

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ



# VHD and Pregnancy

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American  
Heart  
Association

# 2020 ACC/AHA Guideline for the Management of Patients with Valvular Heart Disease

## 2021 ESC/EACTS Guidelines for the management of valvular heart disease



AMERICAN  
COLLEGE of  
CARDIOLOGY  
FOUNDATION



ESC

European Society  
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ESC GUIDELINES

## 2018 ESC Guidelines for the management of cardiovascular diseases during pregnancy

دستورالعمل کشوری مراقبت از بیماران  
قلبی در بارداری، زایمان و پس از زایمان



جدول سه - طبقه بندی اصلاح شده سازمان جهانی بهداشت برای تعیین خطر بیماریهای قلبی

( با استفاده از منبع European Society of Cardiology )

فواصل پیگیری با توجه به نظر تیم مراقبت قلب و بارداری	ضایعات قلبی	کلاس ۱ سازمان جهانی بهداشت Conditions in which 1 pregnancy risk is WHO
یک یا دوبار در حاملگی	<ul style="list-style-type: none"> <li>• موارد زیر با درجات خفیف، کم یا بدون عارضه:                             <ul style="list-style-type: none"> <li>○ تنگی پولمونر</li> <li>○ مجرای شریانی باز</li> <li>○ پرولاپس میترال</li> </ul> </li> <li>• ترمیم موفق ضایعات ساده زیر :                             <ul style="list-style-type: none"> <li>○ نقص دیواره دهلیزی یا بطنی</li> <li>○ مجرای شریانی باز</li> <li>○ آنومالی در درناژ ورید ریوی</li> </ul> </li> <li>• ضربان خارج دهلیزی یا بطنی به تنهایی ایزوله</li> </ul>	در این شرایط افزایش خطر مرگ مادر وجود ندارد، عوارض وجود ندارد یا کم است .
کلاس ۲ سازمان جهانی بهداشت (WHO 2 (if otherwise well and uncomplicated)		
هر تریمستر یک بار	<ul style="list-style-type: none"> <li>• موارد زیر در صورتی که شرایط مناسب و بدون عارضه باشد :                             <ul style="list-style-type: none"> <li>○ نقص دیواره بطنی یا دهلیزی جراحی نشده</li> <li>○ تترالوژی فالوت ترمیم شده</li> </ul> </li> </ul>	در این شرایط خطر مرگ کمی افزایش اما احتمال عوارض تا حد متوسط افزایش می یابد
کلاس ۲ تا ۳ سازمان جهانی ( با توجه به وضعیت بیمار) (WHO 2 – 3 (depending on individual)		
هر دو ماه تا یک ماه	<ul style="list-style-type: none"> <li>• اختلال خفیف در عملکرد بطن چپ</li> <li>• کاردیو میوپاتی هیپرتروفیک</li> <li>• بیماری مادر زادی دریچه ای یا نسج دریچه که در طبقه بندی یک یا چهار سازمان جهانی بهداشت قرار نمیگیرد</li> <li>• سندروم مارفان بدون دیلاتاسیون</li> <li>• قطر آنورت کمتر از ۴۵ میلیمتر (در بیماری آنورت مرتبط با دریچه دولتی آنورت )</li> <li>• کوآرکتاسیون ترمیم شده</li> </ul>	

### کلاس ۳ سازمان جهانی بهداشت

<p>هر یک ماه تا دو ماه</p>	<ul style="list-style-type: none"> <li>• دریاچه مصنوعی مکانیکی</li> <li>• بطن راست سیستمیک</li> <li>• گردش خون فونتان</li> <li>• بیماری های سیانوتیک قلب (ترمیم نشده)</li> <li>• سایر ناهنجاری های مادر زادی عارضه دار</li> <li>• دیلاتاسیون آئورت ۴۵-۴۰ میلیمتر در سندرم مارفان</li> <li>• دیلاتاسیون آئورت ۵۰-۴۵ میلیمتر در بیماری آئورتیک مرتبط با دریاچه دولتی آئورت</li> </ul>	<p>در این شرایط خطر مرگ و یا عوارض بطور قابل توجهی افزایش می یابد . مشاوره تخصصی لازم است . در صورت بارداری مراقبت تخصصی متخصصین قلب و زنان در طی بارداری، زایمان و پس از زایمان لازم است</p>
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### کلاس ۴ سازمان جهانی بهداشت

Conditions in which pregnancy risk is WHO 4 (pregnancy contraindicated)

<p>هر یک ماه یا هر ۲ هفته . ممکن است از تریمستر سوم نیاز به بستری باشد</p>	<ul style="list-style-type: none"> <li>• افزایش فشار خون شریانی ریوی به هر دلیل</li> <li>• اختلال عملکرد بطنی شدید سیستمیک (NYHA III-IV , LVEF&lt;30%)</li> <li>• سابقه کاردیومیوپاتی پری پارتوم با هر نوع عملکرد مختل بطن چپ</li> <li>• تنگی شدید میترال ، تنگی شدید علامتدار آئورت</li> <li>• سندرم مارفان با دیلاتاسیون آئورت بیشتر از ۴۵ میلیمتر</li> <li>• دیلاتاسیون آئورت بیشتر از ۵۰ میلیمتر در بیماری آئورت مرتبط با دریاچه دولتی آئورت</li> <li>• کوآرکتاسیون شدید مادر زادی</li> </ul>	<p>در این شرایط خطر مرگ و یا عوارض افزایش بسیار قابل توجهی دارد . ختم بارداری باید مد نظر باشد اما اگر بارداری ادامه یابد ادامه مراقبت ها مانند کلاس سه انجام شود .</p>
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# Case 1

A 30-year-old woman with asymptomatic **severe AS** intends to become pregnant for the first time.

## Questions:

What pre-pregnancy check is needed?

Permission to get pregnant?

Do you need valvular surgery before pregnancy?

# Initial Management of Women With VHD Before and During Pregnancy

COR	LOE	Recommendations
1	B-NR	<b>1. Women with suspected valve disease who are considering pregnancy should undergo a clinical evaluation and TTE before pregnancy.</b>
1	B-NR	<b>2. Women with severe valve disease (Stages C and D) who are considering pregnancy should undergo pre-pregnancy counseling by a cardiologist with expertise in managing women with VHD during pregnancy.</b>

# Initial Management of Women With VHD Before and During Pregnancy

COR	LOE	Recommendations
1	B-NR	<p>3. Pregnant women with severe valve disease (Stages C and D) should be monitored in a <b>tertiary-care center</b> with a dedicated Heart Valve Team of cardiologists, surgeons, anesthesiologists, and maternal-fetal medicine obstetricians with expertise in the management of high-risk cardiac conditions during pregnancy.</p>
2a	B-NR	<p>4. In <b>asymptomatic women with severe valve disease</b> (Stage C1) who are considering pregnancy, <b>exercise testing</b> is reasonable before pregnancy for risk assessment.</p>



# Risk assessment

TTE and Exercise test revealed the following findings :  
EF=55% 'BAV with AVA=0.9cm<sup>2</sup>' PAP=30mmHg'No COA'  
Ao D=4cm' No significant abnormality on other valves.

Normal BP response ; No symptom and ST-T change during test

FC=13 METs

Recommendations	Class <sup>a</sup>	Level <sup>b</sup>
Pre-pregnancy evaluation, including echocardiography, and counselling is recommended for any woman with known or suspected valvular disease.	I	C

### Aortic stenosis

Intervention is recommended before pregnancy in patients with severe aortic stenosis if:		
<ul style="list-style-type: none"> <li>● they are symptomatic</li> </ul>	I	B
<ul style="list-style-type: none"> <li>● OR LV dysfunction (LVEF &lt;50%) is present<sup>204</sup></li> </ul>	I	C
<ul style="list-style-type: none"> <li>● OR when they develop symptoms during exercise testing.</li> </ul>	I	C
Intervention should be considered before pregnancy in asymptomatic patients with severe AS when a fall in blood pressure below baseline during exercise testing occurs.	IIa	C
Balloon aortic valvuloplasty should be considered during pregnancy in patients with severe aortic stenosis and severe symptoms.	IIa	C

# Pre-Pregnancy Intervention in Women With VHD

COR	LOE	Recommendations
2a	B-NR	<p>4. In women of childbearing age who require valve replacement, <b>bioprosthetic valves</b> are preferred over mechanical valves because of the increased maternal and fetal risks of mechanical heart valves in pregnancy.</p>
2a	C-EO	<p>5. In <b>asymptomatic women</b> with severe AS (aortic velocity <math>\geq 4.0</math> m/s or mean pressure gradient <math>\geq 40</math> mm Hg, Stage C1) who are considering pregnancy, <b>valve intervention before pregnancy</b> is reasonable.</p>

# Intervention During Pregnancy in Women with VHD

COR	LOE	Recommendations
2a	B-NR	1. In pregnant women with severe AS (mean pressure gradient $\geq 40$ mm Hg, Stage D), valve intervention during pregnancy is reasonable if there is hemodynamic deterioration or if there are NYHA class III or IV HF symptoms.
2a	B-NR	2. In pregnant women with severe rheumatic MS (mitral valve area $\leq 1.5$ cm <sup>2</sup> , Stage D) and with valve morphology favorable for PMBC who remain symptomatic with NYHA class III or IV HF symptoms despite medical therapy, PMBC is reasonable during pregnancy if it is performed at a Comprehensive Valve Center.
2a	C-LD	3. In pregnant women with severe valve regurgitation and with NYHA class IV HF symptoms (Stage D) refractory to medical therapy, valve surgery is reasonable during pregnancy.
3: Harm	C-LD	4. In pregnant women with VHD, valve surgeries should not be performed in the absence of severe HF symptoms refractory to medical therapy.

## Follow up

She comes in at 14 weeks pregnant and asks?

Maternal and fetal complications?

Visiting intervals?

Method of childbirth?

# Maternal risk

Cardiac morbidity is related to the baseline severity of AS and symptom

HF: **<10%** in women with moderate AS and asymptomatic  
**25%** in symptomatic patients.

Arrhythmia and mortality: **Rare**

Aortic dissection: In BAV and Ao > 5cm.

# Obstetric and offspring risk

Obstetric complications may be increased in patients with severe AS.

Pre-term birth, intrauterine growth retardation, and low birth weight occur in **20-25%** of the offspring of mothers with moderate and severe AS.

Miscarriage and fetal death rates are **<5%**.

The risk of **genetic** transmission of LV outflow tract malformations justifies the performance of fetal echocardiography in AS due to BAV.

# Follow-up; Labor and delivery

In severe AS, **monthly or bimonthly** cardiac evaluations including echocardiography are advised.

In severe symptomatic AS, **caesarean delivery** should be preferred.

An **individual approach** is recommended for asymptomatic severe AS.

In non-severe AS, **vaginal delivery** is favored.



## Case 2

A 32-year-old woman presented with dyspnea at 25 weeks of gestation.

ECG=AF Rhythm VR=110BPM

TTE: EF=50%; MVA=1.1cm<sup>2</sup>; sPAP=60mmHg

### Questions:

Medical therapy?

Need to intervention?

ACT?

# Maternal risk

HF: **one-third** of pregnant women with a valve area  $< 1.0$  cm<sup>2</sup> most often during the second trimester, even in the absence of symptoms before pregnancy.

Sustained AF, although rare (**<10%**), may precipitate HF and thrombo-embolic events.

Maternal complications **risk factors:**

NYHA class  $\geq$  II, systolic PAP  $>30$  mmHg, severe stenosis, and older age

# Obstetric and offspring risk

Prematurity rates are **20-30%**, intrauterine growth retardation **5-20%**, and foetal death **1-5%**.

Offspring risk is **higher** in:  
women in NYHA class III/IV during pregnancy.

# Medical therapy:

symptoms or clinically significant PH develop: activity should be restricted and **beta-1-selective blockers** (preferably metoprolol or bisoprolol) commenced.

**Diuretics** used if symptoms persist avoiding high dose.

**Anticoagulation** using UFH, LMWH, or VKA: paroxysmal or permanent AF, left atrial thrombosis, or prior embolism.

**Anticoagulation** should be considered in women:

sinus rhythm with significant MS and spontaneous echocardiographic contrast in the left atrium, large left atrium ( $\geq 60$  mL/m<sup>2</sup>), or congestive HF

## Recommendations for the management of native valvular heart disease

Recommendations	Class <sup>a</sup>	Level <sup>b</sup>
Pre-pregnancy evaluation, including echocardiography, and counselling is recommended for any woman with known or suspected valvular disease.	I	C
<b>Mitral stenosis</b>		
In patients with symptoms or pulmonary hypertension, restricted activities and beta-1-selective blockers are recommended. <sup>5,204</sup>	I	B
Diuretics are recommended when congestive symptoms persist despite beta-blockers. <sup>5</sup>	I	B
Intervention is recommended before pregnancy in patients with MS and valve area $<1.0 \text{ cm}^2$ .	I	C
Therapeutic anticoagulation using heparins or VKA is recommended in case of atrial fibrillation, left atrial thrombosis, or prior embolism.	I	C
Intervention should be considered before pregnancy in patients with MS and valve area $<1.5 \text{ cm}^2$ .	IIa	C
Percutaneous mitral commissurotomy should be considered in pregnant patients with severe symptoms or systolic pulmonary artery pressure $>50 \text{ mmHg}$ despite medical therapy.	IIa	C

# Medical Therapy of Pregnant Women with VHD



COR	LOE	Recommendations
2a	C-LD	In pregnant women with VHD, beta-blocker medications are reasonable as required for heart rate control or treatment of arrhythmias.
2a	C-LD	2. In pregnant women with VHD and HF symptoms (Stage D), diuretic medications are reasonable if needed for volume overload.
3: Harm	B-NR	3. In pregnant women with VHD, <b>ACE inhibitors and ARBs should not be given</b> because of fetal risk.

## Intervention:

During pregnancy, **percutaneous mitral commissurotomy** is preferably performed **after 20 weeks** of gestation.

It should **only** be considered in women with NYHA class III/IV and/or systolic PAP  $\geq$  50 mmHg, despite optimal medical treatment in the absence of contraindication.

**Closed commissurotomy** remains an alternative in low-middle-income countries.

Due to fetal risk, **open-heart surgery** should be reserved for cases in which all other measures have failed and the mother's life is threatened.

# Intervention During Pregnancy in Women with VHD

COR	LOE	Recommendations
2a	B-NR	1. In pregnant women with severe AS (mean pressure gradient $\geq 40$ mm Hg, Stage D), valve intervention during pregnancy is reasonable if there is hemodynamic deterioration or if there are NYHA class III or IV HF symptoms.
2a	B-NR	2. In pregnant women with severe rheumatic MS (mitral valve area $\leq 1.5$ cm <sup>2</sup> , Stage D) and with valve morphology favorable for PMBC who remain symptomatic with NYHA class III or IV HF symptoms despite medical therapy, PMBC is reasonable during pregnancy if it is performed at a Comprehensive Valve Center.
2a	C-LD	3. In pregnant women with severe valve regurgitation and with NYHA class IV HF symptoms (Stage D) refractory to medical therapy, valve surgery is reasonable during pregnancy.
3: Harm	C-LD	4. In pregnant women with VHD, <b>valve surgeries should not be performed</b> in the absence of severe HF symptoms refractory to medical therapy.



## Case 3

A 25 year-old woman with Hx of Mechanical MVR intends to become pregnant; her INR is in therapeutic range with 5mg warfarin per day.

### Questions:

Principles of counseling:

Decide for ACT:

Delivery measures:

# Mechanical prostheses and pregnancy

In women with mechanical valves, pregnancy is associated with a very high-risk of complications (**WHO risk classification III**).

In the ROPAC registry, the chances of an **event-free pregnancy** :

**58%** for women with a mechanical valve

**79%** for women with a bioprosthesis

**78%** for women with heart disease but no valve prosthesis.

Main risks :

Need for ACT (valve thrombosis and haemorrhagic complications)

Ventricular and valvular dysfunction.

# Principles of counseling

The **advantages and disadvantages** of different anticoagulation regimen should be discussed extensively before pregnancy.

The mother must understand that the use of **VKAs** is the most effective regimen to prevent valve thrombosis, and therefore the **safest regimen** for her, and that risks to the mother also jeopardize the baby.

However, the **increased risks** of embryopathy, foetopathy, foetal loss, and foetal haemorrhage associated with the use of VKAs need to be discussed while considering the VKA dose.

The higher risk of valve thrombosis and lower foetal risks associated with **LMWH** should be discussed.

# Principles of counseling

Risk of valve thrombosis: Warfarin= 0-4%  
LMWH= 4.4-8.7%  
UFH= 9-33%

Risk of foetal loss : low-dose VKA = 13.4-19.2%, total foetal loss =32.5%.  
combined heparin/VKA regimen = 22.7%  
LMWH throughout pregnancy = 12.2%

Risk of embryopathy:0.6-10% ;dose dependent(0.45-0.9% with low-dose warfarin)  
substitution of VKA with UFH or LMWH in weeks 6-12

Risk of foetopathy : 0.7-2%

# Surveillance during pregnancy

The mother should understand that whatever anticoagulation regime is chosen, her restrict **compliance** is crucial for a success.

These high-risk pregnancies should be managed by a pregnancy **heart team** in an expert center.

The effectiveness of the anticoagulation regimen should be monitored **weekly or every 2 weeks** depending on the anticoagulation regimen.

Clinical follow-up including echocardiography should be performed **monthly**.

# Initial Management of Prosthetic Heart Valves in Pregnant Women

COR	LOE	Recommendations
1	C-EO	<b>1. Women with a prosthetic valve should undergo pre-pregnancy assessment, including echocardiography, by a cardiologist with expertise in managing women with VHD during pregnancy.</b>
1	C-EO	<b>2. Pregnant women with a mechanical prosthesis should be monitored in a tertiary-care center with a dedicated MDT of cardiologists, surgeons, anesthesiologists, and maternal-fetal medicine obstetricians with expertise in the management of high-risk cardiac conditions during pregnancy.</b>
1	B-NR	<b>3. Women with mechanical heart valves considering pregnancy should be counselled that pregnancy is high risk and that there is no anticoagulation strategy that is consistently safe for the mother and baby.</b>
1	B-NR	<b>4. Pregnant women with a mechanical prosthetic valve who have prosthetic valve obstruction or experience an embolic event should undergo a TEE.</b>

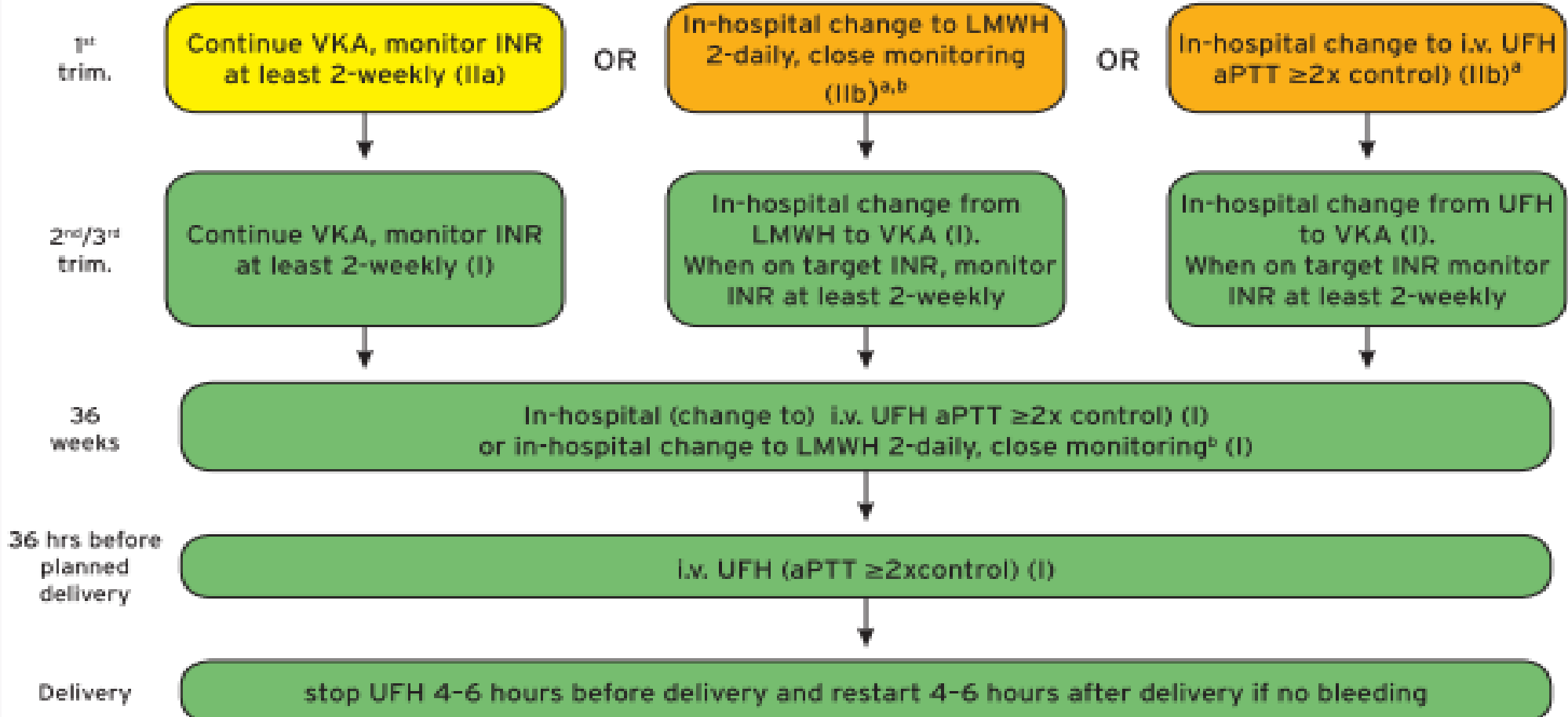
# Anticoagulation for Pregnant Women With Mechanical Prosthetic Heart Valves



COR	LOE	Recommendations
1	B-NR	1. Pregnant women with mechanical prostheses should receive therapeutic anticoagulation with frequent monitoring during pregnancy.
1	B-NR	2. Women with mechanical heart valves who cannot maintain therapeutic anticoagulation with frequent monitoring should be counseled against pregnancy.
1	B-NR	3. Women with mechanical heart valves and their providers should use shared decision-making to choose an anticoagulation strategy for pregnancy. Women should be informed that VKA during pregnancy is associated with the lowest likelihood of maternal complications but the highest likelihood of miscarriage, fetal death, and congenital abnormalities, particularly if taken during the first trimester and if the warfarin dose exceeds 5 mg/d.

**Woman with mechanical valve and LOW dose VKA**  
(warfarin <5 mg/day or phenprocoumon <3 mg/day or acenocoumarol <2 mg/day)  
**who contemplates pregnancy: Pre-pregnancy counselling - Continue VKA antagonist until pregnant**

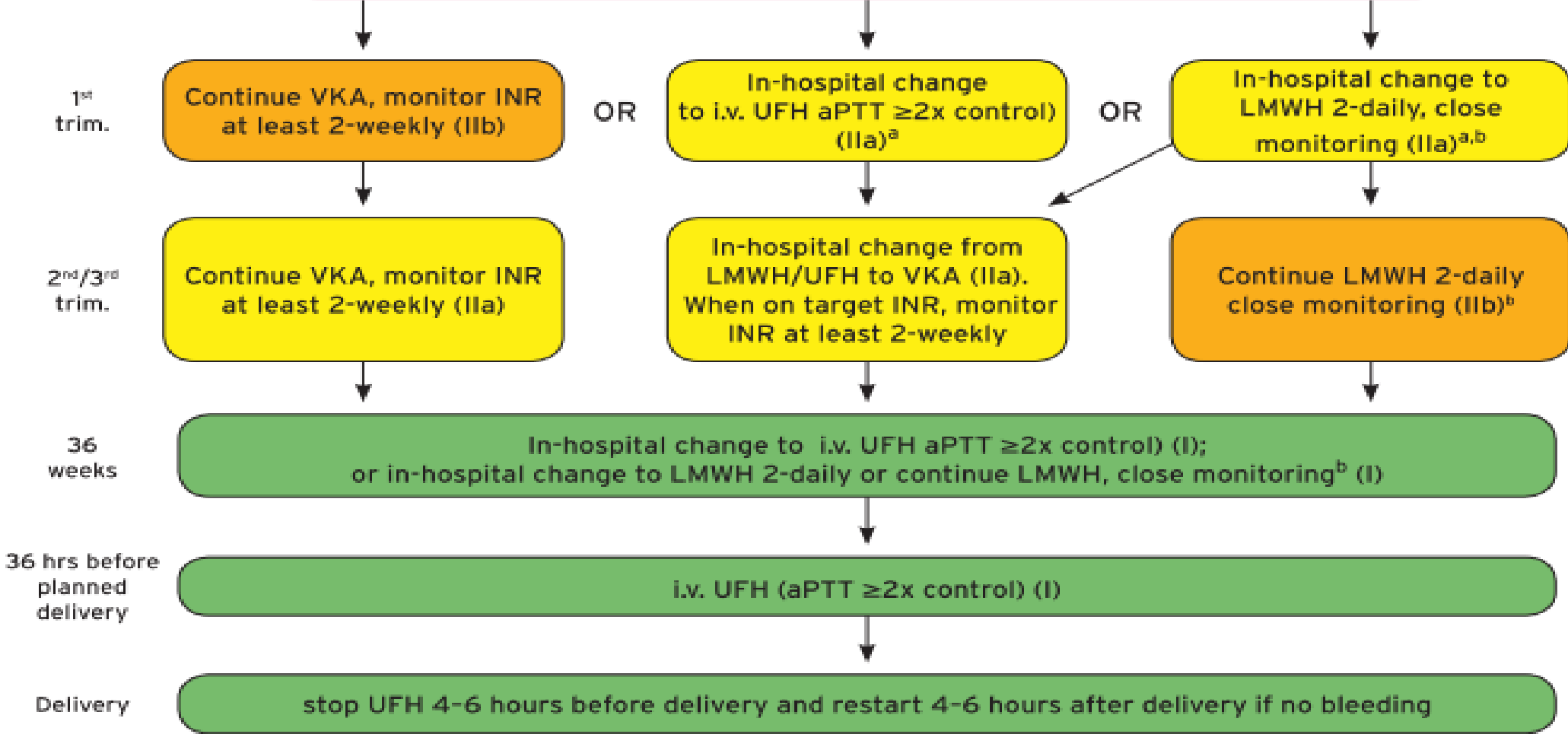
**PREGNANT**





**Woman with mechanical valve and HIGH dose VKA**  
(warfarin >5 mg/day or phenprocoumon >3 mg/day or acenocoumarol >2 mg/day)  
**who contemplates pregnancy: Pre-pregnancy counselling - Continue VKA antagonist until pregnant**

**PREGNANT**



Target INR for mechanical prostheses		
Prosthesis thrombogenicity	Patient-related risk factors <sup>a</sup>	
	None	≥1
Low <sup>b</sup>	2.5	3.0
Medium <sup>c</sup>	3.0	3.5
High <sup>d</sup>	3.5	4.0

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**Figure 4** Flowchart on anticoagulation in mechanical valves and target international normalized ratio for mechanical prostheses (modified from Baumgartner et al.<sup>204</sup>). INR = international normalized ratio; LVEF = left ventricular ejection fraction. <sup>a</sup>Mitral or tricuspid valve replacement, previous thrombo-embolism, atrial fibrillation, mitral stenosis of any degree, or LVEF <35%. <sup>b</sup>Carbomedics, Medtronic Hall, ATS, or Medtronic Open-Pivot, St Jude Medical, On-X, or Sorin Bicarbon. <sup>c</sup>Other bileaflet valves with insufficient data. <sup>d</sup>Lillehei-Kaster, Omniscience, Starr-Edwards (ball-cage), Björk-Shiley and other tilting-disc valves; any pulmonary valve prosthesis.

## Recommendations for the management of prosthetic heart valves

Recommendations	Class <sup>a</sup>	Level <sup>b</sup>
It is recommended that the valve prosthesis for a woman contemplating pregnancy is chosen in consultation with a pregnancy heart team.	I	C
It is recommended to manage pregnancy in women with mechanical valves in a centre with a pregnancy heart team.	I	C
If delivery starts while on a VKA or in less than 2 weeks after discontinuation of a VKA, caesarean section is recommended.	I	C
It is recommended to discontinue VKAs and start adjusted-dose intravenous UFH (aPTT $\geq 2$ x control) or adjusted-dose LMWH <sup>c</sup> (see separate recommendations) at the 36th week of gestation.	I	C
In pregnant women on LMWH or UFH, it is recommended to perform weekly anti-Xa level monitoring or aPTT monitoring with dose adjustment (within 36 h).	I	C
In pregnant women on a VKA, it is recommended to perform INR monitoring weekly or every 2 weeks.	I	C
In pregnant women with LMWH, it is recommended to target anti-Xa levels 4–6 h post-dose at 0.8–1.2 U/l (aortic valve prosthesis) or 1.0–1.2 IU/mL (mitral and right-sided valve prostheses).	I	C
It is recommended to replace LMWH with intravenous UFH (aPTT $\geq 2$ x control) at least 36 h before planned delivery. UFH should be continued until 4–6 h before planned delivery and restarted 4–6 h after delivery if there are no bleeding complications.	I	C
It is recommended to anticipate the timing of delivery to ensure safe and effective peripartum anticoagulation.	I	C
Immediate echocardiography is recommended in women with mechanical valves presenting with dyspnoea and/or an embolic event.	I	C
It is recommended to implement changes in the anticoagulation regimen during pregnancy in hospital.	I	C
During the second and third trimesters until the 36th week, VKAs are recommended in women needing a low dose. <sup>d</sup>	I	C

A bioprostheses should be considered in young women contemplating pregnancy.	<b>IIa</b>	<b>C</b>
During the second and third trimesters until the 36th week, VKAs should be considered in women needing a high dose. <sup>e</sup>	<b>IIa</b>	<b>C</b>
Continuation of VKAs should be considered during the first trimester if the warfarin dose required for therapeutic anticoagulation is <5 mg/day (or phenprocoumon <3 mg/day or acenocoumarol <2 mg/day) after patient information and consent.	<b>IIa</b>	<b>C</b>
Discontinuation of VKAs between weeks 6 and 12, and replacement with adjusted-dose intravenous UFH (aPTT $\geq 2$ x control) or adjusted-dose LMWH <sup>f</sup> twice daily (see separate recommendations), should be considered in patients with a warfarin dose >5 mg/day (or phenprocoumon >3 mg/day or acenocoumarol >2 mg/day).	<b>IIa</b>	<b>C</b>
During the second and third trimesters, LMWH <sup>f</sup> with anti-Xa level monitoring and dose adjustment (see separate recommendations) may be considered in women who need a high dose of VKA <sup>e</sup> after patient information and consent.	<b>IIb</b>	<b>C</b>
In pregnant women with LMWH, in addition to monitoring peak anti-Xa levels, monitoring pre-dose levels targeted at $\geq 0.6$ IU/mL may be considered.	<b>IIb</b>	<b>C</b>
LMWH is not recommended when weekly anti-Xa level monitoring and dose-adjustment is not available.	<b>III</b>	<b>C</b>

aPTT = activated partial thromboplastin time; INR = international normalized ratio; LMWH = low molecular weight heparin; UFH = unfractionated heparin; VKA = vitamin K antagonist.

<sup>a</sup>Class of recommendation.

<sup>b</sup>Level of evidence.

<sup>c</sup>The starting dose for LMWH is 1 mg/kg body weight for enoxaparin and 100 IU/kg for dalteparin, twice daily subcutaneously.

<sup>d</sup>Low-dose VKA: warfarin <5 mg/day (or phenprocoumon <3 mg/day or acenocoumarol <2 mg/day).

<sup>e</sup>High-dose VKA: warfarin >5 mg/day (or phenprocoumon >3 mg/day or acenocoumarol >2 mg/day).

# Anticoagulation for Pregnant Women With Mechanical Prosthetic Heart Valves

COR	LOE	Recommendations
1	C-LD	4. Pregnant women with mechanical valve prostheses who are on warfarin should switch to twice-daily LMWH (with a target anti-Xa level of 0.8 U/mL to 1.2 U/mL at 4 to 6 hours after dose) or intravenous UFH (with an activated partial thromboplastin time [aPTT] 2 times control) at least 1 week before planned delivery.
1	C-LD	5. Pregnant women with mechanical valve prostheses who are on LMWH should switch to UFH (with an aPTT 2 times control) at least 36 hours before <b>planned delivery.</b>
1	C-LD	6. Pregnant women with valve prostheses should stop UFH at least 6 hours before planned vaginal delivery.
1	C-LD	7. <b>If labor begins or urgent delivery is required in a woman therapeutically anticoagulated with a VKA, cesarean section should be performed after reversal of anticoagulation.</b>

# Anticoagulation for Pregnant Women With Mechanical Prosthetic Heart Valves



COR	LOE	Recommendations
2a	B-NR	<p>8. For pregnant women with mechanical prostheses who require a dose of warfarin <math>\leq 5</math> mg/d to maintain a therapeutic INR, continuation of warfarin for all 3 trimesters is reasonable after full discussion with the patient about risks and benefits.</p>
2a	B-NR	<p>9. For pregnant women with mechanical prostheses who require <math>&gt;5</math> mg/d of warfarin to achieve a therapeutic INR, dose-adjusted LMWH (with a target anti-Xa level of 0.8 to 1.2 U/mL at 4 to 6 hours after dose) at least 2 times per day during the first trimester, followed by warfarin during the second and third trimesters, is reasonable.</p>
2a	B-NR	<p>10. For pregnant women with mechanical prostheses who require a dose of warfarin <math>&gt;5</math> mg/d to achieve a therapeutic INR, and for whom dose-adjusted LMWH is unavailable, dose-adjusted continuous intravenous UFH during the first trimester (with aPTT 2 times control), followed by warfarin for the second and third trimesters, is reasonable.</p>

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COR	LOE	Recommendations
2b	B-NR	14. For pregnant women with mechanical prostheses, <b>aspirin 75 to 100 mg daily may be considered</b> , in addition to anticoagulation.
3: Harm	B-NR	15. For pregnant women with mechanical prostheses, LMWH should not be administered unless anti-Xa levels are monitored 4 to 6 hours after administration and dose is adjusted according to levels.
3: Harm	B-R	16. For patients with mechanical valve prostheses, anticoagulation with the direct thrombin inhibitor, dabigatran, should not be administered.
3: Harm	C-EO	17. The use of anti-Xa direct oral anticoagulants with mechanical heart valves in pregnancy has not been assessed and is not recommended.

# Diagnosis and management of valve thrombosis

Management of valve thrombosis is comparable with management in **non-pregnant** patients.

**Fibrinolysis** should be applied in critically ill patients when surgery is not immediately available, and it should be considered when the risk of surgery is high.

Because foetal loss is high (30%) with **surgery**, fibrinolysis may be considered instead of surgery in non-critically ill patients when anticoagulation fails.

Fibrinolysis is the therapy of **choice** in right-sided prosthetic valve thrombosis.



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COR	LOE	Recommendations
2a	B-NR	<b>11. For hemodynamically stable pregnant women with obstructive left-sided mechanical valve thrombosis, it is reasonable to manage with slow-infusion, low-dose fibrinolytic therapy.</b>
2b	B-NR	<b>12. For pregnant women with mechanical prostheses who require a warfarin dose &gt;5 mg/d to achieve a therapeutic INR, dose-adjusted LMWH (with a target anti-Xa level of 0.8 to 1.2 U/mL at 4 to 6 hours after dose) at least 2 times per day for all 3 trimesters may be considered.</b>
2b	B-NR	<b>13. For pregnant women with mechanical prostheses who require a dose of warfarin ≤5 mg/d to maintain a therapeutic INR, dose-adjusted LMWH at least 2 times per day during the first trimester, followed by warfarin for the second and third trimesters, may be considered.</b>

A wide-angle landscape photograph of a mountain valley. In the foreground, a small village with houses of various colors (red, blue, white) is nestled on a green hillside. A river flows through the valley floor, partially obscured by a thick layer of white mist or fog. The middle ground shows rolling green hills and a dirt road winding through them. In the background, dark, rugged mountains rise against a sky filled with heavy, grey clouds. The overall atmosphere is misty and somewhat somber.

**TANKYO FOR  
YOUR ATTENSION**