Patient satisfaction with nursing care in infertility patients: A questionnaire survey

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Abstract: Infertility remains a persistent global reproductive health challenge, with causative factors encompassing abnormalities in both the male and female reproductive systems. Typically, female partners seek initial consultations for infertility concerns, often within the context of routine annual well-woman check-ups. Nurses providing preventive care play a crucial role, conducting initial diagnostic assessments, and addressing certain causes of infertility. Patient satisfaction serves as a vital indicator of care quality. Identifying factors contributing to patient satisfaction with nursing services is crucial, yet research in this area has been limited. This study aimed to compare infertility patients' assessments of nurse quality and satisfaction with hospital services. The findings could offer valuable insights for healthcare providers, hospitals, and policymakers, guiding improvements in nursing care delivery and enhancing patient satisfaction in China's infertility treatment sector. By understanding patients' perspectives and experiences, healthcare providers can make necessary adjustments to improve care quality and patient outcomes. The sample included 1200 patients, and data collection utilized a self-assessment questionnaire, with percentages employed for analysis. Nurses are integral to caring for infertility patients during visits and conducting research to advance fertility care practices.

Keywords: patient satisfaction, healthcare quality, infertility

Introduction

Infertility is commonly defined as the inability to achieve pregnancy for a duration of 12 months or more despite regular, unprotected sexual intercourse, leading a significant number of individuals to seek services that can provide them with the possibility of pregnancy (*1*). Given the potential long-lasting and devastating emotional and psychological impact of infertility on couples and individuals, nurses are advised not to overlook the social and psychological complexities of infertility (*2*). In the context of infertility consultations, nurses play multiple roles, including providing support, education, coordinating care, and advocating for individuals struggling with infertility. This necessitates an understanding of the complexity of infertility issues and care (*3*). An increasing number of women are in search of fertility treatment options (*4*), underscoring the importance of healthcare professionals, particularly nurses, possessing an up-to-date knowledge of contemporary infertility treatments and available options. As such, the general public can benefit from seeking guidance from nurses on all aspects of healthcare-related matters (*5,6*). The incidence of infertility can take a toll on both women and their partners, potentially causing significant grief and disappointment, particularly when faced with potential pregnancy loss (*7,8*). Therefore, providing professional nursing care is a vital component in addressing the unique requirements of such patients (*9*).

In light of all the complexities that can arise in women's reproductive health, specialized nurses have a critical function to fulfill in supporting infertility care and management (*10*). With the increasing number of women seeking infertility treatment, the demand for skilled nurses with expertise in this field continues to rise. Irrespective of whether they are employed in direct care roles for infertile patients or other facets of the healthcare industry, nurses must possess comprehensive knowledge of the infertility experience, including the various stages of treatment and appropriate avenues for care (*11*). To develop tailored care plans that suit individual needs, a systematic, step-by-step approach is necessary, allowing healthcare providers to understand each woman's situation and apply general nursing theory to her specific circumstances (*12*). The impact of infertility on mental well-being has been a subject of keen research interest. Infertility can be regarded as

a prolonged source of stress, which may contribute to a broad range of psychological issues (*13,14*). Several studies have demonstrated that women who receive counselling and actively participate in nurse-led support groups have better chances of achieving successful pregnancies compared to those who do not receive such support (*15*). In addition, some evidence suggests that stress has a direct impact on the outcome of infertility treatment (*16*). Nurses who work with infertility patients must be prepared to conduct comprehensive assessments of patients, assist in reducing discomfort, and provide optimal counselling. Every woman's journey of experiencing and managing infertility is unique, and healthcare professionals must pay close attention to her narrative to provide the best care. It is important for nurses to avoid making assumptions based on factors such as occupation, education level, or financial status. Even those with medical or healthcare backgrounds may have limited knowledge about infertility and may require empathetic explanations (*17,18*).

This article delineates the systematic approach of assessing, planning, implementing, and evaluating the care process for women undergoing infertility assessment and intervention. The primary objective of the study was to evaluate the satisfaction levels of infertility patients with the care provided by nurses. To address the research aim and objectives, a descriptive research design was adopted to determine patients' contentment with the quality of care administered.

Materials and Methods

A descriptive research design

The study population consisted of patients who met the diagnosis of infertility and patients were surveyed and interviewed about their satisfaction with the care they received. The inclusion criteria for the study were: patients who had been married for at least 1 year (*19*), having normal sex life, not using any contraception and unable to pregnancy. The final sample consisted of 1,200 patients. All research content and methodologies strictly adhere to the Helsinki Declaration and have received approval from the Ethics Committee of the Obstetrics & Gynecology Hospital affiliated with Fudan University (2021-154-X1). Clinical data for statistical analysis were derived exclusively from cases meeting diagnostic criteria with complete information. Informed consent was obtained from all patients involved in the study.

Procedures

This study focuses on the satisfaction of infertility patients with outpatient and inpatient healthcare services, covering data collected from July 2022 to July 2023. The focus of the research was the voluntary assessment of satisfaction among patients aged 20 to 45

during their recent outpatient and inpatient treatments. Data collection was conducted through questionnaire surveys, with respondents having the option to complete electronic versions of the questionnaire either during outpatient visits or within hospital wards. This voluntary assessment approach helps to comprehend patients' subjective perceptions of healthcare services, providing a comprehensive evaluation of both outpatient and inpatient treatments. Firstly, a questionnaire was used to measure the quality of nursing care. The satisfaction instrument was modified from the LaMonica-Oberst Patient Satisfaction Instrument to collect data (*20*). The study utilized a rating system that was adapted from a Likert scale (*21*), providing the participants with a range of responses from "strongly agree" to "strongly disagree". A 5-point scale was used, 1) for "Strongly agree", 2) for "Agree" and 3) for "Neither" and 4) for "Disagree" and for 5) "Strongly disagree".

The study applied a multidimensional method of Structural Equation Model (SEM) to estimate and verify the relationships between the variables (*22*). SEM is a statistical technique that integrates Confirmatory Factor Analysis (CFA) and Path Analysis (PA) approaches to analyze the relationships between multiple variables, both latent traits and observable variables (*23*). The CFA technique was employed to deduce the underlying factors or latent traits, such as patient attitudes and satisfaction levels towards selected factors, alongside the corresponding manifest variables. Meanwhile, the PA approach was employed to identify the causal relationships between the latent variables by producing a path diagram in the form of an SEM model (*24*).

Statistical analysis

A chi-squared test result with $p < 0.05$ was considered as indicating a good model fit for the SEM. $P < 0.05$ indicates a statistically significant difference. Acceptable levels of fit were defined by Comparative Fit Index (CFI) and standardized root mean square residual (SRMR) values greater than or equal to 0.90 and less than 0.80, respectively (*25*). All the collected data were subjected to descriptive analysis and SEM. Specifically, the SPSSPRO software was utilized to evaluate the data structure and establish the equation models. The SEM parameters were computed using the maximum likelihood approach and validated based on the established models. Through this process, the SEM approach helped to determine the factors that influence infertility patient satisfaction, and establish the connection between patient adherence, satisfaction, and their degree of impact.

Results

Analysis of overall satisfaction with care services

The number of completed questionnaires was 1,225

(98%). Twenty-five patients were deemed unusable due to incomplete questionnaires. Therefore, the sample of 1,200 infertile patients for analysis were conducted. Table 1 presents the Likert scale questions used to assess infertility patient satisfaction with care, totaling 5 questions. According to the research design, the respondents were requested to evaluate their satisfaction level using a rating scale of 1 to 5. The survey questions presented to the respondents encompassed various aspects relating to the quality of care and the nursing staff's performance. These questions aimed to obtain feedback on several factors influencing patient satisfaction with nursing care, such as the provision of emotional support, communication, explanations of medical procedures, accessibility, and promptness of care, among other aspects. By collecting and analyzing the data from these questions, healthcare providers can assess patient satisfaction levels, identify areas for improvement, and develop strategies to enhance overall patient satisfaction (Table 1).

Structural equation model path diagram

In this study, we used SEM path diagrams to investigate infertility patient satisfaction factors and the correlation between patient adherence and satisfaction. They outline connections among variables such as patient medical adherence, satisfaction, healthcare service quality, and communication effectiveness. Arrows indicate directional relationships, showing if one variable predicts changes in another (26). The path diagrams help identify variables directly influencing satisfaction and reveal indirect pathways through other mediating variables, contributing to understanding the complex mechanisms behind satisfaction formation (27). They also represent the researcher's hypotheses about causal relationships among variables, clarifying which variables are considered as drivers in the model. Moreover, the path diagram aids in identifying variables directly influencing satisfaction and reveals pathways of indirect influence through other mediating variables. This contributes to the understanding of the intricate mechanisms underlying the formation of satisfaction. The path diagram expresses the researcher's hypotheses regarding causal relationships among variables. By examining the directionality of paths, it elucidates which variables are considered the drivers of causal relationships in the model.

According to the results of the fit test summaries and the application of the SEM method, the final SEM model presented in Figure 1 was deemed to be the most appropriate solution for the study. This model was able to effectively estimate and quantify the relationships between the latent variables and their corresponding manifest variables and establish both significant indirect and direct connections between the variables. Figure 1 depicts the weighted structure path diagram, consisting of the model's standardization coefficients, which provides insight into the influence of the structural pathways on the relationships among the variables. The SEM model for infertility patient satisfaction with nursing consists of four latent variables (Professionalism, Emotional Care, Satisfaction, Medical Adherence) and 11 observed variables. The relationships between the final SEM model and variables are depicted in Figure 1.

A hypothesized direct relationship

The Table 2 represents the factor loading coefficient table of the model, encompassing latent variables, observed items, non-standardized loading coefficients,

Table 1. Likert scale for assessing infertility patient satisfaction with care (*n* = 1,200)

Categories	Questions	Strongly Agree	Agree	Neither	Disagree	Strongly Disagree
Professional knowledge and skills of nurses	To what extent are you satisfied with the professional knowledge and skills of the nurses?	80%	10%	5%	5%	0%
Execution quality	Does the care team follow a well-established treatment plan and process?	83%	12%	2%	3%	0%
Decision-making transparency and clarity	How satisfied are you with the transparency and clarity of decision-making by both nurses and doctors?	70%	22%	4%	4%	0%
Quality of communication and explanation of information related to infertility	How satisfied are you with the quality of communication with nurses throughout your care process?	30%	35%	10%	22%	3%
Attitude and performance of nursing staff	How satisfied are you with the timeliness and thoroughness of the medical advice and counseling provided by the nursing staff?	45%	25%	10%	20%	0%
	How satisfied are you with the quality of communication and the clarity of information provided regarding infertility during your care?	78%	12%	5%	5%	0%
	How satisfied are you with the responsiveness and timeliness of communication regarding the support and recognition you receive?	45%	32%	13%	5%	5%

Z-test results, and related information. In the assessment of measurement relationships, the first item was utilized as the reference point. The findings from Table 2, based on the path coefficient table of the model, indicate the rejection of the null hypothesis for both Professional Knowledge and Execution Quality, as their standard load coefficients surpass 0.4 (***$p < 0.001$). This signifies a satisfactory level of explained variance, suggesting that each variable exhibits a meaningful degree of interpretability within the same factor. Comparable observations are applicable to the rejection of the null hypothesis at the level of Human Care and Service Attitude variables, where each variable's standard load coefficient exceeds 0.4 (***$p < 0.001$), underscoring the substantial influence of these latent variables on their respective factors. Furthermore, at the levels of Attitude and Dependency, the null hypothesis was also rejected. This implies a significant impact of these latent variables on their associated factors, thereby contributing meaningfully to the overall satisfaction level of infertility patients. The standardized loading coefficients for

both Attitude and Medical Adherence exceed 0.4 (***$p < 0.001$), indicating a substantial effect on their respective factors. This underscores a sufficient level of interpretability, suggesting the potential for each variable to manifest on the same factor.

The assessment of standardized regression coefficients

The Table 3 presents the regression coefficients of the path nodes, employing the least squares single linear regression method. The path coefficient table of the model indicates that the pairing of Professionalism to Satisfaction was statistically significant, with a *p*-value of 0.025 (*$p < 0.05$), and an associated influence coefficient of 0.144. Similarly, for the pairing of Emotional Care to Satisfaction, the null hypothesis is rejected, with a *p*-value of 0.024 (*$p < 0.05$), signifying a statistically significant and valid path, characterized by an influence coefficient of 0.144. Furthermore, the pairing of Satisfaction to Medical Adherence demonstrates a statistically significant path with a *p*-value of 0.007 (**$p < 0.01$),
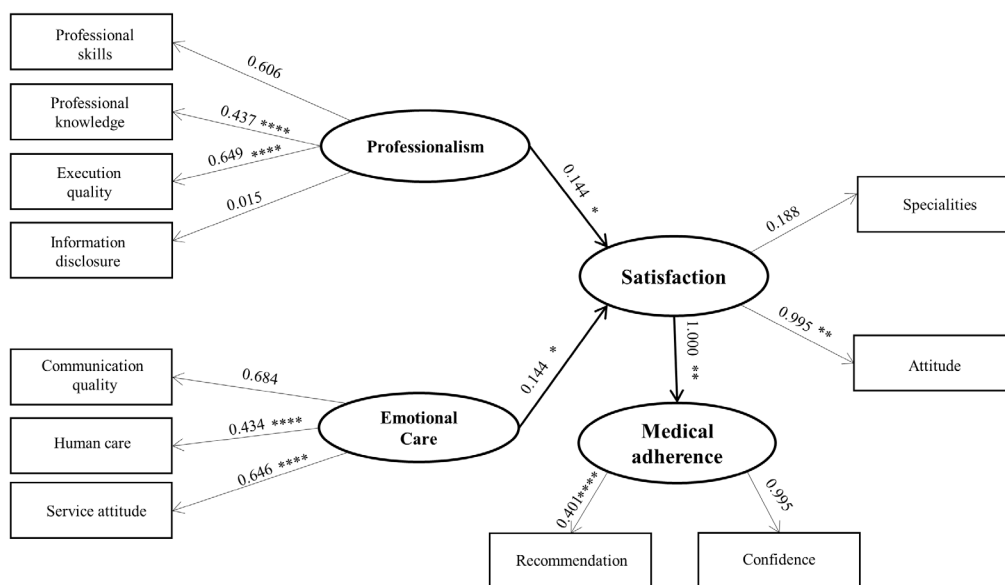

Figure 1. Structural equation model path diagram. This is a path diagram of a SEM illustrating the associations among Professionalism, Emotional Care, Satisfaction, and Medical Adherence. **$p < 0.01$; ***$p < 0.001$; ****$p < 0.0001$.

Table 2. Factor loading coefficient

Factor	Variables	Unchanged factor loading	Standardized factor loading	*Z*	S.E.	*p*
Professionalism	Professional skills	1	0.606	-	-	-
	Professional knowledge	0.765	0.437	8.93	0.086	0.000****
	Execution quality	1.158	0.649	10.634	0.109	0.000****
	Information disclosure	0.026	0.015	0.956	0.027	0.339
Emotional Care	Communication quality	1	0.604	-	-	-
	Human care	0.762	0.434	8.896	0.086	0.000****
	Service attitude	1.157	0.646	10.592	0.109	0.000****
Satisfaction	Specialities	1	0.188	-	-	-
	Attitude	4.104	0.995	2.702	1.519	0.007**
Medical Adherence	Confidence	1	0.995	-	-	-
	Recommendation	0.459	0.401	6.166	0.074	0.000****

Abbreviations: S.E., standard error. **$p < 0.01$, ****$p < 0.0001$.

confirming its validity, and an associated influence coefficient of 1.0.

Evaluation of model fit indicators

In Table 4, the model was deemed well-fitted, with a RMR < 0.1. The CFI index is employed in the comparison of hypothetical and independent models, with a value closer to 1 signifying a better fit. With a CFI of 0.9 in these results, the model is considered well-fitted. The fit indices in Table 4 suggest that the final SEM has a good fit with the observed data. CFI and Tucker-Lewis Index (TLI) values above 0.95 indicate a good fit, while the Root Mean Square Error of Approximation (RMSEA) value of 0.06 and the Standardized Root Mean Residual (SRMR) value of 0.07 are both below the acceptable thresholds of 0.08, indicating a reasonable fit. Additionally, both the Goodness of Fit Index (GFI) and Adjusted Goodness-of-Fit Index (AGFI) values were above 0.90, indicating a good model fit. All these fit indices collectively suggest a satisfactory alignment between the conceptual model and the data, supporting the overall validity and reliability of the model. Therefore, the final SEM model can be considered a robust fit for the data employed in this study.

A path-node covariance matrix

The Table 5 presents the results of the factor covariance analysis, including non-standard coefficient, standard error, *Z*-test values, *p*-values of significance, and standard coefficient. Based on the results of the covariance analysis, the covariance relationship between

Professionalism and Emotional Care was found to be significant. The standardization coefficient of 1.642 indicates a strong association between these two latent variables. Therefore, it was suggested to add the path relationship for the analysis, as it would help to provide a more accurate representation of the relationships between these variables in the SEM model. Adding the path relationship would also help to improve the goodness of fit of the model and enhance the overall accuracy and reliability of the results. Hence, it is essential to analyze the path relationship between Professionalism and Emotional Care to derive meaningful insights from the data and improve the understanding of their interrelationship.

Discussion

Nurses have a crucial role to play in infertility treatment and are instrumental in offering care and support (*18*). They can provide educational material on fertility treatment, help with treatment manipulation, and offer emotional support throughout the process (*28*). Nurses often collaborate with a multidisciplinary team, which may include reproductive endocrinologists and psychologists, to develop a personalized care plan for each patient.

For the SEM method to be applied, the selected variables were assumed to follow the normal distribution (*29*). Therefore, the basic descriptive characteristics were computed to assess the normality assumption of the data. The z-score values were then calculated based on the standard deviation, skewness, and kurtosis values, which were found to be in the normal range of ± 1.5 and

Table 3. The model regression coefficient

Factor (Latent variable)	Analyzed variables (manifest variables)	Non-standardized coefficients	Standardization coefficient	Standard error	Z	p
Professionalism	Satisfaction	0.047	0.144	0.021	2.243	0.025[*]
Emotional Care	Satisfaction	0.047	0.144	0.021	2.250	0.024[*]
Satisfaction	Medical adherence	4.104	1.000	1.519	2.702	0.007[**]

[*]$p < 0.05$, [**]$p < 0.01$.

Table 4. Model fit indices

χ^2	df	p	Chi-square degrees of freedom ratio	GFI	RMSEA	RMR	CFI	NFI	NNFI
-	-	> 0.05	< 3	> 0.9	< 0.10	< 0.05	> 0.9	> 0.9	> 0.9
2247.169	40.000	0.000[****]	56.179	0.450	0.525	8.211	0.453	0.450	0.248

Abbreviations: df, degree of freedom; GFI, goodness-of-fit index; RMSEA, root mean square error of approximation; RMR, root mean square residual; CFI, comparative fit index; NFI, normed fit index; NNFI, non-normed fit index. [****]$p < 0.0001$.

Table 5. Table of path-node covariance relationships

Factor A	Factor B	Non-standard estimated coefficient	Standard estimate coefficient	Standard error	Z	p
Professionalism	Emotional Care	0.320	1.642	0.040	7.944	0.000[****]

[****]$p < 0.0001$.

± 3, respectively (*30*). The GFI represents the amount of variance and covariance accounted for by the model, and a score of 0.90 or higher is generally considered an acceptable fit. The CMIN/DF is the ratio of the Chi-Square statistic to the degrees of freedom, and a value of 2 or lower indicates a good model fit. Therefore, if the data depicts a pattern of normality, and the GFI and CMIN/DF values are within the acceptable range, then the SEM model can be considered a suitable method for estimating and verifying the relationships between the variables (*31*). The significance level was set at 5% (α = 0.05). A good model fit is indicated by high values for GFI, CFI, and NFI, as well as low values for CMIN/DF and RMSEA (*32,33*). By examining these fit test summaries, it was possible to verify the suitability of the SEM model and ensure that it accurately represented the relationships between the variables.

According to the table of Factor loading coefficient, it can be concluded that in the final SEM model, the seven variables: Professional knowledge, Execution quality, Human care, Service attitude, Attitude, Medical adherence, and Recommendation can effectively explain the potential factors they represent. This means that they can be considered as different manifestations of the same underlying factor: different variables on the same factor. This also indicates a high degree of internal consistency and reliability of these variables across the model. This is important for assessing the quality and improving the delivery of healthcare.

The table of model path coefficients, it can be seen that in the final SEM model, Professionalism and Emotional Care have a more significant positive effect on satisfaction, which means that if the level of Professionalism and Emotional Care of medical staff was higher. This means that patients are more satisfied with their care if their Professionalism and Emotional Care are higher. In addition, satisfaction also has a significant positive effect on medical adherence, the more satisfied the patient is with the healthcare service, the more medical adherence the patient is on the healthcare service.

According to the results of the analysis of covariance, there is a significant covariance between the variables Professionalism and Emotional Care with a standardized coefficient of 1.642, indicating a strong correlation between these two variables. It is recommended that the relationship between these two variables be added to the SEM model for further analysis. This will allow for a more comprehensive assessment of the quality of healthcare services and patient satisfaction, and provide guidance for the improvement of the healthcare delivery system.

This study's findings shows that high-quality care and positive attitudes among nursing staff can notably enhance the compliance of individuals undergoing infertility treatment. Furthermore, improvements made to the quality of care and service attitudes can enhance the outcome and overall satisfaction of infertility patients to a considerable extent. Consequently, hospital management should prioritize rigorous training and assessments of nursing staff to augment their professional skills and service quality, thereby boosting patient compliance and treatment effectiveness. The limitations of this study were that the questions listed in the questionnaire were not sensitive enough to identify the level of care and secondly, as the patients had many different nurses caring for them, they could not be evaluated uniformly. These contents need to be collected with more information for more comprehensive analysis.

Conclusions

Patient satisfaction and nursing care have long been focal points in the field of healthcare. The professional and research communities have consistently directed their attention towards assessing patients' contentment with medical services. This trend has driven the creation of methodological platforms and the initiation of new research endeavors, aiming to unveil novel determinants influencing the ultimate evaluation of patient satisfaction (*34*). As the pressure to enhance healthcare efficiency and sustainability intensifies, the standards for nursing quality continue to escalate. This trend is poised to significantly impact patients' loyalty to healthcare facilities and exert a direct influence on nursing practices and service delivery. As a result, research efforts are dedicated to a comprehensive exploration and clarification of these dynamic changes, with the goal of providing improved responses to the ongoing evolution within the healthcare domain.

Currently, we are in the process of establishing various mechanisms and formulating strategies to enhance healthcare quality. While a standardized platform and unified assessment parameters are yet to be established, optimal parameters for healthcare quality can be defined, potentially initiating a process of continuous improvement. The in-depth investigation into the causes of dissatisfaction and exploration of methods to address discontent have led to issues related to patient satisfaction progressively becoming a focal point across multiple disciplines. The purpose of this study was to analyze and assess the determinants influencing the overall satisfaction of infertility patients seeking treatment at our hospital. The study sample comprises 1200 patients who received outpatient or inpatient treatment. In this context, both Professional knowledge and Execution quality exhibit standardized loading coefficients exceeding 0.4, indicating their substantial variance-explaining capacity for latent variables within the model. Standardized loading coefficients measure the strength of relationships between observed variables and latent variables, with values above 0.4 generally considered relatively strong associations. The insights provided by the model's path coefficient table reveal significant relationships among different variables and suggest their

potential co-expression on the same factor. This aids in a deeper understanding of the constituents of satisfaction and its related factors in the study. The effectiveness of three pathways in the model, namely Professionalism > Satisfaction, Emotional Care > Satisfaction, and Satisfaction > Medical adherence, has been confirmed through the regression coefficient table. These pathways are not only statistically significant but also reject the null hypothesis, further supporting their significance in the relationships within the model. This provides crucial information for a comprehensive comprehension of the relationships between satisfaction and medical adherence, along with associated influencing factors. The covariance analysis emphasizes the covariance relationship between Professionalism and Emotional Care. The significant result indicates a covariant association between Professionalism and Emotional Care. With a standardized coefficient of 1.642, a robust correlation between these variables is suggested. The results of the SEM indicate that Professional knowledge, Execution quality, Human Care, Service attitude, accommodation satisfaction, and medical staff satisfaction have a positive impact on nursing satisfaction.

The limitations of this study include the uneven distribution of the research sample in specific regions. The methods of comparative analysis and the size of the research sample remain crucial factors in the evaluation process. Nevertheless, our research results furnish valuable information for healthcare personnel.

Conflict of Interest: The authors have no conflicts of interest to disclose.

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