Patient and caregiver education levels and readmission and mortality rates of congestive heart failure patients

Osama Elkhateeb [1] and Khaled Salem [1]

[1]Cardiac Rehabilitation and Heart Failure Programs, King Abdullah Medical City, Makkah, Saudi Arabia (Correspondence to: K. Salem: cardio1@live.ca).

Abstract

Background: Despite evidence that effective family support improves health behaviour and outcomes, the nature of the correlation between congestive heart failure (CHF) outcome and caregiver contribution has not been well studied.

Aim: This single centre pilot study aimed to determine epidemiological correlations between education level and hospital readmission and mortality rates of CHF patients in a nonwestern country population.

Methods: The study was performed in King Abdullah Medical City, Makkah, Saudi Arabia from February 2015 to February 2016, and included 167 consecutive patients enrolled in a CHF management registry. Data on the education levels of patients and their caregivers were collected, and patient outcomes in high education level (HEL) and low education level (LEL) groups were compared.

Results: Of 167 patients, 101 completed 12 months of follow-up. The mean age was 58 (13.4) years and 80% were men; 87% were Saudi nationals. The HEL group comprised 42 (42%) patients. There were no significant differences in the mortality (3 vs 2%) or readmission rate (18 vs 19%) between the LEL and HEL patients, and 29.6% of LEL patients had caregivers with an LEL.

Conclusion: The education levels of CHF patients and caregivers were not correlated with readmission or mortality rates.

Keywords: caregivers, congestive heart failure, education level, hospital admission, mortality

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Introduction

In 1955, Thomas McKeown, a British physician, was probably the first author to use the term social determinants of health (SDOHs) to describe the correlation of favourable living conditions with improvement of life expectancy (*1,2*). The SODH concept attracted global attention after Marc Lalonde, the Canadian Minister of National Health and Welfare, released his 1974 report that identified 4 major public health components: lifestyle, environment, genetics and healthcare system. The term SDOH achieved additional recognition in 2005, when the World Health Organization formed the "causes of the causes" population health improvement commission (*3–7*).

Education level, employment status, housing, minority status and income level are major social determinants that correlate with individual and overall population health outcomes. People with high education levels (HELs) are expected to have high levels of literacy and understanding, increased ability to afford adequate health insurance plans, more involvement in their own health decision-making, and increased ability to use community resources to affect their lifestyle positively compared with those with low education levels (LELs). LELs have been linked to poor individual health outcomes of parents and their children (*8–10*).

In developed countries, LELs have strong correlations with increased risk and prevalence of cardiovascular disease, decreased HDL levels in women, and increased cardiovascular morbidity and mortality and total cholesterol levels, hypertension and smoking prevalence (*11,12*). However, little is known about how education level correlates with health outcomes in nonwestern countries. This study evaluated the epidemiological correlation of education level of patients and their caregivers and readmission and mortality rates of congestive heart failure (CHF) patients.

Despite the availability of strong evidence that effective family support improves health behaviour and outcomes (*13*), the nature of the correlation between CHF outcome and caregiver contribution has not been well studied. One recent study described a gradient of patient capability or willingness for self-care and the extent of caregiver contribution. The smaller the contribution of patient self-management, the more involved the caregiver becomes (*14*). A survey of 439 diabetes patients with CHF found an inverse relation between education and family support. A higher education level (i.e., above high school) was associated with less support, particularly for female patients (*15*).

The theoretical basis of our CHF health promotion programme is derived from information processing theory and Bandura's social learning theory. The information-processing model of memory has 5 phases

(*16*). The attention stage (phase 1) includes external stimuli such as our educational booklet for the patient to read at home. The processing and short-term memory stages (phases 2 and 3) involve listening to the educator providing information in a noninteractive way. The patient retention span is < 30 seconds. During the long-term memory stage (phase 4), the educator uses methods to promote memorization, such as the teach-back technique, that helps patients reach phase 5, which consists of translating what was externally provided and memorized into self-management skills. It is through this action phase that patients master self-management skills. The application of this theory may be challenged in phases 2–4 by the health literacy level of patients. Patient motivation and caregiver willingness during the action phase are key for regular, daily monitoring of dry weight, recognizing symptoms, identifying warning signs, being able to use a diuretic sliding scale at home, and knowing when and who to ask for help. Bandura's social learning theory, published in 1977, claims that learning is a social process that does not require direct education methods. It contends that people learn and that their behaviour is reinforced through observation of role models in the surrounding environment (*16,17*).

We aimed to use the data from this single centre pilot study to discuss the correlation between patient level of education and its interaction with the caregiver's level of education, and cardiac readmission and mortality outcomes of CHF patients.

Methods

We retrospectively reviewed the data of 101 prospectively enrolled, consecutive patients in a CHF disease management programme registry. The King Abdullah Medical City–heart failure registry is an observational single-centre prospective registry of hospitalized patients with CHF. Patients were hospitalized with increased brain natriuretic peptide levels, evidence of pulmonary congestion upon chest X-ray, ejection fraction of < 40% on echocardiography, and New York Heart Association (NYHA) class II–IV symptoms. Table 1 shows a summary of the baseline characteristics.

No specific interventions were conducted, but all patients received the standard level of care and were treated as inpatients or outpatients by a multidisciplinary CHF team. The patients were followed for a minimum of 12 months. Missing data, particularly on at-home mortality and caregiver education level were collected during the annual routine follow-up telephone interview. Data analysis began with the initial hospital admission as the starting point of our retrospective review. The end points were hospital readmission, mortality or completion of 1-year follow-up. Data analysis targeted patient and caregiver education levels and one or more re-hospitalization and mortality rates. Patients with ≤ 11 years of education were included in the low education level (LEL) group, and they were compared with patients in a high education level (HEL) group with > 11 years of education.

Table 1 Baseline and follow-up characteristics of congestive heart failure patients

Patients	(*n* = 101)
Gender, male (%)	80
Age (SD), yr	58 (13)
Nationality, Saudi (%)	87
Mortality (%)	3
Patients, HEL (%)	42
Caregivers, HEL (%)	74
Ejection fraction (SD)	23 (9.4)
Mortality score (SD)	37 (6.9)
Readmission score (SD)	25 (4.3)
CRTD (%)	18
Atrial fibrillation (%)	7
Education booklet given (%)	48
Medications (%)	
Furosemide	87
β-Blockers	89
ACEI/ARB	68
Hydralazine	18.8
Nitrates	32
Spironolactone	59
Digoxin	6
Readmission (%)	19
1 readmission	10
2 readmissions	3
3 readmissions	6
Length of stay (SD), d	8 (5.8)

ACEI = angiotensin converting enzyme inhibitor; ARB = angiotensin receptor blocker; CRTD = cardiac resynchronisation therapy defibrillator; HEL = high education level; SD = standard deviation.

Statistical analysis described the general demographic and clinical characteristics. Continuous variables were expressed as means (standard deviation; SD) and were compared using the 2-sample *t* test. Categorical variables were expressed as percentages and 95% confidence intervals (CIs) and were compared using χ^2 tests. $P < 0.05$ was considered to be statistically significant.

Results

Of the 167 patients in the CHF registry, 101 completed the 12 months of follow-up. The mean age of the patients was 58 (*13*) years, 80% were men and 87% were Saudi nationals (Table 1). The HEL group comprised only 42% of the patients and had an overall mortality rate of 2.9% (n = 3; 95% CI: 0–8%) and readmission rate of 18.8% (n = 19; 95% CI: 11–27%).

The patients in the HEL group were younger than those in the LEL group [52 (13) vs 61 (12) years; P ≤ 0.001), and 80% of the women versus 53% of the men were in the LEL group. There were no significant differences in mortality (3 vs 2%) or readmission (18 vs 19%) rates between the LEL and HEL groups (Table 2). More automatic implantable cardioverter defibrillators and cardiac resynchronization therapy defibrillators were implanted in HEL patients, but the difference was not significant between the 2 groups of patients (15 vs 24%, respectively P = 0.3). Among the caregivers, 74% had an HEL, but 22% had no formal education. Six (6%) patients had no live-in caregiver, and the caregivers of 29.6% of the patients in the LEL group also had an LEL. An education booklet, which is included in the CHF health management programme, was given to only 37% of the LEL patients and to 64% of those in the HEL group (P = 0.007).

Discussion

This study indicated that there was no correlation between the level of education and study outcomes of CHF mortality and readmission rates. The results are in line with a recent study in which the level of education was not a determinant of efficient self-care management, whereas other socioeconomic factors, such as unemployment and the presence of a caregiver were (18), and with another study in which increased knowledge was not necessarily associated with improved engagement in self-care (19).

The lack of positive correlation between patient education level and CHF readmission and mortality outcome in this pilot Middle Eastern study gives rise to 3 hypotheses. (1) The lack of correlation was due to the combined effect of decreased level of education of both patients and caregivers. In our study, both patients and caregivers in 30% of the households had an LEL. This family-related barrier may have impeded the achievement of efficient self-management adherence. (2) The lack of correlation was due to the possible inefficiency of the traditional standardized and noncustomized patient education and health promotion methodology. The health education methodology was not tailored to align with the patient or the caregiver level of education, or preferences. In our study, caregivers were to attend 1-hour face-to-face didactic education sessions and to be given a copy of a CHF educational booklet. However, this therapeutic educational technique was hampered by the fact that 38% of the patients and 16% of the caregivers had no formal education. (3) The lack of correlation is a CHF disease-specific phenomenon that requires further research.

Table 2 Characteristics of patients and caregivers with HEL and LEL

	HEL (n = 42)	LEL (n = 59)	P
Gender, male (%)	91	73	0.03
Age (SD), yr	52 (13)	61 (12)	< 0.001
Nationality, Saudi (%)	88	87	0.7
Mortality (%)	2	3	
Caregivers, HEL (%)	82	70.4	0.2
Ejection fraction (SD)	23 (8)	23 (10)	0.9
Mortality score (SD)	36 (6)	38 (8)	0.2
Readmission score (SD)	25 (3)	25 (8)	0.4
AICD/CRTD (%)	24	15	0.3
Atrial fibrillation (%)	10	5	0.4
Education booklet given (%)	64	37	0.007
Medications (%)			
Furosemide	81	92	0.1
β-Blockers	91	88	0.7
ACEI/ARB	60	75	0.1
Hydralazine	21	17	0.5
Nitrates	31	32	0.8
Spironolactone	64	55	0.3
Digoxin	10	3	0.2
Readmission (%)	19	18	0.95
1 readmission	4	6	
2 readmissions	1	2	
3 readmissions	3	3	
Heart function clinic attendance (22%)	(24%)	13 (21%)	0.75
Length of stay (SD), d	9 ± 6	8 ± 6	0.4

ACEI = angiotensin-converting enzyme inhibitor; AICD = automatic implantable cardioverter defibrillator; ARB = angiotensin receptor blocker; CRTD = cardiac resynchronisation therapy defibrillator; HEL = high education level; LEL = low education level; SD = standard deviation.

Based on the finding of this study, we suggest the following policy recommendations: (1) encourage innovation in the educational techniques development field, and target patients and caregivers with HEL and LEL; (2) provide healthcare workers with the skills to measure patient and caregiver literacy levels and tailor the CHF programme to match patient needs; (3) continue to engage actively caregivers and family members; (4) invest in and allocate resources for individualized, rather than standardized, health education and promotion research initiatives; and (5) support the implementation of multidisciplinary CHF structured programmes that help identify the characteristics of caregivers, assess their needs, allocate programme resources, train counsellors, and provide psychological and financial support and clear direction to caregivers throughout the journey with their loved ones.

This prospective study evaluated the impact of education level on heart failure outcomes in a previously unstudied population in a nonwestern society. This is one of the few studies to look at healthcare determinants in the Middle East and is probably the first to include CHF patients. We evaluated the impact of the education level of patients and caregivers on healthcare processes and outcomes. The small study sample recruited at a single centre made it difficult to interpret the results or to allow a multivariate analysis of other SDOHs, such as employment, housing, income and environmental safety. In addition, we did not use validated health literacy questionnaires or psychometric measurements and did not study the possible influence of other SDOHs, such as employment, income or housing. Patient choice or the unavailability of printed copies resulted in fewer patients in the LEL than in the HEL group receiving the educational booklet, which may have affected the overall discussion of the optimum health education programme for our CHF patients and their caregivers. Looking at the study through a different lens, it could serve as a pilot study, and a call for action to allocate resources for larger SDOH-oriented multicentre randomized controlled studies in the Middle East.

In conclusion, neither patient nor caregiver education level was significantly associated with hospital readmission nor mortality rates in this series of CHF patients. Caregiver education level may represent a barrier to the CHF health promotion strategy. The size of the patient and caregiver populations with an LEL warrants development of targeted CHF education programmes.

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Niveaux d'éducation des patients et des aidants et taux de réadmission et de mortalité chez les patients atteints d'insuffisance cardiaque congestive

Résumé

Contexte : Malgré les éléments indiquant qu'un soutien familial efficace contribue à l'amélioration du comportement et des résultats sanitaires, la nature de la corrélation entre l'issue de l'insuffisance cardiaque congestive (ICC) et la contribution des aidants n'as pas été bien étudiée.

Objectif : La présente étude pilote unicentrique avait pour objectif de déterminer des corrélations épidémiologiques entre le niveau d'éducation d'une part, et d'autre part les taux de réadmission en soins hospitaliers et de mortalité chez les patients atteints d'ICC au sein d'une population de pays non occidentaux.

Méthodes : L'étude a été menée à l'hôpital King Abdullah Medical City, à La Mecque en Arabie saoudite, de février 2015 à février 2016 ; 167 patients ont été consécutivement inclus dans un registre de prise en charge de l'ICC. Des données concernant le niveau d'éducation des patients et de leurs aidants ont été recueillies et les résultats ont été comparés pour les patients du groupe de niveau d'éducation élevé et ceux du groupe de niveau d'éducation faible.

Résultats : Sur les 167 patients, 101 ont terminé la période de suivi de 12 mois. L'âge moyen était de 58 (13,4) ans et 80 % des patients étaient des hommes ; 87 % étaient des ressortissants saoudiens. Le groupe de niveau d'éducation élevé était composé de 42 (42 %) patients. Aucune différence significative n'a été constatée dans le taux de mortalité (3 % contre 2 %) ou de réadmission (18 % contre 19 %) entre les patients de niveau d'éducation faible et élevé respectivement, et 29,6 % des patients de niveau d'éducation faible avaient des aidants du même groupe.

Conclusion : Aucune corrélation n'a été observée entre le niveau d'éducation des patients atteints d'ICC et celui de leurs aidants et les taux de réadmission ou de mortalité.

مستويات تعليم المرضى ومقدّمي الرعاية الصحية ومعدلات إعادة إدخال مرضى فشل القلب الاحتقاني إلى المستشفى

أسامة الخطيب، خالد سالم

الخلاصة

الخلفية: على الرغم من البراهين على أن الدعم الأسري الفعال يُحسِّن السلوكيات والحصائل الصحية، فإن طبيعة الارتباط بين الحصيلة الخاصة بفشل القلب الاحتقاني ومساهمة مُقدِّمي الرعاية لم تخضع لدراسة وافية.

الهدف: تهدف هذه الدراسة التجريبية التي أجراها مركز وحيد إلى تحديد أوجه الارتباط الوبائي بين مستوى التعليم وإعادة إدخال مرضى فشل القلب الاحتقاني إلى المستشفيات ومعدلات الوفيات في صفوفهم في بلد من غير البلدان الغربية.

طرق البحث: أُجريت هذه الدراسة في مدينة الملك عبد الله الطبية بمكة، المملكة العربية السعودية، في الفترة من فبراير/ شباط ٢٠١٥ حتى فبراير/ شباط ٢٠١٦، وشملت ١٦٧ مريضاً متعاقباً مسجّلين في السجل العلاجي لمرضى فشل القلب الاحتقاني. وتم جمع البيانات المتعلقة بمستويات تعليم المرضى ومقدمي الرعاية لهم، ومقارنة نتائج علاج المرضى المدرجين في مجموعتي ذوي المستوى التعليمي المرتفع وذوي المستوى التعليمي المنخفض.

النتائج: من أصل ١٦٧ مريض، استكمل ١٠١ مريض المتابعة لمدة ١٢ شهراً. وبلغ متوسط العمر ٥٨ عاماً (١٣,٤) رجال (٨٠٪) من المواطنين السعوديين (٨٧٪). وتألفت مجموعة ذوي المستوى التعليمي المنخفض من ٤٢ مريضاً (٤٢٪). ولم تُسجل أي اختلافات كبيرة بين مرضى المجموعتين في معدل الوفيات (٣٪ مقابل ٢٪) أو معدل إعادة الإدخال إلى المستشفى(١٨٪ مقابل ١٩٪) على التوالي، وبلغت نسبة المرضى ذوي المستوى التعليمي المنخفض الذين تلقوا الرعاية على يد مقدمي رعاية ذوي مستوى تعليمي منخفض ٢٩,٦٪.

الاستنتاج: لم يسجّل ارتباط بين المستويات التعليمية لمرضى فشل القلب الاحتقاني ومقدمي الرعاية لهم وبين معدلات إعادة إدخالهم إلى المستشفيات أو معدلات الوفيات في صفوفهم.

References

1. Bynum B. The McKeown thesis. The Lancet. 2008 Feb 23;371(9613):644–5. PMID:18300375
2. Harris B. Public health, nutrition, and the decline of mortality: the McKeown Thesis revisited. Soc Hist Med. 2004 Dec 1;17(3):379–407.
3. Glouberman S, Millar J. Evolution of the determinants of health, health policy, and health information systems in Canada. Am J Public Health. 2003 Mar;93(3):388–92. http://dx.doi.org/10.2105/AJPH.93.3.388 PMID:12604478
4. Lalonde M. A new perspective on the health of Canadians: a working document. Ottawa: Government of Canada; 1974 (http://www.phac-aspc.gc.ca/ph-sp/pdf/perspect-eng.pdf, accessed 12 December 2017).
5. Marmot M. Social determinants of health inequalities. Lancet. 2005 Mar 19–25;365(9464):1099–104. http://dx.doi.org/10.1016/S0140-6736(05)74234-3 PMID:15781105
6. Marmot M, Allen J, Bell R, Bloomer E, Goldblatt P; Consortium for the European Review of Social Determinants of Health and the Health Divide. WHO European review of social determinants of health and the health divide. Lancet. 2012 Sep 15;380(9846):1011–29. http://dx.doi.org/10.1016/S0140-6736(12)61228-8 PMID:22964159
7. Baum F, Harris E. Equity and the social determinants of health. Health Promot J Austr. 2006 Dec;17(3):163–5. PMID:17176226
8. Mikkonen J, Raphael D. Social determinants of health: the Canadian facts. Toronto: York University School of Health Policy and Management; 2010 (http://thecanadianfacts.org/the_canadian_facts.pdf, accessed 12 Decvember 2017).
9. Reducing risks, promoting healthy life. Geneva: World Health Organization; 2002 (http://www.who.int/whr/2002/en/, accessed 12 December 2017).
10. Desai S, Alva S. Maternal education and child health: is there a strong causal relationship? Demography. 1998 Feb;35(1):71–81. http://dx.doi.org/10.2307/3004028 PMID:9512911
11. Winkleby MA, Jatulis DE, Frank E, Fortmann SP. Socioeconomic status and health: how education, income, and occupation contribute to risk factors for cardiovascular disease. Am J Public Health. 1992 Jun;82(6):816–20. http://dx.doi.org/10.2105/AJPH.82.6.816 PMID:1585961
12. Liu K, Cedres LB, Stamler J, Dyer A, Stamler R, Nanas S, et al. Relationship of education to major risk factors and death from coronary heart disease, cardiovascular diseases and all causes, Findings of three Chicago epidemiologic studies. Circulation. 1982 Dec;66(6):1308–14. http://dx.doi.org/10.1161/01.CIR.66.6.1308 PMID:6814786
13. Luttik ML, Jaarsma T, Moser D, Sanderman R, van Veldhuisen DJ. The importance and impact of social support on outcomes in patients with heart failure: an overview of the literature. J Cardiovasc Nurs. 2005 May–Jun;20(3):162–9. http://dx.doi.org/10.1097/00005082-200505000-00007 PMID:15870586
14. Lee CS, Vellone E, Lyons KS, Cocchieri A, Bidwell JT, D'Agostino F, et al. Patterns and predictors of patient and caregiver engage-

ment in heart failure care: a multi-level dyadic study. Int J Nurs Stud. 2015 Feb;52(2):588–97. http://dx.doi.org/10.1016/j.ijnurstu.2014.11.005 PMID:25468283

15. Rosland AM, Heisler M, Choi HJ, Silveira MJ, Piette JD. Family influences on self-management among functionally independent adults with diabetes or heart failure: do family members hinder as much as they help? Chronic Illn. 2010 Mar;6(1):22–33. http://dx.doi.org/10.1177/1742395309354608 PMID:20308348
16. Braungart MM, Braungart RG, Gramet PR. Applying learning theories to healthcare practice In: Bastable SB, Gramet P, Jacobs K, Sopczyk DL, editors. Health professional as educator. Principles of teaching and learning. Jones & Bartlett Learning; 2007: 51–90.
17. Bandura A. Social learning theory. Englewood Cliffs, NJ: Prentice-Hall; 1977.
18. Cocchieri A, Riegel B, D'Agostino F, Rocco G, Fida R, Alvaro R, et al. Describing self-care in Italian adults with heart failure and identifying determinants of poor self-care. Eur J Cardiovasc Nurs. 2015 Apr;14(2):126–36. http://dx.doi.org/10.1177/1474515113518443 PMID:24366984
19. Clark AM, Freydberg CN, McAlister FA, Tsuyuki RT, Armstrong PW, Strain LA. Patient and informal caregivers' knowledge of heart failure: necessary but insufficient for effective self-care. Eur J Heart Fail. 2009 Jun;11(6):617–21. http://dx.doi.org/10.1093/eurjhf/hfp058 PMID:19414477