Title of Article:

Effects of the characteristics of teaching on the outcomes of heart failure patient education interventions: A systematic review

Abstract

Background: Limited research has examined the specific approach, mode of delivery, and dose of educational interventions. Yet such knowledge is essential to develop effective heart failure educational interventions. **Aims and Methods:** The intent of this systematic review was to determine what approach, mode, and dose is most effective in producing changes in heart failure patient education. The sample included 69 studies involving 1865 study participants. **Results:** Findings indicate the most effective means for delivery heart failure patient education is through the individualization of content, the use of combined mediums for delivery, provision of education on a one-on-one basis, and in multiple sessions. **Conclusion:** These results highlight the need to redesign current heart failure patient education initiatives to enhance patient outcomes.

Keywords: systematic review, patient education, heart failure, discharge teaching

1. Introduction

Heart failure affects 2 to 4 % of the population internationally (1). In 2005, 7.6 deaths directly linked to heart failure were reported annually across the globe. The incidence of heart failure is increasing annually (2). Currently, there are more than 5.7 million individuals who are diagnosed with heart failure on an annual basis. Of those diagnosed, approximately half will require aggressive treatment and frequent hospitalizations, especially in the end-stage of the disease process (3, 4). As the number of individuals affected with heart failure continues to spiral, there have been dramatic increases in its associated health care costs. Health care expenditures for the treatment of this illness continues to double annually for inpatient care (5).

Heart failure patient education is an essential component of nursing care aimed at assisting patients diagnosed with heart failure to take care of themselves (6). The education provides patients with the information required to understand their condition; to prevent and manage symptoms; and to decrease hospital readmission and morbidity and mortality rates (6). Results of individual and meta-analytic studies supported the effectiveness of heart failure patient education in reducing costs as reflected in decreased hospital stays (7, 8, 9) and improving knowledge of self-care (10), self-care behaviour performance (11, 12), and symptom experience (13). While these findings demonstrated the effects of heart failure patient education on the intended outcomes, they fall short of elucidating the specific approach, mode of delivery, and dose of educational interventions

that are associated with desired outcomes. Knowledge of the most effective educational intervention with respect to approach, mode of delivery, and dose is required to guide nursing practice. Such knowledge will direct the design and implementation of education in day-to-day practice, in the most effective and efficient way (14).

This systematic review was conducted to address the clinically relevant question: What approach, mode, and dose is most effective in producing changes in heart failure patient education?. The specific objectives were: 1) to describe the approach to education, mode of delivery, and dose used in providing heart failure patient education; and 2) to explore the extent to which variability in outcome achievement is associated with differences in the elements of educational interventions. The target population included adult patients diagnosed with heart failure.

2. Conceptual definition

In this section, the variables of interest to the systematic review are defined at the conceptual level. These definitions guided the specification of criteria for selecting the studies and facilitated data extraction. They were derived from theories and models relevant to patient education and self-care. The variables are categorized into elements of heart failure educational interventions and outcomes of education.

2.1. Elements of heart failure educational interventions

Heart failure patient education refers to the communication of information about the management of heart failure. The goals of heart failure patient education are to ensure that the individual has the appropriate knowledge required to perform self-care behaviours in the home environment; to reduce the occurrence of heart failure symptoms and complications; and to enhance recovery and overall quality of life (15). In general,

heart failure patient education covers topics related to: medication management, activity performance, nutrition, signs and symptoms of complications, and pain management (16, 17).

The elements of heart failure educational interventions include the approach to education, mode of delivery, and dose. Conceptually, approach to education involves the general strategy for communicating the information to patients. Education can be given in two approaches: standardized and tailored or individualized. Standardized heart failure education encompasses the provision of information pertaining to a pre-selected set of topics determined by nurses to be of relevance to heart failure self-management. The nurse discusses all topics with the patient. Individualized heart failure education consists of providing information on topics selected by the patient. The nurse discusses the topics that patients deem to be relevant to their specific health situation (18). Mode of delivery encompasses the medium and format for giving heart failure patient education. Medium is the process through which education is delivered, and includes: 1) contact with the health care professional through face-to-face or phone interaction; 2) written resources available as brochure or pamphlet, or on-line; and 3) audio-visual materials in the form of audiotape or videotape (18). Format refers to how the education is offered, that is, one-on-one or group discussion (18). Dose is defined as the level at which an intervention is given (14). It is operationalized in terms of the number of sessions during which education is provided.

2.2. Outcomes of education

Three outcomes of education are of interest to this systematic review: self-care knowledge, self-care behaviour, and symptom experience. These outcomes represent the

anticipated consequences of education as advanced in models of patient education (18) and self-care (19), and investigated in several studies (17, 20).

Self-care knowledge is defined as a body of facts and principles that is learned through life experience, or is taught. Knowledge is enhanced through educational interventions, and is made visible immediately through cognitive indicators such as recall of information (18). Heart failure patient education focuses on self-care knowledge, which refers to information about the condition and its treatment and about strategies for managing the condition and preventing complications. Self-care knowledge is operationalized as the correct identification of self-care information pertaining to fluid and food intake, activity performance, management of drug therapies, and recognition and response to signs and symptoms indicative of heart failure complications.

Self-care behaviours refer to the performance of self-care strategies to promote the management of heart failure (21). The self-care strategies include: management of fluid intake, nutrition and symptoms; engagement in personal hygiene and usual physical activity; taking medications as prescribed; and monitoring the development of and managing heart failure complications such as difficulty breathing and fluid overload.

Symptoms are "subjective experiences reflecting changes in a person's bio-psychosocial function, sensation, or cognition" (13). Symptoms that are commonly experienced during heart failure include pain, dizziness, difficulty breathing, nausea, edema, sleep disturbances, and mood alterations (13). Heart failure symptom experience is operationalized as the perceived severity of any of these subjective experiences.

3. Methods

3.1. Design

A systematic review of studies that evaluated the effectiveness of heart failure patient education was conducted to address the two objectives. The definitions of the variables of interest guided the specification of key terms used to search databases, the specification of criteria for selecting studies, and the extraction of pertinent data. Effect sizes were computed for each category of outcomes and when pertinent data were reported, and compared across elements of heart failure educational interventions.

3.2. Selection criteria

Studies were included in the systematic review if they met the following selection criteria: 1) the sample represented adult (≥ 18 years) patients diagnoses with heart failure; 2) the educational intervention involved the provision of self-care information related to heart failure; 3) the outcomes assessed were related to self-care knowledge, self-care behaviour, and/or symptom experience; and 4) the study report was published in English between 1986 and 2008. Studies that used experimental or randomized clinical trial (RCT) and quasi-experimental designs involving two groups were included in the systematic review. Results of meta-analyses showed that the effect sizes of experimental and quasi-experimental studies are comparable (22).

3.3. Search strategies

The search for relevant studies used the following databases: CINAHL, MEDLINE, PUBMED, EMBASE, COCHRANE, and HEALTH STAR. The keywords used in the search were: discharge plan, heart failure, heart failure management, education, teaching, heart failure education, and heart failure teaching. Searches were limited to adult population, English language, and 1986-2008 periods. Reference lists of studies retrieved were examined for additional studies that investigated heart failure

education. A total of 578 articles published between 1986 and 2008 were found to have addressed heart failure patient education . Of these, 509 articles were excluded because 1) the reported study evaluated psycho-educational heart failure interventions (12.8 %), or 2) described heart failure educational frameworks or policies guiding practice (87.2 %). A total of 69 studies met the selection criteria and were included in the systematic review (7-12, 15-17, 20, 23-83).

3.4. Data extraction

Data were extracted on study characteristics, elements of educational intervention, and outcomes of education. The definitions presented earlier guided the development of a coding scheme to facilitate data extraction from each article and to assign numeric values to the extracted data.

3.4.1. Study characteristics

The following information was gathered about each study: year of publication, country in which the study was done, study design (quasi-experimental and experimental), sample size (total, and for each study group), number and type of study groups (control or comparison and treatment or two treatment groups), and patient population included. These data were used for descriptive purposes.

3.4.2. Elements of educational intervention

Approach to education was categorized as standardized or individualized. Information on approach to education was obtained from the sections describing the nature of the intervention and/or the procedure for delivering it. Interventions that consisted of handing patients written resources, having patients watch a videotape or listen to an audiotape, and discussing with patients, a pre-selected set of topics, were

categorized as standardized education. In these studies all patients reviewed the same content on heart failure self-care. Interventions that addressed individual patients' learning needs, either through discussion with health care professional or computer-assisted instructions, were considered as individualized education.

The medium for giving heart failure education was coded as face-to-face contact with health care professionals, phone contact with health care professional, distribution of written resources (such as brochure, pamphlet, booklet) for patients to review on their own, and combination of different media for giving education (such as phone contact with health care professional, and distribution of written resources).

The format for delivering education was coded as 1) individual, involving one person at a time, on a one-to-one basis which could take place when interacting with the nurses, or when the patient reviews written and audio-visual materials, and 2) group, involving several persons interacting with the health care professional or watching a videotape.

The dose was indicated by the total number of sessions for giving education and categorized into: one session versus two or more sessions.

3.4.3. Outcomes of education

The specific outcomes of interest, that is, self-care knowledge, self-care behaviour, and symptom experience were assessed with self-report measures capturing 1) the percentage of correct responses to items inquiring about patients' understanding of heart failure and management, 2) performance of strategies in which patients are expected to engage in, and 3) perceived symptom severity, respectively. For each of these outcomes, the following data were extracted: 1) whether or not post-test comparisons

showed statistically significant differences between the study groups. These data were coded into 0 = no significant differences and 1 = significant differences 2) the mean and standard deviation reported for each study variable at the first post-test. These data were used to compute the post-test effect size for each outcome investigated in individual studies.

4. Data analysis

Descriptive statistics were used to 1) delineate the characteristics of the studies included in this systematic review, 2) describe the characteristics of patients comprising the sample selected across studies, and 3) indicate elements of educational intervention frequently implemented across studies (objective 1). For the outcomes of interest, the effect size was computed by subtracting the mean of the control or comparison group from the mean of the experimental group and dividing the difference by the standard deviation of the comparison group (22). Due to the small number of studies that provided the data required to compute the effect size, it was not appropriate to use inferential statistics to explore differences in outcomes in relation to elements of educational interventions (objective 2). Therefore, results pertaining to objective 2 are presented in terms of the number of studies showing statistically significant between-group differences and the mean effect size on the respective outcomes.

5. Results

5.1. Study characteristics

The 69 studies that met the inclusion criteria involved 1865 participants. The studies were conducted in the United States (77.2 %), Canada (4.5 %), United Kingdom (9.2 %), and Asia (9.1 %). More than half (68.2 %) of the studies used an experimental

design to evaluate the effectiveness of heart failure educational interventions, while 31.8 % of the studies used a quasi-experimental design. Most studies (90.9 %) contained one experimental and one control group, while the remainder of the studies used one treatment group.

5.2. Elements of educational interventions

Table 1 presents descriptive statistics regarding the number of studies included according to intervention elements and outcomes. All reports that used standardized only (n = 45, 65.2 %), individualized only (n = 24, 34.8 %), and combined (standardized and individualized) (n = 8, 11.6 %) elements contained a usual care component that consisted of standardized teaching. A combined mode of delivery that included face-to-face contact with a health care professional, phone contact, and the distribution of written resources was used by 26 (37.7 %) studies. Delivery of educational interventions through face-to-face contact with a health care professional was used by 37 (53.6 %) studies, while 43 (62.3 %) used written resources. All (100 %) studies were delivered on an individual basis. Twenty-eight (40.5 %) studies contained interventions that were provided in more than one session, while 41 (59.5 %).

5.3. Characteristics of the participants

In 89.1 % of the studies, the sample consisted of patients $\geq$ 50 years and in 10.9 % of the studies, patients who were < 50 years comprised the sample. For 73.0 % of the studies, the sample was mainly males. In 94.5 % of the studies, the sample had less than or equal to high school education.

5.4. Outcome achievement relative to intervention elements

Table 2 presents statistics related to the number of studies that provided data necessary to compute post-test effect size and the mean (range) effect size for each outcome. The results are summarized for each educational intervention element.

In regards to approach to education, statistically significant differences between the comparison and experimental group in post-test self-care knowledge were reported in 50 % of the studies involving individualized and 39.1 % involving standardized educational interventions. The mean effect size for self-care knowledge was larger for individualized than standardized education. When the outcome was self-care behaviour performance no studies using individualized teaching reported a significant difference in the study groups. Whereas half (50 %) of studies involving standardized teaching, a significant difference was found between the study groups relating to self-care behavior however the mean effect size was small. Finally, statistically significant differences between the comparison and experimental group in post-test symptom experience were reported in one of the two studies involving individualized and 100 % of the studies involving standardized educational interventions. The mean effect size for symptom experience was larger for individualized than standardized education.

Relating to medium, statistically significant differences between the comparison and experimental group in post-test self-care knowledge were reported in 70 % of the studies involving the use of combined media and 51.8 % involving interventions delivered in writing. The mean effect size for the delivery of educational materials using combined media was larger than materials provided in writing. As well, statistically significant differences between the comparison and experimental group in the performance of post-test self-care behaviours were reported in all of the studies involving

the use of combined media and 25 % involving interventions delivered in writing. The mean effect size for the delivery of educational materials using combined media was larger than for materials provided in writing. Finally, statistically significant differences between the comparison and experimental group in post-test symptom experience were reported in 20 % of the studies involving the use of combined media with a moderate mean effect size. None of the studies using written material demonstrated differences in symptom experience between the groups.

With regards to mode of delivery format, there were no studies that described group delivery of patient education information. Of studies using a one-on-one delivery format, 18 (48.6 %) reported a statistically significant difference between comparison and experimental group in post-test self-care knowledge and the mean effect size was moderate. As well, 6 (27.2 %) studies identified a statistically significant difference between comparison and experimental group in the performance of post-test self-care behaviours although the mean effect was small. Finally, 5 (50 %) studies reported a statistically significant difference between comparison and experimental groups on symptom experience with a moderate mean effect size for the delivery of educational materials on a one-to-one basis. A statistically significant difference between the comparison and experimental group in post-test self-care knowledge was reported in 62.5 % of the studies in which the education was delivered in more than one session and 50 % of the studies in which the education was provided in a single session. The mean effect size for self-care knowledge was larger for education delivered in more than one session than education provided in a single dose. Additionally, statistically significant differences between the comparison and experimental group in the performance of post-test self-care

behaviours were reported in all of the studies in which the education was delivered in more than one session and 47.0 % of the studies in which the education was provided in a single session. The mean effect size for the delivery of educational materials using combined media was larger than face-to-face contact with a health care professional. As well, statistically significant differences between the comparison and experimental group in post-test symptom experience were reported in all of the studies involving the delivery of the intervention in more than one session and the mean effect size was moderate. No studies in which the education was delivered at one point in time reported statistically significant differences between the comparison and experimental groups.

6. Discussion

The results of this systematic review showed larger effect sizes for heart failure patient education in which the content was individualized, and given using a combination of media on an individual basis, and in more than one session. These features of educational intervention were beneficial in that they produced moderate improvement in self-care knowledge and performance of self-care behaviour, and decline in the number of post-operative symptoms experienced. These findings are consistent with those of studies conducted by Guruge (1999) and Suls and Wan (1992) who examined pre-operative patient education. Thus, the results reinforce theoretical assumptions (18) for the individualization of educational content, use of multiple means for delivering education, provision of education on an individual basis, and in multiple sessions.

Furthermore, the use of multiple media is consistent with Suls and Wan's (1992) who found that education provided in both written and audiovisual format was most effective in producing changes in patient's knowledge and behaviour performance.

Examples of multiple media include: contact with a health care provider through face-to-face or phone; written materials such as brochures and pamphlets; and audiovisual (e.g. watch a videotape or listen to audiotape) (18).

It is also worth noting that group work was shown to be less effective in heart failure patients than one-on-one interaction, yet it is still the usual method of delivery (86). This could be due to health care institutions imposing a less resource intense option on practitioners.

7. Implications

The findings suggest that nurses could reconsider the redesign of their education initiatives to include individualized educational interventions, use of multiple media, and the delivery of teaching on a one-on-one basis. That is the educational content could be individualized to reflect the learning needs of the individual at a particular point in time. The first step in the process of individualization involves the evaluation of learning needs and delivery of education should be provided in multiple doses over a period of time to enhance the patient's overall knowledge, performance of specific behaviours, and reduce symptoms experienced during the post-operative recovery period. Furthermore, nurses could begin to think about presenting their educational content using multiple modalities to enhance patients' knowledge and performance of behaviours post-operatively, as well to reduce symptoms experienced during the recovery period. Use of multiple modalities enhances the likelihood for retention, recall, and application (18). That is, the education could potentially be presented in written format in combination with audio and/or video accompaniment to further enhance knowledge, behaviour performance, and health related

outcomes. Finally, nurse, specifically unit managers, could begin to think about ways in which to promote the delivery of teaching in a one-on-one format.

References

[1] World Health Organization Fact sheet N°317. (February 2007). Retrieved June 9, 2009, from http://www.who.int/mediacentre/factsheets/fs317/en/print.html.

[2] World Health Organization: Disease incidence, prevalence and disability. (n. d.). Retrieved June 9, 2009, from http://www.who.int/healthinfo/global_burden_disease/GBD_report_2004update_part3.pdf.

[3] Bentkover JD, Stewart EJ, Ignaszewski A, Lepage S, Liu P, Cooper J. New technologies and potential cost savings related to morbidity and mortality reduction in Class III/IV heart failure patients in Canada. *International Journal of Cardiology* 2003; 88:33-41.

[4] Austin J, Williams WR, Hutchison S. Multidisciplinary management of elderly patients with chronic heart failure: Five year outcome measures in death and survivor groups. *European Journal of Cardiovascular Nursing* 2009; 8: 34-39.

[5] Study Group on Heart Failure Awareness and Perception in Europe. (n. d.). Retrieved June 9, 2009, from http://www.heartfailure-europe.com/index1.php?item=153.

[6] Tsuyuki RT, Shibata MC, Nilsson C, Hervas-Malo M. Contemporary burden of illness of congestive heart failure in Canada. *Canadian Journal of Cardiology* 2003; 19: 436-438.

[7] Stewart S, Horowitz JD. Home-based intervention in congestive heart failure: Long-term implications on readmission and survival. *Circulation 2002; 105:* 2861-2866.

[8] Stewart S, Pearson S, Horowitz JD. Effects of a home-based intervention among patients with congestive heart failure discharged from acute hospital care. *Archives of Internal Medicine* 1998; 158: 1087-1072.

[9] Stewart S, Vandenbroek AJ, Pearson S, Horowitz JD. Prolonged beneficial effects of a home-based intervention on unplanned readmissions and mortality among patients with congestive heart failure. *Archives of Internal Medicine* 1995; 159: 257-261.

[10] Jaarsma T, Halfens R, Tan F, AbuSaad HH, Dracup K, Diederiks J. Issues in cardiac care. Self-care and quality of life in patients with advanced heart failure: The effect of a supportive educational intervention. *Heart & Lung* 2002; 29: 319-330.

[11] Simons WR, Haim M, Rizzo J, Zannad F. Effect of improved disease management strategies on hospital length of stay in the treatment of congestive heart failure. *Clinical Therapeutics* 1996; 18: 726-746.

[12] Riegel B, Carlson B, Kopp Z, LePetri B, Glaser D, Unger A. Effect of a standardized nurse case-management telephone intervention on resource use in patients with chronic heart failure. *Archives of Internal Medicine* 2002; 162: 705-712.

[13] Reynolds MAH. Post-surgical pain management discharge teaching -- a pilot study... 35th annual communicating nursing research Conference/16th annual WIN assembly, "health disparities: Meeting the challenge," held april 18-20, 2002, palm springs, California. *Communicating nursing research, 35,* 360 2001.

[14] Sidani S, Braden CJ. *Evaluating nursing interventions: A theory-driven approach.* Sage Publications, 1998.

[15] Meyers K, LaederachHofmann K. Effects of a comprehensive rehabilitation program on quality of life in patients with chronic heart failure. *Progress in Cardiovascular Nursing* 2003; 18: 169-176.

[16] Anderson C, Deepak BV, Amoateng-Adjepong Y, Zarich S.. Benefits of comprehensive inpatient education and discharge planning combined with outpatient support in elderly patients with congestive heart failure. *Congestive Heart Failure* 2005; 11: 315-321.

[17] Caldwell Peters KJ, Dracup KA. A simplified education program improves knowledge, self-care behavior, and disease severity in heart failure patients in rural settings. *American Heart Journal* 2005; 150: 983.

[18] Redman N. *The Practice of Patient Education*. St. Louis: Mosby, 2001.

[19] Orem DE. *Nursing: Concepts of Practice.* (5th Ed.). St. Louis: Mosby, 2001.

[20] Gonzalez B, Lupon J, Herreros J, Urrutia A, Altimir S, Coll R, Prats M, Valle V. Patient's education by nurse: What we really do achieve? *European Journal of Cardiovascular Nursing* 2005; 4: 107-111.

[21] Pomeranz JL, Shaw LR. International classification of functioning, disability and health: a model for life care planners. *Journal of Life Care Planning* 2007; 6: 15-24.

[22] Burns N, Grove S. *Understanding Nursing Research*, 5th edition. Toronto: Saunders, 2005.

[23] Belardinelli R, Georgiou D, Cianci G, Purcaro A.. Randomized, controlled trial of long-term moderate exercise training in chronic heart failure: Effects on functional capacity, quality of life, and clinical outcome. *Circulation* 1999; 99: 1173-1182.

[24] Belardinelli R, Georgiou D, Scocco V, Barstow T J, Purcaro A. Low intensity exercise training in patients with chronic heart failure. *Journal of the American College of Cardiology* 1995; 26: 975-982.

[25] Bennett SJ, Hays LM, Embree JL, Arnould M. Heart messages: A tailored message intervention for improving heart failure outcomes. *Journal of Cardiovascular Nursing* 2000; 14: 94-105.

[26] Bennett SJ, Litzelman DK, Wright A, Perkins SM, Wu J, Meyer L, Vaughn M. The PUMP UP tailored computerized program for heart failure care. *Nursing Outlook* 2006; 54: 39-45.

[27] Blue L, Lang E, McMurray JJV, Davie AP, McDonagh TA, Murdoch DR, Petrie MC, Connolly E, Norrie J, Round CE, Ford I, Morrison CE. Randomized controlled trial of specialist nurse intervention in heart failure. *British Medical Journal* 1995; 323: 715-718.

[28] Chang B, Hendricks A, Zhao Y, Rothendler JA, LoCastro JS, Slawsky MT. A relaxation response randomized trial on patients with chronic heart failure. *Journal of Cardiopulmonary Rehabilitation and Prevention*, 2005; 25: 149-157.

[29] Chang BH, Hendricks AM, Slawsky MT, LoCastro JS. Patient recruitment to a randomized clinical trial of behavioral therapy for chronic heart failure. *BMC Medical Research Methodology* 2004; 4: 8.

[30] Cline CM, Israelsson BY, Willenheimer RB, Broms K, Erhardt LR. Cost effective management programme for heart failure reduces hospitalisation. *Heart*, 1989; 80: 442-446.

[31] Dahl J, Penque S. The effects of an advanced practice nurse-directed heart failure program. *Nurse Practitioner: American Journal of Primary Health Care* 2005; 25: 61-62, 65-66, 68.

[32] DeBusk RF, Miller NH, Parker KM, Bandura A, Kraemer HC, Cher DJ, West JA, Folwer MB, Greenwald G. Improving patient care. Care management for low-risk patients with heart failure: A randomized, controlled trial. *Annals of Internal Medicine* 2004; 141: 606-613, 658.

[33] Delgado DH, Costigan J, Wu R, Ross H J. An interactive Internet site for the management of patients with congestive heart failure. *The Canadian Journal of Cardiology* 2003; 19: 1381-1385.

[34] DeWalt DA, Pignone M, Malone R, Rawls C, Kosnar MC, George G, Bryant B, Rotham RL, Ange1 B. Development and pilot testing of a disease management program for low literacy patients with heart failure. *Patient Education and Counseling* 2004; 55: 78-86.

[35] Duncan K, Pozehl B. Effects of an exercise adherence intervention on outcomes in patients with heart failure. *Rehabilitation Nursing* 2003; 28: 117-122.

[36] Dykes PC, Acevedo K, Boldrighini J, Boucher C, Frumento K, Gray P, Hall D, Smith L, Swallow A, Yarhoni A, Bakken, S. Clinical practice guideline adherence before and after implementation of the HEARTFELT (HEART Failure Effectiveness & Leadership Team) intervention. *Journal of Cardiovascular Nursing* 2005; 20: 306-314.

[37] Flynn KJ, Powell LH, Mendes de Leon CF, Munoz R, Eaton CB, Downs DL, Silver MA, Calvin JE. Increasing self-management skills in heart failure patients: A pilot study. *Congestive Heart Failure* 2005; 11: 297-302.

[38] Gary R. Exercise self-efficacy in older women with diastolic heart failure: Results of a walking program and education intervention. *Journal of Gerontological Nursing* 2006; 32: 31-39.

[39] Gary RA, Sueta CA, Dougherty M, Rosenberg B, Cheek D, Preisser J, Neelon V, McMurray R. Home-based exercise improves functional performance and quality of life in women with diastolic heart failure. *Heart & Lung* 2004; 33: 210-218.

[40] Hanumanthu S, Butler J, Chomsky D, Davis S, Wilson JR.. Effect of a heart failure program on hospitalization frequency and exercise tolerance. *Circulation* 1997; 96: 2842-2848.

[41] Harrison MB, Browne GB, Roberts J, Tugwell P, Gafni A, Graham ID. Quality of life of individuals with heart failure: A randomized trial of the effectiveness of two models of hospital-to-home transition. *Medical Care* 2002; 40: 271-282.

[42] Harrison MB, Toman C, Logan J. Hospital to home: evidence-based education for CHF. *Canadian Nurse* 1998; 94: 36-42.

[43] Hershberger RE, Ni H, Nauman DJ, Burgess D, Toy W, Wise K, Dutton D, Crispell K, Vossler M, Everett J. Prospective evaluation of an outpatient heart failure management program. *Journal of Cardiac Failure* 2001; 7: 64-74.

[44] Hodgen RK, Ferguson D, Davis C, White A. Congestive heart failure: Examining the influence of nurse case management on health care outcomes. *Care Management* 2002; 8: 16-18, 20-22.

[45] Karlsson MR, Edner M, Henriksson P, Mejhert M, Persson H, Grut M, Billing E. A nurse-based management program in heart failure patients affects females and persons with cognitive dysfunction most. *Patient Education and Counseling* 2005; 58: 146-153.

[46] Kasper EK, Gerstenblith G, Hefter G, Van Anden E, Brinker JA, Thiemann DR, Terrin M, Forman S, Gottlieb SH. A randomized trial of the efficacy of multidisciplinary

care in heart failure outpatients at high risk of hospital readmission. *Journal of the American College of Cardiology* 2002; 39: 471-480.

[47] Kavanagh T, Myers MG, Baigrie RS, Mertens DJ, Sawyer P, Shephard RJ. Quality of life and cardiorespiratory function in chronic heart failure: effects of 12 months' aerobic training. *Heart* 1996; 76: 42-49.

[48] Koelling T M, Johnson ML, Cody RJ, Aaronson KD. Discharge education improves clinical outcomes in patients with chronic heart failure. *Circulation* 2005; 111: 179-185.

[49] Krumholz HM, Amatruda J, Smith GL, Mattera JA, Roumanis SA, Radford MJ, Crombie P, Vaccarino V. Randomized trial of an education and support intervention to prevent readmission of patients with heart failure. *Journal of the American College of Cardiology* 2002; 39: 83-89.

[50] Krumholz HM, Wang Y, Parent EM, Mockalis J, Petrillo M, Radford MJ. Quality of care for elderly patients hospitalized with heart failure. *Archives of Internal Medicine* 2002; 157: 2242-2247.

[51] Kutzleb J, Reiner D. The impact of nurse-directed patient education on quality of life and functional capacity in people with heart failure. *Journal of the American Academy of Nurse Practitioners* 2006; 18: 116-123.

[52] LaFramboise LM, Todero CM, Zimmerman L, Agrawal S.. Comparison of HEALTH BUDDY with traditional approaches to heart failure management. *Family & Community Health* 2003; 26: 275-288.

[53] Laramee AS, Levinsky SK, Sargent J, Ross R, Callas P. Case management in a heterogeneous congestive heart failure population: A randomized controlled trial. *Archives of Internal Medicine* 2003; 163: 809-817.

[54] Linne AB, Liedholm H. Effects of an interactive CD-program on 6 months readmission rate in patients with heart failure - A randomised, controlled trial. *BMC Cardiovascular Disorders* 2006; 6: 30.

[55] Linne AB, Liedholm H, Israelsson B. Effects of systematic education on heart failure patients' knowledge after 6 months: A randomised, controlled trial. *European Journal of Heart Failure* 1999; 1: 219-227.

[56] Martensson J, Stromberg A, Dahlstrom U, Karlsson JE, Fridlund B. Patients with heart failure in primary health care: Effects of a nurse-led intervention on health-related quality of life and depression. *European Journal of Heart Failure: Journal of the Working Group on Heart Failure of the European Society of Cardiology* 2005; 7: 393-403.

[57] Miche E, Herrmann G, Wirtz U, Laki H, Barth M, Radzewitz A. Effects of education, self-care instruction and physical exercise on patients with chronic heart failure. *Zeitschrift für Kardiologie* 2003; 92: 985-993.

[58] Morrow DG, Weiner M, Young J, Steinley D, Deer M, Murray MD. Improving medication knowledge among older adults with heart failure: A patient-centered approach to instruction design. *Gerontologist* 2005; 545-552.

[59] Murray MD, Young JM, Morrow DG, Weiner M, Tu W, Hoke SC, Clark DO, Stroupe KT, Wu J, Deer MM, Bruner-England TE, Sowinski KM, Smith FE, Oldridge NB, Gradus-Pizlo I, Murray LL, Brater DC, WeinbergerM. Methodology of an ongoing, randomized, controlled trial to improve drug use for elderly patients with chronic heart failure. *American Journal Geriatric Pharmacotherapy* 2004; 3-65.

[60] Naylor MD, Brooten D, Campbell R, Jacobsen BS, Mezey MD, Pauly MV, Schwartz JS. Comprehensive discharge planning and home follow-up of hospitalized elders: a randomized clinical trial. *The Journal of the American Medical Association* 1998; 28: 613-620.

[61] Oka RK, De Marco T, Haskell WL, Botvinick E, Dae MW, Bolen K, Chatterjee K. Impact of a home-based walking and resistance training program on quality of life in patients with heart failure. *The American Journal of Cardiology* 2000; 85: 365-369.

[62] Paul, S. (2000). Impact of a nurse-managed heart failure clinic: A pilot study. *American Journal of Critical Care*, *9*(2), 140-146.

[63] Piepoli MF, Villani GQ, Aschieri D, Bennati S, Groppi F, Pisati MS, Rosi A, Capucci A. Multidisciplinary and multisetting team management programme in heart failure patients affects hospitalisation and costing. *International Journal of Cardiology* 2006; 111: 377-385.

[64] Quinn C. Low-technology heart failure care in home health: Improving patient outcomes. *Home Healthcare Nurse* 2006; 24: 533-540.

[65] Rauh RA, Schwabauer NJ, Enger EL, Moran JF. A community hospital-based congestive heart failure program: Impact on length of stay, admission and readmission rates, and cost. *The American Journal of Managed Care* 1999; 5: 37-43.

[66] Riegel B, Dickson VV, Hoke L, McMahon JP, Reis BF, Sayers S. A motivational counseling approach to improving heart failure self-care: mechanisms of effectiveness. *Journal of Cardiovascular Nursing* 2006; 21: 232-241.

[67] Roglieri JL, Futterman R, McDonough KL, Malya G, Karwath KR, Bowman D, Skelly J, Warburton SW. Disease management interventions to improve outcomes in congestive heart failure. *The American Journal of Managed Care* 1997; 3: 1831-1839.

[68] Schneider J, Hornberger S, Booker J, Davis A, Kralicek R. A medication discharge planning program. *Clinical Nursing Research* 1993; 2: 41-53.

[69] Schofield, RS, Kline SE, Schmalfuss CM, Carver HM, Aranda JM, Pauly DF, Hill JA, Neugaard BI, Chumbler NR. Early outcomes of a care coordination-enhanced telehome care program for elderly veterans with chronic heart failure. *Telemed. J. E. Health* 2005; 11: 20-27.

[70] Schwabauer NJ. Retarding progression of heart failure: Nursing actions. *Dimensions of Critical Care Nursing* 1996; 15: 307-317.

[71] Scott LD, SetterKline K, Britton AS. The effects of nursing interventions to enhance mental health and quality of life among individuals with heart failure. *Applied Nursing Research* 2004; 17: 248-256.

[72] Shah NB, Der E, Ruggerio C, Heidenreich PA, Massie BM. Prevention of hospitalizations for heart failure with an interactive home monitoring program. *American Heart Journal* 1998; 135: 373-378.

[73] Shively M, Kodiath M, Smith TL, Kelly A, Bone P, Fetterly L, Gardetto N, Shabetai R, Bozzette S, Dracup K. Effect of behavioral management on quality of life in mild heart failure: A randomized controlled trial. *Patient Education and Counseling* 2005; 58: 27-34.

[74] Stewart S, Marley JE, Horowitz JD. Effects of a multidisciplinary, home-based intervention on planned readmissions and survival among patients with chronic congestive heart failure: A randomised controlled study. *The Lancet* 1999; 354: 1077-1083.

[75] Smith B, Forkner E, Zaslow B, Krasuski RA, Stajduhar K, Kwan M, Ellis R, Galbreath AD, Freeman GL. Disease management produces limited quality-of-life improvements in patients with congestive heart failure: Evidence from a randomized trial in community-dwelling patients. *The American Journal of Managed Care* 2005; 11: 701-713.

[76] Smith CE, Koehler J, Moore JM, Blanchard E, Ellerbeck E. Testing videotape education for heart failure. *Clinical Nursing Research* 2005; 14: 191-205.

[77] Todero CM, LaFramboise LM, Zimmerman LM. Symptom status and quality-of-life outcomes of home-based disease management program for heart failure patients. *Outcomes Management* 2002; 6: 161-168.

[78] Topp R, Tucker D, Weber C. Effect of a clinical case manager/clinical nurse specialist on patients hospitalized with congestive heart failure. *Nursing Case Management* 1998; 3: 140-145.

[79] Vaccaro J, Cherry J, Harper A, O'Connell, M. Utilization reduction, cost savings, and return on investment for the PacifiCare Chronic Heart Failure Program, "Taking Charge of Your Heart Health". *Disease Management* 2001, 4: 131-138.

[80] Varma S, McElnay JC, Hughes CM, Passmore AP, Varma M. Pharmaceutical care of patients with congestive heart failure: interventions and outcomes. *Pharmacotherapy* 1999; 19: 860-869.

[81] West JA, Miller NH, Parker KM, Senneca D, Ghandour G, Clark M, Greenwald G, Heller RS, Fowler MB, DeBusker RF. A comprehensive management system for heart failure improves clinical outcomes and reduces medical resource utilization. *The American Journal of Cardiology* 1997; 79: 58-63.

[82] Wheeler EC, Waterhouse JK. Telephone interventions by nursing students: Improving outcomes for heart failure patients in the community. *Journal of Community Health Nursing* 2006; 23: 137-146.

[83] Zwisler AD, Schou L, Soja AM, Bronnum-Hansen H, Gluud C, Iversen L, Sigurd B, Madsen M, Fischer-Hansen J, DANREHAB group. A randomized clinical trial of hospital-based, comprehensive cardiac rehabilitation versus usual care for patients with congestive heart failure, ischemic heart disease, or high risk of ischemic heart disease

(the DANREHAB trial)--design, intervention, and population. *American Heart Journal* 2005; 150: 899.

[84] Guruge, S. The effects of demographic outcomes on pre-operative teaching outcomes. MSc Thesis: University of Toronto, 1999.

[85] Suls J, Wan CK. Effects of sensory and procedural information on coping with stressful medical procedures and pain: a meta-analysis. *Journal of Consulting and Clinical Psychology* 1989; 57: 372-379.

[86] Ribelin P, Neufelder L. Congestive heart failure education study. *Journal for Nurses in Staff Development* 2006 22: 124-8.

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