

## Effect of Tele-Palliative Care Education Program on Family Caregiver Knowledge and Practice among Geriatric Patients with Prostate Cancer

Basma Taher Abdelwahab Mohamed Mostafa<sup>1</sup>, Safaa Mabrouk Abdelaziz Elgarhy<sup>2,3</sup>, Asmaa Hamed Mohamed<sup>4</sup>, Mohamed Saied Harfoush<sup>5,6</sup>

<sup>1,2</sup>Lecturer, Gerontological Health Nursing, Faculty of Nursing, Damanhour University, Egypt

<sup>3</sup>Nursing Department, College of Applied Medical Sciences, Buraydah Private Colleges, Buraydah, Saudi Arabia

<sup>4,5</sup>Lecturer, Community Health Nursing, Faculty of Nursing, Damanhour University, Egypt.

<sup>6</sup> Nursing Department, College of Applied Medical Sciences, Buraydah Private Colleges, Buraydah, Saudi Arabia

**Corresponding author:** Mohamed Saied Harfoush

**Email:** [mohamed.said@nur.dmu.edu.eg](mailto:mohamed.said@nur.dmu.edu.eg)

### Abstract

**Background:** Prostate cancer is a prevalent condition among elderly men, often placing a significant burden on family caregivers. Tele-palliative care programs offer a promising approach to enhancing caregiver knowledge and skills. **Aim:** The study aimed to evaluate the effect of a tele-palliative care education program on family caregiver knowledge and caregiving practices among geriatric patients with prostate cancer. **Subjects and Method: Design:** A quasi-experimental one-group pre- and post-test design was utilized. **Setting:** The study was conducted at the Pain Clinic of the National Cancer Institute in Damanhour, Egypt, from September to December 2023. **Subjects:** Three hundred family caregivers were selected by using a convenience sampling technique. **Tools:** Data were collected through a pre-designed questionnaire assessing caregiver demographics, caregiving practices, and knowledge. **Results:** The intervention led to substantial improvements in caregiver knowledge and practices, as evidenced by significant increases in mean total knowledge and practice scores ( $p < 0.001$ ). Prior caregiving experience, employment status, and formal training were identified as significant predictors of knowledge and practice gains. **Conclusion:** Tele-palliative care education programs can effectively equip family caregivers with the tools necessary to provide high-quality care for geriatric patients with prostate cancer. **Recommendations:** The study recommends that healthcare systems implement strategies to ensure caregivers of individuals with chronic conditions have access to the requisite education and support to deliver high-quality care within the home environment.

**Keywords:** Caregiver education, Caregiving practices, Family caregivers, Geriatric patients, Prostate cancer, Symptom management, Tele-palliative care

## Introduction

Geriatrics and palliative care, though distinct disciplines, overlap significantly in their core objectives and approaches. Both are inherently interdisciplinary and multiprofessional fields aimed at providing patient- and family-centered care, enhancing quality of life, personal capabilities, and encouraging social participation. As a result of medical advancements in recent decades, global life expectancy has increased, leading to a growing population of individuals over the age of 65. These demographic changes, combined with an increase in life-threatening illnesses such as cancer, heart failure, end-stage renal disease, and multiple sclerosis, forecast substantial challenges for healthcare systems globally (Chen et al., 2024; Sultana et al., 2024).

Prostate cancer, for example, is notably more common among individuals over 70 years old, with the disease often presenting at an advanced stage and having higher associated mortality rates. Although many prostate tumors remain asymptomatic and are managed through active surveillance, those that are more aggressive may require intervention via radiation therapy or surgical removal through radical prostatectomy (Giona, 2021; Sekhoacha et al., 2022).

In 2020, prostate cancer became the most diagnosed malignancy in men, ranking among the leading causes of cancer-related deaths globally. More than 1.4 million new cases were reported, with approximately

375,000 deaths attributed to the disease. Most men are diagnosed at a median age of 66, with over 80% of men developing prostate cancer by the age of 80 (Jochems et al., 2024). The disease's progression is typically slow, and initial or localized stages may present minimal or no symptoms. However, as the disease advances, lower urinary tract symptoms (LUTS), often resulting from prostatic hypertrophy, become more common. These symptoms, alongside various voiding difficulties, are frequently encountered in older adults due to benign prostatic obstruction or cancer (Mohamad et al., 2024).

The late stages of prostate cancer can manifest through symptoms such as fatigue, loss of muscle strength, and bone pain, especially when metastasis occurs. A variety of treatment options are available, including active surveillance, surgery, radiotherapy (both external beam and brachytherapy), systemic therapies, and palliative care (Spratt et al., 2021). Treatment choices depend heavily on the individual's life expectancy, the stage and grade of cancer, and the potential risks and benefits of each therapeutic option. As life expectancy increases and prostate cancer diagnoses become more prevalent, the disease remains a major concern among older men (Achard et al., 2021).

Despite the increasing prevalence of prostate cancer, the mortality risk from localized and regional cases remains low. However, older patients with intermediate- or high-risk prostate cancer must navigate the

risks of the disease alongside potential mortality from other health conditions. Prognosis worsens significantly for those with metastatic prostate cancer. Managing the disease and its symptoms requires careful consideration, particularly for frail patients who are more vulnerable to treatment-related side effects **(Clark et al., 2022; Graham et al., 2023)**.

Prostate cancer not only impacts patients but also places considerable physical and emotional strain on caregivers, who often assist with daily care. These caregivers frequently experience high levels of exhaustion and report feeling unprepared to manage cancer-related symptoms. This lack of preparedness can increase their distress and adversely affect both their well-being and that of the patient.

**(Unsar et al., 2021; Zhang et al., 2023)**. Caregivers' psychological health is closely linked to the patient's overall well-being, and when caregivers are emotionally drained or unwell, the patient's condition can deteriorate **(Guerra-Martín et al., 2023)**.

Empowering caregivers with education and training is essential in palliative care. Healthcare professionals widely recognize that many caregivers lack the necessary knowledge and skills to provide effective care in palliative settings. These gaps can obstruct the successful integration of palliative care into patients' treatment plans, particularly for those receiving care at home **(Vale et al., 2023)**. Palliative care has become one of the fastest-

growing healthcare fields in the past decade, offering a team-based service model aimed at relieving suffering and improving the quality of life for both patients and their families **(Zimmermann et al., 2024)**.

The National Consensus Project for Quality Palliative Care defines palliative care as a multidisciplinary approach that aims to anticipate, prevent, and manage physical, psychological, social, and spiritual suffering. Its goal is to optimize the quality of life (QOL) for patients, families, and caregivers. Palliative care can be delivered in any healthcare setting through collaborative efforts among various healthcare providers **(Xiao et al., 2021)**. According to the World Health Organization (WHO), more than 50 million people require palliative care annually, and this number is expected to increase as population's age and medical advancements allow patients to live longer. However, the WHO estimates that only 12% of those who need palliative care worldwide actually receive it **(Axelsson, 2022)**.

Palliative care's clinical benefits have been demonstrated in numerous trials, showing improvements in patients' quality of life, higher patient and provider satisfaction, reduced emotional distress, and even the possibility of life extension **(Gayatri et al., 2021)**. While palliative care is not curative, its purpose is to provide comfort and maintain the highest possible quality of life for as long as possible. Palliative care services have expanded rapidly in healthcare institutions over the past decade due

to the rising prevalence of non-communicable diseases. These services are delivered through a combination of healthcare professionals' knowledge, attitudes, and practices (**MacDonald et al., 2021**).

Cancer patients in palliative care often struggle to attend outpatient appointments due to physical limitations or fatigue. Those on controlled substances like opioids may need frequent medical consultations and typically depend on caregivers for assistance. Furthermore, symptoms such as pain, fatigue, and shortness of breath can intensify the challenges of in-person visits (**Aldana et al., 2023**). The increasing adoption of telemedicine has proven highly beneficial for advanced cancer patients and their caregivers. Telemedicine, which enables virtual health services through audio-video or telephone communications, offers patients the convenience of receiving care without leaving their homes (**Pang et al., 2022**).

Tele-palliative care provides patients with personalized care in familiar environments, which can strengthen the therapeutic relationship between providers and patients. Patients who meet with healthcare providers virtually in their homes often feel they receive more time and attention due to the comfort and familiarity of their surroundings (**Ho et al., 2022**). While the home environment can be conducive to virtual consultations, it is essential that patients engage in tele-visits in settings where they can fully concentrate on the conversation.

For example, providers should recommend that patients conduct tele-visits in well-lit rooms, away from distractions, and with functioning cameras on their devices (**Hayes Bauer et al., 2024**). If safety concerns arise—such as a patient attending a tele-visit while driving—the session should be stopped immediately (**Agosta et al., 2023**).

Family members who participate in tele-palliative care should follow similar recommendations, such as joining from a private setting or using headphones if privacy is an issue (**Shih et al., 2024**). Tele-palliative care education programs have been shown to significantly improve family caregivers' knowledge and caregiving practices, particularly in areas like symptom management, emotional support, and practical care skills. As is well-documented, informal caregivers' lack of proper training being a significant barrier to providing effective palliative care at home (**Yang et al., 2024**).

Caregivers participating in tele-palliative care education programs frequently report increased confidence in their ability to manage symptoms and provide high-quality care. Moreover, these programs facilitate the development of effective coping strategies, mitigating the psychological burden of caregiving (**Chen et al., 2024; Hafez et al., 2024**). Telemedicine-based services offer convenient access to professional healthcare guidance, especially benefiting caregivers facing challenges in attending in-person sessions (**Mackey et al., 2022**). In summary, tele-palliative

care education programs have emerged as a valuable resource for family caregivers, enhancing their capacity to provide optimal care while also supporting their mental and emotional well-being (Şahin et al., 2024).

### **Aim**

The aim of this study is to evaluate effect of tele-palliative care education program on family caregiver knowledge and practice among geriatric patients with prostate cancer.

### **Hypothesis:**

To achieve the study's aim the following research hypotheses was developed:

**H<sup>1</sup>:** Family caregivers who participate in the tele-palliative care education program will demonstrate a significant improvement in their knowledge of prostate cancer management and palliative care compared to their pre-intervention levels.

**H<sup>2</sup>:** Family caregivers who receive tele-palliative care education will exhibit better caregiving practices, including symptom management, emotional support, and daily care for geriatric prostate cancer patients, compared to caregivers who do not receive the program.

### **Subjects and Method**

#### **Research Design:**

A quasi-experimental one-group pre-test and post-test design was utilized.

#### **Setting:**

The study was conducted at the Pain Clinic of the National Cancer Institute in Damanhour, Egypt, from September to December 2023.

### **Subjects:**

Three hundred family caregivers providing care for geriatric patients with prostate cancer were recruited using convenience sampling. Data were collected at three time points: pre-intervention, immediately post-intervention, and one-month post-intervention, to assess the outcomes of the tele-palliative care education program.

### **Inclusion Criteria:**

- Family caregivers providing direct care to geriatric prostate cancer patients at home.
- Caregivers willing and able to participate in the tele-palliative care education program and complete assessments.
- Caregivers with access to the necessary technology for participating in the tele-palliative care program.

### **Sample size:**

To calculate the required sample size for a proportion in a pre-post design, we can use the following formula:

$$n = [(Z\alpha/2 + Z\beta)^2 * (P1*(1-P1) + P2*(1-P2))] / (P1-P2)^2$$

Where:

- **n** = required sample size per group
- **P1** = Pre-intervention proportion
- **P2** = post-intervention proportion
- **Z $\alpha$ /2** = Z score for alpha, here 1.96 for 95% CI
- **Z $\beta$**  = Z score for power

### **Tools of data collection**

#### **Tool I: A Pre-designed Questionnaire**

It was designed by the researcher in Arabic and included the following components:

**Part I-** Caregiver characteristics, such as age, gender, education level,

employment status, caregiving experience, previous caregiving experience prior to caring for this patient, Hours per day spent providing care, Receipt of formal support or training for caregiving, Previous use of tele-palliative care services for the patient

## **Part II: Caregiver Reported Practice Tool**

To assess the impact of the tele-palliative care education program on family caregivers' practices, a comprehensive Reported Practice Tool (Shih et al., 2024 & Yang et al., 2024) was developed. This tool evaluates caregivers' practical skills in the following domains: Symptom management, Medication administration, Daily living assistance, Communication with healthcare providers, Emotional support.

The tool was administered to caregivers both before and after the tele-palliative care education program to determine any improvements or changes in their caregiving practices. The Caregiver Reported Practice Tool consists of 20 questions divided into six key sections:

**Symptom Management:** Assesses the caregiver's ability to monitor, manage, and respond to the patient's symptoms, such as pain and fatigue.

**Medication Administration:** Evaluates the caregiver's competence in administering prescribed medications accurately and managing associated side effects.

**Daily Living Assistance:** Measures the caregiver's ability to assist the patient with activities of daily living,

including bathing, dressing, and feeding.

**Communication with Healthcare Providers:** Examines the caregiver's frequency and effectiveness in using telemedicine to communicate with healthcare providers.

**Emotional Support and Coping:** Assesses the caregiver's ability to provide emotional support to the patient and their own coping strategies.

**Overall Caregiving Practices:** Provides an overall assessment of the caregiver's satisfaction with their caregiving practices and perceived improvements following the education program.

### **Scoring System:**

- **Likert Scale:** Each question is formatted as a Likert scale item with responses ranging from 1 to 3.
- **Scoring:** 1 = Low confidence or frequency, 2 = Somewhat confident or frequent, 3 = High confidence or frequent. The total score for each section is calculated by summing the scores for individual questions. The maximum possible score across all sections is 60 points, with higher scores indicating more confident and frequent caregiving practices.
  - o **Interpretation:** 49-60 points: Satisfactory-level caregiving practices and Below 49 points: Unsatisfactory-level caregiving practices

## **Part III: Knowledge Assessment Tool**

A structured knowledge assessment tool was developed to evaluate family caregivers' understanding of prostate cancer,

tele-palliative care, caregiving practices, and end-of-life care before and after the tele-palliative care education program. The tool consists of multiple-choice questions divided into five sections: **Prostate Cancer Knowledge:** Covers key aspects of prostate cancer, including diagnosis, treatment options, and potential complications. **Tele-Palliative Care Knowledge:** Assesses understanding of the principles and benefits of tele-palliative care. **Caregiver Skills and Practice Knowledge:** Evaluates knowledge of caregiving practices, including symptom management, medication administration, and communication with healthcare providers. **Tele-Palliative Care Platform Knowledge:** Assesses familiarity with the tele-palliative care platform and its features. **End-of-Life Care Knowledge:** Evaluates understanding of end-of-life care concepts and decision-making.

**Scoring System:** Each correct answer is awarded 1 point. The total score is calculated by summing the number of correct answers across all sections, with a maximum score of 16 points. Scores are compared pre- and post-education to evaluate knowledge improvement.

**Interpretation:** Satisfactory Knowledge Level: 9-16 points and Unsatisfactory Knowledge Level: Below 9 points

### **Program Structure**

- Duration: 8 Weeks
- Participants: 300 family caregivers divided into 10 groups (30 caregivers per group) Delivery Mode: Online (Telemedicine)

- Education Methods: Video conferencing, webinars, educational videos, practice assignments, and tele-consultations with healthcare professionals
- Intervention Plan (Week-by-Week Breakdown)

### **Goal and Objectives:**

The program aims to evaluate the effect of a tele-palliative care education program on the knowledge and practices of family caregivers of geriatric patients with prostate cancer. The objectives include enhancing caregivers' understanding of prostate cancer, improving symptom management skills, providing emotional support, and fostering effective end-of-life care practices.

- **Week 1:** Introduction to Prostate Cancer Care

Objective: Provide caregivers with a foundational understanding of prostate cancer, its symptoms, and progression in elderly patients.

Activities: Webinar on prostate cancer biology and symptoms, and group discussion on challenges in caring for geriatric patients.

Materials: Recorded video on prostate cancer and aging and fact sheets on symptoms and treatment options.

Assignment: Caregivers complete a baseline knowledge questionnaire.

- **Week 2:** Tele-Palliative Care Overview

Objective: Introduce tele-palliative care and its application in managing prostate cancer symptoms.

Activities: Video conference on the role of telemedicine in palliative care,

and demonstration of video conferencing tools (e.g., Zoom, Skype).

Materials: Video tutorials on using telemedicine tools and Checklist for tele-palliative care session preparation.

Assignment: Caregiver's practice setting up and participating in a mock telemedicine session.

- **Week 3:** Symptom Management in Prostate Cancer

Objective: Train caregivers on managing common symptoms like pain, urinary issues, and fatigue.

Activities: Interactive session on pain management strategies and Case studies of symptom escalation and intervention.

Materials: Symptom management flowcharts and decision guides, and Practical tips for managing urinary problems and fatigue.

Assignment: Caregivers log daily symptoms and report them in the next session.

- **Week 4:** Medication Management

Objective: Improve caregivers' skills in administering medications and managing side effects.

Activities: Tele-lecture by a pharmacist on medication administration and monitoring and Q &A session with healthcare providers on medication issues.

Materials: Medication administration guides and dosage logs, and side effect tracking sheets.

Assignment: Caregivers track and report any medication side effects.

- **Week 5:** Emotional Support for Patients

Objective: Equip caregivers to provide emotional and psychological support.

Activities: Webinar on psychological aspects of caring for terminally ill patients and Group sharing session on emotional challenges.

Materials: Emotional support guides and Communication strategies for discussing feelings.

Assignment: Caregivers implement emotional support strategies and share outcomes.

- **Week 6:** Daily Living Assistance

Objective:- Train caregivers in assisting with daily activities like personal hygiene and mobility.

Activities: Online workshop on personal care techniques and Video demonstrations of safe lifting and transferring techniques.

Materials: Checklists for daily care activities and safety guidelines for preventing caregiver injury.

Assignment: Caregivers submit reports on implemented techniques.

- **Week 7:** Advanced Tele-Palliative Care Skills

Objective: Enhance caregivers' use of tele-palliative care for ongoing patient care.

Activities: Interactive tele-session on troubleshooting telemedicine issues and Role-playing sessions for provider interactions.

Materials: Quick reference guides for telemedicine tools and FAQs for troubleshooting.

Assignment: Caregivers participate in a simulated teleconsultation and provide feedback.

- **Week 8:** End-of-Life Care



**Objective:** Provide knowledge and skills for managing end-of-life care with patient comfort and dignity.

**Activities:** Webinar on end-of-life care principles and Group discussion on decision-making and communication.

**Materials:** End-of-life care guidelines and Communication templates for discussing care preferences.

**Assignment:** Caregivers create a personalized care plan focusing on comfort and dignity.

**Post-intervention evaluation:** At the end of the 8-week program, all participants will:

- Complete a post-education knowledge questionnaire to assess changes in their knowledge.
- Participate in a practice assessment where healthcare providers evaluate their caregiving skills via tele-observation.
- Submit feedback on the tele-palliative care education program, including its impact on their caregiving experience.
- Then after one month, reassess knowledge and practice.

### **Data analysis**

The data collected during the study were entered into SPSS and coded for analysis. Prior to analysis, the data were checked for errors or outliers. Quantitative data were described using appropriate measures such as mean and standard deviation. Cochran's Q test is a non-parametric statistical test used to determine if there are significant differences between three or more related group. Linear regression is a statistical method used to model the

relationship between one dependent variable (also known as the outcome or response variable) and one or more independent variables (also known as predictors or explanatory variables). The correlation coefficient is a statistical measure of the strength of a linear relationship between two variables. Statistical significance was set at a *P*-value of  $\leq 0.05$ , while highly significant findings were denoted by a *P*-value of  $<0.01^{**}$ .

### **Ethical Considerations:**

- Ethics approval was obtained from the institutional review board of governmental university, approval number (101-e).
- Participation in this study was voluntary and complied with the Declaration of Helsinki. Prior to commencing the study, the researcher provided a thorough explanation of the study's objectives to the participating nurses.
- The caregivers provided oral and written consent before being included in the trial. Participants who chose to take part in the study were assured that all information collected would be kept strictly confidential, and they had the option to withdraw from the study at any time if they desired.
- The researcher assured the nurses that no harm would come to them as a result of their participation in the study. Furthermore, the caregivers were informed that they could disengage from the study at any time.

## Results

**Table 1.** Presents demographic information about the studied caregivers, including age, gender, education level, employment status, and relationship to the patient. The mean age of caregivers is 41.9 years (SD=8.3), with the majority (41%) being between 40 and 50 years old. Most caregivers are female (64.3%), and the predominant education level is a bachelor's degree (41.3%). Additionally, 59.3% of the caregivers are employed, and the largest group in terms of relationship to the patient are sons or daughters (53%).

**Table 2.** Outlines the caregiving experience, support, and use of tele-palliative care services among caregivers. The majority of caregivers have been providing care for 1-2 years (34.3%), and 85.7% had no previous caregiving experience. Most caregivers (48%) spend 2-4 hours per day providing care, and 85.3% live with the patient. Only 15.7% share caregiving responsibilities, and 36.7% have received formal caregiving support. Furthermore, 79.7% have never used tele-palliative care services, with smartphones being the most common technology used for those who did (75.3%).

**Table 3.** Compares caregivers' knowledge across several domains- prostate cancer knowledge, tele-palliative care knowledge, caregiver skills, tele-palliative care platform knowledge, and end-of-life care- at three different stages: pre, post, and follow-up. Significant improvements were observed post-intervention, with knowledge levels increasing

from unsatisfactory in most domains pre-intervention to satisfactory in post and follow-up evaluations ( $p < .001$  in all cases). Notably, total knowledge scores rose from a mean of 3.98 pre-intervention to 14.2 post-intervention and 12.63 in follow-up.

**Table 4.** Provides a comparison of caregiving practices across six areas: symptom management, medication administration, and daily living assistance, communication with healthcare providers, emotional support, and overall caregiving practices. Post-intervention, the number of caregivers reporting satisfactory practices increased significantly in all domains. For instance, satisfactory symptom management improved from 29% pre-intervention to 87% post-intervention ( $p < .001$ ), with follow-up data indicating sustained improvements. The mean total practice score also increased notably, from 26.2 pre-intervention to 53.6 post-intervention.

**Figure 1.** Compares the total knowledge and total practice scores across three stages: pre-intervention, post-intervention, and follow-up. Both knowledge and practice scores increased significantly after the intervention, with knowledge rising from 3.98 to 14.2 and practice from 26.2 to 53.6. At the follow-up stage, there was a slight decline in both measures, with knowledge at 12.63 and practice at 48.02. Despite the decline, the follow-up scores remained higher than the pre-intervention levels, indicating a sustained impact of the intervention.

**Table 5.** This table presents the results of a multiple linear regression analysis examining the factors influencing caregivers' knowledge levels. Several variables were identified as significant predictors, including age ( $p=.014$ ), education level (high) ( $p=.031$ ), employment status (employee) ( $p=.003$ ), caregiving experience ( $p=.002$ ), previous caregiving experience prior to caring for this patient ( $p=.003$ ), hours per day spent providing care ( $p=.011$ ), receipt of formal support or training ( $p=.001$ ), and previous use of tele-palliative care services ( $p=.000$ ). The model explained 61.2% of the variance in knowledge level ( $R^2=.612$ ,  $F=11.209$ ,  $p=.001$ ), indicating that these factors play a substantial role in determining caregivers' knowledge, table 5.

**Table 6.** This table shows the results of a multiple linear regression analysis assessing factors related to

reported caregiving practices. Significant predictors include age ( $p=.003$ ), education level (high) ( $p=.031$ ), employment status (employee) ( $p=.041$ ), caregiving experience ( $p=.000$ ), previous caregiving experience ( $p=.001$ ), hours per day spent providing care ( $p=.026$ ), receipt of formal support or training ( $p=.000$ ), and previous use of tele-palliative care services ( $p=.003$ ). The model accounted for 59.8% of the variance in reported practice ( $R^2=.598$ ,  $F=14.829$ ,  $p=.000$ ), highlighting the importance of these factors in shaping caregivers' practices, table 6.

**Figure 2.** The correlation figure showing the relationship between knowledge and practice with an  $r$  value of 0.876 and a significant  $p$  value of 0.000\*\*. The scatter plot includes a trend line representing the strong positive correlation between these two variables.

**Table 1. Distribution of Socio-Demographic Characteristics of Studied Caregivers (n=300)**

Characteristics of studied caregiver	No.	%
<b>Age:</b>		
• <30	82	27.3
• 30 – <40	95	31.7
• 40 – 50	123	41
<b>Mean ±SD</b>		<b>41.9 ±8.3</b>
<b>Gender:</b>		
• Male	107	35.7
• Female	193	64.3
<b>Education level:</b>		
• Primary education	43	14.3
• Secondary education	110	36.7
• Bachelor's degree	124	41.3
• Postgraduate degree	23	7.7
<b>Employment status:</b>		
• Employed	178	59.3
• Unemployed	122	40.7
<b>Relationship to the patient</b>		
• Spouse/Partner	91	30.3
• Son/daughter	159	53
• Friend	12	4
• Other	38	12.7

**Table 2. Distribution of Caregiving Experience, Support, and Utilization of Tele-Palliative Care Services among Studied Caregivers (n=300)**

	No.	%
<b>Caregiving Experience</b>		
• Less than 6 months	55	18.3
• 6 months to 1 year	85	28.3
• 1-2 years	103	34.3
• More than 2 years	57	19
<b>Previous caregiving experience prior to caring for this patient:</b>		
• Yes	43	14.3
• No	257	85.7
<b>Hours per day do you spend providing care:</b>		
• Less than 2 hours	76	25.3
• 2-<4 hours	144	48
• 4-8 hours	49	16.3
• More than 8 hours	31	10.3
<b>Live with the patient you are caring for</b>		
• Yes	256	85.3
• No	44	14.7

<b>Share caregiving responsibilities with other family members or professionals</b>		
• Yes	47	15.7
• No	253	84.3
<b>Receive any formal support or training for caregiving</b>		
• Yes	110	36.7
• No	190	63.3
<b>Previously using tele-palliative care services for the patient</b>		
• Yes	61	20.3
• No	239	79.7
<b>Type of technology do you use for tele-palliative care services</b>		
• Smartphone	226	75.3
• Computer/laptop	28	9.3
• Tablet	46	15.3

**Table 3. Comparison of caregiver knowledge levels; pre-intervention, post-intervention, and follow-up (n=300)**

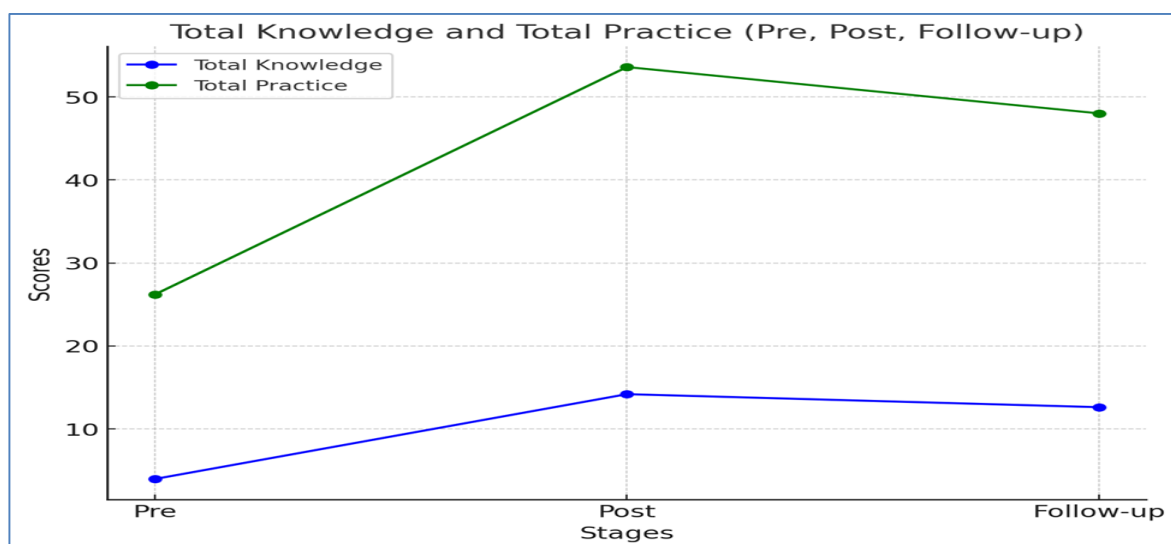
Caregiver Knowle	Pre		Post		Follow-up		Test of significant # p. value
	No.	%	No.	%	No.	%	
<b>Prostate Cancer Knowledge</b>							
• Satisfactory	88	29.3	230	76.7	224	74.7	<b>13.627</b> <b>0.000**</b>
• Unsatisfactory	212	70.7	70	23.3	76	25.3	
<b>Tele-Palliative Care Knowledge</b>							
• Satisfactory	75	25	246	82	233	77.7	<b>14.770</b> <b>0.000**</b>
• Unsatisfactory	225	75	54	18	67	22.3	
<b>Caregiver Skills and Practice Knowledge</b>							
• Satisfactory	79	26.3	257	85.7	240	80	<b>12.999</b> <b>0.000**</b>
• Unsatisfactory	221	73.7	43	14.3	60	20	
<b>Tele-Palliative Care Platform Knowledge</b>							
• Satisfactory	62	20.7	258	86	245	81.7	<b>14.776</b> <b>0.000**</b>
• Unsatisfactory	238	79.3	42	14	55	18.3	
<b>End-of-Life Care Knowledge</b>							
• Satisfactory	42	14	231	77	218	72.7	<b>13.715</b> <b>0.000**</b>
• Unsatisfactory	258	86	69	23	82	27.3	
<b>Total knowledge</b>							
• Satisfactory	59	19.7	238	79.3	226	75.3	<b>13.600</b> <b>0.000**</b>
• Unsatisfactory	241	80.3	62	20.7	74	24.7	
<b>Mean total knowledge</b>	<b>3.98 (1.27)</b>		<b>14.2 (4.6)</b>		<b>12.63 (3.7)</b>		

# Cochran's Q test

\*: Statistically significant at  $p \leq 0.05$

**Table 4. Comparison of reported practice levels among caregivers: pre-intervention, post-intervention, and follow-up (n=300)**

	Pre		Post		Follow-up		Test significant of p. value
	No.	%	No.	%	No.	%	
<b>Symptom Management</b>							
• Satisfactory	87	29	261	87	247	82.3	<b>11.723</b> <b>0.000**</b>
• Unsatisfactory	213	71	39	13	53	17.7	
<b>Medication Administration</b>							
• Satisfactory	89	29.7	276	92	261	87	<b>12.531</b> <b>0.000**</b>
• Unsatisfactory	211	70.3	24	8	39	13	
<b>Daily Living Assistance</b>							
• Satisfactory	98	32.7	287	95.7	271	90.3	<b>14.500</b> <b>0.000**</b>
• Unsatisfactory	202	67.3	13	4.3	29	9.7	
<b>Communication with Healthcare Providers</b>							
• Satisfactory	66	22	264	88	259	86.3	<b>12.729</b> <b>0.000**</b>
• Unsatisfactory	234	78	36	12	41	13.7	
<b>Emotional Support and Coping</b>							
• Satisfactory	87	29	260	86.7	245	81.7	<b>16.801</b> <b>0.000**</b>
• Unsatisfactory	213	71	40	13.3	55	18.3	
<b>Overall Caregiving Practices</b>							
• Satisfactory	73	24.3	274	91.3	268	89.3	<b>15.302</b> <b>0.000**</b>
• Unsatisfactory	227	75.7	26	8.7	32	10.7	
<b>Total reported practice</b>							
• Satisfactory	79	26.3	270	90	259	86.3	<b>16.121</b> <b>0.000**</b>
• Unsatisfactory	221	73.7	30	10	41	13.7	
<b>Mean total Practice</b>	<b>26.2 (6.81)</b>		<b>53.6 (9.6)</b>		<b>48.02 (8.6)</b>		

\*: Statistically significant at  $p \leq 0.05$ **Figure 1. Comparison of Total Knowledge and Total Practice Scores Across Pre, Post, and Follow-Up Stages**

**Table 5. Multiple Linear Regression Model Results for Caregiver Knowledge Level Outcomes**

	Unstandardized Coefficients		standardized Coefficients	T	P. value
	<i>B</i>		$\beta$		
Age	-.244		.199	1.659	.014*
Gender (Female)	.033		.023	.374	.709
Education level (High)	.118		.169	1.038	.031*
Employment status (Employee)	.252		.189	5.169	.003**
Caregiving Experience (Yes)	.465		.310	4.979	.002**
Previous caregiving experience prior to caring for this patient (Yes)	.198		.191	4.368	.003**
Hours per day do you spend providing care	.144		.120	1.525	.011*
Receive any formal support or training for caregiving (Yes)	.290		.215	3.998	.001**
Previously using tele-palliative care services for the patient (Yes)	.301		.234	6.500	.000**
<b>ANOVA</b>					
<b>R<sup>2</sup></b>	<b>Df.</b>		<b>F</b>	<b>P. value</b>	
<b>0.612</b>	<b>9</b>		<b>11.209</b>	<b>0.001**</b>	

**a. Dependent Variable:** Knowledge level

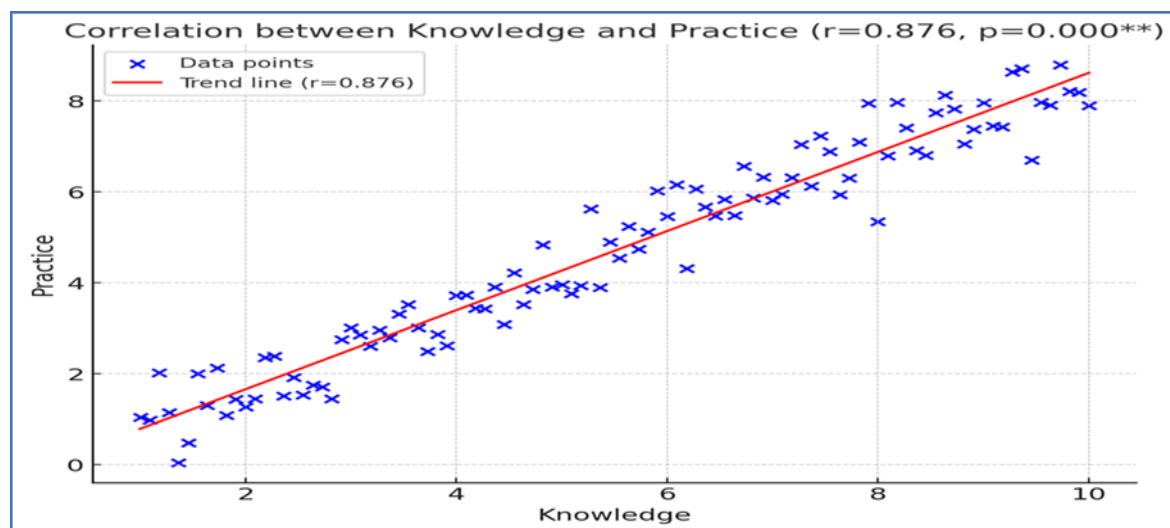
**b. Predictors:** Age, Gender (Female), Education level (High), Employment status (Employee), Caregiving Experience (Yes), Previous caregiving experience prior to caring for this patient (Yes), Hours per day do you spend providing care, receive any formal support or training for caregiving (Yes), Previously using tele-palliative care services for the patient (Yes)

**Table 6. Multiple linear regression model results for caregiver practice level outcomes**

	Unstandardized Coefficients		standardized Coefficients		
	<i>B</i>		$\beta$	T	P. value
• Age	-.263		.150	9.381	.003**
• Gender (Female)	.074		.165	0.520	.064
• Education level (High)	.155		.152	2.908	.031*
• Employment status (Employee)	.179		.168	1.980	.041*
• Caregiving Experience (Yes)	.338		.272	6.536	.000**
• Previous caregiving experience prior to caring for this patient (Yes)	.315		.268	6.464	.001**
• Hours per day do you spend providing care	.176		.134	2.243	.026*
• Receive any formal support or training for caregiving (Yes)	.567		.512	12.440	.000**
• Previously using tele-palliative care services for the patient (Yes)	.241		.209	4.998	.003**
<b>ANOVA</b>					
<b>R<sup>2</sup></b>	<b>Df.</b>		<b>F</b>		<b>P. value</b>
<b>.598</b>	9		14.829		.000**

**a. Dependent Variable:** Reported practice

**b. Predictors: (constant)** Age, Gender (Female), Education level (High), Employment status (Employee), Caregiving Experience (Yes), Previous caregiving experience prior to caring for this patient (Yes), Hours per day do you spend providing care, receive any formal support or training for caregiving (Yes), Previously using tele-palliative care services for the patient (Yes)

**Figure 2. Correlation between Caregiver Knowledge and Practice Levels**



## Discussion

The results of this study underscore the significant positive impact of a tele-palliative care education program on the knowledge and caregiving practices of family caregivers for geriatric patients with prostate cancer. The findings demonstrate that the educational intervention led to substantial improvements in both caregivers' understanding of prostate cancer management and their practical caregiving skills. These improvements were observed across various domains, including symptom management, medication administration, daily living assistance, and communication with healthcare providers.

The marked increase in knowledge levels among caregivers, as evidenced by the rise in total knowledge scores from 3.98 pre-intervention to 14.2 post-intervention, reflects the effectiveness of the tele-palliative care education program. The significant improvement in prostate cancer knowledge, tele-palliative care knowledge, caregiver skills, and end-of-life care knowledge suggests that caregivers became better equipped to provide comprehensive care to their loved ones. This increase in knowledge is particularly important given the complexity of prostate cancer care, which involves understanding disease progression, symptom management, and treatment options. This dramatic improvement suggests that such programs can play a crucial role in equipping caregivers with the necessary skills and

knowledge to manage complex health conditions like prostate cancer. The researcher would advocate for further expansion of these programs to ensure that all caregivers, regardless of background or prior experience, have access to continuous education and training support, which would ultimately enhance the overall caregiving experience and patient outcomes.

These results were supported with the study by **El Mezayen et al., (2022); Hafez et al., (2024)** mentioned that there was a significant improvement in the total level of knowledge and commitment to prostate cancer screening. In addition, The palliative care education program significantly improved caregivers' knowledge, attitudes, and practice scores (**Ibrahim et al., 2024; Hafez et al., 2024**). There is evidence for positive effects of eHealth on perceived support, knowledge, and information competence of cancer patients (**Slev et al., 2016**).

In addition to knowledge, caregivers reported significant improvements in their caregiving practices post-intervention. The increase in practice scores from 26.2 pre-intervention to 53.6 post-intervention highlights the program's success in enhancing practical caregiving skills. The domains that showed improvement included symptom management, medication administration, and emotional support, which are critical areas in palliative care. Notably, caregivers reported better communication with healthcare providers through telemedicine, which further improved their ability

to manage symptoms and medications.

The follow-up data showed a slight decline in both knowledge and practice scores; however, these scores remained significantly higher than pre-intervention levels. This suggests that while some knowledge and skills may diminish over time without continued support, the intervention had a sustained positive impact on caregivers' abilities to manage the complex needs of geriatric prostate cancer patients.

**Basile et al., (2024)** showed that older adults in palliative care at home perceive technology as a means of receiving efficient care. However, future research is needed to investigate what they look for in a technological tool and to develop more suitable technologies for them. Also, **Walton et al., (2023)** reported that the current evidence for telehealth palliative care interventions shows promise for improving quality and outcomes of serious illness care.

The multiple regression analysis revealed several significant predictors of knowledge and practice improvements, including prior caregiving experience, employment status, formal caregiving training, and previous use of tele-palliative care services. Caregivers with more experience or formal training tended to perform better, highlighting the importance of continuous education and support. The findings suggest that targeted interventions for caregivers with less experience or formal support may be beneficial in maximizing the effectiveness of tele-

palliative care programs. From the researcher's viewpoint, these factors highlight the crucial role of experience and structured support in shaping caregiver outcomes. The positive association between caregiving experience and improved practices suggests that those with previous exposure to caregiving situations are better equipped to handle the challenges of caring for prostate cancer patients. Moreover, the fact that formal caregiving training is a significant predictor points to the value of continuous education. The researcher advocates for the need to implement targeted interventions for caregivers who have less experience or lack formal training, as this could bridge knowledge gaps and optimize tele-palliative care effectiveness.

These results supported with the study by **Wong et al., (2024)**; **Hafez et al., (2024)** reported that Care recipient performance status was a strong patient-related factor associated with higher family caregivers' burden regardless of duration of caregiving and other caregiver-related factors after adjusting for caregiver demographics. While **Chen et al., (2023)** reported other factors as regional and cultural characteristics should also be taken into account when tele-palliative care interventions are carried out.

The strong positive correlation between knowledge and practice ( $r = 0.876, p < .001$ ) reinforces the idea that improved knowledge directly translates to better caregiving practices. Caregivers who gained a

deeper understanding of prostate cancer management were better able to apply this knowledge in their day-to-day caregiving activities, leading to improved patient outcomes. This finding supports the hypothesis that caregiver education is crucial in enhancing the quality of care provided to geriatric patients. This emphasizes the need for continuous education programs to ensure that caregivers have the latest information and best practices in managing prostate cancer and other health conditions. These results supported with the study by **Owoo, (2019)** reported that lack of family caregivers knowledge had negative effect of their experience and caring Prostate Cancer patients. Also, **Owoo et al., (2022)** stated that there was positive correlation between caregivers' knowledge and practice related caing Prostate Cancer. Moreover, **Moursi and Sabry, (2022)** mentioned that there was a highly statistically significant correlation between total knowledge, total practices, and total burden scores of the studied family caregivers for elderly patients with cancer.

### **Conclusion**

The findings of this study demonstrate the significant positive impact of a tele-palliative care education program on improving family caregivers' knowledge and caregiving practices for geriatric patients with prostate cancer. Caregivers who participated in the program exhibited a marked increase in their understanding of prostate cancer management, tele-palliative care, and caregiving skills.

Additionally, their ability to manage symptoms, administer medications, and provide emotional support improved significantly post-intervention. The sustainability of these improvements was also observed during the follow-up assessment, indicating the long-term benefits of tele-palliative care education.

### **Recommendations**

1. **Expansion of Tele-Palliative Care Programs:** Tele-palliative care education should be more widely implemented in healthcare systems, particularly for caregivers of patients with chronic conditions like prostate cancer. This can ensure that caregivers are equipped with the necessary skills to manage patients at home.
2. **Ongoing Support and Training:** Caregivers should receive continuous support and periodic refresher training to maintain and further enhance their caregiving skills, especially as the disease progresses or new symptoms arise.
3. **Incorporation of Emotional and Psychological Support:** Given the psychological strain on caregivers, tele-palliative care programs should integrate emotional and psychological support mechanisms, including counseling and stress management strategies.
4. **Technology Accessibility:** Efforts should be made to ensure that caregivers have access to the necessary technological tools for tele-palliative care. Training on using these tools should be

provided as part of the educational program.

### Limitations:

1. Convenience Sampling: The use of convenience sampling may limit the generalizability of the study's findings. Future studies should aim to use random sampling methods to better represent the caregiver population.
2. Short Follow-Up Period: The follow-up period of one month may not be sufficient to fully assess the long-term sustainability of the knowledge and practice improvements. Longer-term follow-up assessments are recommended.
3. Self-Reported Data: The reliance on self-reported measures for caregiving practices may introduce bias, as caregivers may overestimate their abilities or underreport challenges.

### Implications for Practice:

This study highlights the critical role of tele-palliative care education in empowering caregivers to provide effective and compassionate care to geriatric prostate cancer patients. Healthcare providers are encouraged to integrate structured tele-palliative education programs into their standard care regimens for home-based care, ensuring caregivers are well-equipped to manage complex medical and emotional needs. Moreover, healthcare policymakers should advocate for the widespread implementation of telemedicine in palliative care, recognizing its potential to enhance access to care,

particularly in remote and home-based settings.

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