



# Effectiveness of the One-Window Services Model (OWSM) in Enhancing Cancer Patients' Competence in Accessing and Using Immunotherapies: A Quasi-Experimental Study in Pakistan

Rizwan Arshad<sup>1</sup>, Alessio Panza<sup>1</sup>

## Abstract

**Background:** The global burden of cancer is rising, particularly in Asia, with significant challenges in accessing treatments such as surgery, radiotherapy, chemotherapy, and immunotherapy in low- and middle-income countries. In Pakistan, the One Window Services Model (OWSM) aims to streamline access to public services, including healthcare. This study evaluated the impact of OWSM on cancer patients' competence in accessing and utilizing immunotherapies.

**Methodology:** A quasi-experimental study was conducted in two university hospitals in Pakistan from January 26 to April 26, 2023. A total of 152 cancer patients, equally divided into intervention (n=76) and comparison (n=76) groups, participated. Patients were aged 18 or older and eligible for immunotherapies, excluding those with a history of drug reactions or stage 4 cancer. Data were collected using a questionnaire based on Andersen's model, assessing demographics, social structure, health beliefs, enabling factors, and competence in accessing immunotherapies. The intervention group received educational sessions over three months, while the comparison group received standard care. Statistical analyses, including Chi-square and Fisher's exact tests, were conducted using SPSS version 26.

**Results:** Baseline assessments showed no significant differences between groups ( $P > 0.05$ ). Post-intervention, the intervention group demonstrated substantial improvements in "Knowledge of the import process," "Ability to fill and submit forms," and the "Competence index," with increases from 6.6% to 97.4% ( $P < 0.0001$ ). Immunotherapy usage rose to 96.1% in the intervention group compared to 2.6% in the comparison group ( $P < 0.0001$ ). Patient satisfaction in the intervention group was 90.8%.

**Conclusion:** The OWSM significantly enhanced cancer patients' competence in accessing and using immunotherapies, with high levels of patient satisfaction. The model holds promise for improving healthcare delivery in other areas, meriting further investigation into its broader and long-term impacts.

**Keywords:** One Window Services Model, cancer immunotherapies, accessibility, competence, patient satisfaction; Andersen's model; Pakistan

**How to cite this article:** Arshad R, Panza A. Effectiveness of the One-Window Services Model (OWSM) in Enhancing Cancer Patients' Competence in Accessing and Using Immunotherapies: A Quasi-Experimental Study in Pakistan. Pak J Public Health 2024 Sep. 30;14(3):225-31.

Available from: <https://pjph.org/pjph/article/view/1424> DOI: <https://doi.org/10.32413/pjph.v14i3.1424>

<sup>1</sup> CPHS Chulalongkorn University Bangkok, Thailand

**Correspondence:**  
Rizwan Arshad  
[hsrizwankhan@gmail.com](mailto:hsrizwankhan@gmail.com)

**Submitted:** 21-05-2024

**Revised:** 09-08-2024,  
22-08-2024,

**Accepted:** 24-09-2024

**Published:** 30-09-2024

## Introduction

Cancer is a complex and significant public health challenge worldwide. The International Agency for Research on Cancer (IARC) projects that by 2040, the number of new cancer cases and cancer-related deaths will increase by approximately 1.6–1.7 times globally, reaching 29.5 million and 16.4 million, respectively. Nearly 50% of cancer cases and 60% of cancer deaths occur in Asia, home to 60% of the world's population (1). According to the World Health Organization (WHO) Cancer Regional Profile 2020, the Southeast Asia Region with a total population of 2 billion had nearly 20 million reported cancer

patients, out of which more than 13.3 million resulted in fatalities. Additionally, the country profile for 2020 reveals that Pakistan with a total population of 220 million had nearly 174,000 reported cancer patients, out of which more than 118,500 resulted in fatalities (2,3). The main risk factors for cancer include tobacco use, alcohol consumption, unhealthy diet, physical inactivity, and aging (4). Common treatment options for cancer include surgery, radiotherapy, chemotherapy, hormonal therapy, targeted therapy, stem cell transplant, and immunotherapies. Nowadays, the objective of cancer therapy is to provide more accurate care to patients through individualized health care, known as

precision medicine. Precision medicine is particularly beneficial for cancer patients who have previously been subjected to treatments such as chemotherapy and radiation, which fight the disease but frequently destroy healthy tissue in the process (5). Precision medicine is at the heart of immunotherapy, which is now one of the most active fields of cancer research. Immunotherapy is a novel method that uses the strength of our immune systems to diagnose and treat illnesses like cancer. It is being researched in nearly every form of cancer, and the number of tumors successfully treated with immunotherapy is currently at 15 and climbing, including skin, lung, kidney, and bladder cancers (6). Successful treatment achieves "remission" but cancer usually returns (even years later) after remission. "Curing" cancer, i.e. completely eradicating it without it coming back, can happen for some people but currently there is no specific cure for cancer. While in high-income countries about 50% of patients diagnosed with "all" cancers, and 80% of those diagnosed with "easier to diagnose and/or treat" cancers survive their disease for ten years or more in low- and middle-income countries the 10-year survival is much lower because treatments are not easily accessible to all patients (7).

There are five main types of accessibility: physical, geographical, financial, cultural and informational. This research specifically focuses on informational accessibility because several barriers to accessing immunotherapies, including a lack of information, and low education levels, were documented from cancer registries, hospital-based data and metanalysis (8). Similar issues in accessing cancer treatments have been observed in Pakistan as in other parts of the world (9).

In Pakistan, one window services model (OWSM) is increasingly being used to enhance access to various services such as social services, healthcare, employment services, and support for entrepreneurs and small businesses through a single point of contact. However, its role in health services is still limited.

A literature search was conducted to identify articles on studies related to improving access to cancer immunotherapies. The search included articles published between 2012 and 2022 in both English and Urdu languages, used the Boolean operator "AND", "And OR", the keywords "Cancer immunotherapies", "Accessibility", "One Window Services Model(OWSM)", and "Pakistan". PubMed, Google Scholar, and the electronic library of the College of Public Health Sciences were used as databases, yielding 18800 articles. After discarding articles duplicated by the databases, reading the titles (step 1) the abstracts (step 2), and the full text (step 3) of the articles remaining at the end of each step only two articles were relevant to our study the first on strategies for immunotherapies and the second on the development of the OWSM in accessing cancer immunotherapies in Pakistan (10) but none on the

effectiveness of OWSM to improve access and use.

Therefore, this study aimed at measuring the effectiveness of the OWSM in enabling cancer patients to access and use their immunotherapies in Pakistan and to assess their satisfaction with the services provided by the OWSM.

## Methodology

### Study Design

Quasi-experimental, nonrandomized, pre-post intervention study.

### Study Setting and Population

The study was conducted in two university hospitals with cancer centers located in the metropolitan cities, Shaukat Khanum Memorial Trust (SKMT) in Lahore, and Agha Khan University Hospital (AKUH), Karachi in the Punjab and Sindh provinces respectively of Pakistan. The study population consisted of cancer patients who had been advised to undergo cancer immunotherapies by the Tumor Panel Physician (TPP) of the respective hospitals.

### Study Duration

The study duration was from January 26th to April 26th, 2023.

Provinces and cities were purposively sampled because cancer hospitals are in these provinces and cities. Simple random sampling, using the random *number* generator of the Excel we selected the cancer university hospitals within those cities, ensuring equal chances of inclusion for each hospital. Finally, convenience sampling was used to select study participants from the selected hospitals by recruiting every patient meeting inclusion and exclusion criteria presenting at the hospital during the interview days till the required sample size was achieved in both intervention and comparison groups.

### Inclusion and Exclusion Criteria

The study included Pakistani cancer patients who were advised to receive immunotherapies by TPP, were aged 18 years or over, were treated in the study hospitals, had good physical conditions to complete all related tasks, and were screened by the hospital finance department. The study excluded cancer patients with a previous history of drug reactions, those who refused to sign the consent forms, and those with stage 4 cancer.

### Instruments and Process for Data Collection

One questionnaire was used for the Baseline and Post-intervention surveys. It was constructed on the Andersen for Health Services Use Model (AHSUM) behavioral model and consisted of five sections for the independent variables measuring: 'Predisposing factors including 12 questions from (Q1-Q12), Enabling factors including eight questions from (Q13-Q20), Need factors including six questions (Q21-Q26) "Knowledge of import process" including nine

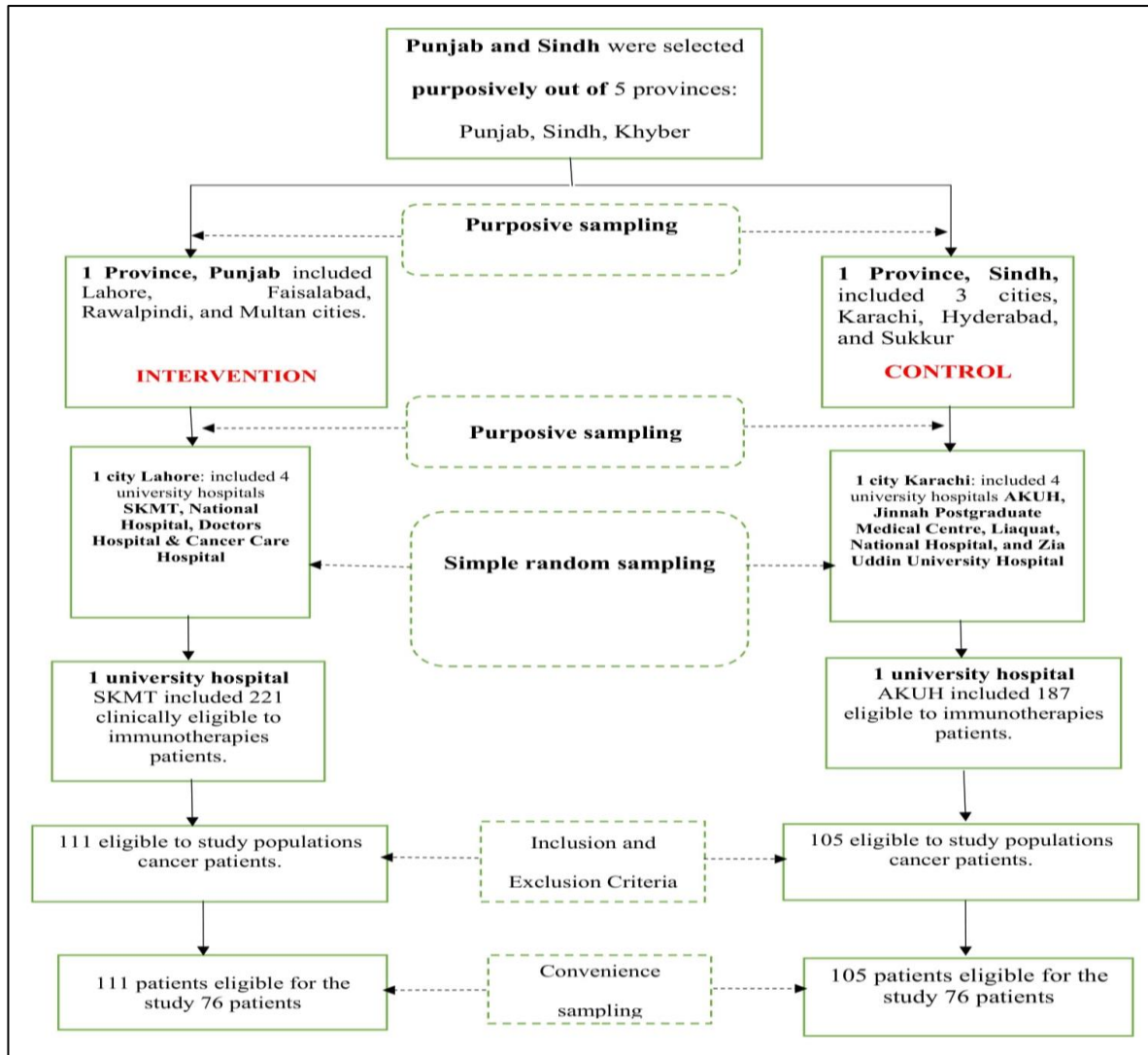


Figure 2 Flow Chart of Sampling Technique

questions (27-35), “Ability to fill in and submit forms” including seven questions (Q36-Q41), “Use of cancer immunotherapies” including three questions (Q42-44). At the Post-intervention survey, the questionnaire for the experimental group had an additional section on patient satisfaction consisting of five questions (Q45-Q49).

The construct validity of the questionnaire was based on relevant Pakistan government guidelines and the AHSUM. Content validity was assessed by three Pakistani experts: a senior oncology researcher, a public health expert, and a consultant oncologist. The Item-Objective Congruence (IOC) Index was used to evaluate the questionnaire items, with scores ranging from +1 to -1 (+1 = measuring, 0 = unclear, and -1 = not measuring). Nine items with scores of < 0.5 were revised. Face validity was assessed during questionnaire pilot testing with similar patients in a bone marrow transplant center. The internal consistency reliability measured for multiple Likert scale questions

yielded a Cronbach’s alpha of 0.85, while questions with a dichotomous score yielded a Kuder-Richardson score of 0.85.

Before the baseline survey, the data collectors called the participant patients and scheduled a 20-minute appointment on the day they had a consultation with their oncologist. During the 20 minutes, data collectors explained to the participants the study objectives and their duties and rights, obtained written informed consent, and filled out the questionnaire in a designated counseling room.

Following the baseline survey, all intervention group participants received an invitation letter to attend a two-hour, one-on-one educational discussion session in designated counseling rooms, on the day patient receive immunotherapy prescription. During the discussion sessions, participants were provided with an OWSM booklet containing simple text and pictorial guidance on import processes and procedures for filling out and submitting

required forms. The sessions began with graphics and interactive card exercises as icebreakers, followed by the use of flip charts, key point action cards, and short instructional videos on import processes and procedures. At the end of the sessions, participants were invited to ask questions for clarification. Attendance for all sessions was recorded in a research logbook. The comparison group received the usual hospital care only.

After the intervention, the data collectors contacted the patients in advance to schedule a 20-30-minute post-intervention survey on the same day they received their first immunotherapy at the outpatient department. Those who missed the appointment were rescheduled on the day they received their second immunotherapy. The immediate outcome of the study, Competence (knowledge of import processes and the ability to fill in and submit required documents), was evaluated by comparing the results of the questionnaire at the baselines and post-intervention surveys. The long-term outcomes, use of immunotherapies, were assessed from the hospital's records, and patients' satisfaction using the specific post-intervention section of the questionnaire above described for the intervention group.

**Data Analysis**

The data was analyzed using SPSS version 26. Descriptive

statistics, such as frequencies and percentages, were used for categorical variables. For inferential statistics, the Chi-square and Fisher's exact tests were used, as relevant, to determine the statistical significance of changes in competence and use between baseline and post-intervention surveys within and between the intervention and comparison groups.

**Ethical Review**

The Research Ethics Review Committee for Research Involving Human Research Participants, Group I approved this study: Chulalongkorn university, Bangkok, Thailand (650125, 09 Dec 2022, COA No. 235/65).

**Results**

Out of the 152 participants (76 each in intervention and comparison group) none dropped out of the study.

Table 1 presents the Baseline predisposing factors: demographics, social structure, and health belief characteristics of the respondents. These particular characteristics were not measured in the post-intervention survey as they remained unchanged. The Pearson chi-square analysis indicated that there were no statistically significant differences between the intervention and comparison groups in terms of their demographics, social structure, and health beliefs (P>0.05).

**Table 1: Baseline Demographics, Social Structure, and Health Beliefs in Intervention (76) and Comparison group (76)**

Variable	Categories	Intervention n (%)	Control n (%)	Chi-square value (df)	P-Value
<b>Predisposing Factors</b>					
<b>Demographics</b>					
Age	18-33 Years	33 (43.4%)	35 (46.1%)	0.860 (2)	0.651 <sup>a</sup>
	34-49 Years	33 (43.4%)	28 (36.8%)		
	50 Years and above	10 (13.2%)	13 (17.1%)		
Gender	Female	54 (71.1%)	52 (68.4%)	0.125 (1)	0.433 <sup>a</sup>
	Male	22 (28.9%)	24 (31.6%)		
<b>Social Structure</b>					
Education	Illiterate or no formal education	6 (7.9%)	8 (10.5%)	0.715 (4)	0.945 <sup>a</sup>
	Primary School level	12 (15.8%)	14 (18.4%)		
	Middle School level	10 (13.2%)	10 (13.2%)		
	High school level	17 (22.4%)	17 (22.4%)		
	College/University level	31 (40.8%)	27 (35.5%)		
Marital Status	Single	15 (19.7%)	11 (14.5%)	0.742 (1)	0.257 <sup>a</sup>
	Married	61 (80.3%)	65 (85.5%)		
Religion	Muslim	70 (92.1)	71 (93.4%)	0.098 (1)	0.501 <sup>a</sup>
	Non-Muslim	6 (7.9%)	5 (6.6%)		
Ethnicity	Punjabis	57 (75%)	56 (73.7%)	0.100 (3)	0.991 <sup>a</sup>
	Pashtuns	8 (10.5%)	8 (10.5%)		
	Sindhis	6 (7.9%)	6 (7.9%)		
	Baloch	5 (6.6%)	6 (7.9%)		

**Health belief (Attitude)**

Variable	Categories	Intervention n (%)	Control n (%)	Chi-square value (df)	P- value
Attitude	Positive	63 (82.9%)	61 (80.3%)	0.165 (1)	0.517 <sup>a</sup>
	Negative	13 (17.1%)	15 (19.7%)		

<sup>a</sup>All between groups variables, are not statistically significantly different (P>0.05).

Note: Attitude as: "Positive" and "Negative" based having mean the mean score 21.8. Attitude above mean respondents was categorised as "Positive" and below mean was as "Negative"

**Table 2: Comparison of Knowledge, Ability, and Competence Between and Within Groups**

Variable		Intervention n (%)	Control n (%)	Chi-square value (df)	P- value
Knowledge	Baseline	5 (6.6%)	5 (6.6%)	0.196 (1)	0.510
	Post intervention	74 (97.4%)	5 (6.6%)	135.485 (1)	<0.0001*
	Chi square value (df)	5.196 (1)	1.296 (1)		
	P- value	<0.0001*	2.678		
Ability	Baseline	5 (6.6%)	6 (7.9%)	0.098 (1)	0.500
	Post intervention	74 (97.4%)	6 (7.9%)	104.465	<0.0001*
	Chi square value (df)	0.196 (1)	12.106 (1)		
	P- value	<0.0001*	0.768		
Competence	Baseline	5 (6.6%)	5 (6.6%)	1.088 (1)	0.900
	Post Intervention	74 (97.4%)	5 (6.6%)	11.865(1)	<0.0001*
	Chi square value (df)	1.206 (1)	12.675 (1)		
	P- value	<0.0001*	0.875		

- Highly, statistically, significantly different (P <0.0001) .
- knowledge is defined as “Don’t know” if participants not answered correctly to any of nine variables and “Know” if participants answered all nine variables correctly.
- ability defined as “ability to do” if participants answered correctly to all six variables and “inability to do” if participants answered any variable wrong

**Table 3: Post-Intervention Use of Immunotherapy in the Intervention Group (76) and Comparison group (76)**

Variable	Groups	Yes n (%)	No n (%)	Chi square	P-value
Prescribed cancer immunotherapy is	Intervention	73 (96.1%)	3 (3.9%)	1.753(1)	<0.0001*
	Control**	2 (2.6%)	74 (97.4%)		
Used as per hospital records	Intervention	73 (96.1%)	3 (3.9%)	1.753 (1)	<0.0001*
	Control **	2 (2.6%)	74 (97.4%)		
Used according to set and required protocols.	Intervention	73 (96.1%)	3 (3.9%)	1.753 (1)	<0.0001*
	Control **	2 (2.6%)	74 (97.4%)		
Recorded by hospital staff, if unused.	Intervention	73 (96.1%)	3 (3.9%)	1.753 (1)	<0.0001*
	Control **	4 (5.3%)	72 (94.7%)		

\*Highly statistically significantly different (P <0.0001)  
(1) Fisher’s Exact Test.

Table 2 presents a Comparison of Knowledge, Ability, and Competence between groups and within groups at baseline and post-intervention.

Between groups: The “Knowledge of the import process”, “Ability to fill in and submit documents”, Competence index”(sum of the previous two variables) of cancer patients were not statistically, significantly different between intervention and comparison groups at baseline, but highly statistically different (P <0.001) at post intervention

Within groups: The “Knowledge of the import process”, “Ability to fill in and submit documents”, Competence index”(sum of previous two variables) of cancer patients at baseline and post-intervention were highly, statistically significantly different(P <0.001) within the intervention group, but no significantly different within the comparison group.

Table 3 presents, the use of Cancer Immunotherapies at post-intervention as highly statistically significantly different (P < 0.0001) in the intervention group while , it was not significantly different in the comparison group.

Table 4 presents patient satisfaction received from OWSM explained as “Satisfied” if participants answered all the five variables with responses (Strongly Agree, Agree, and Neutral) and “Not satisfied” if participants answered with the responses Strongly disagree, and disagree in any of the

five variables). Overall, 94.7 participants were satisfied.

**Table 4: Post-Intervention Patient Satisfaction in the Intervention Group**

Variables	Intervention group n(%)	
	Satisfied	Not satisfied
I am satisfied with....		
Speaking HCP over phone.	68 (94.7%)	8 (5.3%)
Timely responses by HCP.	68 (94.7%)	8 (5.3%)
Quality of Services provided by HCP	68 (94.7%)	8 (5.3%)
Clarity of information provided HCP.	68 (94.7%)	8 (5.3%)
Overall services of HCP	69 (95.4%)	7 (4.6%)

## Discussion

The results of the experimental study indicated a high level of effectiveness and were in line with the study’s initial hypothesis. The study revealed that the majority of the respondents, with ages ranging from 18 to 33, were predominantly female, accounting for 69.7% in both the intervention and comparison groups. These findings are consistent with a previous study( design?) published in 2019 which focused on the burden of cancer among patients in Pakistan. The analysis from the previous study highlighted a higher risk of developing cancer among middle-aged individuals (40–59 years), which accounted for 43.0% of the respondents, compared to seniors (above 60 years). Furthermore, the study also brought to light that 56% of the respondents were female, while 44% were male (11).

The study found that 90% of the respondents had positive attitudes toward the use of cancer immunotherapies and felt very optimistic about its outcome. These findings were consistent with a previous cross-sectional study on cancer patients published in 2018, which analyzed the knowledge and attitudes of cancer patients. The study revealed that while knowledge of cancer patients about immunotherapies was limited, their attitudes were generally favorable, and their expectations were high (12).

In a study, it was found that 80% of cancer patients had poor knowledge of the process of obtaining immunotherapies due to a lack of information from the TPP. These results align with a cross-sectional survey on knowledge, attitude, and perception of cancer patients in Pakistan, published in 2022. The survey showed that the knowledge of cancer patients about the accessibility of immunotherapies was limited. Patients needed information on their country's best practice guidelines to enhance their immunotherapy experience, understand insurance coverage adjustment policies, address logistic concerns, and navigate resource constraints encountered by patients and clinicians (13).

In this study, the intervention group of cancer patients showed a significant increase in the competence index (sum of knowledge of import process and ability to fill in and submit forms), rising from 6.6% to 97.4%. In contrast, the comparison group's rate remained at 7.9%. A review article published in 2023 outlined European regulatory guidelines for providing early access to medicines for rare diseases through various alternative routes on a named-patient basis and revealed that patients have poor knowledge on the processes to access their required medicines (14).

In this study, the competence of cancer patients in the intervention group increased from 6.6% to 97.4%, while it remained unchanged at 7.9% in the comparison group. A 2023, Pakistani mixed-method study on the development of an OWSM suggested that using the model could increase the competency of cancer patients in accessing their immunotherapies.

In this study, 96.1% of the respondents in the intervention group completely used their prescribed immunotherapy as per hospital records. However, 3 patients did not complete immunotherapy due to the disease progression.

In this study, 90.8% of patients expressed satisfaction with the services provided by OWSM. Interestingly, a previous cross-sectional study assessing the quality of patient care in oncology departments, published in 2020, in oncology departments in both public and private tertiary care hospitals of Karachi, Pakistan, reported higher satisfaction levels among private sector hospitals than public sector hospitals (15).

### **Strengths and Limitations**

OWSM has a few strengths. It simplifies the complex healthcare system by providing a centralized and coordinated approach to access immunotherapies, reducing administrative burden. It also enhances patient education and awareness by ensuring that patients have access to comprehensive information about immunotherapies, enabling them to make informed decisions about their treatment timing. However, the study has also limitations. It only included cancer patients treated at two university cancer hospitals, who were selected for their expertise and resources, so the findings may not be broadly applicable to a larger group of cancer patients in other hospitals. Additionally, the questionnaire measured attitudes in only two extremes (positive and negative), and knowledge and ability were categorized as knowledgeable/non-knowledgeable about and ability to import/not ability to import, respectively, which limited the assessment of competence

### **Conclusion**

The study showed that the OWSM intervention greatly enhanced cancer patients' understanding of the import process, document submission, and use of immunotherapies, with high patient satisfaction. It's recommended to explore OWSM's impact on immunotherapy access beyond the study hospitals. Future research should include long-term studies to assess its effectiveness. The study offers practical solutions for improving healthcare service delivery in Pakistan.

### **Recommendations:**

#### **Policy Level:**

1. Expand the OWSM model to include a broader range of healthcare services beyond immunotherapies.
2. Invest in training for healthcare professionals, administrators, and support staff in customer service and patient management.

#### **Program Level:**

1. Implement health insurance policies covering immunotherapy costs.
2. Integrate technology to streamline the OWSM process, including user-friendly online platforms for scheduling and updates.
3. Strengthen Pakistan's drug regulatory authority to ensure the quality and safety of immunotherapies.
4. Collaborate with international organizations for global expertise.
5. Adopt OWSM in other oncology and relevant departments in Pakistan.

### **Future Research:**

1. Conduct studies to assess variables at a moderate level for a deeper understanding of respondent characteristics.

2. Perform longitudinal studies to track changes in patients' competence and access to immunotherapies.
3. Identify barriers and facilitators in the OWSM model affecting patient competence.
4. Use qualitative methods to explore patients' experiences and preferences regarding immunotherapy access.

#### Ethical Approval:

The Research Ethics Review Committee for Research Involving Human Research Participants, Group I approved this study: Chulalongkorn university, Bangkok, Thailand Ref. No. 650125, COA No. 235/65 Date: 09-12-2022

**Financial support and sponsorship:** None

**Conflict of interest:** None declared.

#### Authors' Contribution:

**RA:** Conceptualization, data curation, formal analysis, investigation, methodology, project administration, software, supervision, validation, manuscript drafting, reviewing and editing

**AP:** Conceptualization, formal analysis, methodology, supervision, manuscript drafting, reviewing and editing

#### References

1. Bray F, Ferlay J, Soerjomataram I, Siegel RL, Torre LA, Jemal A, GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries, *Global cancer statistics* 2018, Nov 2018, 70 (4), 394-424, Doi: 10.3322/caac.21609.
2. Noncommunicable Disease Surveillance, Monitoring and Reporting, *Cancer Pakistan 2020 country profile*, WHO, 2020. <https://www.who.int/teams/noncommunicable-diseases/surveillance/data/cancer-profiles>
3. H, Varmous. Trusted Health information from national institutes of health. *Medline Plus winter 2013 The Megazine*. 2013.
4. Hanahan D, Weinberg RA. Hallmarks of Cancer, *The Next Gen Cell*, 2011, 144 (5), 646-674, 10.1016/j.cell.2011.02.013.
5. Fouad YA, Aanei C, Revitalising hallmarks of cancer, *Am J Cancer Res*, 2017, 7 (5), 1016-36. 28560055.
6. Johns Hopkins in Health Precision Medicine Symposium, October 3, 2023. (<https://www.hopkinsmedicine.org/inhealth/about-us/immunotherapy-precision-medicine-action-policy-brief>)
7. Cancer survival statistics, *Cancer Research UK* <https://www.cancerresearchuk.org/health-professional/cancer-statistics/survival#heading-Zero>
8. Raymond U. Osarogiagbon, MBBS 1 ; Helmhneh M. Sineshaw, MD, MPH 2, *Immune-Based Cancer Treatment: Addressing Disparities in Access and Outcomes*, published at [ascopubs.org](http://ascopubs.org) on April 8, 2021: DOI [https://doi.org/10.1200/EDBK\\_323523](https://doi.org/10.1200/EDBK_323523)
9. Zeba Aziz, MD, Hafsa Naseer, MBBS, and Anjum Altaf, PhD, *Challenges in Access to New Therapeutic Agents: Marginalized Patients With Cancer in Pakistan and the Need for New Guidelines*, *JCO Global Oncology* 2022 Volume 8, <https://doi.org/10.1200/GO.21.00132>
10. Arshad Rizwan, Alessio Panza. *Development of One Window Services Model*, *Pakistan Journal of Public Health* <https://doi.org/10.32413/pjph.v13i2.1224>
11. Tufail, M., & Wu, C. *Exploring the Burden of Cancer in Pakistan: An Analysis of 2019 Data*. *Journal of epidemiology and global health*, (2023). 13(2), 333-343. <https://doi.org/10.1007/s44197-023-00104-5>
12. Simranjot Shokar et al. *Patient knowledge, attitudes, and expectations of cancer immunotherapies*. *JCO* 36, e18551-e18551(2018). doi:10.1200/JCO.2018.36.15\_suppl.e18551
13. Khattak, S., Faheem, M., Nawaz, B., *Knowledge, Attitude, and Perception of Cancer Patients towards COVID-19 in Pakistan: A Cross-Sectional Study*. *International journal of environmental research and public health*, (2022). 19(13), 7926. <https://doi.org/10.3390/ijerph19137926>
14. Rosenberg Noa, van den Berg Sibren , Stolwijk Nina N. , Jacobs Bart A. W. , Post Hendrika C. , Pasmooij Anna M. G. , de Visser Saco J. , Hollak Carla E. M. *Access to medicines for rare diseases: A European regulatory roadmap for academia*, *Frontiers in Pharmacology*, Vol.14, 2023. <https://www.frontiersin.org/journals/pharmacology/articles/10.3389/fphar.2023.1142351>, DOI=10.3389/fphar.2023.1142351
15. Fayyaz R, Ahmed FA, Abid A, Akhtar A, Jarwar R, Jasmine A, et al. *The quality of patient care in oncology departments in Karachi, Pakistan: patients' perceptions*. *International journal of health care quality assurance, ahead-of-print* (2020). <https://doi.org/10.1108/IJHCQA-12-2019-0201>