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Risk and Triggers for Exacerbation of Congestive Heart Failure

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Abstract
Background Congestive heart failure exacerbations can be triggered by a variety of factors, many of which are preventable. Understanding these risks is crucial for effective management and prevention strategies. **Aim:** To assess risk and triggers for exacerbation of congestive heart failure. **Research design:** A descriptive research design was utilized in the study. **Setting:** Emergency Heart Unit and cardiovascular medicine department at Assiut University Heart Hospital. **Sample:** A purposive sample of 67 adult patients diagnosed with heart failure were included. **Tools:** Three tools were used to collect data **Tool I**: Congestive Heart Failure Patient Assessment sheet, **Tool II**: Triggers for exacerbation of congestive heart failure. **Tool III**: Ottawa Heart Failure Risk Score**. Results: (**65.7 %) of the studied patients their age ranged between 50 to less 65yrs. (50.7%) of studied patients had left side heart failure & (46.3%) their total length of stay ranged from 5 to 10 days & (35.8%) of the studied patients had high risk for exacerbation. Regarding triggers (70.1%) were non-complied with their medications, (50.7%) had high sodium intake & (52.2%) of them had worsening in renal function. **Conclusion:** The main triggers for exacerbation of congestive heart failure were medication non-compliance, worsening in renal function, high sodium intake, electrolyte imbalances, respiratory infection and cardiac arrhythmia. **Recommendation:** It is important to emphasize on the role of nurse to educate patients with heart failure about triggers for exacerbation of congestive heart failure to prevent congestive heart failure deterioration.

Keywords: Congestive heart failure, Exacerbation & Triggers.

Introduction
Congestive heart failure (CHF) is the result of the heart's inability to adequately pump blood throughout the body. The majority of the pumping action in the heart is produced by the bigger left ventricle **(Alevroudis et al., 2023).**
Heart failure (HF) is a common cardiovascular disease that is becoming more common and prevalent. It is a significant cause of morbidity and mortality for people with congestive heart failure (CHF) and a common reason for immediate hospital admission. While rheumatic heart disease leading to a valvular lesion continues to be the most frequent cause of HF admission in developing nations, coronary artery disease remains are the primary cause of HF in industrialized nations **(Xanthopoulos et al., 2020).**
Worldwide, almost 64 million people suffer from heart failure. It is seen as a worldwide epidemic, especially in nations like the US and Japan where the population is aging quickly. As the population ages, the incidence of heart failure (HF) also rises in nations where effective cardiovascular disease therapy has increased life expectancy overall **(Conrad et al., 2024).**
Common symptoms of CHF include breathlessness (at rest and when lying flat), extreme fatigue, and swelling of legs. Some individuals also experience weight gain, nausea, abdominal pain, loss of appetite, and persistent cough. These symptoms are due to insufficient blood reaching the body (for example, weakness and fatigue), and/or because blood becomes congested in the lungs or systemic circulation system (for example, shortness of breath, weight gain and leg swelling) **(Chung et al., 2024).**
Symptom severity relates to the degree to which the heart's pumping capacity has been compromised, where some individuals experience severe symptoms and other have mild, well-managed symptoms, people with heart failure experience periods of relative stability in their condition that are interspersed with unpredictable episodes of symptom exacerbation **(Elendu et al., 2024).**
There are many risks and triggers that can cause an episode of heart failure exacerbation. The most common ones include respiratory infections, dietary recommendations that are not followed, non-adherence to medication, hypertension, and cardiac arrhythmias **(Verdu-Rotellar et al., 2020).**
Common factors that predispose to exacerbation heart failure include coronary atherosclerosis, cardiac infection, hypertension, myocardial ischemia, pneumonia, chronic obstructive pulmonary diseases,

anemia, dyslipidemia, diabetes mellitus, cigarette smoking ,sedentary patient behavior and emotional stress **(WISELY, 2025).**

Although there is no cure for heart failure, patients' life expectancy and quality of life can be greatly enhanced through early detection and appropriate treatment. Management of heart failure includes lifestyle modification, medications, use of medical device therapy, and/or heart transplant. Lifestyle modifications for patients diagnosed with heart failure include modified diet (such as restricting sodium), smoking cessation, limiting alcohol, weight loss, and controlling hypertension and diabetes **(Hermann et al., 2025).**

In addition to providing education, psycho-social support, counseling, and behavior modification techniques, skilled nurses in heart failure care can also screen for therapy compliance, identify signs and symptoms of cardiac deterioration, and act as a patient's and their family's healthcare link throughout the entire course of the illness. The primary goals of this integrated approach are to increase functional capacity, prevent readmission, and reduce mortality. Additionally, patients with heart failure have a higher quality of life when they receive high-quality nursing care **(Bispott., 2024).**

Nursing care of patients with congestive heart failure (CHF) includes health education and counseling regarding salt restriction, regular body weight monitoring with signs and symptoms of fluid retention, and promoting regular exercise, fluid restriction, quitting smoking, and alcohol consumption **(Dashputre et al., 2025).**

Significance of the study:

Heart failure (HF) exacerbation is a serious and common condition seen in the Emergency Department (ED) that has significant morbidity and mortality **(Rider et al., 2021).** According to patients' record at Assiut University Heart Hospital the number of patients admitted with congestive heart failure are about (200) patients per year. Therefore, early detection of risk and triggers are important to prevent complications and promote patient safety. This study will be conducted to assess risk and triggers for exacerbation of patients with congestive heart failure.

Aim of the study:

To assess risk and triggers for exacerbation of congestive heart failure among studied patients.

Research question:

What are the risk and triggers for exacerbation of congestive heart failure among studied patients?

Subject & Methods

Research design:

Descriptive research design was utilized to conduct the aim of this study.

Setting:

This study was conducted in Emergency Heart Unit which consists of 3 separate rooms each one contains 3 beds and cardiovascular medicine department at Assiut University Heart Hospital which consists of two floors the first floor was men department which consists of 10 rooms; each one contains 3 beds. The second floor was women department which consists of 6 rooms each one consists of 3 beds.

Sample:

A purposive sample of (67) adult patients diagnosed with heart failure within a period of six months, their ranged from age ranged from 20 - 65 years, both sexes, presented to the emergency department with acute dyspnea secondary to acute or chronic onset of heart failure.

Exclusion criteria:

Diseases that presented with clinical features of hemodynamically unstable as resting O_2 sat <85% on room air, heart rate >120 on arrival, Systolic BP <85 mmHg on arrival, confusion, disorientation, dementia, ischemic chest pain requiring nitrates on arrival, ST segment elevation on EKG, and hemodialysis.

Tools for data collection:

Three tools were used for data collection.

Tool (I): Congestive Heart Failure Patient Assessment

This tool was developed by the investigator based on a recent literature review (**Girerd et al., 2018)** to assess patients' status; It was consisted of three parts:

Part (1): Demographic and medical data: this part used to assess demographic data as age, sex, marital status, residence, level of education, occupation, types of heart failure, stages, and length of hospital stay.

Part (2): Physical assessment: This part is used to assess physical assessment as weight, height, vital signs, chest pain, body mass index (BMI), abdomen circumference, edema grades, and level of dyspnea.

Part (3): Laboratory Investigation: This part used to assess laboratory investigation as ECG, complete blood count, arterial blood gases, cardiac enzymes, lipid profile, kidney functions, blood coagulation studies and electrolyte levels (K+, Ca++, Na+).

Tool (II): Triggers for exacerbation of congestive heart failure:

This tool was developed by the investigator based on a recent literature review **(Verdu-Rotellar et al,. 2020)** to assess triggers that may exacerbate heart failure such as: Respiratory infection, hypertensive crisis, anemia, worsening of renal function, non-compliance with pharmacological treatment, certain medications as non-steroidal anti-inflammatory drugs,

corticosteroids, tricyclic antidepressants, changes in diuretic treatment.

Tool III: Ottawa Heart Failure Risk Score:

It was created by **(Stiell et al., 2017**) and developed by **(Malik et al., 2021)**. This scale adopted in this study to assess risk of heart failure exacerbation in patients presenting to the emergency department and diagnosed with heart failure. After they have received the initial emergency intervention; patients with a score of 0 are considered low risk, a score of 1-2 is considered moderate risk, a score of 3-4 is considered high risk, and a score of 5 or higher is considered very high risk.

The scoring criteria are as follows:

One point for each of the following:

- History of stroke or transient ischemic attack
- Oxygen saturation less than 90%
- Heart rate greater than 110 beats per minute on the 3-minute walk test
- Acute ischemic ECG changes
- An NT-proBNP level of greater than 5000 ng/L

Two points for each of the following:

- Prior history of mechanical ventilation for respiratory distress
- Heart rate greater than 110 beats/min on presentation
- Blood urea nitrogen (BUN) greater than 33.6 mg/dl (12 mmol/L)
- Serum bicarbonate greater level than 35 mg/d

Procedures:

To accomplish the aim of the study, it passed through the following phases:

Preparatory phase

Tool development

It was structured by an investigator based on national and international literature review **(Girerd et al., 2018,Verdu-Rotellar et al., 2020 & Stiell et al., 2017).**

Pilot study:

A pilot study was conducted on 10% of patients (7) to evaluate the clarity, feasibility and applicability of tools. The data obtained from pilot study was analyzed and no changes were made. Patients included in the pilot study were added to the main study.

Content validity and reliability:

Tool validity and reliability were tested by a panel of five experts including four Medical -Surgical Nursing staff from Faculty of Nursing, Assiut University, and a professor of cardiovascular medicine Faculty of Medicine, Assiut University who reviewed the tool, for clarity, relevance comprehensive, understanding, applicability and easiness**.** Reliability was measured by Cronbach's alpha coefficient; it was 0.72.

Ethical consideration:

Research proposal was approved from Ethical Committee in the Faculty of Nursing, Assiut University in October 2023, code 1120230701. There was no risk for study subject during application of the study; confidentiality and privacy of the studied patients were asserted by the investigator. Explanation of the aim and nature of the study was done to studied patients. The right to refuse participation in the study was emphasized to the patients; consent for participation in the study was obtained.

Implementation phase:

- This study was carried out over a period of six months from 15 January (2024) to 15 July (2024).
- The investigator attended the mentioned setting three days per week from 9 am to 11pm to collect relevant data from studied patients during morning and afternoon shifts.
- The investigator greeted patients, introduced self, the purpose of study was explained to studied patients prior to any data collection.
- Tools were filled in through patients' interviewing.
- Demographic data and physical assessment were assessed using tool I part (1and 2).
- Laboratory investigations were assessed using tool I (part 3).
- Triggers and risk for exacerbation of congestive heart failure were assessed using (tool II & III).
- Every patient was given nursing instructions booklet in Arabic language before discharge about factors that may exacerbate their condition based on assessment needs.

Statistical analysis:

The investigator entered the data using a personal computer. All data were entered into statistical packages for the social sciences (SPSS). The SPSS version 23 statistical software application was used to evaluate, code, analyze, and tabulate data. Frequencies and percentages were used as descriptive data. Qualitative data were reported as numbers and percentages (n, %). The mean and standard deviation (SD) of quantitative data were used. To analyze the association between two or more qualitative variables, the Chi square ($\chi 2$) test and independent, and one way an ova test was utilized to detect relation between variables. P-value ≤ 0.05 was established as the significant level.

Results:

Table (1): Percentage distribution of demographic data among patient (n= 67)

Variables	N	%
Age		
20 less than 30yrs	7	10.4
30 less than 40yrs	7	10.4
40 less than 50yrs	9	13.4
50 less 65yrs	44	65.7
Gender		
Male	38	56.7
Female	29	43.3
Marital status		
Single	11	16.4
Married	52	77.6
Widow	4	6.0
Level of education		
Educated	31	46.3
Non educated	36	53.7
Occupation		
Professional	9	13.4
Manual work	12	17.9
Not working	46	68.7
Residence		
Urban	25	37.3
Rural	42	62.7
Smoking		
No	46	68.7
Yes	21	31.3
Body mass index		
Over weight	14	20.9
Obesity	53	79.1
Total	67	100.0

Table (2): Distribution of sample according to medical data (n= 67)

Variables	N	%
Types of heart failure		
Right side heart failure	33	49.3
Left side heart failure	34	50.7
Stages of heart failure		
Stage 1	2	3.0
Stage 2	11	16.4
Stage 3	30	44.8
Stage 4	24	35.8
Emergency department length of stay		
3 days	59	88.1
3 ≥ 5 days	7	10.4
More than 5 days	1	1.5
Coronary care unit stay		
1 > 5 days	9	13.4
5 ≥ 10 days	13	19.4
More than 10 days	3	4.5
Department length of stay		
1 > 5 days	51	79.1
5 ≥ 10 days	13	19.4
More than 10 days	3	4.5
Total length of hospital stay		
1> 5 days	15	22.4
5 ≥10 days	31	46.3
More than 10 days	21	31.3

Table (3): Distributions of studied patients according to dyspnea grades, chest pain and edema levels at admission and before discharge (n= 67)

Variables		At Admission		Before dept. Discharge		X2 P. value
		N	%	N	%	
Dyspnea Grades						
Grade 0	Yes	3	4.5	33	49.26	48.48 P < 0.0001**
Grade 1	Yes	10	14.9	15	22.39	
Grade 2	Yes	14	20.9	10	14.9	
Grade 3	Yes	18	26.9	8	11.95	
Grade 4	Yes	22	32.8	1	1.5	
Chest Pain						
Mild (1-3)	Yes	8	11.9	46	68.7	50.66 P < 0.0001**
Moderate (4-7)	Yes	32	47.8	19	28.4	
Sever (8-10)	Yes	27	40.3	2	2.9	
Edema						
Non pitting	Yes	3	4.5	3	4.5	0.0000 P = 1.0000 NS
Pitting	Yes	64	95.5	64	95.5	
Grades +1	Yes	9	14.06	24	37.5	9.37 P = 0.02*
+2	Yes	32	50.00	25	39.07	
+3	Yes	18	28.12	12	18.75	
+4	Yes	5	7.82	3	4.68	

Chi-Square Tests ***(highly statistical significant P value ≤0.01)*

Table (4): Mean scores of laboratory investigations among patient at admission and before discharge (n= 67)

Variables		Mean	Std. Deviation	sign
Red blood cell	At admission	4.4391	1.05552	.262
	Before dept. discharge	4.6151	.72179	
WBC	At admission	10.7018	4.75380	.408
	Before dept. discharge	10.1142	3.31521	
Hemoglobin	At admission	11.0248	2.27103	.242
	Before dept. discharge	11.4212	1.57023	
Hematocrit	At admission	35.3560	6.93421	.631
	Before dept. discharge	35.8884	5.81002	
Platelet	At admission	251.5224	78.21326	.311
	Before dept. discharge	266.0597	86.90554	
PH	At admission	7.4543	.14839	.565
	Before dept. discharge	7.4416	.10193	
Pao2	At admission	74.2388	18.59545	.000**
	Before dept. discharge	93.3731	29.45198	
Paco2	At admission	33.6119	7.83921	.000**
	Before dept. discharge	29.1761	5.20332	
Hco3	At admission	22.9657	5.45609	.995
	Before dept. discharge	22.9601	5.02282	
Sao2	At admission	94.2537	3.14471	.000**
	Before dept. discharge	97.3134	1.67159	
Troponin	At admission	.4980	1.31644	.190
	Before dept. discharge	.2469	.83600	
CK	At admission	109.3239	83.21083	.786
	Before dept. discharge	105.2018	91.74018	
Creatinine	At admission	117.7476	51.61656	.729
	Before dept. discharge	120.9799	55.98763	
Urea	At admission	15.7225	10.24268	.252
	Before dept. discharge	20.0552	29.05710	
Na	At admission	136.8857	8.76206	.946
	Before dept. discharge	136.7910	7.40912	
K	At admission	4.2064	1.15676	.408
	Before dept. discharge	4.3358	.53702	
Ca	At admission	7.9657	1.09289	.000**
	Before dept. discharge	8.7527	1.33057	

Variables		Mean	Std. Deviation	sign
Cholesterol	At admission	167.1642	45.93724	.042*
	Before dept. discharge	151.0448	44.93410	
Triglyceride	At admission	136.0149	53.12236	.093
	Before dept. discharge	120.9254	50.01252	

Table (5): Percentage distribution of triggers for exacerbation of congestive heart failure during hospitalization among patients (n= 67)

Variables	Yes		No	
	N	%	N	%
I- Past health history				
Non-compliance medication	47	70.1	20	29.9
Pulmonary embolism	2	3.0	65	97.0
Myocardial infarction	8	11.9	59	88.1
High sodium intake	34	50.7	33	49.3
II- Current health history				
Myocardial infarction	4	6.0	63	94.0
Respiratory infection	22	32.8	45	67.1
Hypertensive crisis	12	17.9	55	82.1
Cardiac arrhythmia	21	31.3	46	68.7
Electrolyte imbalances:	29	43.3	38	56.7
Worsening of renal function	35	52.2	32	47.8
Anemia (Hgb < 7 g\dl)	10	14.9	57	85.0

Table (6): Total distribution of Ottawa Heart Failure Risk Score among studied patients (n= 67)

Variable	Frequency	Percent
Low risk (0)	7	10.4
Moderate risk (1 – 2)	15	22.4
High risk (3 – 4)	24	35.8
Very high risk (>5)	21	31.3

Table (7): Relation between total length of hospital stay and Ottawa Heart Failure Risk Score (n=67)

Variables	Low risk	1-2 moderate risk		high risk 3-4	very high risk more5	X2 (P. value
Total length of hospital stay						
1-5 days	N	4	4	6	1	
	%	6.0	6.0	9.0	1.5	
5-10 day	N	2	10	11	8	17.074
	%	3.0	14.9	16.4	11.9	0.009 **
>10 days	N	1	1	7	12	
	%	1.5	1.5	10.4	17.9	

Table (1): Demonstrates that about two thirds (65.7 %) of the studied patients their age ranged between 50 to less 65yrs. (56.7%) patients were male, one third of them were smokers (31.3%) .Most of them (79.1%) were obese.

Table (2): Shows that about half (49.3% and 50.7%) respectively of studied patients had right and left side heart failure. The highest percentage (44.8%) of patients were diagnosed with stage 3 HF. The majority of the studied patients (88.1%) their emergency department length of stay ranged from 1 to 3 days and (79.1%) of them were stay in the department from 1 to 5 days. Less than quadrant (19.4%) of them were stay at coronary care unit from 7 to 10 days. Less than half of studied patients (46.3%) their total length of stay ranged from 5 to 10 days.

Table (3): Reflects that there were statistically significant differences in dyspnea grades, chest pain and edema levels before discharge from department than their level at admission.

Table (4): Demonstrates that there were statistically significant improvements in Pao2, Paco2, Sao2 levels, calcium and cholesterol level before discharge than their level at admission.

Table (5): Reflects triggers for congestive heart failure exacerbation. According to past medical history, most of patients (70.1%) were non-complied with their medication. Half of them (50.7%) had high sodium intake. According to current health history, more than half (52.2%) of them had worsening in

renal function. About one third (32.8% and 31.3%) respectively of them had respiratory infection and cardiac arrhythmia.

Table (6): These show that (35.8%) of the studied patients had high risk for exacerbation of congestive heart failure. Another one third (31.3%) of the patients had very high risk. (22.4%) of the patients had moderate risk, and only (10.4%) of them had low risk.

Table (7): This table mentioned that there were a statistically significant relation between total length of hospital stay and Ottawa Heart Failure Risk Score.

Discussion

Congestive heart failure (CHF) exacerbations can be triggered by a variety of factors, many of which are preventable. Understanding these risks is crucial for effective management and prevention strategies. Key triggers include medication noncompliance, health literacy, and underlying health conditions, which can significantly impact patient outcomes. So, this study aimed to assess risk and triggers for exacerbation of congestive heart failure **(Teleanu et al., 2025).**

Regarding demographic data of the studied patients, the current study clarified that more than half of the studied patients their age was less than sixty-five years old, male, from rural areas, non-educated and not working and the majority of them were obese and married. These results are consistent with **(Yu et al., 2019)** who found that the bulk of the study population their age ranged from 31 to 69 years.

Also, these findings are consistent with **(Ahmed et al., 2024)** who Investigated the effect of applying a learning-based program on self-efficacy for patients with congestive heart failure and discovered that most participants were above the age of 50 years, males and married and align with **(Darussalam et al., 2024)** stated that most of the patients were men and at the age of 46 –65 years. Also, goes in line with **(Salah & El Ashery., 2020)**

From the researcher's point of view, the increased incidence of congestive heart failure (CHF) in older adults and males can be attributed to a combination of age-related physiological changes and gender-specific risk factors. As people age, the heart undergoes structural and functional alterations, such as thickening of the heart walls, stiffening of blood vessels, and a decline in the efficiency of the heart's pumping action. These changes make the heart more susceptible to failure. Additionally, older individuals are more likely to have comorbid conditions such as hypertension, diabetes, and coronary artery disease, which further increase the risk of developing CHF. Males are at a higher risk for heart failure due to factors like higher rates of coronary artery disease, which is more prevalent in men at younger ages compared to women. Hormonal differences, with lower estrogen levels in males, also contribute to the increased vulnerability to heart disease and heart failure in men. Moreover, lifestyle factors, including higher rates of smoking and alcohol use in males, can exacerbate the development of CHF.

However, this result is inconsistent with **(Şahin et al., 2024)** who mentioned that the majority of the study sample was female. As well, this result is also incongruent with **(Salmoirago-Blotcher et al., 2017)** who mentioned that half of their study subjects had a college education. This difference may back to difference in characteristics of the study place and sample.

Regarding medical data among the studied sample, the current study clarified that about half of studied patients had right and left side heart failure. The highest percentage of patients were diagnosed with stage 3 HF. Nearly half of them their total length of stay ranged from 5 to 10 days and the majority their emergency department length of stay ranged from 1-3 days and their department length of stay ranged from 1- 5 days**.**

This result agrees with **(Ignataviciūtė et al., 2023)** who reported that nearly half of the patients had right & left side heart failure and a total length of stay between 5-10 days. Also, **(Qadri et al., 2022)** found that emergency department stays typically ranged from 1-3 days, while department stays were between 1-5 days.On the same line with**(Rahman &Rahman., 2022)** who reveals that half of patients were falls at the third degree of heart failure based on the New York Heart Association (NYHA) functional classification. **From researcher point of view**, this result is aligning with findings that longer stays are often associated with more severe cases.

Regarding dyspnea grades, chest pain and edema levels among studied patients at admission and before department discharge**,** the present study revealed a statistically significant differences in dyspnea grades, chest pain and edema levels before department discharge than their level at admission. This result is in the same line with **(Anwar et al., 2020)** who reported that there is a significant improvement in dyspnea at six days than its level at admission.

From researcher 's point of view, this result is reflecting effective targeted medical interventions during hospitalization such as oxygen therapy, medications (like diuretics, bronchodilators, or corticosteroids), and interventions that managed the underlying cause of dyspnea and helped to alleviate symptoms. As these treatments take effect, the respiratory system and heart function improve, leading to a reduction in shortness of breath.

Regarding laboratory investigations among studied patient at admission and before department discharge,

the current study demonstrated that there were statistically significant improvements in Pao2, Paco2, Sao2 levels, calcium and cholesterol level before department discharge than their level at admission. This result is in the same line with **(Anwar et al., 2020)** who reported that there is a significant improvement in Pao2, Paco2, Sao2 levels at six days than their level at admission. **According researcher opinion**, this result reflects the healing process and the effectiveness of the treatments administered during the hospital stay.

Regarding triggers for exacerbation of congestive heart failure during hospitalization among the studied patients, the present study clarified that common triggers for congestive heart failure exacerbation were medication non-compliance, worsening in renal function, high sodium intake, electrolyte imbalances, respiratory infection and cardiac arrhythmia. This result is consistent with **(Verdu-Rotellar et al., 2020)** who concluded that the most frequently identified heart failure precipitation factors were respiratory infections, non-compliance of dietary recommendations and non-compliance with pharmacological treatment. According to **(Narita & Amiya., 2021)** found that risk factors for exacerbation of heart failure include clinical parameters like diabetes and renal dysfunction, alongside social factors such as occupation, lifestyle, socioeconomic status, and environmental influences like air pollution and noise, which collectively impact disease progression ; in a study entitled as Social and environmental risks as contributors to the clinical course of heart failure. Also, **(Rathore., 2022)** found that diabetes mellitus**,** hypertension, coronary artery disease, valvular heart disease, congenital heart disease, uncontrolled arrhythmia and myocarditis are key risk factors for exacerbation of congestive heart failure, which can lead to increased morbidity and mortality in affected patients. According to (**Haider., 2023)** stated that risk factors for exacerbation of congestive heart failure (CHF) include age, coronary artery disease, obesity, diabetes, smoking, and a sedentary lifestyle. Triggers may involve high blood pressure, heart valve issues, and previous heart attacks, worsening heart function and symptoms; in a study entitled as Congestive Coronary Heart Failure.

According to researcher point of view, these triggers for congestive heart failure (CHF) exacerbation can stress the heart and interfere with its ability to function properly, where non-compliance with prescribed medications can lead to fluid retention, worsening symptoms, and increased strain on the heart. Also, worsening renal function is another key trigger, reduces the body's ability to eliminate excess fluid, exacerbating edema and increasing the workload on the heart. High sodium intake can also significantly promote fluid retention, further elevating blood pressure and causing the heart to work harder. Respiratory infections, such as pneumonia can increase the oxygen demand on the body and lead to fluid buildup in the lungs, aggravating dyspnea and other symptoms of heart failure. These factors highlight the importance of careful management and monitoring to prevent exacerbations in patients with congestive heart failure.

Concerning Ottawa Heart Failure Risk Score among studied patients**,** the current study revealed that highest percentage of the studied patients had high and very high risk for exacerbation of congestive heart failure followed by moderate risk. This result agrees with **(Zhao & Cui., 2022)** who found that many patients fall into high and very high-risk categories for exacerbation, highlighting the need for updated risk assessment tools tailored to current clinical practices.

Regarding relation between Ottawa Heart Failure Risk Score and total length of hospital stay, the current study revealed a statistically significant relation between Ottawa Heart Failure Risk Score and total length of hospital stay. This result is in the same line with **(Kojima et al., 2023)** that stated that comprehensive assessments, including OHFRS, can enhance understanding of patient needs and predict total length of hospital stay; in a study to assess relationship between low muscle strength and malnutrition with longer length of hospital stay among older patients with heart failure. Also, **(Stiell et al., 2017)** found that the OHFRS aids in identifying patients at higher risk for serious adverse events, which can lead to extended hospital stays due to increased monitoring and treatment needs.

From researcher' point of view, the relationship between the Ottawa Heart Failure Risk Score (OHFRS) and total length of hospital stay can be explained by the score's ability to predict the severity of heart failure and the likelihood of complications during hospitalization. A higher risk score often indicates more severe heart failure, greater comorbidity burden, and a higher likelihood of adverse events such as arrhythmias, fluid retention, or worsening renal function. These complications typically require extended monitoring, interventions, and treatment, leading to longer hospital stays. Therefore, the OHFRS serves as a valuable tool for clinicians to predict hospital length of stay by identifying patients who may require more intensive care and prolonged treatment, allowing for better resource allocation and more targeted patient management.

Limitations of the study:
It was difficult to assess an NT-proBNP level as it was high cost.

Conclusion:
It was concluded that the main triggers for exacerbation of congestive heart failure were medication non-compliance, worsening in renal function, high sodium intake, electrolyte imbalances, respiratory infection and cardiac arrhythmia.

Recommendation:
It is important to emphasize on the role of nurse to educate patients with heart failure about triggers for exacerbation of congestive heart failure to prevent congestive heart failure deterioration.

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