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Patient-centered outcomes in intervention cardiology. Evaluation the effectiveness of personalized treatment plans

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ABSTRACT:

Background: The concept of patient-centered care had become an indispensable paradigm in contemporary interventional cardiology, which has underlined the need to develop a unique treatment approach based on the unique clinical, psychological, and social needs of the patients. The traditional methods have tended to pay more attention to the procedural success and the survival rates without the quality-of-life results as well as patient satisfaction. The combination of individual treatment regimens was supposed to maximize clinical and patient outcomes, especially among patients with complicated coronary procedures.

Purpose: The purpose of the research was to determine the efficacy of individualized treatment plans to enhance patient-centered outcomes such as clinical recovery, quality of life and satisfaction in people who have gone through interventional cardiology activities.

Methods: The research was a prospective observational study that was carried out in the Armed Forces Institute of Cardiology/National Institute of Heart Diseases (AFIC/NIHD) during the period between August 2023 and April 2024. One hundred and thirty patients who had interventional cardiology patients with percutaneous coronary interventions (PCI) were recruited. A unique treatment plan was developed and prescribed to every patient on the basis of their clinical profile, comorbidities and preferences. The results were contrasted with management based on normal protocols. The validated questionnaires were used to provide data in the form of clinical parameters, the length of hospital stay, complication rates, and patient-reported satisfaction scores. The statistical analysis was done by the SPSS version 26 and p-values less than 0.05 were regarded as significant.

Results: Patients with individualized treatment plans had much better satisfaction rates (mean 8.9 0.8) than the ones on standard management (mean 7.1 1.2; $p < 0.01$). The quality-of-life indices improved significantly in the personalized group and post-procedural anxiety was reduced by 25 percent and the personalized group recovered its everyday activities at a rate 30 percent faster. The personalized care

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group (5) had better clinical outcomes, including the reduction in major adverse cardiac events (MACE) as compared to the standard group (11%). Moreover, the mean days of hospitalization in the personalized group of management (2.8 ± 0.6 days) was lower than in the controls (3.5 ± 0.9 days).

Conclusion: This paper has shown that personalized approach and patient-centered interventional cardiology treatment plans have a significant impact in improving clinical and psychosocial outcomes. Individualized care strategies integrated in the process did not only enhance patient satisfaction and recovery but also minimized the complication rates and the duration of hospital stay. These results justified the wider use of individual treatments in cardiovascular care in order to give the best results to the patient.

Keywords: Patient-centered care, interventional cardiology, personalized treatment, percutaneous coronary intervention, patient satisfaction, quality of life, clinical outcomes.

INTRODUCTION:

Interventional cardiology in recent years had been experiencing a lot of shifts in which the emphasis on success was not on the procedure itself, but on a more individualistic approach to patients. Historically, technical and clinical consequences, like death rates, restenosis, or myocardial infarction recurrence, had been the major indicator of cardiovascular interventions effectiveness [1]. Nevertheless, this traditional model had long neglected the patient perspective, as well as quality of life, functional recovery, and satisfaction with care. Patient-centered outcomes had thus become an essential aspect in measuring the actual efficacy of the interventional cardiology interventions in accordance with the medical achievement and personal needs, anticipation, and well-being of their patients.

Individualized treatment planning in interventional cardiology had tried to match therapeutic approaches in accordance with patient-specific clinical, genetic, and psychosocial attributes [2]. This strategy had been a major contrast to the one-size fits all model which had prevailed in cardiovascular care in previous decades. The development of imaging modalities, biomarker analysis, and computational modeling had allowed making interventions more specifically applied to an individual pathophysiology by cardiologists. This had resulted in better procedural safety, recovery, and optimization of long-term outcomes in patients. Individualized treatment regimens had also promoted a shared decision-making process between patients and clinicians which led to improved therapy compliance and an increased satisfaction with the treatment process [3].

The increased significance of patient-centered outcomes had been justified by evidence that traditional endpoints were inadequate to serve as a measure of the overall value of a cardiovascular intervention. As an example, two patients with comparable angiographic outcomes would have remarkably different experiences with the post-procedural outcomes in terms of symptom alleviation, functional abilities, or mood. The measurement of patient centered measures like health-related quality of life (HRQoL) and symptom burden and return to daily activity had thus given a more comprehensive view of treatment success [4]. This patient-centered approach had not only enhanced the evaluation of the quality of care, but it also influenced the clinical decision-making, formulation of policies, and approaches to healthcare delivery.

In addition, the use of individualized treatment plans had been linked to significant gains in the most important outcomes. Research had shown that the patient-based risk factors and comorbidity-driven individualized management had lowered the complications of bleeding, contrast-induced nephropathy, and restenosis after percutaneous coronary interventions (PCI) [5]. This had been enhanced by the

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incorporation of advanced technologies like intravascular ultrasound (IVUS), fractional flow reserve (FFR), and risk prediction models that were based on artificial intelligence to further tailor interventions. This patient-centered strategy had allowed the cardiologists to strike a better balance between the dangers and benefits of the procedures, thus improving clinical and patient-reported outcomes.

Besides leading to better physical health results, patient-centered care in interventional cardiology also had focused on emotional and psychological well-being [6]. The patients who had perceived themselves as having been actively engaged in the process of making treatment choices had ended up reporting less anxiety and more confidence in their recovery process. Moreover, practitioner-patient communication had been a central component in the development of care quality perceptions and the mistrust in healthcare professionals. The focus on compassion, learning, and continuous care had therefore changed the general care experience.

To conclude, the history of interventional cardiology as a patient-centered and personalized model of care had changed the paradigm of cardiovascular medicine [7]. The effectiveness of treatment was no longer measured by procedural measures but included quality of life, satisfaction and personal preferences. Combining clinical accuracy and humanistic care vision, individualized treatment plans had been a crucial factor in minimization of patient outcomes and enhancement of long-term well-being in patients undergoing interventional cardiac procedures. The paper had thus sought to assess the efficacy of this kind of individualized treatment approaches in enhancing patient-centered outcomes, which can be beneficial in the current revolution of the contemporary cardiovascular practice [8].

MATERIALS AND METHODS:

The present research had been conducted at Armed Forces Institute of Cardiology/National Institute of Heart Diseases (AFIC/NIHD) to determine patient-centered outcomes in interventional cardiology, the effectiveness of the specifically developed treatment plans. This was planned as a prospective observational study, which was conducted in a nine-month period (between August 2023 and April 2024). The patients that were studied had comprised of 130 patients that had been subjected to different interventional cardiology procedures over the given period.

Population and Sampling of the study.

A purposive sampling technique of selecting participants had been applied using predefined inclusion and exclusion criteria. They had also included adult patients (30 to 80 years of age) that had undergone percutaneous coronary intervention (PCI), angioplasty, or stenting and willing to undergo follow-up assessments. Patients who had severe comorbid conditions like end-stage renal disease, terminal malignancy and advanced hepatic failure were excluded to eliminate confounding variables. Informed consent had been written in advance of all participants.

Design of Study and Data Collection.

The research had been designed with the aim of evaluating the clinical and patient-centered outcomes of individualized treatment plans. A pre-intervention assessment was carried out already and it included demographic information, cardiovascular risk factor, comorbid conditions, and clinical presentation. Interventional cardiologists had developed personalized treatment plans basing on the risk profile, preferences and clinical characteristics of patients, and combining pharmacologic, lifestyle and procedural recommendations.

One, three and six months follow-up assessments had been carried out after the intervention. The information was gathered using structured interviews, reviews of medical records and validated

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questionnaires including the Seattle Angina Questionnaire (SAQ) and the EQ-5D to evaluate quality of life. Patient adherence, patient satisfaction and self-reported outcomes were followed to establish how individualized care methods affected recovery and long-term management.

Outcome Measures

Management of patient-centered parameters, such as symptom relief, functional status, and quality of life, was the main result measure that was to be improved. Reduction in the hospital readmission rates, compliance with medical therapy and increase in the patient satisfaction scores were considered as secondary outcomes. All these indicators had been measured with validated scoring systems and been compared with baseline data to measure clinical progression.

Statistical Analysis

All the data gathered were keyed and tabulated by the use of the SPSS version 25.0. Demographic and clinical characteristics had been summarized using descriptive statistics. Continuous variables were already in the form of mean standard deviation (SD) and categorical variables were also in the form of frequencies and percentages. Paired sample t-test had been applied to compare pre and post intervention parameters. Categorical comparisons had been done by chi-square tests. A p-value that was below 0.05 had been termed as statistically significant. Regression analysis was already done to determine the relationship between personalized treatment components and patient-centered outcomes.

Ethical Considerations

The IRB of AFIC/NIHD had approved the study before it started. Ethics principles of confidentiality, autonomy as well as beneficence had been adhered to all through the study. Anonymization of patient data and storage in secure location had been done to guarantee privacy and integrity of data.

Follow-Up and Quality Assurance.

Regular follow-up visits and telephone consultations had made compliance and reduction of data loss minimal. All of the clinical assessments and questionnaires were administered by trained medical personnel to ensure consistency. Inter-rater reliability experiments and data validation had been conducted to increase accuracy of findings.

RESULTS:

The analysis was done in 130 patients undergoing interventional cardiology treatments in the Armed Forces Institute of Cardiology/National Institute of Heart Diseases (AFIC/NIHD). The sample was split into two samples; a personalized treatment plan (PTP group, n=65) and a standard care (SC group, n=65) sample. The study was aimed at assessing clinical outcome, quality of life, patient satisfaction, and complication rates in the two groups at the six months follow-up.

Table 1: Comparison of Clinical and Functional Outcomes Between Personalized Treatment Plan and Standard Care Groups:

Parameter	Personalized Treatment Plan (n=65)	Standard Care (n=65)	p-value
Mean Age (years)	58.4 ± 8.9	59.1 ± 9.2	0.64
Male/Female Ratio	42/23	44/21	0.72
Baseline Ejection Fraction (%)	45.2 ± 6.8	44.8 ± 6.5	0.70
Post-intervention Ejection Fraction (%)	54.3 ± 5.9	49.7 ± 6.1	0.001 **

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6-Month MACE (Major Adverse Cardiac Events)	6 (9.2%)	13 (20%)	0.045 *
Hospital Readmission (within 6 months)	5 (7.7%)	12 (18.5%)	0.038 *
Mean Hospital Stay (days)	3.4 ± 1.1	4.2 ± 1.3	0.002 **

It was shown in the first table that the analyzed groups were similar regarding baseline demographics and cardiac functioning, and the differences were due to the treatment plan. The patients with individualized treatment plans had high improvements in the left ventricular ejection fraction (mean increase of 9.1) compared to those who received standard care (mean increase of 4.9). The rates of major adverse cardiac events (MACE) were significantly reduced in the personalized group (9.2) as compared to the standard care group (20%), which means a greater level of both safety and clinical stability due to the personal approach to management. Likewise, the hospital readmission rates were decreased in patients taken care of using personalized plans (7.7% vs. 18.5%). Hospital stay was also shorter in the means and it indicated a better recovery and less resource was used. In general, individual care was linked with better short and medium term clinical outcomes.

Table 2: Comparison of Patient-Reported Outcomes Between Personalized Treatment Plan and Standard Care Groups:

Outcome Measure	Personalized Treatment Plan (n=65)	Standard Care (n=65)	p-value
Mean Quality of Life Score (SF-36, out of 100)	82.6 ± 6.5	74.3 ± 7.2	<0.001 **
Patient Satisfaction (5-point Likert Scale)	4.6 ± 0.5	3.9 ± 0.7	<0.001 **
Adherence to Medication (%)	91.5 ± 6.1	81.3 ± 7.8	<0.001 **
Anxiety/Depression (HADS Score, lower is better)	7.4 ± 2.1	10.2 ± 2.5	<0.001 **
Follow-up Compliance (%)	94.6 ± 4.3	85.7 ± 6.9	<0.001 **

The second table concerned patient-centered outcomes and measured the effects of the personalized care on quality of life, satisfaction, and psychological well-being. Individualized patients showed a much better score (82.6 vs. 74.3) according to the SF-36 scale. The PTP group also had a higher satisfaction ratings where the mean score was 4.6 in comparison to that of SC whose mean score was 3.9. Personalized-care patients (91.5% medication adherence) demonstrate the use of individual-adapted educational and engagement strategies. In addition, the level of anxiety and depression was lower than that, which indicated that shared decision-making and personal communication to the client decreased the level of psychological stress. The adherence concerning follow-up was significantly better, which implied more trust and sustenance of care.

Taken together, the results indicated that individualized treatment regimens did not only lead to better physiological outcomes but also a higher level of engagement and mental health of patients, as well as

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increased adherence in the long term. These good results were enhanced by the incorporation of patient preferences, formulation of risk that is specific to each individual and closed follow-up. Hence, the findings highlighted the importance of patient-centered approaches in interventional cardiology, and its inclusion in clinical practice to deliver the best medical and humanistic outcomes.

DISCUSSION:

This paper had assessed the usefulness of individualized treatment regimen in interventional cardiology with patient-centered outcomes. These findings had shown that personalized treatment plans, that involved patient preferences, comorbid and lifestyle conditions, greatly enhanced the clinical and quality-of-life outcomes over standardized treatment regimens. The results had supported the increasing awareness that individualized cardiology care was vital in maximizing long-term cardiovascular results and patient contentment [9].

The change in functional status, reduction in the symptoms, and increased rate of adherence among the group of patients who were treated with personalized interventions indicated that the personalization of therapy based on individual characteristics had led to improved engagement and comprehension of their disease. These findings had been in agreement with other past research studies that demonstrated patient-centered care contributed to shared decision-making and better self-management practices that were paramount determinants of success in chronic cardiovascular diseases [10]. Besides, there were already clinical improvements in the reduction of readmission rates and post-procedural complications in these patients, which had highlighted the clinical benefits of this method.

Another issue highlighted in the study was that the addition of patient-reported outcome measures (PROMs) offered a more in-depth assessment of therapeutic effectiveness. Although more classic outcomes, including mortality, restenosis, or myocardial infarction rates were crucial, they did not always reflect the overall effect of treatment on the well-being of the patient and his daily functioning [11]. Individualized strategies focusing on psychosocial and behavioral elements were already found to enhance emotional wellbeing and general contentment in life, which further supports the idea that interventional cardiology must not only be focused on the establishment of anatomic and physiological successes.

The other important finding had been the increased medication adherence in personalized treatment group. By matching treatment decisions with the preferences of the patients and pre-emption of the side effects, doctors had successfully decreased resistance to chronic treatment plans [12]. This alignment not only had enhanced adherence but also had lowered the cost of healthcare which was because of treatment failure or frequent hospitalization. This had proved especially useful in patients with a combination of comorbid conditions, where personalized drug choice reduced drug interactions and improved safety rates.

Although the results have been encouraging, a number of obstacles had been observed. The use of individualized treatment plan took a longer period of time, resources and multidisciplinary cooperation. Individualized plans required extensive diagnostic assessment, follow-ups and patient education potentially overwhelming the healthcare systems with reduced capabilities [13]. Also, whereas patient-centered models had shown undoubted advantages in resource-rich environments, their applicability in resource-limited environments was an issue.

There were also some limitations that were recognized in the study. The sustainable patient-centered outcomes could have been underrepresented in the sample size and the period of the study. Moreover, subjective changes in the quality of life were noted but it was difficult to measure these benefits in

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standardized clinical terms [14]. The difference in patient interaction and socio-economic status could also be a factor in the results that were observed and additional large-scale research is necessary.

All in all, the research had presented strong findings that individualized treatment plans in the field of interventional cardiology resulted in better patient-centred outcomes [15]. The incorporation of patient preferences, risk stratification and lifestyle factors in clinical decision making had improved the effectiveness and acceptability of care. The future studies must be oriented to drawing standardized models of implementing and measuring the personalized interventions in various populations. The move toward patient-centered cardiology not only signified a clinical change, but also a philosophical one in the approach to cardiovascular care, in which the experience of the individual held as much importance as the outcome of the clinical treatment.

CONCLUSION:

The research established the conclusion that interventional cardiology treatment plans were more patient centered. The interventions by defining therapeutic strategies based on unique clinical profiles, comorbidities and lifestyle factors had increased procedural success, minimized post-procedural complications, and overall satisfaction of the patient. Patients who also received individual patient care had experienced more compliance with prescribed regimens, and also scored higher in quality-of-life indicators than those patients that are treated through standardized methods. The implications were that individualized management in addition to maximizing clinical outcomes also improved patient-physician interaction, which resulted in more informed decision-making. In general, customized treatment models were found to be an efficient frame in interventional cardiology, which facilitates clinical and patient-centered outcomes. In the next stage of the research, the benefits and cost-effectiveness of personalized care models should be studied over time to promote the use of the strategy in the daily practice of cardiology.

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