

2022

# Essential Messages from ESC Guidelines

Clinical Practice

Guidelines Committee

# PULMONARY HYPERTENSION

Guidelines for for the diagnosis and  
treatment of pulmonary hypertension



# Essential Messages

## 2022 ESC/ERS Guidelines for the diagnosis and treatment of pulmonary hypertension

Developed by the Task Force for the diagnosis and treatment of pulmonary hypertension of the European Society of Cardiology (ESC) and the European Respiratory Society (ERS). Endorsed by the ISHLT (International Society for Heart and Lung Transplantation) and the ERN-LUNG (European Reference Network on rare respiratory diseases)

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Councils: Council on Cardiovascular Genomics.

Working Groups: Adult Congenital Heart Disease Pulmonary Circulation and Right Ventricular Function, Thrombosis.

Patient Forum

Adapted from the 2022 ESC/ERS Guidelines for the diagnosis and treatment of pulmonary hypertension

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# ESSENTIAL MESSAGES FROM THE 2022 ESC/ERS GUIDELINES FOR THE DIAGNOSIS AND TREATMENT OF PULMONARY HYPERTENSION

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# Key messages

1. The haemodynamic definition of PH has been updated as mPAP  $>20$  mmHg. The definition of PAH also implies a PVR  $>2$  WU and a PAWP  $\leq 15$  mmHg. These cut-off values better reflect the limits of normal ranges, but do not yet translate into new therapeutic recommendations, since the efficacy of PAH therapy in patients with PVD and a mPAP 21-24 mmHg and/or PVR 2-3 WU is still unknown.
2. The main diagnostic algorithm for PH has been simplified following a three-step approach, from suspicion by first-line physicians, detection by echocardiography, and confirmation with RHC in PH centres. Warning signs associated with worse outcomes have been identified, which justify immediate referral and management in PH centres.
3. Screening strategies for PAH in patients with Ssc and in patients at risk of HPAH are proposed based on the results of published cohort studies. Their implementation may shorten the time from symptom onset to diagnosis of PAH.
4. An improved recognition of CT and echocardiographic signs of CTEPH at the time of an acute PE event, together with a systematic follow-up of patients with acute PE as indicated in the 2019 ESC/ERS Guidelines for the diagnosis and management of acute pulmonary embolism should help remediate the underdiagnosis of CTEPH.
5. The three-strata risk-stratification assessment in PAH has been refined after being validated in multiple registries. MRI and echocardiographic criteria have been added to the ESC/ERS table, refining non-invasive evaluation at diagnosis.
6. A four-strata risk stratification, dividing the large, intermediate-risk group into intermediate-low and intermediate-high risk, is proposed at follow-up.
7. The treatment algorithm for PAH has been simplified with a clear focus on risk assessment, cardiopulmonary comorbidities, and treatment goals. Initial combination therapy and treatment escalation at follow-up when appropriate are current standards.
8. The Task Force has attempted to close the gap between paediatric and adult PAH care with therapeutic and follow-up strategies based on risk stratification and treatment response, extrapolated from that in adults but adapted for age.
9. The recommendations on sex-related issues in patients with PAH, including pregnancy, have been updated, with information and shared decision-making as key points.
10. The recommendations for rehabilitation and exercise programmes in PH have been updated following the release of additional supportive evidence.
11. For the first time, there is a recommendation for PH medical therapy in group 3 PH, based on a single positive RCT in patients with ILD.

## Key messages

12. The concept of CTEPD with or without PH has been introduced, allowing further research on the natural history and management in the absence of PH.
13. The treatment algorithm for CTEPH has been modified, including multi-modal therapy with surgery, PH drugs, and BPA.

# Gaps in evidence

## **Pulmonary arterial hypertension (group 1)**

- The efficacy and safety of PAH drugs in group 1 patients with a mPAP 21-24 mmHg, PVR 2-3 WU, and exercise PH has to be established
- The role of PAH drugs in different PAH subgroups, including schistosomiasis-associated PAH, needs to be explored
- Risk-stratification assessment in PAH needs to be prospectively validated further through goal-orientated outcome studies, and optimized for patients with PAH and comorbidities
- New PAH phenotypes observed in patients with significant cardiopulmonary comorbidities are common and should be the focus of more research
- The importance of PAH patient phenotypes and the relevance of comorbidities on treatment goals and outcomes must be further evaluated
- The impact of PAH therapies and treatment strategies on survival needs to be further assessed
- PAH drugs targeting novel pathways are emerging and the impact of add-on use of these medications on outcomes has to be evaluated in RCTs
- The role of RV imaging techniques (echocardiography, cMRI) in diagnosing and stratifying risk in PAH needs to be further studied. The proposed cut-off values for risk stratification need to be properly validated in multi-centre studies
- The role of CPET in the early diagnosis of PAH in populations at risk of developing PAH, and in assessing prognosis in PAH on top of clinical and haemodynamic data, needs further investigation
- The role of exercise echocardiography and exercise RHC in patients at risk of developing PAH, with abnormal CPET but normal rest echocardiogram, also needs further evaluation
- The use of mechanical circulatory support, particularly in reversible PH or in patients with advanced right heart failure with an exit strategy (such as LTx) has to be further studied

# Gaps in evidence

- Differences in natural history and treatment response between adults and children should be further investigated
- Further studies are needed on the effects of PADN in PAH and in other PH groups
- The impact of centre volume, organization, and expertise on treatment outcome needs further investigation

## **Pulmonary hypertension associated with left heart disease (group 2)**

- The management of patients with group 2 PH needs further study in RCTs
- Additional research is needed to facilitate non-invasive diagnosis of HFpEF-associated PH and distinguishing it from PAH
- The role of fluid challenge and exercise testing to reveal left heart failure needs further validation
- Further studies focusing on PDE5is in patients with HFpEF and a CpcPH phenotype are needed and currently underway
- The effects new heart failure medications (ARNIs, SGLT-2is) have on PH, through reverse remodelling of the LV, need further investigation

## **Pulmonary hypertension associated with lung diseases and/or hypoxia (group 3)**

- The management of patients with group 3 PH has to be further studied in RCTs
- Refining phenotypes will be crucial as this will inform development of trials
- Clinical relevance and therapeutic implications of severe PH in lung disease needs to be investigated
- Long-term data on the effects of inhaled treprostinil (and other PAH drugs) in patients with PH associated with lung disease are needed
- The impact of hypobaric, hypoxic environment for the >150 million people living at >2500 m of altitude has to be clarified and studies performed to assess potential treatment strategies for PH

# Gaps in evidence

## **Chronic thrombo-embolic pulmonary hypertension (group 4)**

- The differentiation between acute and chronic PE in imaging (CTPA) has to be improved
- In patients with suspected CTEPH, the diagnostic role of DECT or iodine subtraction mapping vs. V/Q lung scintigraphy has to be validated
- The effect of drug therapy on the outcome of patients with CTEPH needs to be established
- The treatment goals in patients with CTEPH have to be clarified, as it is still unclear if normalizing mPAP and PVR translates into improved outcomes
- The role of BPA vs. PEA should be further clarified: which treatment in which patient? Are they equivalent for the treatment of segmental/subsegmental disease?
- In inoperable CTEPH or persistent/recurrent PH after PEA, the potential role of combination therapy of PH drugs must be assessed
- The role of medical treatments as bridges to interventional and operative treatments needs to be formally tested
- RCTs are needed to discriminate the effects of PEA and early follow-up rehabilitation
- The effect of PEA, BPA, and medical therapy on patients with CTEPD without PH is not established

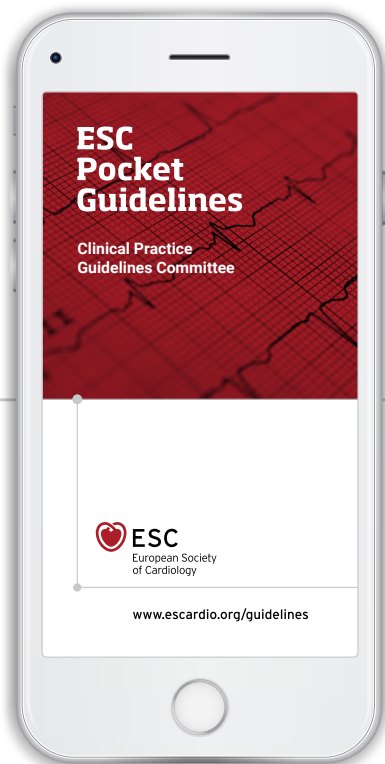
## **Pulmonary hypertension with unclear and/or multi-factorial mechanisms (group 5)**

- Further research needs to inform management of group 5 PH, such as SCD-associated PH and sarcoidosis-associated PH



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The material was adapted from the 2022 ESC/ERS Guidelines for the diagnosis and treatment of pulmonary hypertension (European Heart Journal; 2022 - doi: 10.1093/eurheartj/ehac237 and European Respiratory Journal; 2022 - doi: 10.1183/13993003.00879-2022).

Post-publication corrections and updates are available at: [www.escardio.org/guidelines](http://www.escardio.org/guidelines)

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