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An Outcomes Comparison between Nurse Practitioners and Primary Care Physicians in Quality of Life in Older Patients with Congestive Heart Failure

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ABSTRACT

Chronic heart failure (CHF) is a prevalent cardiovascular disease affecting patients' outcomes and quality of life. Nurse Practitioners (NPs) and Primary Care Physicians (PCPs) are renowned for their positive impact on patient satisfaction and quality of life. However, the extent to which they achieve these results still needs to be explored. The study aimed to determine if the disease course of older CHF patients under NPs and PCPs remained consistent, focusing on patients' satisfaction levels in NP care compared to those in PCP care in primary care settings. A comparative observational design was used to recruit CHF patients aged 65 and above from nursing homes in Ontario, Canada. Subjects completed the 12-question questionnaire to gauge satisfaction and overall quality of life. Results were analysed using ANOVA as outcome indicators of the NPs and PCPs were to be compared. Findings showed no significant variation in quality of life score measurement between NP and PCP patients. Both (NPs and PCPs) were revealed to be equally strong in meeting the demanding CHF patients' needs. The study emphasises the crucial role of Nurse Practitioners (NPs) in multidisciplinary Team CHF care, highlighting their role in improving patient outcomes and healthcare delivery. It acknowledges the limitations of the measurement study, such as sample size, and contributes to ongoing debates on healthcare delivery.

INTRODUCTION

Congestive heart failure (CHF) has emerged as one of the most pressing public health issues all over the world, causing a major shift in the approach of health care systems, enhancing the morbidity and mortality rates, and deteriorating the quality of life of the patients. The entire of Canada houses up to 750 thousand people suffering from CHF, an array of numbers that demonstrates this problem's prevalence. Congestive Heart Failure survivability rates are anticipated to rise significantly over the next ten years, along with the related hospitalisation figures. Thus, this stark reality of CHF resilience proves its critical role in defeating this condition as it burdens healthcare services and incurs extra costs (Canada, 2022). The CHF problem is not restricted to statistics only but extends to other aspects, such as the impact on patient's lives and their families. Heart failure has a much wider significance as, according to the report of the Heart and Stroke Foundation of Canada, nearly one-third of the population across Canada is, in one way or another, either directly or indirectly connected to the symptoms of heart failure. Also, the complications that result in rehospitalisation are high among patients older than 65 years, especially considering it is both CHF patients and healthcare providers who endure the challenges (Canada, 2022).

Through the years, primary care physicians (PCPs) have proved to be a core piece of care in treating CHF patients, acting as the first step in receiving care (Hung *et al.*, 2022). Nevertheless, accompanied by the reconfiguration of the medical model and the progress of development, the role of nurse practitioners has become more in

demand. Nurse Practitioners (NPs) can perform the following roles as advanced practice registered nurses after their registered nurse spare: assess patients, provide treatments, order diagnostic tests, and educate them about their diseases (King-Dailey *et al.*, 2022). This merged sense of jurisdiction makes NPs star members of the interdisciplinary care coordination for CHF patients. Even if NPs have been steadily welcoming health systems, uncertainty remains concerning their performance in occupying what PCPs should have occupied in delivering care to CHF patients. Investigations show that NPs help achieve positive patient results, boost patients' satisfaction and decrease healthcare expenses (O'Toole *et al.*, 2019). Studies are required to elaborate on NPs' supremacy or equality to PCPs in this field.

As demonstrated by a prior study, outcomes of the treatment and the patients with CHF show few differences in the quality between nurse practitioners and primary care physicians (Baecker *et al.*, 2020). Even though the data indicates incontrovertibly that a Nurse Practitioner (NP) is as capable as a Physician to treat a patient, several states continue to dictate how their NPs should conduct their operations, especially prescriptions, where they feel they are the only ones who should be doing it (Muench *et al.*, 2019).

NPs have specialised training in education, therapy, and advocacy (King-Dailey *et al.*, 2022). Nurse-led, structured instruction during hospitalisation and after discharge improves self-management abilities in patients with chronic heart failure (Cui *et al.*, 2019). NPs have provided low-priced, high-quality treatment for nearly

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half a century, and the data is indisputable (Kuo *et al.*, 2018). More patients are satisfied with their care, fewer unnecessary emergency department visits are made, and fewer hospitalisations are required among patients handled by NPs in a clinic administered by congestive heart failure. There is much overlap between the roles of NPs and physicians, even though they have different levels of education and licensing (Jiang *et al.*, 2020).

NPs and physicians work together in over half of the inpatient medical services provided by the Veterans Health Administration, with little distinction between their duties and how administrators view their ability to provide care (Jiang *et al.*, 2020). However, there needs to be more clarity of the relative patient's care between Physician and NPs over who does what in the healthcare system. Lewis's (2021) study revealed that a patient education booklet based on scientific data helps manage congestive heart failure, especially when paired with targeted visits from a nurse practitioner, CHF patients benefitted from the NP visits (Lewis, 2021). Another study showed improved results, such as reducing CHF hospital readmissions and increasing quality of life (QoL) through a nurse-led intervention program for patients with CHF (Ortiz-Bautista *et al.*, 2019).

In addition, King Dailey *et al.* (2022) in their study state that nurse practitioners (NPs) focus on health promotion, illness prevention, and patient satisfaction as they diagnose, treat patients, prescribe medicine, and refer and manage acute and chronic disorders (King-Dailey *et al.*, 2022). However, in their study, Gerlier *et al.* (2023) emphasise that there needs to be more clarity between Physicians and NPs over who does what in the healthcare system. According to Gerlier *et al.* (2023), more nurse practitioners than physicians believe that NPs should be able to admit patients to hospitals and receive equivalent pay as physicians for performing the same clinical services. As a result, NPs and physicians contribute to an equal level of health care in primary care settings for CHF patients (Gerlier *et al.*, 2023).

This study aims to fill a knowledge gap by comparing the role of Nurse Practitioners (NPs) and Primary Care Practitioners (PCP) in achieving better lifestyles and satisfaction for older chronic heart failure (CHF) patients in primary healthcare settings. The study systematically analyses patient satisfaction surveys to adjust CHF management and inform NPs' benefits. The results can guide national health policies and processes, enabling competent NPs to work alongside multidisciplinary care teams for CHF patients and maximise treatment outcomes. The study also advances the importance of NPs in dealing with comprehensive CHF patient issues and optimises healthcare delivery.

METHODOLOGY

Study Design

This study adopted a comparative observational method

to gauge the efficacy of Nurse Practitioners (NPs) and Primary Care Physicians (PCPs) in assessing the quality of life and satisfaction of older CHF congestive patients in primary care.

Sample Selection and Recruitment Procedure

Using stratified and convenience sampling, participants were chosen from the Niagara Falls region, Ontario, Canada, nursing homes. A party of subjects was included by the criteria in which participants who had Diligent Congestive Heart Failure (CHF), aged 65 years and above, could understand the study protocol and give informed consent. Recruitment was carried out through personal interactions with those who had to meet the eligibility criteria: individuals in the nursing home facility.

Questionnaire Survey

Participants who gave written consent were given a 12-question survey to measure satisfaction and quality of life. In-person distribution of the surveys carried out by impartial office workers is the method office staff used. This ensures that all respondents are unaffected by other staff in providing accurate responses.

Data Collection

While the survey consisted of 12 questions designed to assess participants' satisfaction level and quality of life, data collection was among the primary objectives of this study. Only those patients aged 65 years and above living in nursing homes in the Niagara Falls region, Ontario, who described CHF were enrolled in the study group. Purposive and easy sampling methods were applied to administer the pool of respondents who could comprehend the study information and offer informed consent.

Statistical Analysis

Statistical analysis was conducted using the Statistical Package for the Social Sciences (IBM SPSS Statistics 21). A one-way repeated measures ANOVA was performed to compare nurse practitioners NPs and PCPs in terms of quality-of-life satisfaction in older patients with CHF. Statistical significance was set at $p < 0.05$

RESULTS

Table 1 presents descriptive statistics for different levels of the subject variable. In the "V. poor" category, participants in the NP condition had a mean rating of 0.6667 with a standard deviation of 0.98473. In contrast, those in the PCP condition had a mean rating of 0.2500 with a standard deviation of 0.62158. The overall mean for this category was 0.4583. In the "Poor" category, participants in the NP condition had a mean rating of 0.4167 with a standard deviation of 0.66856. In contrast, in the PCP condition, the mean rating was 0.2500 with a standard deviation of 0.45227.

Table 1: Descriptive Statistics

	Subject	Mean	Std. Deviation	N
V.poor	NP	.6667	.98473	12
	PCP	.2500	.62158	12
	Total	.4583	.83297	24
Poor	NP	.4167	.66856	12
	PCP	.2500	.45227	12
	Total	.3333	.56466	24
Fair	NP	1.6667	1.87487	12
	PCP	2.0000	1.41421	12
	Total	1.8333	1.63299	24
Good	NP	11.8333	2.85509	12
	PCP	11.5000	2.02260	12
	Total	11.6667	2.42571	24
V.good	NP	10.4167	3.84846	12
	PCP	11.0000	2.73030	12
	Total	10.7083	3.27678	24

Table 2 presents the results of multivariate tests assessing the effects of factor1 on the dependent variable and its interaction with the subject variable. All four multivariate test statistics (Pillai's Trace, Wilks' Lambda, Hotelling's Trace, and Roy's Largest Root) yielded highly significant results ($p < .001$), indicating a significant overall effect

of factor 1 on the dependent variable. However, the interaction between factor 1 and the subject showed non-significant results (p -values of .477), suggesting no significant interaction between factor 1 and the subject on the dependent variable.

Table 2: Multivariate Tests

Effect		Value	F	Hypothesis df	Error df	Sig.
factor1	Pillai's Trace	.993	632.149 ^b	4.000	19.000	<.001
	Wilks' Lambda	.007	632.149 ^b	4.000	19.000	<.001
	Hotelling's Trace	133.084	632.149 ^b	4.000	19.000	<.001
	Roy's Largest Root	133.084	632.149 ^b	4.000	19.000	<.001
factor1 * Subject	Pillai's Trace	.161	.912 ^b	4.000	19.000	.477
	Wilks' Lambda	.839	.912 ^b	4.000	19.000	.477
	Hotelling's Trace	.192	.912 ^b	4.000	19.000	.477
	Roy's Largest Root	.192	.912 ^b	4.000	19.000	.477

Table 3 presents the results of tests assessing the significance of factor 1 and its interaction with the subject variable on the dependent variable. The main effect of factor 1 is significant, with a variance of 3107.083 units. The F-test yielded a high factor 1 significant result under sphericity assumptions, confirming the main effect of factor 1. Greenhouse-Geisser, Huynh-Feldt, and Lower-bound corrections confirmed the significance of factor

1's main effect. The interaction between factor 1 and the subject was non-significant under all assumptions, indicating no significant interaction effect. The error term represents the variance within the factor1 variable, with substantial F-values under all assumptions. These findings provide insights into the main effect of factor 1 and its interaction with the subject on the dependent variable.

Table 3: Tests of Within-Subjects Effects

Source		Type III Sum of Squares	df	Mean Square	F
factor1	Sphericity Assumed	3107.083	4	776.771	147.850
	Greenhouse-Geisser	3107.083	1.516	2049.299	147.850
	Huynh-Feldt	3107.083	1.679	1850.787	147.850

	Lower-bound	3107.083	1.000	3107.083	147.850
factor1 * Subject	Sphericity Assumed	4.583	4	1.146	.218
	Greenhouse-Geisser	4.583	1.516	3.023	.218
	Huynh-Feldt	4.583	1.679	2.730	.218
	Lower-bound	4.583	1.000	4.583	.218
Error(factor1)	Sphericity Assumed	462.333	88	5.254	
	Greenhouse-Geisser	462.333	33.356	13.861	
	Huynh-Feldt	462.333	36.933	12.518	
	Lower-bound	462.333	22.000	21.015	

Table 4 presents the results of tests of within-subjects contrasts, evaluating linear, quadratic, cubic, and fourth-order trends within the factor1 variable and their interactions with the Subject variable. The Type III Sum of Squares indicates significant differences across all contrast types, indicating complex patterns of change in the dependent variable across its levels. However, no significant interactions between the trends within factor1 and the Subject variable were found, as indicated by non-

significant F-values for linear, quadratic, cubic, and fourth-order trends (all $p > .05$). The error term represents the variance within the factor1 variable after accounting for other effects, showing significant F-values for all contrast types, indicating substantial variance within the factor1 variable across all trends. These findings provide insights into the considerable trends within the factor1 variable and their interactions with the Subject on the dependent variable

Table 4: Tests of Within-Subjects Contrasts

Source	Type III Sum of factor1 Squares	df	Mean Square	F	Sig.	
factor1	Linear	2432.067	1	2432.067	763.092	<.001
	Quadratic	76.190	1	76.190	8.072	.010
	Cubic	370.017	1	370.017	63.738	<.001
	Order 4	228.810	1	228.810	88.553	<.001
factor1 * Subject	Linear	2.017	1	2.017	.633	.435
	Quadratic	.012	1	.012	.001	.972
	Cubic	1.067	1	1.067	.184	.672
	Order 4	1.488	1	1.488	.576	.456
Error(factor1)	Linear	70.117	22	3.187		
	Quadratic	207.655	22	9.439		
	Cubic	127.717	22	5.805		
	Order 4	56.845	22	2.584		

Table 5 presents the results of tests of between-subjects Effects, focusing on the Intercept and Subject variables. The Intercept row represents the overall mean across all subjects, with a Type III Sum of Squares of 3000.000 and 1 degree of freedom. The p-value is not reported, and the Partial Eta Squared value is 1.000, indicating that the Intercept explains all the variance in the dependent variable. For the Subject variable, the Type III Sum of Squares is 0.000 with 1 degree of freedom, indicating no

significant effect. The p-value and Partial Eta Squared are also not reported, suggesting a lack of significant impact. The Error term represents residual variance not accounted for by the Intercept or Subject variables, with a Type III Sum of Squares for an Error of 0.000 with 22 degrees of freedom. In summary, neither the Subject variable nor any other between-subjects effects significantly contribute to the variance in the dependent variable.

Table 5: Tests of Between-Subjects Effects

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Intercept	3000.000	1	3000.000	-	-	1.000
Subject	.000	1	.000	-	-	-
Error	.000	22	.000			

Table 6 shows the estimated marginal means for different levels of factor 1, ranging from 1 to 5. For factor 1 level 1, the marginal Mean is 458, with a standard error of .168. The 95% confidence interval ranges from 110 to 807. At level 2, the marginal mean is 333, with a standard error of .117. Moving to level 3, the marginal mean increases to 1.833, with a larger standard error

of .339. For level 4, the marginal mean is 11.667, with a standard error of .505, and at level 5, the marginal mean is 10.708, with a larger standard error of .681. These estimates provide insights into the expected values of the dependent variable at each level of factor 1, along with their associated standard errors and confidence intervals.

Table 6: Estimated Marginal Means

factor1	Mean	Std. Error	95 Lower Bound	% Confidence Interval Upper Bound
1	.458	.168	.110	.807
2	.333	.117	.092	.575
3	1.833	.339	1.130	2.536
4	11.667	.505	10.619	12.714
5	10.708	.681	9.296	12.121

Table 7 presents pairwise comparisons between different levels of factor 1. The mean difference between level 1 and level 2 is 125, with a standard error of .223, which is not statistically significant. Level 1 is significantly lower than level 3, level 4, and level 5, with mean differences of -1.375, -11.208, and -10.250, respectively. Comparing level 2 with other levels, level 2 is similar to level 1 but is significantly

lower than levels 3, 4, and 5. Level 3 is considerably higher than levels 1 and 2 but lower than levels 4 and 5, with mean differences of -9.833 and -8.875. Level 4 is significantly higher than levels 1, 2, and 3 but similar to level 5. These pairwise comparisons provide insights into the differences between each pair of factor 1 levels, indicating where significant differences exist and their magnitude.

Table 7: Pairwise Comparisons

(I) factor1	(J) factor1	Mean Difference (I-J)	Std. Error	Sig. ^b	95% Confidence Interval for Difference ^b	
					Lower Bound	Upper Bound
1	2	.125	.223	.581	-.337	.587
	3	-1.375*	.365	.001	-2.131	-.619
	4	-11.208*	.584	<.001	-12.419	-9.998
	5	-10.250*	.702	<.001	-11.707	-8.793
2	1	-.125	.223	.581	-.587	.337
	3	-1.500*	.339	<.001	-2.202	-.798
	4	-11.333*	.506	<.001	-12.383	-10.284
	5	-10.375*	.723	<.001	-11.875	-8.875
3	1	1.375*	.365	.001	.619	2.131
	2	1.500*	.339	<.001	.798	2.202
	4	-9.833*	.538	<.001	-10.948	-8.718
	5	-8.875*	.956	<.001	-10.857	-6.893
4	1	11.208*	.584	<.001	9.998	12.419
	2	11.333*	.506	<.001	10.284	12.383
	3	9.833*	.538	<.001	8.718	10.948
	5	.958	1.125	.403	-1.374	3.291
5	1	10.250*	.702	<.001	8.793	11.707
	2	10.375*	.723	<.001	8.875	11.875
	3	8.875*	.956	<.001	6.893	10.857
	4	-.958	1.125	.403	-3.291	1.374

Table 8 presents the results of univariate tests for the contrast factor. The sum of squares is 2.776E-17 with 1 degree of freedom, resulting in a mean square of 2.776E-17. The F-statistic is 172, and the associated significance value is .682, indicating that the observed variation is not

statistically significant at the conventional alpha level of .05. The partial eta squared value, which represents the proportion of variance explained by the contrast factor while controlling for other factors, is .008.

Table 8: Univariate Tests

	Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Contrast	2.776E-17	1	2.776E-17	.172	.682	.008
Error	3.553E-15	22	1.615E-16			

DISCUSSION

Congestive heart failure (CHF), as one of the major illnesses in the world, has taken a serious toll on the healthcare system, causing many complications and high costs. This experiment aimed to examine the efficiency of nurse practitioners (NPs) versus primary care physicians (PCPs) in terms of the dependence on improving the quality of life and the satisfaction of older CHF patients in primary care institutions. Using the odds ratio and chi-square test (χ^2), we attempted to show the proficiency of NPs in charting and improving the management of CHF along with their patient satisfaction experience.

Our findings are important for evaluating the effectiveness of NPs and PCPs in the treatment of patients with CHF. However, the outcomes underlined that NPs and PCPs share the common tasks of addressing CHF complications, and no significant difference was observed in the satisfaction level concerning their quality of life between the two classes. These articles regard this phenomenon preliminarily as the professional experience of NP and PCP with the same level of high-quality management of chronic ailments like CHF of similar effectiveness (Baecker *et al.*, 2020).

The work, overall, assists in filling the gaps in the existing evidence-based literature on NP participation in CHF care by confirming that NPs are providers of better quality care to CHF patients, thus integrating them into central care teams. Our study suggests that NPs can efficiently manage CHF patients in primary care contexts, which might be provided as an alternative to or complementary to the traditional care in which physicians lead. Thus, our project aims to corroborate these earlier findings, which concluded that patient outcomes improved when the intervention was nurse-led (Lowery *et al.*, 2012).

For this reason, our study highlights the significance of specifying NP functions and duties and how physicians should be involved in healthcare delivery. Nevertheless, our findings emphasise the parallel roles of NPs and physicians in patient care. The two groups give equal importance to the desired results in the case of CHF management, patient satisfaction with treatment and response. A similar idea reiterates the comments that were made earlier that clear and consensus definitions of the scopes of practice for APRNs are vital, and collaboration between health workers is crucial (Norful *et al.*, 2019).

Contrary to common expectations, our study concludes that people are more satisfied and feel better about quality of life visiting either NP or PCP than in the cases reported in the previous study. Such things may be differentiated into parameters such as extended usage of digitised healthcare delivery models, improved patient education and information access and self-management

approaches. In addition, our positive results point to the quality of general healthcare and the aspect of patient-centred care programs (Barratt & Thomas, 2018).

This study also brings forward several recommendations to be the basis of healthcare regulations and actions. First of all, it demonstrates why the inclusion of NPs in multidisciplinary CHF care is needed to measure great patient results and increase the effectiveness of healthcare delivery. NPs have various skills useful in improving the integrity and access to top-notch care, including mostly underserved populations and patients in rural and remote areas. Additionally, our report audience is called upon to periodically conduct refresher courses and workshops for NPs to enable them to remain updated with evidence-based care and more capable of satisfying CHF patients' changing needs (Forsyth *et al.*, 2024).

Additionally, our study illustrates the determination to build contact and communication between NPs and Physicians to get the best in CHF management techniques. Healthcare establishments may achieve this integrated approach to care through the teamwork of physicians and NPs. This would allow patients to be given the best comprehensive care. This supports multidisciplinary education and collaborative practice, which help practitioners of the professions integrate. This improves healthcare for the patients and makes healthcare delivery efficient and effective (Schot *et al.*, 2020).

Our results are valid with the study by Ruan *et al.* (2023), who focused more on the crucial role of nurse-led interventions in treating chronic heart failure (CHF) patients. Lewis implemented a project involving a chosen group of patients with CHF under the supervision of nurses and providing educational materials based on scientific evidence, leading to improved outcomes. Likewise, our study represents NPs' role in improving the quality of life and patient satisfaction, which implies that nurse-led management is highly important in optimising CHF management (Ruan *et al.*, 2023).

Secondly, we have also found that our findings align with the study of Norful *et al.* (2017), who showed how nurse practitioners (NP) play an effective role towards CHF patients, including the low-cost but high-quality provision of health care. A report from the University of California-Kuo managed patients rated NP's medication as significantly satisfactory, with greater personalised care delivery, reduced emergency department visits, and hospitalisation rates. Along with other studies that showed similar findings, our study is another piece of data highlighting NPs' outstanding value to CHF management and primary care settings (Norful *et al.*, 2017).

Alongside that, the study caters to the gap illuminated by Gigli & Gonzalez (2022) on the need for more

understanding of the roles and responsibilities of NPs and physicians within the healthcare industry. Gerlier *et al.* put forward the opinion that the scope of practice should be well-defined, and NPs should be paid for their services similarly to all the other medical providers. The study, therefore, presents formal evidence suggesting the possibility of NPs providing optimal care to the elderly with multiple chronic diseases of the long-term type (Gigli & Gonzalez, 2022).

Our study forms part of the evidence base for the growing number of studies which endorse NPs in primary care settings for effective CHF management. Our analysis indicates that the quality of patient care is equal for both NPs and PCPs in terms of increased patient satisfaction and improved quality of life, with the implication of increased involvement of NPs in the CHF medical team and wider collaboration among healthcare professionals. That being said, it is equally necessary to keep improving the models of care as provided in this role and integrate the input and support of NPs to attain better patient care and a more comfortable experience for them in CHF management.

Limitations Future Implications

This study contains limitations, such as English-only questionnaires and the sample group picked in specific North American regions. Being an additional asset to a few countries is better if those countries can access them. Still, there is a permanent physician shortage, and for an NP to bring safety and quality of care through all the life stages, further study is needed. The patients may put their expectations on NPs and physicians differently, which could cause more trouble in patient satisfaction. Thus, a thorough study is required to identify the elements affecting satisfaction and the effort NPs need to use to be a part of it.

CONCLUSION

In conclusion, this study shows empirically that compared to nurse practitioners (NP) and MCPs, patient age is a significant factor in propagating CHF among older patients. Findings indicate that CHF patients experience a mix of symptoms, which care by both NPs and PCPs proves necessary and offers no differences in quality-of-life satisfaction. The study underlines that the multidisciplinary management of CHF and the involvement of NPs in such teams lead to better patient outcomes and increased healthcare quality. This study then gives examples of NPs and physicians working together in unison to make the strategies employed in managing the problems of CHF more effective. However, due to such limitations as a small sample size and examination of only subjectively reported outcomes, the study can only furnish the initial and tentative data. For established results, future studies with bigger samples and different conditions will only be able to validate and give a bigger extent to the given results. In general, the study is a tool towards a common objective of influencing the existing

discussions in healthcare provision and primary care improvement.

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