

Experience of Symptoms Related to Dysarthria in Patients with NPC During Radiotherapy: A Descriptive Qualitative Study

Fan Li ^{1,2}, Lingling Xiong², Cheng Lei ³, Shitong Zhou ², Hongyao Leng⁴, Li Tang², Chunyu Wang⁵, Zaiqiao Ding⁶, Mengya Ge⁷, Qiuling Shi ^{1,3}

¹College of Public Health, State Key Laboratory of Ultrasound in Medicine and Engineering, Chongqing Medical University, Chongqing, People's Republic of China; ²Department of Otorhinolaryngology Head and Neck Surgery, Chongqing General Hospital, Chongqing University, Chongqing, People's Republic of China; ³Department of Thoracic Surgery, Sichuan Cancer Hospital & Institute, University of Electronic Science and Technology of China, Chengdu, Sichuan, People's Republic of China; ⁴Department of Nursing, Children's Hospital of Chongqing Medical University, Chongqing, People's Republic of China; ⁵Radiation Oncology Center, Chongqing University Cancer Hospital, Chongqing, People's Republic of China; ⁶Department of Oncology, Army Medical Center of PLA, Chongqing, People's Republic of China; ⁷Department of Public Health, Chongqing University Three Gorges Hospital, Chongqing, People's Republic of China

Correspondence: Qiuling Shi, College of Public Health, State Key Laboratory of Ultrasound in Medicine and Engineering, Chongqing Medical University, No. 1 Medical College Road, Yuzhong District, Chongqing, 400016, People's Republic of China, Tel +86 13647689863, Email qshi@cqmu.edu.cn

Background: Radiation to the adjacent parts of the tumor and radiation to the larynx may lead to voice changes and the development of dysarthria, however, dysarthria is often overlooked compared to other complications. It is necessary to understand the experience of nasopharyngeal cancer (NPC) patients with symptoms related to dysarthria after radiotherapy.

Methods: This qualitative descriptive study enrolled 33 patients NPC radiotherapy patients who experienced dysarthria were recruited from May to August 2024. Data were collected using semi-structured interviews. The interviews were audio-recorded and converted verbatim into standard text, and the data were iteratively thematically analyzed.

Results: Changes in speech and language quality after radiotherapy for NPC are common, but there are differences in the degree of symptoms perceived by patients. At the same time, dysarthria is often accompanied by other diverse oropharyngeal symptoms, and the trajectory-varying nature of these symptom experiences imposes a dual physical and psychological burden on patients. Lack of awareness of dysarthria and inadequate emotional support may lead to very different coping styles and a desire for professional ongoing voice management.

Conclusion: This study helps to elucidate the current status of dysarthria faced by patients undergoing radiotherapy for NPC and provides multiple dimensions of dysarthria assessment and management goals for quantitative research. We call attention to the need for healthcare professionals to pay attention to patients' perspectives and related needs and to develop targeted management strategies that match patients' needs, and we emphasize the importance of continuity of care to effectively improve dysarthria-related symptoms.

Keywords: nasopharyngeal carcinoma, radiotherapy, dysarthria, syndrome, qualitative research

Introduction

Nasopharyngeal carcinoma (NPC) is a common malignant tumor of the head and neck, and the 2020 global cancer epidemiology data show that the annual incidence and mortality rates of NPC in China are 3.00 and 1.60 per 100,000 people, respectively, accounting for 46.9% of the world's new cases and 43.0% of the world's deaths, which is one of the regions with high incidence of NPC worldwide.¹ NPC treatment focuses on radiotherapy with adjuvant chemotherapy and surgery as needed.² Currently, radiotherapy for NPC patients is mostly based on Intensity-modulated Radiotherapy Technique (IMRT), which uses a linear gas pedal for radical radiotherapy to the nasopharynx and neck.³

One of the problems with radiotherapy is the damage that reaches healthy organs near the tumor.⁴ Vital organs such as the pharynx and mouth are also exposed to high radiation doses in the radiation field of view,⁵ and thus may cause



considerable functional changes, such as voice and dysarthria. Patients often complain of changes in their voice, including decreased voice loudness, low modal speaking pitch, decreased voice breathing support, roughness of voice, hoarseness of breathing voice, and voice fatigue.⁶ Radiotherapy leads to atrophy and fibrosis of muscles related to vocalization, such as laryngeal muscles and tongue muscles.⁷ Additionally, radiation may cause peripheral neuropathy, such as sublingual neuropathy and cervical bulbous neuropathy. All of these factors are closely associated with the development of dysarthria. Dysarthria refers to neurological or muscular lesions related to articulation, incoordination of articulatory organ movement. Although, numerous studies have shown that patients treated with radiotherapy for nasopharyngeal carcinoma may develop dysarthria, the exact incidence and severity have not been clarified. The results of a prospective study showed a significant deterioration in sound outcomes from pre-treatment to early post-treatment (mean 16.5 weeks) in advanced non-laryngeal head and neck cancer (HNC) treated with simultaneous radiotherapy.⁸ Difficulties in speaking and involuntary movements of the tongue muscles have even been found to occur about 12 years after head and neck radiotherapy, adversely affecting patients.⁹

Voice is the tool that best expresses our feelings, thoughts, and identity, it is a very important link to normal human life and social activities. Research conducted in the broader speech therapy literature has recognized that changes in speech characteristics due to dysarthria may increase the risk of patients developing anxiety, depression,¹⁰ significantly reduced communication with others and social contact, resulting in social dysfunction and ability to function in daily life, and even affect patients' confidence in returning to work and society, further aggravating the burden on society. As we know, there are many shared organs in the swallowing and speech processes, and in the case of dysarthria, the patient may suffer from dysphagia, swallowing disorder, etc., which seriously affects the patient's physical and mental health. In conclusion, dysarthria after NPC radiotherapy directly or indirectly affects patients' speech-related quality of life.

As mentioned in the authoritative evidence, the assessment and intervention of speech function is an important aspect in patients undergoing radiotherapy for NPC.^{2,11} However, much of the current research has focused on laryngeal tumors, and studies on speech outcomes in non-laryngeal HNC are rare, especially in NPC cases,¹² and have focused on subjective and objective measures and physical aspects,⁵ lacking focus on individual patient experience. Knowledge of their dysarthria experience remains very limited. Thus, understanding patient true feeling and needs for dysarthria holds significant implication for formulating a comprehensive rehabilitation management program after radiation therapy.

Materials and Methods

Study Design

We utilized a qualitative descriptive design based on a naturalistic inquiry to delineate experiences of dysarthria-related symptoms in patients with NPC undergoing radiotherapy. Semi-structured interviews and open-ended questions are used to explore care-related phenomena of participants. The Standards for Consolidated criteria for reporting qualitative research (COREQ) checklist serves as a guide for the research. The participants were selected to be as diverse as possible to achieve a complete and rich description of the patient's experience of dysarthria symptoms.

Participants

From May to August 2024, a purposive sample was used to recruit participants from patients with NPC admitted to the Department of Otorhinolaryngology Head and Neck Surgery, Chongqing General Hospital and Radiation Oncology Center, Chongqing University Cancer Hospital, China. Recruitment criteria: (i) at least 18 years; (ii) Pathologic diagnosis of nasopharyngeal carcinoma with ongoing radiation therapy; (iii) Dysarthria was experienced during radiotherapy (a score of <27 on the modified Frenchay Dysarthria Assessment (m-FDA) scale; (iv) Stable condition and cooperated with the interview process. Exclusion criteria: (i) previous organic diseases of the pharynx and other organs of articulation affecting speech function; (ii) combined with other cancers; (iii) combined with cognitive disorders. The participants were selected to be as diverse as possible to achieve a complete and rich description of the patient's experiences and needs with dysarthria.

Data Collection

Semi-structured interviews last 23 to 35 min. The interviews took place in a quiet room in the hospital where the participants felt comfortable and their privacy was respected. All interviews were audio-recorded and conducted by the first author (Li Fan), who had received comprehensive training in qualitative research methodology. Simultaneously, a paper notebook was utilized to document important details during the interview process by the other author (Tang Li) (such as the patient's tone, expression, and the interviewer's thoughts about the current situations). An interview outline was developed to assist in face-to-face interviews ([S1 in the Supplementary Material](#), according to the literature review and research members to discuss the draft). The process was recorded with the informed consent of the participants, and the audio files were transcribed verbatim into text documents within 24 hours post-interview.

Data Analysis

The data analysis began as soon as the first patient's interview text was obtained and was then carried out in tandem with data collection in an ongoing comparison and iterative process. Thematic saturation was achieved at thirty-three interviews with no, and repeat interviews were not conducted. Two researchers (Li Fan and Xiong Lingling) conducted independent coding and extracting using Braun and Clarke's six-step thematic analysis framework ([S2 in the Supplementary Material](#)). NVivo 14 (a qualitative data analysis software) was employed to facilitate data analysis. To illustrate the formation of themes from codes, we used RAWGraphs, an online platform (<https://www.rawgraphs.io/>) that provides a free and open-source tool for data visualization, to craft the alluvial diagram.

Rigor

Initially, COREQR checklist contributes to enhancing transparency and maintaining an audit trail of the qualitative study process. Each interview was given sufficient time, and the transcribed text was separately checked by two experienced researchers (Li Fan and Xiong Lingling) to ensure the text's authenticity. The findings were rechecked with the participants. Concurrently, data collection and iterative analysis also served as a verification method for trustworthiness in this study. Coding was performed independently by two researchers (Li Fan and Xiong Lingling), and discrepancies were resolved by discussion with a third researcher (Zhou Shitong, who is an expert in dysarthria). As all participants were conversing in Chinese, after forming the final English version of the theme description, a bilingual researcher (LF, who is studying for a PhD, studied at Brigham and Women's Hospital in the United States) validated the accuracy of the translated text. Lastly, the entire work process was supervised by another researcher (Shi Qiuling), not directly engaged in the analysis of results.

Ethical Considerations

This study was approved by the ethics committee of Chongqing General Hospital, Chongqing University (Approval Number: KY S2023-087-01) and Chongqing University Cancer Hospital (Approval Number: CZLS2024120-A). All Participants gave their informed consent before the interview.

Results

A total of 33 patients diagnosed with nasopharyngeal carcinoma (NPC) were recruited, with an average interview duration of 29 minutes, ranging from 23 to 35 minutes. The demographic data and disease - related characteristics of the patients are presented in [Table 1](#).

Table 1 Characteristics of Study Participants (n=33)

Characteristic	n	%
Age, years		
30-49	13	39.39
50-69	16	48.49
≥70	4	12.12

(Continued)

Table I (Continued).

Characteristic	n	%
Gender		
Male	31	93.94
Female	2	6.06
Marital status		
Married	30	90.91
Unmarried	0	0.00
Divorced/widowed	3	9.09
Education		
Primary school or below	13	39.39
Junior high school	12	36.36
High school or technical secondary school	5	15.15
College or above	3	9.09
Occupations		
Staff member	6	18.18
Self-employed or tradesman	5	15.15
Workers	1	3.03
Farmer	6	18.18
Retirement	6	18.18
Others	9	27.28
Payment		
Employee health insurance	14	42.42
Medical insurance for residents	18	54.55
Others	1	3.03
Place of residence		
Towns and cities	15	45.45
Rural areas	18	54.55
Time of diagnosis, months		
0-3	14	42.42
3-6	11	33.34
6-24	3	9.09
≥24	5	15.15
Stage of disease		
≤II	11	33.34
III	12	36.36
IV	10	30.30
Treatment options		
Radiation therapy	6	18.18
Radiotherapy plus chemotherapy	27	81.82
Dose of radiotherapy, times		
0-10	7	21.21
11-20	4	12.12
21-30	7	21.21
≥31	15	45.45

Table 2 Three Major Themes and ten Sub-Themes

Themes	Sub-Themes
Perception and impact of dysarthria related symptoms	Perception of voice change Diverse experience of related symptom clusters Different trajectory characteristics of dysarthria Adverse effects caused by dysarthria
Coping styles for dysarthria	Positive coping style Negative coping style
Unmet needs for dysarthria	Lack of dysarthria-related knowledge Insufficient support from medical staff and family members Diversified intervention measures Continuation of dysarthria management

Four primary themes and twelve sub-themes were identified, as illustrated in [Table 2 \(S3 in Supplementary Material\)](#) provides more in-depth details). A thematic map was employed to showcase their interrelationships ([Figure 1](#)), and the process from code generation to theme establishment was depicted through an alluvial diagram ([Figure 2](#)).

Perception and Impact of Dysarthria Related Symptoms

Participants reported varying degrees and types of voice changes after radiotherapy, and perceived a variety of related symptoms, resulting in adverse effects.

Perception of Voice Change

The symptoms of voice changes after radiotherapy are diverse. Some patients experience vocal fatigue after radiotherapy (11, 33.33%), their voices became hoarse (8, 24.24%), their tongue mobility decreased (6, 18.18%), their voice clarity was reduced (2, 6.06%), their speech slowed down (2, 6.06%), and uncomfortable vibration of the vocal cords during vocalization (1, 3.03%), and some other participants felt that their speaking voice did not change (11, 33.33%). The overall level of dysarthria was low ([Figure 3](#)).

Recently, after the radiotherapy, my voice has become a bit hoarse, a bit rough, not as smooth and rounded as before. (P1)

Now when I talk, my tongue feels different from before. It's all tense, especially at the back, and sometimes it even hurts. When I speak, it feels like my tongue isn't moving smoothly, which makes my speech sound all muffled and unclear. (P2)

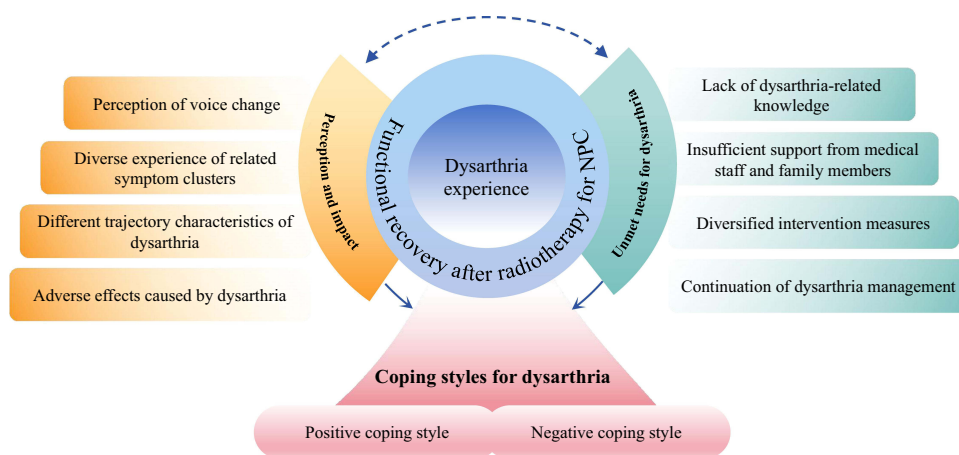


Figure 1 Thematic map of symptoms related to dysarthria experience in patients with NPC undergoing radiotherapy.

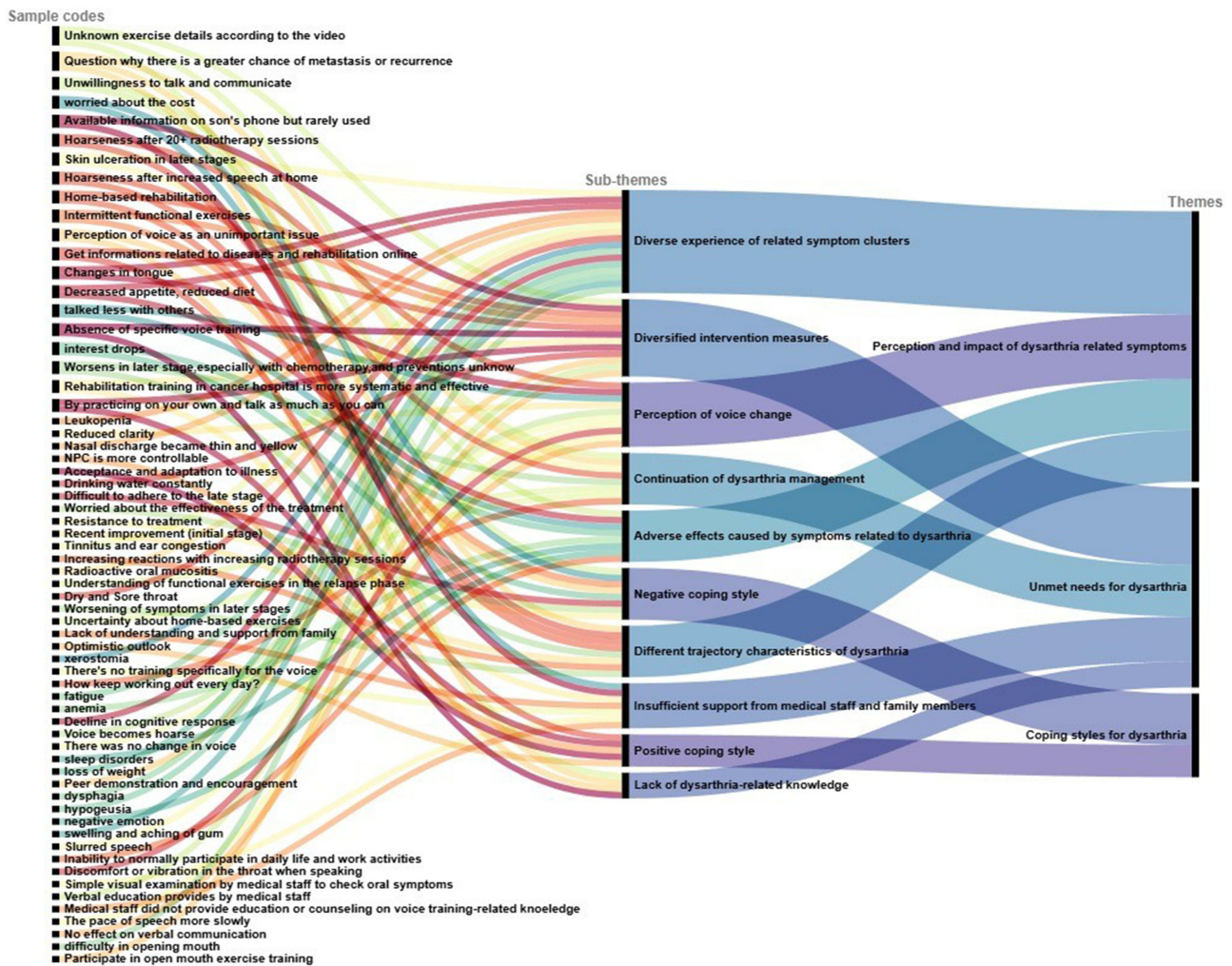


Figure 2 Alluvial diagram of sample codes and their subordination to each theme.

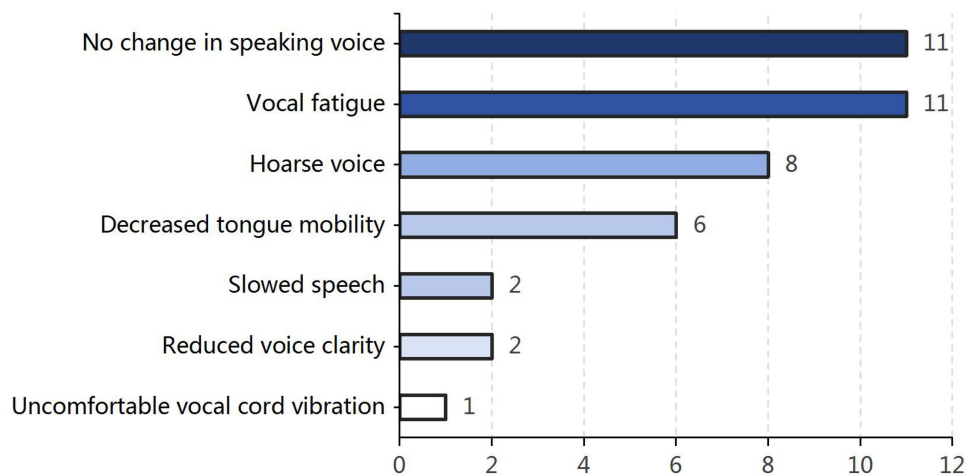


Figure 3 The perception of voice change.

...and sometimes it feels like my nose is stuffed up, making my voice sound muffled too, like I'm talking inside a can or something. Others might find it hard to hear me clearly. (P13)

Oh, I've only gone through a few (radiation treatments) so far, and my voice hasn't changed too much. It doesn't really affect my communication with others. Plus, I speak slowly, sometimes I can't think of words as quickly as before, so I don't talk as much as I used to. I don't really feel like talking much either. (P22)

Diverse Experience of Related Symptom Clusters

The normal process of sound formation requires the vibration of the vocal cords, the cooperation of the respiratory system, and the precise and coordinated movement of the organs of sound formation in the oral, nasal, and pharyngeal cavities, as well as the regulation of nerves and muscles. Dysarthria may arise if any of these components encounter dysfunction. In this study, a majority of participants (30, 90.91%) reported experiencing diverse symptoms related to articulation following radiotherapy, collectively termed as a “dysarthria-related symptom cluster”.

The oropharynx is the most crucial organ for articulation. All participants (33, 100%) mentioned a high number of oropharyngeal symptoms after radiotherapy, especially oropharyngeal dryness (33, 100%), oropharyngeal pain (19, 57.58%), loss of taste (11, 33.33%), dysphagia (9, 27.27%), mouth ulcers (7, 21.21%), difficulty in opening the mouth (3, 9.09%), as well as some patients mentioned trouble eating and loss of appetite (16, 48.48%), tinnitus and ear stuffiness (9, 27.27%) (Figure 4).

Well, my mouth is really dry, my throat hurts, and I've got these painful ulcers. Swallowing is a real struggle, and I have no appetite for food. I can only manage to drink some liquids. There's no taste in my mouth, and I feel like I've lost a lot of weight. (P1)

My throat is so dry. I really don't feel like talking. It hurts whenever I do, and my voice gets hoarse. Singing is out of the question, not even in my dreams (with a sigh) ...I'm hungry and exhausted, and I can't catch my breath. Especially at night, my mouth gets dry as a bone, and I have to keep drinking water every now and then. I can't even sleep well. It's really annoying. (P7)

My ears feel plugged up, kind of muffled, and my mouth won't open properly. I have to tilt my head and stuff food in from the side. I can't speak clearly, and I can't hear others very well too. (P17)

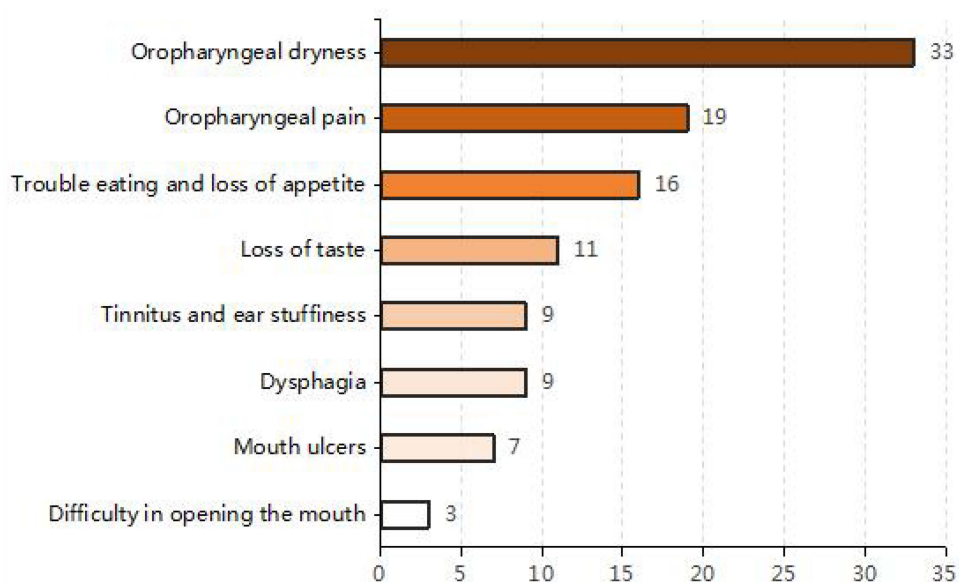


Figure 4 Diverse experience of related symptom clusters.

Different Trajectory Characteristics of Dysarthria

Some patients (8, 24.24%) mentioned that the symptoms associated with dysarthria changed over time, varying in the time of symptom onset as well as in the type of symptoms, presenting different developmental trajectories.

As the number of radiotherapy treatments increased, the patient's symptoms became more complex. At the very beginning, my voice remained unchanged, just like usual. It wasn't until after undergoing radiotherapy more than twenty times that my voice started to become hoarse. During the last couple of radiotherapy sessions, the skin on my neck broke, but resting for a week or two, it gradually healed. (P3)

Symptoms may also fluctuate and be unpredictable.

Hmm, things have been a bit better lately (after five rounds of radiotherapy). A few days ago, it was more frustrating. I noticed the patient in the next bed is in a really tough situation. He started radiotherapy before me and has had a lot of reactions. Could I end up like that too in the future? (P4)

Two participants (2, 6.06%) mentioned that their voices became hoarse during recuperation at home.

...Now, the radiotherapy is nearly wrapping up, and experiencing a lot of symptoms. While at home resting, talked too much and voice got really hoarse. I'm not sure if it's related to the radiotherapy. (P8, P32)

Adverse Effects Caused by Dysarthria

Eleven participants (11, 33.33%) perceived that voice changes alone, which do not affect communication, do not result in serious adverse consequences. However, after radiotherapy, dysarthria often does not occur in isolation, but in the form of a cluster of symptoms. More than half of the participants (19, 57.58%), in some instances, these responses are bidirectional with dysarthria-related symptoms. These dysarthria-related symptoms may lead to other physical or psychological adverse reactions, and these negative effects may exacerbate the symptoms, ultimately creating a vicious cycle.

Currently, I am experiencing difficulty in opening my mouth, necessitating the use of a mouth opener. Alas, both physicians and nurses consistently advise me to engage in oral exercises, yet any slight movement of my mouth elicits pain, which in turn diminishes my willingness to speak. This has created a vicious cycle, where my oral function progressively declines and speaking becomes increasingly arduous. (P32)

Some participants mentioned that dysarthria-related symptoms are also one of the leading causes of systemic symptoms, such as loss of body weight (6, 18.18%), sleep disturbance (3, 9.09%), and fatigue (3, 9.09%), and so on.

...My mouth has been experiencing numerous issues lately. Unfortunately, I could eat only a liquid diet, resulting in a weight drop from over 160 pounds to just 130 pounds. During my last follow-up appointment, the doctor mentioned that I'm also anemic. Additionally, whenever I lie down at night, my throat feels dry and painful, making it hard to sleep properly. Sometimes, I need to keep a candy in my mouth to alleviate the discomfort. (P9)

I'm currently on radiation therapy, and also undergoing my third round of chemotherapy at the same time. The symptoms are just getting worse and worse. My white blood cell count has dropped to 1.6 ($1.6 \times 10^9/L$), and all I want to do is lie down all day, I don't feel like moving at all. (P17)

Ten participants (10, 30.30%) said they felt overwhelmed by the physical burden, which may further increase their psychological burden. It also increases the obstacles to their reintegration into daily life, encompassing family affairs, social activities and employment, thereby diminishing the overall quality of life.

In some instances, I find myself articulating with difficulty, resulting in my family members being unable to comprehend my words, which frustrates me considerably. Yet, there is little I can do to alleviate this situation. Observing their relentless efforts on my behalf further exacerbates my feelings of depression. (sigh) (P13)

Once, I was chatting with a patient, and I felt embarrassed because I was having a hard time pronouncing some of the words, which were quite funny. Moreover, sometimes when I hear my own voice, I feel irritated for no reason, which makes me even more upset, and slowly I don't want to talk more. (P19)

Actually, I am not that afraid of voice changing, but it's just that my health issues are piling up, and I can't really continue with my work anymore. I'm uncertain about whether the radiotherapy is effective or not? I've spent so much money, and I'm afraid that in the end, I might end up with neither my money nor my health. Whenever I think about these things, I feel deeply distressed. (P26)

Coping Styles for Dysarthria

When dysarthria occurs, the patients generally exhibited positive and negative attitudes toward coping. Positively coping with dysarthria-related symptoms can lead to effective self-management and seeking help, accelerating recovery. Conversely, a negative attitude may require additional support for effective coping.

Positive Coping Style

Nine participants (9, 27.27%) tended to cope with dysarthria with a positive attitude. They actively cooperate with the treatment and insist on rehabilitation exercises, as well as try to acquire relevant knowledge through various channels.

I'm already in my seventies, having experienced so many things in life. I've become indifferent to most things, and cancer is nothing to fear. Furthermore, the issue with my voice is not that serious. (P10)

Every afternoon, I participate in rehabilitation exercises, and I've also found some videos online to follow for voice training. Compared to major cancers such as liver cancer and lung cancer, nasopharyngeal cancer is relatively manageable. I still look forward to singing with my friends and exploring the broader world. (P22)

Negative Coping Style

However, the majority of participants (24, 72.73%) held a slightly pessimistic attitude, believing that dysarthria is a common side effect of radiotherapy and that voice problems were not a priority, thus choosing to ignore or tolerate as much as possible.

The change in my speaking voice is just as it is, since my life is almost at its end, why should I care about that? I rarely engage in oral exercises, as they don't seem to be useful, and tend to endure the situation rather than actively address it. (P21)

Alternatively, they may exhibit a tendency towards resistance to functional training pertinent to dysarthria.

What's the point of all this treatment? I think it's just a waste of money. But I can't help it, they (my family) keep urging me to go for voice rehabilitation, so I reluctantly go! (P20)

Unmet Needs for Dysarthria

Dysarthria is a possible adverse effect of radiotherapy in patients with NPC, yet it is often overlooked in clinical practice. And there are unmet needs for patients regarding knowledge about dysarthria, more support from medical staff and family members, individualized dysarthria intervention measures, and continuous voice function management.

Lack of Dysarthria-Related Knowledge

Dysarthria-related knowledge deficiency was a common issue among most participants (24, 72.73%), manifested in conceptual understanding of dysarthria, influencing factors, adverse effects and rehabilitation exercises.

Prior to radiation therapy, the doctor explained a range of potential side effects to us. I recall him mentioning something called dysarthria, but I was completely confused about what it specifically entailed and had no clear understanding of it. (P23)

My voice has become hoarse. At first, I thought I had a cold, but it never got better. How can radiation therapy affect my speaking voice? I really don't know if my throat will ever go back to its original state after radiation therapy is finished. (P31)

Does (dysarthria) have any effect on my recovery from the disease? I did the oral exercises that my doctor said I needed to do and I followed them, but they don't seem to have much effect. What should I be looking for in my life? (P16)

Insufficient Support from Medical Staff and Family Members

The support of healthcare professionals and family caregivers plays an important role in the treatment of illness and recovery.

Nevertheless, more than one-third of participants (11, 33.33%) felt that the support provided by healthcare professionals was insufficient, mainly in terms of lack of voice-specific knowledge education and did not pay enough attention to dysarthria.

The doctors and nurses would check my mouth and skin every morning during their rounds, but there was no special attention paid to that aspect of my voice. (P22)

The doctors didn't educate me on the knowledge related to my voice, probably because they were too busy and might have thought it wasn't very important. So, I haven't done any exercises to train my voice. (P33)

Family members, as the patient's closest social support network, provide indispensable emotional comfort. However, some participants (7, 21.21%) reported that family members similarly lacked knowledge and communicated insufficiently with each other to provide effective emotional support.

My daughter, who also works at the hospital, gave me some precautions to take, such as mouth ulcer prevention, and medication use and so on, but voice function rehab was not mentioned to me. (P8)

We rarely talk about this, and I usually don't tell them if I'm uncomfortable, and they don't ask me specifically. (Wife) just tells me to hang on, thinking that these symptoms of voice are normal after radiation therapy, and that she actually doesn't know what to do, so why add to her worries. (P21)

Diversified Intervention Measures

Most of the participants (26, 78.79%) expressed the need for more diversified and individualized management of dysarthria related symptoms. In a subset of participants (13, 39.39%), there existed uncertainties regarding the specifics of voice rehabilitation training, and were not fully satisfied with their consistently effective.

The nurses uniformly arranged for us (patients of NPC) to go to the treatment room on the third floor to do rehabilitation exercise training every week, and some patients said it was effective, but I felt that it was not very effective, so I didn't go to attend it later. (P11)

In the past, when I was hospitalized in the Cancer Hospital, they arranged some systematic rehabilitation training for me, such as opening my mouth and so on, and the result was quite good. But after I came here, the training was not so systematic, and I mostly practiced on my own. That's it, there are some little details I forgot. (P17)

I've heard that there are specialized voice therapists helping people with laryngeal cancer, and even though my voice doesn't interfere with my usual communication at the moment. I'd like to have specialized training in phonation so that it can help me to prevent and recover more quickly. (P22)

Four participants (4, 12.12%) mentioned that they would like to access to reliable channels of implementing voice training programs.

We have a (WeChat) group, and the doctor sometimes sends videos to it, so we follow and learn. The group also has partners who are doing treatment together, so we can cheer each other up and guide each other if we have any problems. (P1)

I did some searching online and there are some short videos on TikTok, but I'm not sure if these are reliable or not. (P9)

Continuation of Dysarthria Management

All participants (33, 100%) expressed an expectation of continuous symptoms management throughout the peri-radiotherapy period.

I'm going to have many times of radiotherapy, and I'm sure I'll have more and more problems with my body afterward, so there should be different treatments and responses at each stage of the process. (P4)

Four participants (4, 12.12%) were particularly hoped that receiving authoritative guidance from medical personnel during the period between radiotherapy treatments as well as during the post-radiotherapy rehabilitation phase at home.

When I got home, I wasn't sure if the functional exercises were correct, such as what the different vocalizations should look like, and it would be great to have a professional healthcare provider to keep in contact with regularly. (P29)

Four participants (4, 12.12%) expressed a desire for ongoing supervision to improve adherence to rehabilitation exercises.

I had a relapse this time, and I knew in my heart that those functional exercises were important, and I still had the videos on my phone. I was lazy when I got home, no one was supervising me, and slowly I didn't keep doing them. (P28)

Discussion

We discerned a thematic framework for the experience of dysarthria-related symptoms among patients undergoing radiotherapy for nasopharyngeal carcinoma (NPC), encompassing three themes: Perception and impact of dysarthria-related symptoms, Coping strategies for dysarthria, and Unmet requirements for dysarthria. As the survival rate of NPC patients treated with radiotherapy gradually rises, enhancing their quality of life has emerged as a highly concerning topic.¹³ The symptom burden is a crucial factor influencing patients' quality of life, and the significance of dysarthria as a component thereof should not be underestimated. This study delves into the experience of dysarthria-related symptoms in NPC patients undergoing radiotherapy, offering a wealth of patients' perspectives to comprehend this intricate and multi-dimensional phenomenon. It fills a void in the existing literature and represents one of the primary contributions of this study.

Thus, after radiotherapy for nasopharyngeal cancer (NPC) is not just about but accompanied other oropharyngeal symptoms, consistent with this study's findings.¹⁴ So, when and managing dysarthria, we should consider the patient's overall oropharyngeal health holistically, which is crucial for clinical providers.¹⁵ The study results show that dysarthria-related symptoms change dynamically over time, with different trajectories of progressive exacerbation or fluctuation. Previous studies found that during NPC radiotherapy, most symptoms appear in the second to third week, worsen with increasing treatment dose, and are most severe in the fifth to sixth week.^{16,17} That's why the recruited subjects were at different radiotherapy phases. One study noted that voice changes and unpredictability after radiation were common patient complaints.¹⁸ More studies are needed to explore the dysarthria NPC patients at different radiotherapy stages and its correlation with other symptoms. Incorporating time trajectories into symptom assessment and management may be a more scientific and effective care strategy. Dynamic symptom management (DSM) model has potential in managing dysarthria-related symptom clusters in NPC radiotherapy patients. Moreover, the complex perception of dysarthria-related symptoms causes physiological harm, increases psychological burden, and leads to role conflicts. This means that while focusing on dysarthria, we also need to assess and intervene in the additional burdens it brings to promote the holistic recovery of patients' "physical-psychological-social" attributes.

Coping style is a crucial concept in the symptom management of cancer patients. Coping style refers to the efforts made by individuals in terms of cognition and behavior to alleviate their own stress when they are in a stressful situation, including a positive tendency and a negative tendency, including a positive tendency and a negative tendency.¹⁹ High levels of positivity may give patients more expectations and confidence in coping with adverse challenges.^{20,21} In this study, a small number of patients adopted positive coping styles when symptoms related to dysarthria appeared, including actively cooperating with treatment and rehabilitation training, acquiring relevant knowledge. However, we found that the majority of participants had negative attitudes, ignored or succumbed in the face of dysarthria, consistent with previous findings in radiotherapy patients with NPC overall. This may be due to a number of reasons. On the one hand, patients perceive dysarthria to be less severe compared to other symptoms, and on the other hand, it may be related to the lack of knowledge about the subject and the insignificant effect of the intervention mentioned in this study. In addition, under the influence of traditional Chinese concepts, people are "colorful when talking about cancer", and some patients are unable to frankly face and discuss the changes in their own conditions, and have a negative attitude towards treatment.²² Negative coping styles can impair the management of dysarthria. Research confirms that if patients neglect or fail to rehabilitate their speech function, timely detection of other more serious symptoms may be delayed, exacerbating the impact of related symptoms and reducing patients' quality of life.¹⁵ Therefore, when formulating a dysarthria

management plan, medical staff should fully assess the coping styles of patients and strive to promote positive, constructive actions, and problem-oriented coping strategies.

This study shows that patients undergoing radiotherapy for NPC generally lack knowledge about dysarthria and expect health education. Participants noted that it is possible that the lack of attention to the quality of speech and language by healthcare professionals has led to a reduction in the chances of patients receiving relevant knowledge. The formation of a multidisciplinary team (MDT) is essential in order to provide higher-quality dysarthria education, with speech-language pathologists (SLPs) playing a key role in this MDT to provide skilled assessment and treatment for speech, voice, and swallowing disorders. Meanwhile, it is recommended that clinicians provide appropriate and timely training and support to nursing staff in the team.¹⁵ This study also pointed out that the emotional support provided by healthcare professionals and family members was insufficient. Therefore, on the one hand, it is important to train not only professional voice rehabilitators, but also to focus on their communication and empathy skills. On the other hand, it is an important decision to include families in the rehabilitation process and to check their attitudes and ideas.^{23,24} In our study, patients wanted to receive a more diverse range of measures. They mentioned live demonstrations, videos, manuals, and other modalities that could be integrated in clinical practice to meet their dysarthria-related needs. Numerous studies have shown that voice rehabilitation training is considered to be positive and one of the most important means of rehabilitating voice function after radiotherapy compared to pharmacological treatment.²⁵ However, most of the participants in this study had poor adherence to rehabilitation training, and how to improve patient adherence became a key issue. Zhou proposed integrated theory of health behavior change (ITHBC), which promotes health behavior change by developing patients' knowledge and beliefs, improving self-regulation skills and competencies, and enhancing social facilitation. The feasibility of ITHBC in improving adherence to rehabilitation exercises provides a new idea for the study of voice rehabilitation training adherence in NPC patients.²⁶ We also found that there is an urgent need for patients to be managed for dysarthria according to the professional continuity of the medical staff during the interval between radiotherapy treatments and during home rehabilitation. With the rapid development of Internet technology in the field of medicine, remote voice rehabilitation management solutions based on digital therapy are expected to become better actions.²⁷ Our research center is constructing an information-based model of continuity of care for voice correction, which provides an innovative approach to the assessment, treatment, and management of dysarthria by implementing an integrated, online and offline system of pre-hospital, in-hospital, and out-of-hospital management for patients throughout the entire cycle. In the future, diverse interventions and a high level of evidence should be integrated in the provision of dysarthria management for patients undergoing radiotherapy for nasopharyngeal carcinoma in order to meet their needs and improve their quality of life and experience of medical care.²⁸

Limitations

First, although we used maximum variance sampling to recruit patients to mitigate a potential lack of data richness, our results should be treated with caution when extrapolating because our participants were from two centers. Second, we focused on the experience of patients with NPC with symptoms related to dysarthria after radiotherapy. However, the presence or absence of surgery, chemotherapy, immunotherapy, or targeted therapies are factors that may also burden patients with dysarthria. Future studies could consider additional factors to create a more comprehensive framework of dysarthria-related complex relationships. Another limitation may be that the interviews occurred at a single point in time, so we did not explore intra-individual changes in experience over time. Additionally, most participants described their experiences as recollective, which may have led to recall bias in the data. In upcoming research, we intend to triangulate a combination of quantitative and qualitative data to gain deeper insights and mitigate recall bias through multiple return interviews over time. Finally, participant reluctance to disclose all opinions may have influenced findings.

Conclusions

This study elucidates the multifaceted nature of dysarthria-related symptom experiences among patients with NPC undergoing radiotherapy, alongside their coping strategies and currently unaddressed management needs. Patients with NPC frequently exhibit articulation disorders post-radiotherapy, often concomitant with other oropharyngeal symptoms. These symptoms demonstrate a dynamic trajectory, imposing a dual impact on patients' physical and psychological well-

being. Patient coping strategies manifest as adaptive or maladaptive; the former facilitates recovery, whereas the latter, characterized by neglect or tolerance, contributes to suboptimal symptom management. Patients demonstrate limited awareness regarding articulation disorders and consistently report requiring personalized intervention strategies and sustained support for speech function management. Healthcare professionals should prioritize the holistic needs of these patients, formulating individualized management plans through multidisciplinary collaboration. These findings hold significant implications for developing individualized dysarthria management protocols and improving care quality.

Data Sharing Statement

The dataset generated and analyzed in this study are not publicly available due to the sensitive nature of the answers from the informants. Please contact the corresponding author for requests of data from this study.

Ethics Approval and Consent to Participate

Our study complies with the Declaration of Helsinki. The study was approved by the Chongqing General Hospital, Chongqing University Ethical Review Authority (Approval Number: KY S2023-087-01) and Chongqing University Cancer Hospital Ethical Review Authority (Approval Number: CZLS2024120-A). All methods were performed in accordance with the relevant guidelines and regulations. All participants reviewed the written informed consent included provisions for the publication of anonymized responses and direct quotes, and signed the form prior to the commencement of the study.

Consent to Participate

All study participants provided written informed consent.

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Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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Disclosure

The authors have declared no conflicts of interest in this work.

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