

Transthoracic echocardiography Guidelines of the German Society for Ultrasound in Medicine, German Cardiac Society, German Society of Anesthesiology and Intensive Care Medicine, German Society of Internal Medicine, Professional Association of German Internists, and the German Association of Cardiologists in Private Practice (Association of Scientific Medical Societies in Germany, S2k LL85-004, 9/1/2025)

Transthorakale Echokardiographie Leitlinie der DEGUM, DGK, DGAI, DGIM, BDI, BNK (AWMF S2k LL085-004 1.9.2025)

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Bibliography

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ABSTRACT

Echocardiography is the most commonly used imaging method for evaluating the heart. It plays a central role in the cardiology routine and in acute and emergency situations, and is an essential component of the medical decision-making process. In spite of its high clinical relevance, national recommendations standardizing the examination procedure, equipment settings, and image documentation have been lacking. The present guidelines were created by the German Society for Ultrasound in Medicine and the German Cardiac Society in coordination with the German Society of Anesthesiology and Intensive Care Medicine, German Society of Internal Medicine, Professional Association of German Internists, and the German Association of Cardiologists in Private Practice. The recommendations were formulated in consensus, published as draft guidelines, and finalized by the participating professional associations after evaluation of the feedback. The document meets the criteria for S2k guidelines in accordance with

the Association of Scientific Medical Societies in Germany and defines binding standards for performing transthoracic echocardiography. The guidelines define which images and measurements are required to ensure valid and reproducible findings. The main recommendations relate to device settings, image acquisition, the minimum dataset to be acquired, and the definition of focused cardiac ultrasound (FoCUS). The complete long version of the guidelines is available on the website of the Association of Scientific Medical Societies in Germany.

Note The short version of this guideline is being published simultaneously in the journals *Ultraschall in der Medizin* – *European Journal of Ultrasound* and *Die Kardiologie*.

ZUSAMMENFASSUNG

Die Echokardiografie ist die am häufigsten eingesetzte bildgebende Methode zur Beurteilung des Herzens. Sie spielt in der kardiologischen Routine, in Akut- und Notfallsituationen eine zentrale Rolle und ist ein unverzichtbarer Bestandteil der medizinischen Entscheidungsfindung. Trotz ihrer hohen klinischen Relevanz fehlten bislang nationale Empfehlungen, die Untersuchungsablauf, Geräte-Einstellung und Bilddokumentation einheitlich regeln.

Die vorliegende Leitlinie wurde von der Deutschen Gesellschaft für Ultraschall in der Medizin (DEGUM) und der Deut-

schen Gesellschaft für Kardiologie – Herz- und Kreislaufforschung (DGK) unter Beteiligung der Deutschen Gesellschaft für Innere Medizin (DGIM), der Deutschen Gesellschaft für Anästhesiologie und Intensivmedizin (DGAI), des Berufsverbandes Deutscher Internistinnen und Internisten (BDI) und des Bundesverbandes Niedergelassener Kardiologen (BNK) erarbeitet. Im strukturierten Konsensus-Verfahren wurden die Empfehlungen abgestimmt, als Konsultationsfassung veröffentlicht und nach Auswertung der Rückmeldungen final durch die beteiligten Fachgesellschaften verabschiedet.

Das Dokument erfüllt die Kriterien einer S2k-Leitlinie der AWMF und definiert verbindliche Standards für die Durchführung der transthorakalen Echokardiografie. Es legt fest, welche Aufnahmen und Messungen erforderlich sind, um valide und reproduzierbare Befunde zu gewährleisten. Zentrale Empfehlungen betreffen die Geräte-Einstellung, die Bildakquisition, den minimal zu erfassenden Datenumfang sowie die Abgrenzung zur fokussierten kardialen Ultraschall-Untersuchung (FoCUS).

Die vollständige Langversion ist auf der Website der AWMF verfügbar.

Hinweis Die Kurzfassung dieser Leitlinie wird gleichzeitig in den Zeitschriften *Ultraschall in der Medizin* – *European Journal of Ultrasound* und *Die Kardiologie* veröffentlicht.

1. Information about the guidelines

Citation format

Knierim J, ten Freyhaus H, Magunia H, Kruck S, Goepfert M, Smetak N, von Kaisenberg C, Morbach C, Ewen S, Flachskampf FA. Transthoracic echocardiography. Guidelines of the German Society for Ultrasound in Medicine, German Cardiac Society, German Society of Anesthesiology and Intensive Care Medicine, German Society of Internal Medicine, Professional Association of German Internists, and the German Association of Cardiologists in Private Practice (S2k guidelines, The Association of Scientific Medical Societies in Germany registry number 085–004) <https://register.awmf.org/de/leitlinien/detail/085-004>.

Documents

The full version and the short version of the guidelines in German, a patient information flyer, and the comments that were received during the consultation period are available online on the homepage of the Association of Scientific Medical Societies in Germany: <https://register.awmf.org/de/leitlinien/detail/085-004>.

2. Area of application and purpose

Objective and research question

Cardiac ultrasound (echocardiography) is a widely used diagnostic method for evaluating cardiac function and is employed by physi-

cians in a variety of medical disciplines. Echocardiography is a routine examination in cardiology and internal medicine. It is also essential for preoperative diagnostic imaging and pre-hospital emergency examinations and in emergency departments and intensive care units. Transthoracic echocardiography is by far the most commonly used noninvasive method for cardiac imaging in hospitals and private practices in German-speaking countries.

However, the examination procedure, the equipment settings, and the required videos and images have barely been standardized. There is still a lack of clarity regarding a minimum standard for images and measurements for a normal finding in the daily routine.

The goal of these guidelines is to develop standardized recommendations for Germany in coordination with the relevant professional associations by clearly defining the procedure for performing cardiac ultrasound examinations and which images and measurements are required. This standardization should facilitate the comparability of measured values and findings, improve follow-up, and improve the usability of acquired data for future scientific studies.

The indications for echocardiography are described in detail in the chapters of the individual guidelines of the Association of Scientific Medical Societies in Germany (including reg. nos. 053–011, 030–046, 065–022, 001–016, and nvl-006). Therefore, indications and alternative examination methods are available in the respective guidelines and are not included in this article.

There are numerous publications and international recommendations listing and describing the numerous images, videos, and

measurements that can be acquired during echocardiography [1, 2, 3, 4, 5, 6, 7, 8, 9, 10].

The goal of these guidelines is not to summarize or evaluate the existing literature. Instead, they are focused on the minimum standard for a valid echocardiographic examination of a normal cardiac finding. Findings acquired in accordance with the guidelines must then also include the evaluation of the particular pathology. Refer to the literature mentioned above in this regard.

To maintain the scope of the present document, stress echocardiography, transesophageal echocardiography, and echocardiography with contrast were intentionally not included in these guidelines. These methods are discussed in separate publications.

Modern transthoracic echocardiography also offers the option of analyzing myocardial deformation as part of strain echocardiography and reconstructing and visualizing three-dimensional structures (3D echocardiography). Strain analysis is also increasingly being used in routine 2D examinations. Therefore, the guidelines committee decided to include 2D strain echocardiography in the current document but not to include a detailed description of 3D echocardiography.

Area of application

Germany

Target patient group

All adult patients examined by means of transthoracic echocardiography regardless of the examination urgency and the medical discipline of the examining physician.

Target user group

Physicians from all medical disciplines that use echocardiography, especially cardiologists, internists, and anesthesiologists. The guidelines also provide information for nursing staff, medical assistants, and physician assistants working in the field of cardiac imaging.

Documents

- Long version
- Short version
- Patient information

3. Important research questions

Standardization of imaging greatly simplifies the subsequent evaluation of acquired datasets. In particular, artificial intelligence (AI) requires extremely large quantities of data to generate reliable models. The large number of echocardiographic examinations in Germany makes it possible to generate comprehensive image data.

Restrictions due to data protection and the lack of standardization in the acquisition of image data present a significant challenge for future research projects, e.g., the training of AI models. Standardization of imaging is therefore essential to facilitate future AI analyses and promote innovation.

4. Members of the guideline group

Guideline coordinator and contact person

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Participating professional societies and organizations

The guidelines take into consideration the professional groups that primarily perform transthoracic echocardiography and are involved in the interpretation and clinical and scientific evaluation of these examinations. The professional societies listed in ► **Table 1** were involved in the creation of the guidelines.

Participation of patients

The German Heart Foundation was actively involved in the creation of the guidelines. As a representative of the German Heart Foundation, Mr. Herbert Ehses participated in the meetings of the guideline group and brought the perspective of patients. Additional information regarding the perspective of patients was also collected in a member survey by the German Heart Foundation and integrated in the guidelines. In collaboration with the German Heart Foundation, a patient information flyer was also developed and included with the guidelines. The patient information flyer was created by the guideline coordinator and the content was approved by the guideline group.

Methodological support

The guideline group received methodological support from Dr. Monika Nothacker from the Association of Scientific Medical Societies in Germany and from Prof. Dr. Constantin von Kaisenberg from the German Society for Ultrasound in Medicine (guideline adviser certified by the Association of Scientific Medical Societies in Germany). Dr. Nothacker moderated the structured consensus process and participated in the meetings of the guideline group.

► **Table 1** Members of the guideline group.

Member	Professional association/organization	Time period
PD Dr. med. Jan Knierim	German Society for Ultrasound in Medicine	Entire time period
PD Dr. med. Henrik ten Freyhaus	German Society for Ultrasound in Medicine	Entire time period
Prof. Dr. med. Frank A. Flachskampf	German Cardiac Society	Entire time period
Prof. Dr. med. Sebastian Ewen	German Cardiac Society	Entire time period
PD Dr. med. Matthias Göpfert	German Society of Anesthesiology and Intensive Care Medicine	Entire time period
PD Dr. med. Caroline Morbach	German Society of Internal Medicine	Entire time period
Dr. med. Norbert Smetak	Professional Association of German Internists	Entire time period
Dr. med. Sebastian Kruck	German Association of Cardiologists in Private Practice	Entire time period
Additional participants	Professional association/organization	Time period
Dr. med. Monika Nothacker	Association of Scientific Medical Societies in Germany	Entire time period
Prof. Dr. med. Constantin von Kaisenberg	German Society for Ultrasound in Medicine	Entire time period
Herbert Ehes	German Heart Foundation	Entire time period

5. Information about these guidelines

Methodological principles

These guidelines were created in accordance with the rules of the Association of Scientific Medical Societies in Germany for the development of guidelines for diagnosis and treatment and correspond to the S-classification of the Association of Scientific Medical Societies in Germany for S2k guidelines (consensus-based).

The initial structure of the guidelines was developed by the guideline coordinator in coordination with the guideline group. In the inaugural meeting, this concept was discussed in detail and clearly defined under the methodological guidance mentioned above. Small groups then developed the individual chapters of the guidelines including a thorough search of the literature.

The first draft of the manuscript was subsequently reviewed and revised by the entire guideline group. Central questions were identified in a consensus conference and the statements and recommendations were discussed and voted on using the nominal group technique.

The procedure was as follows:

- Presentation and explanation of the recommendation to be voted on.
- Opportunity to ask content-related questions
- Structured acceptance of suggested changes
- Formal voting under consideration of conflicts of interest (see below)
- If the group failed to meet a consensus, discussion was resumed and members voted on any changes to formulation.

The Association of Scientific Medical Societies in Germany was responsible for providing methodological support and moderation for this process. Any unresolved questions were discussed and then approved using the same procedure in a second consensus conference that was held online.

Use of existing guidelines and literature search

The guidelines of the American Society of Echocardiography and the British Society of Echocardiography [6, 9] served as the basis for the creation of these guidelines. In addition, a comprehensive literature search including numerous publications from various journals and textbooks (see references) was performed.

A systematic literature search with selection and critical evaluation of evidence and linking of evidence and recommendations as required for S3 guidelines was not performed. This is also due to the fact that comparative prospective studies specifically examining the methods addressed in these guidelines are not available.

Grading of recommendations and determination of the level of consensus

Using the nominal group technique mentioned above under the moderation of the Association of Scientific Medical Societies in Germany, the following recommendation strengths were defined:

- **Strong recommendation:** “Recommended” or “not recommended”
- **Recommendation:** “Should be considered” or “should not be considered”
- **Weak recommendation:** “Can be considered” or “can be omitted”

The degree of consensus was documented for each recommendation. The votes were distributed in accordance with the rules defined at the outset: Two votes each for the registered professional societies (the German Society for Ultrasound in Medicine and the German Cardiac Society) and one vote for each of the other participating professional societies (the German Society of Anesthesiology and Intensive Care Medicine, German Society of Internal Medicine, Professional Association of German Internists, and the German Association of Cardiologists in Private Practice).

Minimum participation of over 75% of voting members was ensured. Absent members were not included in the calculation

of the level of consensus. Although moderate conflicts of interest of individual members were identified, they did not relate to the content of the recommendations. Therefore, it was not necessary to exclude any members from voting.

The level of consensus for each recommendation is indicated as follows with specification of the percentage of those in favor versus those against:

- **Strong consensus:** >95 % of voting members
- **Consensus:** 75–95 % of voting members
- **Majority agreement:** 50–75 % of voting members

6. Editorial independence

Financing of the guidelines

These guidelines were registered and commissioned by the German Society for Ultrasound in Medicine in partnership with the German Cardiac Society. The costs for creating the guidelines totaling 4557.66 Euros were split equally by the two societies. Members of the guideline group and authors performed all work on a voluntary basis.

Declaration of interests and handling of conflicts of interest

The interests of all authors of the guidelines were recorded in accordance with the specifications of the Association of Scientific Medical Societies in Germany by means of a structured online form (version 2018) on the association's digital platform for declarations of interest. Conflicts of interest were then evaluated by 2 members of the guideline group in consultation with the Association of Scientific Medical Societies in Germany, represented by Dr. Nothacker, in accordance with the rules of the Association of Scientific Medical Societies in Germany (see the long version on the association's homepage for details). Dr. Nothacker's evaluation of conflicts of interest was also assessed by the two members. The 2 members reviewed each other's evaluation of conflicts of interest and these were also reviewed by Dr. Nothacker.

Conflicts of interest were classified as minor in the case of work as a speaker, involvement in an industry-financed advisory board, management responsibility in an industry-financed study, involvement in a scientific advisory board, or work as an expert without direct connection to echocardiography. Moderate or major conflicts of interest were identified in the case of the activities mentioned above performed in connection with companies with a connection to echocardiography or shareholdings in such companies.

In the case of minor conflicts of interest, participation in voting was allowed. In the case of moderate conflicts of interest, voting would not have been allowed. However, moderate conflicts of interest only related to topics that were not included in voting.

7. External review and approval

After completion of the revised manuscript, it was presented to the participating professional societies and institutions for ap-

proval and was approved by the management of the participating organizations. There was also a 4-week period in which comments could be submitted. All comments that were received were reviewed by the guideline group and were either taken into consideration or were included in the manuscript. A document including the proposed changes and comments of the guideline group was created (see the homepage of the Association of Scientific Medical Societies in Germany). The Association of Scientific Medical Societies in Germany also performed a formal review.

8. Validity period and procedure for updates

The guidelines are valid for 5 years. In the case of an urgent need for updating prior to the end of the 5-year period, the updated document will be published separately. Comments and notes regarding the need for updating are expressly desired and can be sent to the guideline coordinator at the German Society for Ultrasound in Medicine.

9. Guidelines

9.1 Preparing for the examination and preparing the acoustic window

Positioning

9.1.1 RECOMMENDATION (AS OF 2025)

When the patient's clinical condition allows, echocardiography should be started with the patient positioned on their left side.

Level of consensus: 7/7 (100 %) strong consensus

ECG recording

9.1.2 RECOMMENDATION (AS OF 2025)

A three-lead ECG should be connected in all patients undergoing echocardiography.

Level of consensus: 7/7 (100 %) strong consensus

Acoustic window

9.1.3 RECOMMENDATION (AS OF 2025)

Echocardiography should include at least the left parasternal, apical, and subcostal acoustic windows.

For special medical questions, additional acoustic windows should be used.

Level of consensus: 7/7 (100 %) strong consensus

9.3 Device settings

2D image

9.1.4 RECOMMENDATION (AS OF 2025)

Within a private practice, hospital, or department, echocardiography equipment from the same manufacturer should consistently be operated using the same standardized basic setting (cardiac preset).

This should include at least:

- 2D gain
- Dynamic range
- Color Doppler gain
- Nyquist limit.

Level of consensus: 7/7 (100%) strong consensus

Penetration depth, sector width, zoom function

2.2 RECOMMENDATION (AS OF 2025)

The penetration depth and sector width of 2D imaging and color Doppler should be selected to be large enough to ensure that the relevant structures are completely visualized. The penetration depth and sector width should also be as small as possible to achieve optimal image quality and spatial and temporal resolution.

Level of consensus: 7/7 (100%) strong consensus

2D strain

2.3 RECOMMENDATION (AS OF 2025)

For strain determination,

- the frame rate should be >40f/s, ideally approximately in the range of the patient's heart rate
- a comparable heart rate in the 3 apical video loops should be ensured in order to calculate the left-ventricular strain, alternatively triplanar acquisition mode can be used
- careful attention should be paid to the image quality.

If the imaging quality of >2 segments of the left ventricle is not sufficient for strain measurement, the global left-ventricular strain should not be calculated.

Level of consensus: 8/8 (100%) strong consensus

9.4 Image and video acquisition and data storage

3.1 RECOMMENDATION (AS OF 2025)

- When performing an examination in sinus rhythm, at least two complete cardiac cycles should be acquired in every ECG-triggered video sequence.

- In the case of irregular RR intervals, e.g., atrial fibrillation, multiple cardiac cycles should be recorded in accordance with the patient's particular medical issue.

Level of consensus: 6/6 or 7/7 agree (100%) strong consensus

9.5 Minimum dataset

6.1 RECOMMENDATION (AS OF 2025)

► **Table 2** provides the minimum number of videos and still images that should be acquired for complete examination of a normal finding. The dataset should be expanded in the case of specific pathologies. These recommendations do not apply to focused cardiac ultrasound (see below).

Level of consensus: 8/8 (100%) strong consensus

► **Fig. 1** and ► **Fig. 2** show the minimum dataset.

9.6 Recommendations regarding measurements

Left-ventricular outflow tract (LVOT)

7.1 RECOMMENDATION (AS OF 2025)

The LVOT measurement should be performed mid-systole from inner edge to inner edge in the annulus of the aortic valve or immediately proximal to the annulus (► **Fig. 3**).

Level of consensus: 8/8 (100%) strong consensus

9.7 Documentation of findings and reporting

8.1 RECOMMENDATION (AS OF 2025)

The final echocardiographic report should include:

- Name, date of birth, and ID
- Size and weight
- Cardiac rhythm
- Measured values

A brief summary of the main findings possibly with data regarding the particular hemodynamic situation

Level of consensus: 8/8 (100%) strong consensus

The following text is an example of such a report:

“Normal-sized, non-hypertrophic left ventricle, with normal systolic left-ventricular function without regional wall motion abnormalities. Normal diastolic function. Normal diameter of left atrium, right heart chambers, and visible aorta. Normal right-ventricular function. No pericardial effusion. Heart valves normal, no severe valvular lesion, minimal tricuspid valve insufficiency with an RVSP of n.n. mmHg + central venous pressure. Vena cava not dilated and exhibits inspiratory collapse”.

► **Table 2** Recommendations regarding the minimum dataset with corresponding level of consensus.

Axis	Video or still image	Consensus*
Parasternal long axis (PLAX)	Video	8/0/0, 100%
	Video, color Doppler, aortic valve and mitral valve	8/0/0, 100%
	Still image, measurement of IVS, LVEDD, PW	8/0/0, 100%
Parasternal short axis, at the level of the atrial valve (PSAX)	Video	8/0/0, 100%
	Video, color Doppler, pulmonary valve	8/0/0, 100%
	Video, color Doppler, tricuspid valve	8/0/0, 100%
	Video, color Doppler, aortic valve	7/1/0, >75%
Parasternal short axis, at the level of the mitral valve	Video	7/1/0, >75%
Parasternal short axis, at the level of the papillary muscles	Video	8/0/0, 100%
Four-chamber view (AP4)	Video	8/0/0, 100%
	Video, color Doppler, mitral valve	8/0/0, 100%
	Still image, PW Doppler, mitral valve	8/0/0, 100%
	Still image, tissue Doppler, medial mitral valve annulus	8/0/0, 100%
	Still image, tissue Doppler, lateral mitral valve annulus	8/0/0, 100%
	Still image, measurement of the LAVI	8/0/0, 100%
RV-focused four-chamber view	Video, color Doppler, tricuspid valve	8/0/0, 100%
	Still image, CW-Doppler, tricuspid valve	8/0/0, 100%
	Still image, M-mode, tricuspid valve annulus	8/0/0, 100%
Five-chamber view (AP5)	Video, color Doppler, aortic valve	7/0/0, 100%
	Still image, CW-Doppler, aortic valve	7/0/0, 100%
Two-chamber view (AP2)	Video	7/0/0, 100%
Three-chamber view (AP3)	Video	7/0/0, 100%
	Video, color Doppler, aortic valve and mitral valve	7/0/0, 100%
Subcostal four-chamber view	Video	6/1/0, >75%
Subcostal inferior vena cava	Video	7/0/0, 100%

* Agree/disagree/abstain, level of consensus in %

9.8 Focused cardiac ultrasound examination

Focused cardiac ultrasound is performed as a point-of-care examination that is used especially in emergency situations for the diagnostic workup of acute hemodynamic instability and in the case of resuscitation. The term focused cardiac ultrasound is a synonym for focused echocardiography and focused ultrasound of the heart. Comprehensive echocardiography should be differentiated from these other methods. Recommendations in the chapter on focused ultrasound can deviate from the recommendations of the previous chapters.

Focused cardiac ultrasound is performed, for example, in emergency care, emergency outpatient care, intensive care, and in the operating room.

A limited examination scope that takes into account the time constraints of an emergency situation is characteristic of a focused cardiac ultrasound examination. The examination must be performed in a problem-oriented manner and the acquired findings should be qualitative and semiquantitative [11]. Moreover,

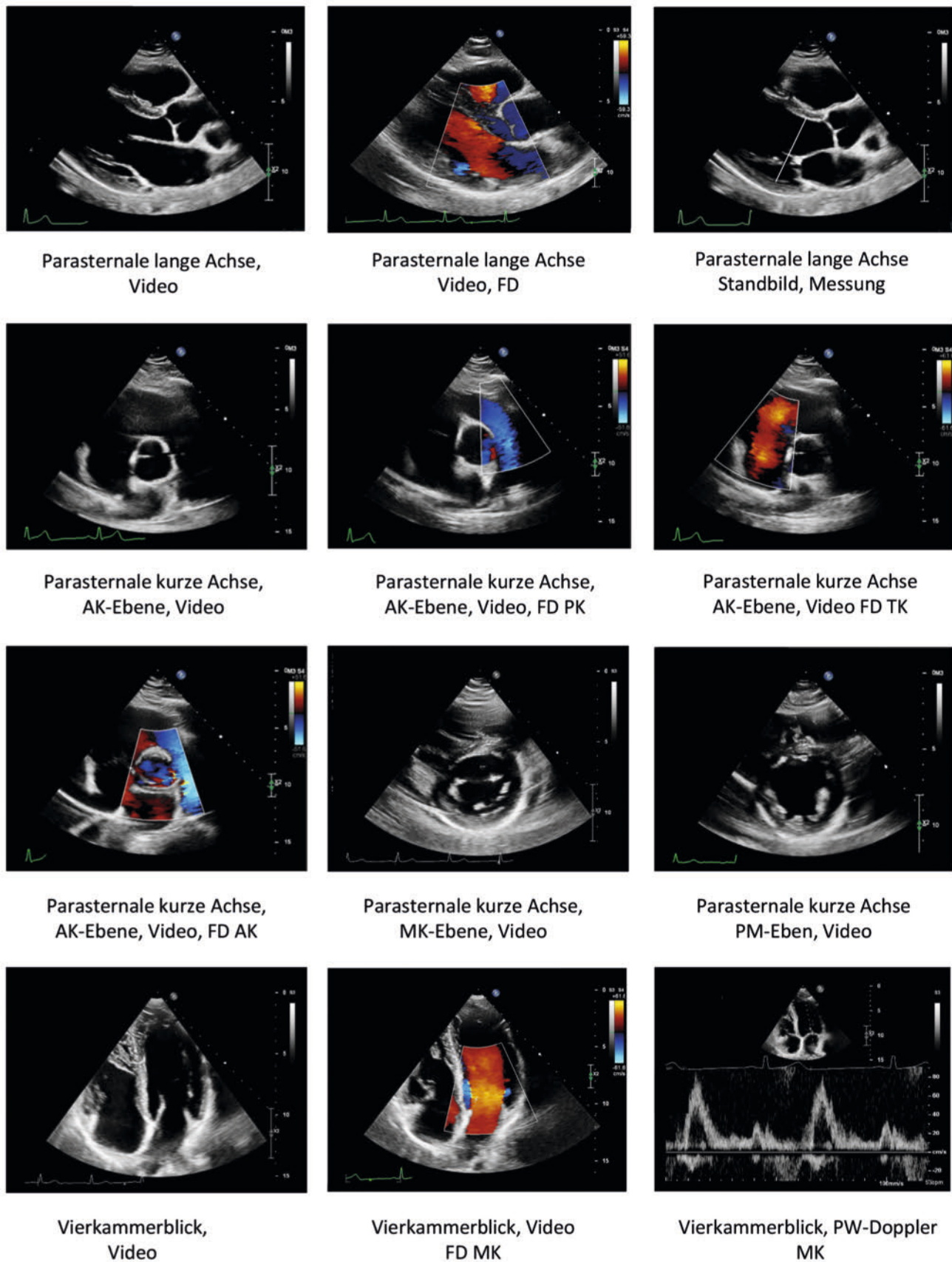
the examination should make it possible to initiate immediate therapeutic steps.

9.1 RECOMMENDATION (AS OF 2025)

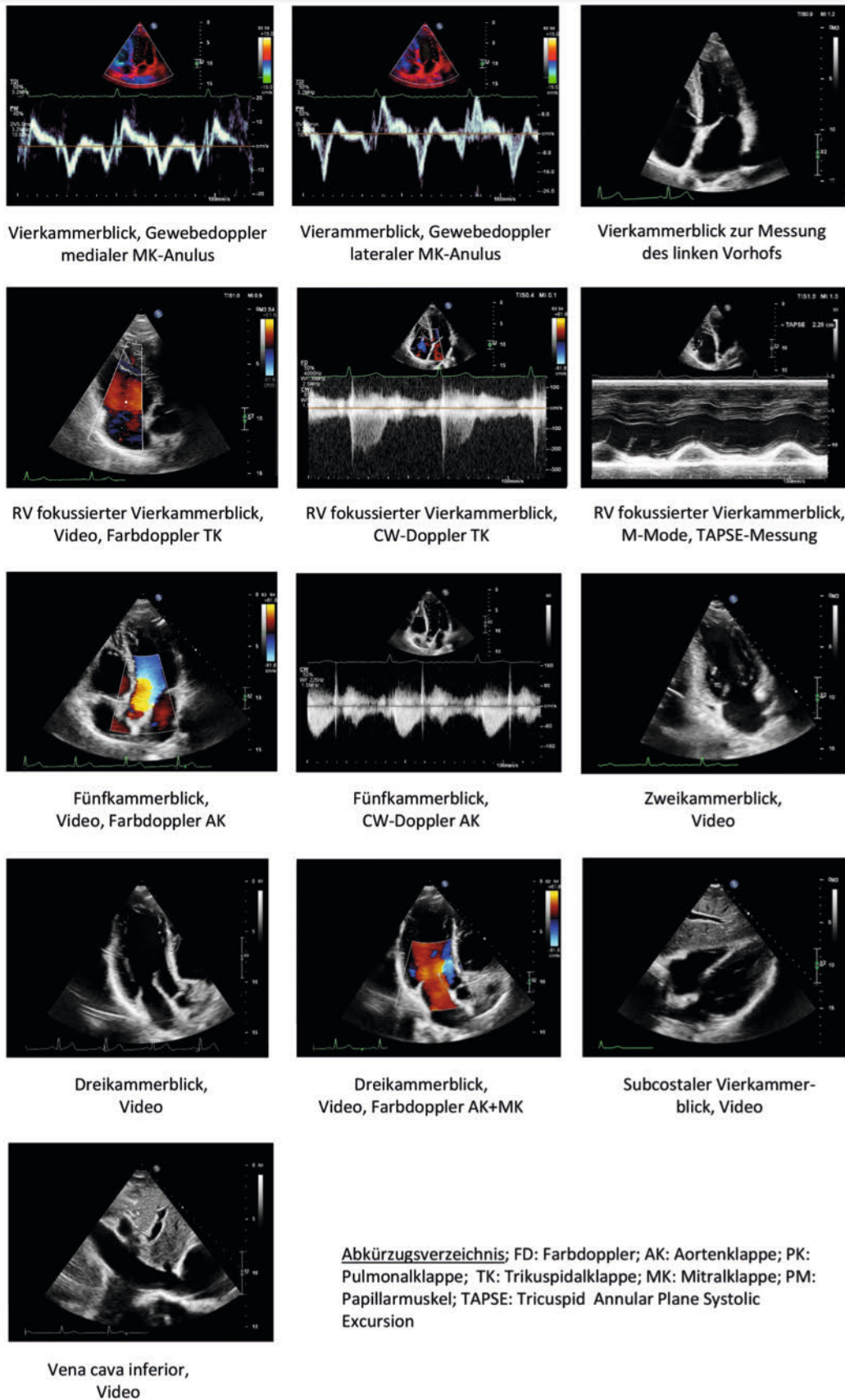
Focused cardiac ultrasound should be performed in the following situations:

- Evaluation of the anatomy and function of the heart in emergency situations
- Acute hemodynamic instability
- Acute respiratory insufficiency with suspicion of a cardiac origin
- Resuscitation

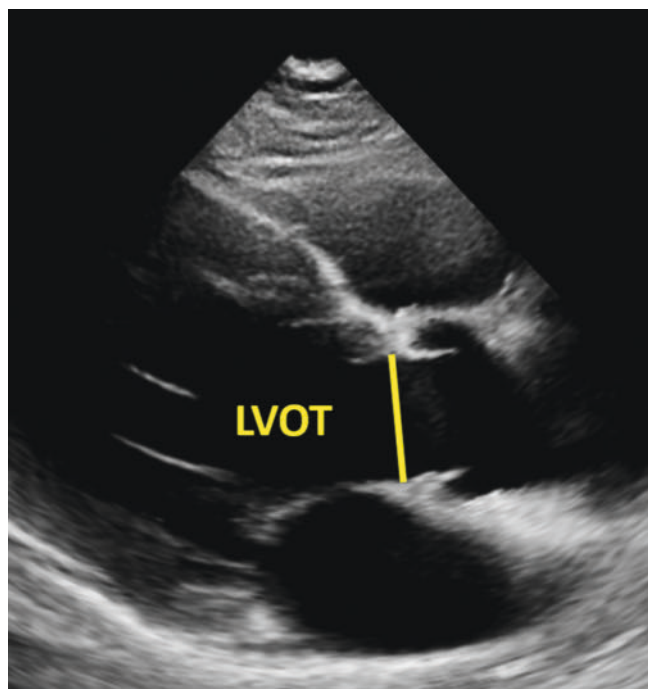
Level of consensus: 8/8 (100%) strong consensus



► **Fig. 1** Minimum dataset for transthoracic echocardiography (part 1). [rerif]



► **Fig. 2** Minimum dataset for transthoracic echocardiography (part 2). [rerif]



► **Fig. 3** Measurement of the left ventricular outflow tract (LVOT) immediately proximal to the aortic valve annulus. [rerif]

Focused cardiac ultrasound procedure

9.2 RECOMMENDATION (AS OF 2025)

Focused cardiac ultrasound should include the following sectional planes (► **Fig. 4**):

- Subcostal long axis view
- Subcostal view of the inferior vena cava
- Parasternal long axis view
- Parasternal short axis view on the mid-papillary plane
- Apical four-chamber view

Level of consensus: 8/8 (100%) strong consensus

The most important questions

9.3 RECOMMENDATION (AS OF 2025)

The most important issues to be investigated by focused cardiac ultrasound are:

- Left- and right-ventricular size
- Position of the interventricular septum
- Global and regional ventricular function
- Intravascular volume status
- Position of the atrial septum
- Pericardial effusion and signs of tamponade
- Evidence of chronic cardiac insufficiency



► **Fig. 4** FoCUS scheme as an example for focused cardiac ultrasound. [rerif]

- Severe valve pathologies
- Cardiac mass (e.g., thrombi, vegetations caused by endocarditis)

Level of consensus: 8/8 (100%) strong consensus

What to do in the case of limited image quality

9.4 RECOMMENDATION (AS OF 2025)

If focused cardiac ultrasound does not provide sufficient visualization, another examiner should be consulted and/or another diagnostic method should be used.

Level of consensus: 8/8 (100%) strong consensus

Measurements

9.5 RECOMMENDATION (AS OF 2025)

Focused cardiac ultrasound is not a replacement for comprehensive echocardiography. If there is suspicion of cardiac disease, comprehensive echocardiography should be performed. Comprehensive echocardiography should be recommended in the focused cardiac ultrasound report.

Level of consensus: 8/8 (100%) strong consensus

9.6 RECOMMENDATION (AS OF 2025)

In the case of unclear hemodynamic instability or acute impaired oxygenation, focused cardiac ultrasound as well as ultrasound examination of the lung (pleura and chest) and of the abdomen (FAST examination) should be performed.
Level of consensus: 8/8 (100%) strong consensus

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Contributors' Statement

Jan Knierim: Conceptualization, Funding acquisition, Project administration, Resources, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. Henrik ten Freyhaus: Conceptualization, Methodology, Validation, Writing – original draft. Harry Magunia: Conceptualization, Supervision, Validation, Writing – original draft. Sebastian Kruck: Conceptualization, Validation, Writing – original draft, Writing – review & editing. Matthias Goepfert: Conceptualization, Validation, Writing – original draft, Writing – review & editing. Norbert Smetak: Conceptualization, Validation, Writing – original draft. Constantin von Kaisenberg: Project administration, Supervision. Caroline Morbach: Conceptualization, Validation, Writing – original draft, Writing – review & editing. Frank Flachskampf: Conceptualization, Resources, Supervision, Validation, Writing – original draft, Writing – review & editing.

Conflict of Interest

All potential conflicts of interest have been comprehensively disclosed and evaluated in the long version of the guideline and can be accessed on the AWMF website.

References

- [1] Baumgartner H, Hung J, Bermejo J et al. Recommendations on the Echocardiographic Assessment of Aortic Valve Stenosis: A Focused Update from the European Association of Cardiovascular Imaging and the American Society of Echocardiography. *Journal of the American Society of Echocardiography* 2017; 30: 372–392
- [2] Galderisi M, Cosyns B, Edvardsen T et al. Standardization of adult transthoracic echocardiography reporting in agreement with recent chamber quantification, diastolic function, and heart valve disease recommendations: an expert consensus document of the European Association of Cardiovascular Imaging. *Eur Heart J Cardiovasc Imaging* 2017; 18: 1301–1310
- [3] Hagendorff A, Helfen A, Flachskampf FA et al. Manual zur Indikation und Durchführung spezieller echokardiographischer Anwendungen. *Kardiologie* 2021; 15: 595–641
- [4] Hagendorff A, Knebel F, Helfen A et al. Expert consensus document on the assessment of the severity of aortic valve stenosis by echocardiography to provide diagnostic conclusiveness by standardized verifiable documentation. *Clin Res Cardiol* 2020; 109: 271–288. doi:10.1007/s00392-019-01539-2
- [5] Lang RM, Badano LP, Mor-Avi V et al. Recommendations for Cardiac Chamber Quantification by Echocardiography in Adults: An Update from the American Society of Echocardiography and the European Association of Cardiovascular Imaging. *Eur Heart J Cardiovasc Imaging* 2015; 16: 233–271
- [6] Mitchell C, Rahko PS, Blauwet LA et al. Guidelines for Performing a Comprehensive Transthoracic Echocardiographic Examination in Adults: Recommendations from the American Society of Echocardiography. *Journal of the American Society of Echocardiography* 2019; 32: 1–64
- [7] Nagueh SF, Smiseth OA, Appleton CP et al. Recommendations for the Evaluation of Left Ventricular Diastolic Function by Echocardiography: An Update from the American Society of Echocardiography and the European Association of Cardiovascular Imaging. *J Am Soc Echocardiogr* 2016; 29: 277–314
- [8] Robinson S, Ring L, Oxborough D et al. The assessment of left ventricular diastolic function: guidance and recommendations from the British Society of Echocardiography. *Echo Res Pract* 2024; 11: 16
- [9] Robinson S, Rana B, Oxborough D et al. A practical guideline for performing a comprehensive transthoracic echocardiogram in adults: the British Society of Echocardiography minimum dataset. *Echo Res Pract* 2020; 7: G59–G93. doi:10.1530/ERP-20-0026
- [10] Zoghbi WA, Adams D, Bonow RO et al. Recommendations for Noninvasive Evaluation of Native Valvular Regurgitation. *Journal of the American Society of Echocardiography* 2017; 30: 303–371. doi:10.1016/j.echo.2017.01.007
- [11] Via G, Hussain A, Wells M et al. International evidence-based recommendations for focused cardiac ultrasound. *J Am Soc Echocardiogr* 2014; 27: 683.e1–683.e33