



Therapeutic patient education and all-cause mortality in patients with chronic heart failure: A propensity analysis

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ABSTRACT

Background: Meta-analyses of disease management programs have shown favorable effects in chronic heart failure. Therapeutic patient education forms an integral part of these programs and may influence mortality per se. We aimed to determine the relationship between therapeutic patient education applied in routine clinical practice and long-term mortality in chronic heart failure.

Methods: From 2007 to 2010 (median follow-up: 27.2 months), heart failure patients were prospectively enrolled in a multicenter, 'real-world', French cohort by centers previously trained in therapeutic patient education. As educated and non-educated patient profiles were expected to differ, mortality was assessed using conventional multivariate analyses and analyses made on propensity-matched cohorts for the application of therapeutic patient education.

Results: Of the 3237 patients who participated in the study (67.5 years; 69.5% men), 2347 were educated (72.5%) and 890 were not educated (27.5%). Non-educated patients were older, more often female, and more severely diseased than educated patients. All-cause mortality was 17.3% in the educated group vs. 31.0% in the non-educated group (adjusted HR 0.70, 95% CI 0.58–0.84, $P < .001$). This association remained in paired groups after adjustment for all baseline covariates excluding (model 1) or including (model 2) cardiovascular medications and propensity score (HR 0.72, 95% CI 0.58–0.90, $P = .003$; HR 0.73, 95% CI 0.59–0.90, $P = .004$, respectively).

Conclusion: In chronic heart failure, therapeutic patient education by trained healthcare professionals appears associated with lower all-cause mortality. These data may have important implications in terms of healthcare organization, because they suggest that therapeutic patient education should be developed in all types of cardiology centers.

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1. Introduction

Chronic heart failure (CHF) is a frequent, severe disease that has become a major public health problem in industrialized countries [1,2]. In this context, disease management programs (DMP) appear geared to play a central role in improving delivery of care [3,4] and reducing

mortality and CHF hospitalizations, as established by meta-analyses [5,6]. As an integral part of DMP, therapeutic patient education (TPE) is a science of education specifically dedicated to patients suffering from a chronic disease, and has been well defined by the World Health Organization [7]. Developing a multi-disciplinary approach with a large multi-professional team can prove difficult, and it would appear easier and cheaper to focus on TPE dispensed by a minimal team [8,9]. Following this format, the I-CARE (Insuffisance cardiaque: éduCation théRapeutiquE) program was developed in France to promote the establishment of TPE units in all types of cardiology centers, based on a voluntary approach by the medical team [8]. However, while the value of TPE has been recognized in most industrialized countries [4,10–12] and is

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¹ The ODIN cohort participants are listed in the Appendix A.

recommended in European guidelines [13], there is little evidence that TPE per se in routine practice impacts survival in CHF.

We used data from a large, prospective, multicenter French cohort of CHF patients (ODIN: Observatoire De l'Insuffisance cardiaque) enrolled in I-CARE centers trained in TPE for CHF to assess whether TPE applied in routine practice is associated with an effect on long-term survival.

2. Methods

2.1. Selection of centers and study patients

Centers had to have fulfilled the requirements for participation in the I-CARE program [14]. Briefly, at least one permanent cardiologist and one paramedic, usually a nurse involved primarily in CHF management, at each center had to attend a comprehensive 32-hour TPE training program conducted over 2 2-day periods and given by specialists in TPE. An optional additional 1-day immersion course was offered in centers already practicing TPE. Training was completed for 110 centers in 2007 and for more than 220 in 2010. Among the first 110 trained centers throughout France, 61 (55.5%) volunteered to contribute patients to the ODIN cohort. With the exception of 7 rehabilitation centers and 5 CHF networks, all participating sites (32 general hospitals, 14 university hospitals, 3 private clinics) developed outpatient educational programs in their departments of clinical cardiology for short-stay hospitalizations.

Patients were enrolled prospectively between 2007 and 2010; during this period the therapeutic guidelines for CHF remained largely stable [13]. Enrollment in the study was consecutive. To increase the external validity, exclusion criteria were purposely kept to

a minimum: patients were excluded only if they attended sites not participating in the I-CARE program or if they declined to participate.

2.2. Usual care and TPE protocols

'Usual care' consisted of care management according to European guidelines [13]. Medical therapy was adjusted as judged necessary by the investigator.

'Educated' patients were those that completed a full TPE program [14] in addition to receiving usual care. A complete program usually consisted of 3 to 5 sessions lasting between 1 and 2 h each. Sessions could be performed as collective workshops or as individual teaching units, using the specifically dedicated I-CARE educational tools [15]. During these sessions, various topics could be discussed, including knowledge of CHF, warning signs, diet, levels of physical activity, practical considerations for daily life, and medical therapies. The program should imperatively start with a comprehensive interview with the patient in order to determine an educational diagnosis, to fully understand the patient and their life conditions, and to define the educational objectives. Needing to be adapted to each patient according to the educational diagnosis, all programs could differ in terms of content and duration.

'Non-educated' patients were those managed by usual care only. Some patients might have received simple educational information without including an education diagnosis, and were included in the non-educated group.

2.3. Data collection

The investigation conforms to the principles outlined in the Declaration of Helsinki. The study was approved by the *Commission Nationale Informatique et Liberté* (CNIL) – as required by French law for any patient cohort study in France – and the institutional

Table 1
Baseline socio-demographic characteristics of the overall population (ODIN cohort) and by TPE before and after PS matching (model 1).^a

Characteristics	Overall population (n = 3237)	Before PS match		P value	After PS match (model 1)		P value
		TPE (n = 2347)	No TPE (n = 890)		TPE (n = 825)	No TPE (n = 825)	
Age, mean (SD), year	67.6 (14.2)	65.9 (13.6)	72.0 (14.6)	<.001	71.2 (12.5)	71.0 (14.5)	.71
Women	989/3237 (30.6)	658/2347 (28.0)	331/890 (37.2)	<.001	303/825 (36.7)	291/825 (35.3)	.54
Matrimonial status				<.001			.83
Single	338/3133 (10.8)	245/2279 (10.8)	93/854 (10.9)		94/789 (11.9)	87/791 (11.0)	
Couple	1990/3133 (63.5)	1477/2279 (64.7)	516/854 (64.4)		479/789 (60.7)	491/791 (62.1)	
Divorced/widowed	805/3133 (25.7)	560/2279 (24.6)	245/854 (28.7)		216/789 (27.4)	213/791 (27.0)	
First language French	2816/3132 (89.9)	2064/2276 (90.7)	752/856 (87.9)	.02	691/792 (87.2)	694/792 (87.6)	.82
Place of residence				.10			.87
Town	1707/2952 (57.8)	1264/2152 (58.7)	443/800 (55.4)		413/739 (55.9)	424/753 (56.3)	
Country	1245/2952 (42.2)	888/2152 (41.3)	357/800 (44.6)		326/739 (44.1)	329/753 (43.7)	
Home				<.001			.88
House	1702/2526 (67.4)	1290/1901 (67.9)	412/625 (65.9)		417/608 (68.6)	402/593 (67.8)	
Apartment	779/2526 (30.8)	595/1901 (31.3)	184/625 (29.4)		177/608 (29.1)	179/593 (30.2)	
Institution	45/2526 (1.8)	16/1901 (0.8)	29/625 (4.6)		14/608 (2.3)	12/593 (2.0)	
Level of education				.002			.36
Elementary	989/2679 (36.9)	678/1950 (34.8)	311/729 (42.7)		304/664 (45.8)	281/678 (41.4)	
Professional certificate	1102/2679 (41.1)	826/1950 (42.4)	276/729 (37.9)		229/664 (34.5)	261/678 (38.5)	
Graduate	269/2679 (10.0)	206/1950 (10.6)	63/729 (8.6)		53/664 (8.0)	59/678 (8.7)	
Post-graduate	319/2679 (11.9)	240/1950 (12.3)	79/729 (10.8)		78/664 (11.7)	77/678 (11.4)	
Causes of heart failure							
Ischemic	1497/3209 (46.7)	1114/2330 (47.8)	383/879 (43.6)	.03	373/816 (45.7)	363/816 (44.5)	.62
Hypertensive	479/3209 (14.9)	314/2330 (13.5)	165/879 (18.8)	<.001	134/816 (16.4)	142/816 (17.4)	.60
Valvular	445/3209 (13.9)	308/2330 (13.2)	137/879 (15.6)	.09	142/816 (17.4)	125/816 (15.3)	.26
Idiopathic	796/3209 (24.8)	592/2330 (25.4)	204/879 (23.2)	.20	195/816 (23.9)	194/816 (23.8)	.95
Hypertrophic	87/3209 (2.7)	70/2330 (3.0)	17/879 (1.9)	.10	31/816 (3.8)	15/816 (1.8)	.02
Preserved EF	93/3209 (2.9)	47/2330 (2.0)	46/879 (5.2)	<.001	21/816 (2.6)	38/816 (4.7)	.02
Duration of heart failure history				<.001			.95
0–1 year	1148/2867 (40.0)	888/2100 (42.2)	260/767 (33.9)		237/708 (33.5)	249/710 (35.0)	
1–<2 year	408/2867 (14.2)	298/2100 (14.2)	110/767 (14.3)		97/708 (13.7)	99/710 (13.9)	
2–<5 year	635/2867 (22.1)	458/2100 (21.8)	177/767 (23.1)		177/708 (25.0)	162/710 (22.8)	
≥5 year	676/2867 (23.6)	456/2100 (21.7)	220/767 (28.7)		197/708 (27.8)	200/710 (28.2)	
Number of hospitalizations during the previous year							
Mean (SD)	0.77 (1.05)	0.77 (1.03)	0.79 (1.11)	.76	0.83 (1.09)	0.80 (1.12)	.66
0	1191/2418 (49.3)						
1 or 2	1090/2418 (45.1)						
>2	136/2418 (5.6)						
Number of associated conditions				.001			.45
Mean (SD)	1.83 (1.38)	1.77 (1.36)	1.99 (1.43)		1.92 (1.34)	1.98 (1.44)	
0	315/2496 (12.6)						
1 or 2	1524/2496 (61.1)						
3 or 4	567/2496 (22.7)						
>4	90/2496 (3.6)						

Abbreviations: EF, ejection fraction; PS, propensity score; SD, standard deviation; TPE, therapeutic patient education.

Empty cells correspond to the non-comparison of patient distribution for variables divided in some groups for Cox multivariate analyses.

^a Data are presented as No./No. (%) unless otherwise specified.

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