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# Can Nurses master Pediatric Cardiac Auscultation *(following appropriate Teaching and Practice)?*

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## Introduction.

**Pediatric cardiac auscultation (PCA) proficiency** is a **key clinical skill**, fundamental for the efficiency of any pediatric **cardiovascular disease (CVD) screening program** and for a **cost-effective use of pediatric cardiology services**.

We aimed to test the **hypothesis** that following structured teaching **non-medical personnel (nurse students) can also become masters of PCA**

## Methods

- **Pilot study**
- **two volunteer nurse students**
- full attendance of a **3-month teaching program of PCA** including attendance
- 1) ***e-learning material*** (videolectures) as open-courses free web lectures available at University of Crete web-site (Fig. 1)
- 2) ***interactive, multimedia-based PCA lectures and workshops*** for medical students, with reproduction of digital phonocardiogams (Ref.1,2)
- 3) weekly ***attendance of an academic pediatric cardiology outpatient clinic***.
- **Teaching outcomes** were **assessed**:
- 1) both students ***validating a series of recorded digital phonocardiograms*** representing innocent and abnormal murmurs, additional sounds (clicks, pericardial friction) and heart tone abnormalities (wide S2 split)
- 2) one student ***recording*** and ***interpreting digital phonocardiograms of 30 school children*** participating on a pediatric CVD screening program.
- Their performance was compared to that of 34 medical students attending the same teaching program (1) and against expert pediatric cardiologist, all validating the same digital phonocardiograms (2)

## Results

**A. Interpretation of Digital Phonocardiograms against medical students.**

**Differentiation of normal vs abnormal auscultation**

| Sensitivity | Specificity | |
|---|---|---|
| 100% | 33% | **for both nurses** vs |
| 98% | 65% | **for medical students** (mean) |

**Auscultation quality scores**
(composite score of cardiac auscultation detailed description variables)

| | |
|---|---|
| **8,7 and 7,8** | **for nurse students** vs |
| **7,8** | **for medical students** (mean) |

**B. Interpretation of Digital Phonocardiograms against expert.**

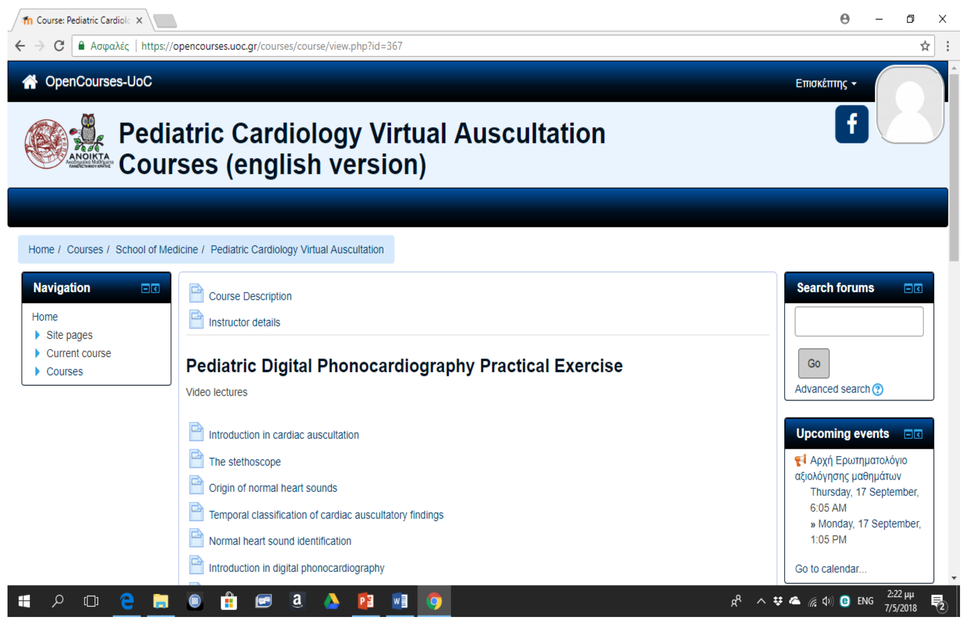
- **Complete agreement**

in **18/30 validations (60%)** including normal auscultation (n=10), innocent murmur (n= 6), abnormal murmur (n=1), abnormal extra sounds (n=1).

- **Disagreement**

**a) detection only by expert**:
- innocent murmur (n=4),
- abnormal murmur (n=1),
- abnormal extra sound (n=2).

**a) detections only by student**:
- innocent murmur (n=3, no murmur by expert),
- abnormal murmur (n=1, innocent murmur by expert),
- additional sound (n=2, abnormal murmur in 1 case by expert).



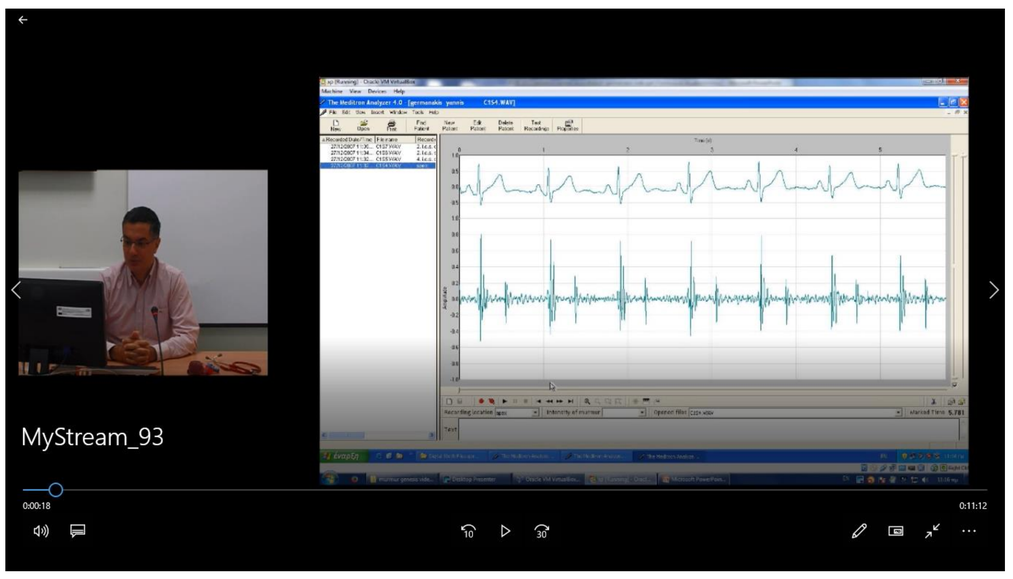




**Fig.1 Web-lectures in pediatric cardiac auscultation including digital phonocardiograms**

https://opencourses.uoc.gr/courses/enrol/index.php?id=367
**English version**. For Password please contact: yannis.germanakis@gmail.com
**Greek version**. Free available: https://opencourses.uoc.gr/courses/course/view.php?id=342

## Conclusions

**Pediatric Cardiac Auscultation proficiency can be achieved also by non-physicians,** including **training nurses**, following structured intensive teaching combining e-learning and practical exercise.

**The role of trained nurses supporting pediatric CVD screening programs,** including cardiac auscultation**, should be further investigated.**

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