**Comparison of the Recent Updates to the ACC/AHA and ESC Guidelines for the Management of Valvular Heart Disease: Similarities and Differences**

Nabila Laskar, Sveeta Badiani, Thomas Treibel, Sanjeev Bhattacharyya, Guy Lloyd

***Corresponding Author*** *- Nabila Laskar, Clinical Research Fellow St Bartholomews Hospital, MBBS MRCP, nabila.laskar@nhs.net*

*Sveeta Badiani, Consultant Cardiologist Barts Health Trust, MBBS MRCP sveeta.badiani@nhs.net*

*Thomas Treibel, Consultant Cardiologist St Bartholomews Hospital, MBBS MRCP PhD, Thomas.treibel@nhs.net*

*Sanjeev Bhattacharyya, Consultant Cardiologist St Bartholomews Hospital and University College Hospital, MBBS MRCP MD, Sanjeev.bhattacharyya@nhs.net*

*Guy Lloyd, Consultant Cardiologist St Bartholomews Hospital and University College Hospital, MBBS MRCP MD FBSE FESC FRCP, guy.lloyd1@nhs.net*

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**Abstract**

Purpose of Review: There have been several advances in the diagnosis and management of Valvular Heart Disease (VHD) over the last decade. These have been reflected in the latest European and North American guidelines, although both contain significant similarities and differences. In this review, we highlight the important overlaps and variations between the updated guidelines and their previous versions to help guide the general cardiologist.

Recent findings: There has been extensive revision on the use of percutaneous treatments, the indications for intervention in asymptomatic VHD and perioperative bridging therapies.

Summary: The updated guidelines provide new recommendations in many aspects of VHD however there remain significant gaps in the role of biomarkers in VHD and the long-term outcomes of novel oral anticoagulants (NOACs) and transcatheter therapies.

**Introduction**

Valvular Heart Disease (VHD) affects 2.5% of the population and is more prevalent with increasing age (1). As the landscape of cardiovascular medicine changes, and life expectancy increases, VHD, now a recognised public health problem, will continue to rise (1).

Perhaps the largest advances that have occurred within the realm of VHD, are in its management and treatment. With greater accessibility to percutaneous and surgical interventions along with a variety of novel therapeutic strategies, there is significant emphasis on preventing adverse healthcare outcomes including heart failure and premature deaths (2). The number of deaths due to VHD alone reached 2.5% in the 2019 Global Burden of Cardiovascular Disease registry (3).

Updated clinical practice guidelines in the management of VHD have come following a surge of new data since 2012 in percutaneous therapies. The main differences across the years between the former and recently published guidelines are 1) the increase in several randomised controlled trials specifically comparing surgical and transcatheter therapies, 2) the trial participant population more commonly reflect the day-to-day patient cohort and lastly, 3) risk scores have been redefined.

This paper compares the recently updated North American and European Guidelines in the diagnosis and management of VHD, with particular focus on situations commonly encountered in generally cardiology practice.

**The Heart Team and Heart Valve Centre**

Both guidelines highlight the importance in centralising and organising expertise into centres which can meet contemporary standards of care.

The European Society of Cardiology **(ESC**) guidelines published in 2017 highlighted the significance of a dedicated Heart Team in the evaluation of patients with VHD, which included recommendations for a Heart Valve Centre. This has been strengthened in the 2021 guidelines with emphasis on the Heart Valve Centre as a 'Centre of Excellence'.

The American College of Cardiology/American Heart Association (**ACC/AHA**) guidelines similarly highlight the importance of dedicated centres and outline the differences between the 'Primary Valve Centre' compared to the 'Comprehensive Valve Centre'. Figure 1 illustrates the key features of both the 'Centre of Excellence' and the 'Comprehensive Valve Centre'.

**Patient Evaluation**

The importance of detailed patient evaluation and decision making is central to both guidelines. The **ESC** guidelines replace previous descriptions with an infographic illustrating the role of shared decision making and the importance of working simultaneously with patient, clinician and centre. The **ACC** guidelines continue to highlight the stages of VHD and include the range of investigations required when assessing the patient.

Positron Emission Tomography (PET) imaging has been newly included in the latest guidelines as part of ancillary testing alongside traditional transthoracic echo (TTE),

transoesophageal echo (TOE), computed tomography (CT) and magnetic resonance imaging (MRI).

**Risk Scores**

The **ESC** guidelines suggest either STS-PROM or EuroSCORE II to estimate patient risk. For example for surgical aortic valve replacement (SAVR), low risk is defined as being <75yrs with STS-PROM <4%. In contrast, in the updated **ACC** guidelines, EuroSCORE II is offered as an alternative to STS-PROM with low risk for SAVR being an STS-PROM <3%, no frailty, cardiac dysfunction or procedure specific impediments which are given special prominence in the guideline.

**Aortic Stenosis (AS)**

i. Diagnosis in Low flow low gradient AS

The diagnosis of low flow low gradient (LFLG) aortic stenosis is challenging and the difficulty in differentiating between severe and pseudosevere AS including possible measurement errors, present sources of inconsistencies in patient evaluation. The **ACC** have issued new guidance on LFLG severe AS where in suspected cases, with normal left ventricular ejection fraction (LVEF), optimisation of blood pressure must be undertaken before further investigation into the severity (4-6).

In cases with normal or reduced LVEF, it is now reasonable to calculate the ratio of the outflow tract to aortic velocity (dimensionless index) or use the aortic valve calcium score from CT imaging to define the severity of aortic valve disease, this aligns with the **ESC** guidance.

ii. Medical therapy in AS

There is limited data on statin therapy in VHD. The current **ACC** guidelines have advised statins in calcific AS for primary and secondary prevention of atherosclerosis on the basis of standard risk scores (Level IA) (7, 8). This is new guidance however, there has been no change between the 2014 and 2020 guidelines stating no role for statins in mild or moderate AS for the prevention of haemodynamic progression of AS. The 2020 guidelines also address the potential role of angiotensin converting enzyme inhibitors (ACEI's) or angiotensin receptor blockers (ARB's) in reducing the long-term all-cause mortality risk in patients post transcatheter aortic valve replacement (TAVR) (Level IIB) (9).

The 2021 **ESC** document does not deliver any guidance on medical therapies in AS or post TAVR.

iii. Intervention in severe AS

According to the **ESC** guidelines in 2017, intervention for symptomatic AS was advised in severe high gradient aortic stenosis (MG ≥40mmHg OR peak velocity ≥4.0m/s). The key change in 2021 is that all three parameters (MG ≥40mmHg, peak velocity ≥4.0m/s AND AVA ≤1.0cm2) have to be present.

In asymptomatic severe AS, there were no clear guidelines on timing of intervention. In the 2021 guidance, it is stated that intervention **should be considered** in asymptomatic patients with severe AS if LVEF ≤55% without another cause, or if the surgical risk is low with no exercise abnormalities and 1) the peak velocity is ≥5m/s or the mean gradient is ≥60mmHg, 2) there is severe valve calcification on CT 3) the peak velocity increases by ≥0.3m/s/yr or 4) the BNP levels are raised three times above normal limits. The presence of pulmonary hypertension has been removed as a criteria for intervention. The **ACC** guidelines address this indication with similar criteria but have also added a Level IIB recommendation to consider AVR in those with a progressive decrease in LVEF on at least 3 serial imaging studies to <60%. This is based on new data showing the importance of change in LVEF (even in the normal range) in predicting the outcome of asymptomatic severe AS (10, 11).

iv. Mechanical vs Bioprosthesis in severe AS

The **ACC** guidelines state that mechanical AVR is reasonable in those <50yrs without contraindication to oral anticoagulation (OAC). The age has been lowered from 60yrs to 50yrs to perhaps reflect changing practice and the greater durability in newer generation bioprostheses, as well as the wider availability of future percutaneous treatment. This is supported by a reduction in age when suggesting implantation of a bioprosthesis is reasonable - 65yrs from 70yrs. The **ESC** guidelines advise considering an aortic mechanical prosthesis in <60yrs or <65yrs if in the mitral position. An aortic bioprosthesis is to be considered in >65yrs and >70yrs for a mitral bioprosthesis. These guidelines have not changed from the previous version.

v. SAVR vs TAVR

The **ESC** guidance have stressed the significance in involving the Heart Team and patient for each case when choosing between surgery or transcatheter therapies, recognising the increasingly strong data supporting equipoise between the techniques in lower and intermediate risk patients. Factors that require consideration are the clinical, anatomical and procedural factors along with the risk: benefit ratio.

The American guidelines share this idea but are more prescriptive suggesting between 65-80yrs, with severe symptomatic AS and no anatomical contraindication to TAVR, SAVR ***OR*** transfemoral TAVR is recommended after shared decision making. Similarly in those with asymptomatic severe AS with LVEF <50% who are ≤80yrs with no anatomic contraindication to transfemoral TAVR, TAVR vs SAVR should be a shared decision making process. However, where a bioprosthetic valve is favoured and vascular anatomy is not amenable for transfemoral TAVR, SAVR is recommended.

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Where TAVR is favoured over SAVR, is when the patient with severe AS is >80yrs of age or if younger, but have a life expectancy <10yrs and no anatomic contraindication to transfemoral TAVR.

The **ESC** guidelines state if the patient is ≥75yrs or high risk for surgery (based on STS-PROM/EuroSCORE II >8%), TAVR is recommended in place of SAVR. However, the use of conventional EuroSCORE II or STS-PROM score when evaluating the patient for SAVR vs TAVR is vague, and guidelines maintain the decision should be based on patient clinical, anatomical and procedural characteristics.
Non transfemoral TAVR is uniquely mentioned in the 2021 **ESC** guidelines and reserved for those who are inoperable with unsuitable transfemoral access. This comes with a class of recommendation of Level IIB reflecting all current data advising against alterative access sites, especially given the PARTNER trial data solely referencing transfemoral and transapical access (12).

The **ACC/AHA** recommendations offer new guidance where SAVR over TAVR is advised (Level IB) in asymptomatic severe AS if the patient has an abnormal exercise test, very severe AS, rapid progression or an elevated BNP laboratory value.

The **ACC** address recommendations for palliative care in patients with severe symptomatic AS with <12 months life expectancy estimated post intervention (Level IC); this is not explicitly addressed in the ESC guidance.

**Aortic Regurgitation (AR)**

i. Medical therapy in AR

There is agreement between both societies for a role for guideline directed medical therapy (GDMT) in severe symptomatic AR with or without reduced LVEF and high surgical risk. The latest **ACC** guidelines have specifically included Sacubitril/Valsartan amongst the treatment options.

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ii. Intervention for asymptomatic severe AR

The updated **ESC** guidelines have amended their criteria for intervening in asymptomatic severe AR. Surgery in asymptomatic patients is indicated (Class IIA recommendation) if LVEF ≤55% OR LVESD >50mm or >25mm/m2 (small body size). The LVEDD value in the 2017 guidelines have been removed. The **ACC** guidelines advise consideration of AVR with normal LVEF at rest and low surgical risk but with *progressive* decline in LVEF on at least 3 serial studies to the low-normal range (55-60%) or *progressive* LV dilation (LVEDD >65mm) (13, 14).

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**Mitral Regurgitation (MR)**

i. Changing signs and symptoms of MR

Changing signs and symptoms in primary MR have not been addressed explicitly before but in the latest ACC guidance, there is stress on obtaining a TTE for new-onset or changing symptoms in primary MR to evaluate the mitral valve apparatus and LV function.

**ii.** Follow up in **Primary MR**

There is new guidance in the north American guidelines for patients with asymptomatic severe primary MR, a TTE is indicated every 6-12 months for surveillance of LVEF and assessment of pulmonary arterial pressures. This aligns with the European guidelines.

A new addition to the **ESC** guidelines has been included when assessing for left atrial (LA) dilation, where LA diameter has been included as an acceptable parameter (alongside LA volume).

iii. Intervention in **Primary MR**

There have been significant changes in the **ESC** guidelines on the indications for intervention in severe primary MR. The LVESD dimension used as a cut off value for surgery or surgical valve repair in symptomatic and asymptomatic severe primary MR has been changed to 40mm (from 45mm) aligning with the **ACC/AHA** guideline.

The **ACC** guidelines have changed their recommendations for mitral valve surgery in symptomatic severe primary MR. The 2014 guidelines mandated the LVEF was >30% to consider mitral valve surgery. The 2020 guidelines state that in symptomatic severe primary MR, mitral valve intervention is recommended irrespective of LVEF (Level IB). Where patients remain symptomatic and are at high or prohibitive surgical risk, transcatheter edge-to-edge repair (TEER) carries a Level IIa recommendation.

New guidance exists for asymptomatic patients with severe primary MR and normal LVEF (>60%) and LVESD( <40mm), who have a progressive increase in LV size or decrease in LVEF in ≥3 serial imaging studies. In this case, mitral valve surgery may be considered irrespective of the probability of a successful and durable repair (Level IIB).

Global longitudinal strain (GLS) and serum biomarkers as a measurement of LVEF may be considered as an adjunct to guide timing of intervention in asymptomatic severe primary MR according to the updated **ACC** guidelines (IIb recommendation).

iv. Role of imaging in **Secondary MR**

The updated **ACC** guidelines have new guidelines on the role of TOE and intraprocedural TOE when evaluating and performing transcatheter interventions for chronic secondary MR.

v. Medical therapy in **Secondary MR**

Sacubitril/Valsartan has been added to GDMT in the **ACC** guidelines for chronic secondary MR and heart failure (HF) with reduced LVEF. It has also been stressed that a HF specialist

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should be managing these patients as a member of the multidisciplinary care team. The ESC guidelines refer to standard HF guidelines to guide management (15).

vi. Intervention in **Secondary MR**

The **ESC** have issued new Level I guidance on intervention in secondary MR. MV intervention should only be performed in patients with severe secondary MR who remain symptomatic despite GDMT (including CRT if indicated). This has to be decided by a structural collaborative Heart Team. Prior guidelines did not address this.

Transcatheter edge to edge repair (TEER) has been specifically highlighted as the procedure to be considered in selected symptomatic patients who are not eligible for surgery but fulfil criteria suggesting an increased chance of responding to therapy in the ESC guideline document. These patients must have also been assessed for a ventricular assist device (VAD) or heart transplant.

In the **ACC** guidelines, TEER has been introduced in specific circumstances (LVEF <50%, NYHA II, III or IV, on optimal GDMT for HF, appropriate anatomy on TOE, LVESD ≤70mm and PASP ≤70mmHg) based on randomized clinical trial data published in the last few years.

Intervention in moderate secondary MR has been removed in the updated guidelines.

Figure 2 illustrates the differences and similarities in the management of severe asymptomatic VHD.

**Mitral Stenosis (MS)**

There has been no new European guidance on MS.

The new **ACC** guidance covers the management of mitral annular calcification (MAC), where valve intervention may be considered only after discussion of the high procedural risk and the individual patient's preferences and values.

**Tricuspid Regurgitation (TR)**

i. The role of investigations in TR

The role of CMR and real time 3D TTE have been removed in the **ACC** 2020 guidelines when assessing right ventricular volumes in severe TR. Exercise testing has also been removed in the evaluation of exercise capacity in patients with severe TR and minimal symptoms, to affiliate with the **ESC** guidelines.

ii. Intervention in primary and secondary TR

There has been new guidance in the 2020 **ACC** guidelines on isolated tricuspid valve surgery in primary and secondary TR in order to reduce symptoms and recurrent hospitalisations.

In the 2017 European guidance, Level IIA recommendations stated that surgery should be considered in severe symptomatic secondary TR with RV dilation in the absence of previous left sided surgery. The updated **ACC/AHA** guidelines have removed the importance of previous left sided surgery.

Transcatheter therapies for TR are still novel, thus the **ESC** guidelines have included consideration of transcatheter treatment for symptomatic secondary severe TR in inoperable patients only at a Heart Valve Centre with relevant expertise.

**Prosthetic Valves**

i. Management of paravalvular leaks

There has been new European guidance on the management of paravalvular leaks based on patient, anatomy and local expertise when deciding between transcatheter or surgical closure of clinically significant leaks (Level IIA). Transcatheter closure is favoured in the event of clinically significant regurgitation or haemolysis in patients with high surgical risk.

ii. Bioprosthetic thrombosis and failure

The **ESC** guidelines newly advise considering anticoagulation in leaflet thickening and reduced leaflet motion leading to elevated bioprosthetic valve gradients (Level IIA).

In instances of bioprosthetic failure, transcatheter valve in valve implantation has been included in the 2021 guidance to be considered in the mitral or tricuspid position in selected patients at high-risk for surgical re-intervention (Level IIB). The previous guidelines only addressed transcatheter valve in valve implants in the aortic position.

All other recommendations remain the same.

The **ACC** guidelines have concentrated on imaging in their new guidelines when addressing prosthetic valve dysfunction. Gated cardiac CT and fluoroscopy along with TOE are now recommended when diagnosing prosthetic valve dysfunction (Level IC) and in patients undergoing a transcatheter procedure for paravalvular prosthetic regurgitation, while 3D TOE is recommended for intraprocedural guidance.

iii. Excessive anticoagulation and serious bleeding

The **ACC** guidelines have issued new guidance on the use of IV Vitamin K and prothrombin complex concentrate in patients with mechanical heart valves and uncontrollable bleeding if resumption of Vitamin K Antagonist (VKA) therapy is not anticipated for 7 days.

There is also new guidance on reversal agents for NOACs (Idarucizumab for Dabigatran) and anti Xa agents (Andexanet Alfa) in patients with bioprosthetic valves and annuloplasty rings.

There is no **ESC** guidance on this particular topic.

iv. Thromboembolic events with prosthetic heart valves

This is a new section in the **ACC** 2020 guidelines. If thromboembolism occurs in a mechanical AVR/MVR, it is reasonable to increase the target INR value **OR** add low daily ASA.

In bioprosthetic valves, it is reasonable to change to a VKA to replace ASA.

v. Acute mechanical valve thrombosis

The **ACC** guidelines now state that in suspected mechanical valve thrombosis, evaluation with TTE, TOE, fluoroscopy, AND/OR CT imaging is indicated.

Slow infusion and fibrinolytic therapy as an alternative option to surgery, for treatment in left sided prosthetic valve thrombosis, has been converted to a Level I recommendation preferencing milder HF symptoms, smaller thrombus burden and none/mild coronary artery disease (CAD).

The **ESC** guidelines recommend urgent or emergency valve replacement in critically ill patients without serious comorbidity leaving fibrinolytic therapy use only for when surgery is high risk or for right sided prostheses (Level IIA).

vi. Prosthetic Valve Stenosis

There is new guidance in the **ACC** guidelines on the imaging required to diagnose bioprosthetic and mechanical prosthetic valve stenosis including cine CT or fluoroscopy.

In the **ACC/AHA** guidelines, a transcatheter valve in valve procedure is reasonable for bioprosthetic aortic valve stenosis and high surgical risk if performed at a Comprehensive Valve Centre. This is similar to the recommendations in the latest **ESC** guidelines.

The **ACC** guidelines include that OAC with a VKA is reasonable in suspected bioprosthetic valve stenosis (aortic/mitral) with elevated gradients and clinical hemodynamic stability.

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**Antithrombotic Therapy**

i. AF and native VHD

The **ESC** guidelines advise consideration of left atrial appendage (LAA) occlusion in patients with AF and CHAD-VASC score ≥2 who require cardiac surgery. The CHADS-VASC score has been added to the latest guidance.

The use of NOACs over VKAs for stroke prevention in AF and AS, AR or MR has been changed to class of recommendation Level I in the latest **ESC** guidance.

ii. Perioperative management in valve replacement or repair

There has been extensive new guidance on this topic in the 2021 **ESC** guidelines including: 1) bridging of OAC when required 2) commencing bridging therapy post operatively 3) timing of resuming VKAs in metallic heart valves and 4) resumption of dual antiplatelet therapy (in particular P2Y12 inhibitors) post operatively.

New Level IC **ESC** guidance states that bridging of OAC when required is recommended in mechanical prosthetic heart valves, AF with significant MS, AF with CHADS-VASC ≥3 for women or ≥2 for men, acute thrombotic event within the previous 4 weeks, high acute thromboembolic risk.

Figure 3 illustrates these new guidelines, all with Level IC recommendation.

The **ACC** guidelines contain fewer changes within this topic; most notably, previous Level I guidance recommending the use of IV unfractionated heparin (UFH) or low molecular weight heparin (LMWH) in selected patients for subtherapeutic INR has been removed and there is new Level IIA guidance on bridging anticoagulation in these patients once the bleeding and thromboembolic risks have been considered.

There has also been new guidance on bridging therapy aligning with the European guidance during interruption of OAC in bioprosthetic heart valves or annuloplasty rings in people with AF, where it is now reasonable to use CHADS-VASC and bleeding risk to decide.

iii. Indications for concomitant antiplatelet therapy

The latest **ESC** guidelines contain newly amended Level I guidance on early switching from ASA + P2Y12 inhibitor to OAC + P2Y12 inhibitor following uncomplicated PCI or ACS if the bleeding risk is more of a concern over stent thrombosis.

The 2021 guidelines also contain new guidance on when to stop dual antiplatelet therapy (DAPT) in patients taking OAC, when to stop VKA and continue with clopidogrel monotherapy in those with a high bleeding risk and new guidance on the INR target when on triple therapy or antiplatelet + VKA including, recommended time in therapeutic range. There is also new guidance on when to when to stop triple therapy in patients with high stent thrombosis risk after PCI or ACS.

iv. Antithrombotic therapy following surgical valve replacement

There have been a few changes to the previous **ESC** guidelines involving the use of VKAs and NOACs following valve replacement. In patients with AF and a bioprosthetic valve replacement, NOACs should be considered over a VKA after 3 months, and up to 3 months in bioprosthetic mitral valve replacement, however, if there are no baseline indications for OAC, ASA/VKA should be considered for the first 3 months after bioprosthetic valve replacement.

The **ACC** guidelines have amended the class of recommendation from Level IA to IIB for the addition of ASA to a VKA in patients with a mechanical valve prosthesis. There is also some

clarity on the target INR value for patients with a low bleeding risk following a bioprosthetic aortic valve replacement – an INR of 2.5 is considered reasonable up to 6 months post replacement (Level IIa). For patients with a mechanical On-X AVR and no thromboembolic risk factors, it may be reasonable to aim for a lower target INR (1.5-2.0) ≥3 months after surgery, with continuation of aspirin 75mg to 100mg daily (IIb recommendation).

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v. Antithrombotic therapy following TAVR

Both the European and American guidelines have new recommendations on antithrombotic therapy post TAVR.

The **ESC** guidelines have new Level I guidance recommending continuation of OAC post TAVR in those with an indication for OAC, alternatively lifelong antiplatelet therapy is recommended if there is no indication for OAC.

Interestingly, the **ACC** guidelines have given treatment with antiplatelet therapy post TAVR a Level IIA recommendation (16, 17). This is based on small studies showing a reduction in bleeding rates following single vs dual antiplatelet therapy. There is also Level IIB guidance on the use of OAC with a VKA post TAVR in those with a low bleeding risk up to 3 months post implant (18, 19). This particular treatment is classed at Level III in the **ESC** guidance where routine use of OAC is NOT recommended after TAVR without an indication for OAC. This comes after a recent controlled trial showed that use of a NOAC following TAVR resulted in a higher risk of bleeding (20). Conversely, the newly published ATLANTIS trial showed that Apixaban was not superior to standard therapy (VKA in those with an indication or antiplatelet) in causing major or life-threatening bleeding (21). Much is yet to be studied in this field.

## Pregnancy, preconception and VHD

The **ESC** guidelines contain some recommendations but advise readers to follow the relevant guidelines for the management of cardiovascular diseases during pregnancy for detail (22).

There is a new section in the **ACC** guidelines on preconception imaging, counselling patients with severe VHD and the role of monitoring in a tertiary care centre with a dedicated multidisciplinary team.

i. Intervention in pre-pregnant and pregnant women with VHD

Percutaneous mitral balloon commissurotomy (PBMC) is no longer routinely recommended in asymptomatic patients with severe MS (MVA ≤1.5cm2) prior to pregnancy. This practice has been changed to a Level IIA recommendation.

There is also new guidance on women of childbearing age who require a valve replacement where bioprosthetic valves are favoured over mechanical because of the increased risk of maternal and fetal risks of mechanical heart valves in pregnancy (IIA recommendation).

Finally, there is a role for consideration of medical therapy in women during pregnancy who are truly asymptomatic with severe AS (with normal BNP and exercise stress test) to avoid prosthetic valve replacement.

ii. Anticoagulation for pregnant women with mechanical prosthetic heart valves

There is clear guidance on counselling women with mechanical heart valves on the risk of pregnancy and lack of consistent, safe anticoagulation strategy in the ACC guidelines, while the recommendations in the **ESC** guidelines remain vague.

The 2020 **ACC** guideline states that in women who cannot maintain therapeutic anticoagulation with frequent monitoring, counselling against pregnancy is advised given the hypercoagulable state associated with pregnancy.

During the first trimester, there is recommendation on the significance of counselling and shared decision making while informing the patient of the safety of a VKA provided the dose is ≤5mg (IIA recommendation).

There is now a clear time cut off reference for switching from warfarin to LMWH or IV UFH and when to stop all anticoagulation altogether before planned delivery.

The mode of delivery has been clarified in the event of urgent delivery or labour in the therapeutically anticoagulated woman on a VKA with specific recommendations for 1 week, 36 hours, and 4-6 hours prior to planned delivery.

**Conclusions**

The Guidelines from North America and Europe unsurprisingly show a high degree of concordance. Both guidelines have significantly evolved as the body of knowledge around natural history and the outcome of therapeutic interventions has advanced. There are important revisions around thresholds for intervention and antithrombotic therapy / bridging anticoagulation therapy. The increasing use of transcatheter therapies and how the balance between surgical and percutaneous approaches is managed, in particular the increasing role of specialist valve teams, is extensively revised.

There remain significant gaps in evidence in 1) the role of biomarkers and imaging in disease progression and prognosis, 2) the long term outcomes of novel transcatheter therapies and 3) the safety and efficacy of NOACs post-surgical and transcatheter procedures.

Both guidelines provide a comprehensive and pragmatic roadmap for clinicians to manage these increasingly common and often complex patients.

**Declarations**

**Conflict of Interest**

Nabila Laskar reports salary support from Medtronic (2020-2021); Funding from Barts Charity to conduct service evaluation programme (Oct 2020). They are also currently conducting a pilot study on valvular heart disease incidence in the community, this will form part of a higher research degree (2020-2023) related to patents planned, issued or pending. Funding from Barts Charity has contributed to the purchase of echocardiography devices for current service evaluation programme to identify valvular heart disease in the community.
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Guy Lloyd reports consulting fees from GE; payment or honoraria from Edwards, Jannsen, Siemens, and GE; leadership or fiduciary role in British Cardiovascular Society; and research support from Medtronic.
The other authors declare that they have no conflict of interest.

**Human and Animal Rights and Informed Consent**

This article does not contain any studies with human or animal subjects performed by any of the authors.

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• Of importance
•• Of major importance


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**Figure 1**: Centre of Excellence/Comprehensive Valve Centre. ICU = Intensive Care Unit; TTE = transthoracic echocardiography; TOE = transoesophageal echocardiography; CCT = cardiac CT; CMR = cardiac magnetic resonance; CPD = continuing professional development

**Figure 2**: Intervention recommendations for severe asymptomatic VHD. AS = Aortic Stenosis; AR = Aortic Regurgitation; MR = Mitral Regurgitation; AVR = Aortic Valve Replacement; LVEF = Left Ventricular Ejection Fraction; CABG = Coronary Artery Bypass Graft.

**Figure 3:** ESC 2021 Guidelines on bridging therapy in the perioperative period in valve replacement or repair. VKA = Vitamin K Antagonist; INR = international normalised ratio; IV = intravenous; UFH = unfractionated heparin; LMWH = low molecular weight heparin; MHV = mechanical heart valve; PCI = percutaneous coronary intervention; OAC = oral anticoagulation.