

The Impact of Clinical Pathway for Congestive Heart Failure Patients on their Length of Hospital Stay and Limb Edema

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Abstract

Background: After quite a long time, heart failure (HF) turns into a typical cardiovascular condition whose occurrence and predominance are increasing. Being a typical cause for urgent hospital admission, it is a noteworthy reason for morbidity and mortality for the patients. **The aim of the study:** to determine the impact of clinical pathway for congestive heart failure patients on their Length of hospital stay and Limb edema. **Subjects & methods:** **Research design:** A quasi-experimental research design was utilized in this study. **Setting:** Cardiology department and Outpatient clinic of cardiology at Sohag Cardiac and Hepatic institution. **Subjects:** A convenient sample of 68 patients with CHF divided to equal group (34 patients each). **Tools of data collections:** Three tools were used for data collection Congestive Heart Failure Patient Assessment, Clinical Pathway Protocol and Congestive Heart Failure Patient Variance Sheet. **Results:** The study supported as a good improvement in complains of study group and decrease in length of hospital stay as compared with control group. **Conclusion:** Patient with congestive heart failure exposed for several complications. Improving care and practice can favorable affect the incidence of these complications. **Recommendation:** Apply clinical pathway for patients with CHF rather than the traditional care with the aid of established guidelines of care and illustrated patient education handout, providing comprehensive education and training for nurses who care for CHF patients lays the foundation for quality care.

Key Words: Congestive Heart Failure, limb edema, clinical pathway, length of hospital stay, nurses.

Introduction

Heart failure (HF) is a noteworthy health problem worldwide associated with a high prevalence, mortality rate and hospital costs. It is estimated that about 5.7 million individuals are burdened by CHF in the United States ⁽¹⁾ and in Europe roughly 5% of all acute medical admissions are HF-related. ⁽²⁾ American Heart Association was reported that the cost of HF care is two times higher than that of breast cancer, and three times higher contrasted to costs of colorectal also lymphoma malignancy care in the USA.⁽³⁾

Heart failure (HF) is characterized by frequent hospital admissions and prolonged length of stay. These hospital admissions contribute to the significant and increasing resource utilization associated with HF, costing approximately 1.5% of the annual healthcare budget of most Western countries. ⁽¹⁾

Congestive heart failure is one of the most important causes of peripheral edema seen in clinical practice. Edema in congestive heart failure is the result of the activation of a series of humoral and neuro-

humoral mechanisms that promote sodium and water re-absorption by the kidneys and expansion of the extracellular fluid. ⁽²⁾ Longer length of hospital stay may expose patients to greater risk of nosocomial infections, venous thromboembolism, sleep deprivation, and de-conditioning, which could all contribute to an increased risk of readmission. Longer length of hospital stay (LOS) may also simply be a marker of 'high-risk' patients who, by definition, are at heightened risk of readmission. ⁽⁴⁾

Clinical Pathway (CP) is a multipart intervention for the mutual decision making and organization of care processes planned for a well-defined group of patients throughout a well-defined period. CPs is also known as integrated care pathways, critical pathways, care plans, care pathways, care maps moreover care protocols. ⁽⁵⁾

Clinical Pathway boast curved into a popular tool to improve quality of health-care services provided to HF patients by reducing the risks of mortality and readmission prompting shorter length of stay and lower costs. Every hospital incorporated in CPs utilizes the similar protocol in practice. ⁽⁶⁾ The aim of a clinical pathway is to improve the quality of care, over the continuum, by enhancing patient outcomes, promoting patient safety, increasing patient satisfaction, and optimizing the utilization of resources. ⁽⁷⁾

In the present health care system, providing quality of care while maintaining cost-effectiveness is an ever-growing battle that institutions face. The nurse role is central to use of clinical pathways as a means of improving patient outcomes. Clinical pathways must be developed, implemented, and evaluated utilizing validated methods including the use of best practice standards. ⁽⁸⁾

Significant of the study:

In Egypt around 1, 5 million individuals have CHF and yearly incidence around 111,937 new cases diagnosed with CHF, additionally WHO reported that 23% of recorded deaths were confirmed to heart failure in Egypt in 2014. ⁽⁹⁾ This study was the first study in this location handling this topic to help those patients.

Aim of the study:

To determine the impact of clinical pathway for congestive heart failure patients on their Length of hospital stay and Limb edema.

Research Questions:

- Does clinical pathway shorter length of hospital stay in patients with congestive heart failure than those who are undergoing hospital routine care?
- Does clinical pathway decrease level of limb edema in patients with congestive heart failure than those who are undergoing hospital routine care?

Subjects and Method

Research design:

A quasi- experimental design was utilized to meet the aim of the present study.

Study setting:

The study was conducted, in Cardiology department and Outpatient clinic of cardiology at Sohag Cardiac and Hepatic institution.

Study subjects:

Convenience sample of 68 adult patients with congestive heart failure. They were sequentially recruited equally into 2 separated age matched groups; control and study group (34 patients). Who fulfilled the following inclusion criteria:

- Primary admitting diagnosis is Congestive Heart Failure.
- Class II and Class III of Congestive Heart Failure according to New

York Heart Association Classification.

- Age: above 20 years.
- Able to communicate.
- Emotional stable, have not psychiatric disorder.

Tools of data collection: Three tools were used for data collection.

• **Tool 1: Congestive Heart Failure Patient Assessment:**

developed by the researcher based on recent literature review, included five parts:

Part I: Socio demographic data: it includes; age, sex, residence, phone number, level of education, marital status and occupation.

Part II: Patient medical data: it includes; associated medical diseases, date of admission & discharge, degree of CHF, health habits, causes, signs and symptoms of CHF; finally patient medications

Part III: Physical assessment: it includes; weight, height, body mass index (BMI), abdominal girth, Vital signs, Hepatojugular reflux, chest pain, level of fatigue and edema graded. The scaling depends on both the pit and depth and how long the pit will remain:

- 1+: 2mm depression, barely detectable. Immediate rebound.
- 2+: 4mm deep pit, a few seconds to rebound.
- 3+: 6mm deep pit. 10-12 seconds to rebound.
- 4+: 8mm: very deep pit. >20 seconds to rebound. ⁽¹⁰⁾

Part IV: Laboratory Investigation: it includes; ECG, Complete blood count, blood coagulation studies, electrolyte levels (K⁺, Ca⁺⁺, Na⁺) and liver functions.

Part V: Post discharge patient's follow up: it includes; patients

evaluation of medications, Physical assessment and Laboratory Investigation.

• **Tool 2: Clinical Pathway Protocol:**

This protocol was developed by the researcher on recent literature review ^{(11, 12, 13, and}

¹⁴⁾ then modified after the approval of collaborative pathway team. Three columns have time line in three phases as follow: On admission to day one, PHASE 1 (Approximately 2 days) and PHASE 2 (From 2nd day till discharge) and discharge plan. The activity listed in rows to cover each phase, this includes: patient outcomes, assessment\monitoring, physical needs, psychosocial needs and patient \family education. A discharge criterion is the final item in pathway developed to help staff when patient discharged from hospital.

• **Tool 3: Congestive heart failure patient Variance Sheet:**

This tool was developed by researcher to elect the variance in patients do not follow the plan outlined in the pathway using an observational checklist for the following aspects:

1. **Patient/ Family:** This comprised change in the patient's status that includes (edema of the lower extremities, hepatomegaly, ascites, tachycardia, increase fatigability, progress dyspnea level, positive hepatojugular reflux, increase anxiety level, less Patient's satisfaction, admission more than 8 days and others) and patient/ family refuse care decision.

2. **Health care providers:** This involves; decision by providers, physician orders, care not done within time frame, care done incorrectly and care not done

3. **Facilities:** This encompassed equipment which cannot be available or not efficient, staffing

number and qualifications and inter-department (x-ray, laboratory, dietary) delays.

Validity and Reliability:

The developed tools were tested for content validity by 5 experts three in the field of medical surgical nursing and two in cardiology medicine, the needed modification was done, accordingly. Concerning reliability, the cronbach's alpha test used to examine the internal consistency was (0.93) for two tools.

Field work:

Data were collected during the period from 15/8 /2015 to 28 / 1 /2016. All patients who were present in the units during the period of data collection and met the criteria of subject selection were included in the study after obtaining the written informed consent. The first group (control group) was managed according to usual hospital routine; the second (study group) was subjected to the clinical pathway.

Development of care procedures guideline checklist for CHF patient: This guideline checklist contains the recommended nursing care procedures for patients with CHF to be used with pathway as a guide for detailed procedure steps. It was prepared by the researcher using relevant literatures and tested for content validity by jury members. It included CHF patient education, teaching patient deep breathing exercise, diet, exercise, teaching medication regimen, follow up, warning signs, cardiovascular system assessment, assess peripheral pulse, and assess respiration, brachial artery blood pressure and insertion intravenous line.

Development of CHF Illustrated educational materials: A PowerPoint presentation and videos was developed by the researcher in Arabic language to teach patient and

family about anatomy and physiology of cardiovascular, pathophysiology and causes of CHF, signs, symptoms and complications of CHF, treatment modalities for CHF, diet, exercise, medication regimen, warning signs, follow up, salt/fluid restriction and daily weights. A handout in a form of an illustrated colored educational booklet for patient was developed in Arabic language by the researcher to help the patient and his family to know what would be expected post discharge and to reinforce the oral materials taught.

Upon the completion of the clinical pathway implementation, the post test to evaluate the outcomes was done using the same pre test tools.

Pilot study:

It carried out in mid-august 2015 to evaluate the clarity and applicability of the tools on 10% of groups (8 patients), samples were selected conveniently 4 patients for each group. The data obtained from the pilot study were analyzed; no change was done in the assessment sheet, so the 8 patients selected for the pilot study were included in the main study.

Administrative and ethical Consideration:

Approval was obtained from ethical committee and official permission was obtained from the dean of faculty of Nursing after explain the purpose of the study. Verbal informed consent of participants was achieved and anonymity was assured and informed that they could refuse as withdraw from it at any time.

Statistical design:

Data were analyzed using PC with statistical package for social

science (SPSS) version 22. Qualitative data were expressed as frequency and percentage. Comparison of means was performed using paired-sample t-test. Likelihood Ratio chi-square and Fisher's exact test used for tables with a cell or more with an expected frequency of less than 5.

Results:

Table (1): Indicates that (58.8%) and (41.2%) respectively for both study and control group patients were in the age (40- years). Mean age of both study and control groups were approximately equal (47.13 years) and (47.04 years) respectively. Regarding sex, more than half of both study and control group patients were males represented (70.6%) and (64.7%) respectively. As regard residence, half of both study and control group patients were from rural area. Regarding level of education, observed that (44,1%) and (29,4%) respectively for both study and control group patients were hold secondary school certificate.

Table (2): Concerning to signs and symptoms of disease; it was noticed that all the patients (100.0%) of both groups were having dyspnea, more than half of study patients (55.9%) were having orthopnea, while less than one third of control patients (20.6%) were having orthopnea, and the difference was statistically significant. 100 % on study group and 73.5% of control group were suffering from edema of the lower extremities, the difference was statistically significant. Reported that more than half of study group and less than half of control group were having hepatomegaly represented (67.6%) and (47.1%) respectively, the difference was statistically significant.

Table (3): Concerning to follow up signs and symptoms of groups; it was noticed that only three patients of study group was having dyspnea represented (8.8%), while all the patients of control group was having dyspnea represented (100.0%). In the same line less than one fifth of study patients (17.6%) were having orthopnea, while more than two third of control patients (64.7%) were having orthopnea. No patients of study group having edema of the lower extremities while majority of control group were suffering from edema of the lower extremities represented (00.00%) and (82.4%) respectively, the difference was statistically significant.

Table (4): In relation to length of hospital stay, it was observed that the study group was statistically differing from control group. The mean of LOS in study group was (4.73) days on the contrary in control group the mean of LOS was (10.11) days. The difference was statistically significant ($t= 15.229$, $P= 0.001$).

Table (5): Regarding the occurrence of variances in study group, the results revealed that all the patients in the study group had no variances.

Discussion:

Based on the results on the present study; the majority of the patients were males were in forties, more than half were from rural area and about half were secondary school certificate. These finding are consistent with Seval et al. ⁽¹⁵⁾ also Lowery et al. ⁽¹⁶⁾ whose reported that; about half of the study patients were married males and secondary school certificate.

Massimiliano et al. ⁽¹⁷⁾ and Ranjan et al. ⁽¹⁸⁾ revealed that, the majority of the samples were above the sixty years and widow, this result disagrees with the present study. It

has been observed that there is no one study had patients with age less than 60 years old as opposed to the result of this study, but the explanation came at the hands of Sobhy et al.⁽¹⁹⁾ reported in Cardio Alex conference 2013, highlighted that Egyptians are most vulnerable to heart diseases at an early age. The possible causes of this increase are the progressive ageing of the population, dietary changes, sedentary lifestyles, smoking and stress.

In relation to patient's residence, The results of the present study agrees with study by Fahmy et al.⁽²⁰⁾ reported that; in Egypt, heart failure is more common in rural than urban regions because rural regions deprived from medical education about risk factors, signs and symptoms of disease and ways of management.

The present study revealed that; the most common associated medical disease and cause of H F is hypertension. This result agrees with finding of; Hassanein et al.⁽²¹⁾ and Aljefree et al.⁽²²⁾, who reported that hypertension and diabetes being the most common risk factors among heart failure patients.

Concerning edema, more than two third of study group was having 3+ edema compare to half of control group was having 1+ edema. This supported by Laxman et al.⁽²³⁾, reported that half of study patients have edema and it is from criteria for the diagnosis of clinical heart failure.

Reveled that length of hospital stay results the mean of length of stay in study group was 4.7 days on the contrary in control group the mean of length of stay was 10.1 days. This result agrees with Seval et al.⁽²⁴⁾ reported that mean length of hospital stay (LOS) for usual care (UC) patients and clinical pathway (CP) patients was 11.42 ± 6.69 and

8.35 ± 5.17 days. Also Preston et al.⁽²⁵⁾ reported that, care pathways can reduce length of stay and costs, not only in patients undergoing oesophagectomy, but also in those having a wide variety of major operations improvement in length of hospital stay from 17 to 7 days, with no increase in mortality and complications.

Likewise Jung et al.⁽²⁶⁾ noticed that, application of guidelines decreased hospital readmission from 5 to 0 admissions, shortened length of hospital stay from 15 to 3 days, and lowered cost of hospitalization by 10,620,000 Italian lira (\$7,264 US) during the study period.

This finding was contradicted by Thomas et al.⁽²⁷⁾, who reported that the findings regarding LOS for the Falconer (1993) and Sulch et al. (2000, 2002) studies were not statistically significant but did not support the decreased LOS from CPWs reported in other studies (Falconer et al., 1993; Sulch et al., 2000). This may be explained by the rehabilitation settings in which these studies were conducted already delivering optimal care without use of a clinical pathway.

Edema is caused by fluid accumulation in the body, which can be a sign of worsening heart failure, the majority of study group was having no edema comparing to two third of control group was having 6mm deep pit 10-12 seconds to rebound edema.

Japanese Circulation Society⁽²⁸⁾ noticed that, an important point in suggested criteria for clinical stability with chronic heart failure is freedom from evidence of congestion: absence of orthopnea and edema.

Conclusion:

Based on findings of the present study, it can be concluded that:

The results show the statistical significant differences upon admission in signs and symptoms and edema measurement between the study and control groups. The researcher found that, statistical significant in follow up of patients post discharge in relation to signs and symptoms, vital signs, length of hospital stay and edema measurement between the study and control groups. Finally, all of the patients in study group had no variances with prove the preset hypothesis of the study.

Recommendations

Recommendations for practice:

- Apply clinical pathway for patients with CHF rather than the traditional care with the aid of established guidelines of care and illustrated patient education handout.
- Perform annual competency skills assessment in order to maintain high
- skilled nurses caring for patients with CHF to improve quality of patients care.

Recommendations for further researches:

- Study the effect of using computerized clinical pathway on patient's health outcomes.
- Study the staff satisfaction and cost effectiveness after implementation of the clinical pathway.

Table 1: Distribution the study and control group patients regarding their sociodemographic characteristic

Sociodemographic characteristics		Type				X ² /FET	P
		Study group		Control group			
		No (34)		No (34)			
		No	%	No	%		
Age (years)	30-	4	11.8%	6	17.6%	0.346	0.599
	40-	20	58.8%	14	41.2%		
	50-60	10	29.4%	14	41.2%		
Mean \pmSt Deviation		47.13 \pm 5.477		47.04 \pm 6.530		t= 0.060	0.353
Sex	Male	24	70.6%	22	64.7%	0.796	0.604
	Female	10	29.4%	12	35.3%		
Residence	Rural	17	50.0%	19	55.9%	0.404	0.171
	Urban	17	50.0%	15	44.1%		
Level of education	Illiterate	4	11.8%	8	23.5%	0.395	0.05 [*]
	Read and write	5	14.7%	2	5.9%		
	Basic education	6	17.6%	9	26.5%		
	Secondary school	15	44.1%	10	29.4%		
	University	4	11.8%	5	14.7%		

Table 2: Distribution the study and control group patients regarding their signs and symptoms.

# Signs and symptoms	Type				X ² / FET	P
	Study group		Control group			
	No	%	No	%		
Dyspnea	34	100.0%	34	100.0%	-	-
Cough	18	52.9%	8	23.5%	0.024	0.01*
Orthopnea	19	55.9%	7	20.6%	0.006	0.001*
Oliguria	3	8.8%	2	5.9%	1.000	0.320
Dizziness, restlessness	6	17.6%	12	35.3%	0.168	0.05*
Altered digestion	7	20.6%	20	58.8%	0.003	0.001*
Anxiety	23	67.6%	22	64.7%	1.000	0.196
Insomnia	8	23.5%	12	35.3%	0.425	0.121
Edema of the lower extremities	34	100.0%	25	73.5%	0.002	0.001*
Hepatomegaly	23	67.6%	16	47.1%	0.132	0.02*
Distended jugular veins	28	82.4%	17	50.0%	0.010	0.004*
Ascites	19	55.9%	6	17.6%	0.002	0.001*
Weakness	18	52.9%	14	41.2%	0.466	0.121
Nausea	13	38.2%	20	58.8%	0.145	0.04*
Weight gain	23	67.6%	19	55.9%	0.454	0.121
Fatigue	15	44.1%	24	70.6%	0.048	0.01*

More than one answer might be given

Table 3: Comparison between the study and control group patients regarding their signs and symptoms during follow up.

Signs and symptoms in follow up	Type				X ² / FET	P
	Study group		Control group			
	No	%	No	%		
Dyspnea	3	8.8%	30	88.2%	0.001	0.001*
Cough	19	55.9%	27	79.4%	0.068	0.02*
Orthopnea	6	17.6%	22	64.7%	0.001	0.001*
Oliguria	1	2.9%	3	8.8%	0.614	0.250
Dizziness, restlessness	20	58.8%	10	29.4%	0.027	0.01*
Altered digestion	27	79.4%	16	47.1%	0.011	0.004*
Anxiety	2	5.9%	25	73.5%	0.001	0.001*
Insomnia	13	38.2%	23	67.6%	0.028	0.01*
Edema of the lower extremities	0	00.00%	28	82.4%	0.001	0.001*
Hepatomegaly	0	00.00%	29	85.3%	0.001	0.001*
Distended jugular veins	1	2.9%	24	70.6%	0.001	0.001*
Ascites	1	2.9%	25	73.5%	0.001	0.001*
Weakness	10	29.4%	22	64.7%	0.007	0.003*
Nausea	11	32.4%	23	67.6%	0.007	0.003*
Weight gain	5	14.7%	16	47.1%	0.008	0.003*
Fatigue	6	17.6%	15	44.1%	0.034	0.01*

More than one answer might be given

Table 4: Significance differences between the study and control group patients regarding their length of hospital stay.

Length of hospital stay	Type				t- test	p
	Study group		Control group			
	Mean	Std. Deviation	Mean	Std. Deviation		
LOS (day)	4.73	± 0.93	10.11	± 1.83	15.229	0.001

Statistical significant ($P \leq 0.05$)

Table 5: Frequency distribution of variances in the study group. (Variances for study group only)

Variances #	Study group (n= 34)	
	No.	%
1.Patient/ Family		
1.1.Change in the Patient's status		
1.1.1.Edema of the lower extremities	0	0.0%
1.1.2. Increase fatigability	0	0.0%
1.1.3.Progress dyspnea level	0	0.0%
1.1.4. Admission more than 8 days	0	0.0%
1.2. Patient/ Family refuse care decision	0	0.0%
2.Health care Providers		
2.1. Decision by providers	0	0.0%
2.2. Care not done within time frame	0	0.0%
2.3. Care not done	0	0.0%
3. Facilities		
3.1. Equipment:	0	0.0%
3.2. Staffing:	0	0.0%
3.3. Inter department (x-ray, laboratory, dietary)	0	0.0%

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