

## Echocardiography in heart failure patients admitted onto internal medicine wards: when? Data from the CONFINE-FADOI study

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An echocardiographic assessment is almost mandatory for in-hospital management of heart failure (HF). A low left ventricular ejection fraction (LVEF) at the first examination is a predictor of adverse outcomes during hospitalization.<sup>1,2</sup> But when is it advisable to perform echocardiography if a patient with HF is admitted to hospital, taking into account the heavy workload of an internal medicine ward?

European Guidelines recommend carrying out the examination as soon as possible after the suspected diagnosis.<sup>3</sup> Preserved systolic function HF may be diagnosed in the absence of invasive diagnostic procedures with an echography (echo) performed within 72 h. Beyond this time it is assumed that therapy may improve an acute systolic dysfunction, leading to overestimation of a preserved systolic function.<sup>4</sup> No changes can be recorded in two examinations performed with an interval of three days following an episode of acute pulmonary edema in a patient with hypertensive heart disease.<sup>5</sup>

Establishing a time limit beyond which echo was less useful in defining the cause, tailoring treatment and helping prognosis would make the clinical path unequivocally rigid and might impact the well-known difficulties of managing the complicated patients on the internal medicine wards. And actually this is the case both for those who can perform echocardiography on the ward and for those (especially true of hub hospitals) where echocardiography is carried out only by Cardiology Clinics.<sup>6,7</sup> In any case, very often the timing of the examination can not always be programmed so that sometimes the internist is forced not to request them at all. We must ultimately ask whether a promptly performed echo is equally effective in defining the type of HF, therapy and prognosis.

We have analyzed the data of the echo performed on the index day or on admission or on discharge in patients affected by HF enrolled on the CONFINE study.<sup>8</sup> Participating centers were free to make only one or multiple examinations during hospitalization according to their internal ward organization. It was not relevant whether they were performed by internists or not. LVEF was measured using Simpson's method.

Echocardiography was carried out in 827 subjects (57.1%) with a mean LVEF of  $43.1 \pm 12.3$ . A further examination (at least one) was performed in 146 patients: the first and the second mean LVEF values are reported in Table 1. A total of 973 echos in 827 patients were carried out.

In our population, the prevalent causes of HF are ischemic and hypertensive cardiac diseases. In both groups, LVEF discharge is higher than before but in those patients in whom echo was performed two or more times during their hospitalizations (at an interval of  $8.8 \pm 6.0$  days) there was no statistical difference in LVEF values (Table 2).

Our data come from a retrospective analysis of an epidemiological study on HF performed on many internal medicine wards in Italy. They are not produced by just one laboratory of echocardiography and the date of each echo could not be confirmed for every patient. On the other hand, data extrapolated from many locations may be considered independent of operator and instruments, and, therefore, a better reflection of *real world* situations. In our opinion, it was sufficient for our purpose to demonstrate that LVEF does not substantially change during hospitalization for HF. So if we measure it close to discharge we may find a higher LVEF than that measured on admission both in hypertensive and ischemic HF. One could, therefore, argue that LVEF improves during hospitalization, but if only one examination has been performed on discharge this hypothesis cannot be proved.

In those patients who had at least more than one echocardiography during their hospital stay, we found that LVEF was nearly the same and the registered differences (the last LVEF better than the former) are not statistically significant. The mean time range between the two examinations in our study is approximately eight days so the hypothesis that LVEF may improve quickly after treatment has not been fully proven, either in ischemic or in hypertensive HF etiology. There-

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**Table 1. Differences in left ventricular ejection fraction between the first and the second echo.**

First LVEF (%)	Second LVEF (%)	P
43.91±13.19	44.82±12.67	0.59 (ns)

LVEF, left ventricular ejection fraction.

**Table 2. Left ventricular ejection fraction (LVEF) at three time points (admission, index day, discharge) in hypertensive heart failure (HF) and in ischemic HF. There is a significant difference between the three time points, the best LVEF being recorded on discharge. No difference was found in those patients who had two or more echo examinations.**

	No. of echos performed	LVEF (no. of patients) mean±SD			P
		A	I	D	
<b>Ischemic HF</b>					
	1	(119) 41.9±11.9	(84) 45.6±13.5	(45) 48.3±13.0	A vs I P<0.05 A vs D P<0.001 I vs D n.s.
	2	(49) 42.2±11.7	(58) 43.8±10.8	(20) 42.9±11.6 A vs D n.s. I vs D n.s.	A vs I n.s.
	3	(14) 44.9±12.4	(12) 44.9±12.3	(11) 46.6±12.0 A vs D n.s. I vs D n.s.	A vs I n.s.
<b>Hypertensive HF</b>					
	1	(126) 41.6±12.9	(85) 46.2±12.6	(57) 50.0±12.3	A vs I P<0.01 A vs D P<0.001 I vs D n.s.
	2	(44) 42.43±14.7	(55) 42.7±12.6	(16) 40.9±11.0	A vs I n.s. A vs D n.s. I vs D n.s.
	3	(15) 44.8±11.4	(14) 46.8±12.9	(14) 47.7±12.8	A vs I n.s. A vs D n.s. I vs D n.s.

LVEF, left ventricular ejection fraction; SD, standard deviation; A, admission; I, index day; D, discharge; HF, heart failure; n.s., not significant.

fore, taking into account the suggestion made by the European Society of Cardiology, according to our data we can perform an echo without *any anxiety*, i.e. we are not obliged to perform it as close as possible to the episode that led to hospitalization. Moreover, if LVEF does not seem to change substantially, we may also extend this observation and suggest that the patient may not need a new echo every time he or she is readmitted. In other words, we may perform an echo at any moment of the hospital stay but at least one should be done in order to provide a starting point of reference for prognostic stratification.

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