gravidanze e cardiopatie

European Heart Journal (2015) **36**, 2491–2499
doi:10.1093/eurheartj/ehv288

REVIEW

Clinical update

Pregnancy in women with congenital heart disease

Matthias Greutmann[1]* and Petronella G. Pieper[2]

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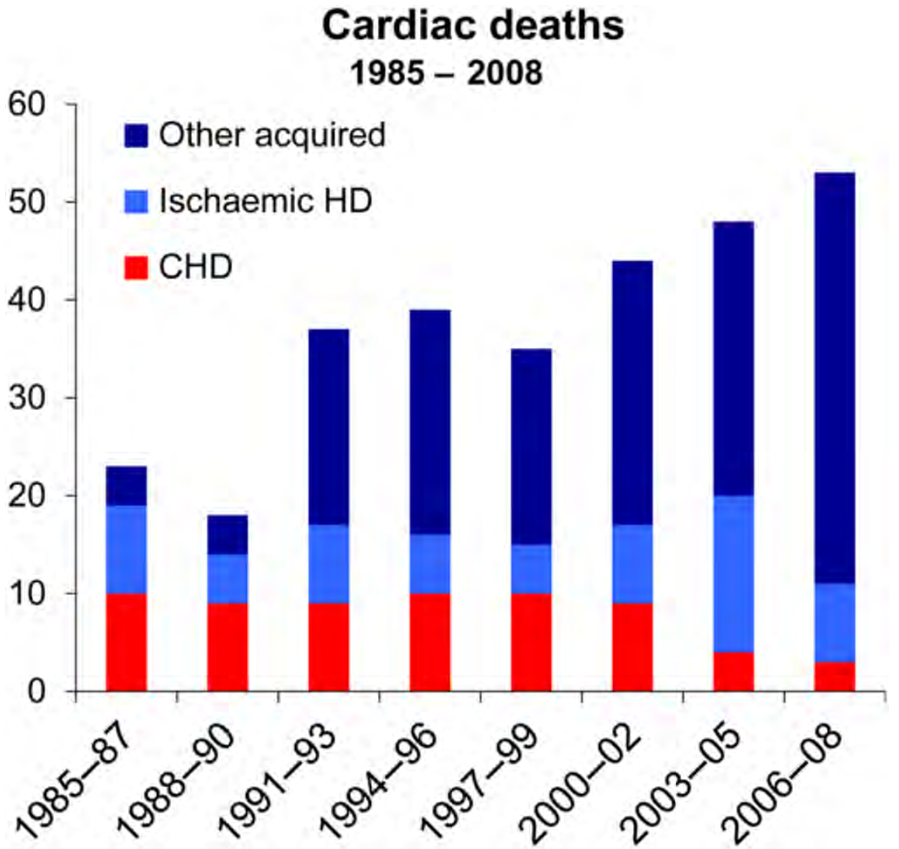
Congenital heart defects are the most common birth defects. Major advances in open-heart surgery have led to rapidly evolving cohorts of adult survivors and the majority of affected women now survive to childbearing age. The risk of cardiovascular complications during pregnancy and peripartum depends on the type of the underlying defect, the extent and severity of residual haemodynamic lesions and comorbidities. Careful individualized, multi-disciplinary pre-pregnancy risk assessment and counselling, including assessment of risks in the offspring and estimation on long-term outcomes of the underlying heart defect, will enable informed decision making. Depending on the estimated risks, a careful follow-up plan during pregnancy as well as a detailed plan for delivery and postpartum care can reduce the risks and should be made by the multi-disciplinary team.



Greutmann et al , 2015

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..Before the widespread institution of penicillin, rheumatic heart disease was the most common form of heart disease encountered in pregnancy. **Marked improvements in treating congenital heart disease have led to more women with congenital cardiac malformations reaching reproductive age and and desiring fertility..**

Adulti con Cardiopatie congenite (GUCH)

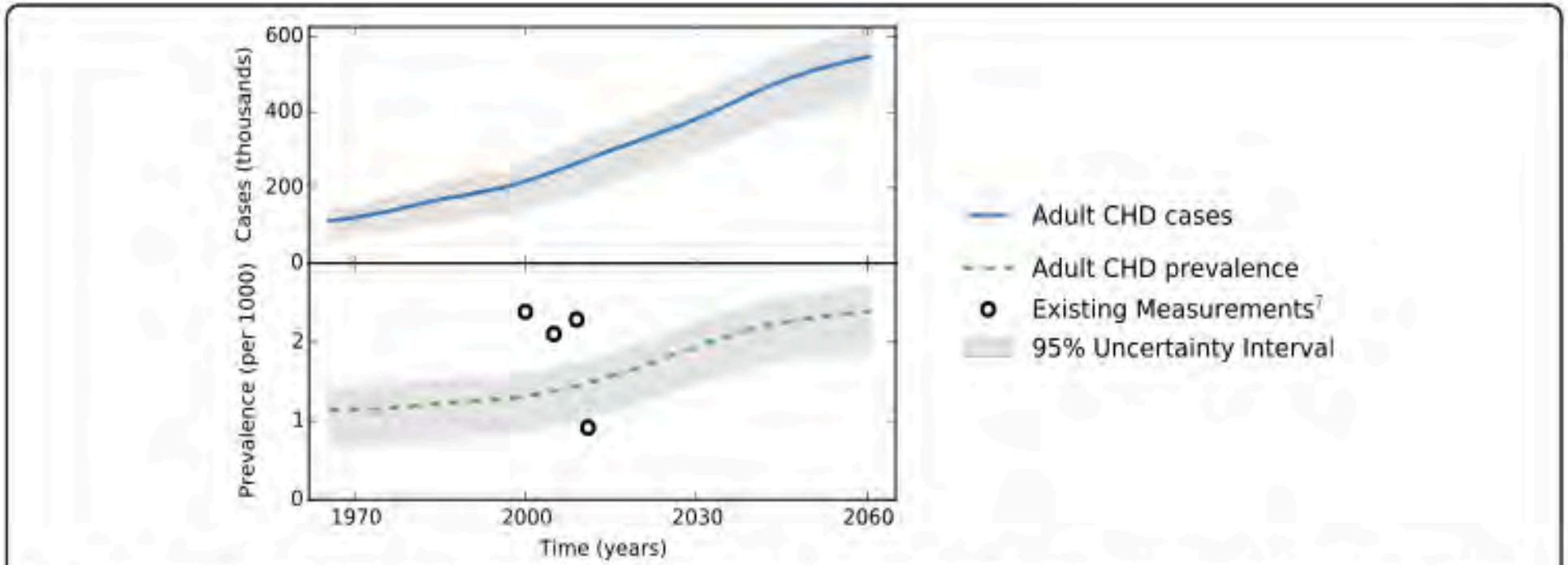


Fig. 4 Estimated number of adults (ages 20 to 64 years) with recalled congenital heart disease cases (blue solid line) and prevalence of recalled congenital heart disease in adults (per 1000) (green dotted line), with 95 % uncertainty intervals shaded in grey, as a function of time, from 1965 to 2060. Previous estimates of ACHD prevalence are marked with circles for comparison

➢**50% donne >> età fertile >>> gravidanza**

Benziger et al. Population Health Metrics (2015) 13:29

Gravidanze e cardiopatie

...Given the epidemiology of CHD with rapidly expanding cohorts of young women with complex CHD (i.e. Fontan palliation for univentricular hearts), we have to prepare for an increasing number of high-risk pregnancies….

Greutmann et al, European Heart Journal (2015)

Cambiamenti emodinamici durante la gravidanza

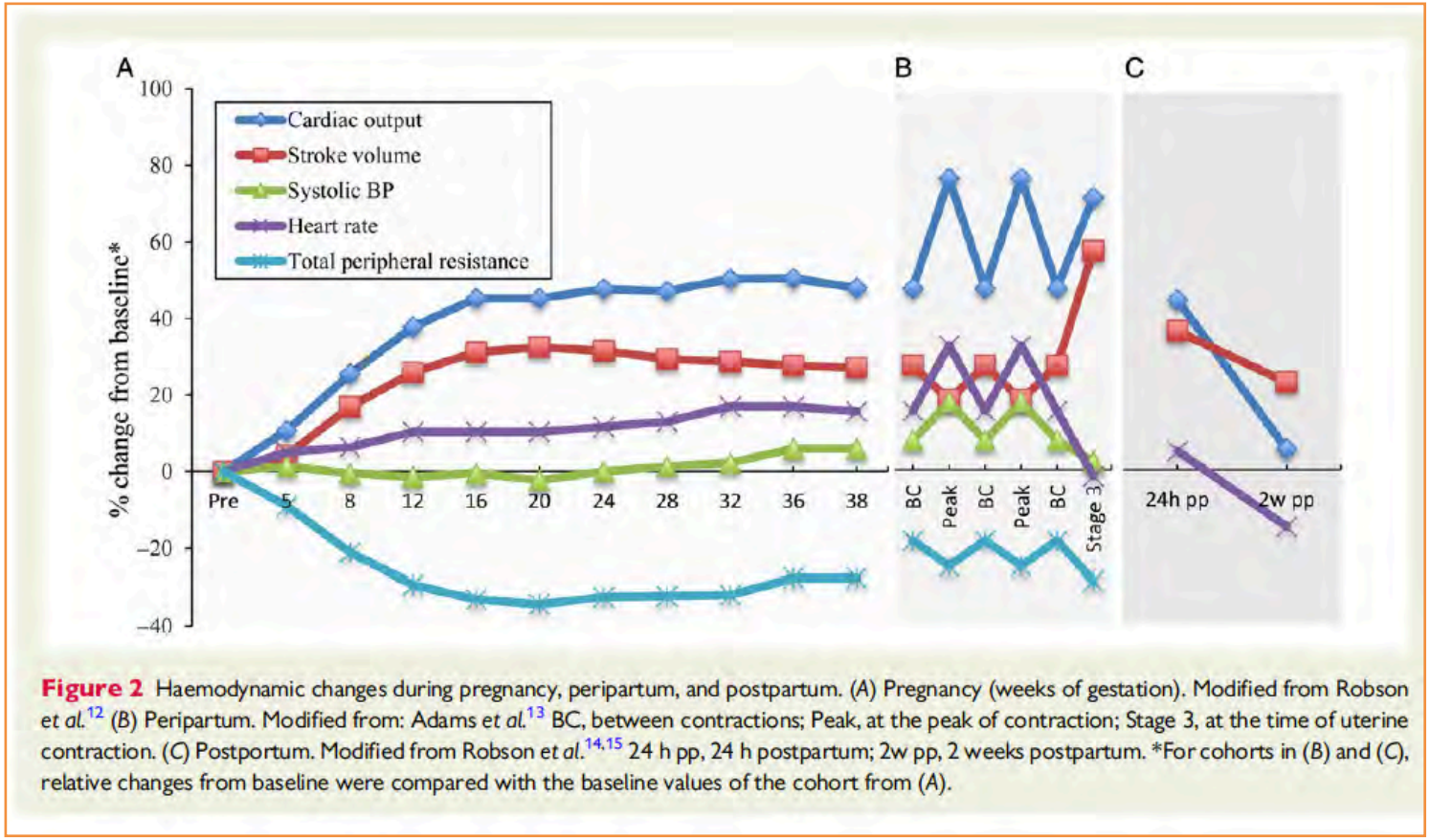


Figure 2 Haemodynamic changes during pregnancy, peripartum, and postpartum. (*A*) Pregnancy (weeks of gestation). Modified from Robson *et al.*[12] (*B*) Peripartum. Modified from: Adams *et al.*[13] BC, between contractions; Peak, at the peak of contraction; Stage 3, at the time of uterine contraction. (*C*) Postportum. Modified from Robson *et al.*[14,15] 24 h pp, 24 h postpartum; 2w pp, 2 weeks postpartum. *For cohorts in (*B*) and (*C*), relative changes from baseline were compared with the baseline values of the cohort from (*A*).

Greutmann et al, European Heart Journal (2015) 36, 2491–2499

Rischio di eventi cardiovascolari materni

CARPREG predictors and risk score	*SIU 2001*
ZAHARA I predictos and risk score	*Drenthen 2010*
CARPREG and Zahara I predictors (as well as predictors identified by Khairy)	*Khairy 2006*
WHO risk classification	*WHO 1998/Thorne2006*
Classification according to disease complexity (simple, moderate, complex and complex CHD	*Warnes 2001*

Rischio di eventi cardiovascolari materni

WHO-MOD
RISK SCORE

Table 6 Modified WHO classification of maternal cardiovascular risk: principles

Risk class	Risk of pregnancy by medical condition
I	No detectable increased risk of maternal mortality and no/mild increase in morbidity.
II	Small increased risk of maternal mortality or moderate increase in morbidity.
III	Significantly increased risk of maternal mortality or severe morbidity. Expert counselling required. If pregnancy is decided upon, intensive specialist cardiac and obstetric monitoring needed throughout pregnancy, childbirth, and the puerperium.
IV	Extremely high risk of maternal mortality or severe morbidity; pregnancy contraindicated. If pregnancy occurs termination should be discussed. If pregnancy continues, care as for class III.

Modified from Thorne *et al.*[72]
WHO = World Health Organization

I : Nessun rischio
II: Basso rischio
III: Rischio significativo
IV: Controindicazione alla gravidanza
(ESC guidelines)

Table 7 Modified WHO classification of maternal cardiovascular risk: application

Conditions in which pregnancy risk is WHO I
• Uncomplicated, small or mild - pulmonary stenosis - patent ductus arteriosus - mitral valve prolapse
• Successfully repaired simple lesions (atrial or ventricular septal defect, patent ductus arteriosus, anomalous pulmonary venous drainage).
• Atrial or ventricular ectopic beats, isolated
Conditions in which pregnancy risk is WHO II or III
WHO II *(if otherwise well and uncomplicated)*
• Unoperated atrial or ventricular septal defect
• Repaired tetralogy of Fallot
• Most arrhythmias
WHO II–III *(depending on individual)*
• Mild left ventricular impairment
• Hypertrophic cardiomyopathy
• Native or tissue valvular heart disease not considered WHO I or IV
• Marfan syndrome without aortic dilatation • Aorta <45 mm in aortic disease associated with bicuspid aortic valve
• Repaired coarctation
WHO III
• Mechanical valve
• Systemic right ventricle
• Fontan circulation
• Cyanotic heart disease (unrepaired)
• Other complex congenital heart disease
• Aortic dilatation 40–45 mm in Marfan syndrome • Aortic dilatation 45–50 mm in aortic disease associated with bicuspic aortic valve
Conditions in which pregnancy risk is WHO IV (pregnancy contraindicated)
• Pulmonary arterial hypertension of any cause
• Severe systemic ventricular dysfunction (LVEF <30%, NYHA III–IV)
• Previous peripartum cardiomyopathy with any residual impairment of left ventricular function
• Severe mitral stenosis, severe symptomatic aortic stenosis
• Marfan syndrome with aorta dilated >45 mm • Aortic dilatation >50 mm in aortic disease associated with bicuspid aortic valve
• Native severe coarctation

WHO IV
(gravidanza controindicata)

- Ipertensione arteriosa polmonare
- Severa disfunzione del ventricolo sistemico (EF <30%) , classe funzionale avanzata (NHYA III-IV)
- Pregressa cardiomiopatia peripartum con riduzione della funzioen ventricolares sinistra
- Coartazione aortica severa non trattata
- Stenosi severa mitralica , stenosi severa Ao sintomatica
- S. di Marfan con dilatazione Ao >45 mm, dilatazione Ao con BAV>50 mm
- Fontan con disfunzione ventricolare e/o insufficienza valvola AV , cianosi entropatia proteino disperdente

WHO-MODIFICATA

WHO I
(nessun-lieve aumento del rischio di morbidità)

Stenosi polmonare lieve
Pervietà del dotto di Botallo lieve
Prolasso valvolare mitralico
Cardiopatie semplici: DIA, DIV,RPVA,PDA (non esiti)

WHO II
Lieve aumento del rischio di mortalità materna, moderato aumento del rischio di mordibità

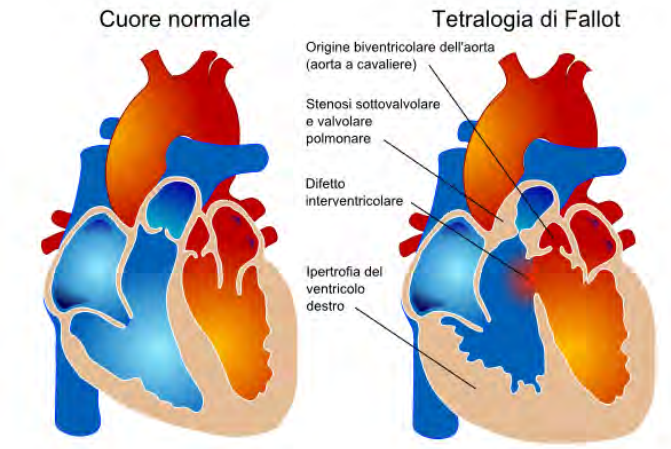
DIV e DIA non operati
TETRALOGIA DI Fallot operata
Aritmie (maggior parte)

WHO III (Significativo incremento del rischio di mortalità materna e severa morbidità)

Protesi valvolare meccanica
Ventricolo destro sistemico
Fontan
CHD cianogene non corrette
Altre CHD complesse
S.Di Marfan con dilatazione Ao 40-45 mm
Dilatazione AO con BAV -Ao 45-50 mm

Tetralogia di Fallot

Incidenza 8-11%



Eccellente sopravvivenza
a lungo termine

Gravidanza
ben tollerata

Rigurgito polmonare
(patch transanulare)
Stenosi efflusso dx
Disfunzione vt dx
Aritmie

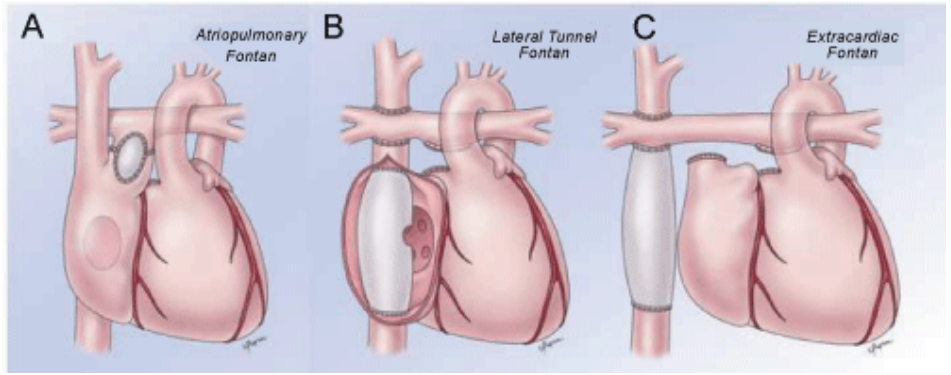
Aritmie >>Scompenso
Possibile deterioramento vtdx
(dopo la gravidanza)

Farmaci

Rischio fetale: Prematurita 6% SGA 9%

Cuore Univentricolare/ Fontan

8% CHD



Rischio cardiovascolare alto

Funzionamento del circuito
Funzione ventricolare sisto-diastolica
Grado di cianosi
Funzione della valvola AV
Aritmia

Farmaci

Complicanze materne :
deterioramento della classe funzionale (20%)
aritmie (16%)
scompenso cardiaco (4%)
insufficienza della valvola AV
eventi tromboembolici morte (2%)

Rischio fetale 50%

Nati vivi 45% ; Aborto spontaneo 50% ; Prematurità 20%; SGA, Mortalità perinatale

Gravidanza GUCH: rischio aborto

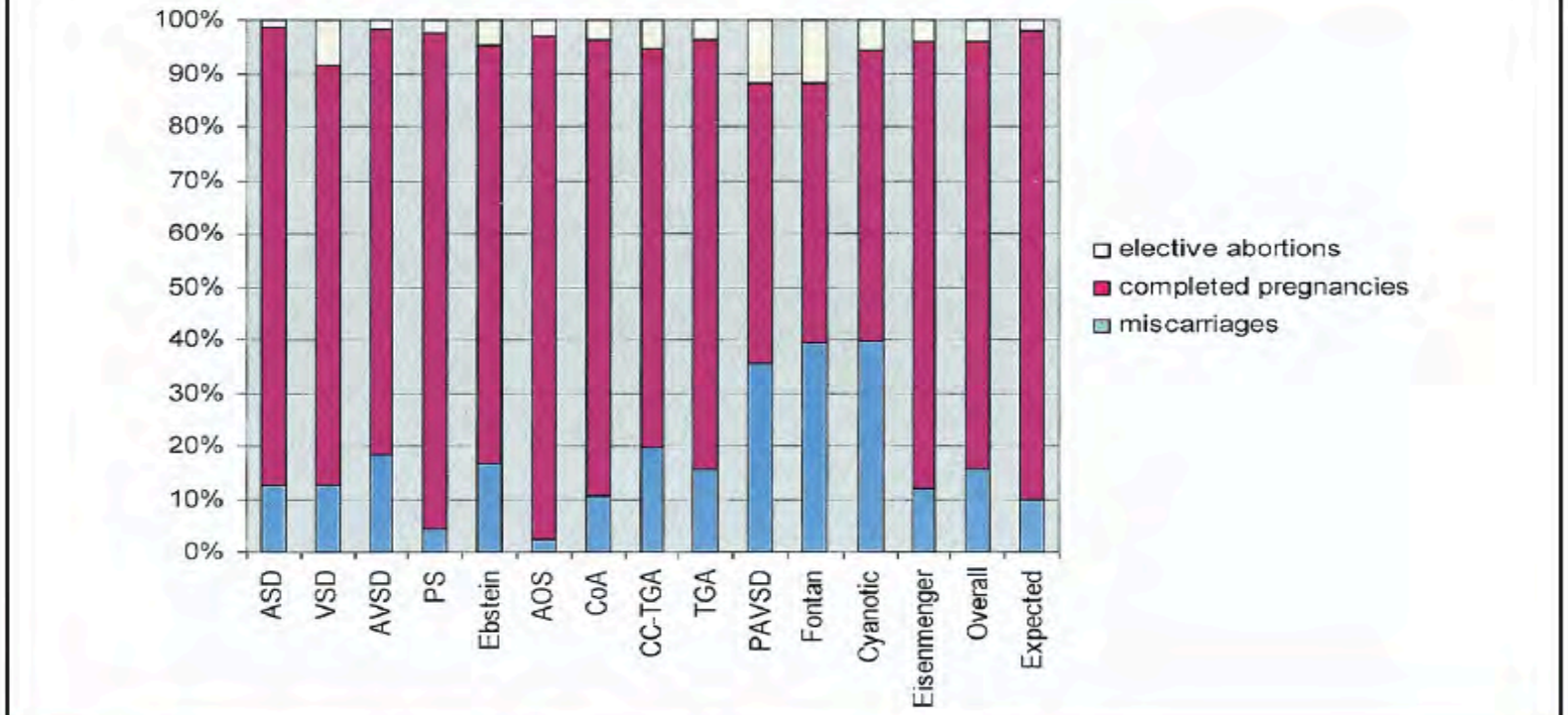


Figure 1 **Pregnancy Outcome in Women With Congenital Heart Disease**

Distribution of miscarriages, completed pregnancies, and elective abortions for each congenital heart disease are shown separately and as overall rates. On the **right side**, the expected rates in healthy women are depicted. AOS = aortic stenosis; ASD = atrial septal defect; AVSD = atrioventricular septal defects; CC-TGA = congenital corrected transposition of the great arteries; CoA = aortic coarctation; Ebstein = Ebstein's anomaly; Eisenmenger = Eisenmenger syndrome; Fontan = patients after Fontan repair; PAVSD = pulmonary atresia with ventricular septal defects; PS = pulmonary valve stenosis; TGA = complete transposition of the great arteries; TOF = tetralogy of Fallot; VSD = ventricular septal defect.

Drenthen et al., JACC Vol. 49, No. 24, 2007

Patologia dell'aorta

Rischio cardiovascolare alto

S.Di Marfan	Ao 40-45 mm
AO in BAV	Ao 45-50 mm

Dissezione >>> 3 trimestre (50%) e immediato postparto

BAV+stenosi → dilatazione AO (50%) → Dissezione (rischio < rispetto al Marfan)

MALATTA CORONARICA

Sindrome coronarica acuta 3-6 / 100.000 parti (in tutte le fasi della gestazione)

Fattori di rischio :
Fumo
IPT
Ipercolesterolemia
Diabete
Età avanzata
Familiarità
Preeclampsia,
Trombofilia
Infezioni peripartum
Severa emorragia postpartum

Dissezione coronarica spontanea più frequente in gravidanza

Mortalità 5-10% peripartum

Fattori predittivi di eventi avversi fetali/neonatali

NYHA>2 o Cianosi

Ostruzione all'efflusso sinistro materno

Fumo

Gravidanza multipla

Età <20anni >35 anni

TAO

Condition	Expected outcome
Pulmonary hypertension	Neonatal survival 87-89% (Bedard,EH J 2009)
Eisenmenger syndrome	Maternal mortality of 20-50% Life-birth 12%if O2saturation <85% (Presbitero,Circ 1994)
Cyanotic HD without PH	Depends on maternal oxygen saturation Life birth 12% if saturation <85% (Presbitero,Circ 1994)
Severe LVOTO	Should be treated before pregnancy if not discourage pregancy

Counseling pre-gravidanza/ GUCH

- Rischio materno durante la gravidanza
- Conseguenze a lungo termine della gravidanza sulla cardiopatia
- Valutazione strumentale: ECO, RM, test cardiopolmonare, NT-proBNP

Valutazione strumentale

- Test da sforzo cardiopolmonare → donne a rischio
- Scarsa risposta cronotropa pre-gravidanza e basso VO2 max

↓

outcome sfavorevole

Gravidanza /GUCH: Monitoraggio e Trattamento

Scompenso

Aritmia

Anticoagulazione

Ecocardiografia fetale (rischio di ricorrenza CHD)

Gravidanza /GUCH: Monitoraggio e Trattamento

Scompenso cardiaco

- fine del II trimestre, periodo peri-partum, immediato post-parto

- **<u>Trattamento</u>**

  - Controindicati: ACE-inibitori e anti-aldosteronici,
  - Consentiti: beta-bloccanti.
  - L'impiego di diuretici va bilanciato tenendo conto del rischio di riduzione del flusso utero-placentare.
  - Scompenso grave: il parto va anticipato nei limiti della vitalità del feto,
  - l'impiego di corticosteroidi per l'induzione della maturità polmonare fetale, può incidere sulla ritenzione di liquidi e peggiorare lo scompenso

Gravidanza /GUCH: Monitoraggio e Trattamento

Scompenso

Aritmie

Anticoagulazione

Ecocardiografia fetale (rischio di ricorrenza CHD)

Gravidanze e cardiopatie

Aritmie:

- trigger per complicanze trombo-emboliche e scompenso cardiaco,
- la maggiore complicanza nei GUCH
- La più frequente è il flutter atriale atipico

- Trattamento
  - Terapia
  - Cardioversione elettrica
  - Anticoagulazione

Table 14.11 General treatment guidelines for commonly encountered arrhythmias during pregnancy

Arrhythmia	Examples	Recommended treatment
Supraventricular tachycardia (SVT)		
	Atrial fibrillation	Vagal maneuvers for the acute conversion of paroxysmal SVT
	Atrial flutter	Immediate electrical cardioversion for the acute treatment of any tachycardia with hemodynamic instability
	Atrial tachycardia AV nodal reentry tachycardia AV reentry tachycardia involving an accessory pathway	Digoxin or metoprolol/propranolol for long-term management of SVT
Ventricular tachycardia (VT)		
	RV outflow tract tachycardia	Implantation of ICD, if clinically-indicated, prior to or during pregnancy
	Non-long QT sustained VT	Beta-blocking agents for the long-term management of congenital long QT syndrome
	Monomorphic VT	Metoprolol, Propranolol or Verapamil for the long-term management of idiopathic sustained VT Immediate electrical cardioversion of VT for sustained stable or unstable VT
Sinus bradycardia		
	Valsalva maneuver during delivery	Usually transient
	Supine hypotensive syndrome	Temporary pacemaker if symptoms persist
Atrioventricular blocks		
	First degree AV block	No treatment required
	Second degree AV Block, usually associated with underlying structural heart disease	No treatment required if Type I (Wenckebach) and asymptomatic
	Complete heart block, usually associated with congenital heart disease	Supportive pacing if required, but usually not necessary

Adapted from Regitz-Zagrosek et al. [17]. With permission of Oxford University Press (UK) © European Society of Cardiology. www.escardio.org/guidelines

E.O. Miller et al.

Gravidanza /GUCH: Monitoraggio e Trattamento

Scompenso

Aritmia

Anticoagulazione

Ecocardiografia fetale (rischio di ricorrenza CHD)

Gravidanza/ GUCH: Monitoraggio e Trattamento

Anticoagulazione

- Indicazioni:
  - protesi meccanica
  - aritmie intrattabili
  - cardiopatie complesse palliate (es. Fontan)

- Farmaci:
  - warfarin
  - LMWH
  - UFH
- Monitoraggio

Gravidanza /GUCH: Monitoraggio e Trattamento

Anticoagulazione:

Strategy	Operational details	Recommendations	Comments
LMWH throughout pregnancy	Twice-a-day subcutaneous administration	Dosing based on anti-Xa level 4 hours after last administration	Minimal risk of embriopathy. Maternal thromboembolic events: 4.3%-16.7%.
UFH throughout pregnancy	Twice-a-day subcutaneous administration	Dosing based on aPTT level 6 hours after last administration	Minimal risk of embriopathy. Maternal thromboembolic events: 33.3%.
UFH/LMWH up to 13th week of gestation, vitamin K oral antagonist after	Target INR Aortic mechanic cardiac valve: INR 2.5 (range 2.0-3.0) Mitral mechanic cardiac valve: INR 3.0 (range 2.5-3.5)	Back-switch to UFH/ LMWH after 36th week of gestation	Risk of embriopathy: 2% Maternal thromboembolic events: 8.6-22.4%
Vitamin K oral antagonist throughout pregnancy	Target INR Aortic mechanic cardiac valve: INR 2.5 (range 2.0-3.0) Mitral mechanic cardiac valve: INR 3.0 (range 2.5-3.5)	Back-switch to UFH/ LMWH after 36th week of gestation To be considered in very high risk profile for thrombotic events. Consider low dose of aspirin.	Risk of embriopathy: 3.7-6.4% Maternal thromboembolic events: 3.9%.

LMWH= low molecular weight heparin; UFH= unfractioned heparin

Bates et al. VTE, Thrombophilia, antithrombotic therapy, and pregnancy. Chest. 2012;141(Suppl):e691S-e736S

Chan et al. Anticoagulation of pregnant women with mechanical heart valves: a systematic review of the literature. Ann Int Med. 2000;161:191-196.

Whitlock et al. Antithrombotic and thrombolytic therapy for valvular disease: antithrombotic therapy and prevention of thrombosis, 9th ed: American College of Chest Physicians evidence-based clinical practice guidelines. Chest. 2012;141(Suppl):e576S-e600S.

James et al. Low-molecular weight heparin for thromboprophylaxis in pregnant women with mechanical heart valves. J Matern Fetal Neonatal Med. 2006;19:543-549.

Scompenso

Aritmia

Anticoagulazione

Ecocardiografia fetale

Gravidanza/ GUCH: Monitoraggio e Trattamento

Ecocardiografia Fetale

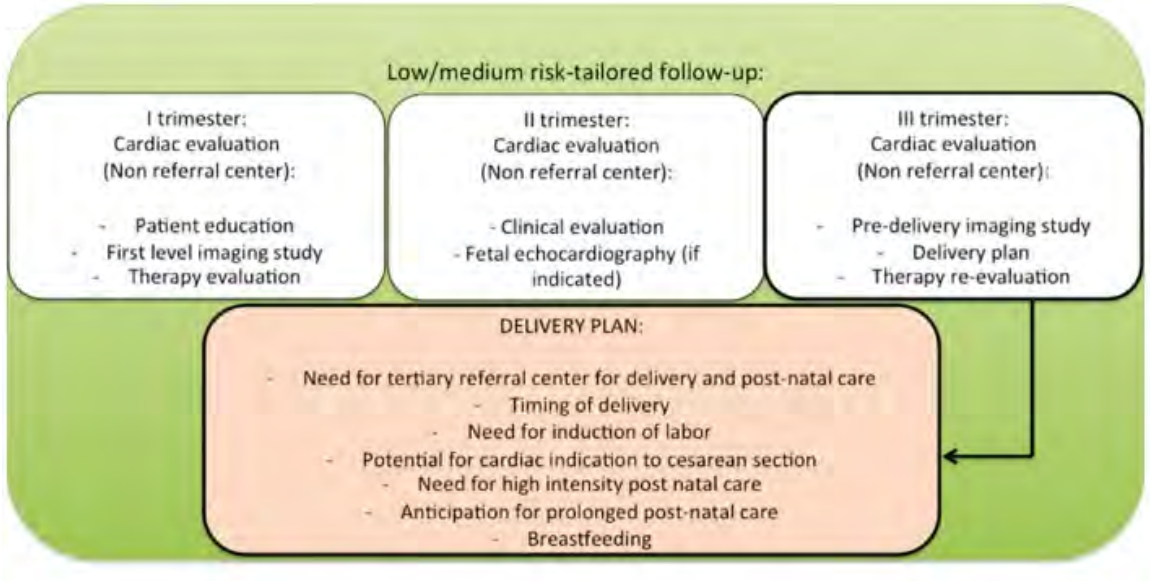
Rischio di ricorrenza **CHD 3-5%**

Benessere Fetale

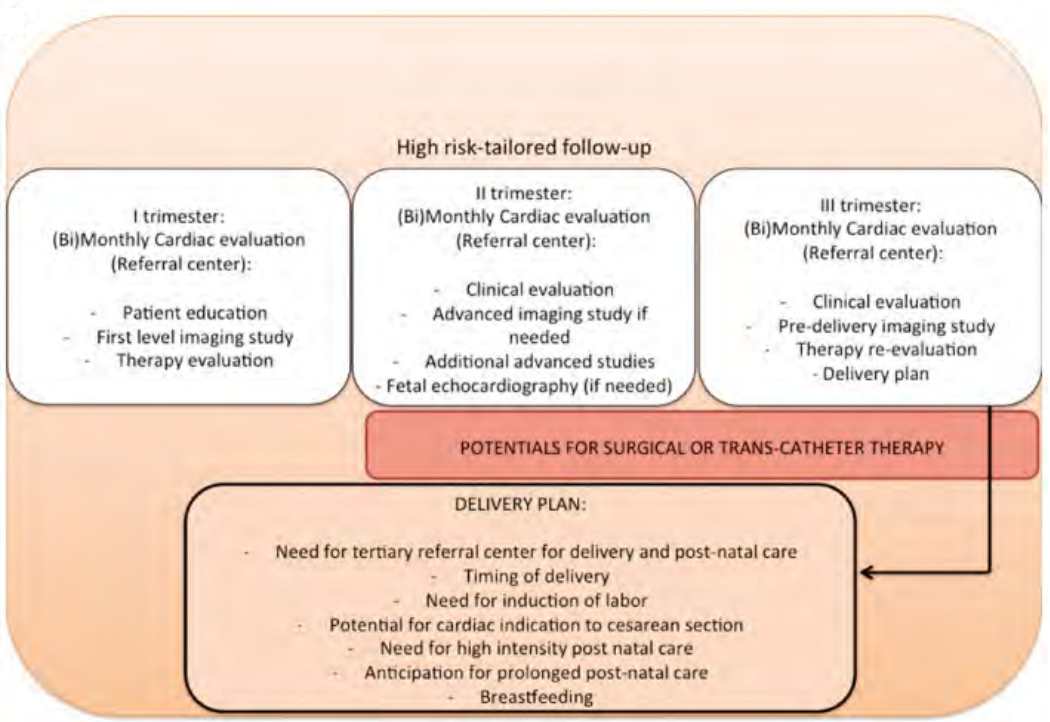
- B-bloccante
- Cianosi
- Output Cardiaco ⇩

Gravidanza GUCH: Monitoraggio e Trattamento

Rischio intermedio



Rischio elevato



From: Consensus Document of the Italian Association of Hospital Cardiologists (ANMCO), Italian Society of Pediatric Cardiology (SICP), and Italian Society of Gynaecologists and Obstetrics (SIGO): pregnancy and congenital heart diseases. Eur Heart J Suppl. 2017:D256-D292.

Gravidanza/GUCH: Parto

Parto per vie naturali:

va sempre preferito, favorito da analgesia epidurale

L'analgesia e il parto >> aumentato rischio di emorragie e lacerazioni di elevato grado.

Indicazione taglio cesareo

diametro Aorta asc. > 45 m
anticoagulazione orale in corso
stenosi sistemiche
scompenso cardiaco

➢Terapia intensiva cardiologica post-partum

Gravidanza GUCH

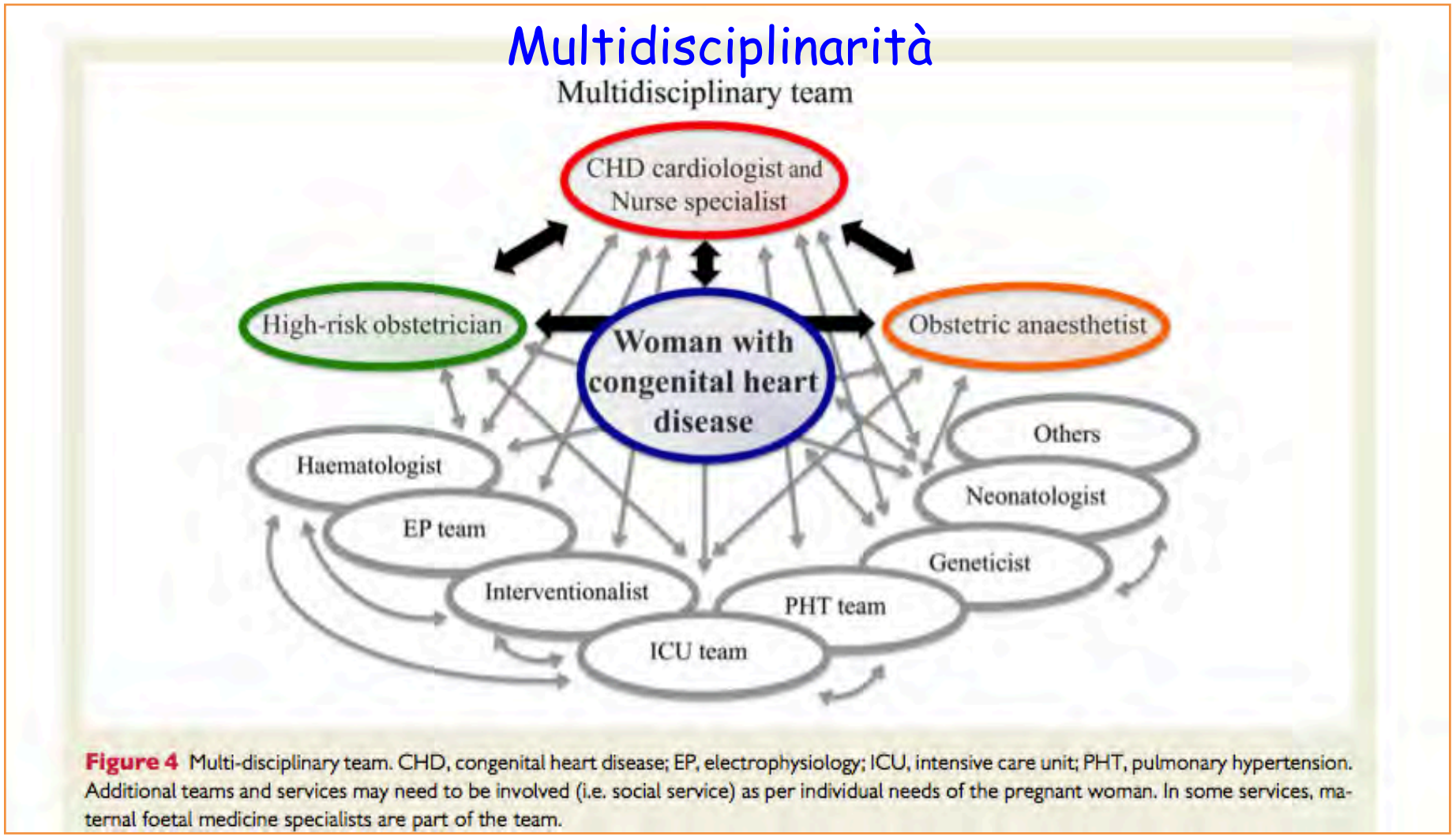


Figure 4 Multi-disciplinary team. CHD, congenital heart disease; EP, electrophysiology; ICU, intensive care unit; PHT, pulmonary hypertension. Additional teams and services may need to be involved (i.e. social service) as per individual needs of the pregnant woman. In some services, maternal foetal medicine specialists are part of the team.

Greutmann et al, European Heart Journal (2015) 36, 2491–2499

Gravidanza GUCH: La nostra esperienza

- Centro GUCH: OPA FTGM
- Dal 2015 percorso “materno-infantile” FTGM, Ospedale del Cuore di Massa, in collaborazione con la ASL nord-ovest
  - Feti con cardiopatie congenite
  - Madre con cardiopatia congenita
- team multi-disciplinare disponibile H24

Gravidanza GUCH: percorso “materno-infantile” FTGM-USL 1

Donne GUCH: 20

WHO II: 7

WHO III: 12

WHO IV: 1

Complicanze durante gravidanza: 7
Scompenso: 2; Aritmie: 2; Ostetriche: 3

Gravidanza GUCH: percorso “materno-infantile” FTGM-USL 1

Donne GUCH: 20

WHO II: 7

WHO III: 12

WHO IV: 1

Complicanze durante gravidanza: 7
Scompenso: 2; Aritmie: 2; Ostetriche: 3

Parto spontaneo: 4

Parto cesareo: 15

Complicanze post partum: 3
Scompenso : 1
Aritmie: 2

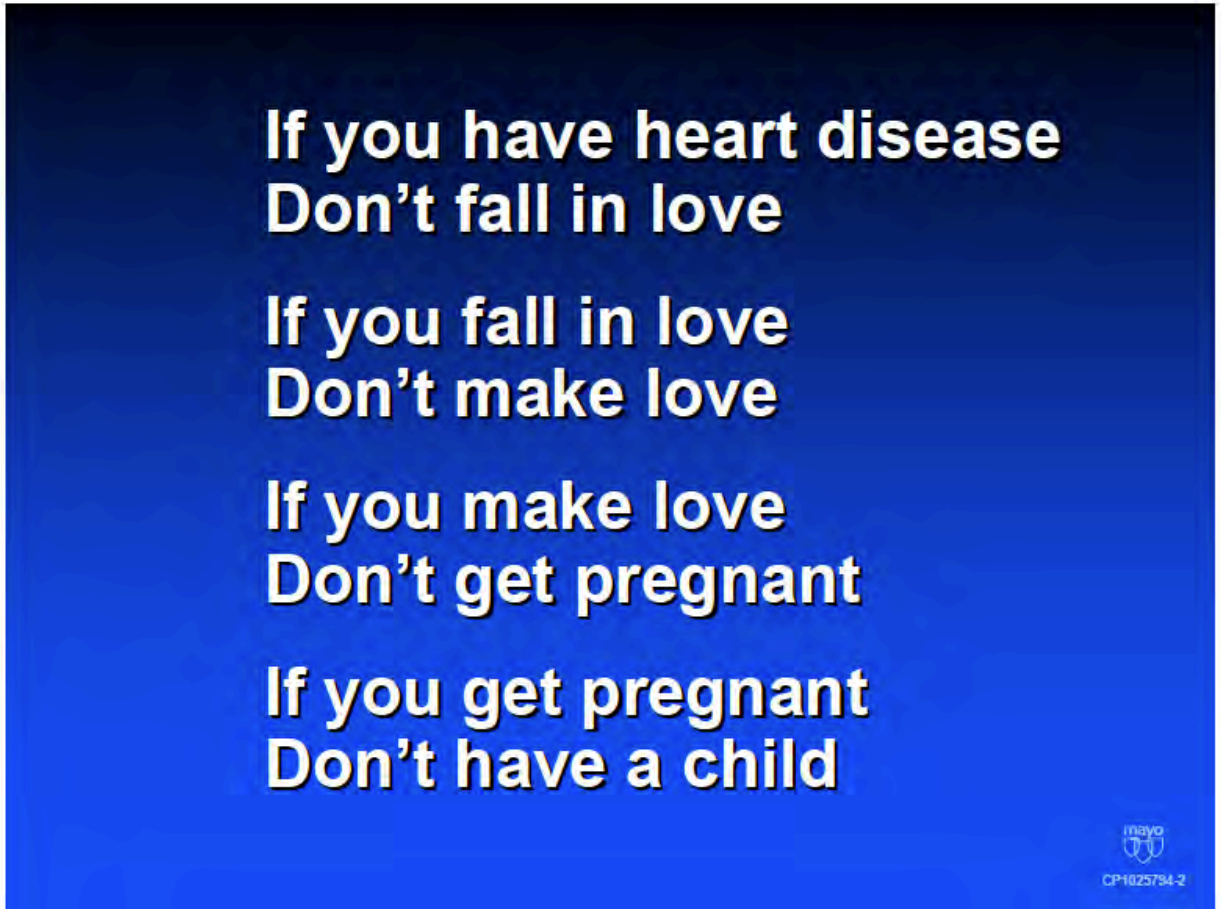
Complicanze fetali 4
CHD: 1; Prematurita: 2; SGA, 1

Take-home message

- Nella maggior parte dei casi di malattia cardiaca la gravidanza è ben tollerata
- Counselling preconcezionale è necessario (GUCH in età adolescenziale)
- Modificazioni terapeutiche
- Follow-up personalizzato
- Team multidisciplinare

Gravidanze nelle donne con Cardiopatie Congenita

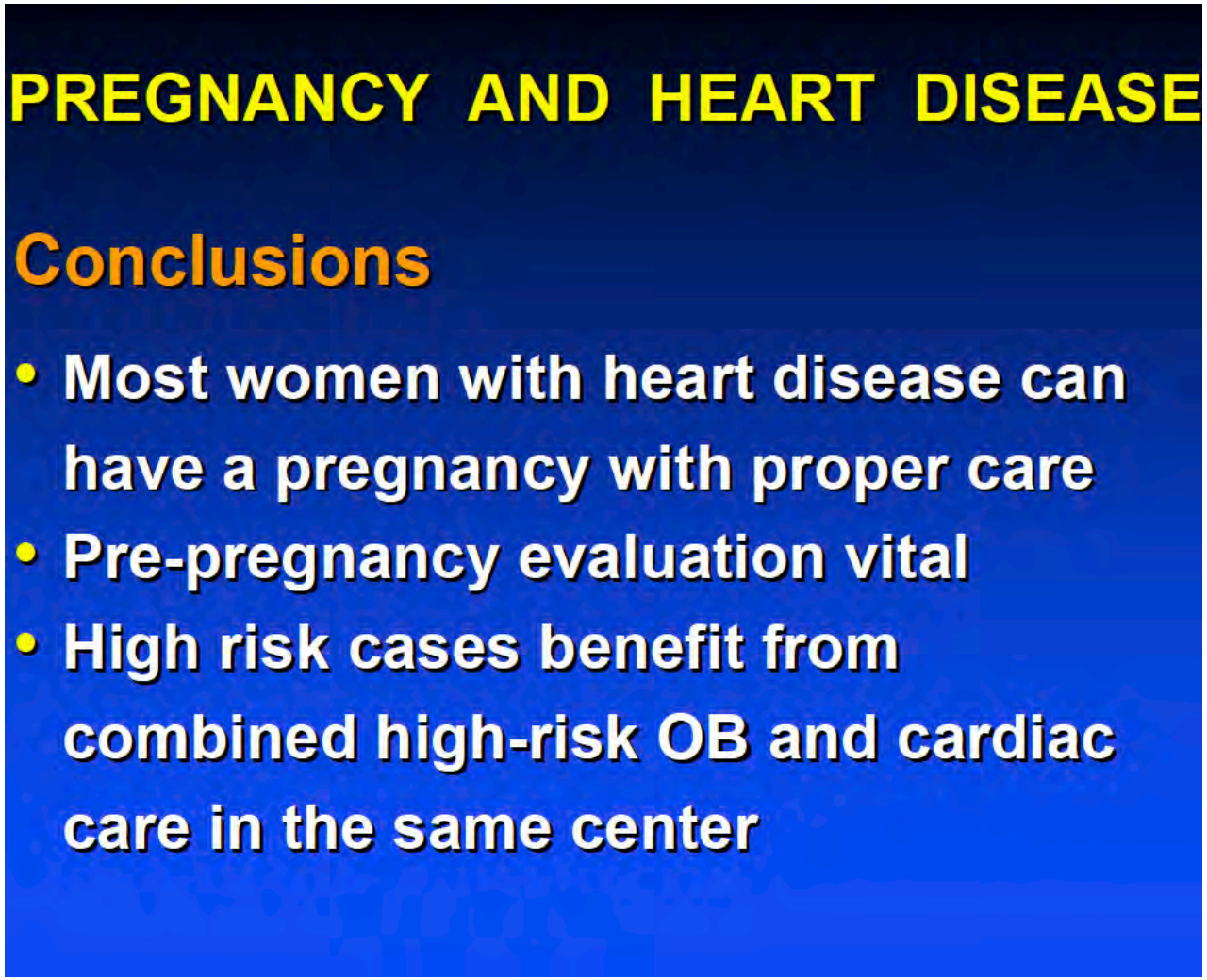
- Anni ‘80



Warnes Mayo clinic

Gravidanze nelle donne GUCH

➢Oggi….

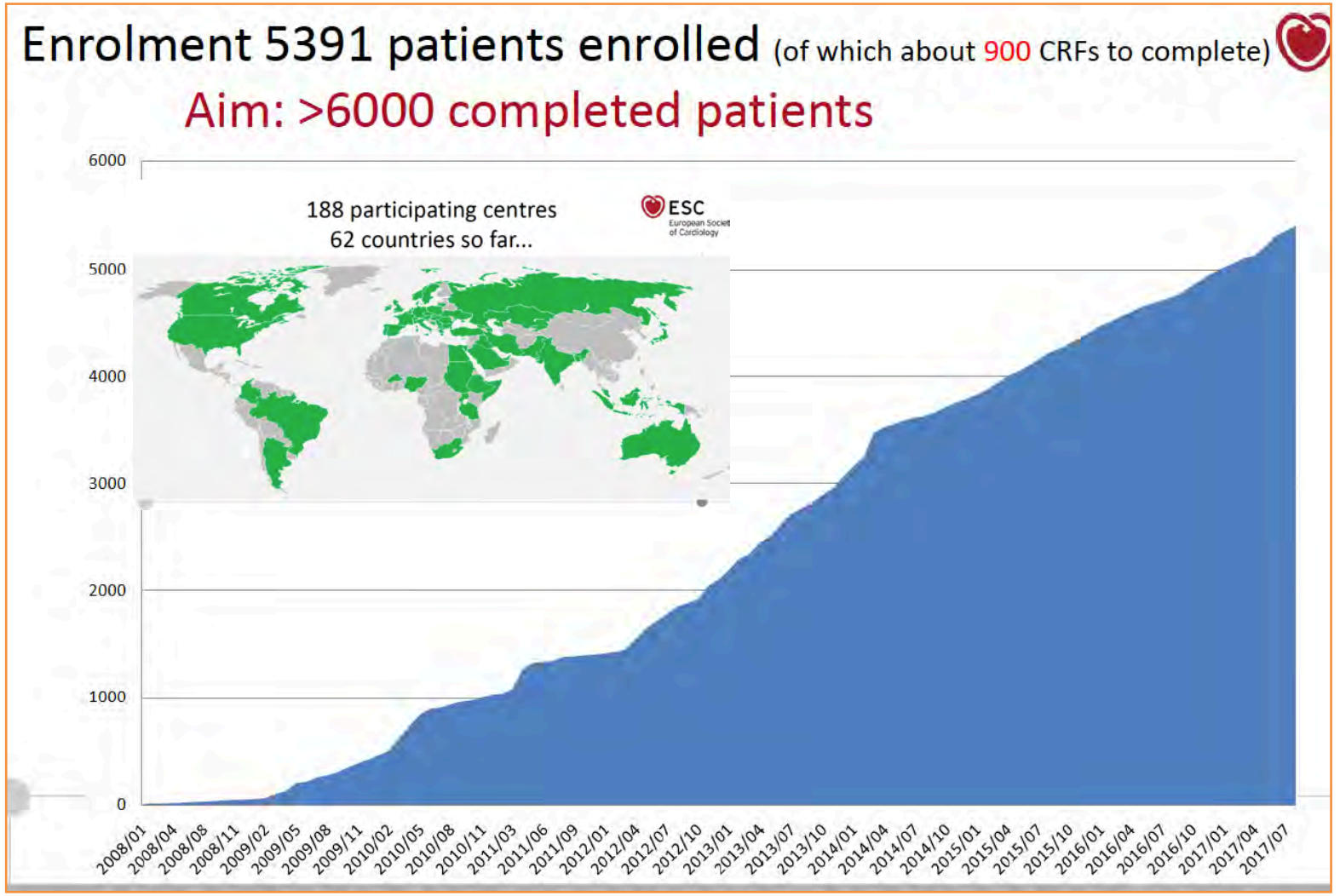


Warnes Mayo clinic


THANKS

Registro europeo: gravidanza e cardiopatia

Registry On Pregnancy And Cardiac disease (ROPAC)



Gravidanze e cardiopatie: planning

Counselling pre- gravidanza GUCH

- Rischio materno durante la gravidanza

- Conseguenze a lungo termine della gravidanza sulla cardiopatia

Counseling pre- gravidanza GUCH

- Rischio materno durante la gravidanza
- Conseguenze a lungo termine della gravidanza sulla cardiopatia
- Valutazione strumentale: ECO, RM, test cardiopolmonare, NT-proBNP

Insufficienze valvolari

- video

Risk of maternal cardiovascular events

WHO III
• Mechanical valve
• Systemic right ventricle
• Fontan circulation
• Cyanotic heart disease (unrepaired)
• Other complex congenital heart disease
• Aortic dilatation 40–45 mm in Marfan syndrome • Aortic dilatation 45–50 mm in aortic disease associated with bicuspid aortic valve

Esc Guideline

Gravidanza controindicata

Conditions in which pregnancy risk is WHO IV (pregnancy contraindicated)
• Pulmonary arterial hypertension of any cause
• Severe systemic ventricular dysfunction (LVEF <30%, NYHA III–IV)
• Previous peripartum cardiomyopathy with any residual impairment of left ventricular function
• Severe mitral stenosis, severe symptomatic aortic stenosis
• Marfan syndrome with aorta dilated >45 mm • Aortic dilatation >50 mm in aortic disease associated with bicuspid aortic valve
• Native severe coarctation

Esc Guideline

Gravidanza GUCH: Rischio materno

WHO III
• Mechanical valve
• Systemic right ventricle
• Fontan circulation
• Cyanotic heart disease (unrepaired)
• Other complex congenital heart disease
• Aortic dilatation 40–45 mm in Marfan syndrome • Aortic dilatation 45–50 mm in aortic disease associated with bicuspid aortic valve

Esc Guideline