

Review

A scoping review of high-flow nasal cannula therapy in advanced cancer: implications for quality of life, psychological well-being, and family-centered decision-making

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Abstract: High-flow nasal cannula (HFNC) oxygen therapy has received increasing attention as a noninvasive respiratory support modality for patients with advanced cancer. This scoping review examines the clinical application of HFNC in advanced cancer complicated by respiratory failure, with a focus on its potential contributions to symptom relief, quality of life (QoL), psychological well-being, and family-centered decision-making. By synthesizing current clinical evidence, this scoping review suggests that HFNC may reduce dyspnea while helping preserve patients' ability to communicate and maintain oral intake during the terminal phase, thereby supporting overall QoL. Compared with other respiratory support modalities, such as noninvasive ventilation (NIV), HFNC may offer advantages in tolerability, comfort, and psychological acceptability. However, challenges remain, including ethical dilemmas, resource allocation, and decisions regarding treatment withdrawal. Overall, HFNC may have a supportive role in end-of-life care and advance care planning by supporting patient autonomy and shared decision-making among patients, families, and healthcare professionals.

Keywords: high-flow nasal cannula, neoplasms, respiratory failure, palliative care, quality of life, mental health, family-centered care, advance care planning

1. Introduction

Advances in cancer treatment have improved survival for many patients, yet a growing number of those with advanced disease continue to experience serious complications requiring intensive care [1]. Among these, respiratory failure is one of the most frequent and life-threatening complications [1,2]. It can result from airway obstruction, lung metastases, treatment-related toxicities—such as chemotherapy-induced pneumonitis or cytokine release syndrome from chimeric antigen receptor redirected T-cells (CAR-T) therapy—and infections due to immunosuppression [1–3]. These conditions often lead to hypoxemic or hypercapnic respiratory failure, both associated with poor prognosis [1–3]. Managing respiratory distress in such patients is clinically challenging, especially when invasive interventions like intubation are not aligned with the patient's goals of care, such as in Do-Not-Intubate (DNI) decisions [1,4].

The global cancer burden is increasing at a substantial rate. The number of newly diagnosed cancer cases worldwide has continued to rise [5]. With the growing

population of patients with advanced malignancies, the demand for intensive healthcare services is escalating. Among these patients, the most commonly reported symptoms remain fatigue, cough, and dyspnea [6–10], which significantly increase the risk of developing respiratory failure [1]. High-flow nasal cannula (HFNC) therapy, a noninvasive oxygen delivery method, has emerged as a promising option to reduce dyspnea and improve patient comfort [11–13]. This scoping review aims to summarize the current evidence regarding the use of HFNC in patients with advanced cancer, with a particular focus on its clinical indications, effects on symptom relief and quality of life (QoL), potential implications for psychological well-being and patient experience, and its role in family-centered communication, advance care planning, and end-of-life decision-making. In addition, the scoping review identifies current knowledge gaps and highlights priorities for future research and clinical practice.

2. Methods

This review was conducted in accordance with the Joanna Briggs Institute (JBI) methodology for scoping reviews and followed a review protocol developed a priori [14]. Reporting of the review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews (PRISMA-ScR) guidelines [15]. To enhance the transparency and conceptual organization of the review, the Population–Concept–Context (PCC) framework used to guide the literature search and evidence synthesis is presented in **Table 1**. The framework was used to guide a focused synthesis of literature on the clinical and psychosocial implications of high-flow nasal cannula therapy in patients with advanced cancer. The review was organized around three major domains: quality of life and symptom relief, psychological well-being and patient experience, and family-centered communication and decision-making. In this review, advanced cancer refers to incurable, recurrent, locally advanced, or metastatic malignancies primarily managed with supportive or palliative care [7,16]. Refractory dyspnea is persistent breathlessness despite optimal treatment of reversible causes and standard therapies [17–19]. DNI indicates that invasive mechanical ventilation is not performed, although HFNC or other noninvasive respiratory support may still be used in accordance with the patient’s goals of care [1,4].

Table 1. Population–Concept–Context (PCC) framework used to guide the literature search.

Element	Description
Population (P)	Adult patients with cancer or neoplasms, particularly those with advanced or terminal disease experiencing acute or chronic respiratory failure, hypoxemia, or refractory dyspnea.
Concept (C)	Clinical application of high-flow nasal cannula, with emphasis on quality of life, supportive care, palliative care, psychology, emotional responses, anxiety, patient experience, family and caregiver involvement, communication, and end-of-life care and decision-making.
Context (C)	Hospital, intensive care unit, oncology, supportive care, palliative care, hospice, and end-of-life care settings where HFNC is used for respiratory support in adult patients with cancer or neoplasms.

Search strategies were adapted according to the indexing system, controlled vocabulary, and search syntax of each database. **Table 2** search strategies for PubMed and EBSCOhost are provided below. This search from EBSCOhost included

PsycINFO and CINAHL, as well as other relevant EBSCO databases, thereby broadening the scope of the literature retrieval and improving the comprehensiveness of the review.

Table 2. Detailed search strategies.

Search Topic	Database	Search Strategy	Records Retrieved
I. Quality of Life & HFNC in Advanced Cancer	PubMed	("High-Flow Nasal Cannula" OR HFNC) AND (cancer OR neoplasm) AND ("quality of life" OR "supportive care" OR "palliative care") Filters: free full text, English	14
	EBSCOhost	("High-Flow Nasal Cannula" OR HFNC) AND (cancer OR neoplasm*) AND ("quality of life" OR "supportive care" OR "palliative care") Filters: full text, Peer review	2
II. Psychological Response to HFNC in Advanced Cancer	PubMed	("High-Flow Nasal Cannula" OR HFNC) AND (cancer OR neoplasm) AND (psychology OR emotional OR anxiety OR "patient experience") Filters: free full text, English	5
	EBSCOhost	("High-Flow Nasal Cannula" OR HFNC) AND (cancer OR neoplasm*) AND ("quality of life" OR "supportive care" OR "palliative care") Filters: full text, Peer review	2
III. HFNC in Oncology Family & Communication	PubMed	("High-Flow Nasal Cannula" OR HFNC) AND (cancer OR neoplasm) AND (family OR caregiver OR communication OR "end of life") Filters: free full text, English	10
	EBSCOhost	("High-Flow Nasal Cannula" OR HFNC) AND (cancer* OR neoplasm*) AND (family OR caregiver* OR communication OR "end of life") Filters: full text, Peer review	0

Using the predefined search strategy and keywords described above, a comprehensive literature search was conducted to identify relevant studies published up to July 20, 2026. Only English-language articles were considered for inclusion. Two reviewers (CYT and SJY) independently screened the titles and abstracts of all retrieved records, followed by full-text assessment of potentially eligible studies. Any disagreements during the selection process were resolved through discussion, and a third reviewer (CTA) was consulted when necessary. Studies were excluded if they did not focus on HFNC therapy, were unrelated to cancer or advanced malignancy, or did not address respiratory failure, palliative care, quality of life, psychological well-being, patient experience, family involvement, communication, or end-of-life decision-making. Studies focusing exclusively on non-cancer populations were also excluded. Conference abstracts, editorials, non-English publications, and case reports with limited relevance were excluded. Only studies published in English were included because English is the predominant language of publication in the selected bibliographic databases, and the review team did not have the resources to ensure accurate translation and data extraction from non-English publications. The study

selection process was conducted systematically and transparently in accordance with the PRISMA 2020 framework. A PRISMA flow diagram was used to summarize the identification, screening, eligibility assessment, and inclusion of studies. Furthermore, relevant gray literature was incorporated, where appropriate, to supplement the discussion and provide additional context for interpreting the findings.

3. Search results

A total of 33 records were identified through database searching, including 29 records from PubMed and 4 records from EBSCOhost. After the removal of 10 duplicate records, 23 records remained for title and abstract screening. During the screening process, 15 records were excluded. The remaining eight reports were retrieved and assessed for full-text eligibility. All reports were successfully retrieved, and no studies were excluded after full-text review. Consequently, eight studies met the eligibility criteria and were included in this review. The study selection process is summarized in **Figure 1**.

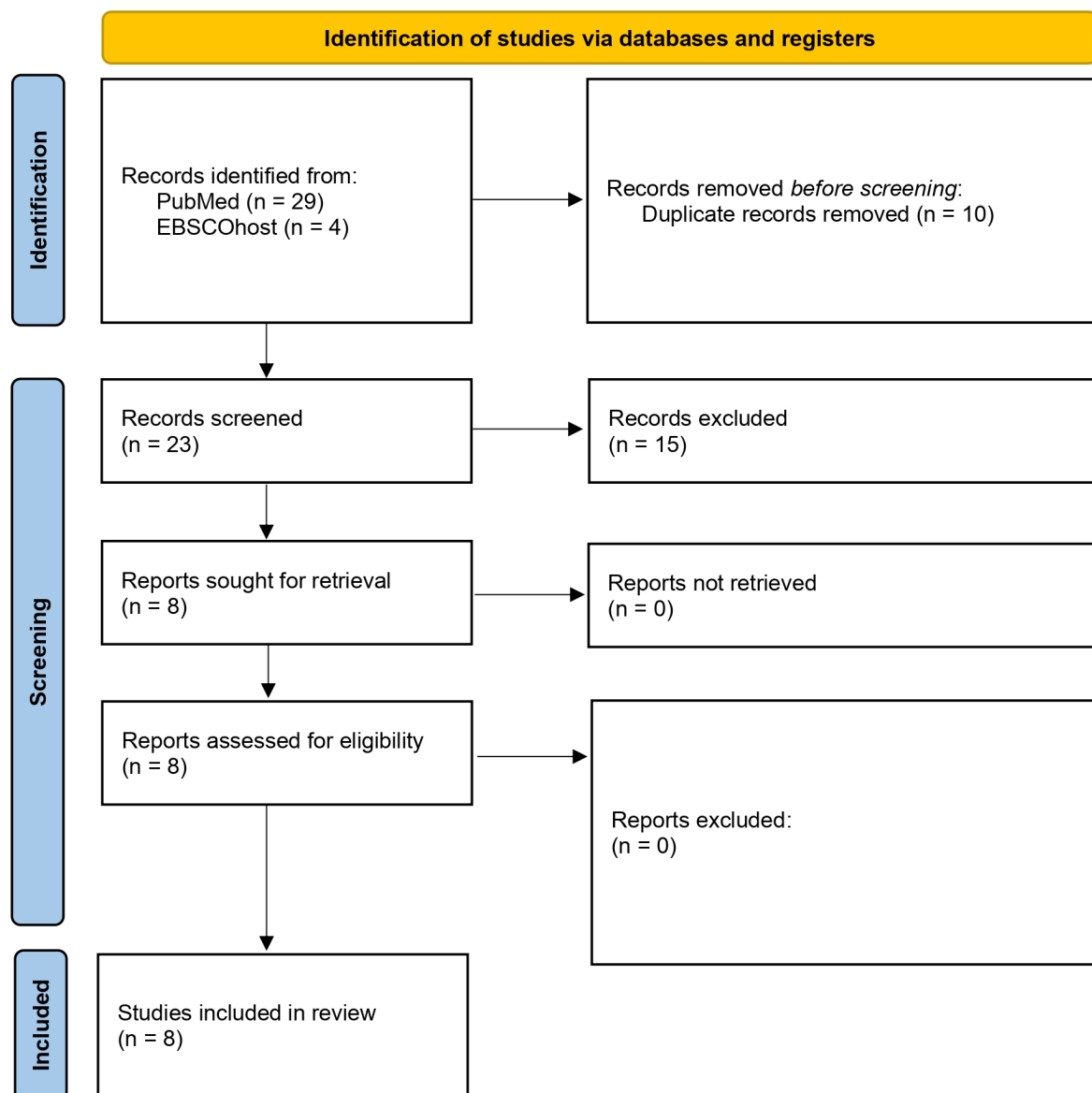


Figure 1. PRISMA 2020 flow diagram showing the identification, screening, eligibility assessment, and inclusion of studies.

The eight included studies were published between 2021 and 2025 and were conducted in the United States (n = 3), Japan (n = 2), China (n = 1), South Korea (n = 1), and Taiwan/Vietnam (n = 1). Study designs included two randomized controlled trials, one pilot randomized controlled trial, one prospective phase II study, three retrospective or observational studies, and one systematic review with network meta-analysis. The study populations primarily comprised patients with advanced cancer, cancer requiring oxygen therapy, or end-stage respiratory diseases, including those with lung cancer or DNI status receiving palliative care. All studies evaluated HFNC therapy, either as the primary intervention or as one of the interventions compared with alternative pharmacological or non-pharmacological approaches. Detailed characteristics of the included studies are presented in **Table 3**.

Table 3. Characteristics of included studies evaluating high-flow nasal cannula therapy in patients with advanced cancer.

First author (Year)	Country	Study design	Population	Intervention	Primary outcomes
Hui (2021)	United States	Pilot RCT	Patients with primary or secondary lung cancer	Cycle ergometry test at 4 different oxygen therapy (including HFNC)	The modified Borg dyspnea intensity scale.
Shibata (2021)	Japan	Retrospective and observational study	Patients with end-stage respiratory diseases (including lung cancer)	HFNC	The usefulness of HFNC as palliative oxygen therapy.
Xu (2022)	China	RCT	Advanced cancer requiring oxygen therapy	HFNC	Dyspnea, oral dryness, and sleep condition.
Bramati (2023)	United States	Retrospective study	Cancer treated with HFNC	HFNC	HFNC liberation rate.
Takase (2023)	Japan	Prospective study (Phase II)	Advanced cancer patients with do-not-intubate status and received HFNC	HFNC	The mean change of modified Borg scale at 24 hours.
Kim (2023)	South Korea	Retrospective study	Patients with cancer and receiving HFNC	HFNC at the end of life	Evaluate HFNC usage in the do-not-intubate setting at the end of life.
Vo (2025)	Taiwan/Vietnam	Systematic review and network meta-analysis	Patients with advanced cancer	Pharmacological and non-pharmacological interventions (including HFNC)	Dyspnea severity
Hui (2025)	United States	RCT	Patients with advanced cancer	Three Time limit trials (including HFNC)	The change in dyspnea intensity between baseline and 24 hours.

Abbreviations: HFNC, high-flow nasal cannula; RCT, randomized controlled trial.

4. Clinical context and rationale for HFNC Use in advanced cancer

As the population of patients with advanced malignancies grows, the demand for intensive healthcare services has escalated. In the United States, approximately 20% of patients admitted to the intensive care unit (ICU) are diagnosed with malignancies [20], and about 10% of all cancer patients require intensive care due to life-threatening complications—most commonly respiratory failure [1]. Respiratory failure, which can be classified into four types, is particularly challenging in oncology due to the interplay of tumor burden, treatment toxicity, comorbidities, and immunosuppression [1–3]. Cancer-related respiratory failure typically manifests as type I (hypoxemic) or type II (hypercapnic) failure, often requiring specialized management strategies [1–3,21]. The pathophysiology behind respiratory compromise in cancer patients is multifactorial, involving pulmonary capillary damage, interstitial lung injury, infections, and even cardiac dysfunction related to malignancy [1–3]. The incidence of respiratory failure varies widely by tumor type, ranging from 5% to 50% [22]. Despite advances in respiratory support—such as the use of HFNC—short-term outcomes have improved, but the financial and emotional costs remain high [1,23].

The growing burden of advanced cancer has profound psychosocial and economic implications. Respiratory failure not only represents a life-threatening complication but also signifies the complex, multidimensional nature of end-stage disease [24–26]. It often necessitates interdisciplinary management, blending oncology, intensive care, and palliative services. Although the World Health Organization has called for the integration of palliative care into national healthcare systems since 2014 [27], real-world implementation remains inconsistent. Barriers include limited resources, cultural perceptions of end-of-life care, and challenges in interprofessional collaboration [25,27]. Palliative care aims to provide holistic, patient-centered support by alleviating symptoms, enhancing QoL, and honoring patient preferences—making it essential for comprehensive cancer care [24]. For patients with advanced malignancies, palliative care should not be confined to terminal stages but integrated throughout the continuum of care, in parallel with active treatment.

From a psychosocial perspective, the combined weight of symptom distress, economic hardship, and uncertainty about prognosis places a heavy burden not only on patients but also on their families. In particular, the challenge of alleviating dyspnea—a common and distressing symptom in advanced cancer—while maintaining comfort and emotional well-being illustrates the intersection of oncology, palliative care, and psychosocial support [1,4]. Given these healthcare burdens and the multifaceted needs of patients with advanced cancer, innovative respiratory support strategies like HFNC deserve closer examination.

HFNC oxygen therapy is a widely used intervention for both acute and chronic respiratory failure, increasingly used across various healthcare settings [4]. HFNC provides a noninvasive method of respiratory support by delivering high-flow oxygen through a nasal cannula, often in addition to or as an alternative to traditional oxygen delivery methods such as simple facemasks and noninvasive ventilation (NIV) [4]. The European Society of Intensive Care Medicine’s 2023 guidelines recommend HFNC over conventional oxygen therapy for non-mechanically ventilated patients to help prevent the need for intubation, especially in conditions like acute respiratory distress syndrome (ARDS), excluding cardiogenic pulmonary edema and acute exacerbations of chronic obstructive pulmonary disease (COPD) [28]. HFNC offers flexible oxygen delivery, ranging from 20 to 70 liters per minute (L/min), with

oxygen concentrations adjustable from 21% to 100%, which can be tailored to patient needs [29]. The mechanism behind HFNC's therapeutic benefits involves several physiological effects, including improvement in ventilation, reduction of work of breathing, and enhanced mucociliary clearance [30–34]. These effects may improve patient comfort and overall outcomes, as illustrated in **Figure 2**. This facilitates longer therapy durations and improves patient compliance with HFNC therapy.

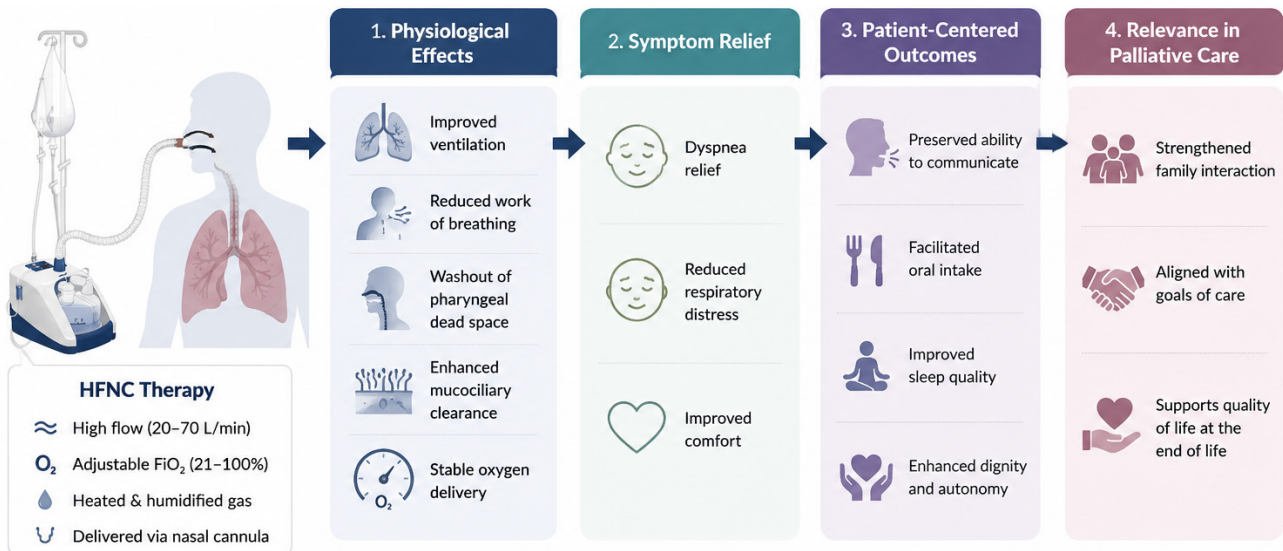


Figure 2. Clinical and potential benefits of hfnc in advanced cancer care.

In practice, HFNC is easy to set up in hospital settings, making it a versatile tool for respiratory care [4,33,34]. It includes components like a flow generator, heated humidifier, and a nasal cannula that can be adjusted based on patient needs, such as flow rate, oxygen concentration, and temperature [4,33]. HFNC therapy provides multiple physiological benefits that enhance respiratory function in patients with respiratory compromise [26,35,36]. As illustrated in **Figure 2**, one of its primary effects is the washout of pharyngeal dead space, which improves alveolar ventilation by reducing carbon dioxide rebreathing. HFNC also lowers nasopharyngeal resistance, thereby decreasing the work of breathing [21,35]. Additionally, the high flow of gas generates a mild level of positive expiratory pressure, promoting alveolar recruitment and better oxygen exchange. The delivery of heated and humidified oxygen not only improves mucociliary clearance but also enhances patient comfort and tolerance [35]. Furthermore, HFNC allows for precise regulation of the fraction of inspired oxygen (FiO_2), ensuring consistent and effective oxygen delivery [35].

5. HFNC, dyspnea relief, and quality of life in advanced cancer

HFNC has become increasingly relevant in advanced cancer care because dyspnea directly affects patients' QoL, comfort, communication, and ability to maintain daily activities. It is estimated that approximately 10% to 70% of patients with advanced cancer experience dyspnea during palliative care [37]. Mild symptoms are often managed with non-pharmacological interventions. These include airflow interventions such as directing a fan toward the face, providing psychological support, and teaching self-management techniques to reduce the sensation of breathlessness [37,38]. More severe dyspnea, particularly when associated with hypoxemia, is commonly treated with conventional oxygen therapy, although its benefit is often limited [37,39,40]. Therefore, the potential benefits of HFNC therapy

become particularly relevant in patients with more severe symptoms. HFNC may be particularly useful in this context because it reduces the work of breathing and can relieve dyspnea [41].

In patients with advanced cancer, dyspnea is often managed with pharmacological treatments [16,42]. Medication-related adverse effects may worsen QoL, especially in patients with frailty, advanced disease, or limited physiological reserve [37,42–47]. As a result, the importance of non-pharmacological interventions—such as oxygen therapy, HFNC, and NIV—is increasingly emphasized in this population [16,48]. NIV also appears to improve dyspnea in palliative care settings; however, potential harms include facial pressure injuries, claustrophobia, and anxiety [48,49]. The risk of harm associated with NIV may be higher than that of HFNC, thus requiring more careful deliberation before implementation [49]. HFNC may offer better tolerability than NIV in selected patients, making it a clinically practical option when comfort and communication are central goals of care.

A growing body of literature has investigated the application of HFNC in patients receiving end-of-life or palliative care [11,48,50–53]. Current evidence indicates that HFNC is effective and well-tolerated for the relief of dyspnea [11,38–40,48,50,51], including improvement in both resting and exertional dyspnea in cancer patients [26,40,50]. Nonetheless, potential biases in study populations and timing of interventions may limit the generalizability of these findings to patients with advanced cancer [53]. A recent prospective study aimed to evaluate the five-day efficacy and tolerability of HFNC for dyspnea in patients with advanced cancer and those receiving palliative care. The study used the modified Borg scale and the numeric rating scale for dyspnea at rest as outcome measures. Results showed a 1.0-point improvement on the modified Borg scale [53], which corresponds to the minimally clinically important difference in chronic pulmonary disease [52]. These findings suggest that HFNC may represent a promising option for relieving dyspnea in selected patients with advanced cancer while highlighting the importance of careful patient selection and goal-oriented application.

Preserving oral intake and communication is central to QoL near the end of life [7,36,39,54]. HFNC facilitates oral intake in patients with terminal respiratory diseases who are under DNI orders. HFNC should therefore be considered not only as an oxygenation device but also as a palliative respiratory support modality that may help preserve QoL, comfort, and dignity in patients with advanced cancer [11,36,39,54]. Current evidence directly supports the use of HFNC for relieving dyspnea in selected patients with advanced cancer, with several clinical studies demonstrating improvements in dyspnea intensity and patient comfort. In contrast, evidence regarding broader QoL outcomes—including communication, oral intake, functional status, and overall well-being—remains limited and less certain. Consequently, although HFNC appears to be a promising supportive intervention for symptom relief, its broader effects on QoL require confirmation through additional prospective studies using validated patient-reported outcome measures.

6. Psychological well-being and patient experience during HFNC therapy

Beyond physical symptoms, psychological well-being is another critical dimension of care in terminal illness. HFNC may also contribute meaningfully to psychological well-being. In this review, the term psychological well-being is used in a broad clinical context to describe emotional comfort, psychological distress, anxiety, and patient experience associated with HFNC therapy, rather than

the multidimensional construct of psychological well-being defined in positive psychology [55]. The current HFNC literature has primarily evaluated symptom relief, comfort, and emotional responses, while evidence regarding broader dimensions of psychological well-being—including self-acceptance, autonomy, purpose in life, personal growth, environmental mastery, and positive relationships—remains limited. In the management of anxiety, conventional pharmacological interventions such as opioids and corticosteroids have demonstrated limited effectiveness in relieving anxiety or related symptoms [16,19]. This may be due to their focus on singular physiological mechanisms while neglecting psychological aspects of care [16]. Activity rehabilitation significantly reduces anxiety symptoms—likely mediated by physical activity though evidence quality remains low. Contrasting findings across studies are largely attributable to heterogeneity in exercise type, intensity, and duration [16,56–58]. Overall, these combined physiological and psychosocial mechanisms contribute to effectively easing psychological distress [16,59–61].

Non-pharmacological strategies to relieve dyspnea also include HFNC and NIV [16,48,49,62]. Before the widespread use of HFNC, NIV was commonly employed as supportive therapy for respiratory distress [48,49]. However, NIV is associated with potential drawbacks such as facial pressure injuries and claustrophobia, which may in turn exacerbate anxiety [49]. HFNC, which delivers high-flow, humidified, and heated oxygen, not only reduces the work of breathing but also enhances patient comfort [4,29–33,62]. Although HFNC primarily targets the physiological aspect of respiratory distress, whether the associated comfort could also contribute to anxiety reduction is an area that warrants further investigation. Therefore, in addition to activity-based rehabilitation and other non-pharmacological interventions, HFNC may represent a promising supportive strategy with the potential to improve patient comfort, quality of life, and psychological well-being in patients with advanced cancer. However, these potential psychological benefits remain insufficiently investigated and warrant confirmation in future studies using validated psychological outcome measures. Based on the currently available evidence, we propose the potential pathways linking HFNC to quality of life and psychological well-being in advanced cancer, as illustrated in **Figure 3**, as a conceptual framework to guide future research rather than as established causal relationships. [16].

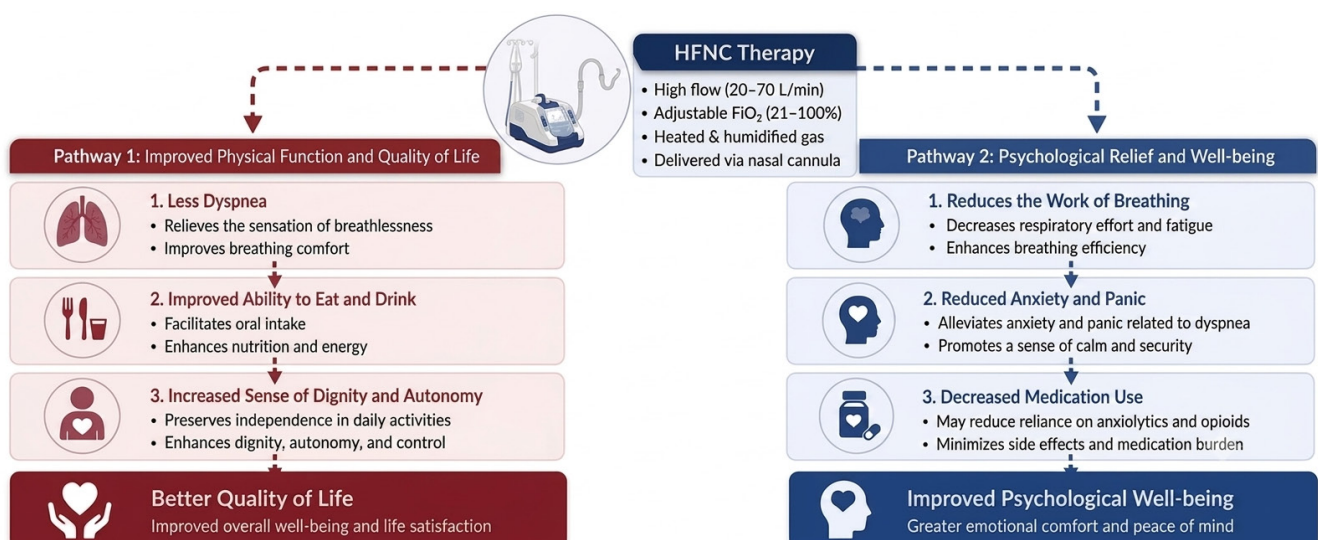


Figure 3. Potential pathways linking HFNC to quality of life and psychological well-being in advanced cancer (Dashed arrows indicate proposed or hypothetical pathways that require empirical verification in future studies).

Direct evidence evaluating the effects of HFNC on psychological well-being in patients with advanced cancer remains scarce. Most available studies focus on dyspnea relief, patient comfort, or treatment tolerability rather than validated psychological outcomes. Therefore, current conclusions regarding anxiety reduction, emotional well-being, and patient experience are derived primarily from indirect evidence or extrapolation from mixed palliative care. These proposed benefits should be regarded as hypothesis-generating rather than established clinical effects.

7. Family-centered decision-making and ethical considerations

While HFNC offers potential benefits for patients, its use also intersects with complex family dynamics and care planning decisions, especially near the end of life. HFNC therapy is predominantly utilized in inpatient settings and is typically managed by respiratory therapists [63]. Consequently, patients receiving HFNC must be weaned off the device before hospital discharge is possible [17]. As previously noted, HFNC is frequently employed for the relief of dyspnea in terminal oncology patients. However, data regarding the feasibility of HFNC withdrawal in this population remain scarce. Although some studies have reported on mortality rates associated with HFNC use in terminally ill patients, limitations in study design, patient population, and research objectives limit the generalizability of these findings [18,64]. Notably, among studies evaluating HFNC for refractory dyspnea, none have investigated whether HFNC can be successfully discontinued once initiated [17,18]. A retrospective study reported that only approximately 25% of patients with advanced cancer treated with HFNC were able to discontinue its use, and merely 16% survived to hospital discharge [17]. These findings are of critical importance when discussing goals of care with patients and their families.

In patients with advanced cancer and dyspnea, the initiation of HFNC should be approached as a time-limited trial. Careful consideration by patients, families, and the interdisciplinary care team is essential prior to initiating HFNC, given that alleviating suffering—not correcting oxygen saturation or prolonging life—should be the primary goal of care in this context [62,65]. Vulnerable, dying patients and their families may initially consent to HFNC therapy but later experience reluctance to discontinue it, potentially complicating care decisions [62,63,65,66]. Moreover, since HFNC is generally limited to hospital use, continued dependence on the device may impede timely discharge planning and hospice transition [63,65,66].

Furthermore, there is currently no consensus on the optimal strategy for weaning patients from HFNC. It remains uncertain whether clinicians should first reduce flow rates, the FiO_2 , or both simultaneously [17]. Establishing clear treatment goals prior to HFNC initiation is critically important. Early palliative care consultation or advance care planning may enhance the appropriateness and effectiveness of HFNC use in this patient population [62,67]. Providing patients and families with this information prior to HFNC initiation and during care planning discussions is essential for informed, shared decision-making [17,67].

The initiation and continuation of HFNC in terminal cancer care also raise important ethical and palliative considerations, particularly when treatment goals are not well defined [17,67]. Evidence suggests that HFNC is often initiated in the final days of life without prior advance care planning or palliative care consultation, which may lead to interventions that unintentionally prolong the dying process rather than alleviate suffering [63,65–68]. This raises concerns regarding ethical principles such as beneficence, non-maleficence, and respect for patient autonomy. Without

established goals of care or documentation of patient wishes, families and clinicians may face moral distress when making decisions about continuing or withdrawing treatment [24]. In situations where HFNC does not provide meaningful benefit, compassionate withdrawal protocols should be employed to support a peaceful and dignified dying process, with an emphasis on symptom relief and communication with the family [64].

Additionally, the use of HFNC in patients with limited prognoses poses questions about the just allocation of healthcare resources, especially when demand exceeds availability [67]. Palliative care teams are essential in navigating these issues, ensuring that HFNC use aligns with the patient's values, promoting shared decision-making, and providing holistic support [17,24,63,64,67]. Overall, integrating ethical reflection and palliative principles into HFNC use is crucial to uphold patient-centered care in the context of terminal illness.

8. Limitations

This review has several limitations that should be considered when interpreting its findings. First, this was a scoping review; therefore, although a structured literature search and predefined thematic synthesis were performed, no formal quality appraisal or risk-of-bias assessment of the included studies was undertaken. Consequently, evidence selection and interpretation were inherently subject to narrative synthesis and should be regarded as descriptive rather than quantitative.

Second, the direct evidence regarding psychological well-being, patient-reported experience, family-centered decision-making, and HFNC withdrawal remains limited. Although these topics represent important aspects of supportive and palliative cancer care, much of the available literature consists of observational studies or evidence extrapolated from related clinical populations. Future prospective studies involving clearly defined advanced cancer populations, standardized HFNC protocols, and validated patient-reported, psychological, and caregiver-related outcome measures are needed to strengthen the evidence base and guide patient-centered clinical practice.

Overall, this review provides a narrative synthesis of the current evidence rather than definitive clinical recommendations, highlighting important knowledge gaps that warrant further investigation.

9. Future directions for research and clinical practice

Although HFNC therapy has shown important clinical value in patients with advanced cancer, several evidence gaps remain. Future studies should further clarify the feasibility, timing, and optimal strategies for HFNC withdrawal, particularly in patients with advanced cancer receiving palliative care. Standardized protocols for time-limited HFNC trials, weaning approaches, and integration with advance care planning are needed to support goal-concordant care and reduce uncertainty for patients, families, and clinicians.

Future research should also evaluate the direct impact of HFNC on patient-centered outcomes beyond oxygenation, including dyspnea relief, QoL, psychological well-being, communication ability, oral intake, dignity, and treatment-related distress. Validated psychological assessments, symptom scales, and qualitative interviews should be incorporated to better capture the lived experiences of patients receiving HFNC near the end of life. In addition, caregiver burden and family decision-making experiences should be examined, as HFNC use often influences communication, discharge planning, hospice transition, and decisions regarding continuation or

withdrawal of therapy.

Multicenter and population-specific studies are needed to determine which patients are most likely to benefit from HFNC, how responses differ across cancer types and disease stages, and how HFNC can be combined with pharmacological and non-pharmacological palliative interventions. Interdisciplinary collaboration among oncology, respiratory therapy, intensive care, and palliative care teams will be essential to develop personalized, ethically sound, and clinically practical models for HFNC use in advanced cancer care.

10. Conclusion

HFNC represents a promising noninvasive respiratory support strategy for selected patients with advanced cancer experiencing respiratory failure. Current evidence suggests that HFNC may relieve dyspnea and improve short-term patient comfort, although the certainty of this evidence is limited by the small number of heterogeneous studies. Evidence supporting broader patient-centered outcomes, including quality of life, communication, oral intake, psychological well-being, family-centered decision-making, and HFNC withdrawal, remains limited. Therefore, HFNC should be considered an individualized supportive intervention within a multidisciplinary palliative care framework, guided by patients' goals of care, preferences, and shared decision-making. Further prospective, cancer-specific studies using validated patient- and family-reported outcome measures are needed to better define its effectiveness and appropriate role in advanced cancer care.

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