

Original Research

Received 06 June 2026

Revised 23 July 2026

Accepted 08 August 2026

Natural Resources for Human Health 2026, Vol. 6 (14s): 1317–1337

KEYWORDS:

patient-centered care, patient satisfaction, chronic disease management, public hospitals, Egypt Donabedian model, Egypt

Patient Centered Care and Patient Satisfaction in Chronic Disease Management at Public Hospitals in Greater Cairo: A Cross-Sectional Study

Passant A. Nassar¹, Samir Y. Marzouk², and Mai S. Mabrouk³

¹Productivity and Quality Institute, Arab Academy for Science, Technology and Maritime Transport (AASTMT), Egypt. Passantnassar3@gmail.com

²Department of Basic and Applied Science, College of Engineering and Technology, Productivity and Quality Institute (PQI), Arab Academy for Science, Technology and Maritime Transport (AASTMT), Cairo, Egypt. samir_marzouk2001@yahoo.com

³Center for Informatics Science (CIS), Biomedical Informatics Program, School of Information Technology and Computer Science (ITCS), Nile University, Sheikh Zayed City, Egypt. masaid@nu.edu.eg

ABSTRACT:

Background: Patientcentered care (PCC) is widely promoted as an important component of patient experience, yet evidence from resourceconstrained public hospital settings in the Middle East and North Africa region remains limited. Objective: This study examined the association between PCC and patient satisfaction among adults receiving chronic disease management at public hospitals in Greater Cairo, Egypt.

Methods: An analytical crosssectional design was used, guided by the Donabedian structureprocessoutcome framework. A structured bilingual questionnaire comprising the 18item Patient Perception of Patient Centeredness Questionnaire Revised (PPPCR) and an 8item satisfaction scale was administered to 500 adult respondents attending outpatient clinics. Data were analyzed in SPSS 26 using descriptive statistics (frequencies, percentages, means, and standard deviations), Pearson correlation, Cronbach's alpha for reliability, and simple and multiple linear regression with residual diagnostics.

Results: Respondents rated PCC and satisfaction favorably overall (PCC M = 3.14; satisfaction M = 3.12, on a 4point scale). Both instruments demonstrated excellent internal consistency ($\alpha = .96$ and $.94$, respectively). PCC was strongly and statistically significantly associated with patient satisfaction ($R = .970$, $R^2 = .941$, $F(1,498) = 7935.62$, $p < .001$). Among the three PCC subdimensions, Roles/Partnership in Care showed the strongest standardized coefficient ($\beta = .416$), followed by Context and Relationship ($\beta = .312$) and Health Care Process ($\beta = .306$), together explaining 94.1% of the variance in satisfaction.

Conclusion: Patientcentered communication and, in particular, shared decisionmaking and role clarity were strongly associated with satisfaction among respondents in Egyptian public hospitals. Because all measures were collected by selfreport at one time point, the findings should not be interpreted as causal effects.

1. INTRODUCTION

Patient-centered care (PCC) has become a central quality-of-care benchmark in health systems worldwide. The Institute of Medicine's landmark report named patient-centeredness one of six core aims of a high-quality health system, defining it as care that is respectful of and responsive to individual patient preferences, needs, and values (1). This conceptualization built on earlier work by the Picker Institute and Harvard Medical School, whose foundational study of the patient experience identified dimensions of care that patients themselves consider central to a positive encounter, including respect for values, information and education, and involvement of family (2). Consistent with these accounts, patient-centered communication has been operationalized as the elicitation and understanding of patient perspectives, understanding of the patient within his or her unique psychosocial and cultural contexts, and the reaching of a shared understanding of patient problems and treatments concordant with patient values (26).

Rooted in the Donabedian structure-process-outcome model, PCC is conceptualized as a process construct through which structural features of the care environment translate into patient-reported outcomes, including satisfaction (3). Considerable evidence links patient-centered communication with better patient outcomes: an early review of physician-patient communication studies found consistent positive associations between communication quality and health outcomes (4), a finding later formalized within the patient-centered clinical method (5) and extended within primary-care redesign efforts (6). A narrative synthesis of this literature identifies consensus "best practice" communication functions that foster the relationship, gather and provide information, support shared decision-making, respond to emotions, and enable self-management behavior (27). Shared decision-making in particular has been described as central to even the "pinnacle" of patient-centered care (9), with practical models proposed for how it can be enacted during routine encounters (7). Patient-centered communication appears to influence outcomes through several discrete pathways, including clearer information exchange, a stronger patient-clinician relationship, and enhanced patient self-management capacity (8). A 2026 scoping review further shows that integrating patient-generated health data into shared decision-making requires attention to the patient-provider relationship, organizational workflow, ethics, and technology design (39).

The relationship between PCC and satisfaction is not uniform across settings, however. A recent quasi-experimental study in Kenya found that a patient-centered communication intervention did not improve satisfaction scores among patients with chronic life-limiting illness, underscoring that context-specific factors shape whether PCC translates into greater satisfaction (10). A systematic review of the Middle East and North Africa region likewise concluded that PCC is practiced to a limited extent there and that its implementation is shaped by regional cultural contexts, constrained resources, and organizational factors (28). Reviews of the instruments used to measure patient experience have emphasized substantial heterogeneity in how PCC and satisfaction are operationalized across studies (11). Evidence from Egyptian settings adds further nuance: the first assessment of patient satisfaction at an Egyptian tertiary hospital, using a HCAHPS-derived survey, reported mixed satisfaction levels with particular deficits in provider-patient communication and explanation of medications (30), whereas a longitudinal study of Egyptian physicians showed that communication skills training grounded in the PCC model significantly enhanced both patient-centered attitudes and patient satisfaction (29). Broader evidence from African healthcare settings shows that patients and providers emphasize dimensions such as dignity, privacy, communication, and access to care somewhat differently than frameworks developed in European and North American contexts (12), while cross-sectional studies from Nigeria and Uganda have identified consultation length, information-giving, and interpersonal respect as consistent predictors of patient satisfaction in resource-constrained public facilities (13, 23), and low overall outpatient satisfaction has been documented in other public facilities in the region (35). Consultation time itself has been specifically linked to satisfaction in both systematic reviews and primary studies conducted elsewhere (14, 24).

Chronic disease management poses a particular test of PCC because it requires sustained, longitudinal engagement between patients and providers rather than a single episodic encounter. Egypt, like much of the surrounding region, faces a substantial and long-recognized burden of chronic disease: national surveys have documented a high prevalence of diabetes mellitus in Egypt for over two decades (15), consistent with wider trends of rising chronic disease prevalence across Northern Africa (16), and the MENA region now hosts one of the world's highest rates of diabetes, predominantly type 2, a condition whose management depends heavily on patient self-care behaviors (32). In public hospital settings with high patient volumes and constrained provider time, delivering individualized,

patientcentered communication is inherently more difficult, yet arguably more consequential for longterm adherence and satisfaction. Systematic reviews and metaanalyses indicate that patientcentered selfmanagement interventions improve glycemic control and selfcare behaviors in type 2 diabetes (32), and that shared decisionmaking is particularly well suited to longterm, chronicillness decisions, where it can improve satisfaction, adherence, and health status (33).

Evidence from Egyptian and comparable publichospital contexts remains limited, particularly regarding which specific dimensions of PCC the clinical process itself, the interpersonal relationship, or the negotiation of roles and responsibilities contribute most strongly to satisfaction. This study therefore examined (a) the overall relationship between PCC and patient satisfaction among adults receiving chronic disease care at public hospitals in Greater Cairo, and (b) the relative contribution of three PCC subdimensions Health Care Process, Context and Relationship, and Roles (Partnership in Care) to satisfaction. In statistical terms, the null and alternative hypotheses were formulated as follows:

H0: There is no statistically significant linear association between patientcentered care and patient satisfaction in chronic disease management within public hospitals; the Health Care Process, Context and Relationship, and Roles (Partnership in Care) subdimensions are not statistically significantly associated with patient satisfaction.

H1: Patientcentered care has a positive, statistically significant linear association with patient satisfaction in chronic disease management within public hospitals, operationalized through three subhypotheses: (H1a) Health Care Process, (H1b) Context and Relationship, and (H1c) Roles, each is positively and significantly associated with patient satisfaction.

2. METHODS

2.1 Study Design

An analytical crosssectional design was used to measure PCC perceptions and patient satisfaction at a single time point and to test the statistical association between them. A structured quantitative survey served as the sole datacollection method. No provider interviews or hospital-record reviews were conducted or included in the supplied dataset. Reporting followed the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) recommendations for transparent reporting of design, setting, participants, variables, and statistical methods (17, 18). The hypotheses were tested by formulating a null hypothesis of no association between PCC and satisfaction against the alternative hypothesis of a positive, statistically significant association (H0 and H1, above), so that statistical support for H1 is evaluated as rejection of H0 at the prespecified significance level.

2.2 Study Setting

The study was conducted in public outpatient hospital departments in Greater Cairo that provide ambulatory management for chronic conditions such as diabetes, hypertension, cardiovascular disease, chronic kidney disease, and chronic respiratory disease. These settings were selected because they serve a sociodemographically diverse patient population under considerable resource and time constraints, making them well suited to examining how PCC is delivered and perceived when clinical capacity is limited and provider time per patient is scarce.

2.3 Target Population

The target population consisted of adult patients receiving care for chronic diseases in public hospitals. The accessible population comprised eligible patients attending participating hospital departments or clinics during the datacollection period. Healthcare providers, including physicians and nurses involved in chronic disease care, were also eligible as secondary informants for the qualitative component addressing implementation barriers and facilitators.

Inclusion criteria: adults aged ≥ 18 years; diagnosed with at least one chronic disease (diabetes mellitus, hypertension, cardiovascular disease, chronic kidney disease, chronic respiratory disease, or another condition requiring continuing care); received care at a participating hospital during data collection; able to understand the questionnaire language and provide informed consent.

Exclusion criteria: age < 18 years; acute emergency conditions precluding safe participation; inability to provide informed consent due to severe cognitive impairment, severe illness, or unresolved communication limitations; questionnaires with substantial missing data on the core PCC or satisfaction items.

2.4 Sampling Technique and Sample Size

A consecutive convenience sampling approach was used, in which respondents were approached during or immediately after a clinical encounter at three outpatient clinics (Diabetes and Endocrinology, Internal Medicine, and Cardiology/Vascular). This approach is well suited to hospitalbased surveys because it allows respondents to be surveyed close to the point of care while the encounter is still fresh in memory, although it may not generalize to patients who do not attend these facilities. The final dataset contained 500 respondents. Of these, 435 (87%) reported a chronic condition and 65 (13%) reported no chronic condition; all 500 records were retained in the analysis in accordance with the supplied results, and this eligibility discrepancy is reported as a limitation. The principles and formulas for sample size determination in survey research follow the classical treatments of sampling theory (33).

Sample size calculation was based on the desired level of precision and statistical power, using Cochran's formula for an unknown/unlimited population with its finitepopulation correction (33), shown below.

where n is the sample size, z is the critical value (1.960 for a 95% confidence level), N is the population size, and p is the estimated sample proportion (taken as 50%), with $q = 1 - p$ and e the desired margin of error. This yielded a minimum requirement of 384 completed responses. The achieved dataset contained 500 records. Because the supplied file retained all respondents, the descriptive and regression analyses were based on all 500 records. The inclusion of 65 respondents who reported no chronic condition should be checked against the original recruitment records before final submission.

2.5 Study Variables

Study variables were organized according to the Donabedian model: contextual factors describe the care environment, PCC dimensions represent the care process, and patient satisfaction represents the outcome. Sociodemographic and clinical variables were included as descriptive variables; they were not entered as covariates in the supplied regression models because the available results contain only the overall PCC and PCC-subdimension models (Table 1).

Table 1. Study Variables

Variable group	Variables	Operational definition	Planned analysis role
Independent variable	Patientcentered care	Patients' perception of the extent to which the doctor discussed problems, understood the patient, explained the problem and management plan, explored goals, respected values, listened, showed compassion, and encouraged patient participation.	Main predictor
Outcome variable	Patient satisfaction	Patients' perception of the extent to which the doctor discussed problems, understood the patient, explained the problem and management plan, explored goals, respected values, listened, showed compassion, and encouraged patient participation.	Main dependent variable
Demographic variables	Age, gender, education, occupation, marital status, governorate, chronic condition, visit frequency	Patient characteristics collected in the demographic section of the questionnaire.	Adjustment variables and subgroup descriptors
Contextual factors	Hospital resources, workload, consultation time, provider training, care coordination	Structural and organizational factors identified through interviews and contextual review.	Explanatory and interpretive variables

2.6 Data Collection Instruments

The primary instrument was a structured, bilingual (Arabic/English) questionnaire comprising a sociodemographic and clinical section and the 18-item Patient Perception of Patient-Centeredness Questionnaire-Revised (PPPCR; Ryan et al., 2019). Demographic items captured age, gender, highest level of education, occupation, chronic condition status and specified condition, marital status, governorate of residence, and frequency of facility visits.

The PPPCR's 18 items reflect core aspects of the patient-centered clinical method, including exploration of health problems, understanding of the patient, explanation of the health problem, agreement with the physician's opinion, discussion of treatment goals, explanation of the management plan, consideration of manageability in daily life, personal care and empathy, knowledge of the patient's family and home situation, comfort discussing personal problems, respect for beliefs and values, consideration of thoughts and feelings, compassion, trust, discussion of roles, and encouragement of the patient's desired role in care and decisionmaking (19). An 8-item patient satisfaction scale assessed satisfaction with communication, time spent, care coordination, and overall experience. Items in both scales were rated on an ordered Likert-type response format, a widely used format for measuring attitudes and perceptions that yields scores suitable for descriptive and regression analyses (36).

Responses used ordered Likert-type categories. Items were coded consistently, with reverse coding applied where necessary, so that higher composite scores reflect higher perceived patient-centeredness and satisfaction. The questionnaire dataset contained 18 PCC items and eight patient-satisfaction items. No provider interview or hospital-record-review data were available for analysis.

2.7 Pilot Testing

A pilot test was conducted with a small group of eligible patients prior to full administration to evaluate the clarity, length, and feasibility of the questionnaire, including whether participants understood the questions, whether response options were appropriate, and whether administration was practical in the hospital environment. Feedback from the pilot informed refinements to wording and instructions and supported the validity and reliability testing described below.

2.8 Validity and Reliability

Content validity was supported by using an established, previously validated measure (19) with demonstrated factor-structure evidence, including in multimorbidity populations (20) and independent validity and reliability evaluations in other cultural contexts (21), and by aligning questionnaire content with the study objectives and theoretical framework. Item-total correlations were used as evidence of item-scale coherence and internal consistency; they should not be interpreted alone as proof of convergent validity. Item-total correlations were used as evidence of item-scale coherence and internal consistency; they should not be interpreted alone as proof of convergent validity. Face validity was assessed through review for clarity, relevance, and cultural appropriateness, with expert review from academic supervisors and specialists in healthcare quality, public health, and chronic disease management; because the questionnaire is bilingual, particular attention was given to equivalence between the English and Arabic wording.

Item-total Pearson correlations, shown in Table 2, ranged from .684 to .856 for the PCC items and from .825 to .858 for the satisfaction items. Every item-total correlation was statistically significant at the 0.01 level (all $p < .001$), supporting the internal coherence of each dimension. Consequently, a separate significance column was omitted from Tables 2 and 3 in the interests of concision.

Table 2. Item-Total Correlation Coefficients for Patient-Centered Care Statements

Subdimension	Statement	Pearson
Health Care Process	1	.684**
	2	.701**
	3	.755**
	4	.716**
	5	.719**
	6	.788**
	7	.749**
	8	.763**
Context & Relationship	1	.771**
	2	.765**

	3	.781**
	4	.723**
	5	.803**
	6	.777**
	7	.753**
	8	.753**
Roles (Partnership in Care)	1	.855**
	2	.856**

Note. **Correlation significant at the 0.01 level; all correlations reported were significant at $p < .001$.

Table 3. ItemTotal Correlation Coefficients for Patient Satisfaction Statements

Statement	Pearson
1	.854**
2	.830**
3	.841**
4	.825**
5	.846**
6	.849**
7	.858**
8	.847**

Note. **Correlation significant at the 0.01 level; all correlations reported were significant at $p < .001$.

Internal consistency reliability, assessed with Cronbach's alpha, was excellent for both the PCC scale ($\alpha = .960$, 18 items) and the satisfaction scale ($\alpha = .942$, 8 items), and for the combined instrument ($\alpha = .975$, 26 items) (Table 4). Reliabilities below .60 are conventionally regarded as poor, .70-.80 as acceptable, and above .80 as good (22).

Table 4. Cronbach's Alpha Reliability Coefficients

Dimension	Cronbach's α	No. of statements
Patientcentered care	0.960	18
Patient satisfaction	0.942	8
All the questionnaire	0.975	26

2.9 Data Collection Procedures

Following academic and ethical approval, trained data collectors approached eligible respondents after they received care or during a waiting period, explained the study purpose, confirmed eligibility, and obtained informed consent. Participants completed the questionnaire independently or, where literacy, vision, or physical limitations required it, with assistance limited to reading items aloud and recording responses without influencing them. Completed questionnaires were checked for missing essential items before participants left the facility. No provider interviews or hospital-record reviews were conducted.

2.10 Statistical Analysis

All data were analyzed with IBM SPSS Statistics version 26. The analytical procedures followed standard guidance for multivariate analyses in the behavioral and health sciences (37, 38). Descriptive analyses characterized the sample and study variables using frequency tables and percentages, arithmetic means, relative weight, standard deviations, and graphics, following conventional practice for summarizing survey data (37). Pearson productmoment correlation was used to assess itemtotal associations and linear associations between the composite measures. Internal consistency was assessed with Cronbach's alpha, the conventional coefficient of internal consistency for Likerttype scales, where values of .70 and above indicate acceptable reliability (22). The required sample size for the regression analyses was above the commonly used rule of $50 + 8$ predictors for multiple regression (35). Ordinary least squares linear regression was used to test associations between continuous predictors and the continuous satisfaction outcome in the crosssectional survey. A simple linear regression tested the overall association between composite PCC and patient satisfaction (H1 against H0), and a multiple linear regression tested the independent contributions of the three PCC subdimensions to satisfaction (H1aH1c). The

significance of each model was evaluated with the overall F test and t tests for individual coefficients, and statistical significance was set at $p < .05$. Regression diagnostics included inspection of standardized residual distributions through histograms and normal PP plots. Linearity, homoscedasticity, influential observations, and multicollinearity should also be reported where the relevant diagnostic output is available.

2.11 Ethical Considerations

Ethical approval was obtained from the relevant academic and institutional review bodies prior to data collection. Participation was voluntary and based on informed consent, which explained the purpose of the study, the type of information collected, the right to withdraw at any time, and confidentiality protections. No participant was denied care or received different care because of participation or refusal to participate. Questionnaires did not include unnecessary identifiers, data were stored securely with access limited to the research team, and results were reported in aggregate form so that individual patients or departments could not be identified. Data collection was scheduled at convenient times, and participants were not pressured to complete the questionnaire if tired, distressed, or clinically unstable.

Several methodological limitations should be acknowledged in interpreting these results. Selection bias may occur because convenience sampling can overrepresent patients who are available and willing to respond, and response bias and social desirability bias may occur if participants provide more favorable answers because the survey is conducted in a healthcare setting. Recall bias was limited because the questionnaire focuses on the recent healthcare encounter, but patient expectations and prior experience may still influence responses. These limitations were addressed through use of a validated measure, standardized data collection procedures, clear eligibility criteria, reliability testing, and appropriate statistical modeling.

3. RESULTS

3.1 Demographic Variables

Table 6 shows the distribution of the sample according to the demographic variables, and Figures 1 to 6 present these distributions graphically. Figure 1, a pie chart of the gender distribution, shows that the sample comprised 274 females (55%) and 226 males (45%), indicating a slight female predominance that mirrors the higher use of public outpatient services by women in this setting. Figure 2 displays the distribution of the highest level of education and shows that a majority of participants had completed secondary or higher education (64%), with 33% holding a university (Bachelor's) degree and only 14% having no formal education. Figure 3 presents the occupational distribution, which was heterogeneous, reflecting varied socioeconomic backgrounds: retirees (18%), manual workers (17%), the unemployed (15%), and the selfemployed (15%) were most common. Participants were represented across all stages of adult life, with the highest proportion aged 35-44 (26%), followed by 25-34 (21%) and 55-64 (20%); 13% were aged 18-24, 5% were 45-54, and 14% were 65 or older—a distribution consistent with the higher incidence of chronic disease among middle-aged and older adults. Educational attainment varied widely: 33% held a university (Bachelor's) degree and 8% a postgraduate degree, while 14% had no formal education, 17% primary, and 23% secondary education.

An extremely high proportion of respondents reported a chronic illness. Figure 4, which plots chronic condition status, shows that 87% of the sample ($n = 435$) reported living with a chronic illness while 13% ($n = 65$) reported none. Figure 5 shows the distribution by specific diagnosed condition among the full sample: diabetes and endocrinology accounted for 51% of participants, internal medicine conditions for 34%, cardiology and vascular conditions for 2%, and 13% reported no diagnosed condition. Figure 6 presents the marital status distribution, with the majority married (61%), followed by single (27%), widowed (8%), and divorced (4%). Most respondents lived in Cairo (42%), followed by Giza (30%) and Qalyubia (27%), reflecting the Greater Cairo Metropolitan Area served by these public hospitals. Regarding facility visit patterns, 26% attended for the first time, 6% once a year, and 11% a few times a year, while more frequent use was also prevalent: 18% every six months, 16% every three months, and 23% monthly.

Table 6. Distribution of the Sample According to the Demographic Variables (N = 500)

Variable	Category	n	%
Age (years)	1824	64	13
	2534	105	21
	3544	132	26
	4554	26	5
	5564	102	20
	65 or over	71	14
Sex	Female	274	55
	Male	226	45
Education	No formal education	69	14
	Primary	84	17
	Secondary	115	23
	Vocational training	27	5
	University (Bachelor's)	165	33
	Postgraduate	40	8
Occupation	Retired	90	18
	Manual worker	84	17
	Unemployed	75	15
	Selfemployed	74	15
	Employee	63	13
	Healthcare professional	52	10
	Engineering & technical	18	4
	Administrative & business	17	3
	Academic & education	16	3
	Accounting & finance	5	1
	Legal professionals	5	1
	Clinician/quality consultant	1	0
Chronic condition	Yes	435	87
	No	65	13
Diagnosed condition	Diabetes & endocrinology	253	51
	Internal medicine	172	34
	Cardiology & vascular	10	2
Marital status	None	65	13
	Married	306	61
	Single	134	27
	Widowed	39	8

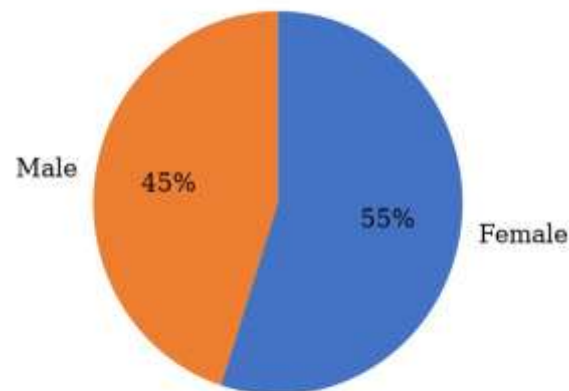


Figure 1. Distribution of the sample according to the gender variable.

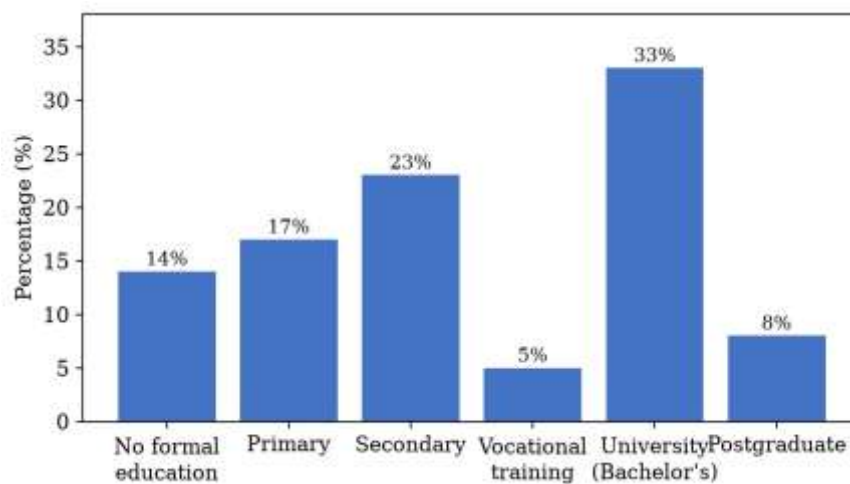


Figure 2. Distribution of the sample according to the highest level of education variable.

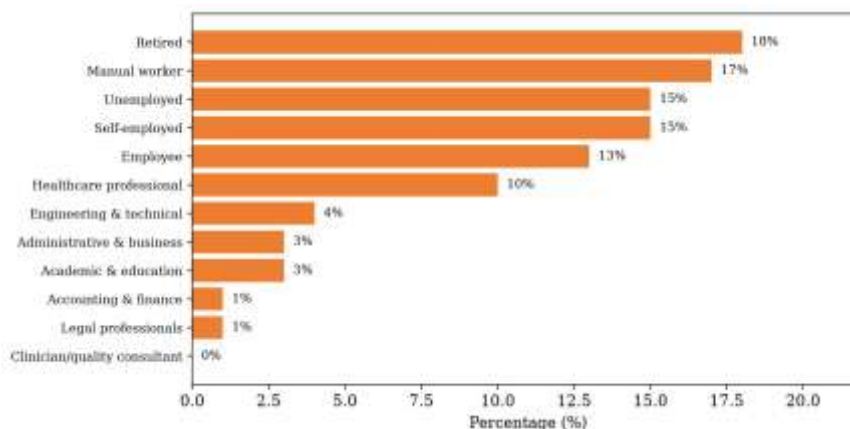


Figure 3. Distribution of the sample according to the occupation variable.

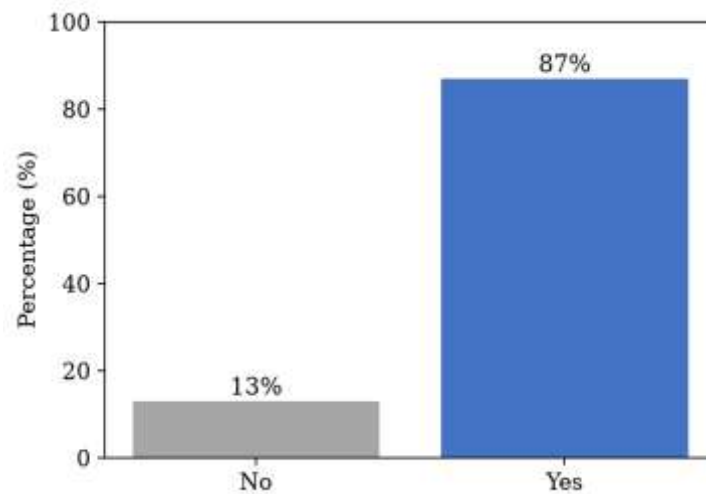


Figure 4. Distribution of the sample according to whether participants have a chronic condition.

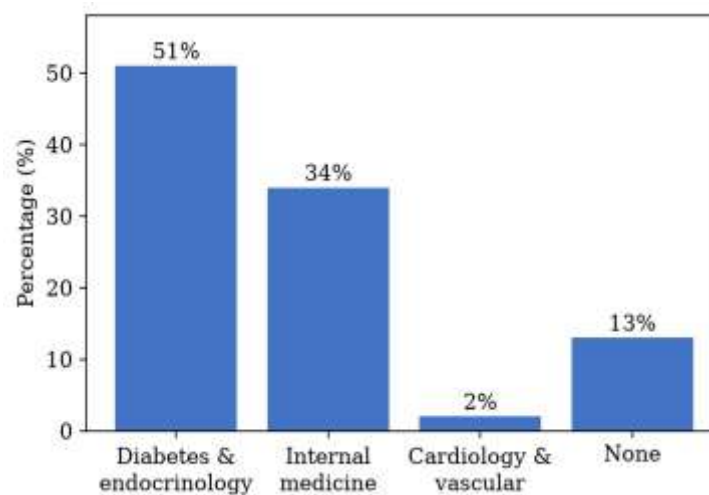


Figure 5. Distribution of the sample according to the specific diagnosed chronic condition.

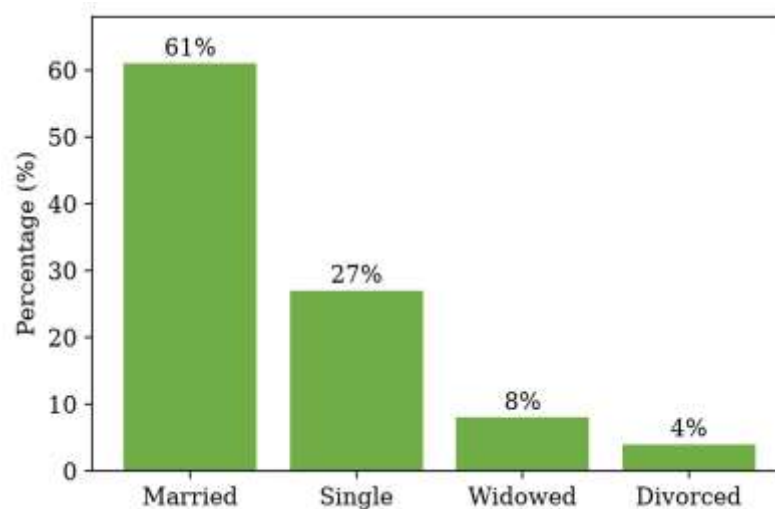


Figure 6. Distribution of the sample according to the marital status variable.

3.2 Descriptive Statistics for PatientCentered Care

Table 7 presents the means and standard deviations of the study sample's responses regarding the items of the Health Care Process dimension ($n = 500$). The composite mean was 3.18 ($SD = 0.603$), showing a high level of perceived patientcenteredness in clinical encounters. The highestrated item was "To what extent did the doctor explain this health problem to you?" ($M = 3.22$, $SD = 0.740$, rank 1), and the lowest was "To what extent did the doctor ask about your goals for treatment?" ($M = 3.12$, $SD = 0.797$, rank 8), though still within the high range.

Table 7. Descriptive Statistics for Health Care Process Items ($n = 500$)

N	Statement	Mean	SD	Rank	Level
1	To what extent was your main health problem(s) discussed today?	3.21	0.764	3	High
2	How well do you think the doctor understood you today?	3.19	0.746	5	High
3	How satisfied were you with the discussion of your health problem today?	3.18	0.752	6	High
4	To what extent did the doctor explain this health problem to you?	3.22	0.74	1	High
5	To what extent did you agree with the doctor's opinion about the problem?	3.21	0.724	2	High
6	To what extent did the doctor ask about your goals for treatment (what you hope to achieve)?	3.12	0.797	8	High
7	To what extent did the doctor explain the treatment or management plan?	3.2	0.766	4	High
8	To what extent did the doctor explore how manageable this treatment would be for you in your daily life?	3.14	0.79	7	High
	Health Care Process (composite)	3.18	0.603		High

Table 8 presents the Context and Relationship items. The composite mean was 3.13 ($SD = 0.640$). The highestrated item was "To what extent does the doctor respect your beliefs, values, and cultural customs?" ($M =$

3.24, SD = 0.701, rank 1); the lowest was “To what extent does the doctor know about your family life and home situation?” (M = 2.96, SD = 0.961, rank 8), suggesting relatively limited exploration of patients’ broader life context.

Table 8. Descriptive Statistics for Context and Relationship Items (n = 500)

N	Statement	Mean	SD	Rank	Level
1	How much would you say that this doctor cares about you as a person?	3.2	0.775	2	High
2	To what extent does the doctor know about your family life and home situation?	2.96	0.961	8	High
3	How comfortable are you discussing personal problems related to your health with this doctor?	3.04	0.872	7	High
4	To what extent does the doctor respect your beliefs, values, and cultural customs?	3.24	0.701	1	High
5	To what extent does the doctor consider your personal thoughts and feelings?	3.09	0.823	6	High
6	To what extent does the doctor show you compassion and kindness?	3.15	0.771	5	High
7	To what extent does the doctor really listen to you?	3.15	0.745	4	High
8	To what extent do you trust this doctor with your care?	3.19	0.731	3	High
	Context and Relationship (composite)	3.13	0.64		High

Table 9 presents the Roles (Partnership in Care) items. The composite mean was 3.10 (SD = 0.789), the highest variability among the three PCC subdimensions. The item “To what extent did the doctor encourage you to take the role you wanted in your own care and decisionmaking?” (M = 3.15, SD = 0.831) ranked above “To what extent did you and the doctor discuss your respective roles?” (M = 3.06, SD = 0.891).

Table 9. Descriptive Statistics for Roles (Partnership in Care) Items (n = 500)

N	Statement	Mean	SD	Rank	Level
1	To what extent did you and the doctor discuss your respective roles (who is responsible for what in your care)?	3.06	0.891	2	High
2	To what extent did the doctor encourage you to take the role you wanted in your own care and decisionmaking?	3.15	0.831	1	High
	Roles/ Partnership in Care (composite)	3.1	0.789		High

3.3 Descriptive Statistics for Patient Satisfaction

Table 10 presents the patient satisfaction items. The overall mean was 3.12 (SD = 0.641), in the high agreement range. The highest rated item was “I feel confident in the treatment plan that was agreed upon for managing my chronic condition” (M = 3.15, SD = 0.774, rank 1); the lowest was “I am satisfied with how well my questions and concerns were answered by the healthcare provider” (M = 3.07, SD = 0.757, rank 8).

Table 10. Descriptive Statistics for Patient Satisfaction Items (n = 500)

N	Statement	Mean	SD	Rank	Level
1	I am satisfied with the way my chronic health problem was explained to me during my visit to this public hospital.	3.13	0.767	5	High
2	I am satisfied with the amount of time the healthcare provider spent with me during my consultation.	3.11	0.771	7	High
3	I feel that my needs as a patient with a chronic condition are adequately addressed in this hospital.	3.13	0.751	3	High

4	I am satisfied with how well my questions and concerns were answered by the healthcare provider.	3.07	0.757	8	High
5	I feel confident in the treatment plan that was agreed upon for managing my chronic condition.	3.15	0.774	1	High
6	I am satisfied with the coordination of my care between different providers and departments in this hospital.	3.13	0.741	4	High
7	Overall, I am satisfied with the quality of care I receive for my chronic disease in this public hospital.	3.14	0.76	2	High
8	I would recommend this hospital to other patients with chronic diseases based on my experience of care.	3.12	0.76	6	High
	Patient satisfaction (composite)	3.12	0.641		High

3.4 Hypothesis Testing

H1 (composite PCC → satisfaction). A simple linear regression was estimated to test H0 against H1. The model summary in Table 11 shows that composite PCC was a very strong, statistically significant variable positively associated with patient satisfaction, explaining 94.1% of the variance (Tables 11 to 13). Each a higher PCC score was strongly associated with a higher satisfaction score in patient satisfaction ($B = 0.979$, $\beta = 0.970$, $t = 89.082$, $p < .001$). The ANOVA in Table 12 confirms that the overall model was highly significant, $F(1, 498) = 7935.623$, $p < .001$. Because the probability of the observed result under H0 is far below the prespecified $\alpha = .05$ threshold, the null hypothesis of no linear association was rejected in favour of H1. The diagnostic plots in Figure 7 (a standardized residual histogram and normal PP plot for the simple regression model) indicate that the standardized residuals were approximately normally distributed and centered near zero, supporting the validity of the regression estimates (35).

Table 11. Model Summary for the Association between PatientCentered Care on Patient Satisfaction

Model	R	R ²	Adjusted R ²	SE of the
1	0.970 ^a	0.941	0.941	0.156

Table 12. ANOVA for the Association between PatientCentered Care on Patient Satisfaction

Model	Sum of Squares	df	Mean Square	F
Regression	193.039	1	193.039	7935.623
Residual	12.114	498	0.024	
Total	205.153	499		

Note. Dependent variable: Patient satisfaction. Predictors: (Constant), Patientcentered care. $F(1, 498) = 7935.623, p < .001$.

Table 13. Regression Coefficients for the Association between PatientCentered Care on Patient Satisfaction

Predictor	B (SE)	β	t
Constant	0.052 (0.035)		1.464
Patientcentered care	0.979 (0.011)***	0.970	89.082

Note. *** $p < .001$.

Diagnostic Plots for the Simple Linear Regression Model (Standardized Residuals)

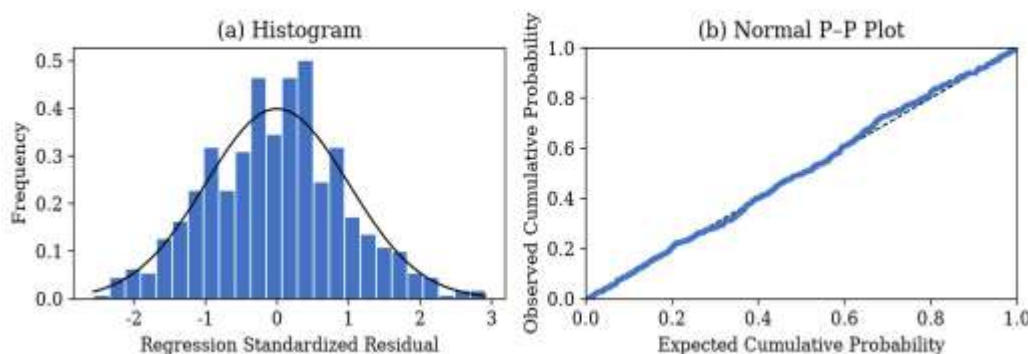


Figure 7. Diagnostic plots for the simple linear regression model: (a) histogram of the standardized residuals, centered near zero and following a unimodal shape, and (b) normal PP plot of the standardized residuals, which follow the expected normal distribution, indicating that the assumptions of the regression model are met.

3.5 Multiple Regression: PCC Subdimensions and Patient Satisfaction

Table 14 reports the summary statistics for the multiple regression model, in which the three PCC subdimensions jointly predicted patient satisfaction. The full model explained 94.1% of the variance in patient satisfaction ($R^2 = .941$, adjusted $R^2 = .941$) and was highly significant, $F(3, 496) = 2638.154, p < .001$ (Table 15). As shown in Table 16, all three subdimensions were significant positive predictors: Roles (Partnership in Care) showed the strongest standardized effect ($\beta = .416, t = 21.140, p < .001$), followed by Context and Relationship ($\beta = .312, t = 11.899, p < .001$) and Health Care Process ($\beta = .306, t = 13.456, p < .001$). Because all three coefficients remained significant and positively signed in the presence of the others, the null hypotheses embedded in H_0 (no effect of the subdimensions) were rejected in favor of H_{1aH1c} .

Table 14. Model Summary for the Multiple Regression of PatientCentered Care Subdimensions on Patient Satisfaction

Model	R	R ²	Adjusted R ²	SE of the
1	0.970 ^a	0.941	0.941	0.156

Table 15. ANOVA for the Multiple Regression of PatientCentered Care Subdimensions on Patient Satisfaction

Model	Sum of Squares	df	Mean Square	F
Regression	193.054	3	64.351	2638.154
Residual	12.099	496	0.024	
Total	205.153	499		

Note. Dependent variable: Patient satisfaction. Predictors: (Constant), Health Care Process, Context and Relationship, Roles/Partnership in Care. $F(3, 496) = 2638.154, p < .001$.

Table 16. Regression Coefficients for the Multiple Regression of PatientCentered Care Subdimensions on Patient Satisfaction

Predictor	B (SE)	β	t
Constant	0.060 (0.038)		1.582
Health Care Process	0.325 (0.024)***	0.306	13.456
Context and	0.312 (0.026)***	0.312	11.899
Roles (Partnership in	0.339 (0.016)***	0.416	21.140

Note. *** $p < .001$.

Figure 8 presents the diagnostic plots for the multiple regression model. The standardized residual histogram is approximately unimodal and centered near zero, while the normal probability plot follows a near linear pattern. Together, these visual checks support the assumptions of approximate normality and adequate model specification for the multiple regression estimates.

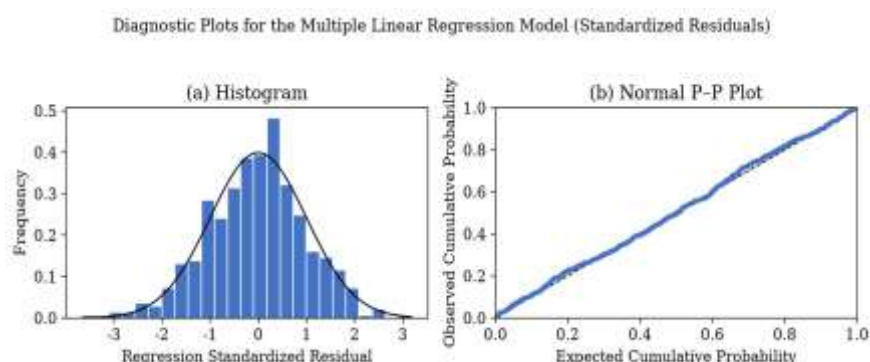


Figure 8. Diagnostic plots for the multiple linear regression model: (a) histogram of the standardized residuals, showing a unimodal distribution centered near zero, and (b) normal PP plot of the standardized residuals, which follow the expected normal distribution, indicating that the assumptions underlying the multiple regression estimates are satisfied.

4. DISCUSSION

This study found that patients receiving chronic disease management at public hospitals in Greater Cairo perceived their care as substantially patientcentered (composite mean 3.14 on a 4point scale) and reported a high overall level of satisfaction (mean 3.12), and that these two constructs were very strongly associated. The simple regression confirmed that composite PCC was a powerful predictor of satisfaction ($R^2 = .941; \beta = .970, p < .001$), supporting H1 and rejecting H0. These levels of perceived patientcenteredness are encouraging in light of evidence that PCC is practiced to a limited extent in the MENA region, where its implementation is shaped by cultural expectations of deference to physicians, constrained resources, and organizational pressures (28), and that the first assessment of an Egyptian tertiary hospital found mixed satisfaction levels with particular deficits in provider communication and the explanation of medications (30). They are also consistent with a recent Egyptian longitudinal study showing that structured communication skills training grounded in the PCC model significantly improved both physicians' patientcentered attitudes and their patients' reported satisfaction (29).

The multiple regression yielded three findings of particular interest. First, Roles (Partnership in Care) was the strongest predictor of satisfaction ($\beta = .416$) among the three subdimensions. Negotiating who is responsible for

what, and encouraging patients to take the role they want in their own care and decisionmaking, appears to matter most to patients with chronic conditions, who must live with and manage their treatment day after day. This pattern is consistent with the argument that shared decisionmaking represents the pinnacle of patientcentered care (9), with practical models available for enactment in routine encounters (7), and with evidence that shared decisionmaking is particularly effective for longterm, chronicillness decisions, where it improves satisfaction, adherence, and health status (33). It is also consistent with metaanalytic evidence that patientcentered selfmanagement interventions improve glycemic control and selfcare behaviors in type 2 diabetes the dominant condition in the present sample (32). In addition, selfdetermination theory which holds that autonomysupportive care satisfying patients' needs for autonomy and competence is especially effective for sustaining longterm health behavior change explains why supporting patients' involvement in their own care and decisionmaking, rather than relying on directive control, is particularly effective for chronic populations (31).

Second, Context and Relationship showed a similarly strong effect ($\beta = .312$), emphasizing that feeling understood, respected, and listened to and trusting that the clinician cares is central to satisfaction even in brief, highvolume outpatient encounters. The lowestrated PCC item, knowledge of the patient's family life and home situation, suggests that deeper contextual exploration is the dimension most compressed by workload in public hospital settings, and that targeted time for understanding patients' circumstances may yield additional satisfaction gains. Third, Health Care Process was also a significant predictor ($\beta = .306$), and its highestrated item the explanation of the health problem indicates that clear, welldelivered information remains a durable driver of patient satisfaction, as prior work in hospital settings has shown (13, 14). Consultation time has been identified repeatedly as a predictor of satisfaction in resourceconstrained settings (14, 24), so the present findings should not be read as implying that communication quality can substitute for adequate contact time, but rather that, at a given level of resource, patientcentered communication is the dimension on which marginal improvements produce the largest satisfaction returns.

The strength of the association found here deserves interpretive caution. Both the predictor and the outcome were reported by the same patients on the same instrument at the same time, so commonmethod variance may have inflated the observed association (25), and the crosssectional design permits identification of association but not of causation. Convenience sampling at three outpatient clinics may also overrepresent patients who were available and willing to participate, limiting generalizability beyond similar public hospital settings, and response and socialdesirability biases are possible whenever surveys are administered within a healthcare setting. Recall bias was minimized by focusing on the immediate encounter, but prior expectations and experience may still have shaped responses. These limitations were mitigated by the use of a validated measure with strong psychometric support (1921), standardized data collection procedures, clear eligibility criteria, reliability testing ($\alpha = .94.98$), regression diagnostics confirming model assumptions (35), and appropriate statistical modeling (34). Despite these caveats, the direction and pattern of results are consistent with the international evidence base, including trials and reviews in which PCCbased interventions improve satisfaction and selfmanagement outcomes (10, 29, 32, 33).

5. CONCLUSION

Among adults receiving chronic disease management at public hospitals in Greater Cairo, patientcentered care and particularly the negotiation of roles and partnership in care was strongly and positively associated with patient satisfaction. These findings suggest that qualityimprovement efforts in similarly resourceconstrained public hospital settings may achieve meaningful gains in patient satisfaction by strengthening shared decisionmaking and role clarity within routine clinical encounters, even where time and resources for more comprehensive relationshipbuilding are limited.

Several practical implications follow. Hospital administrators and policymakers should consider embedding brief, structured PCC elements explicit discussion of patient goals, treatmentplan explanation, and negotiation of roles into the standard workflow of highvolume chronic disease clinics, because the present results indicate that these elements are the strongest predictors of satisfaction. Investment in communication skills training for physicians and nurses, such as the PCCbased programs already shown to improve patient satisfaction in Egyptian facilities (29), should be paired with organizational measures that protect consultation time, since time pressure remains the most consistent barrier to contextual and relational aspects of care. Because the sample was dominated by patients with diabetes and endocrine conditions, conditionspecific pathways for example, integrating diabetes education and

selfmanagement support into consultations may be an efficient target for patientcentered redesign (32). Researchers should build on these findings with longitudinal and interventional designs to establish causality, with patientlevel outcome measures (adherence, glycemic control, quality of life), and with comparative studies across facility types tertiary, district, and private to determine whether the observed pattern generalizes across the Egyptian health system and to culturally similar settings in the MENA region (28). In sum, this study adds regional evidence to the international literature that patientcentered care is not a luxury confined to wellresourced health systems: even in busy public hospitals serving diverse and often underserved populations, the way clinicians communicate, involve, and partner with patients is a decisive factor in how those patients experience their care.

6. FUTURE INSIGHTS

Several avenues merit attention in future research and practice. First, the crosssectional design of the present study precludes causal inference; prospective longitudinal cohorts following chronic disease patients across multiple visits would clarify whether sustained improvements in patientcentered communication produce durable gains in satisfaction, adherence, and clinical outcomes (32). Second, intervention research such as randomized trials of structured shared decisionmaking training or PCC communication modules for outpatient clinicians would directly test the actionable implication of the present findings, building on emerging Egyptian evidence that communicationskills training improves physician attitudes and patient satisfaction (29). Third, future work should extend patientcentered measurement beyond satisfaction to patientreported outcome measures (PROMs) and experience measures that capture health status, selfmanagement confidence, and quality of life, which align with the motivational mechanisms described by selfdetermination theory (31). Fourth, digital and hybrid care models telehealth followups, patient portals, and electronic PROM collection offer a promising infrastructure for routinely monitoring the patient experience in highvolume public hospitals, and research should examine how these tools preserve or erode the relational elements of care found to matter most here, particularly roles and partnership in care (39). A 2026 controlled intervention study found that family engagement during interdisciplinary rounds improved patient satisfaction, supporting the value of structured communication and participation strategies in patientcentered care (40). Fifth, comparative multicenter studies across facility types (tertiary, district, and private) and across MENA countries would test the generalizability of the observed PCCsatisfaction relationship (28). Finally, embedding patientreported PCC indicators into national qualityimprovement and accreditation frameworks could translate the present evidence into systemic change, ensuring that the patient perspective remains central to the evaluation of chronic disease services (12).

Acknowledgments

The authors gratefully acknowledge the participating hospitals and outpatient clinics in Greater Cairo, the healthcare providers who facilitated data collection, and the patients who generously contributed their time and experiences to this study.

Author Contributions

Passant A. Nassar: conceptualization, study design, methodology, data collection, data analysis, and manuscript preparation.

Samir Y. Marzouk: supervision, methodological review, interpretation of findings, and critical revision of the manuscript.

Mai S. Mabrouk: statistical guidance, validation, visualization, and critical revision of the manuscript.

All authors reviewed and approved the final manuscript.

Conflict of Interest

The authors declare no conflict of interest.

Funding

This research received no specific grant from any funding agency in the public, commercial, or notforprofit sectors.

Data Availability

The datasets generated and analyzed during the current study are available from the corresponding author on reasonable request.

REFERENCES

- [1] Institute of Medicine (2001). Crossing the Quality Chasm: A New Health System for the 21st Century. National Academies Press. <https://doi.org/10.17226/10027>
- [2] Gerteis, M., EdgmanLevitan, S., Daley, J., & Delbanco, T. L. (1993). Through the Patient's Eyes: Understanding and Promoting PatientCentered Care. JosseyBass.
- [3] Donabedian, A. (1988). The quality of care: How can it be assessed? JAMA, 260(12), 17431748. <https://doi.org/10.1001/jama.1988.03410120089033>
- [4] Stewart, M. (1995). Effective physicianpatient communication and health outcomes: A review. CMAJ, 152(9), 14231433.
- [5] Stewart, M., Brown, J. B., Weston, W. W., McWhinney, I. R., McWilliam, C. L., & Freeman, T. R. (1995). PatientCentered Medicine: Transforming the Clinical Method. Sage Publications.
- [6] Davis, K., Schoenbaum, S. C., & Audet, A. M. (2005). A 2020 vision of patientcentered primary care. Journal of General Internal Medicine, 20(10), 953957.
- [7] <https://doi.org/10.1111/j.15251497.2005.0178.x>
- [8] Elwyn, G., Frosch, D., Thomson, R., JosephWilliams, N., Lloyd, A., Kinnersley, P., Cording, E., Tomson, D., Dodd, C., & Rollnick, S. (2012). Shared decision making: A model for clinical practice. Journal of General Internal Medicine, 27(10), 13611367. <https://doi.org/10.1007/s1160601220776>
- [9] Street, R. L., Makoul, G., Arora, N. K., & Epstein, R. M. (2009). How does communication heal? Pathways linking clinicianpatient communication to health outcomes. Patient Education and Counseling, 74(3), 295301. <https://doi.org/10.1016/j.pec.2008.11.015>
- [10] Barry, M. J., & EdgmanLevitan, S. (2012). Shared decision making The pinnacle of patientcentered care. New England Journal of Medicine, 366(9), 780781. <https://doi.org/10.1056/NEJMP1109283>
- [11] Sirera, B., Naanyu, V., Kussin, P., Lagat, D., & Koech, L. (2024). Impact of patientcentered communication on patient satisfaction scores in patients with chronic lifelimiting illnesses: An experience from Kenya. Frontiers in Medicine, 11, 1290907. <https://doi.org/10.3389/fmed.2024.1290907>
- [12] Beattie, M., Lauder, W., Atherton, I., & Murphy, D. J. (2015). Instruments to measure patient experience of healthcare quality in hospitals: A systematic review. Systematic Reviews, 4, 97. <https://doi.org/10.1186/s1364301500890>
- [13] Okeny, C., et al. (2024). The importance of the patient's perspective in assessing quality of care: A systematic scoping review of patient satisfaction dimensions in African healthcare. PLOS ONE, 19(4), e0299627. <https://doi.org/10.1371/journal.pone.0299627>
- [14] Kuteyi, E. A., Bello, I. S., & Olaleye, T. M. (2010). Determinants of patient satisfaction with physician interaction: A crosssectional survey at the Obafemi Awolowo University Health Centre, IleIfe, Nigeria. South African Family Practice, 52(6), 557562.
- [15] <https://doi.org/10.1080/20786204.2010.10874047>
- [16] Surbakti, S. I., & Sari, N. P. (2018). The effect of time management on patient satisfaction in the outpatient room. KnE Life Sciences, 4(9), 4149. <https://doi.org/10.18502/cls.v4i9.3556>
- [17] Herman, W. H., Ali, M. A., Aubert, R. E., Engelgau, M. M., Kenny, S. J., Smith, P. J., et al. (1995). Diabetes mellitus in Egypt: Risk factors and prevalence. Diabetic Medicine, 12(12), 11261131.
- [18] <https://doi.org/10.1111/j.14645491.1995.tb00432.x>
- [19] Bos, G. B., & Agyemang, C. (2013). Prevalence and complications of diabetes mellitus in Northern Africa, a systematic review. BMC Public Health, 13, 387. <https://doi.org/10.1186/1471245813387>
- [20] von Elm, E., Altman, D. G., Egger, M., Pocock, S. J., Gøtzsche, P. C., & Vandenbroucke, J. P. (2007). The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: Guidelines for reporting observational studies. The Lancet, 370(9596), 14531457.
- [21] [https://doi.org/10.1016/S01406736\(07\)61602X](https://doi.org/10.1016/S01406736(07)61602X)
- [22] Vandenbroucke, J. P., von Elm, E., Altman, D. G., Gøtzsche, P. C., Mulrow, C. D., Pocock, S. J., et al. (2007). Strengthening the Reporting of Observational Studies in Epidemiology (STROBE): Explanation and elaboration. PLoS Medicine, 4(10), e297.
- [23] <https://doi.org/10.1371/journal.pmed.0040297>

- [24] Ryan, R., Brown, J. B., Tremblay, P. F., & Stewart, M. (2019). Measuring patients' perceptions of health care encounters: Examining the factor structure of the revised Patient Perception of PatientCenteredness (PPPCR) questionnaire. *Journal of PatientCentered Research and Reviews*, 6(3), 192202. <https://doi.org/10.17294/23300698.1696>
- [25] Nguyen, T., et al. (2020). Validity and reliability of the Patient Perception of PatientCenteredness QuestionnaireRevised in patients with multimorbidity. *Health Expectations*, 23(4), 904909. <https://doi.org/10.1111/hex.13068>
- [26] Cai, H., et al. (2024). Psychometric evaluation of the Patient Perception of PatientCenteredness QuestionnaireRevised in a primary care setting. *BMC Primary Care*, 25, 8. <https://doi.org/10.1186/s1287502302227x>
- [27] Tavakol, M., & Dennick, R. (2011). Making sense of Cronbach's alpha. *International Journal of Medical Education*, 2, 5355. <https://doi.org/10.5116/ijme.4dfb.8dfd>
- [28] Kabatooro, A., Ndoboli, F., & Namatovu, J. (2016). Patient satisfaction with medical consultations among adults attending Mulago hospital assessment centre. *South African Family Practice*, 58(3), 8793. <https://doi.org/10.1080/20786190.2016.1177977>
- [29] Ogden, J. (2004). "I want more time with my doctor": A quantitative study of time and the consultation. *Family Practice*, 21(5), 479483. <https://doi.org/10.1093/fampra/cmh502>
- [30] Podsakoff, P. M., MacKenzie, S. B., Lee, J. Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology*, 88(5), 879903. <https://doi.org/10.1037/00219010.88.5.879>
- [31] Epstein, R. M., & Street, R. L. (2007). PatientCentered Communication in Cancer Care: Promoting Healing and Reducing Suffering. National Cancer Institute, NIH Publication No. 076225.
- [32] King, A., & Hoppe, R. B. (2013). "Best practice" for patientcentered communication: A narrative review. *Journal of Graduate Medical Education*, 5(3), 385393. <https://doi.org/10.4300/JGMED1300072.1>
- [33] Alkhaibari, R. A., SmithMerry, J., Forsyth, R., & Raymundo, G. M. (2023). Patientcentered care in the Middle East and North African region: A systematic literature review. *BMC Health Services Research*, 23, 135. <https://doi.org/10.1186/s12913023091320>
- [34] Samir, M. M., Eisa, N. M., Khaled, H., Syed, W., AlRawi, M. B. A., Abou Warda, A. E., Kamal, N. M., Mahmoud, R. S., & Refaee, A. S. H. (2025). The impact of communication skills training on patientcentered attitude and patient satisfaction: A longitudinal study of Egyptian physicians. *Preventive Medicine Reports*, 55, 103117. <https://doi.org/10.1016/j.pmedr.2025.103117>
- [35] Farghaly, M., Kamal, A., ElSetouhy, M., Hirshon, J. M., & ElShinawi, M. (2021). Patient satisfaction with a tertiary hospital in Egypt using a HCAHPSderived survey. *Journal of Multidisciplinary Healthcare*, 14, 30533060. <https://doi.org/10.2147/JMDH.S317322>
- [36] Deci, E. L., & Ryan, R. M. (2012). Selfdetermination theory in health care and its relations to motivational interviewing: A few comments. *International Journal of Behavioral Nutrition and Physical Activity*, 9, 24. <https://doi.org/10.1186/14795868924>
- [37] Joosten, E. A. G., DeFuentesMerillas, L., de Weert, G. H., Sensky, T., van der Staak, C. P. F., & de Jong, C. A. J. (2008). Systematic review of the effects of shared decisionmaking on patient satisfaction, treatment adherence and health status. *Psychotherapy and Psychosomatics*, 77(4), 219226. <https://doi.org/10.1159/000126073>
- [38] Cochran, W. G. (1977). *Sampling Techniques* (3rd ed.). John Wiley & Sons.
- [39] Green, S. B. (1991). How many subjects does it take to do a regression analysis? *Multivariate Behavioral Research*, 26(3), 499510. https://doi.org/10.1207/s15327906mbr2603_7
- [40] Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). *Multivariate Data Analysis* (7th ed.). Pearson Education.
- [41] Likert, R. (1932). A technique for the measurement of attitudes. *Archives of Psychology*, 22(140), 155.
- [42] George, D., & Mallery, P. (2019). *IBM SPSS Statistics 26 Step by Step: A Simple Guide and Reference* (16th ed.). Routledge. <https://doi.org/10.4324/9780429056765>
- [43] Field, A. (2018). *Discovering Statistics Using IBM SPSS Statistics* (5th ed.). Sage Publications.

- [48] Pakianathan, P. V. S., Kumar, D., Prabath, J., Hussein, R., Niebauer, J., Schmidt, A., & Smeddinck, J. (2026). Barriers and Enablers to Integrating Patient Generated Health Data in Shared Decision Making From Health Care Professional and Patient Perspectives: Scoping Review. *JMIR mHealth and uHealth*, 14, e85197. <https://doi.org/10.2196/85197>
- [49] Cypress, B. S., & Gharzeddine, R. (2026). Patient and family centered interdisciplinary rounds and patient satisfaction: A controlled intervention study. *Intensive and Critical Care Nursing*, 93, 104347. <https://doi.org/10.1016/j.iccn.2026.104347>