

The Role Interplay Between Internal Factors In Cervical Cancer Treatment Outcomes

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Abstract

Background: Cervical cancer treatment outcomes were influenced not only by medical procedures but also by sociodemographic, clinical, and personality characteristics. Understanding these factors was essential for optimizing therapy success.

Objective: This study aimed to analyze the interplay between knowledge, education, stage of cervical cancer, length of illness, and personality in determining treatment success among cervical cancer patients.

Methods: A quantitative, cross-sectional study was conducted in 2024 at General Hospital, Semarang, involving 135 cervical cancer patients. Data were collected using a validated and authorized questionnaire. Independent variables included knowledge, educational, stage of cervical cancer, length of illness, personality while the dependent variable was treatment success. Data were analyzed through univariate, bivariate (Somers'd test), and multivariate analyses using ordinal logistic regression.

Results: The respondents had good knowledge (58.5%), elementary education (57.8%), advanced-stage disease (57.8%), treatment success was categorized as good in 58.3% of patients. Knowledge ($p < 0.001$, $r = 0.960$), and education ($p < 0.001$, $r = 0.479$) were significantly associated with treatment success. Multivariate analysis showed that these five variables explained 83% of the variance in treatment success (Cox and Snell $R^2 = 0.830$).

Conclusions: Higher knowledge, and better education were associated with greater treatment success in cervical cancer patients. Interventions that targeted patient education, early detection, and psychosocial support were recommended to enhance treatment outcomes.

Keywords: Cervical cancer; chemotherapy; educations; knowledge.

INTRODUCTIONS

Cervical cancer is the most prevalent gynecological malignancy among women and ranks as the fourth leading cause of cancer-related mortality worldwide. The primary etiological factor of this disease is persistent infection with oncogenic types of Human Papillomavirus (HPV). In its early stages, cervical cancer is frequently asymptomatic, leading to delayed detection in many cases that are often diagnosed at an advanced stage. Late diagnosis decreases treatment effectiveness and heightens the risk of severe complications, including mortality [1,2]

According to the Global Cancer Observatory (Globocan) 2023, more than 600,000 new cases of cervical cancer and over 340,000 related deaths were reported worldwide. In Indonesia, cervical cancer ranks as the second most common malignancy after breast cancer, with an incidence rate of approximately 24.5 per 100,000 women. Central Java Province is identified as one of the regions with a high incidence, particularly in communities with limited access to early screening programs and reliable health information. Cervical cancer remains a major public health concern in Indonesia and other Southeast Asian nations. National data indicate that cervical

cancer accounts for about 20% of cancer cases among Indonesian women, with an estimated 40,000 new cases reported each year [3,4].

In Indonesia and the Southeast Asian region, incidence and mortality still show significant disparities [5,6], so that the success of treatment as measured by clinical outcomes and the patient's quality of life becomes an important focus of oncology services [7]. Treatment success rates are heavily influenced by clinical factors such as disease stage at diagnosis, with advanced stages associated with lower survival rates and less favorable outcomes [8]. In addition to clinical determinants, sociodemographic and behavioral factors also play a significant role. Patient education and knowledge about the disease are associated with time to seek care, adherence to therapy, and access to health services, which ultimately influence treatment success [9]. Previous studies have shown a relationship between education level or income and the time of arrival for treatment at a health service center and cancer mortality [10]. In addition, educational interventions have been shown to increase knowledge and preventive behaviors related to cervical cancer [11].

Reflecting on the increasing prevalence of cervical cancer and how education and knowledge factors influence the success of cervical cancer treatment, a simultaneous analysis is essential to understand how these factors interact to influence the success of cervical cancer treatment. While many previous studies have examined these factors separately, an integrative approach that considers both education and knowledge is still limited and requires further study. This study aims to identify the joint role of knowledge and education about the disease, and personality in determining the success of cervical cancer therapy.

MATERIALS AND METHODS

Design

This study was classified as analytical observational research using a cross-sectional design, which is commonly applied to examine relationships between variables at a single point in time (Rahman, 2021).

Sample and setting

The sampling technique used was total sampling, involving 135 cervical cancer patients as respondents. The inclusion criteria were: (1) cervical cancer patients who had received at least one session of cancer treatment at General Hospital Semarang; (2) patients who were willing to participate by signing informed consent; and (3) Muslim patients. The exclusion criteria were: (1) patients who were illiterate; (2) patients with decreased hearing function; and (3) patients with comorbidities such as heart disease, hypertension, kidney failure, or diabetes mellitus. These criteria were determined to ensure that respondents could understand the questionnaire, respond independently, and reduce bias from clinical complications (Ismail et al., 2022).

Variable

The independent variables in this study were knowledge, educational, stage of cervical cancer, length of illness, personality. The dependent variable was the treatment success rate.

Instruments

In quantitative research, the credibility of a study relies on the development of instruments used to measure the underlying concepts. The measurement of a variable is designed to achieve consistency, adequacy, accuracy, precision, uniformity, and comparability in assessing and explaining a specific concept. Therefore, the measurement approach encompasses testimony and confirmation variables that function as representations of constructs [12]. Data were collected using a structured questionnaire, which was developed by the research team and adapted from relevant literature. The questionnaire consisted of five variables: knowledge, educational, stage of cervical cancer, length of illness, personality, and treatment success rate. The instrument validity test showed corrected item-total correlations in the range of 0.452–0.933, while Cronbach's alpha values ranged from 0.874 to 0.973, indicating excellent reliability (Nasution et al., 2021). All variables in this study were measured using a questionnaire, and has been granted permission to modify the instrument was obtained from the original author. Likert scale was applied, consisting of such options as strongly disagree, disagree, neutral, agree and strongly agree. The variables were ordinally scaled with indicators ranging from 76%-100% (good), 55%-75% (enough), and lower than 55%.

Data collection

Various attempts have been made to solve any research bias with multiple inclusion and exclusion criteria, narrowing down the biases and ensuring that the criteria were satisfied for the respondents. The researcher collected the primary data for this study. A total of 135 questionnaires was distributed in April 2024. The data were collected in the following steps: (1) conduct research permits in hospitals; (2) after obtaining permission for the ethical process at the Hospital Ethics Committee Institute; (3) pass the ethical test, the data collection process for inpatient patients who met the inclusion and exclusion criteria, patients first received an explanation from researchers about the research carried out in full, an explanation carried out orally and in writing; after the patient understands the research being conducted, the researcher requests written informed consent and then the patient who agrees to be a respondent can sign the informed consent sheet, which is in accordance with the ethical principles of research, namely informed consent, anonymity, confidentiality, fidelity, and autonomy; (4) the data that have been collected are then checked for completeness and then processed with somers'd test and ordinal logistic regression.

Data analysis

The independent variables in this study were knowledge, educational, stage of cervical cancer, length of illness, personality. The dependent variable was the treatment success rate. Bivariate analysis was conducted using Somers'd test to determine the direction and strength of associations between each independent variable and the treatment success rate. A p-value of less than 0.05 was interpreted as statistically significant, while a p-value equal to or above 0.05 indicated no significant relationship (Hartono & Siregar, 2022). Correlation strength was determined by the r-value, with higher values indicating stronger associations. Multivariate analysis was performed using ordinal logistic regression to examine the simultaneous influence of all independent variables on treatment success. Variables with p-values less than 0.05 were considered to significantly influence treatment success, while those with higher p-values were not (Yuliyanti & Prasetyo, 2023).

Ethical consideration

This study received ethical approval from the Health Research Ethics Committee of General Hospital Semarang, with approval number 1691/KEPK-RSDK/2024, dated February 21, 2024. After obtaining institutional permissions, data were collected between April 10 and April 25, 2024, in the oncology and gynecology outpatient departments, and had obtained the participants' consent through informed consent, thus patients first received an explanation from researchers about the research carried out in full, an explanation carried out orally and in writing. After the patient understands the research being conducted, the researcher is given informed consent in writing, and then the patient who agrees to be a respondent can sign the informed consent sheet, which is in accordance with the ethical principles of research, namely informed consent, anonymity, confidentiality, fidelity, and autonomy.

RESULTS

Table 1 frequency distribution of knowledge, educational, and treatment success rate in cervical cancer patients in 2024 (n=135).

Variables	Category	Frequency (f)	Presentation (%)
Knowledge	Less	10	7.4
	Enough	46	34.1
	Good	79	58.5
Total		135	100
Educations	Elementary	78	57.8
	Intermediate	41	30.3
	High	16	11.9
Total		135	100
Treatment success rates	Less	11	8.1
	Enough	45	33.3
	Good	79	58.3

Total	135	100
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The results of this study are reflected in Table 1 the frequency distribution results of 135 cervical cancer patients in 2024 showed that the majority of respondents had a good level of knowledge about cervical cancer, accounting for 79 individuals (58.5%). Most participants had an elementary level of education, with 78 individuals (57.8%). The highest treatment success rate was in the good category, reported in 79 individuals (58.3%).

Table 2 Analysis of the Relationship between Knowledge and Educations with Treatment success rate in cervical cancer patients in 2024 (n=135).

Variables		Treatment success rates						p value	R
		Less		Enough		Good			
		f	%	f	%	f	%		
Knowledge	Less	7	70	3	30	0	0	< 0.001	0.960
	Enough	4	8.7	42	91.3	0	0		
	Good	0	0	0	0	79	100		
Education	Elementary	9	6.7	33	24.4	36	26.7	< 0.001	0.479
	Intermediate	2	1.5	10	7.4	29	21.5		
	High	0	0	2	1.5	14	10.4		

The analysis showed that knowledge had a significant relationship with treatment success rates in cervical cancer patients ($p < 0.001$) with a very strong positive correlation ($r = 0.960$), indicating that higher levels of knowledge were associated with better treatment outcomes. Education demonstrated a significant relationship ($p < 0.001$) with a moderate positive correlation ($r = 0.479$), suggesting that higher educational attainment tended to improve treatment success.

Table 3 Analysis of the Magnitude of the Relationship between Knowledge, Educations, Stage of cervical cancer, length of illness, personality with Treatment success rate in cervical cancer patients in 2024 (n=135).

Pseudo R Square	
Cox and Snell	0.830
Nails	0.983
McFadden	0.956

The results in Table 3 illustrate the Cox and Snell Pseudo R Square value, which indicates the proportion of variance in treatment success rates that can be explained by the independent variables in the model, namely knowledge, and education. The value obtained was 0.830, meaning that these five variables collectively contributed to explaining 83% of the variation in treatment success among cervical cancer patients in 2024. This high percentage reflects the substantial role of patient-related factors, such as cognitive understanding of the disease, educational background, in influencing the likelihood of achieving better treatment outcomes. The remaining 17% ($100 - 83\%$) of the variation is likely attributable to other factors not examined in this study, which may include clinical interventions, treatment adherence, comorbidities, socioeconomic conditions, healthcare facility quality, and support systems. This finding highlights the importance of a comprehensive approach that not only focuses on medical treatment but also addresses patient education, and individualized care strategies to optimize treatment success.

DISCUSSION

This study showed that the majority of respondents in this study had good knowledge (58.5%), basic education level (57.8%), suffered from advanced cervical cancer (57.8%), disease duration of less than one year (44.4%), and extroverted personality (97.8%). Treatment success was categorized as good in 58.3% of patients. The results of the bivariate analysis showed that knowledge ($p < 0.001$, $r = 0.960$) and education ($p < 0.001$, $r = 0.479$) had a significant relationship with treatment success. Multivariate analysis using a logistic regression model revealed that education and knowledge together were able to explain 83% of the variation in treatment success (Cox and Snell $R^2 = 0.830$). These findings indicate that the combination of education and knowledge factors not only

play an individual role, but also form a complex interaction that influences the outcome of cervical cancer therapy.

The study results showed that most patients with good knowledge achieved higher treatment success rates. This finding aligns with a 2025 study that reported that cervical cancer patients with high knowledge scores had a higher rate of treatment success than those with low knowledge [13].

Good knowledge is an important foundation for patients in understanding the condition of the disease, therapy procedures, side effects, and coping strategies, this understanding provides a cognitive basis for making the right decisions regarding treatment, including choosing therapy methods, regulating diet, and maintaining genital hygiene to prevent infection, patients who have adequate knowledge are better able to recognize signs of worsening conditions, such as abnormal bleeding or increasing pain, so they can immediately seek medical help [14]. A good level of understanding also influences the patient's risk perception of the disease, which has an impact on motivation to comply with treatment despite facing severe side effects [15].

Adequate knowledge not only serves as a source of information but also builds patient self-efficacy. High self-confidence in managing the disease encourages consistent health behaviors, including disciplined adherence to chemotherapy or radiotherapy as scheduled, adherence to oral medication, and preventive measures against complications. A thorough understanding of the benefits of therapy and the risks of abruptly discontinuing treatment provides strong intrinsic motivation [16]. This study demonstrated that knowledge plays a significant role in the success of cervical cancer treatment, rooted in its ability to foster positive attitudes, reduce anxiety, and strengthen the therapeutic relationship between patients and healthcare providers. Adequate knowledge reduces misconceptions, such as the belief that therapy is only necessary if symptoms worsen, allowing patients to more consistently adhere to treatment plans. This understanding also helps patients manage the emotional stress that arises during therapy, as they have a realistic picture of the treatment process and the chances of success. Recent literature indicates that patients who understand their treatment plans have a significantly lower dropout rate than those who lack a thorough understanding of treatment procedures.

The study results showed that education was significantly associated with successful cervical cancer treatment. This finding is consistent with a 2023 study that showed that cervical cancer patients with a secondary education or higher had a higher chance of successful treatment [17]. Higher education facilitates the understanding of complex medical information, including technical terms frequently used by healthcare professionals. A good level of health literacy enables patients to absorb educational materials, understand medication information brochures, and access valid online sources. The sharpened cognitive abilities of individuals with higher education also enhance their ability to evaluate the credibility of health information circulating in the community or on social media. This minimizes the risk of being influenced by myths or alternative therapies that are not scientifically proven [18].

Education also contributes to the quality of interactions between patients and healthcare professionals. Individuals with higher levels of education are more likely to ask specific questions, provide detailed medical histories, and critically discuss therapeutic options. Good communication skills minimize misunderstandings of medical instructions and enable healthcare professionals to design interventions tailored to the patient's clinical condition and needs [19][20].

The influence of education on cervical cancer treatment success in this study was largely due to its association with cognitive capacity and health information management skills. Good health literacy enables patients to understand the stages of therapy, anticipate side effects, and implement coping strategies independently. This understanding improves the ability to adapt to changes in physical and emotional conditions during therapy. Good education also expands social networks and access to relevant social support, which has been shown to strengthen adherence to treatment plans [21][22].

The interaction between knowledge and education creates a significant synergistic effect on the success of cervical cancer therapy. Adequate education enhances the ability to acquire, analyze, and apply medical knowledge, while robust knowledge strengthens the ability to apply that information to everyday behavior. This synergy results in consistent health behaviors, adherence to therapy schedules, and the ability to overcome psychological and practical barriers during treatment. The combination of the two forms a strong foundation for an effective therapeutic partnership, ultimately substantially increasing the chances of treatment success.

CONCLUSION

This study confirms that knowledge and education contribute significantly to the success of cervical cancer therapy. The combination of the two forms a cognitive and behavioral foundation that encourages patients to be more adaptive to their disease, adhere to their therapy regimen, and develop effective self-management strategies during treatment. Understanding the disease and therapy not only improves patients' ability to make informed decisions but also strengthens their confidence to consistently undergo the treatment process. Improving cognitive capacity through targeted and continuous education is a crucial strategy for improving treatment outcomes for cervical cancer patients.

The results of this study also demonstrate a synergy between individual factors, such as knowledge, and external factors, such as education, that play a role in shaping positive health behaviors. The interaction of these two factors enhances patients' ability to access, understand, and implement medical information in their daily lives. Good health literacy contributes to adherence to treatment, management of side effects, and the ability to recognize warning signs that require further medical intervention. Efforts to improve patient health literacy through comprehensive and contextual education programs are believed to strengthen the chances of successful therapy and improve the quality of life for cervical cancer patients.

STRENGTHS AND LIMITATIONS

The main strength of this study lies in the use of multivariate analysis, which explains up to 83% of the variation in treatment success. This analysis provides a broader picture of the relationship between knowledge, education, and clinical factors on the success of cervical cancer therapy. These findings strengthen the empirical evidence that can serve as a basis for formulating promotive and preventive interventions, while also confirming that patient factors play a crucial role in treatment success. The integration of various variables in the study also demonstrates a comprehensive approach to understanding the complexity of the cervical cancer healing process. A limitation of the study lies in the limited scope of variables, which are still internal to the patient, while external factors such as the quality of healthcare services, family support, economic status, and the availability of medical facilities are not explored in depth. The cross-sectional design used also limits the study's ability to explain long-term causal relationships between the studied variables. This condition prevents the study results from fully describing the dynamics of patient behavior changes throughout the therapy process. Further research with a longitudinal design and a broader range of variables is needed to provide a more comprehensive picture of the determinants of cervical cancer treatment success.

IMPLICATIONS

The implications of this research emphasize the importance of strengthening literacy-based health education programs tailored to patients' educational levels. Healthcare providers need to develop simple, communicative, and easy-to-understand information delivery methods, including through visual media, individual counseling, and community-based support. Effective education plays a crucial role in improving patients' understanding of the therapy process, potential side effects, and strategies for managing the physical and psychological changes they experience. Improving patient knowledge will encourage long-term adherence to treatment and strengthen their ability to make informed health decisions.

The policy implications of this research point to the need to integrate educational interventions as part of standard cervical cancer treatment protocols in hospitals and other healthcare facilities. Health literacy training programs can be developed to improve patients' skills in understanding medical information and strengthen the quality of patient-healthcare interactions. Implementing this education-based policy has the potential to reduce non-adherence rates, reduce the risk of therapy dropout, and increase treatment effectiveness. An approach that places education as a central pillar of healthcare is believed to have a sustainable impact on improving the quality of life for cervical cancer patients.

Declaration of Conflicting Interest

None declared

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Authors' Contributions

All authors contributed equally to all stages of the study, including making substantial contributions (conception and design or acquisition of data or analysis and interpretation of data), drafting, and revising the manuscript, giving final approval of the version to be published, and agreeing to be accountable for all aspects of the work.

Data Availability Statement

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

Declaration of Generative AI

Nothing to disclose.

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