

# Self-efficacy, drug side effects, and nurse communication: Factors related in chemotherapy adherence for breast cancer patients

Muhammad Ashraf<sup>1</sup>, Hema Malini<sup>2</sup>, Randy Refnandez<sup>3</sup>, Intan Yullya Kardila<sup>4</sup>

<sup>1</sup> Bachelor of Nursing Student, Faculty of Nursing, Universitas Andalas, Padang, West Sumatera, Indonesia

<sup>2</sup> Department Medical Surgical Nursing, Faculty of Nursing, Universitas Andalas, Padang, West Sumatera, Indonesia

<sup>3</sup> Department Mental and Community Nursing, Faculty of Nursing, Universitas Andalas, Padang, West Sumatera, Indonesia

<sup>4</sup> Stikes Garuda Putih, Jambi city, Jambi, Indonesia

## Abstract

**Background:** Chemotherapy is a crucial therapy for breast cancer patients, and its success heavily depends on patient compliance. However, despite extensive in the impact of Non-compliance, there is still limited understanding of the specific factors influencing chemotherapy adherence among breast cancer patients, highlighting the need to re-identify these contributing factors.

**Purpose:** This study aims to identify the determinant factors related to chemotherapy adherence among breast cancer patients at the West Sumatera Provincial Hospital.

**Methods:** This study is a quantitative research with a cross-sectional design. An accidental sampling technique was used, with a total of 81 patients. Bivariate analysis was conducted using the chi-square test ( $p < 0.05$ ), and multivariate analysis was performed using Multiple Logistic Regression.

**Results:** The results showed that 61.7% of patients had good compliance. Factors associated with compliance included good self-efficacy, low knowledge, feeling bothered by the side effects of chemotherapy drugs, and effective nurse interpersonal communication. Multivariate analysis revealed that self-efficacy and drug side effects had a significant relationship with compliance ( $p < 0.05$ ). Drug side effects were the most significant factor (OR = 12.223, 95% CI: 1.371 to 109.015,  $p < 0.05$ ).

**Conclusion:** The findings of this study highlight the importance of managing drug side effects and enhancing self-efficacy through patient education and improved nurse interpersonal communication. These measures are expected to improve the quality of nursing care and patient outcomes.

**Keywords:** adverse reactions; breast cancer; chemotherapy; drug-related side effect; patient compliance

## Introduction

Cancer is the leading cause of death worldwide, causing nearly 10 million deaths in 2020. Breast cancer is the highest case in 157 out of 185 countries in the world (Ferlay et al., 2020). According to the Global Burden of Cancer Study data, breast cancer ranks first in the world (11.7%) and the mortality rate (6.9%) in the age range of 40-50 years (GLOBOCAN, 2020). Based on data, Indonesia is included in the top 10 highest rates of breast cancer sufferers and the fourth highest death rate caused by breast cancer. The prevalence of breast cancer in Indonesia is in first place with 65,850 cases with the second leading cause of death after lung disease (Indra, 2020). Deaths from breast cancer are expected to continue to increase to more than 14.1 million in 2023. The prevalence of breast cancer is spread across all provinces, based on data stating that breast cancer is in first place which every year there is an increase (Basic Health Research, 2018).

Primary treatment to improve healing and reduce the risk of breast cancer recurrence through surgery and radiation. Chemotherapy is the

## OPEN ACCESS

### Jurnal Keperawatan Padjadjaran (JKP)

Volume 13(3), 253-260  
© The Author(s) 2025  
<http://dx.doi.org/10.24198/jkp.v13i3.2748>

#### Article Info

Received : February 23, 2025  
Revised : November 18, 2025  
Accepted : December 08, 2025  
Published : December 10, 2025

#### Corresponding author

**Hema Malini\***  
Department Medical Surgical Nursing, Faculty of Nursing, Universitas Andalas, Padang, West Sumatera, Indonesia; Limau Manis, Pauh, Padang City, West Sumatra 25163; Phone: +62 812-6104-5860; E-mail: [hemamalini@nrs.unand.ac.id](mailto:hemamalini@nrs.unand.ac.id)

#### Citation

Ashraf, M., Malini, H., Refnandez, R., & Kardila, I. Y. (2025). Self-efficacy, drug side effects, and nurse communication: Factors related in chemotherapy adherence for breast cancer patients. *Jurnal Keperawatan Padjadjaran*, 13(3), 253-260. <http://dx.doi.org/10.24198/jkp.v13i3.2748>

#### Website

<http://jkp.fkep.unpad.ac.id/index.php/jkp>

This is an **Open Access** article distributed under the terms of the [Creative Commons Attribution-NonCommercial 4.0 International License](https://creativecommons.org/licenses/by-sa/4.0/).

E-ISSN: 2442-7276  
P-ISSN: 2338-5324

Malini, H., et al. (2025)

most used cancer modality therapy option and can break down 30% of recurrences (Harun et al., 2022; Sordo-Bahamonde et al., 2023; Wang & Wu, 2023).

Chemotherapy as the first choice of treatment in advanced cancers with palliative goals, is expected to increase the patient's "survival rate", lower the risk of recurrence, prevent complications and kill cancer cells. With a variety of cancer treatment options, the proportion of cancer patients' compliance in undergoing chemotherapy is still low (Bekalu et al., 2023; Hastuty et al., 2020).

Adherence in therapy is urgently needed because non-compliance of patients, especially breast cancer patients undergoing chemotherapy, can reduce the success of therapy, reduce the chance of survival, increase the incidence of hospital admissions, health care costs, recurrence events, and mortality rates (Indah et al., 2020). In addition, non-compliance can result in the spread of cancer cells to other organs of the body so that it will cause complaints due to the process of spreading cancer cells to other organs of the body. If cancer cells are left untreated, their spread can reach entire healthy parts of the organ, affect organ function, or metastasize to more distant parts of the body, which can ultimately lead to death. Data shows that of the 19,241 breast cancer patients, 3,158 (16%) died within 10 years of diagnosis. One of the causes of death is due to further complications resulting from failure to complete treatment (Ho et al., 2020; Lestari & Lestari, 2019).

Chemotherapy compliance requires collaborative efforts and understanding between healthcare professionals and patients. Patients must adhere to daily medications such as dosage, frequency, duration of therapy, and discontinuation. In addition, the chemotherapy schedule for breast cancer patients set by the doctor is something that must be adhered to by patients (Ho et al., 2020). Adherence to treatment is one of the factors in the effectiveness of a treatment so that it can reduce the mortality and mortality rate of a disease (Indah et al., 2020).

Compliance is a picture for patients in following instructions from health workers. Every patient must adhere to both long-term and short-term treatment to help the patient recover properly and quickly. Factors that affect compliance in undergoing chemotherapy are knowledge, self-efficacy, distance from the location of residence, side effects of chemotherapy, quality of service of health workers, family social support, age, education, economy. Patients who do chemotherapy not according to the schedule provided by health workers will have an impact on the patient's survival. Non-compliance is associated with poor survival will lead to death. Although previous studies have examined factors influencing chemotherapy compliance, aspects such as medication side effect, patient accommodation, inadequate knowledge, self-confidence, and the impact of psychosocial support from nurses' interpersonal communication remain underexplored.

Investigating these factors is important because they can significantly affect patient adherence, self-confidence and overall treatment outcomes. Thus, the purpose of this study is to further investigate factors related to chemotherapy adherence in breast cancer patients (Fitriana et al., 2023; Lestari & Lestari, 2019).

## Materials and Methods

### Design

The type of research used in this study is quantitative research with a cross-sectional approach.

### Population and sampling

The population of this study is all breast cancer patients in the National General Hospital. The population in April 2023 undergoing outpatient treatment at the West Sumatera provincial National General Hospital is 102 people. The sample was carried out through an accidental sampling technique of 81 respondents. The sampling technique used in this study was accidental sampling, which is a method of determine samples based on chance. In this approach, all respondents who happened to meet the researcher and met the inclusion and exclusion criteria were selected as data sources, the participants were breast cancer patients undergoing chemotherapy. The inclusion criteria in this study were breast cancer patients who had completed-5 chemotherapy cycles. The exclusion criteria were patients with decreased consciousness, patients with comorbid diseases, and patients with intellectual disabilities.

### Instruments

The instruments in this study included data on the characteristics of respondents consisting of age, education, occupation, monthly income, distance and time to health services, and stadium. Furthermore, the researcher used five questionnaires and one observation sheet. The knowledge questionnaire was adopted from Yulia (2012) and consisted of 15 questions, a Cronbach's alpha = 0.896. The self-efficacy questionnaire was adopted from Hia (2019) consisting of 10 questions, with a validity coefficient of 0.399 and a reliability coefficient (Cronbach's alpha) of 0.83. The chemotherapy drug side effect questionnaire was adapted from Makoul et al., (2007), with validity values ranging from 0.370-0.934 and a reliability coefficient (Cronbach's alpha) of 0.942. in addition, the Interpersonal Communication of Nurses or Communication Assessment Tool (CAT) was used, with Cronbach's alpha reliability of 0.96. Meanwhile, the observation sheet on chemotherapy compliance was based on the control card of breast cancer patients.

### Data collection procedures

The study was conducted from September 8, 2023, to March 6, 2024. All respondents were selected according to the inclusion and exclusion criteria.

**Table 1. Characteristics of Respondents (Age, Education Level, Occupation, Income, Distance, Time, Stage, Cycle (n=81))**

Characteristics of Respondents	Mean /SD	Min-Max
Age	49.14/ 8.452	26-71
	<b>f</b>	<b>%</b>
<b>Education</b>		
Primary Education	11	13.6
Secondary Education	41	50.6
Higher education	29	35.8
<b>Work</b>		
Not Working	51	63.0
Work	30	37.0
<b>Income</b>		
Low	34	42.0
Keep	38	46.9
Tall	9	11.1
<b>Distance and Time</b>		
Close ≤ 5km/<30 minutes	20	24.7
> 5 km/>30 minutes away	61	75.3
<b>Stadium</b>		
Stadium 2	57	70.4
Stadium 3	23	28.4
Stadium 4	1	1.2
<b>Cycle</b>		
5-6 Cycles	43	53.1
7-8 Cycles	38	46.9

**Table 2. Distribution of Category Frequency Based on Knowledge, Side Effects of Chemotherapy Drugs, Self-Efficacy, Interpersonal Communication of Nurses, Compliance (n=81)**

Category	F	%
<b>Knowledge</b>		
Tall	35	43,2
Low	46	56,8
<b>Side Effects of Chemotherapy Drugs</b>		
Disturb	64	79,0
Non-Intrusive	17	21,0
<b>Self-Efficacy</b>		
Good	66	81,5
Enough	15	18,5
<b>Nurse Interpersonal Communication</b>		
Good	42	51,9
Bad	39	48,1
<b>Compliance</b>		
Obedient	50	61,7
Non-Compliance	31	38,3

**Table 3. Relationship of Knowledge, Self-efficacy, Side Effects of Drugs, and Interpersonal Communication of Nurses with Chemotherapy Compliance (n=81)**

	Compliance				Total	P value	
	Obedient		Non-Compliance				
	f	%	f	%			
<b>Knowledge</b>							
Tall	27	77.1	8	22.9	35	100.0	0.024
Low	23	50.0	23	50.0	46	100.0	
<b>Self-efficacy</b>							
Good	45	68.2	21	31.8	66	100.0	0.027
Enough	5	33.3	10	66.7	15	100.0	
<b>Side Effects of the Drug</b>							
Non-Intrusive	17	94.4	1	5.6	18	100.0	0.003
Disturb	33	52.4	30	47.6	63	100.0	
<b>Nurse Interpersonal Communication</b>							
Good	31	73.8	11	26.2	42	100.0	0.036
Bad	19	48.7	20	51.3	39	100.0	

**Table 4. Models of Logistic regression of Knowledge, self-efficacy, side effects of medications, and interpersonal communication of nurses with Chemotherapy Compliance**

Variables	Model 1		Model 2	
	OR (ICR 95%)	p	OR (IC95%)	p
Knowledge	3.044 (0.976-9.497)	0.055	2.649 (0.884 – 7.943)	0.82
Self-Efficacy	3.152 (0.748 – 13.278)	0.25	4.666 (1.220 – 17.847)	0.024
Perception of Drug Side	12.223 (1.371-109.015)	0.118	12.262 (1.411 – 106.531)	0.023
Perceptions related to nurse interpersonal communication	2.276 (0.725 – 7.145)	0.159		

The data collection process began with obtaining research ethics approval, followed by recruiting respondents using the accidental sampling technique, in which all individuals who happened to meet the researcher and met the inclusion and exclusion criteria were included as participants.

Afterward, the researcher introduced themselves and explained the purpose and objectives of the study to the respondents. Informed consent was then obtained, and each respondent was asked to sign the consent form. Subsequently, data were collected through guided interviews using questionnaires, assisted by enumerators.

### Data Analysis

The results of the study were analyzed using statistical software. Univariate analysis was carried out on each variable from the results of the study, namely independent variables (knowledge, self-efficacy, side effects of chemotherapy drugs, interpersonal communication of nurses) and dependent variables (adherence in undergoing chemotherapy in breast cancer patients) which were analyzed using statistics in the form of mean and frequency distribution.

Bivariate analysis was carried out to determine whether there was a relationship between independent variables (knowledge, self-efficacy, side effects of chemotherapy drugs, interpersonal communication of nurses) and dependent variables (adherence in undergoing chemotherapy in breast cancer patients) using the Chi Square test with a significance degree of 0.05, since based on the results of the normality test (Shapiro–Wilk), the data were not normally distributed. Furthermore, a multivariate analysis was carried out with a multiple logistic regression test to see the most dominant factor with a significance degree of 0.05.

### Ethical considerations

The ethical license has been confirmed by the Ethical Standards Committee of the Faculty of Nursing on January 02, 2024, Number: DP.04.03/D. XVI.XI/06/2024 Participants give consent before conducting the survey and have the option to refuse to answer any questions or stop the survey at any stage. All information collected is completely anonymous. Each respondent took about 25-30 minutes to complete the questionnaires. No major complaints were reported, although some noted that

the number of questions was many. Short breaks were allowed to minimize fatigue.

## Results

This study aims to investigate adherence and factors related to chemotherapy adherence in breast cancer patients in national general hospitals. The study involved 81 breast cancer patients undergoing chemotherapy. The results of the study presented data related to demographic characteristics, univariate, bivariate and multivariate analysis results.

Table 1 presents the demographic characteristics of respondents undergoing chemotherapy. The average age was 41.14 years. Most respondents had completed education at the level of 29 people (35.8%) and were unemployed, total 51 people (63.0%). The majority lived more than 5 km from the hospital and took over 30 minutes to reach it (75.3%). Most respondents were in stage 2 of cancer (70.4%) and had undergone 5-6 chemotherapy cycles (53.1%).

Based on table 2, 43.2% of respondents had high knowledge about chemotherapy. Most respondents (79.0%) experienced side effect during chemotherapy. Regarding self-efficacy, 81.5% were in the good category. Nurse interpersonal communication was rate god by 51.9% of respondents. More than half (61.7%) of the respondents complied with the chemotherapy regimen.

Table 3 shows the correlation between various factor and chemotherapy adherence. Among respondents with high knowledge, 77.1% adhered to chemotherapy, while 50.0% of those with low knowledge were non-compliant. In terms of themes of self-efficacy, 68.2% of respondents in the good category adhered to chemotherapy, compared to 66.7% non-compliance in the sufficient category. Regarding drug side effects, 94.4% of respondents without interfering side effects were non-compliant. For nurse interpersonal communication, 73.8% of respondents with good communication adhered to chemotherapy, while 51.3% with poor communication were non-compliant. Statistical analysis revealed significant correlations between knowledge, self-efficacy, drug side effects, and nurse interpersonal communication with chemotherapy adherence ( $p < 0.05$ ), indicating these factors are significantly associated with patient compliance during chemotherapy.

Table 4 shows the factors associated with chemotherapy adherence, after a multiple logistical analysis. Of the four variables included in the multivariate model, (Model 1) there was one factor that remained significant ( $p < 0.05$ ), related to chemotherapy adherence in the last model (Model 2): self-efficacy and drug side effects. Side effects showed a stronger association with chemotherapy adherence of cancer patients with (OR = 12,223, 95% CI 1,371 to 109,015,  $p < 0.05$ ).

## Discussion

This study found that 61.7% of respondents adhered to their chemotherapy schedule, while 38.3% were unable to follow the prescribed cycles. The reasons for non-adherence included low hemoglobin levels, thrombocytopenia, poor physical condition, forgetfulness, and work commitments. Previous studies indicate that adherence is influenced by environmental motivation and strong nurse support (Siska, 2017). More than half of respondents (56.8%) demonstrated low knowledge regarding breast cancer, its prevention, chemotherapy procedures, and potential drug side effects.

Moreover, this study found that 30.9% of participants had poor knowledge, reflecting persistent gaps in understanding breast cancer and its risk factors. Evidence from previous research supports this finding, showing that over half of patients had inadequate knowledge of chemotherapy, its side effects, and self-care strategies (Rizka et al., 2023; Abu El-Kass et al., 2021; Suhail et al., 2024). Lack of knowledge often increases anxiety about chemotherapy, but this can be alleviated through adequate education on its benefits, risks, and management.

Chemotherapy knowledge encompasses understanding the purpose, duration, side effects, and necessary lifestyle adjustments during therapy. Adequate knowledge helps patients anticipate potential side effects, take preventive measures, and adhere to treatment (Mathur et al., 2015; Parker et al., 2020; Berger et al., 2018). However, many patients remain uninformed, with 54.6% unaware of their chemotherapy regimen and 56.9% unable to identify the medications they were receiving (Suhail et al., 2024). Factors contributing to poor knowledge include limited exposure to health information, cognitive constraints, low educational background, and negative perceptions about chemotherapy (Arunachalam et al., 2021). Thus, health workers need to provide clear, accessible, and continuous education to ensure patients understand the treatment and its potential side effects.

This study also showed that most respondents (81.5%) had good self-efficacy. Self-efficacy is essential in motivating individuals to believe in their capacity to undergo chemotherapy, manage side effects, and maintain treatment continuity. High self-efficacy enhances readiness to face treatment challenges, while low self-efficacy may result in lack of motivation, hopelessness, and fear (Ester & Wardah, 2020). When self-efficacy is low, patients need emotional, social, and informational support from families and healthcare providers to strengthen their confidence and resilience.

Most respondents (79%) reported experiencing chemotherapy side effects, primarily physiological complaints such as nausea, vomiting, loss of appetite, fatigue, and mucositis. These findings are consistent with previous studies documenting similar side effects (Rusmalina, 2019; Koshy et al.,

2023). Chemotherapy side effects vary depending on drug type, dosage, treatment duration, and patient characteristics (Nurseta et al., 2022). Preventive measures—such as premedication with antiemetics, erythropoietin, and supportive drugs—can reduce the severity of side effects and improve patient comfort (Wardani, 2014).

This study found that 51.9% of respondents rated nurse interpersonal communication as good, indicating that nurses generally treated patients respectfully, provided comfort, and showed empathy. Effective communication is crucial in cancer care, as poor communication contributes to misunderstandings, delays in reporting side effects, and reduced trust (Keutchafo, W. et al., 2022). However, 48.1% rated nurse communication as poor, particularly regarding opportunities for asking questions, shared decision-making, and receiving adequate explanations. These gaps highlight the need for nurses to strengthen patient engagement, clarify information about chemotherapy, and provide consistent feedback.

The multivariate analysis showed that self-efficacy and side effects significantly influenced chemotherapy adherence. Higher self-efficacy was associated with better compliance, consistent with evidence that confidence improves persistence during treatment despite physical and emotional challenges (Bandiyah et al., 2017; Wu et al., 2020). Interestingly, the side effect factor was identified as the strongest predictor of adherence, supporting findings that patients who recognize and anticipate side effects tend to be more compliant (Fitriana et al., 2023). This emphasizes the importance of providing early, clear, and comprehensive information about potential side effects and management strategies.

### Strengths and Limitations

This study has several strengths. First, it provides comprehensive data on multiple determinants of chemotherapy adherence among breast cancer patients, including knowledge, self-efficacy, side effects, and nurse interpersonal communication. Second, the use of validated questionnaires enhances measurement reliability and validity. Third, the study involved an adequate sample size, allowing for meaningful statistical analysis, including multivariate modelling.

However, the study has limitations. The cross-sectional design restricts the ability to infer causal relationships. The use of accidental sampling limits the generalizability of the findings to all breast cancer patients. Additionally, adherence and other variables were measured through self-report, introducing the possibility of recall and social desirability bias. Future research using longitudinal designs, random sampling, and objective adherence measures is recommended to strengthen evidence.

### Implications of the Study

The findings have several practical and clinical implications. First, identifying factors such

as knowledge, self-efficacy, side effects, and communication provides direction for developing targeted interventions to improve adherence. Second, the study underscores the pivotal role of nurses in providing education, emotional support, and effective communication to enhance patient understanding and treatment continuity. Third, routine assessment of patient knowledge, self-efficacy, and treatment side effects is necessary to guide individualized counselling and timely support. These insights can inform nursing practice, patient education programs, and policy development aimed at optimizing adherence to chemotherapy among breast cancer patients.

### Conclusion

This study found that chemotherapy adherence among breast cancer patients is significantly influenced by self-efficacy and drug side effects, with side effects emerging as the strongest predictor. Enhancing patient self-efficacy and providing structured information about chemotherapy and its side effects are essential to improving adherence.

Based on the findings, healthcare providers—especially nurses—should prioritize interventions that strengthen patient self-efficacy, increase knowledge about treatment, and offer strategies for managing side effects. Continuous health education, counseling, and the use of educational materials such as booklets can help patients better understand their treatment and improve their compliance with chemotherapy.

### Declaration of Interest

The authors state that they have no competing financial interests or personal relationships that could seem to affect the work reported in this paper.

### Acknowledgment

The authors sincerely thank all respondents and the staff of general hospital in west Sumatra for their support. Special appreciation is given to the research team for their assistance during data collection

### Funding

This research received no specific grant from any funding agency in the public, commercial, or not for profit sectors.

### Data Availability

All data generated or analyzed during this study are included in this published article.

### References

- Abu El-Kass, S., Ragheb, M. M., Hamed, S. M., Turkman, A. M., & Zaki, A. T. (2021). Needs and self-care efficacy for cancer patients suffering from side effects of chemotherapy. *Journal of Oncology*, 2021. <https://doi.org/10.1155/2021/5523456>

- [org/10.1155/2021/8880366](https://doi.org/10.1155/2021/8880366)
- Arunachalam, Shetty, A. P., Panniyadi, N., Meena, C., Kumari, J., Rani, & Kumari, S. (2021). Study on knowledge of chemotherapy's adverse effects and their self-care ability to manage-The cancer survivors impact. *Clinical Epidemiology and Global Health*, 11(100765). <https://doi.org/10.1016/j.cegh.2021.100765>
- Bandiyah, Rejeki, & Hayati. (2017). The relationship between self-image and compliance with chemotherapy for breast cancer patients at Kraton Hospital, Pekalongan Regency. *Jurnal Keperawatan*, 8, 131–139.
- Basic Health Research (2018). Basic Health Research Report 2018. 1–582.
- Bekalu, Y. E., Wudu, M. A., & Gashu, A. W. (2023). Adherence to chemotherapy and associated factors among patients with cancer in Amhara region, Northeastern Ethiopia, 2022. a cross-sectional study. *Cancer Control*, 30, 1–10. <https://doi.org/10.1177/10732748231185010>
- Berger, O., Grønberg, B. H., Loge, J. H., Kaasa, S., & Sand, K. (2018). Cancer patients' knowledge about their disease and treatment before, during and after treatment: A prospective, longitudinal study. *BMC Cancer*, 18(1), 1–11. <https://doi.org/10.1186/s12885-018-4164-5>
- Ester, Y., & Wardah, W. (2020). Self-efficacy of nurses in fulfilling the spiritual needs of patients. *Jurnal Keperawatan*. 12(1), 63–70. <https://doi.org/10.32583/keperawatan.v12i1.696>
- Ferlay, J., Ervik, M., Lam, F., Colombet, M., Mery, L., Piñeros, M., Znaor, A., Soerjomataram, I., & Bray, F. (2020). Observatory: "cancer today". Lyon International Agency Res. Cancer.
- Fitriana, E. R., Ardiyanti, N. A., Vallen, N., & Puspita, I. (2023). Relationship between mileage and side effects on chemotherapy adherence in cervical cancer patients. 1(3). <https://doi.org/10.59680/medika.v1i3.406>
- Globocan. (2020). International agency for research on cancer 2020. *WHO Chronicle*, 23(7), 323–326.
- Harun, H. M., Jannah, N., & Ahmad, Z. F. (2022). Evaluation of radiotherapy treatment in cancer patients. *Journal Syifa Sciences and Clinical Research (JSSCR)*, 4(3), 662–670. <https://doi.org/10.1038/s41598>
- Hastuty, S., Saputra, M. A. S., & Handayani, M. (2020). The relationship between the level of knowledge of carcinoma mammae and patient motivation with compliance with chemotherapy at Pusri Palembang hospital in 2020. *Jurnal Keperawatan Bina Husada* (2020), 5(3), 248–253. <https://doi.org/10.36089/nu.v14i4.1685>
- Hia, N. H. (2019). The relationship between cancer patients' self-efficacy and compliance with chemotherapy at Santa Elisabeth Hospital Medan. Thesis. Santa Elisabeth College of Health Sciences.
- Ho, P. J., Ow, S. G. W., Sim, Y., Liu, J., Lim, S. H., Tan, E. Y., Tan, S. M., Lee, S. C., Tan, V. K. M., Yap, Y. S., Chay, W. Y., Tan, B. K. T., Wong, F. Y., Li, J., & Hartman, M. (2020). Impact of deviation from guideline recommended treatment on breast cancer survival in Asia. *Scientific Reports*, 10(1), 1–12. <https://doi.org/10.1038/s41598-020-58007-5>
- Indah, F., Qodir, N., & Legiran, L. (2020). Factors affecting treatment compliance of breast cancer patients undergoing chemotherapy at Dr. Mohammad Hoesin Palembang hospital. *Sriwijaya Journal of Medicine*, 3(1), 24–32. <https://doi.org/10.32539/sjm.v3i1.116>
- Indra. (2020). World Cancer Day socialization (world cancer day). In Pemerintah Provinsi Sumatera Barat Dinas Kesehatan. <https://dinkes.sumbarprov.go.id/details/news/467>
- Keutchafu, W., E. L., Kerr, J., & Baloyi, O. B. (2022). A Model for Effective Nonverbal Communication between Nurses and Older Patients: A Grounded Theory Inquiry. *Healthcare (Switzerland)*, 10(11). <https://doi.org/10.3390/healthcare10112119>
- Koshy, B., Avudaiappan, S. L., & Anand, A. S. (2023). Self-care behaviour of patients with breast cancer in the management of side effects of chemotherapy. *Cureus*, 15(9). <https://doi.org/10.7759/cureus.44586>
- Ky, T. D., Loan, N. T., Thinh, N. T., & Binh, M. T. (2024). Nonadherence to oral cancer chemotherapy in hepatocellular carcinoma: prevalence and predictive factors in Vietnam. *BMC Cancer*, 24(1), 1–10. <https://doi.org/10.1186/s12885-024-12601-2>
- Lestari, N. K. Y., & Lestari, A. A. D. (2019). An overview of the compliance of breast cancer patients undergoing chemotherapy in the Sanjiwani chemotherapy room of Sanglah hospital Denpasar. *Proceedings of the national seminar, breast cancer patients' compliance with chemotherapy*, 145.
- Makoul, G., Krupat, E., & Chang, C. H. (2007). Measuring patient views of physician communication skills: Development and testing of the Communication Assessment Tool. *Patient Education and Counseling*, 67(3 SPEC. ISS.), 333–342. <https://doi.org/10.1016/j.pec.2007.05.005>
- Mathur, G., NAIN, S., & SHARMA, P. Kumar. (2015). Cancer: an overview. *Acad. J. Cancer Res*, 8(1), 01–09. <https://doi.org/10.5829/idosi.ajcr.2015.8.1.9336>
- Nurseta, T., Samsu, N., Perdhana, R., Palapa, H., Anggraeni, F. R., Wicaksono, B. A., ... & Gandhari, A. S. A. A. (2022). Chemotherapy in gynecological cancer. Universitas Brawijaya Press.
- Parker, P. D., Heiney, S. P., Adams, S. A., Friedman, D. B., & Dawson, R. M. (2020). Factors influencing chemotherapy knowledge in women with breast cancer. *Applied Nursing Research*, 56, 1–20. <https://doi.org/10.1016/j.apnr.2020.151335>

Malini, H., et al. (2025)

- Rizka, A., Iskandar, & Akramah, S. (2023). Analysis of the relationship between education level and knowledge on chemotherapy adherence in breast cancer patients at Cut Meutia general hospital, North Aceh. *Jurnal Ilmiah Manusia Dan Kesehatan*, 6(1), 69–77. <https://doi.org/10.31850/makes.v6i1.1947>
- Rusmalina, S. (2019). Study of the side effects of the use of chemotherapy drugs in breast cancer patients (carcinoma mammae) at Kraton Pekalongan Hospital. *Jurnal Kesehatan Pena Medika*, 9(2), 48–54.
- Siska, H. (2017). Factors related to the compliance of breast cancer patients in undergoing chemotherapy at Ropanasuri Hospital. In *Diponegoro Journal of Accounting*, 2(1).
- Sordo-Bahamonde, C., Lorenzo-Herrero, S., Gonzalez-Rodriguez, A. P., Martínez-Pérez, A., Rodrigo, J. P., García-Pedrero, J. M., & Gonzalez, S. (2023). Chemo-immunotherapy: a new trend in cancer treatment. *Cancers*, 15(11), 1–15. <https://doi.org/10.3390/cancers15112912>
- Suhail, M., Saulat, F., Khurram, H., Fatima, F., Zenab, A., Wasim, M., Sadia, N. U. A., Afzaal, F., Latif, H., & Nasrullah, M. (2024). Knowledge, attitude and practice related to chemotherapy among cancer patients. *Inquiry (United States)*, 61. <https://doi.org/10.1177/00469580241246460>
- Wang, J., & Wu, S. G. (2023). Breast cancer: an overview of current therapeutic strategies, challenge, and perspectives. *Breast Cancer: Targets and Therapy*, 15(October), 721–730. <https://doi.org/10.2147/BCTT.S432526>
- Wardani, W. N. A. & E. K. (2014). Side effects of chemotherapy physically in patients with cervical cancer. *Proceedings of National & International Seminars*, 2(2), 97–106.
- Wu, F., Howell, D., Fang, Q., Chen, J., & Yuan, C. (2020). Trajectory patterns and factors influencing self-management behaviors in Chinese patients with breast cancer. *Cancer Nursing*, 43(2), E105–E112. <https://doi.org/10.1097/NCC.0000000000000681>
- Yulia, T. (2012). An overview of the patient's level of knowledge about chemotherapy treatment at Dharmais Hospital. Thesis. University of Indonesia.