



Dipartimento Integrato Interistituzionale
DIPINT



Primo Workshop
Clinical Research and Innovation
Venerdì 4 luglio 2014 9.00 - 19.00
Aula Magna - Polo Fibonacci - Largo Pontecorvo 3, Pisa

**“Valore incrementale dell'ecocardiografia miniaturizzata nel
contesto della visita cardiologica
a letto del malato: dati dello studio multicentrico SIEC”**

Prof. Vitantonio Di Bello

Azienda Ospedaliero-Universitaria Pisana

Università di Pisa



What is pocket-sized ultrasound?

- Quick and immediate visualization
- Ultrasound technology
- Portability

- Function: Black & White / Color imaging
- Size: < approx. 1 pound, pocket-sized
- Scanner: single probe with 6-24cm depth



Vscan may redefine primary care for physicians by allowing for anatomical visualization potentially providing for an immediate diagnosis decision during physical exams.

background

HTA study comparing :

- cardiological examination at the bedside +
ecg+ x-ray chest

VS

- Vscan

In the diagnostic and prognostic evaluation, in the therapeutic approach in decision making related to the patient in other departments;

In terms(HTA) feasibility, accuracy, cost savings, impact on the organization.

Incremental value of Pocket-size Hand-Held Echocardiography during bedside inpatients cardiology consultations, in addition to physical examination: a Multicentric Italian study (SIEC)

- **443 patients (53% men) referred for initial bedside cardiology consultations**
- **Physical examination**
- **ECG**
- **Chest-X-Ray**
- **PHHE (VScan, GE Healthcare) examination.**
- **Assessment of:**
 - **scanning time**
 - **number of examinations with abnormal results after physical examination and PHHE exam**
 - **information obtained by physical examination alone and followed by PHHE**

Clinical Findings and population characteristics	mean ± SD or n (%)
Age	68.7 ± 14.7
Gender	52% (men)
Systolic Arterial Pressure (mmHg)	128 ± 21
Diastolic Arterial pressure (mmHg)	75 ± 12
Clinical symptoms	
Hypertensive crisis	12 (2.8)
Acute pulmonary edema	12 (2.8)
Dyspnea	80 (18)
Angina pectoris	102 (23)
Arrhythmias	80 (25)
Syncope	25 (5.6)
Pre-surgery	106 (25)
Others	26 (5.8)

Physical examination	n (%)
Normal heart sounds	297 (67)
Third heart sound	41 (9.3)
Accentuation of the aortic component of second heart sound	39 (8.8)
Accentuation of the pulmonic component of second heart sound	36 (8.1)
Systolic murmur of mitral regurgitation	105 (23.7)
Systolic murmur of tricuspid regurgitation	28 (6.3)
Systolic murmur of aortic stenosis	25 (5.6)
Systolic murmur of aortic sclerosis	55 (12.4)
Diastolic murmur of mitral stenosis	2 (0.5)
Diastolic murmur of aortic regurgitation	50 (11.3)
Pulmonary rales	15 (3.4)
Bronchospasm	34 (7.7)

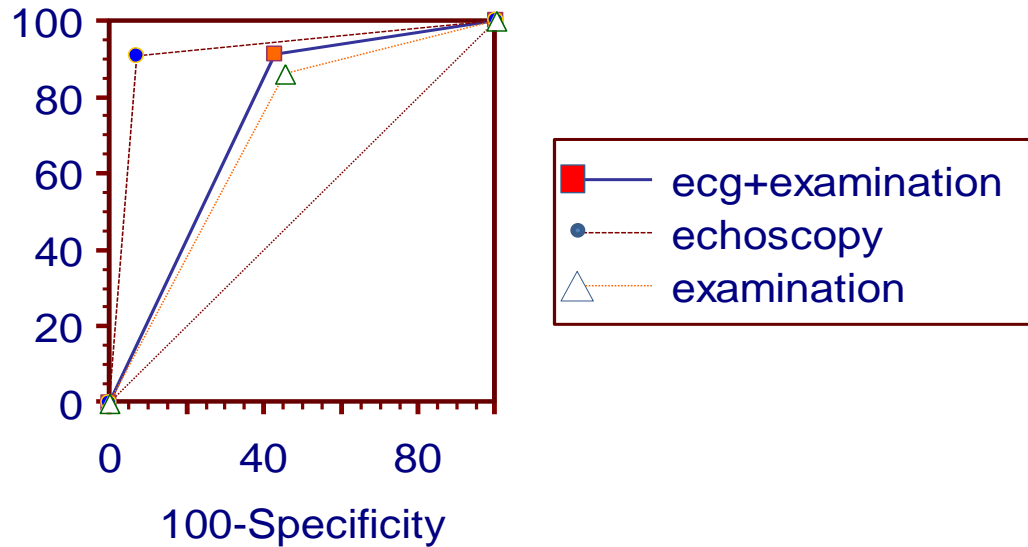
ECG Results	n (%)
Normal	129(29.1)
RBBB	26 (5.9)
LAFB	47 (10.6)
LBBB	32 (7.2)
LVH	47 (10.6)
ST depression	21 (4.7)
ST elevation	10 (2.3)
SVE	14 (3.2)
VE	20 (4.5)
AF	71 (16)
AV block	11 (2.5)
Other	14 (3.2)

Chest X-Ray	n (%)
Normal chest-X-ray	117 (35.6)
Emphysema	88 (18.9)
Pulmonary fibrosis	5 (1.2)
Pleural effusion	38 (8.6)
Evidence for Acute pulmonary edema	29 (6.5)
Shock lung	2 (0.4)
Cardiomegaly	88 (19.9)
Others/missing	36 (8.1)

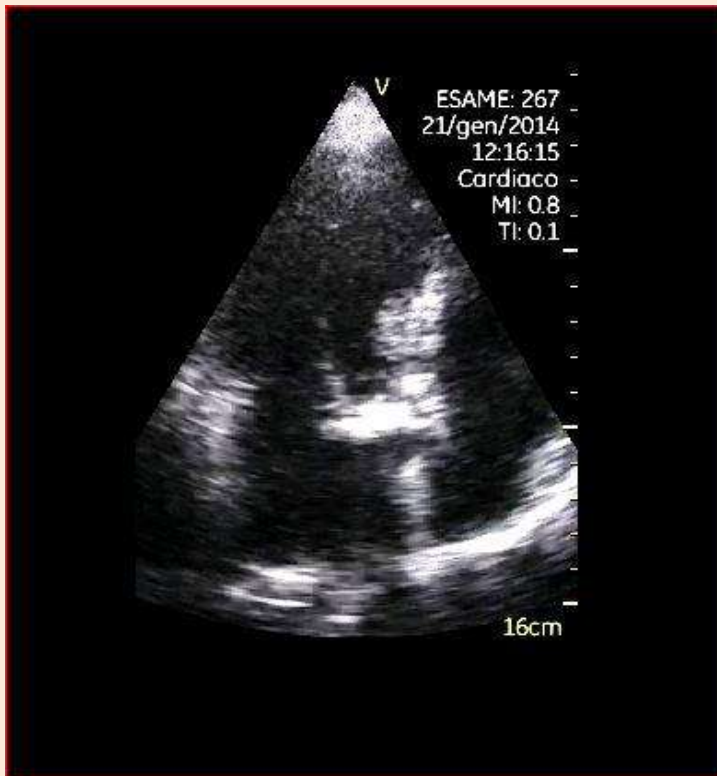
PHHE results	n (%)
Normal echocardiographic examination	87 (19.6)
Increased volume of left sections with an overall reduction of wall motion	84 (19)
Left ventricle akinesia / segmental hypokinesia	111 (25.1)
Asymmetric septal hypertrophy	8 (1.8)
Left Ventricular concentric hypertrophy	133 (30)
Left ventricular eccentric hypertrophy	19 (4.3)
Increase in volume of right sections (ventricle)	71 (16)
Tricuspid regurgitation	96 (21.7)
Left atrial enlargement	164 (37)
Bi-atrial enlargement	79 (17.8)
Moderate-to-severe mitral regurgitation	81 (18.3)
Mitral Flail (rupture of chordae)	1 (0.2)
Aortic stenosis (calcific)	25.3 (5.3)
Pericardial effusion, not buffering	30 (6.8)
Marked ascending aorta dilatation	7 (1.6)
Moderate-severe aortic regurgitation	63 (15.3)

Definitive Diagnosis	n (%)
Normal	138(31.1)
Arrythmias	53 (11.9)
Heart failure	89 (20.1)
Hypertensive crisis	13 (2.9)
Cardiogenic shock	5 (1.1)
Syncope	25 (5.7)
ACS NSTEMI	19 (4.3)
ACS STEMI	17 (3.8)
Pulmonary embolism	15 (3.4)
Pericardial effusion	30 (6.8)
Cardiomyopathy	25 (5.6)
Valvulopathy	14 (1.6)

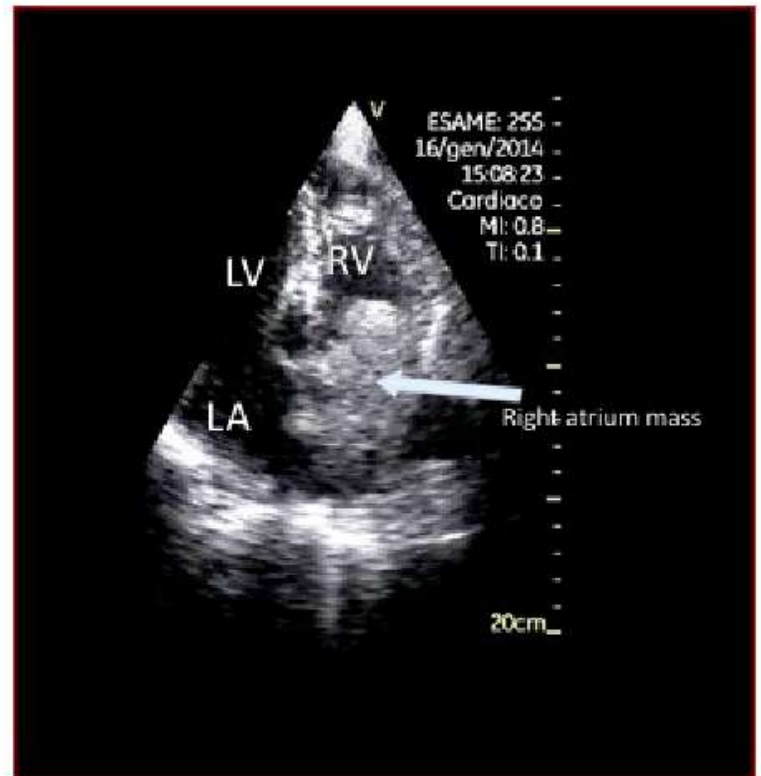
<u>Correspondence between clinical and PHHE diagnosis</u>	• n (%)
NO diagnostic influence	104 (23.5)
Diagnosis verified	97 (21.9)
Diagnosis changed	104(23.5)
Diagnosis added	97 (21.9)
No possible execution	6 (1.4)
Missing	35 (7.9)



ROC curves analysis comparing the sensitivity and specificity of clinical examination alone, clinical examination added with electrocardiographic results and V-Scan results.



Woman, 84 y.o., hospitalized in Orthopedic Department after femoral fracture (evaluation required to define ejection murmur. ECG revealed signs of Left Ventricular Hypertrophy . V-SCAN in action: a densely calcific aorta with severely restricted motion was found. Left ventricle diameter was within normal limits, with concentric hypertrophy. A subsequent conventional echocardiographic exam then confirmed severe aortic stenosis.



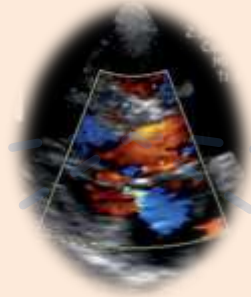
Male, 85 y.o. Hypertension, dyslipidemia. Former smoker. Thrombocytosis. Recent diagnosis of gastric tumor waiting for gastrectomy. During the pre-surgery investigation, patient presented worsening dyspnea. V-SCAN in action: a large right atrial mass, partially protruding in right ventricle was ruled out. A subsequent computed tomography revealed a large thrombosis originating from inferior vena cava and complicated by significant pulmonary embolism.

CONCLUSIONS

The use of PHHE showed a significant increase in the diagnostic accuracy of clinical cardiology consultation at bedside, compared with clinical examination alone or added by electrocardiographic and, when available, by chest-x-ray findings. If used by experienced hands, this ultrasonic approach at bedside cardiologic consultations could have a significant impact on clinical decision making, with a more accurate and rapid diagnosis, a better therapeutic choice and prognostic stratification.

Vscan could redefine physical exams

Quick look



Palpation



Inspection



Vscan + physical exam

Auscultation



Percussion



...quick and immediate visualization.

Value proposition for primary care

Clinical value

- May help speed diagnosis decision
- Helps obtain efficient patient triage
- May improve quality of referral

Patient value

- May reduce unnecessary follow ups

Economic value

- May reduce unnecessary testing

Physician personal value

- Affordability
- Portability

Physicians	Environment	Clinical utility	Clinical anatomy
Primary care	Office	Visual evaluation during physical exam	Abdominal aorta, gall bladder, kidney, and liver
Hospitalist	Hospital / Wards	Bedside evaluation	Cardiac left ventricular function and inferior vena cava
Cardiologist	Outpatient Inpatient	Limited focus echo exam	Cardiac left ventricular function, myocardium septum wall, and mitral & aortic valve
Critical care	ICU/CCU/ED Ambulance	Rapid clinical decisions	Lower extremity for peripheral vessel, lung pleural motion, and fluid detection
Medical education faculty	Medical school	Education using visual validation	Heart, kidney, lung, liver, and gall bladder

Vscan may help redefine primary care

Physical exam	Physical exam
Inspection	⇒See liver
Palpation	⇒See apex area
Percussion	⇒See cardiac area
Auscultation	⇒See mitral or aortic valve function

Impact patient triage efficiency

Helps speed diagnosis decision

Non-invasive diagnostic power



Economic section of this HTA study
is under statistical evaluation

Thank You