Who should perform and interpret emergency echo?

Bogdan A. Popescu

"Carol Davila" University of Medicine and Pharmacy

Bucharest, Romania

EUROPEAN ASSOCIATION OF Echocardiography
A Registered Branch of the ESC

EUROPEAN SOCIETY OF CARDIOLOGY®

EAE course, Belgrade, Oct 2010

Who is performing emergency echo in real life?

Everyone!

The emergency echo paradox

A very important procedure, able to provide critically important information for patient' management…

is often performed by:

- **the most junior trainee on duty**
- **with no adequate echo training**
- **on a suboptimal machine**

Who should perform emergency echocardiography?

- **the most experienced available physician should have to perform/interpret ultrasound investigations in emergency medicine.**

The physician who performs emergency echocardiography should meet the condition of an experienced 'imaging' cardiologist

Ann Emerg Med 2009;53:550-570.
EAE recommendations for echocardiography in emergencies. In press.

Education

The better the education in echocardiography, the better the diagnostic success rate and the management of the patients

The echo information has to be fully integrated in the clinical decision-making process!

In emergencies, more than in any other settings, the person performing/interpreting echocardiography should have a good knowledge of cardiology!

EAE recommendations for echocardiography in emergencies. In press.

Education

- The cardiologist (or the sonographer) has to be **proficient in the use of all the echo techniques** to produce the necessary anatomic and pathophysiologic information for diagnostic interpretation.

- An acute problem will only be detected in acute situations if the problem is known by the investigator/sonographer.

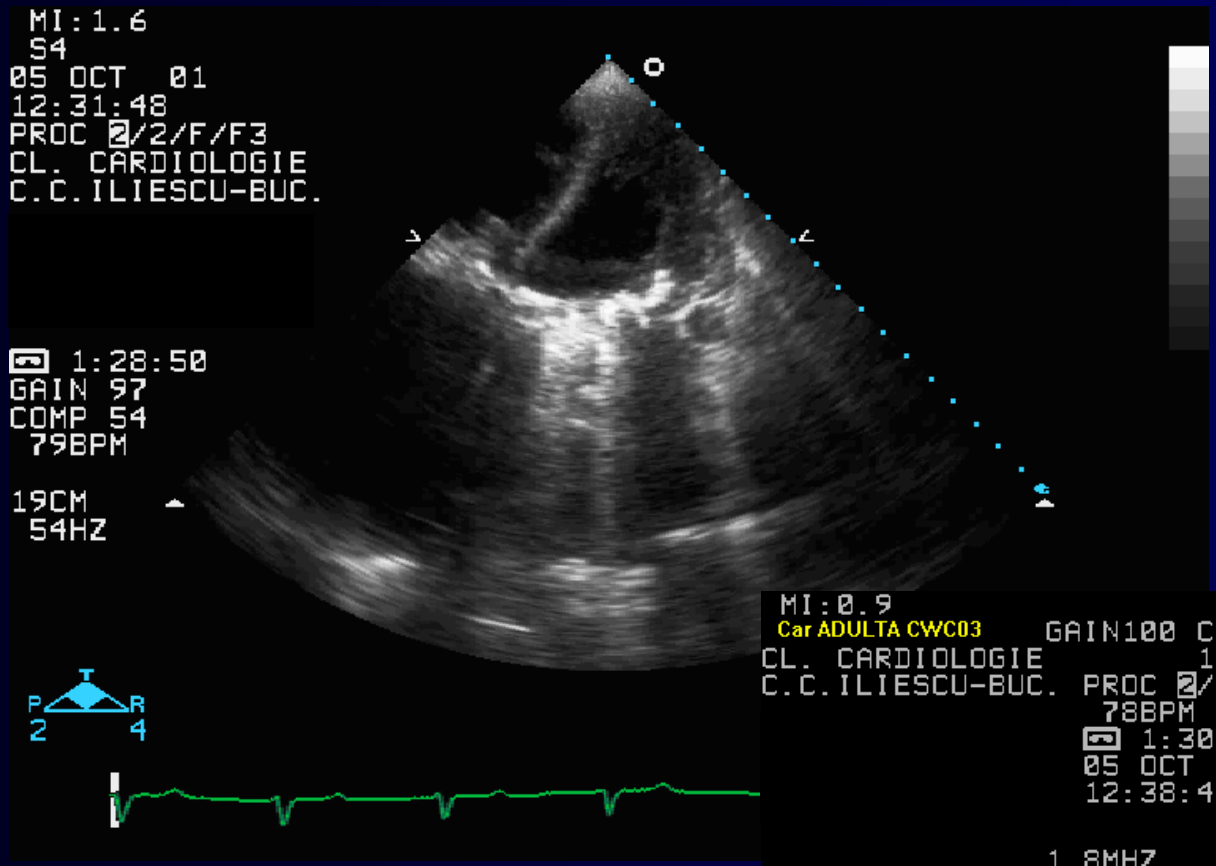
You only see what you know!

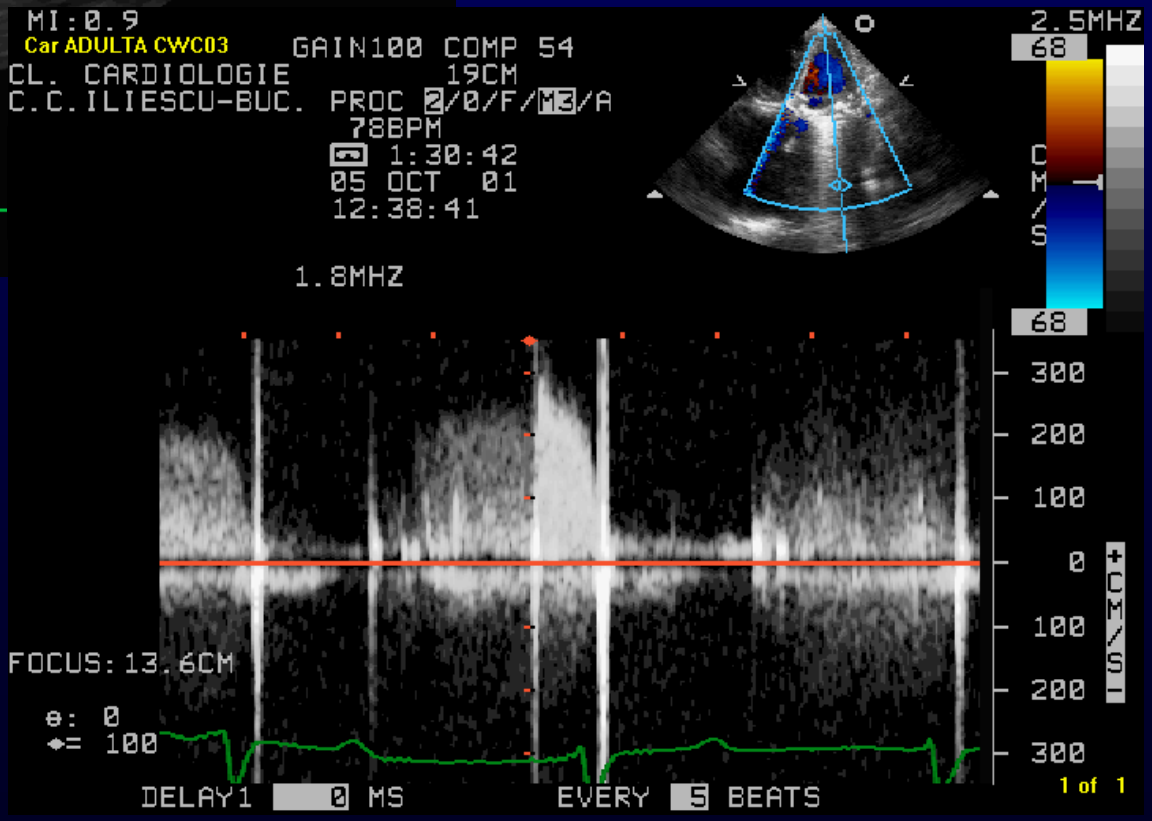
Education

The prerequisites of an experienced operator have to be defined:

- knowledge about the principles of ultrasound physics and instrumentation
- technical skill of echocardiographic applications
- detailed understanding of cardiac and thoracic anatomy, physiology, and pathophysiology
- ability to recognize abnormalities
- ability to obtain and understand clinical information, physical findings and laboratory data as well as concomitant imaging results
- ability to perform measurement and calculations of relevant parameters and to document them

Severe dyspnea in a patient with a MV prosthesis





Education

The quality of the echo examination determines the quality of patient's management

- **Standardization!**
- **Documentation!**
- **Digital storage!**

Eur J Echocardiogr 2008;9:438-448.
Eur J Echocardiogr 2009;10:893-905.

Educational programme

- Long-term training period in an accredited laboratory
- At least one month sitting on a critical care unit to be introduced to diagnostic and therapeutic procedures of emergency medicine
- Didactic sessions in cardiology and emergency medicine, access to all educational modalities including journals, textbooks and web-based products
- Participation in national/international courses of basic and advanced TTE as well as TEE
- For advanced emergency echo training courses of virtual echocardiography with dummies (eg rare diseases)

EAE recommendations for echocardiography in emergencies. In press.

Educational programme

- The trainee should be able to perform **at least 150 investigations** of TTE and/or TEE in ‘critical’ or ‘life-saving’ scenarios
- This should ensure a minimum level of expertise to document an advanced standard for the trainee

In summary, a long-term rotation in an echo laboratory **learning from a supervisor with excellent expertise in echocardiography** provides the best facility to solve the challenge in education of emergency echocardiography

EAE recommendations for echocardiography in emergencies. In press.

Training

- Performing emergency echocardiography requires that the physician (or the team sonographer – physician) is competent in excellent image acquisition and interpretation

- Thus, the prerequisite for integration of diagnostic findings into the clinical management is appropriate technical skill for producing echocardiographic documentation with an optimal image quality.

EAE recommendations for echocardiography in emergencies. In press.

Training in emergency echo

- **Basic level**

(also for emergency doctors and anesthesiologists)

- **Advanced level**

(reserved for cardiologists accredited in echocardiography)

EAE recommendations for echocardiography in emergencies. In press.

Training duration

The documentation of a **minimum of 150 echocardiographic investigations** with critical cardiovascular diseases performed by the trainee under supervision within the **three months education period** for the advanced level of emergency echocardiography.

The training center

The echocardiography laboratories in which training is undertaken **should fulfill the EAE recommendations**, preferably those for an advanced level.

In particular, **the commitment of training staff is vital for training quality**. The trainer should be available to supervise, criticize, and correct the performance and interpretation of echo studies.

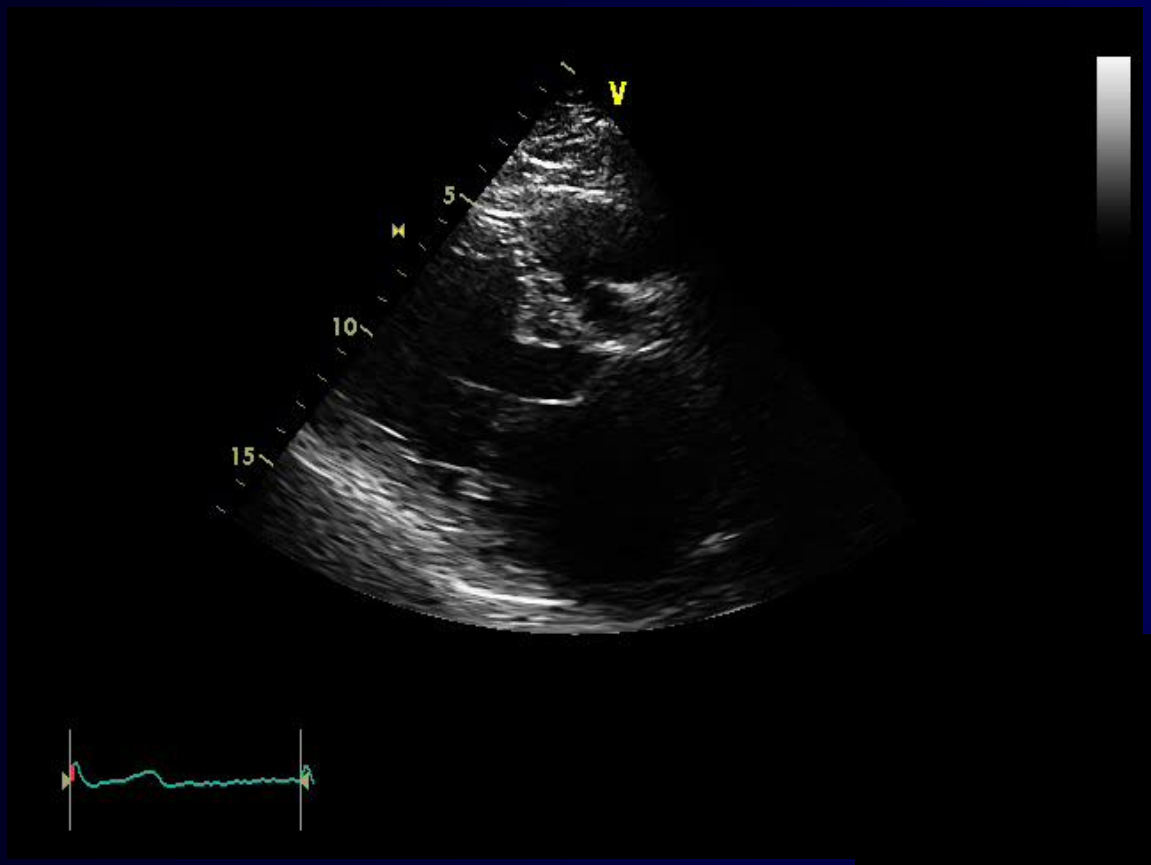
Ideally, there should be **joint educational programmes** that rotate fellows who are training in cardiovascular medicine, among **echocardiography, nuclear cardiology, CMR and CT**, if these are available.

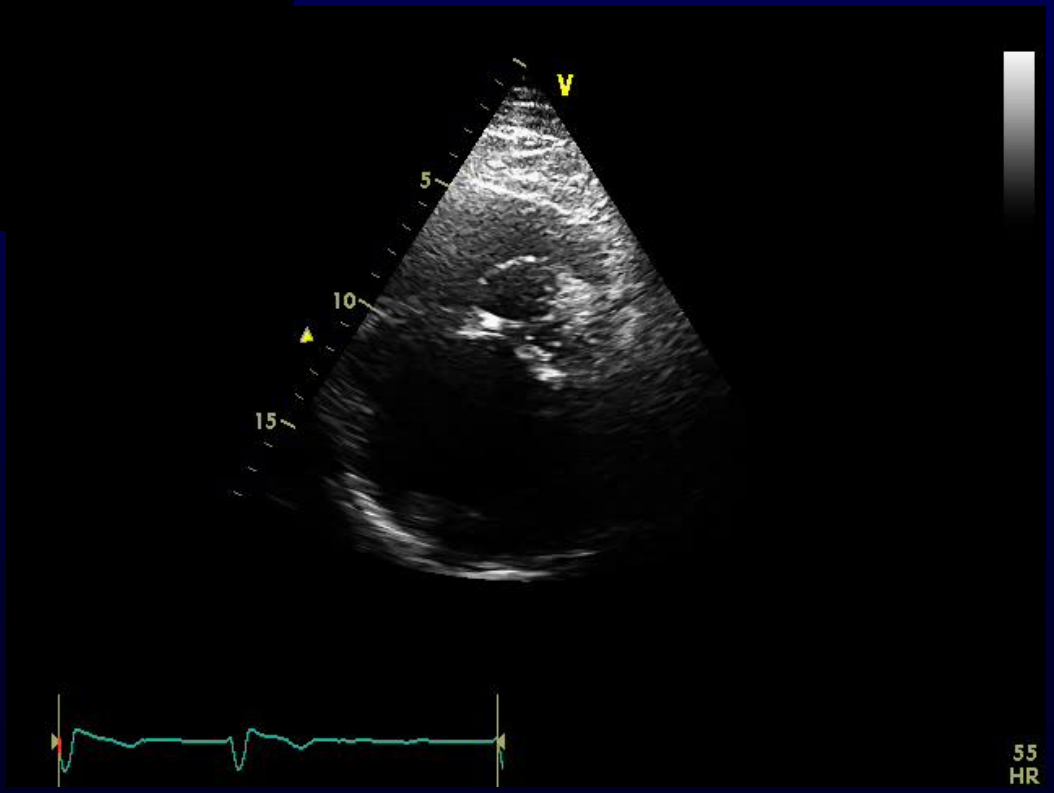
Eur J Echocardiogr 2009;10:893-905.
Eur J Echocardiogr 2007;8:80–7.

Training programme

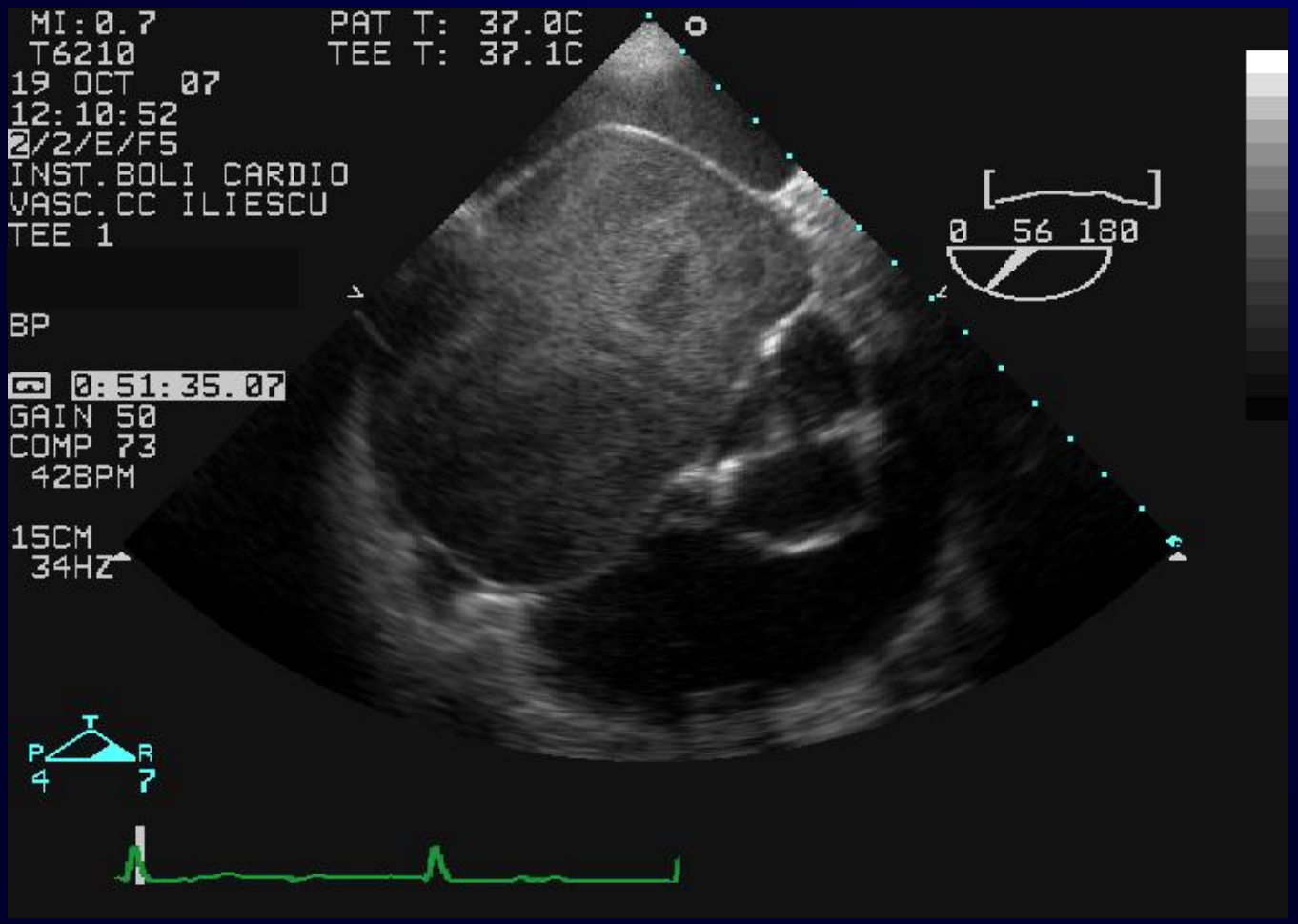
- The practical component of echocardiography has to be taught and controlled carefully
- Echo examinations should be assessed for technique, speed of image acquisition, representative planes, standardization, image quality and diagnostic accuracy
- Hands-on sessions, image presentations, observation of bedside skills and simulation models should be included into the training program
- Therefore a quality assurance process is necessary

Dyspnea in a 82 y/o man

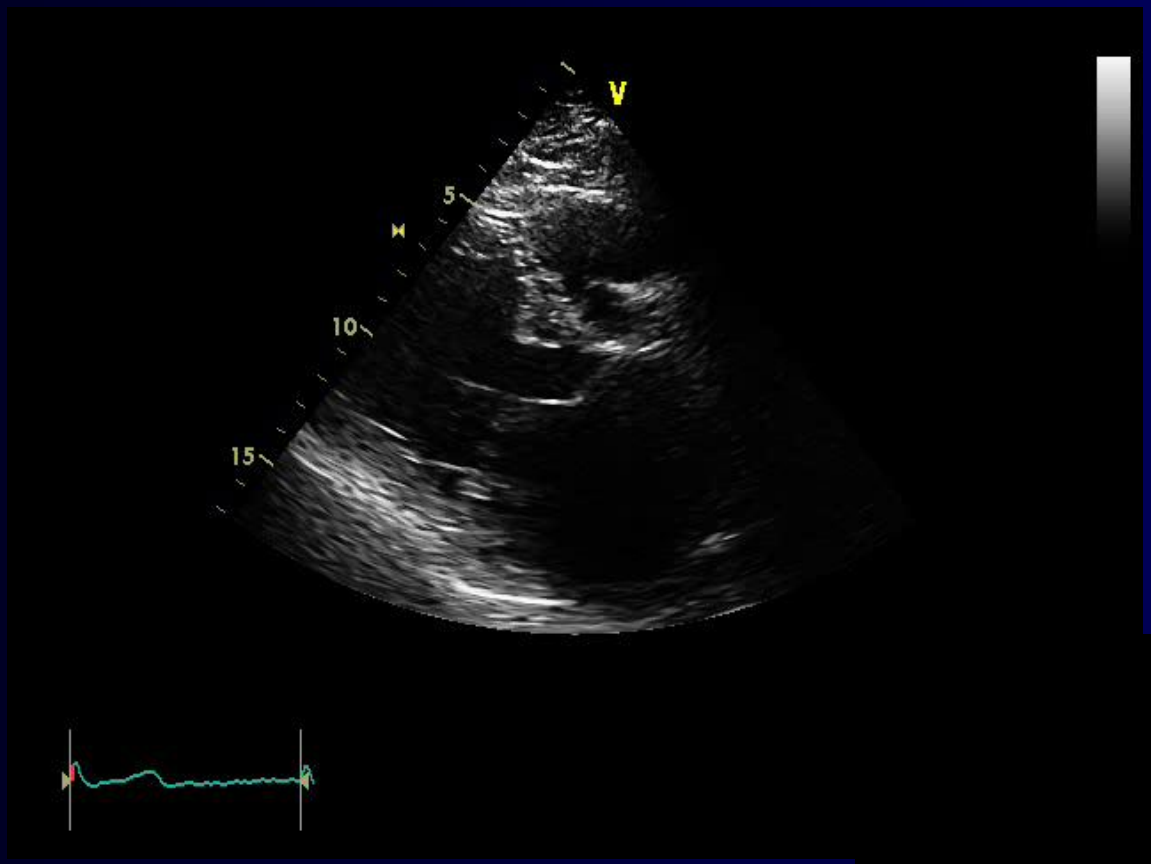




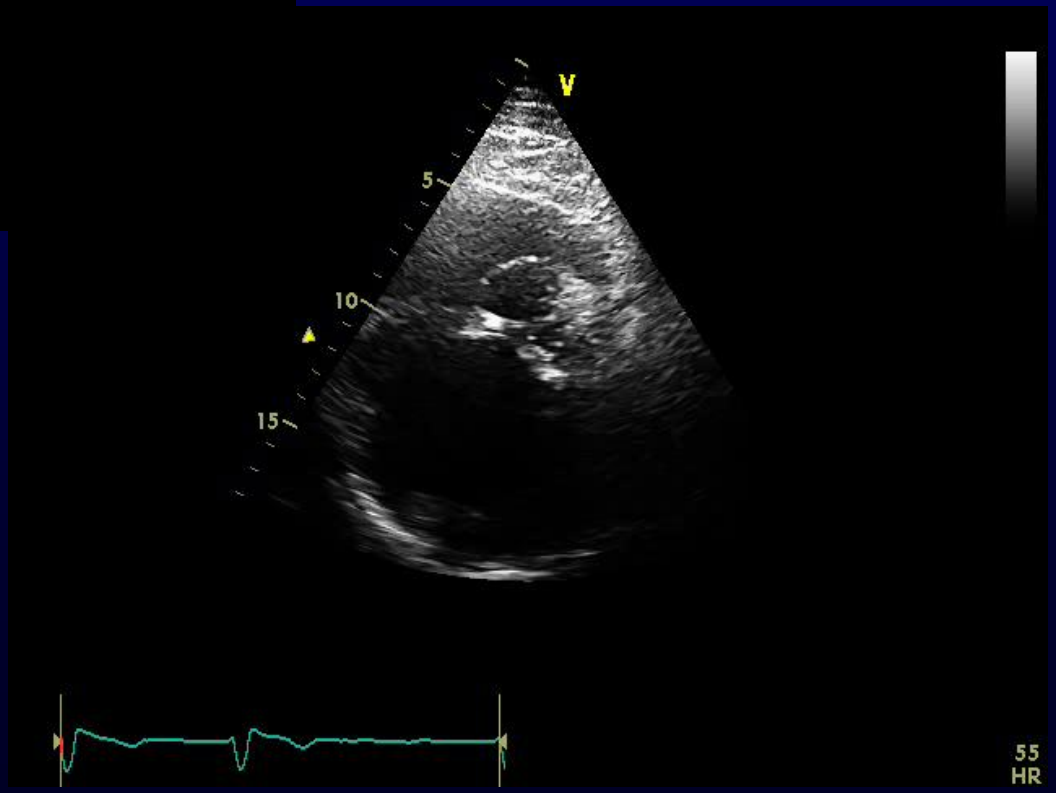
Giant aneurysm of the non-coronary sinus of Valsalva



Popescu BA, et al. J Am Coll Cardiol 2011.



Images need to be carefully analyzed for a correct diagnosis



Clinical experience and technical skill

In emergency echocardiography the experience of the physician has to be documented within his education by the following aspects which should be fulfilled:

- **to be familiar with the indications and the limitations of emergency echocardiography**
- **to define normal cardiac anatomy and to discriminate the normal status from cardiovascular pathologies**
- **to define global and regional left and right ventricular function qualitatively and semiquantitatively by algorithms of modern echocardiography**
- **to differentiate pericardial effusions with or without signs of tamponade**

EAE recommendations for echocardiography in emergencies. In press.

Clinical experience and technical skill

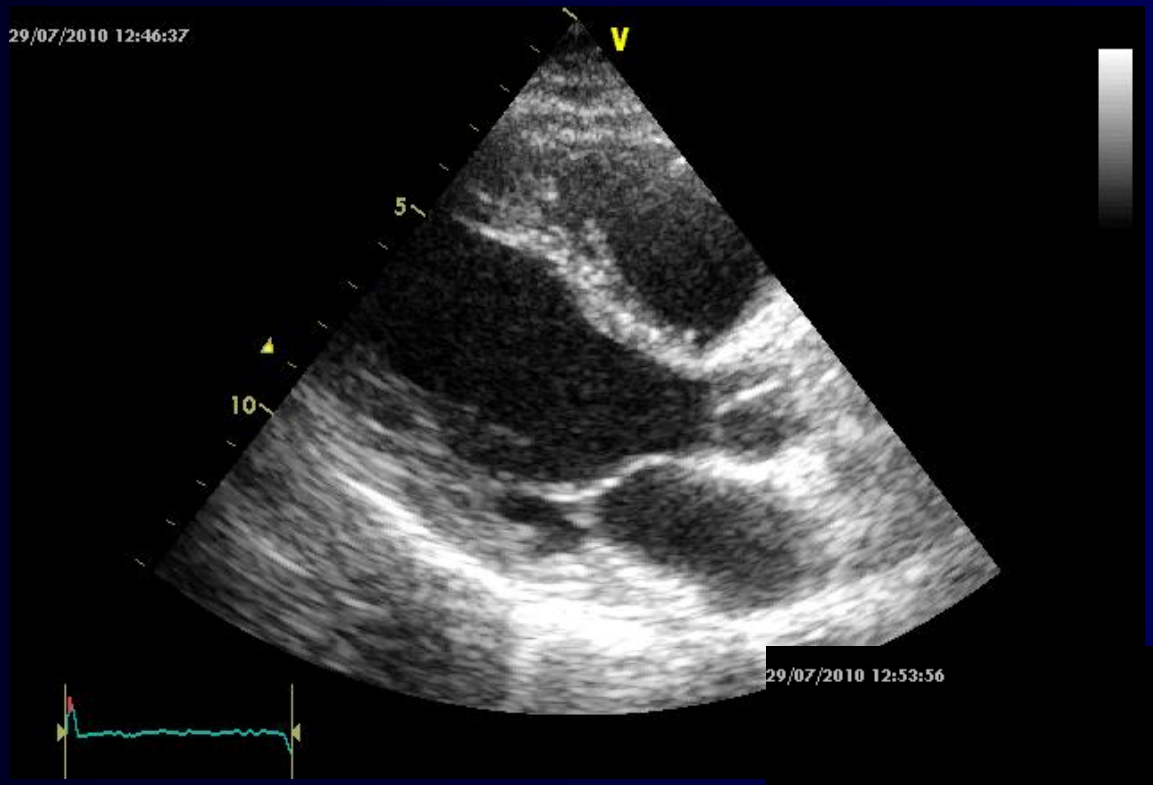
- to detect the status of right ventricular preload and to detect the reasons of pathophysiological conditions
- to be familiar with rare cardiovascular diseases – especially heart valve diseases, cardiomyopathies and diseases of the thoracic aorta
- to be familiar with artefacts of echocardiography and handle pitfalls
- to be able to analyze cardiovascular hemodynamics in ‘critical’ or ‘life-saving’ situations and to guide resuscitation

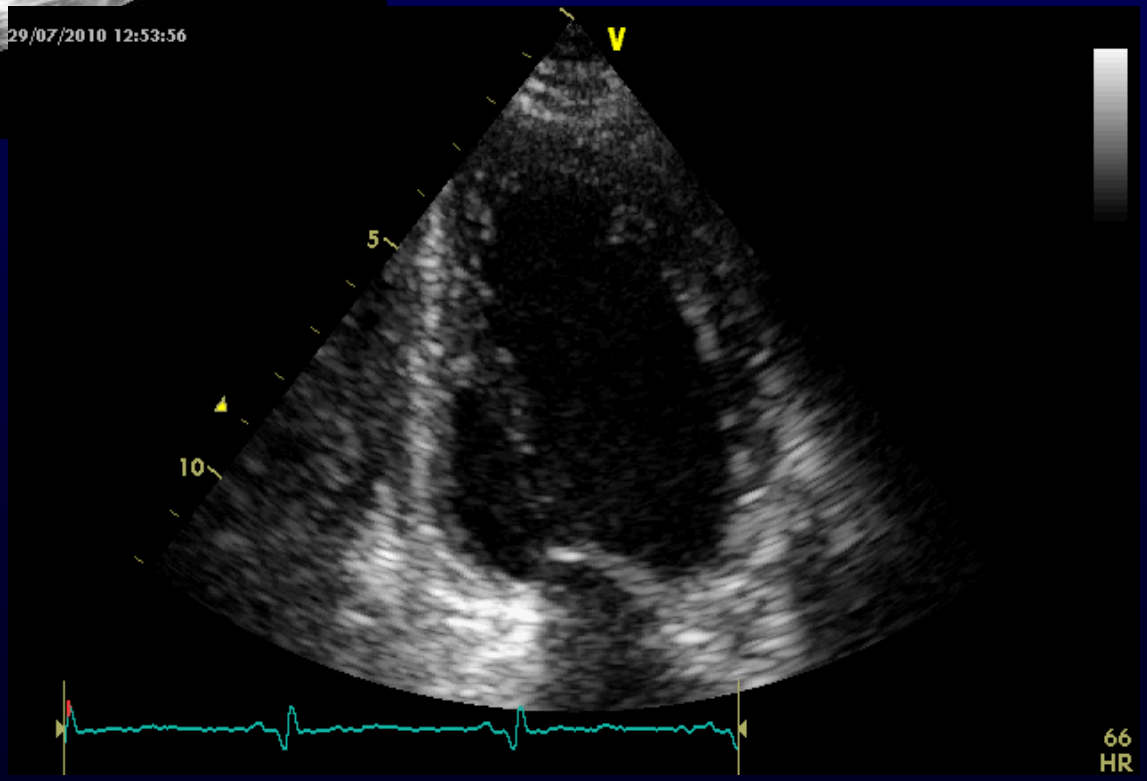
EAE recommendations for echocardiography in emergencies. In press.

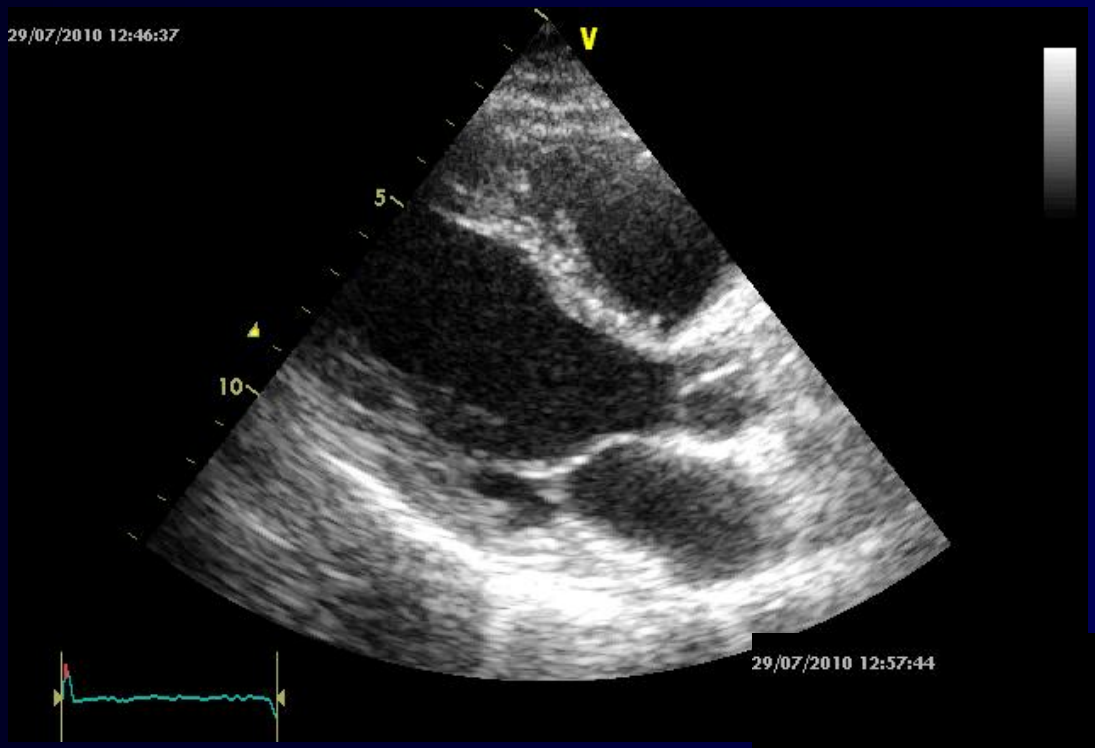
- **In summary, clinical experience and technical skill in all echocardiographic applications and techniques should be mandatory for physicians who perform emergency echocardiography.**

- **Basic and advanced levels of qualification have to be defined to ensure the best possible quality of echocardiography in emergency care for an optimal patient management.**

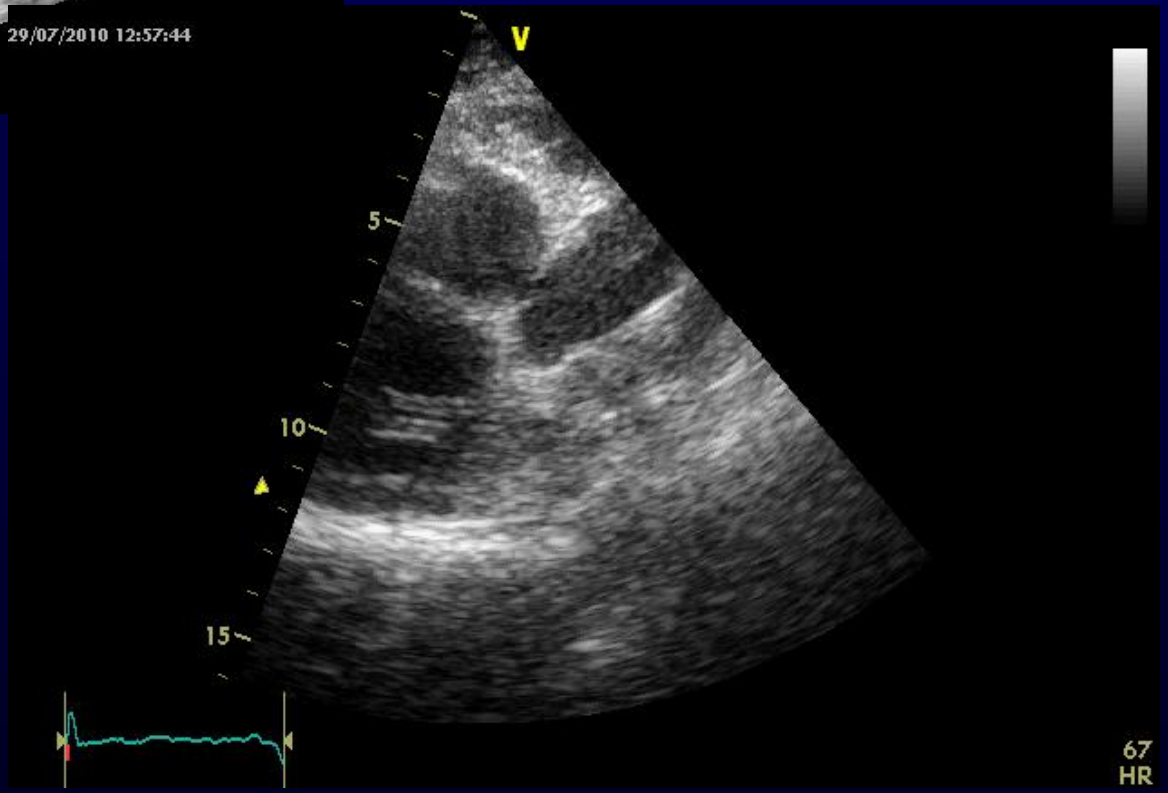
Chest pain in a patient with a recent TIA

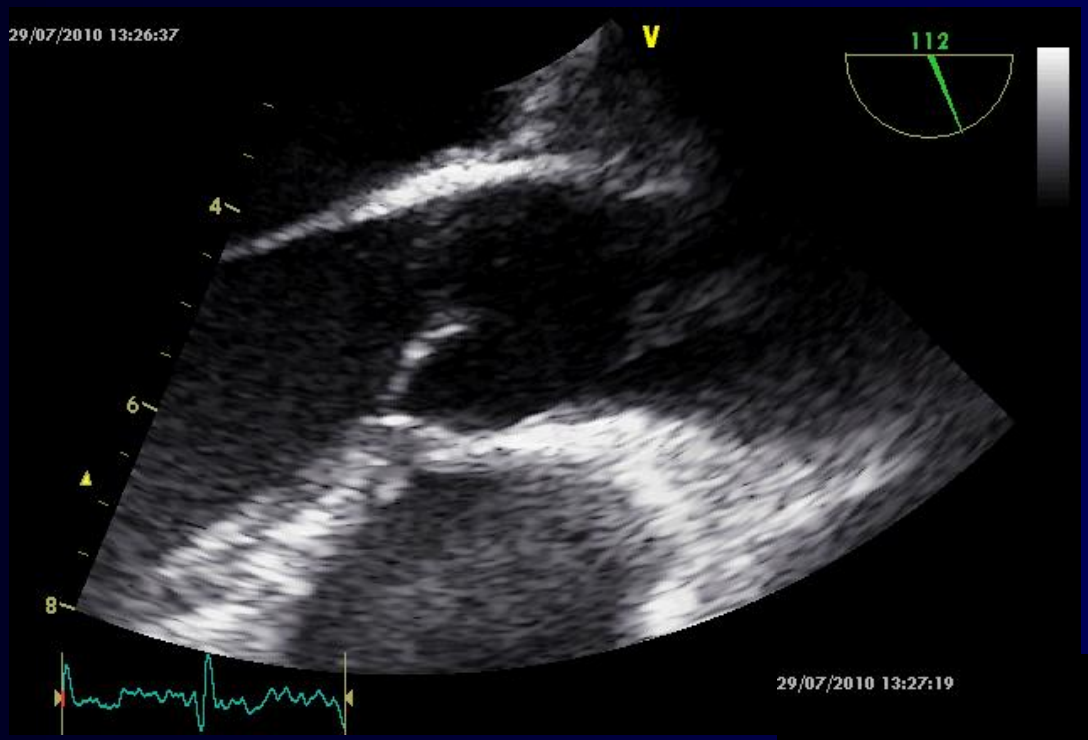




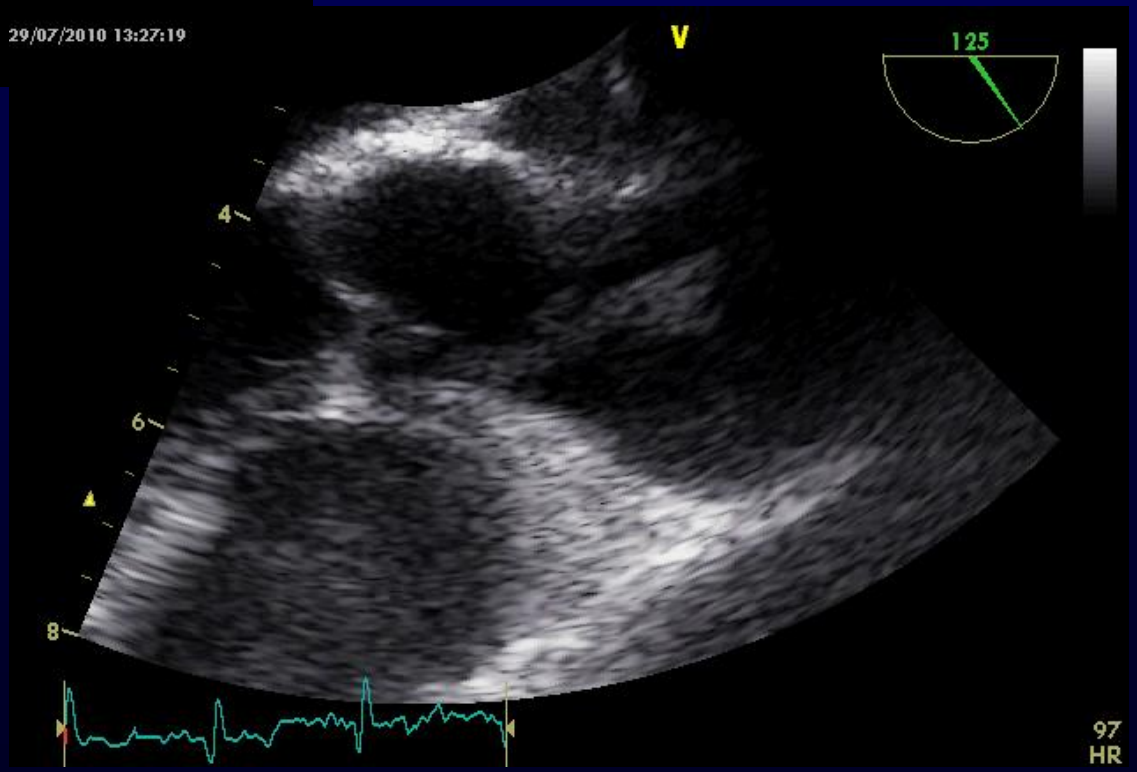


Importance of knowing the clinical question and also getting non-standardized views





Mobile masses in the ascending aorta (including one sitting in RCA ostium)



Logistics

- **Equipment requirements in accordance with the EAE laboratory accreditation and standardization documents** should also be fulfilled in emergency echocardiography

- **Routine digital storage** of echo data with fast speed storing settings should be recommended and other analogue media should be regarded as not acceptable

Eur J Echocardiogr 2007;8:80–87.
Eur J Echocardiogr 2008;9:438-448.

Hand-held devices

offer many opportunities

- **quick identification of gross abnormalities**
- **accesible and ultra-portable**
- **cost-effectiveness**

…but many questions arise!

- **Responsibility and legal issues**
- **Need for clear definition of diagnostic capabilities**
- **Full digital storage and network compatibility**
- **Education and training for using of such devices !**