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## Original research article

# The involvement of nurses in clinical echocardiography



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## ABSTRACT

Echocardiography is a basic examination in cardiology used to assess the anatomy and function of the heart. An echocardiography nurse is a health care specialist who is able to use echocardiographic equipment to obtain images of the heart. Standards for echocardiography personnel vary widely between countries. In the Czech Republic, there is no training program for nurses to carry out echocardiograms and the work is done almost exclusively by physicians. In many other countries, including the United Kingdom and the USA, specialist nurses carry out and report echocardiograms independently. In this article, we compare requirements for echocardiography nurses in different countries.

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## Introduction

Echocardiography is a standard examination in cardiology used to assess the anatomy and function of the heart. Personnel requirements for this procedure vary considerably between countries, and the role of the nurse in clinical echocardiography is evolving [1–3].

In this paper, we describe requirements for echocardiography nurses in the Czech Republic and compare them to

standards in other countries – education, professional qualification, certification, carry out TTE, report examination and physician's review (Table 1).

### Basics of echocardiography

An echocardiogram is an examination that uses high frequency waves (ultrasound) to produce images of the heart. An echocardiogram is carried out for a variety of reasons, although it is mostly used to assess the anatomy and function

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**Table 1 – Requirements and standards for echocardiography nurses in different countries.**

Country	Czech Republic	Belgium	United Kingdom	USA
Education	Medical doctor	Bachelor	Bachelor	Bachelor
Professional qualification	Not available	None	Accredited program	Accredited program
Certification	Not available	Certification exam (not compulsory)	Certification exam	Certification exam
Carry out TTE	Not available	Independent	Independent	Independent
Report examination	Not available	Usually independent	Independent	Independent
Physician's review	Not available	Necessary	Not necessary	Not necessary

TTE – transthoracic echocardiography.

of the heart and its valves [4,5]. Pulses of ultrasound are sent from the echocardiographic probe toward the heart, and the reflected waves (echoes) that bounce back from the heart and other structures are detected by a receiver (built into the same probe) and displayed as a picture on a monitor.

There are various forms of echocardiography. Transthoracic echocardiography (TTE) uses a probe that is placed on the chest; a lubricating jelly is used to ensure good contact with the skin (Fig. 1).

Doppler echocardiography uses the same probe, but additionally, can also measure the direction and speed of blood flow within the heart. Transesophageal echocardiography (TEE) is an alternative method in which the probe is passed into the patient's esophagus [5–8] (Fig. 2).

Common indications for TEE are to rule out endocarditis, cardiac clots (prior to cardioversion), and assess the degree and cause of valvular regurgitation. Stress echocardiography uses a treadmill, or medications such as dobutamine, during the

echocardiography procedure, to make the heart beat faster and stronger. This is done to assess heart muscle function under increased workloads and at increased heart rates. Advanced technologies, such as three-dimensional speckle tracking and contrast echocardiography are also available, but are mostly used for research purposes in highly specialized departments [9–11]. Intracardiac echo (ICE) uses a probe that is inserted inside the heart via the femoral vein. The technique is invaluable for interventional electrophysiology procedures such as transseptal punctures [12,13]. An ICE probe is inserted into the heart by the physician, but a trained nurse is able to find basic projections to navigate catheters during catheter ablation (Fig. 3).

#### **Personnel and technical equipment in the echocardiography laboratory**

The echocardiography laboratory is a facility with the primary purpose of accepting referrals for echocardiographic examination [14,15]. The goal is to provide a full scope of echocardiography services and engage appropriately trained personnel to carry out and interpret adult and/or pediatric examinations. All laboratories should establish protocols for the acquisition, reporting, and recording of echocardiographic examinations. These protocols should be reviewed and accepted by all staff involved. A fully equipped and perfectly functioning echocardiographic machine is essential if optimal examinations are to be produced. In addition, an examining bed, chairs for the personnel, blood pressure monitoring, oxygen, and pulse oxymetry, as well as intravenous and resuscitation equipment must also be available [16].

**Fig. 1 – Transthoracic echocardiography.****Fig. 2 – Transesophageal echocardiography.**

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