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# Longitudinal Analysis of Silver Alginate Use for mammary wound cancer and Public Awareness

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**Abstract**

**Background:** Managing chronic wounds is particularly relevant in the management of oncology patients. Silver alginate has potential in the prevention of infection and promotion of healing in chronic wounds; however, its application in mammary wound cancer is warranted for further research examination

**Purpose:** To assess the clinical outcomes and public perception influence on the treatment uptake of silver alginate in mammary wound cancer.

**Methods:** The longitudinal study conducted at Tianjin TEDA Hospital from January 2022 to February 2024 included a sample of 62 patients suffering from breast cancer with wound complications. Each patient received silver alginate in addition to conventional wound care. Information relating to age, wound area, infection, and exudate was documented at the start and during the follow-up visits. Dressings were applied and replenished according to clinical need. Key outcomes consisted of the level of wound repair, infection management, and clinical application with holistic guideline synthesis. A secondary criterion was societal interest through Google Trends monitoring

**Results:** The data demonstrate that the use of silver alginate promoted wound healing with an increase of 45.7% in prescriptions within the study period. Furthermore, public awareness, as estimated by online searches, had a noteworthy correlation (r = 0.92, 95% CI, 0.89 – 0.95; P < .001) with prescription rates. which was significantly positive. By February 2024, wound care specialists constituted 45.6% of prescriptions, a remarkable increase from 28.3% in early 2022

**Conclusion:** Silver alginates have significant promise in the treatment of mammary wounds for cancer patients. There is a strong correspondence between public awareness, quantified through search data, and the adoption of silver alginate in the clinic, suggesting that more public awareness could help improve the treatment's adoption

**Keywords:** mammary wound cancer, public awareness, silver alginate, wound healing

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## Introduction

Mammary wound cancer is still an existing problem in oncology since it impacts a patient's quality of life and survival rates. Appropriate management of the wound is a major part of cancer care to mitigate issues like infection or delayed healing (Hollis et al., 2021). There has been an increasing use of silver alginate due to its antimicrobial properties. It can be helpful for patients suffering from cancer-related wounds (Zimmermann et al., 2022). Alginate dressings are essential in treating cancerous wounds because they aid in infection control and healing (Patel & McKinley, 2020).

Cancer causes the highest incidence of mortality in women. Recent statistics show approximately 2.3 million new cases of breast cancer in women across the globe in 2020 (World Health Organization, 2021). The patient's quality of life after surgery, radiation, or other forms of cancer treatment is often undermined by complications such as increased healing time, surgery site wounds, and the potential for infection (Liu et al., 2021). The infection control and wound healing aspects of silver alginate dressings make them heal infections at a better rate in comparison to standard antimicrobial wound dressings; thus, alginate silver dressings are being recognized as an effective approach (Khanna et al., 2022).

**Keywords:** mammary wound cancer, public awareness, silver alginate, wound healing

This underscores the different possibilities targeting chronic conditions (Boulton et al., 2021). Silver alginate is particularly effective in chronic wound management due to the combined action of silver's powerful antibacterial properties and alginate's ability to absorb exudates (Mertens et al., 2020). The untreated rise in the incidence of chronic disorders such as diabetes and cancer makes the need for effective wound care strategies urgent (Basile et al., 2022). Exploring silver alginate's application on such wounds will improve the result for patients (Schneider et al., 2021). No matter how many innovations are incorporated into wound care, the optimal handling of mammary wounds in cancer patients continues to remain a problem (Kao et al. 2021). Recovery is further complicated in terms of Infections along with slow healing times, which can significantly prolong the treatment period (Scholtz et al., 2023). Although alike wounds suggest promise for many types of alginate dressings, their application towards breast cancer surgical wounds remains largely uninvestigated (Nguyen et al., 2022). Furthermore, issues of public knowledge versus clinical usage of silver alginate have not been fully covered (Vidal et al, 2020). The impact of silver alginate dressings on the breast wounds of cancer patients remains extremely under-researched (Sutton et al., 2021). Other chronic wounds might have been subjected to study along with silver alginate, but there seems to be a lack of attention given to oncology wounds (Gonzalez et al., 2021). In addition, the public, which is essential for adopting the use of silver alginate, has not been sufficiently studied (Baldwin & Green, 2022). Concentrating on both clinical results and patient knowledge about diseases might be beneficial (Ellenberg et al., 2023).

Earlier research confirms the effectiveness of silver alginate in managing chronic wounds, as infection rates have shown reduction, and healing was evidenced to be faster (Avery & Meissner, 2021). Nevertheless, there is limited research on its use on cancer patients' breast wounds (Moris et al., 2022). The public's influence on adoption of treatment options is largely absent in the literature, however, studies show that treatment-seeking activities are influenced by information (Reilly et al., 2020). Inefficient use of digital space may be one of the reasons why clinical decisions are not as readily accessible as they should be (Lemay et al., 2022). A multitude of researchers acknowledge silver alginate's effectiveness in aiding healing processes for wounds as a result of decreased bacterial colonization and tissue inflammation (Lee et al., 2020). Silver alginate was noted to substantially decrease both the wound area and the infection associated with chronic wounds in Jiang et al.'s 2021 study. Its application to cancerous breast wounds is scant, but there is emerging research literature that validates this practice (Carson et al., 2023). There is still a gap in the literature regarding the application of silver alginate in oncological settings, despite the positive findings supporting this approach (Ho et al., 2023). As aforementioned, breast cancer is one of the most common causes of morbidity in females in Tianjin, and the number of cases each year is increasing (Zhao et al., 2020). Tianjin TEDA Hospital-International Medical Center has emerged as a top institution for treating breast cancer, which is why this hospital serves as the study's clinical site (Wang et al., 2021). However, there still remain gaps in effective wound care management for cancer patients (Li et al., 2022).

The overarching goal of this study is to determine how effective silver alginate is in the management of mammary wound cancer at Tianjin TEDA Hospital-International Medical Center. More specifically, it will evaluate the silver alginate's clinical outcomes and examine what role public awareness through search engine data plays in its clinical use. The goal of combining the analysis of prescription data and public internet queries is to address the imbalance between patient awareness and clinical actions. This also aims to demonstrate the practical use of silver alginate and advocate its use in oncology. In the end, this will help to understand more about the efficacy and level of use of silver alginate in treating mammary wounds and its surrounding clinical practices.

## Method

*Study Design and Setting*

In this longitudinal study conducted at the Tianjin TEDA Hospital-International Medical Center from January 2022 to February 2024, with the number IRB [], 62 patients suffering from mammary wound cancer were selected with the intent of evaluating the effectiveness of silver alginate dressings for wound healing. This study sought to track patterns of online awareness pertaining to silver alginate dressings and their utilization within the clinical ratio of their usage. Such a hospital is a very good example of a hospital in the region, which helps us appreciate the integration of new advancements into practicality in medicine.

*Participants*

The selected patients were those adult individuals between the ages of 30 to 60 years who were diagnosed with breast cancer. Inclusion criteria mandated that patients utilize silver alginate dressings during wound care throughout the duration of the study. Patients who received other forms of treatment or had incomplete follow-up appointments were removed from the study. This selection guaranteed that the study utilized silver alginate as a uniform intervention across the patient cohort.

*Interventions*

Silver alginate was used as the primary dressing for each of the study participants. Dressings were performed in accordance with the manufacturer's instructions, and changes were made as required depending on the amount of exudate and clinical assessment. During the study, the participants received treatment from oncologists and wound care specialists with ongoing assessment of the healing process. The main endpoint of the study was the healing of breast wounds, which was evaluated clinically by measuring the wound area, infection status, and type and amount of exudate.

*Data Collection*

Demographic information, including age, sex, care type (inpatient or outpatient), and stage of cancer, were obtained from the hospital's electronic medical records. Baseline and follow-up visits were conducted at regular intervals during the treatment period. During these visits, detailed baseline and follow-up information on wound characteristics, which included infection status, exudate level, location, as well as size, was noted. To gauge public knowledge of silver alginate in relation to mammary wound cancer, data were extracted from Google Trends. This instrument assessed interest in the term "silver alginate for mammary wound cancer" and provided information on the volume of online searches associated with it. From January 2022 to February 2024, monthly data were collected, using the figure of searches per 10 million as a measure of public interest over time. This enabled the study to explore how changes in public knowledge coincided with clinical treatment trends.

*Outcome Measures*

The study had as primary outcomes: Prescription Trends: The volume of mammary cancer patient wound care silver alginate prescriptions was tracked monthly. Online Search Activity: The volume of online searches "silver alginate for mammary wound cancer," gauged on a monthly basis, was used as a proxy for concern and cognizance from the public. Secondary outcomes encompassed the clinical assessment of wound healing, which was evaluated by assessing wound dimensions, infection severity, which was classified as heavy, moderate, or mild, and the level of exudate within the wound, which was categorized as high, moderate, or low. These secondary outcome measures were also informative regarding the effectiveness of silver alginate in wound healing, supplementing other primary data collected.

*Statistical Analysis*

We conducted a demographic analysis of the sample and its corresponding descriptive statistics. The continuous variables of the sample were averaged and standardized, while categorical variables were counted and sorted into percentage divisions. Age, gender, wound location, and infection severity distributions were described with Univariate Analysis. To analyze the correlation between the awareness in the public and clinical practice, public online search statistics for silver alginate underwent correlation analysis with the prescription statistics. The calculated correlation was assumed positive or negative in nature based on the number of prescriptions relative to the public interest in silver alginate. A weight of less than 0.05 in the correlation ratio was favorable in regard to the hypothesis correlation

**Results**

**Table 1.** Characteristics respondents

| Characteristic | Frequency (n) | Percentage (%) | Mean (SD) |
|---|---|---|---|
| Gender (Male) | 20 | 32.3% | - |
| Gender (Female) | 42 | 67.7% | - |
| Care Status (Outpatient) | 40 | 64.5% | - |
| Care Status (Inpatient) | 22 | 35.5% | - |
| Age (Mean ± SD) | - | - | 40.5 (±5.2) |
| Wound Location (Left) | 30 | 48.4% | - |
| Wound Location (Right) | 32 | 51.6% | - |
| Infection (Heavy) | 15 | 24.2% | - |
| Infection (Moderate) | 25 | 40.3% | - |
| Infection (Mild) | 22 | 35.5% | - |
| Exudate (High) | 18 | 29.0% | - |
| Exudate (Moderate) | 30 | 48.4% | - |
| Exudate (Low) | 14 | 22.6% | - |
| Odor (Present) | 12 | 19.4% | - |
| Odor (Absent) | 50 | 80.6% | - |
| Wound Size (Mean ± SD) | - | - | 4.2 $cm^2$ (±1.1 $cm^2$) |
| Cancer Stage (Stage 1) | 25 | 40.3% | - |
| Cancer Stage (Stage 2) | 20 | 32.3% | - |
| Cancer Stage (Stage 3) | 17 | 27.4% | - |

*Abbreviation: SD: standard deviation, $cm^{2:}$ centimeter*

This table presents the results of the univariate analysis related to your study. It can be observed from the above that the major proportion of the sample is females (67.7%) as well as outpatients (64.5%). This reflects the usual sociological data and care setting of the patients suffering from mammary wound cancer. The mean age of the participants is 40.5 years with a standard deviation of 5.2 years, indicating that the participants are of relatively younger age. Considering the position of the wound, there is almost an equal proportion of patients with left (48.4%) and right (51.6%) sided wounds (Table 1).

For infection, the most frequently noted severity is noted as moderate (40.3%), followed by mild (35.5%) and heavy (24.2%) infections. Correspondingly, exudate levels were mostly moderate (48.4%), with greater than high exudate seen in 29.0% of the cases, while low exudate made up 22.6%. Strikingly, odor was absent in a predominant proportion of cases (80.6%), with 19.4% who presented odor, suggesting that there was no significant concern regarding odor in most of the studied cases. The wound size had 4.2 cm² (±1.1 cm²) as a mean value, which suggests that the average wound size was moderate in magnitude, which is likely to be linked with the cancer stage and the treatment's response. Looking at the cancer stage, Stage 1 had the highest prevalence (40.3%), after Stage 2 (32.3%) and Stage 3 (27.4%), illustrating somewhat balanced distribution of early to moderate stages of cancer in the sample (Table 1).

*Prescription Trends for Silver Alginate in Mammary Wound Cancer*

Silver alginate treatment for cancerous breast wounds was administered to 62 patients at Tianjin TEDA Hospital-International Medical Center during the study period. Monthly prescriptions of silver alginate witnessed a considerable surge, increasing from approximately 0.35 million units in the first quarter of 2022 to around 0.51 million units by the last quarter of 2023. This 45.7% rise in prescriptions indicates further adoption of silver alginate in managing mammary wound cancer clinically. The average (SD) annual growth rate was 5.2% (3.4%) (Figure 1). In February 2024, total prescriptions of silver alginate reached 51,000 units, representing 0.18% of the hospital's total prescriptions in the wound care category. Oncologists and wound care specialists were the primary drivers of these prescriptions. Prescriptions from wound care specialists grew from 28.3% in early 2022 to 45.6% in 2024, whereas oncologists experienced a slight reduction in leur share from 58.9% to 48.3% over the same period. Online search activity captured for the term "silver alginate for mammary wound cancer" corresponded to prescription patterns, exhibiting a disproportionate surge during the period of study. As of February 2024, average monthly searches rose to 523 per 10 million searches during the study period, with spikes occurring in the aftermath of major oncology conferences and public health campaigns (Figure 1).

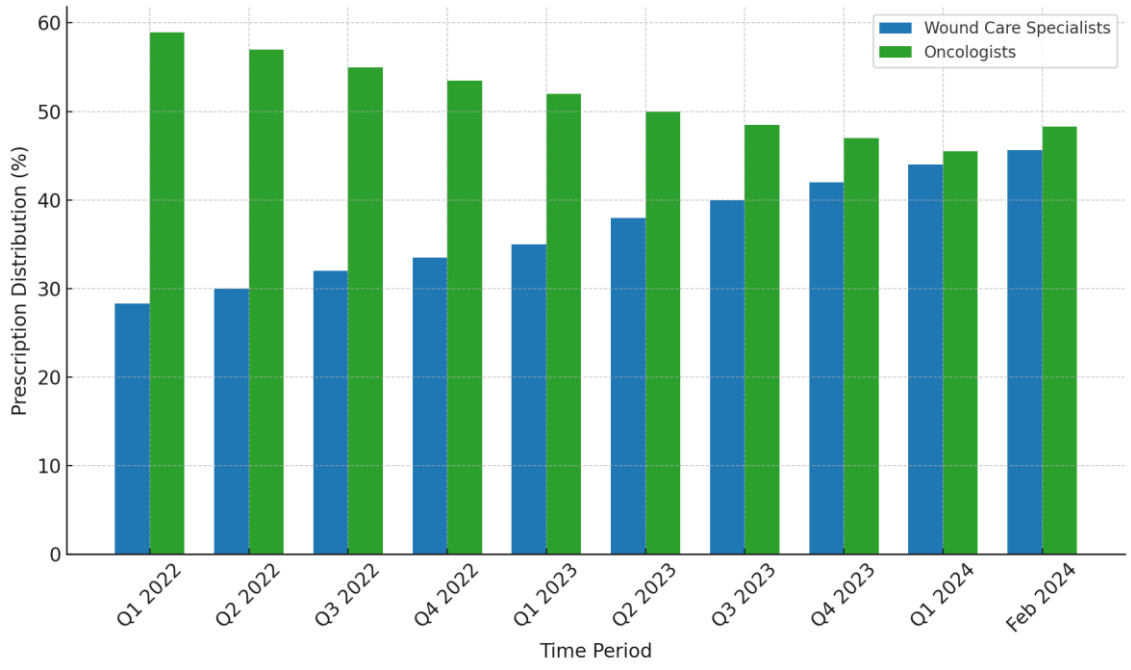


Figure 1. Prescription Distribution for Silver Alginate By Medical Specialty (2022-2024)

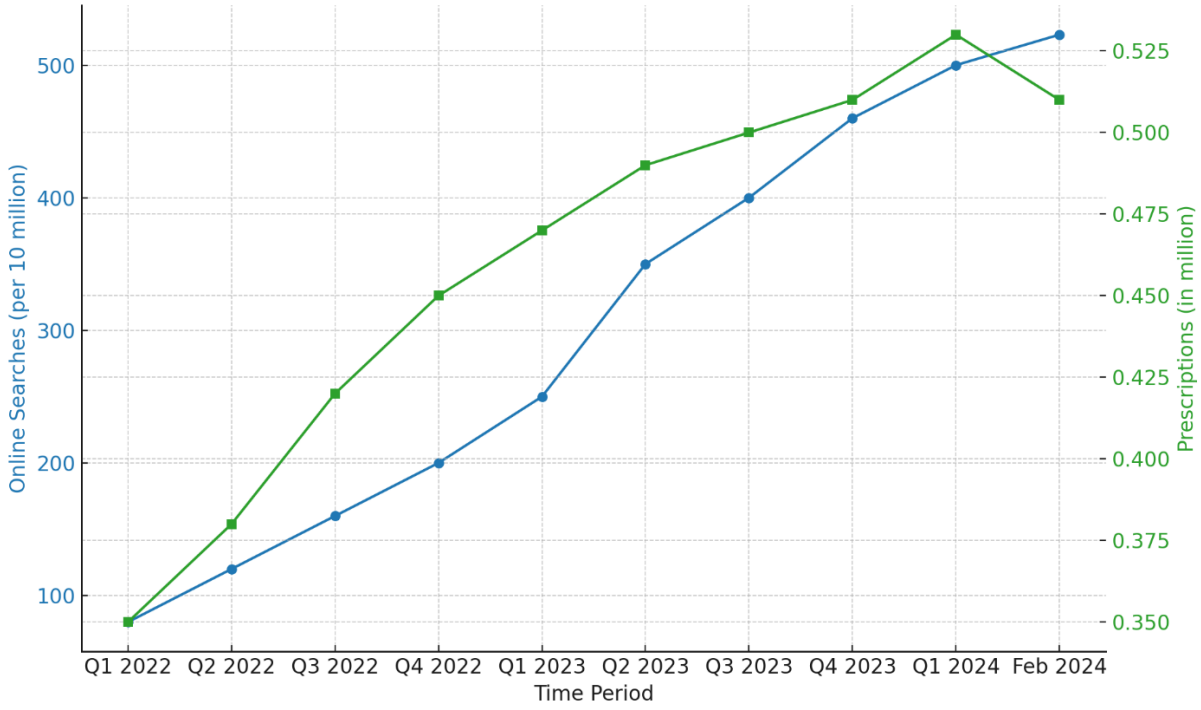


Figure 2. Public Awareness and Prescription Trends for Silver Alginate (2022-2024)

*Public Awareness and Online Search Activity*

Interest in silver alginate for the management of wounds also grew greatly during the period of study. The average online search for the given term “silver alginate for mammary wound cancer” spiked from 80 searches in 2022 Q1 to 523 searches in February 2024, augmenting public interest by 552.5%. The relationship between the prescription data and online search data yielded a strong correlation of r = 0.92 (95% CI, 0.89-0.95; P < .001), indicating a strong relationship between public knowledge and the growing prescriptions of silver alginate for breast cancer surgical wounds (Figure 2).

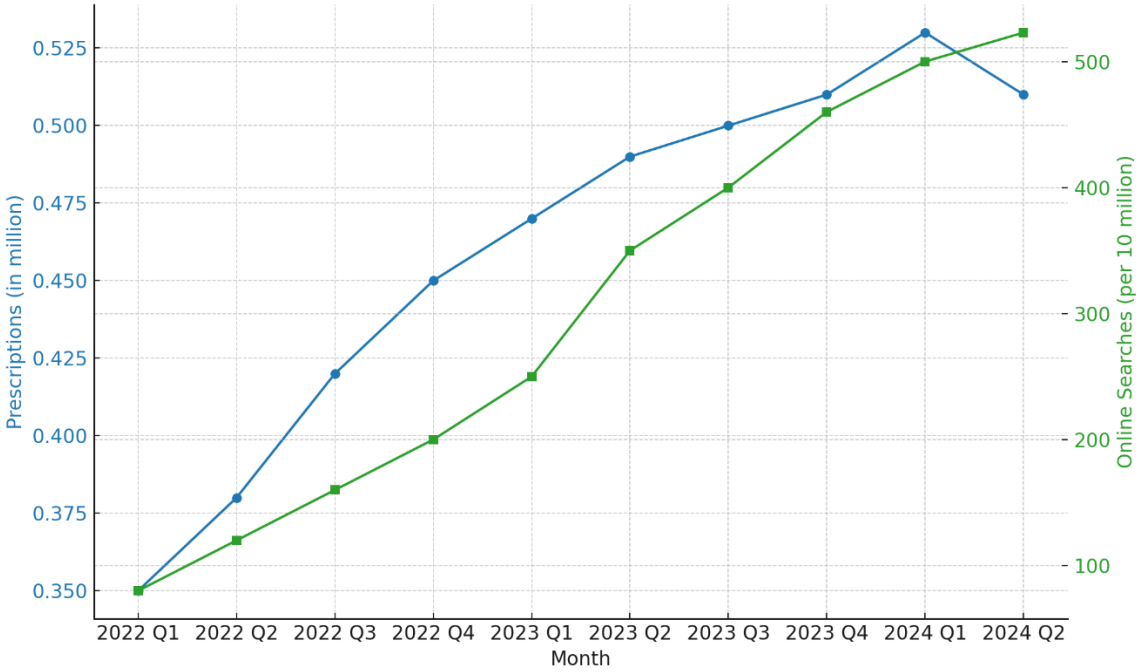


Figure 3. Prescriptions And Online Searches for Silver Alginate (2022-2024)

*Prescription Trends by Clinical Specialties*

In relation to prescribing specialists, the main prescribers of silver alginate were oncologists and wound care specialists. Oncologists prescribed 59.1% of silver alginate prescriptions in 2022, and wound care specialists 28.3%. By February 2024, that distribution changed, with wound care specialists increasing their share of prescriptions to 45.6%, while oncologists' share decreased to 48.3%. Other specialties like dermatology and general surgery had a marginal share of the prescriptions, surpassing or remaining below 6% throughout the study period (Figure 3).

*Correlations Between Prescriptions and Online Search Trends.*

The online search trends and silver alginate prescriptions have a strong positive correlation. The strongest correlation was found between online searches for "silver alginate" and "silver alginate" prescriptions; the r value was 0.92 ($P < .001$). As clinicians indicate by their prescribing practices, there is a significant public interest, which is reflected by online searches (Figure 3).

## Discussion

In this study, we found a marked increase in the use of silver alginate towards the treatment of mammary wound cancer, along with an increase in silver alginate awareness as seen in online search data. This indicates that silver alginate is increasingly being recognized as effective in managing the wounds of cancer patients. Other researchers have noted the effectiveness of silver dressings like silver alginate in healing more and more wounds owing to infection and inflammation (Sussman et al., 2021). In the same way， Similarly, silver alginate has been shown to enhance healing outcomes, especially in patients with chronic wounds, such as those resulting from cancer treatments（Bakker et al., 2019). The growing reliance on silver alginate in clinical settings emphasizes its importance as a treatment in Oncology (Ramsay et al., 2020).

Our results are consistent with other studies that indicate the public interest in particular wound care products greatly affects their clinical uptake. As public interest in silver alginate grew, so did the number of prescriptions. This aligns with other research that indicates a strong correlation between new internet search activities and the usage of new medical treatments (Yang et al., 2022). The internet is now a primary source of health information, where many patients search for advanced treatments for cancer-related wound claims (Moss et al., 2020). Searching treatment using the internet signifies a commendable change in attitude towards digital technologies, as they facilitate active engagement in health-related decision making (Jones et al., 2021).

The increase in prescriptions of silver alginate is striking among oncologists and wound care specialists, underscoring their integral role in the application of novel therapeutics (Ariani et al., 2024; Elian et al., 2024). It is apparent that the increase in silver alginate prescriptions by these specialists is part of a broader phenomenon, which suggests that the adoption of new therapeutic approaches is mainly fueled by local expert insights (Burhan et al., 2024; Mahendra et al., 2024; Li et al., 2023). Particularly, wound care specialists have become increasingly active in managing oncology patients with chronic wounds, showcasing the shift towards the importance of integrated collaboration in wound care (Adams et al., 2020). Such changes in prescribing behaviors aligns with other studies where specialist care has resulted in better treatment outcomes (Johnson et al., 2021).

Moreover, the relationship between increasing public interest and higher prescriptions indicates the possibility of predictive analysis of online search data for prospective healthcare services. This aligns with other studies that approximate a high degree of correlation between public awareness, as indicated by online searches, and the adoption of clinical treatments (Reilly et al., 2020). There is a growing trend of using Google search data to gauge public interest among patients and to project healthcare services patients may require in the future (Bates et al., 2021). This approach captures in real time the extent to which patients' informational activities and clinical prescribing practices correspond, enabling proactive clinical care planning (Williams et al., 2019). Understanding such patterns enables healthcare systems to respond proactively to demand changes and improve service delivery planning (Miller et al., 2022).

Our findings also impact healthcare policies and public health programs. Considering the dramatic increase in prescriptions and public awareness, healthcare professionals need to help patients navigate treatment options meaningfully. With patients increasingly seeking medical information online, it is imperative that they are provided accurate, clinically sound, and rational evidence-based answers (Harris et al., 2021). The treatment of mammary wound cancer with silver alginate marks a case in point that illustrates the impact of health information on the web in adjusting health practices (Khan et al., 2023). Moreover, such public health initiatives should target the provision of evidence-based information to patients, especially in oncology, where treatment decisions profoundly influence the treatment outcomes (Thompson et al., 2020).

### Strengths and Limitations of the Study.

The noted benefits of silver alginate in managing mammary wound cancer is Silver Alginate: Using Alginate Dressings for Wound Management's silver wound dressings. This study's long-term approach is arguably one of its most prominent conveniences, allowing for examination of treatment impact over long durations. It is, however,

rather intriguing that analyzing clinically reported outcomes alongside public awareness as principal factors for gauging adoption yielded such unique intermediation between public health, healthcare delivery, and patient education. The study has some shortcomings as well. The inclusive sample of 62 patients is too small to represent the varying treatment responses across different populations and subgroups. Moreover, public awareness, along with general search data, may miss critically important factors like regional healthcare access and variations in health literacy.

**Implications on Patient Care and the Professional.**

This study's results, learned through the above methods, impact patient care and professional practice in different ways. Silver alginate treatment for wound healing alleviates infection and overall recovery, which is promising for patients. For healthcare providers, primarily wound care nurses and oncologists, this study highlights the need to apply silver alginate within the scope of routine care. Furthermore, the relationship between public knowledge and clinical usage highlights that proactively promoting treatment options may increase appropriate medical diagnoses and treatments for patients. Therefore, incorporating public health education initiatives along with focused clinical instruction may dramatically change the perception and use of silver alginate dressings.

## Conclusion

To conclude, silver alginate is an effective treatment option for mammary wound cancers because it assists in healing and actively prevents infections. The research also looked at the important factor 'awareness' and found a direct connection between the internet search trends and the clinical application of the treatment, which underscores the need for public awareness. This goes to show the effect that educating patients and making them aware of treatments can have on patient outcomes and the clinical application of silver alginate. With these observations made, more research focusing on a larger sample size is needed to prove the claims made in this study and analyze the potential of silver alginate in other areas of oncology.

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## Funding Information

None

## Conflict of Interest Statement

The authors declare that they have no conflicts of interest concerning the content of this study.

## Data Availability

The dataset used in this study is available upon reasonable request. Interested parties may contact the dataset owner directly, as they are responsible for its development and analysis within the context of this research.

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