5. PH is defined hemodynamically by right-heart catheterization using a mean pulmonary artery pressure threshold of >20 mm Hg, which has recently been reduced from ≥25 mm Hg. However, the mean pulmonary artery pressure alone does not distinguish PAH from other forms of PH. Additional criteria for the diagnosis of PAH include a pulmonary artery wedge pressure of ≤15 mm Hg and a pulmonary vascular resistance of ≥3 Wood units (240 dyn × seconds × cm^{-5}).

Management of abnormal echocardiography

RECOMMENDATION 2a. For asymptomatic children and adults with SCD and an isolated peak TRJV of ≥2.5 to 2.9 m/s, the ASH guideline panel *suggests against* right-heart catheterization (conditional recommendation, very low certainty in the evidence about effects ⊕◯◯◯).

RECOMMENDATION 2b. For children and adults with SCD and a peak TRJV of ≥2.5 m/s who also have a reduced 6MWD and/or elevated NT-BNP, the ASH guideline panel *suggests* right-heart catheterization (conditional recommendation, very low certainty in the evidence about effects ⊕◯◯◯).

Remarks:

1. Repeating ECHOs demonstrating elevated peak TRJV are important prior to referral for right-heart catheterization under the guidance of a PH expert because reproducibility of TRJV measurements may vary due to technical factors, severity of anemia, or increased cardiac output.
2. For patients with peak TRJV of ≥2.5 m/s who are asymptomatic, the addition of NT-BNP and 6MWD may help to improve the diagnostic accuracy for PH. Abnormal cutoff values for NT-BNP and 6MWD have not been firmly determined for patients with SCD. However, NT-BNP values of ≥160 pg/mL and 6MWD values of <333 m represent reasonable thresholds for adults with SCD based on published studies in this population. Referrals for right-heart catheterization should also account for clinical judgment and discussion with a PH expert.
3. For patients with peak TRJV of ≥2.5 m/s who have normal 6MWD and NT-BNP, serial noninvasive monitoring with ECHOs should be considered if clinically indicated (see list of symptoms in remarks for recommendation 1).
4. Consultation with a PH expert regarding the need for a right-heart catheterization should be considered for patients with TRJV of >2.9 m/s who have normal 6MWD and NT-BNP or other findings on ECHO, in addition to elevated peak TRJV, which could suggest significant PH (eg, right-atrial enlargement, pericardial effusion, right-ventricular failure, or septal flattening).
5. PH is defined hemodynamically by right-heart catheterization using a mean pulmonary artery pressure threshold of >20 mm Hg, which represents a recent reduction from ≥25 mm Hg. However, the mean pulmonary artery pressure alone does not distinguish PAH from other forms of PH. Additional criteria for the diagnosis of PAH include a pulmonary artery wedge pressure of ≤15 mm Hg and a pulmonary vascular resistance of ≥3 Wood units (240 dyn × seconds × cm^{-5}).

Treatment of PAH

RECOMMENDATION 3a. For children and adults with SCD who do not have PAH confirmed by right-heart catheterization, the ASH guideline panel *recommends against* the use of PAH-specific therapies (strong recommendation, low certainty in the evidence about effects ⊕⊕◯◯).[14]

RECOMMENDATION 3b. For children and adults with SCD and a diagnosis of PAH confirmed by right-heart catheterization, the ASH guideline panel *suggests* the use of PAH-specific therapies under the care of a PH specialist given the lack of alternative treatment options and associated high morbidity and mortality (conditional recommendation, low certainty in the evidence about effects ⊕⊕◯◯).

Remarks:

1. Although different subtypes of PH may develop in individuals with SCD, this recommendation refers only to PAH and not other subtypes of PH.
2. Treatment options may differ based on the subtype of PH as classified by findings on right-heart catheterization and clinical evaluation by a PH specialist.
3. PH is defined hemodynamically by right-heart catheterization using a mean pulmonary artery pressure threshold of >20 mm Hg, which was recently reduced from ≥25 mm Hg. However, the mean pulmonary artery pressure alone does not distinguish PAH from other forms of PH. Additional criteria for the diagnosis of PAH include a pulmonary artery wedge pressure of ≤15 mm Hg and a pulmonary vascular resistance of ≥3 Wood units (240 dyn × seconds × cm^{-5}).
4. Improvements in cardiopulmonary hemodynamics, as determined by right-heart catheterization, and clinical status, such as a change in PAH symptoms or functional status, initiation of other PAH drugs, or diuretic requirements (eg, in the setting of right-heart failure), are important additional end points for monitoring the benefits of PAH-specific therapy started for patients with PAH confirmed by right-heart catheterization.
5. It is appropriate to refer patients with SCD and PAH confirmed by right-heart catheterization to treatment centers with expertise in PH and SCD, given the possibility of increased side effects (eg, pain) with PAH-specific therapy such as sildenafil.
6. It is important to consider initiation and/or optimization of disease-modifying therapy such as hydroxyurea or chronic transfusions for patients with PAH confirmed by right-heart catheterization.
7. It is important to consider potential differences in the pathophysiologic basis of PAH (eg, contribution of chronic anemia and high-output cardiac states) and differences in side-effect profiles (eg, pain) when determining treatment options for PAH confirmed by right-heart catheterization in SCD.
8. The recommendation for PAH-specific therapy in SCD applies to patients with SCD who have no other clear reason for their PAH confirmed by right-heart catheterization (eg, obstructive sleep apnea, significant lung disease, left-heart failure).

Screening pulmonary function testing

RECOMMENDATION 4. For asymptomatic children and adults with SCD, the ASH guideline panel *suggests against* performing routine screening pulmonary function testing (PFT) (conditional recommendation, very low certainty in the evidence about effects ⊕◯◯◯).

Remarks:

1. A comprehensive respiratory history and review of systems are an essential part of the diagnostic strategy to identify patients with