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Cardiac Evaluation before kidney transplantation

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Cardiovascular disease is **leading cause of morbidity and mortality** before and after kidney transplantation in ESRD patients.

Chronic kidney disease (CKD) is an independent risk factor for the development of Cardiovascular disease.

Cardiovascular diseases in aggregate **make up the most common cause of death in patients with functioning allografts at all times after kidney transplantation**, accounting for 30% of mortality overall, with highest rates in the **peri** transplantation period



Both decreased glomerular filtration rate (GFR) and increased proteinuria increase the risk of cardiovascular disease

Estimated GFR and ACR(Alb/Cr ratio) improves the ability to predict cardiovascular events in patients at high cardiovascular risk

Evidence that mild to moderate CKD is associated with an adverse cardiovascular prognosis led both the National Kidney Foundation and the American College of Cardiology/American Heart Association to recommend that:

**** CKD MAYBE considered as a CHD risk equivalent****

NATIONAL KIDNEY FOUNDATION PRACTICE GUIDELINE

The risk of heart disease in those with CKD appears to vary based upon not only absolute level of *renal dysfunction* and degree of *proteinuria*, but also the *rate* at which these factors emerge

Even patients with the same degree of renal dysfunction may not have the same risk of cardiovascular disease since the risk of cardiovascular disease in a patient with CKD is in part related to the presence and extent of *significant comorbidities*



Nontraditional risk factors — Possible risk factors that are relatively unique to patients with moderate to severe CKD include:

retention of uremic toxins, anemia, elevated levels of certain cytokines, positive calcium balance, abnormalities in bone mineral metabolism, and/or an "increased inflammatory-poor nutrition" state

Ambiguity in cardiac evaluation

The great number of CKD patients **unfortunately do not present themselves with typical coronary** symptoms like general population

Perioperative MI occurs predominantly in patients with multivessel CAD, especially left main and 3-vessel disease;

however, the severity of preexisting underlying stenosis ***did not*** predict accurately the resulting infarct territory.

Why?

Because the nidus for the thrombosis is often a *noncritical stenosis*, preoperative cardiac evaluation before surgery may fail to identify patients at risk for plaque rupture

Methods of preoperative cardiovascular testing do not identify patients with **mild to moderate** but:

”vulnerable coronary plaque”

AHA2012

There are **no** definitive data at this time **for or against** screening for myocardial ischemia among kidney transplantation candidates *who are free of active cardiac conditions.*

However, until more data are available, it may be useful to use aggregate CAD risk factors to target screening of patients with the highest pretest likelihood of prognostically significant CAD

ACTIVE CONDITION: ACUTE CORONARY SYNDROME, ACTIVE HF, ACTIVE ARRHYTHMIA. SEVERE VALVULAR DISEASE

European Renal Best Practice Guideline on kidney donor and recipient evaluation and perioperative care 2015

We recommend performing cardiac investigation for occult coronary artery disease with non-invasive stress imaging (myocardial perfusion or dobutamine stress echocardiography) In kidney transplant candidates with high risk and a positive or inconclusive exercise tolerance test. (1C)

We recommend performing **coronary angiography** in renal transplant candidates with a **positive test for cardiac ischemia**. Further management should be according to the current cardiovascular guidelines

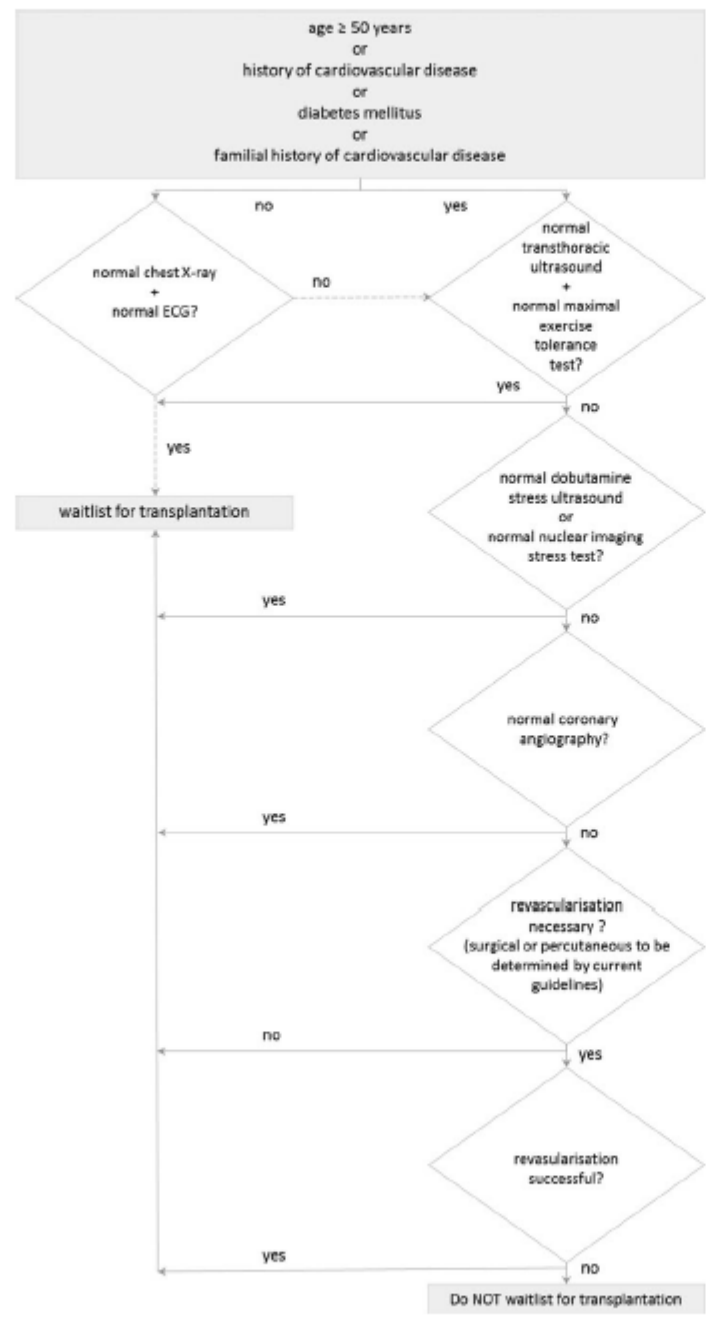
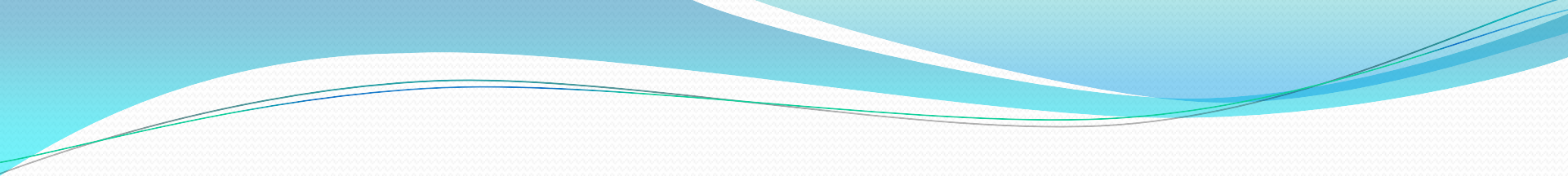


FIGURE 1. Decision tree pre-transplant cardiovascular screening.

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- Patients with *nonischemic cardiomyopathy* and no other significant comorbidities may be candidates for kidney transplant alone after consultation with a heart failure specialist.
 - Cardiomyopathy may reverse or improve after kidney transplantation.

CORONARY ANGIOGRAPHY

Patients with angina symptoms, Cardiomyopathy
reduced ejection fraction,

- Diabetes mellitus type 1 with diabetic nephropathy as
the cause of their end-stage renal disease (ESRD)

Patients with a positive noninvasive stress test

AHA₂₀₁₂& Uptodate 2018

Clinical risk factors:

- Age >60 years
- Diabetes mellitus
- Hypertension
- Dyslipidemia
- Peripheral vascular disease
 - Previous history of CHD (such as myocardial infarction)
 - Left ventricular hypertrophy
 - Family history of heart disease
- Dialysis vintage greater than **one year**
- Prolonged duration of CKD
- History of smoking
- History of radiation therapy (either whole body or chest irradiation)

Uptodate 2018 & AHA 2012

Patients with <3 of the above clinical risk factors are considered to be at low risk for CHD, and in general, we do not screen such patients with noninvasive testing .

*However, we screen all patients who have either diabetes mellitus or peripheral vascular disease , even if they *don't* have any additional risk factor*

UPTODATE 2018

Relative contraindications to transplantation

Many centers consider the following as relative contraindications to transplantation:

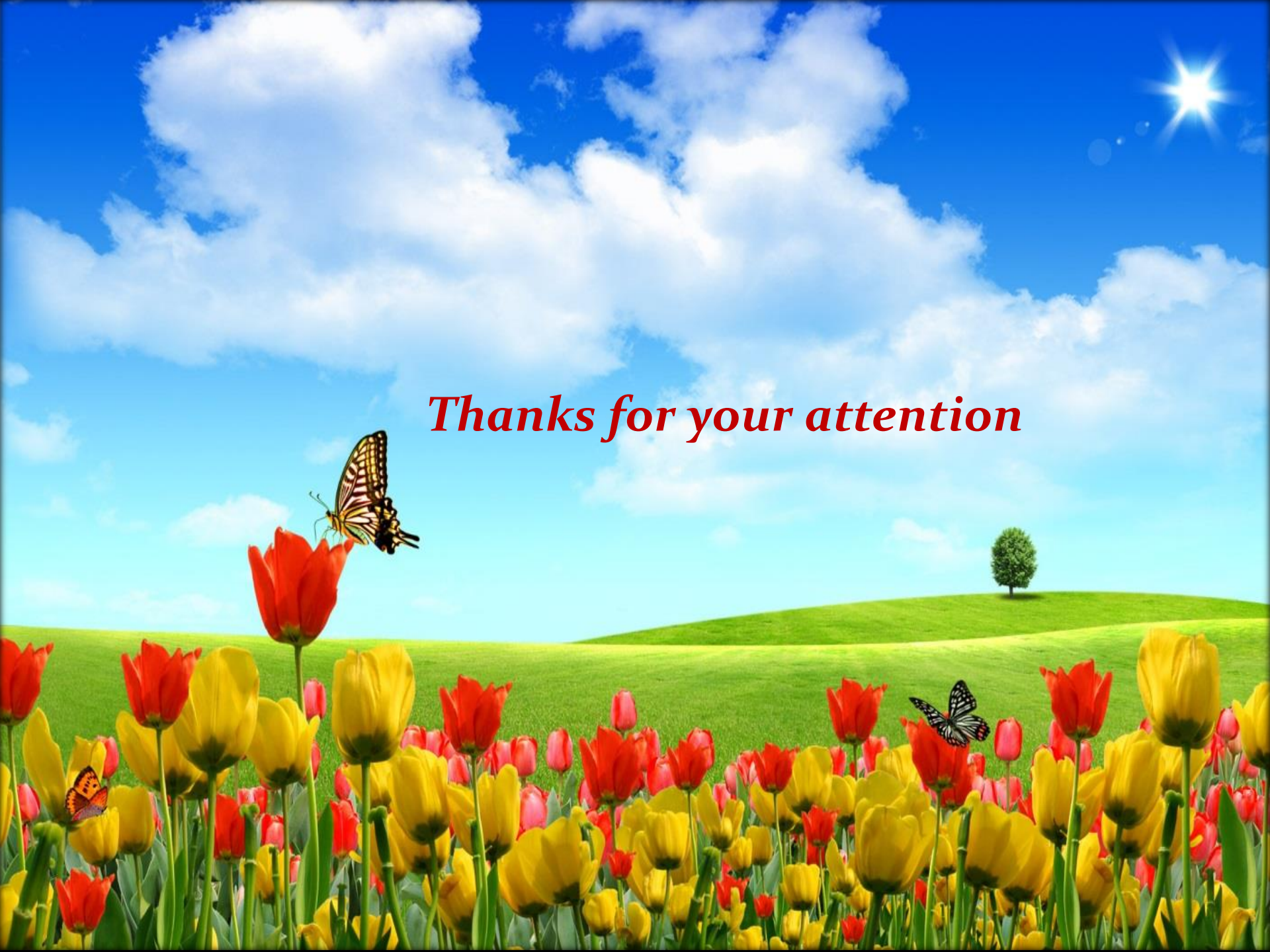
- Progressive symptoms of angina that are not amenable to angioplasty or bypass surgery
- History of myocardial infarction within the past three to six months
- Known severe coronary heart disease (CHD) Severe ischemic cardiomyopathy (ejection fraction less than 30% that is not amenable to intervention

For patients treated with DES who are to undergo subsequent procedures that mandate discontinuation of thienopyridine therapy, *aspirin should be continued if at all possible* and the thienopyridine restarted as soon as possible after the procedure because of concerns about late stent thrombosis

CONCLUSION

Until better evidence for cardiovascular disease risk management emerges, the decision for coronary revascularisation, optimisation of medical management and transplantation should be made on a case by case basis and involve transplant and nephrology, cardiology teams

Thanks for your attention



Assessing cardiovascular risk in chronic kidney disease patients prior to kidney transplantation: standardised cardiovascular assessment protocol

Each patient underwent cardiac risk stratification and was assigned to a

'high-risk' group:

those older than 60 years of age or 60 and below with at least one of the following cardiac risk factors: diabetes, ischemic heart disease, peripheral vascular disease, congestive cardiac failure;

'low-risk' group :

those patients aged between 40 to 60 years old with none of the mentioned cardiac risk factors;

'minimal risk' group:

those younger than 40 with none of these risk factors

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- **high-risk** patients requiring DSE;
- **minimal-risk** patients below age 40 years undergoing transthoracic echocardiogram (TTE);
- patients between ages 40-60 years
- requiring an exercise treadmill test (ETT).

low-risk patients with *positive or inconclusive* exercise treadmill test or abnormal TTE were assessed with DSE.

- The patients with *positive DSE, symptomatic angina or acute coronary syndrome (ACS)* underwent coronary angiography.

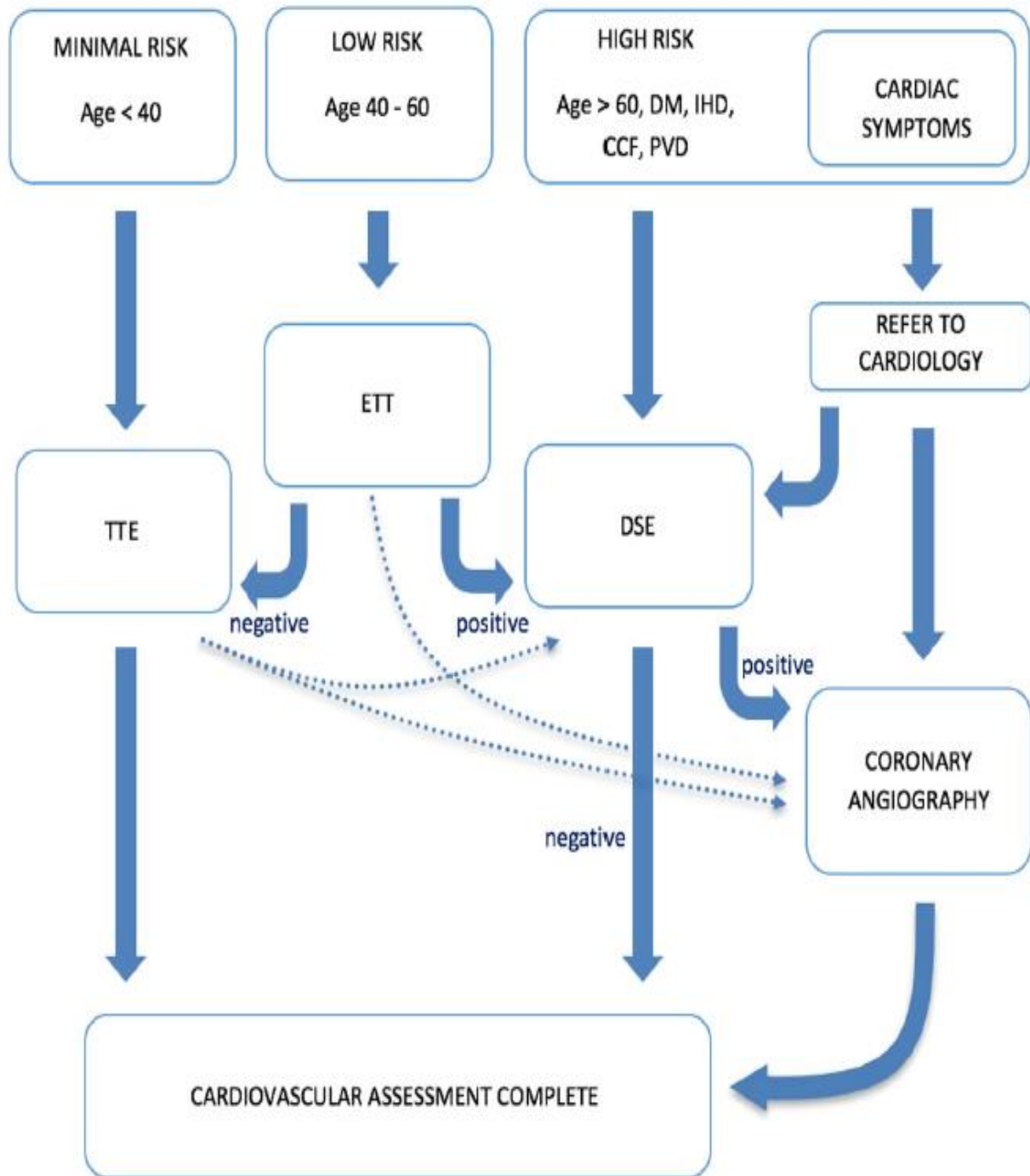


Figure 1. Guidelines for cardiovascular assessment. DM, Diabetes Mellitus; IHD, Ischemic Heart Disease; PVD, Peripheral Vascular Disease; CCF, Congestive Heart Failure; DSE, Doppler Stress Echocardiography.