an interactive stepwise model that included demographic and clinical parameters (c_2=30.6), EF<30% (c_2=37.6; p=0.003) and hemodynamic profile D (c_2=48.8; p=0.007).

Conclusion: Survival analyses showed that echo-directed hemodynamic profiles and BNP significantly predict outcome in HFrEF.

P4723
Estimation of right ventricular-arterial coupling can better predict acute right ventricular failure after heart transplantation than right heart catheterisation

E. Espinosa, I.M. Bluro, S. Sanchez Bustamante, R.G. Marenchino, M.L. Falconi, P.F. Oberti, C.A. Belziti. *Italian Hospital of Buenos Aires, Cardiology, Buenos Aires, Argentina*

Background: Elevated pulmonary vascular resistance (PVR) is a major risk factor for morbimortality after orthotopic heart transplantation (OHT), especially regarding acute right ventricular failure (RVF), and has been cited as a relative contraindication in guidelines.

Echocardiographic estimation of right ventricular-arterial coupling through TAPSE/PAPs ratio has demonstrated to be a good predictor of CV events in group 2 PH

Purpose: To evaluate the ability of TAPSE/PAPs ratio to predict RVF in adult patients undergoing OHT, in comparison with invasive hemodynamic evaluation

Methods: Retrospective, single-centre study. 134 patients who underwent OHT between 2012 and 2017 were identified. Those with incomplete data in medical records (eg.: no PAPs or TAPSE reported), multiple-organ transplantation, prior OHT or congenital heart disease were excluded. 74 patients were included in the analysis

Results: Population basal characteristics are described in table 1. Global 30-day mortality was 5.5% (n=4). No hemodynamic or echocardiographic variable was significantly associated with postoperative death. RVF was present in 24% of patients (n=18). Elevated pretransplant PAPs and PAPm, and low TAPSE/PAPs were all univariate significant predictors of RVF. PVR showed a near significant association with RVF (OR 1.42; 95% CI 0.97 - 2.08; p=0.071). TAPSE/PAPs ratio≤0.26 showed a sensitivity of 78% and specificity of 87%, and the best discrimination (AUC ROC 0.83). After multivariate analysis, TAPSE/PAPs was the only independent predictor of RVF.

The incidence of RVF was not significantly associated with 30-day mortality (11.1% vs. 3.6%; OR 3.39; 95% CI 0.44–25.8; p 0.24), but it was significantly associated with a longer need of inotropic support (3.5 vs. 2 days; p 0.01)

Table 1

Male sex	74%
Age (years)	54 (IQ 45–59)
Ischemic ethiology	27%
EF	0.23 (IQ 0.18–0.28)
PAPm (mmHg)	30±9
PVR (Wu)	2.9 (IQ 2.16–3.7)
PAWP (mmHg)	17±7
TAPSE (mm)	15±3
RV dysfunction	68%
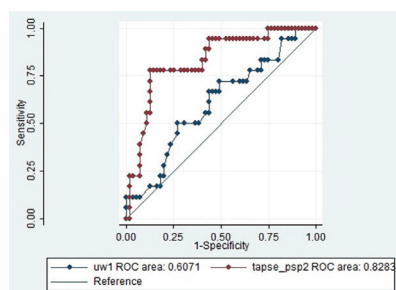
ROC curves TAPSE/PAPs vs PVR

Conclusions: TAPSE/PAPs ratio demonstrated a significantly better ability to predict RVF after OHT, when compared with hemodynamic variables obtained by right heart catheterisation

P4724
Lung ultrasound B-Lines readings by medical residents: the need of training and quality control

M.A.R. Torres[1], T.F. Texeira[1], C.C.A. Bellagamba[1], B. Iplinski[1], M.C. Scali[2], C. Carpeggiani[2], P. Colonna[2], L. Cortiggiani[2], L.C. Danzmann[1], A.I. Heidemann Junior[1], A.D. Dikic[1], Q. Ciampi[2], E. Picano[2]. *[1]Hospital de Clínicas de Porto Alegre, Porto Alegre, Brazil; [2]Institute of Clinical Physiology, CNR, Pisa, Italy*. On behalf of Stress Echocardiography 2020

Background: Lung ultrasound B-Lines (LUS) identification is presently an evolving method for identification and follow up of extravascular lung water accumulation. Although it had been increasingly used, its limitation relates to the dependency of the reading skills of the operators, necessary to levelling their report, that can impact on its diagnostic accuracy.

Purpose: We sought to determine the accuracy of an in-training group of medical residents (MDR) of various specialties that routinely use LUS everyday in bedside practice to determine presence and grading of pulmonary congestion.

Methods: Ten MDR in three University hospitals read a set of 20 video-clips of LUS of different patients. For each set they gave an answer of number of B-Lines varying from 0 (black lung, only A-Lines) to 10 (white lung, coalescent B-lines). Diagnostic reference pattern (gold standard) was considered the concordant answer of two experts in this setting and very experienced readers. The answer was considered correct if equals to gold standard ± 1 (e.g. gold-standard 5 B-lines; correct answer 4, 5 and 6). Sixty naive cardiologists qualified for B-lines reading working in 52 centers (16 countries) of a network of studies of stress echocardiography that also read the set of videos after taking an obligatory online course of 2-hours duration, also read the same set of 20-video-clips and served as the reference group for comparison of the readings of the group of MDR. Comparison between percentages of correct answers of MDR and the controls was done with t test (program WINPEPI, software version 11.65).

Results: Mean diagnostic accuracy of readings of the MDR readers (group A) and 60 quality controlled cardiologists (group B) was, respectively, 81.5% ± 0.085 and 95% ± 0.05 as compared to gold standard. Differences between mean values (group A - group B) was -13.500 (p<0.001). Another comparison, now made only between group of residents vs gold standard readings, showed that the most disagreement evidenced by higher dispersion among readers in zones with more accentuated fluid accumulation, and was smaller in regions with normal patterns of A-lines as demonstrated in balloon graph (see Figure).
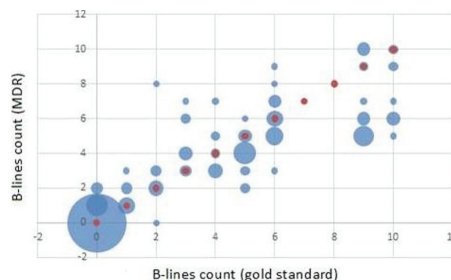
Agreement between MDR and gold-standard

Conclusion: B-line assessment is simple but a standardized training, specific certification and audit are warranted to harmonize reading criteria and optimize the potentially important clinical impact of the technique.

P4725
The additive value of left ventricular global longitudinal strain in predicting cardiac death and ventricular tachyarrhythmias in patients with heart failure and reduced ejection fraction

G.G. Galeotti[1], N.R. Pugliese[1], I. Fabiani[1], R. Citro[2], P. Colonna[3], V. Manupelli[4], F. Antonini-Canterin[5], F. Benedetto[6], F.L. Dini[1]. *[1]University of Pisa, Cardiac, Thoracic and Vascular Department, Pisa, Italy; [2]University Hospital St. John of God, Salerno, Italy; [3]University of Bari, Cardiology Department, Bari, Italy; [4]University of Foggia, Cardiology Department, Foggia, Italy; [5]Riabilitation Hospital O.R.A.S, Motta di Livenza, Italy; [6]Bianchi Melacrino Morelli Hospital (BMM), Division of cardiology, Reggio Calabria, Italy*. On behalf of ULTIMATE study group of the Italian Society of Echocardiography and Cardiovascular Imaging

Background: A reduced left ventricular (LV) ejection fraction (EF) is a known predictor of ventricular tachyarrhythmias in patients with chronic heart failure (HF), but lacks in sensitivity and specificity, potentially leading to inaccurate selection of candidates to implantable cardioverter defibrillator (ICD) in primary prevention.

Purpose: We sought to investigate whether other echocardiographic parameters beyond LV EF, including LV global longitudinal strain (GLS), are valuable in the prediction of tachyarrhythmic events and cardiac death in patients with HF with reduced EF (HFrEF).

Methods and results: We enrolled 240 outpatients (mean age 66±11 years, 78% males) with HFrEF (mean EF 32±7%). 30% of them have been previously implanted with an ICD. All patients underwent a complete echocardiographic examination including GLS assessment by analyzing standard views with 2D speckle tracking technique. The end point was a composite of cardiac death and sustained ventricular tachycardia (VT) or ventricular fibrillation (VF). During a median follow up of 39 months, 30 patients died and 26 had VT/VF. Univariate predictors of the composite end point were age, estimated glomerular filtration rate, BNP, LV EF, end-diastolic and end-systolic volume indexes, GLS and the ratio of mitral E peak velocity and averaged e' velocity (E/e') ratio. In a multivariate Cox proportional hazards model, only GLS (Hazard ratio [HR] 0.84; p=0.0004) and E/e' (HR 1.04; p=0.046) resulted to be independent predictors of outcome. Receiver operating curve analyses showed that GLS ≤ -10% was the best cut-off value for outcome prediction (AUC = 0.69, p<0.0001). At Kaplan-Maier estimates, patients with GLS ≤ -10% showed the worst event free-survival (log-rank c_2 =26.42; p<0.0001). GLS ≤ -10% significantly improved chi square (c_2 = 21.9; p=0.001)

over LV EF<30% (c2 = 13.7; p=0.05) and demographic and clinical parameters (c2 = 11.9) at incremental stepwise Cox analysis.

Conclusions: In patients with chronic HFrEF, the results of this study show that GLS was independently associated with cardiac death and ventricular tachyarrhythmias and had an incremental value over LV EF and clinical and demographic parameters.

P4726
Recognition of stage c heart failure in the community: combined assessment with six-minute walk test and echocardiography

E. Potter[1], H. Yang[2], T.H. Marwick[1]. [1]*Baker IDI Heart and Diabetes Institute, Melbourne, Australia;* [2]*Menzies Research Institute, Hobart, Australia*

Background: Heart failure (HF) therapy should be started in Stage C heart failure (SCHF), but diagnosis of SCHF is dependent on the patient's recognition of symptoms, which can be problematic in inactive elderly subjects. Six-minute walk distance (6MWD) is a simple and standardized approach to symptom assessment.

Aim: To determine whether combining functional assessment (6MWD) with echo evidence of LV dysfunction (LVD) can categorize early stage C HF (eSCHF) as evidenced by higher incident HF rate.

Methods: Asymptomatic, non-ischaemic subjects aged $\geq$65yrs with at least one HF risk factor, without a prior diagnosis or clinical signs of HF were recruited from the community and underwent 6MWD and echo. Reduced 6MWD (<443m) was based on the normal range of 6MWD in healthy individuals of this age. LVD was defined as global longitudinal strain $\leq$16%, LV hypertrophy (LVMI 109 g/m^2 in women, 132 g/m^2 in men) or E/e' >13. The combination of reduced 6MWT and LVD defined eSCHF. Participants were followed for up to 2 years (13$\pm$6 months) for incident HF.

Results: 548 subjects (age 71$\pm$5 yrs, 49% male) were included. 6MWD (mean 474$\pm$102m) was abnormal in 31%, and LVD occurred in 31%. Reduced 6MWD and LVD (eSCHF) were present in 68 (12%), who were older, and more likely to have comorbidities (Table). HF incidence for eSCHF was 25%, compared with 13% for reduced 6MWD or LVD (p=0.025) and 7.5% (p<0.001) with normal 6MWD without LVD. Cox regression showed that eSCHF had significantly higher risk of incident HF compared with normal pts (HR 3.9, 95% CI 1.8–8.5, p=0.001) and those with reduced 6MWD or LVD (HR 2.3, 95% CI 1.1–4.9, p=0.023).

Baseline clinical variables and outcome

	Normal 6MWD, no LVD (n=278)	Reduced 6MWD or LVD (n=202)	eSCHF: reduced 6MWD and LVD (n=68)	p value
Age, yrs (IQR)	69 (66–72)	71 (68–75)	73 (70–78)	<0.001
Male gender (%)	144 (51.8)	93 (46)	31 (45.6	0.39
Hypertension (%)	218 (78.4)	164 (81)	54 (79.4)	0.6
Diabetes (%)	122 (43.9)	117 (58)	44 (64.7)	0.001
BMI, kg/m^2 (IQR)	27.8 (25.2–31)	29.3 (26.4–33.2)	30.8 (26.2–36.8)	<0.001
Mobility impairment (%)	6 (2.2)	11 (5.4)	5 (7.5)	0.06
Charlson Comorbidity index (IQR)	1 (0–2)	1 (0–2)	1 (1–4)	0.005
Incident HF (%)	21 (7.6)	27 (13.4)	17 (25)	<0.001, 0.025*

*Comparison between group 2 and eSCHF. 6MWD: six minute walk distance; LVD: left ventricular dysfunction; BMI: body mass index; HF: heart failure; IQR: interquartile range.
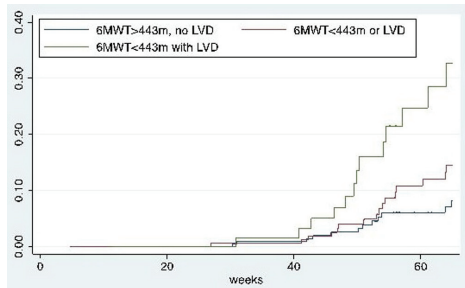
Nelson-Aalen cumulative hazard by group

Conclusion: Recognition of symptoms is unreliable in inactive elderly subjects. The combination of reduced 6MWD and LVD accounts for 12% of pts with HF risk factors, and represents a group with a high annual HF incidence.

P4727
T-wave amplitude in aVR for left ventricular dyssynchrony in patients with complete left bundle branch block

M. Shimizu[1], M. Ohmori[1], Y. Taomoto[1], T. Kaneda[1], Y. Yamakami[1], M. Iiya[1], H. Shimada[1], T. Manno[1], H. Fujii[1], M. Suzuki[1], N. Yamawake[2], H. Sakurada[3], M. Hiraoka[4]. [1]*Yokohama Minami Kyosai Hospital, Department of Cardiology, Yokohama,* [2]*Kanto Gakuin University, Yokohama,* [3]*Tokyo Metropolitan Okubo Hospital, Tokyo,* [4]*Tokyo Medical and Dental University, Tokyo, Japan*

Background: Patients with complete left bundle branch block (CLBBB) often shows left ventricular (LV) dysfunction including LV dyssynchrony. Conversely, some features of aVR on electrocardiography (ECG) were considered to indicate LV damage. However, the prognostic value of aVR for LV dyssynchrony in patients with CLBBB was not elucidated.

Purpose: To estimate T-wave amplitude in aVR lead for LV dyssynchrony in patients with CLBBB

Methods: We enrolled consecutive 93 patients who underwent ECG and gated semiconductor SPECT simultaneously. All the parameters were measured automatically (ECG: ECAPs12c Nihon-Koden). Analysys by phase histogram underwent; one cardiac cycle corresponded 360 degree, and the onset of LV contraction was displayed as histogram. 95% bandwidth of the histogram was defined as Bandwidth, and standard deviation of it was defined as Phase SD, which indicated LV dyssynchrony. The state LV dyssynchrony in this study was defined as Bandwidth over 143 degree and Phase SD over 45 degree which was reported to predict cardiac-resynchronization-therapy responder (Hannemann et al. J Nucl Med. 2007).

Results: Bandwidth and SD had weak correlation to heart rate, QRS width, and QTc. Among features of aVR lead, R wave, ST level at J point, and T-wave amplitude of aVR were correlated with Bandwidth and Phase SD, and in the parameters, the T-wave amplitude had the strongest correlation (to Bandwidth: correlation coefficient R=0.472, P=0.001, to Phase SD: R=0.505, P=0.001). Multivariate analysis showed HR and T-wave amplitude were significant and independent predictors for LV dyssynchrony (T-wave amplitude: Odds ratio=1.01, P<0.001). ROC curve analysis suggested T-wave amplitude of aVR over -80microV had high diagnostic performance for LV dyssynchrony (specificity0.617, sensitivity0.875, area under ROC=0.752).

Correlation analysis for LV dyssynchrony

	Histogram Bandwidth		Phase SD	
	R	P value	R	P value
Heart Rate	0.308	0.003*	0.331	0.001*
QRS width	0.216	0.037*	0.321	0.001*
QTc	0.304	0.003*	0.277	0.007*
R wave amplitude in aVR	-0.355	0.027*	-0.223	0.173
ST level at J-point in aVR	0.380	<0.001*	0.279	0.007*
T wave amplitude in aVR	0.472	0.001*	0.505	0.001*

R: correlation coefficient. P<0.05 was considered as significant.

Multivariate Logistic Regression Analysis for LV dyssynchrony

	Univariate			Multivariate		
	Odds ratio	95%CI	P value	Odds ratio	95%CI	P value
Age	1.00	0.96-1.05	0.841			
Male	1.15	0.46-2.87	0.765			
HR	1.05	1.01-1.08	0.004*	1.06	1.02-1.11	0.002*
QRS width	1.01	0.98-1.04	0.429			
QTc	1.01	0.99-1.03	0.075			
R wave amplitude in aVR	1.00	0.99-1.00	0.061			
ST level at J point in aVR	1.02	1.01-1.03	0.003*	1.01	0.99-1.02	0.350
T wave amplitude in aVR	1.01	1.00-1.01	<0.001*	1.01	1.00-1.01	0.002*

ECG analyzing system: ECAPS 12c (Nihon-Koden) Semiconductor SPECT system: NM530c (GE medical) 37Mbeq ^{201}Thallium Chloride was used. All parameters were measured automatically.

LV dyssynchrony was defined as both Histogram Bandwidth$\geq$145° and Phase SD $\geq$43° which was reported as a predictor of CRT.

ROC curve Analysis of T-wave Amplitude for LV dyssynchrony
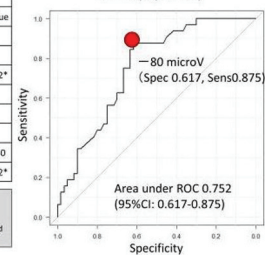
Conclusion: T-wave amplitude in aVR was a powerful predictor of LV dyssynchrony in patients with CLBBB.

P4728
Prognostic value of heart rate variability for cardiac events after discharge in patients with congestive heart failure

T. Manno[1], M. Shimizu[1], M. Ohomri[1], Y. Taomoto[1], T. Kaneda[1], Y. Yamakami[1], M. Iiya[1], H. Shimada[1], H. Fujii[1], M. Suzuki[1], N. Yamawake[1], M. Nishizaki[2], K. Hirao[3]. [1]*Yokohama Minami Kyosai Hospital, Dept. of Cardiology, Yokohama,* [2]*Odawara Cardiovascular Hospital, Dept. of Cardiology, Odawara,* [3]*Tokyo Medical and Dental University, Dept. of Cardiology, Tokyo, Japan*

Background: Patients with congestive heart failure (CHF) often had abnormalities in heart rate variability (HRV). However, the prognostic value of HRV for cardiac events after discharge was not elucidated.

Methods: We enrolled consecutive 50patients with CHF admission who underwent Holter ECG and echocardiography before discharge (67.0$\pm$14.5years,
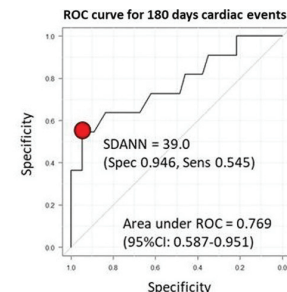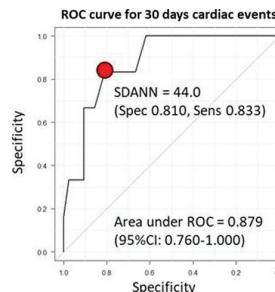

Figure 1