Journal of Clinical Nursing

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Journal of Clinical Nursing

EMPIRICAL RESEARCH QUANTITATIVE

Nursing Skills in the Care of Patients With Respiratory Stomas in Hospitals With and Without Advanced Practice Tracheostomy Service

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Received: 9 October 2024 | **Revised:** 4 December 2024 | **Accepted:** 2 January 2025

Funding: The authors received no specific funding for this work.

Keywords: nursing care | patient care team | professional training | surgical stomas | tracheostomy

ABSTRACT

Aims: To identify whether there are differences in knowledge regarding the management of patients with respiratory stomas among nurses working in hospitals with an advanced practice tracheostomy service compared to those without it.

Design: Descriptive, cross-sectional, comparative, analytical survey study.

Method: The study was conducted from January to March 2023 in four tertiary care hospitals, two of which have an advanced practice tracheostomy service. A self-administered questionnaire was designed, consisting of 16 questions about nurses' specialised training in caring for tracheostomy patients. The study adhered to the STROBE checklist. Statistical analyses were performed using SPSS (24.0) from IBM.

Results: Nurses in hospitals with a dedicated tracheostomy service obtained a higher mean score (7.1/10) and demonstrated greater anxiety when managing patients with stomas ($p < 0.001$), as well as an increased willingness to undergo specific training ($p = 0.017$) to reduce their lack of self-confidence.

Conclusions: A higher level of anxiety in the management of tracheostomised patients and a greater interest in receiving specific training have been observed among nurses in hospitals with advanced practice services (APTS), despite having greater training. Therefore, institutions should commit to incorporating advanced practice nurses and continuing education in the approach to ostomies among their professionals.

Implications for the Profession and/or Patient Care: Implementing ongoing training programmes and specific tracheostomy services or units in hospitals would enable nurses to provide high-quality care for patients with respiratory stomas.

Reporting Method: The study adhered to the STROBE checklist.

Patient or Public Contribution: Neither patients nor the public were involved in the design or conduct of this research. Nurses participated exclusively in data collection.

1 | Introduction

The care of individuals with tracheostomies by nurses is complex and requires specific knowledge and skills (Karaca, Altinbas, and Aslan 2019). Therefore, it is crucial for institutions to implement standardised care protocols, tailored training programmes and management services at the institutional level to coordinate multidisciplinary care for these patients (McGrath et al. 2020a; McGrath et al. 2020b; Ninan et al. 2023).

Summary

- What does this paper contribute to the wider global community?
  - This study identified a lack of training and knowledge among nurses when caring for patients with stomas.
  - The findings may encourage hospital management boards to consider establishing advanced practice tracheostomy services.

The establishment of interdisciplinary teams specialising in the treatment of patients with respiratory stomas has been shown to reduce length of hospital stays, decrease the number of complications and increase the safety and well-being of both patients and their families (Oikarinen et al. 2024).

1.1 | Background

The number of tracheostomies performed annually in developed countries is estimated to be around 250,000, approximately 10% of which are conducted on children (Brenner et al. 2020). A tracheostomy may be performed as part of a surgical procedure or for patients requiring prolonged periods of mechanical ventilation in intensive care units (Twose et al. 2019).

Mortality rates in patients requiring tracheostomy range from 10% to 60%, depending on the presence of comorbidities (Brenner et al. 2020). While much of this mortality is attributed to the underlying condition, up to 30% is directly linked to the tracheostomy itself. These rates vary depending on the setting, with higher mortality observed in hospital wards, where there is an increased risk of pulmonary infections and other complications, such as accidental decannulation, tube obstruction, pneumothorax and haemorrhage (Brenner et al. 2020). This highlights the need for timely and effective prevention and safety strategies to mitigate risk factors and reduce the number of complications (Zhang et al. 2022; Erickson et al. 2023).

A lack of training and experience among professionals, fragmented services, insufficient equipment and infrastructure, communication barriers and the absence of standardised protocols and uniform care practices are all risk factors for developing complications (McGrath et al. 2020a, 2020b; Stark and Ewers 2020). It is therefore safe to say that caring for individuals with tracheostomies is inherently complex and demands specific knowledge and skills (Karaca, Altinbas, and Aslan 2019).

To coordinate resources and strategies that address these challenges, international associations have emerged, including the UK National Tracheostomy Safety Project (NTSP), the American Academy of Otolaryngology-Head and Neck Surgery and the Global Tracheostomy Collaborative (GTC). These organisations, along with hospitals worldwide, have implemented urgently needed standardised care protocols, specialised training programmes and management services at the institutional level to facilitate multidisciplinary care for patients with respiratory stomas (McGrath et al. 2020a, 2020b; Ninan et al. 2023). Institutions that implement the GTC's key drivers act as agents of change both within their organisation and beyond, fostering positive developments through information dissemination and communication strategies regarding the management of individuals with tracheostomies (Bedwell et al. 2019; Zhu et al. 2023).

Evidence highlights the positive impact of having a multidisciplinary tracheostomy team within healthcare facilities (Mussa et al. 2021; Panattoni et al. 2023), comprising nurses with specialised knowledge who work in coordination with other professionals (such as physical therapists, speech therapists, ENT specialists, intensive care physicians, dietitians and others). Multidisciplinary approaches have been shown to reduce the length of hospital stays, financial costs, readmissions to intensive care units, morbidity and mortality, adverse events and the time taken to achieve decannulation, in addition to promoting the early use of speaking valves. Having multidisciplinary teams in place also reduces the levels of stress and anxiety experienced by nurses who do not routinely care for patients with tracheostomies (Graham et al. 2021; Pandian et al. 2020; Mohapatra et al. 2020; Zaga et al. 2020; Zhou et al. 2022).

At the patient level, having an advanced practice tracheostomy service (APTS) available reduces the number of complications (such as accidental decannulation, tube obstruction and haemorrhage) and promotes the early initiation of swallowing, phonation and decannulation (Benito-Orejas et al. 2022; Graham et al. 2021). This also facilitates continuity of care both within the hospital setting and beyond, enhancing the safety and wellbeing of patients and their families (Oikarinen et al. 2024). Moreover, it helps to prioritise the central role of patients, families and carers in decision-making and ensures optimal tracheostomy care following hospital discharge through effective patient education (McGrath et al. 2020a, 2020b; Pandian et al. 2022; Swords et al. 2021).

In Spain's public healthcare network, some tertiary care hospitals (Clavel Cerón 2016; Sánchez-Gómez et al. 2022) have established APTSs, equipped with the infrastructure and resources needed to provide high-quality care for patients with tracheostomies on an outpatient basis both during their hospital stay and postdischarge (Bonvento et al. 2017). Nurses in these hospitals are likely to have better knowledge of the care required for the upper aerodigestive tract of patients with respiratory stomas, supporting the need for the widespread implementation of such teams in hospitals (Brenner et al. 2020).

The aim of this study was to determine whether there are differences in the level of knowledge of managing patients with respiratory stomas between nurses working in hospitals with an APTS and those in healthcare facilities without.

2 | Methods

2.1 | Design

A descriptive, cross-sectional observational study was conducted using a self-report questionnaire on nurses' knowledge of caring for patients with respiratory stomas in four tertiary care hospitals within the Spanish national health system (SNS).

The study took place between January and March 2023. The STrengthening the Reporting of OBservational studies in Epidemiology (STROBE) checklist was used to guide the reporting of this study (Supporting File S1) (Von Elm et al. 2014).

2.2 | Study Setting and Sampling Method

A convenience sampling method was used across four hospitals, two of which have an APTS. The sample consisted of 267 nurses working in hospital wards. Nurses from specialised intensive care units or from ENT and paediatric hospital units were excluded.

2.3 | Data Collection

An ad hoc questionnaire was distributed via corporate email to all nurses working in hospital wards across the four hospitals. The survey was administered online through the Google Forms platform. Instructions for completion, the study objectives and the informed consent form were provided prior to the start of the questionnaire.

The content validity of the questionnaire for relevance and clarity was assessed using content validity indices. Content reliability was determined through the internal consistency coefficient, Cronbach's alpha (α), which was 0.78.

The questionnaire consisted of two dimensions and 16 items, based on the study by Yelverton et al. (2015). The dimensions included basic knowledge of patient care and nurses' perceptions of their own knowledge. The items in the 'basic knowledge' dimension were assessed through closed-ended questions with five response options. Those in the 'perception of knowledge' dimension were rated using a five-point Likert scale, with the exception of the final item, which was a closed-ended question with five options. Higher average scores indicated a greater perceived level of knowledge regarding caring for patients with respiratory stomas.

The sociodemographic variables of age and sex were also included, as well as hospital where the nurse works, presence of an APTS, hospital unit, years of general professional experience, years of experience in ENT wards or other specialty services and number of patients with respiratory stomas attended to in the past 6 months. The outcome variables included nurses' knowledge of caring for patients with respiratory stomas, their subjective perception of their knowledge level, and whether there is a perceived need to establish an APTS in their hospital to care for these patients.

2.4 | Data Analysis

Data were analysed using IBM SPSS v. 24.0 software (IBM, Armonk, New York, NY, USA). Quantitative variables were presented as means and standard deviations, while qualitative variables were expressed as percentages. Associations between qualitative variables were analysed using Pearson's chi-squared test, and comparisons of quantitative values were made using Student's *t*-test and Pearson's correlation coefficient. A p value of <0.05 was considered statistically significant.

2.5 | Ethical Considerations

The anonymity of respondents was preserved at all times, and participation was voluntary. The principal research team adhered to the bioethical standards outlined in the Declaration of Helsinki and in Spanish Organic Law 3/2018 of 5 December, on Personal Data Protection and Guarantee of Digital Rights. The study was approved by the relevant Ethics Committee for Medical Research (ECMR), under code PI-21-2526.

3 | Results

3.1 | Sociodemographic Characteristics of the Study Sample

A total of 267 nurses participated in the study, 89.5% ($n=239$) of whom were women and 10.5% ($n=28$) were men. Of the total number of nurses, 38.5% ($n=103$) worked in a hospital with an APTS, while 61.5% ($n=164$) worked in a hospital without this service. The mean age of the sample was 41.02 ± 9.63 years, with a higher mean age in the group with an APTS (42.8 ± 7.9 years) compared to the group without an APTS (39.88 ± 10.4 years), with a p value of 0.01.

Nurses' overall professional experience was greater in hospitals with an APTS, with a mean of 18 ± 7.9 years. However, experience in ENT units, ICUs and/or tending to patients with respiratory stomas was higher in hospitals without an APTS, with a mean of 2 ± 4.2 years. No statistically significant differences were observed.

Table 1 shows the number of patients with respiratory stomas attended to by the nurses over the previous 6 months, as well as the work units of the respondents. A greater number of nurses worked in medical wards compared with surgical units and specialty services in both types of hospitals (Table 1).

3.2 | Knowledge Level Analysis

Nurses in hospitals with an APTS scored higher (7.1/10 points) on questions assessing their level of knowledge compared to those working in hospitals without an APTS.

Figure 1 shows the weighted percentage of the maximum score for each of the questionnaire items within the 'level of knowledge' dimension, with a higher rate of positive responses among nurses in hospitals with an APTS. The exceptions were the questions on managing tracheostomy complications: 'What is the first step if partial or total airway obstruction is suspected in a patient with a tracheostomy tube?'; 'What should be done in the event of haemorrhage with a cuffed tracheostomy tube?'; and 'How should one proceed after confirming that a patient is ventilating adequately following accidental decannulation?' (Figure 1. Results of the questions on nurses' knowledge of basic care for patients with respiratory stomas).

3.3 | Nurses' Perceptions of Care for Patients With Respiratory Stomas

Nurses working in hospitals with an APTS reported greater anxiety ($p < 0.001$) and a lack of knowledge in managing these patients. They also perceived specific training as necessary ($p = 0.017$) to reduce the level of insecurity they experience when handling the patient's airway ($p = 0.001$) (Table 2).

TABLE 1 | Sociodemographic characteristics: Inpatient unit and number of patients with respiratory stomas tended to in the past six months.

	Hospital				
	w/ APTS		w/o APTS		
	n	%	*n*	%	*p*
Inpatient unit					0.002
Specialty services	11	10.6	45	27.6	
Medical ward	62	59.6	88	54	
Surgical ward	31	29.8	30	18.4	
Number of patients with respiratory stomas tended to in the past 6 months					0.081
0–1 patient	30	28.8	52	31.9	
2–3 patients	23	22.1	45	27.6	
4–5 patients	10	9.6	25	15.3	
> 5 patients	41	39.4	41	25.2	

Figure 2 shows the weighted percentage of the maximum percentile score for responses to the questionnaire item on which aspects of care caused the most insecurity. Changing the cannula was highlighted as the most anxiety-inducing task across all four hospitals, with nurses from hospitals with an APTS reporting higher scores ($p = 0.002$). The aspect of care causing the least insecurity was the use of alternative communication systems ($p = 0.002$), with higher scores in hospitals without an APTS (Figure 2. Results of the question on which aspects of care generated the greatest insecurity among nurses from different hospitals).

According to the nurses surveyed, the interdisciplinary team was expected to include a nurse (99%, $n = 264$), a speech therapist (77.15%, $n = 206$), an ENT specialist (93.63%, $n = 250$) and, to a lesser extent, an intensive care physician (24.34%, $n = 65$), a dietitian (49%, $n = 131$) and other professionals (52.8%, $n = 141$).

4 | Discussion

The study shows that nurses working in hospitals with an APTS demonstrated higher levels of knowledge regarding the management of patients with respiratory stomas. The nurses evaluated in this study shared sociodemographic characteristics similar to those reported in other studies (Abu-Sahyoun et al. 2023), where age, educational level and years of experience have been shown to correlate with higher levels of knowledge in caring for patients with respiratory stomas.

Caring for a patient with a tracheostomy requires continuous follow-up from the preoperative period to the late postoperative phase. This continuity ensures the maintenance of self-care

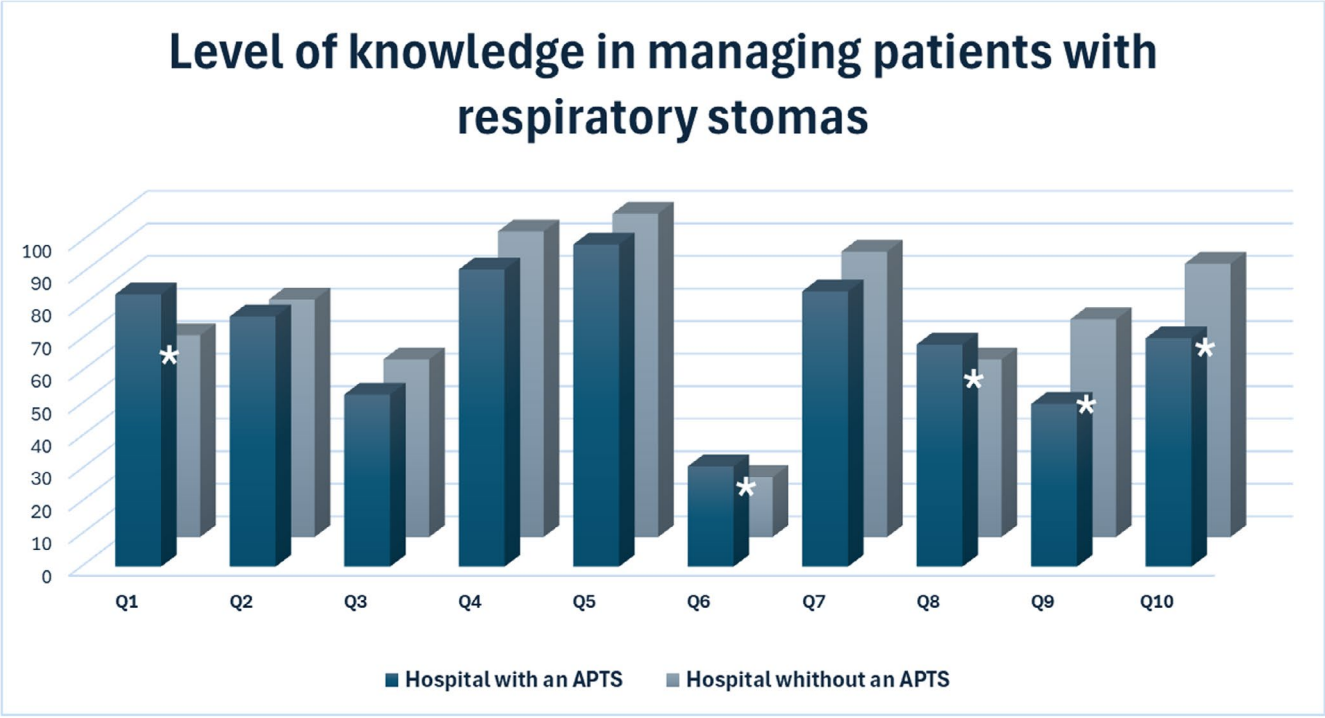

FIGURE 1 | Results of the questions on nurses' knowledge of basic care for patients with respiratory stomas. *$p < 0.05$ for questions comparing hospitals with and without an advanced practice tracheostomy service (APTS). [Colour figure can be viewed at wileyonlinelibrary.com]

education, ongoing monitoring of patients and the prevention and early identification of complications (Queirós et al. 2021; Morris et al. 2020).

It is essential to assess nurses' level of training in caring for these patients, as gaps in specific knowledge on airway management (the terms used, the necessary care to prevent the risk of aspirating secretions/fluids and pneumonia and swallowing) may directly impact patient safety (McGrath et al. 2020a, 2020b; Swords et al. 2021). Several international studies revealed that there are still gaps in knowledge in various aspects of tracheostomy care and management, producing a lack of confidence among professionals (Khanum et al. 2022; Rahim Akroute et al. 2023). Roof et al. (2020) also published about nurses' lack of confidence in caring for tracheotomised patients.

There is a deficiency in the proper handling of cuffed tracheostomy tubes, despite the fact that correct inflation can prevent injury to the structures surrounding the trachea, avoid unwanted aspiration and isolate the airway (Moser et al. 2022).

As evidenced in other studies (Graham et al. 2021; Moser et al. 2022; Chen et al. 2022; Fine et al. 2021), nurses showed lower levels of training and higher levels of anxiety when managing airway complications such as obstruction, haemorrhage and accidental decannulation. Therefore, previous studies, including those by Marget, Dunn, and Morgan (2023) and Ninan et al. (2023), agree that nurses' anxiety and insecurity in managing patients with respiratory stomas are closely related to a lack of knowledge. Alotaibi et al. (2022), reported that the level of

TABLE 2 | Nurses' perceptions of their training and knowledge in relation to caring for patients with respiratory stomas.

	Hospital				
	w/ APTS		w/o APTS		
	X	*σ*	*X*	*σ*	*p*
Do you think further training is needed for nurses and healthcare staff in caring for patients with respiratory stomas?	4.88	0.33	4.75	0.48	0.017
Do you feel adequately prepared to provide health education and explain the necessary care to these patients and their families for at-home management?	2.05	0.85	2.4	1.02	0.003
Currently, how anxious do you feel when caring for this type of patient?	4.25	1.08	3.43	1.07	< 0.001
Do you feel sufficiently competent to provide the necessary care in critical situations for patients with respiratory stomas?	2.13	0.82	2.65	0.96	< 0.001

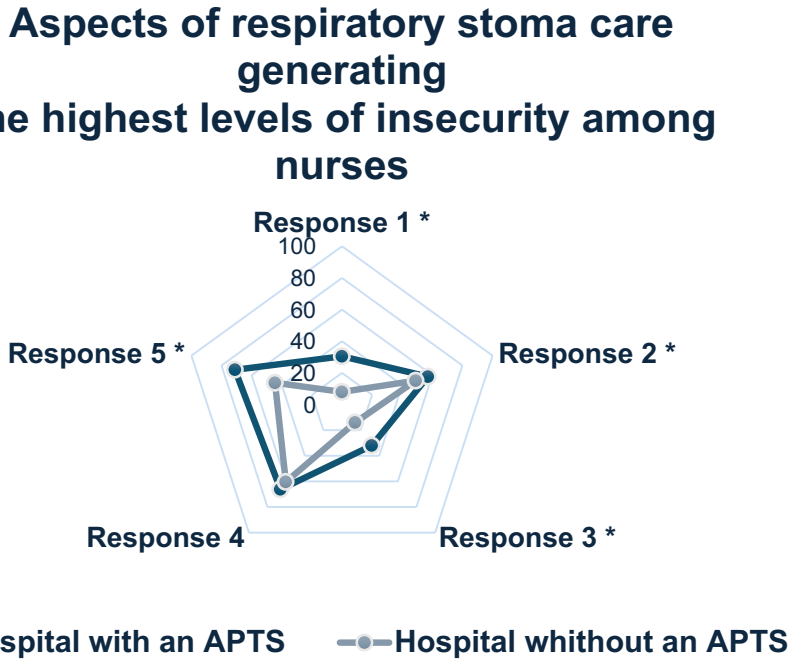

FIGURE 2 | Results of the question on which aspects of care generated the greatest insecurity among nurses from different hospitals. *$p < 0.05$ for questions comparing hospitals with and without an advanced practice tracheostomy service (APTS). Response 1: Proper stoma care. Response 2: Ensuring airway patency. Response 3: Using alternative communication systems. Response 4: Proper management of cuff inflation and swallowing. Response 5: Correctly replacing a tracheostomy tube. [Colour figure can be viewed at wileyonlinelibrary.com]

knowledge and practices regarding tracheostomy-related complications and indications among nurses remains limited. Their study evidenced approximately 59% had poor knowledge regarding tracheostomy-related complications and indications, 39% had moderate knowledge, and only 2% had good knowledge. They strongly recommend in-service continuing professional development programmes for nurses working in all hospital settings.

The nurses in this study, as well as those in the research by Pandian et al. (2022), agree on the need for a cohesive interdisciplinary team comprising a nurse, a speech therapist, an ENT specialist and other professionals as part of the strategies and units aimed at improving care for patients with respiratory stomas (Ninan et al. 2023; Duggal et al. 2023). This team would be responsible for implementing and coordinating appropriate interventions, humanising the care delivered to patients with respiratory stomas and enhancing nurses' knowledge and experience in this regard. Even nurses working in hospitals with an APTS recognise the need for further training, as they are aware of the challenges and requirements involved in providing holistic care to these patients and their families.

4.1 | Strengths and Limitations of the Study

One potential bias to consider is that the sample of participating nurses was not randomly selected. However, we believe that this limitation was acceptable given the aims of the study.

In addition, there is currently no global consensus on a validated survey for assessing nurses' knowledge and skills in managing patients with respiratory stomas, which would have allowed us to use such a tool in this study.

4.2 | Recommendations for Further Research

Further research should consider expanding the study to include other hospitals and primary care facilities in different geographic areas, to enhance the generalisability of the findings and strengthen the scientific evidence base.

4.3 | Implications for Policy and Practice

The implementation of continuing education programmes and APTSs in hospital settings could help bridge the knowledge gap among nurses caring for patients with tracheostomies. Moreover, most nursing interventions in this regard would focus on promoting patient self-care (McGrath et al. 2020a, 2020b; Mussa et al. 2021). Consider integrating a bedside safety checklist, as demonstrated in their study by Mary Anne Gallagher, which fostered team communication and supported direct care nurses in managing people with a new tracheostomy. (Gallagher and Torrieri 2022).

In addition, creating multidisciplinary teams to review tracheostomies (Priddle et al. 2024), training of staff, involvement in the care of the ostomy of the patient and family members are proposed lines, which are practices that have demonstrated their effectiveness in other published studies. (McGrath et al. 2020a, 2020b; Brenner et al. 2020; Bedwell et al. 2019).

This approach aimed to enhance patient independence by equipping them with the necessary skills to manage all aspects of stoma care, ultimately improving their quality of life.

5 | Conclusions

Nurses working in hospitals with APTSs demonstrated higher levels of knowledge in managing patients with respiratory stomas compared to those in healthcare facilities without these specific services.

The majority of nurses surveyed reported not feeling sufficiently trained to provide optimal care for these patients, with notable gaps in knowledge regarding tracheostomy terminology and the appropriate management of cuffed tracheostomy tubes. Furthermore, nurses from hospitals with APTSs reported greater anxiety levels and perceived themselves as less qualified, despite being more knowledgeable and experienced than those working in hospitals without these services.

All study participants expressed the need to establish interdisciplinary care teams to ensure optimal management of the care delivered to patients with respiratory stomas.

The management of healthcare centres should aim to include in their staff advanced practice nurses specialised in the care of tracheostomised patients. Working with evidence-based practice is essential, so managers should encourage ongoing training, the creation of clinical practice guides, protocols in healthcare units and specific verification checklists on the management of tracheostomised patients.

Author Contributions

All of the authors have made substantial contributions to the manuscript and have agreed to the publication of this version. Beatriz Martínez: conceptualisation, data curation, formal analysis, investigation, methodology, writing/original draft, writing/review and editing, visualisation, validation. María López: conceptualisation, data curation, investigation, methodology, writing/original draft, writing/review and editing, visualisation, validation. Sonia De Juana: conceptualisation, data curation, investigation, methodology, writing/original draft, writing/review and editing, visualisation, validation. Irene Alcoceba: conceptualisation, writing/review and editing, visualisation, validation. José-María Jiménez: conceptualisation, investigation, methodology, writing/original draft, writing/review and editing, visualisation, validation. Sara García: conceptualisation, investigation, methodology, writing/original draft, writing/review and editing, visualisation, validation, supervision.

Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon request. The data are not publicly available due to privacy or ethical restrictions.

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Supporting Information

Additional supporting information can be found online in the Supporting Information section.