



## Original Research Article

# Caregiver's Skills and Confidence Enhancement Through Tailored Videos in Children with Long-term Tracheostomy Children

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**Abstract:** **Background:** Pediatric tracheostomy care requires specialized skills and confidence to ensure safe home-based management. Caregivers often experience anxiety and lack adequate training, which can impact the quality of care and child outcomes. Video-based educational interventions offer a flexible and accessible method to improve caregivers' competence and self-efficacy. **Objective:** This study aimed to evaluate the effectiveness of tailored video-based education in enhancing caregivers' skills and confidence in providing home care for children with long-term tracheostomies. **Methods:** A quasi-experimental, one-group pretest–posttest design was employed at the Children's Hospital, Lahore, Pakistan. A total of 34 caregivers of children aged 1–12 years with long-term tracheostomies were purposively selected. Caregivers were divided into four groups and received weekly video-based training sessions over three months. Tracheostomy care skills were assessed using an 11-item checklist, and confidence levels were measured with a six-item questionnaire, both administered pre- and post-intervention. Data were analyzed using SPSS version 24.0, and the Wilcoxon signed-rank test was applied to evaluate pre-post changes. **Results:** Post-intervention, caregivers showed a significant improvement in both skills and confidence. The proportion of caregivers with good skills increased from 0% to 82.35%, while unsatisfactory skills decreased from 88.23% to 2.9% ( $p = 0.001$ ). Similarly, caregivers reporting good confidence increased from 0% to 79.41%, and less confident caregivers decreased from 91.17% to 14.7% ( $p = 0.002$ ). Improvements were observed across all assessed competencies, including tracheostomy site care, suctioning, and emergency management, alongside enhanced self-assurance in providing care at home. **Conclusion:** Tailored video-based education effectively enhances caregivers' technical competence and confidence in managing children with long-term tracheostomies. Implementing such structured, multimedia interventions can improve home care quality, reduce caregiver anxiety, and potentially contribute to better pediatric outcomes.

**Keywords:** Pediatric tracheostomy, caregiver training, video-based education, home care, skills enhancement, confidence.

## INTRODUCTION

**Background of Study:** Pediatric tracheostomy care is most effectively managed within sophisticated healthcare systems through a coordinated, multidisciplinary strategy that combines standardized clinical procedures with comprehensive family education. For children experiencing chronic respiratory failure or upper airway obstruction, tracheostomy—a surgical procedure establishing a direct airway via the trachea—offers significant clinical advantages. While often in line with

recognized treatment standards, the decision to proceed with tracheostomy can be morally complex, particularly when considerations involve prolonged hospitalization, ongoing mechanical ventilation, or transition to palliative care. Accordingly, shared decision-making (SDM) has emerged as the preferred standard, ensuring that medical choices incorporate caregivers' perceptions of survival, pain, and overall quality of life (Kon et al., 2016). Despite these advances, providing safe and efficient tracheostomy care in **resource-limited settings** remains

challenging. Constrained healthcare infrastructure, lack of specialized equipment, and insufficient training for medical personnel often result in suboptimal outpatient care, leading to preventable complications. To address these issues, innovative and context-sensitive strategies have been introduced, including low-cost tracheostomy kits crafted from locally available materials, pictorial care instructions, and simulation-based training programs for nurses and early-career physicians. Evidence suggests these targeted interventions enhance caregiver confidence and significantly improve clinical skill levels, ultimately raising the quality and safety of tracheostomy care (Sandler et al., 2020). Additionally, it has been shown that combining simulation-based training with traditional bedside instruction improves caregiver knowledge and lowers anxiety levels. In order to prepare caregivers for the intricate duties of overseeing tracheostomy care at home, this mixed learning approach is essential (Wooldridge & Carter, 2021). Furthermore, it has been demonstrated that using teaching resources that are visual or graphic-based may significantly increase patients' and caregivers' self-efficacy. These graphic aids make complex medical processes easier to grasp and help uncover variables that might make caregivers less confident. Accordingly, they encourage the creation of more individualized and effective educational interventions. Poor tracheostomy care performance has been linked to higher hospital readmission rates, a higher risk of clinical problems, and a lower quality of life. The dearth of instructional materials that are well suited to the unique requirements of patients—especially those with head and neck malignancies, who frequently need information adapted to their particular health literacy levels—is a major contributing cause. In this regard, pictographic instructional resources have proven to be highly successful, producing modest to significant increases in the self-efficacy of patients and caregivers in handling tracheostomy-related activities (Wang, 2021).

**PROBLEM STATEMENT:** Long-term tracheostomy in children is associated with high morbidity and mortality in Pakistan, with in-hospital death rates around 8% and 9–15% mortality reported within 10 years post-tracheostomy. Beyond medical challenges, these children place significant emotional, social, and financial burdens on their families, particularly home caregivers, who often experience stress, guilt, and feelings of inadequacy. Hospital-based training is frequently insufficient, leaving caregivers unprepared for daily care and emergencies. Video-based educational interventions offer a practical and accessible method to enhance caregiver skills and confidence, but their effectiveness in pediatric tracheostomy care in Pakistan remains underexplored. Research is needed to evaluate such

interventions to improve clinical outcomes for children and support family well-being.

### **SIGNIFICANCE OF THE STUDY:**

This study aims to enhance caregiver skills and confidence in managing children with long-term tracheostomies at home through tailored video-based education. In Pakistan, where formal caregiver training is limited and pediatric tracheostomy mortality remains high, such interventions can provide affordable, accessible support, reduce hospital readmissions, and improve child survival. The study highlights nurses' roles as educators, strengthens family-centered care, and offers a scalable strategy to improve caregiver competence, social support, and quality of life, while contributing to global knowledge on digital education in tracheostomy care.

### **HYPOTHESES OF THE STUDY**

#### **Alternative Hypotheses (H<sub>1</sub>)**

1. There will be enhancement of caregiver tracheotomy care skills at home in children with long term tracheostomy through tailored videos.
2. There will be enhancement in confidence level of caregivers of children with long term tracheostomy through tailored videos.

#### **Null Hypotheses (H<sub>0</sub>)**

1. There will be no an enhancement of caregiver tracheotomy care skills at home in children with long term tracheostomy through tailored videos.
2. There will be no an enhancement in confidence level of caregivers of children with long term tracheostomy through tailored videos.

#### **OBJECTIVE OF THE STUDY:**

1. To evaluate the effectiveness of tailored video-based educational interventions in enhancing caregivers' nursing skills for managing children with long-term tracheostomies.
2. To assess the impact of tailored video-based education on caregivers' confidence and preparedness in providing home-based care for children with long-term tracheostomies.

**LITERATURE REVIEW.** Recent efforts in resource-limited settings have focused on low-cost, context-appropriate tools for tracheostomy care. A pilot study in Kigali, Rwanda, introduced an inexpensive tracheostomy supply kit, a manual suction device, and an image-based care manual within a simulation-based training program for nurses and medical residents. Participants reported increased confidence and improved competence, highlighting the effectiveness of affordable, visual educational resources in environments with limited training and equipment (Karaca et al., 2019). A quasi-experimental study assessed 45 nurses' competence in tracheostomy care and the impact of an educational program. Pre- and post-training

results showed knowledge scores improved from 2.2–46.7% to 57.8–88.9%, with 91.1% having no prior training. The increase was statistically significant ( $p = 0.00$ ), highlighting a lack of prior expertise regardless of qualifications or experience. The study recommended mandatory continuing education in tracheostomy care for all nurses (Abdulrahman et al., 2021). Baron et al. (2023) found that hospital-based training significantly improved family caregivers' readiness and confidence in managing home tracheostomy care. Staged discharge planning and peer support networks further eased the transition from hospital to home. Similarly, Yan et al. (2022) developed a peer-narrative intervention to aid parental decision-making for tracheostomies, emphasizing early, balanced, and practical information about caregiving challenges, responsibilities, and long-term quality of life. Both studies highlight the importance of structured education and supportive resources for caregivers of children with tracheostomies.

## MATERIALS AND METHODS

### Study Design:

A quasi-experimental, one-group pretest–posttest design was used to assess changes in caregivers' knowledge, skills, and confidence before and after a video-based educational intervention.

### Study Setting:

Children's Hospital, Lahore, Punjab, Pakistan.

### Study Population:

Caregivers of children with long-term tracheostomies.

### Study Duration:

Nine months, starting February 2025, after approval from the University of Lahore Research Ethics Committee.

### Operational Definitions:

**Caregiver Skill:** Ability to manage blocked tubes, emergency de-cannulation, tracheostomy hygiene, monitor respiratory distress, and identify urgent symptoms (Mohajan, 2017). Scored 11–33: Unsatisfactory  $\leq 11$ , Fair 12–22, Good 23–33.

**Level of Confidence:** Assessed comfort, emergency management, and tracheostomy knowledge (Tallon et al., 2020). Scored 6–18: Less  $\leq 6$ , Average 7–12, Good 13–18.

### Variables:

**Independent:** Tracheostomy care video intervention

**Dependent:** Caregiver skills and confidence

**Sample Selection:** Purposive sampling from ICU, CCU, and ENT wards at Children's Hospital. Final sample size: 34 participants.

### Inclusion Criteria:

- Blood relatives (parents, uncles, aunts)
- Limited tracheostomy care skills and low confidence
- Spending  $>12$  hours/day with the child

- Caregivers of children aged 1–12 years from inpatient or outpatient settings

### Exclusion Criteria:

- Healthcare professionals or caregivers with prior knowledge of tracheostomy care
- Those with home medical facilities
- Elderly caregivers or those without Android phones

## STUDY TOOLS

**Demographic Datasheet:** Collected participants' age, gender, education, and prior caregiving or tracheostomy-related training to describe the socio-demographic profile.

**Tracheostomy Care Skill Assessment:** An 11-item tool evaluated caregivers' competence in providing tracheostomy care before and after the video-based intervention.

**Confidence Level Questionnaire:** A six-item tool measured caregivers' self-confidence in performing tracheostomy-related tasks pre- and post-intervention.

**Instructional Videos:** Educational videos were developed in English and Urdu based on American Association of Respiratory Care and NHS guidelines to standardize and improve home tracheostomy care.

**Sample Size:** The calculated sample size was 28 participants; accounting for a 20% dropout rate, the final sample size was 34. Calculation used a 95% confidence interval,  $d = 0.09$ , and a pre-post mean difference of  $4.04 \pm 0.26$  from a pilot study.

**Data Collection Procedure:** After ethical approval, 34 caregivers were recruited via purposive sampling. The study purpose, procedure, and benefits were explained, and informed consent obtained. Pre-intervention data on demographics, skills, and confidence were collected using structured questionnaires.

**Pre-Intervention Phase:** Participants were divided into four groups (two groups of 8, two groups of 9). Caregivers were screened, study objectives explained, and baseline assessments of tracheostomy skills and confidence conducted.

**Intervention Phase:** Over three months, weekly sessions (1–3 hours each) included video demonstrations, interactive discussions, and hands-on practice with printed handouts to enhance caregivers' skills and confidence in home-based tracheostomy care.

**Post-Intervention Phase:** After 12 weeks, caregivers were reassessed using the same validated questionnaires to measure skill and confidence improvement.

**Data Analysis:** Data were analyzed using SPSS v25. Descriptive statistics summarized demographics, and the Wilcoxon signed-rank test compared pre- and post-intervention scores. A  $p$ -value  $\leq 0.05$  was considered statistically significant.



## RESULTS

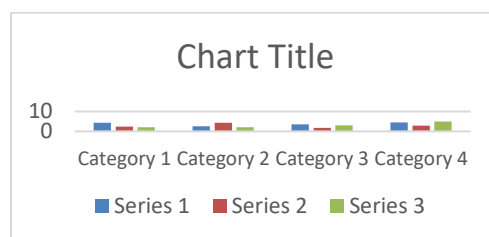
**Demographic Characteristics:** Most caregivers were female (70.6%) and aged 51–60 years (32.4%), with the majority having matric-level education (61.8%). Caregiving responsibilities spanned a broad age range, with older adults most frequently involved.

|           |                      | Frequency<br>(N) | Percentage<br>(%) |
|-----------|----------------------|------------------|-------------------|
| Age       | 20 years to 30 years | 10               | 29.4%             |
|           | 31 to 40 years       | 4                | 11.8%             |
|           | 41 to 50 years       | 9                | 26.5%             |
|           | 51 to 60 years       | 11               | 32.4%             |
| Gender    | Male                 | 10               | 29.4%             |
|           | Female               | 24               | 70.6%             |
| Education | Primary              | 13               | 38.2%             |
|           | Matric               | 21               | 61.8%             |

**Caregiver's Skills:** The findings from the table clearly demonstrate a significant improvement in caregiver skills following the intervention. Before the program, the vast majority of caregivers (30 out of 34, or 88.23%) exhibited unsatisfactory skills, with none being rated as having good skills. Only a small proportion (11.76%) fell into the fair category. However, after the intervention, there was a remarkable shift: the number of caregivers with unsatisfactory skills dropped drastically to just 1 (2.9%), while the proportion with good skills rose sharply to 29 caregivers (85.3%). Interestingly, the number of caregivers with fair skills remained relatively stable, changing only slightly from 4 (11.76%) before to 4 (11.71%) after. The associated p-value of 0.001 indicates that these improvements are statistically significant, meaning that the changes observed are unlikely to be due to chance. This suggests that the intervention had a profound and positive impact, transforming the skill levels of caregivers from predominantly unsatisfactory to predominantly good, thereby highlighting its effectiveness in enhancing caregiving competencies.

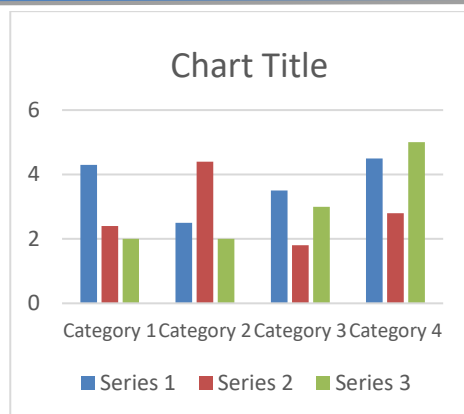
| Caregiver's | Pre- | Post- | P- |
|-------------|------|-------|----|
|-------------|------|-------|----|

| s Skill               | Intervention |         | Intervention |         | value |
|-----------------------|--------------|---------|--------------|---------|-------|
|                       | (F)          | %       | (F)          | %       |       |
| Unsatisfactory Skills | 30           | 88.23 % | 1            | 2.9%    | 0.001 |
| Fair Skills           | 4            | 11.76 % | 4            | 14.71 % |       |
| Good Skills           | 0            | 0%      | 29           | 82.35 % |       |



**Caregiver's Confidence:** The data on caregiver confidence shows a marked improvement following the intervention. Before the intervention, the majority of caregivers (31 out of 34, or 91.17%) reported having less confidence in providing care, while only a small number (3 caregivers, 8.82%) had mild confidence, and none demonstrated good confidence. After the intervention, there was a substantial shift in confidence levels: the number of caregivers with less confidence dropped dramatically to 5 (14.70%), and those with average confidence decreased slightly to 2 (5.82%). Importantly, a significant proportion of caregivers, 27 out of 34 (79.41%), reported good confidence after the intervention. The p-value of 0.002 indicates that this improvement in caregiver confidence is statistically significant, suggesting that the intervention had a strong and positive impact on enhancing caregivers' self-assurance in performing their caregiving duties. Overall, these results highlight the effectiveness of the intervention in transforming caregivers from predominantly low-confidence to high-confidence levels. The findings indicate a **notable improvement in caregiver confidence after the intervention**. Prior to the program, the mean caregiver confidence score was **1.17 (SD = 0.41)**, suggesting that participants had relatively low confidence levels. Following the intervention, the mean increased to **2.67 (SD = 0.52)**, reflecting a clear enhancement in their confidence. Although the **sample size was small (N = 6)**, the reduction in variability and the increase in mean scores suggest consistent positive changes across participants. The **standard error of the mean** rose slightly from **0.17 before to 0.21 after**, but this is expected with the observed shift in overall scores. Importantly, the **p-value (< 0.003)** confirms that this difference is statistically significant, indicating that the observed improvement in caregiver confidence is unlikely due to chance and can be attributed to the effectiveness of the intervention.

| Caregiver's Confidence | Pre-Intervention |        | Post-Intervention |        | P-value |
|------------------------|------------------|--------|-------------------|--------|---------|
|                        | (F)              | %      | (F)               | %      |         |
| Less Confidence        | 31               | 91.17% | 5                 | 14.70% | 0.002   |
| Average Confidence     | 3                | 8.82 % | 2                 | 5.82%. |         |
| Good Confidence        | 0                | 0%     | 27                | 79.41% |         |



## DISCUSSION

This study highlights the significant effectiveness of tailored video-based interventions in improving caregivers' skills and confidence in managing children with long-term tracheostomies. Before the intervention, most caregivers demonstrated unsatisfactory skills (88.23%) and low confidence (91.17%); however, post-intervention, 82.35% achieved good skills and 79.41% reported good confidence, with statistically significant improvements ( $p < 0.001$  for skills;  $p < 0.002$  for confidence). These findings emphasize the value of structured educational programs in preparing caregivers for complex home care responsibilities, aligning with previous research that supports the role of combined practical, digital, and reinforcement-based training methods (Smith et al., 2020; Kwon et al., 2021). Specifically, structured tracheostomy education has been associated with fewer complications and improved child outcomes (Lima et al., 2022). Moreover, the rise in confidence underscores the psychological benefits of ongoing, tailored training that addresses both technical and emotional readiness (Bayoumi & Alwakeel, 2020; Nageswaran et al., 2018). Video-based education offers accessible, flexible, and repeatable learning opportunities, making it especially beneficial for caregivers across varying literacy levels (Chorney et al., 2020). Despite the study's small sample size, which limits generalizability, the results strongly advocate for integrating multimedia education into standard caregiver training and conducting larger-scale studies to evaluate its long-term impact on clinical outcomes and caregiver well-being.

**CONCLUSION:** Video-based education markedly improved caregivers' technical competence and confidence in managing children with long-term tracheostomies. Structured, tailored training can empower caregivers, enhance home care safety, and potentially improve pediatric outcomes.

## LIMITATIONS:

Single-site study, limiting generalizability. Short-term follow-up; long-term skill and confidence retention not assessed. Results may be influenced by caregivers' home environment, literacy, and prior experience. Only quantitative data collected; qualitative caregiver experiences were not explored.

**RECOMMENDATION:** Studies should explore caregivers' psychological aspects, including stress, coping, and support.

Expand training via interactive e-learning, mobile apps, or virtual simulations to improve access in remote areas.

Nurses should lead structured video-based caregiver training with evaluations, bedside demos, and refreshers.

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