

Nursing interventions for dyspnoea management among inpatients with cancer in palliative care

Johanna Kero, Jaana-Maija Koivisto, Anne Kuusisto, Pauliina Kesonen and Elina Haavisto

Abstract

Background: Dyspnoea, a commonly reported symptom among patients with cancer, necessitates the need for appropriate non-pharmacological interventions for its management and suitable assessment scales. **Aims:** To explore the nursing interventions and assessment scales for managing dyspnoea in patients with cancer receiving palliative care. **Methods:** Systematic review. Five databases (CINAHL Complete, PubMed, Web of Science, Scopus and the Cochrane Central Register of Controlled Trials) were searched, and seven studies were identified. Only studies that comprised randomised controlled trials (RCTs), non-randomised controlled trials or quasi-experimental settings were included. **Findings:** Nursing interventions, that support a patient's physical breathing and mental functioning, are effective in managing dyspnoea. It is crucial to use both subjective and physical assessment methods to accurately measure the outcomes of these interventions. **Conclusion:** These interventions have been proven to be effective, with outcomes centred on changes in physiological measurements and patients' subjective expressions.

Key words: ● dyspnoea management ● inpatients ● nursing interventions ● systematic review

Johanna Kero
PhD Candidate,
Department of Nursing
Science, Tampere
University,
Tampere, Finland

Jaana-Maija Koivisto
Associate Professor,
Department of Health
Science, Tampere
University, Tampere,
Finland; Faculty of
Medicine, University of
Helsinki, Finland

Anne Kuusisto
Postdoctoral Researcher,
Department of Nursing
Science, University of
Turku, Turku, Finland;
Wellbeing Services
County, Satakunta,
Satasairaala Central
Hospital Pori, Finland

Pauliina Kesonen
PhD Candidate,
Department of Health
Science, Tampere
University,
Tampere, Finland

Elina Haavisto
Professor, Department of
Health Science, Tampere
University, Tampere,
Finland; Pirkanmaa
Wellbeing Services
County, Finland

Correspondence to:
johanna.kero@tuni.fi

This is an open access
article distributed under
the terms of the Creative
Commons Attribution
Noncommercial License
(CC BY-NC 4.0, [http://
creativecommons.org/
licenses/by-nc/4.0/](http://creativecommons.org/licenses/by-nc/4.0/))

The literature on the prevalence of dyspnoea among patients with cancer in palliative care is limited. Solano et al (2006) have estimated that between 10 and 70% of every 10 000 patients with advanced cancer report symptoms of dyspnoea. This is one of the most distressing symptoms for such patients. Dyspnoea increases during the last months of life and near death in patients with cancer (Bausewein et al, 2010). Therefore, the ability to optimally manage this condition should be a priority for healthcare professionals (Chin and Booth, 2016). A systematic screening of dyspnoea should be performed in patients with cancer by using validated patient-reported outcome measurements (Hui et al, 2021).

Palliative care is a critical aspect of healthcare, with an estimated 34% of adults with cancer requiring such care, according to the World Health Organization (World Health Organization, 2022). Nurses are at the forefront of this care, acting as coordinators and responding to patients' needs (Sekse et al, 2018; Haavisto et al, 2021; Hökkä et al, 2021). Their role often involves a significant amount of physical work, much of which remains invisible

in busy hospital settings (Sekse et al, 2018). In addition to the physical aspects, palliative care nursing also requires a deep understanding of the patient's distress and fears, necessitating a strong knowledge base. This knowledge of palliative care enables nurses to provide appropriate care, including being present with patients, understanding the distress of the patient and their family, and easing the patients' fears (Sugimura et al, 2017). Therefore, the need for adequate knowledge of nurses is needed to provide effective palliative care.

The most important task is to assess and manage the severity of the patient's expressed dyspnoea (Meriggi, 2018). Thus, the most appropriate assessment scales should be combined; depending on the purpose, this combination of dyspnoea assessment scales may include unidimensional scales and disease-specific scales or multidimensional scales (Bausewein et al, 2007; Hui et al, 2020). In assessing a patient's dyspnoea, multiple dyspnoea-measuring scales should be used, not just one. The use of multiple scales enhances the comprehensiveness of assessing the severity of the patient's dyspnoea. It is thus important to investigate the assessment

scales used in the management of dyspnoea (Bausewein et al, 2007).

Dyspnoea is a multidimensional symptom (Hui et al, 2020). Non-pharmacological interventions offer alternative options in the management of this condition when it occurs in an advanced illness, such as cancer (Gupta et al, 2021; Hui et al, 2021). While there are studies on non-pharmacological interventions for dyspnoea caused by advanced disease, there is limited specific research on cancer (Hui et al, 2020). Furthermore, in these studies, non-pharmacological interventions are reviewed in different contexts, such as hospital wards, outpatient clinics and patients' homes (Ben-Aharon et al, 2008; Gupta et al, 2021). Unfortunately, the evidence concerning suggested non-pharmacological interventions seldom distinguishes between the medical and nursing interventions. Nursing interventions, such as breathing techniques (Corner et al, 1996; Bredin et al, 1999) and psychological support for patients (Moore et al, 2002), have been found to be valuable in dyspnoea care (Ben-Aharon et al, 2008). Therefore, a combined strategy of non-pharmacological and pharmacological interventions should be developed (Hui et al, 2020). However, most of the published evidence is dated, and there is no recent systematic review dedicated to nursing interventions for dyspnoea management among inpatients with cancer in palliative care.

Combinations of nursing interventions for dyspnoea management and assessment scales needs to be implemented to relieve dyspnoea and other combined symptoms caused by cancer (Inzeo and Tyson, 2003). The purpose of this systematic review, therefore, is to explore the literature on the outcomes of nursing interventions and assessment scales for dyspnoea among inpatients with cancer in palliative care. The aim is to explore the nursing interventions and assessment scales for managing dyspnoea in patients with cancer receiving palliative care. This study asked the following three research questions:

1. What nursing interventions have been conducted for dyspnoea management among patients with cancer in palliative care?
2. What assessment scales have been used to measure the outcomes of nursing interventions for dyspnoea management?
3. What are the outcomes of nursing interventions to relieve dyspnoea in patients with cancer?

Method

Search strategy

A systematic review was chosen as this study's method (Campbell et al, 2019) to provide nurses working in hospital settings with the best available evidence on nursing interventions for the management of dyspnoea among patients with cancer in palliative care.

The systematic review design followed the PRISMA 2020 statement to ensure that all the recommended information was captured (Page et al, 2021). Five electronic databases, CINAHL Complete (EBSCO), PubMed (Medline), Web of Science, Scopus and the Cochrane Central Register of Controlled Trials) were searched between January 2008 and December 2022 for publications in English.

The rationale for the timeframe was that the last systematic review of non-pharmacological interventions (including interventions by nurses) for managing cancer-related dyspnoea was conducted in 2007 (Ben-Aharon et al, 2008). The search strategy was developed in consultation with two experienced librarians. The Medical Subject Headings (MeSH) terms used to search the databases were "cancer," "dyspnoea," "palliative care" and "nursing," as well as their synonyms, with Boolean operators. For instance, the search strategy included the use of the following search with synonyms: (Cancer* OR carcinoma* OR tumour* OR tumor* OR neoplasm* OR "Neoplasms"[MeSH]) AND (dyspnea* OR dyspnoea* OR breathless* OR "shortness of breath*" OR "Dyspnea"[MeSH]) AND ("palliative care*" OR "palliative nursing*" OR "terminally ill*" OR "hospice care" OR "Palliative Care"[MeSH] OR "Hospice and Palliative Care Nursing"[MeSH] OR "Terminally Ill"[MeSH]) AND (nurse* OR nursing* OR "Nurses"[MeSH])

The literature retrieval was reported in accordance with the PRISMA 2020 flow diagram for new systematic reviews, which includes searches of databases, registers and other sources (Page et al, 2021). A total of 877 studies were identified, divided as follows: CINAHL Complete (EBSCO), n=119; PubMed (Medline), n=275; Web of Science, n=174; Scopus, n=265; and Cochrane Central Register of Controlled Trials, n=44. The papers were downloaded to a reference management software (Zotero), and duplicates (n=310) were removed. The reference lists of the examined studies were read by JK and AK to ensure that no relevant articles were omitted (*Figure 1*).

Table 1. The inclusion and exclusion criteria of the systematic review based on the PICOS process and the research questions

Term	Inclusion criteria	Exclusion criteria
P (Population)	Use a sample of inpatients who were over 18 years old, had cancer, were receiving palliative care and suffering from dyspnoea	Chronic disease or symptoms concerned with children, adolescents, other patient groups or a single family member or used samples of patients in home care or out-patients' clinic
I (Intervention)	Be a standalone nursing intervention of dyspnoea management or be an intervention in which nurses collaborate with other health care professionals	The intervention was not related to dyspnoea management of patients with cancer or focused only on physicians
C (comparison)	Comparison group not necessary	Did not measure dyspnoea management outcomes
O (Outcome)	Any outcomes relating to nursing management for dyspnoea	Were completely medical or pharmacological interventions
S (Type of Studies)	Randomised controlled trials (RCT), non-randomised controlled trials, quasi-experimental study designs	Reviews, qualitative studies, non-experimental studies, meta-analysis, observational research

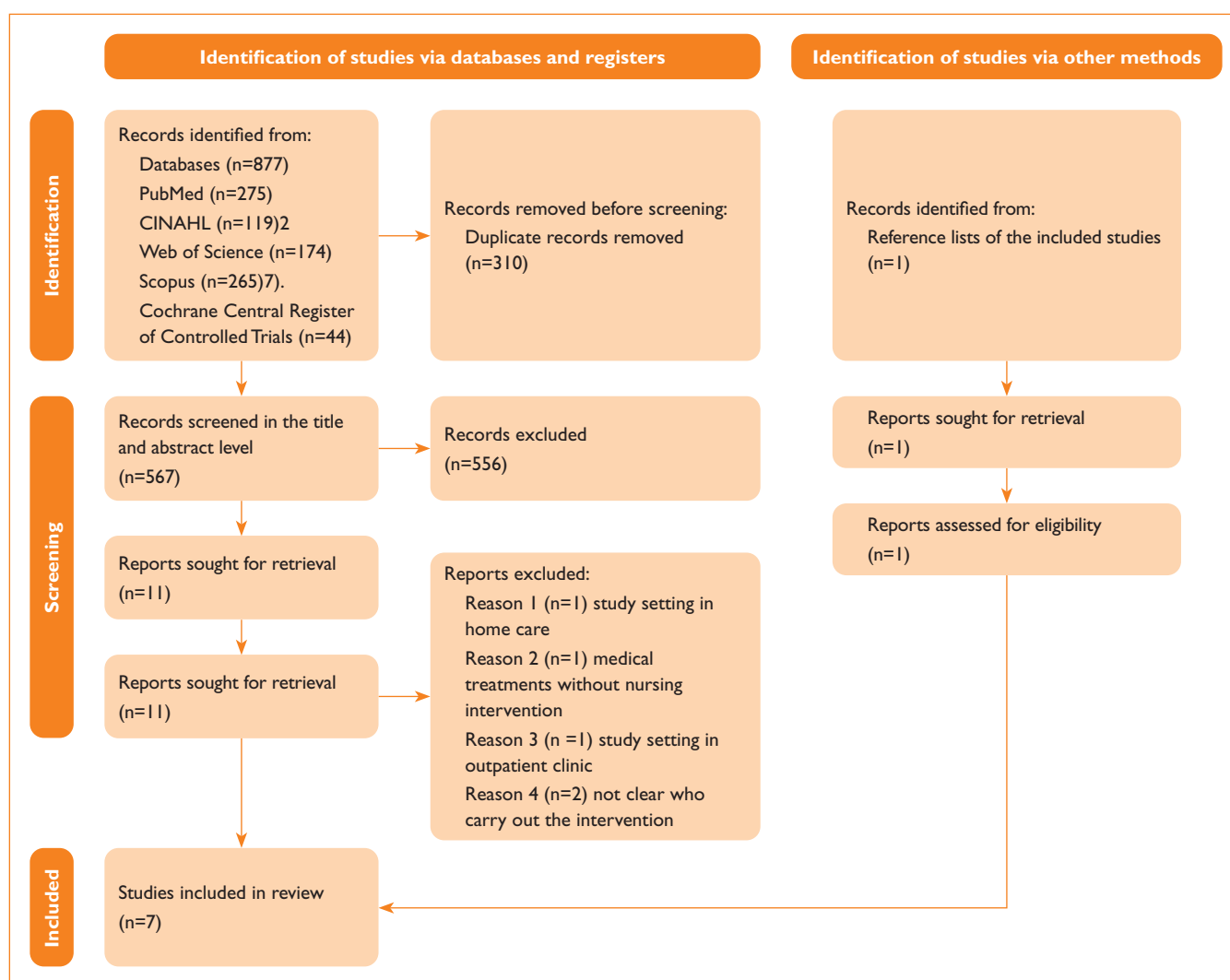


Figure 1. PRISMA 2020 flow diagram for new systematic reviews which included searches of databases and other sources.

Table 2. The quality appraisal of the selected studies.

JBI Critical Appraisal checklist for Randomised Controlled Trials (n=4)				
	Ozcelik et al, 2014	Puspawati et al, 2017	Wong et al, 2017	Kako et al, 2018a
Was true randomisation used for the assignment of participants to treatment groups?	Y	Y	Y	Y
Was allocation to treatment groups concealed?	N/A	N	N	N
Were treatment groups similar at the baseline?	Y	Y	Y	Y
Were participants blind to treatment assignment?	N	Y	Y	N
Were those delivering treatment blind to treatment assignment?	N	Y	N/A	N
Were outcomes assessors blind to treatment assignment?	N/A	N	N/A	N
Were treatment groups treated identically other than the intervention of interest?	Y	Y	Y	Y
Was follow up complete and if not, were differences between groups in terms of their follow up adequately described and analysed?	Y	Y	Y	Y
Were participants analysed in the groups to which they were randomised?	N/A	N	N/A	N/A
Were outcomes measured in the same way for treatment groups?	Y	Y	Y	Y
Were outcomes measured in a reliable way?	Y	Y	Y	Y
Was appropriate statistical analysis used?	Y	Y	Y	Y
Was the trial design appropriate, and any deviations from the standard RCT design (individual randomisation, parallel groups) accounted for in the conduct and analysis of the trial?	Y	Y	Y	Y
Total quality scores	7/13	10/13	9/13	8/13
JBI Critical Appraisal checklist for Quasi-experimental Studies (n=3)				
	Lai et al, 2010	Kako et al, 2018b	Niki et al, 2019	
Is it clear in the study what is the 'cause' and what is the 'effect' (i.e. there is no confusion about which variable comes first)?	Y	Y	Y	
Were the participants included in any comparisons similar?	N/A	Y	Y	
Were the participants included in any comparisons receiving similar treatment/care, other than the exposure or intervention of interest?	Y	Y	Y	
Was there a control group?	N	N	N	
Were there multiple measurements of the outcome both pre and post the intervention/exposure?	Y	Y	Y	
Was follow up complete and if not, were differences between groups in terms of their follow up adequately described and analysed?	Y	Y	Y	
Were the outcomes of participants included in any comparisons measured in the same way?	Y	Y	N	
Were outcomes measured in a reliable way?	Y	Y	Y	
Was appropriate statistical analysis used?	Y	Y	Y	
Total quality scores	7/9	8/9	7/9	

Inclusion criteria

The inclusion criteria were chosen based on the research questions and the PICOS process (Table 1). The studies were included when:

- The population consisted of inpatients who were over 18 years old, had cancer, were receiving palliative care and were suffering from dyspnoea
- The topic covered a nursing intervention for dyspnoea management, or an intervention in which nurses collaborated with other healthcare professionals
- The outcomes included information relating to the nursing management of dyspnoea
- The design was a randomised controlled trial (RCT), a non-randomised controlled trial or a quasi-experimental study.

Study selection

During the review process, two researchers, JK and AK, assessed the titles and abstracts together and decided which studies should be checked in their entirety against the inclusion criteria. One additional study was identified through the reference lists. Disagreements were resolved by discussion, and the justification for the excluded studies were documented. In this phase, 556 abstracts were excluded based on the inclusion criteria. The full texts of 12 studies were retrieved and read through systematically by three researchers, JK and PK. At this stage of the review, five studies were excluded due to their settings. Eventually, seven studies were included in the systematic review for quality appraisal (Lasserson et al, 2020).

Table 3. The general information of the included studies

	Purpose		
Author, year and country			
Lai et al, 2010 [1] Taiwan	To identify a low-cost and effective intervention for the fear and anxiety associated with cancer and dyspnoea	A quasi-experimental study	N=53 Experimental group: n=53 Control group: no control group
Ozcelik et al, 2014 [2] Turkey	To investigate the improvement in symptoms, quality of life, patient and family satisfaction with care, and direct costs resulting from a palliative care programme based case management model	A randomised controlled trial	Total N=44 Experimental group: n=22 Control group: n=22
Wong et al, 2017 [3] China	To assess the clinical feasibility and outcome of using an electric fan to alleviate the symptom of dyspnoea in Chinese patients with advanced cancer	A single-blinded trial randomised controlled trial	Total N=30 Experimental group: n=15 Control group: n=15
Puspawati et al, 2017 [4] Indonesia	To identify the effect of airflow stimulation from a hand-held fan as nonpharmacological palliative intervention on dyspnoea in patients with lung cancer	A randomised controlled trial	Total N=21 Experimental group: n=10 Control group: n=11
Kako et al, 2018b [5] Japan	To clarify the duration required for dyspnoea to return to the baseline severity after fan therapy, to evaluate if fan-to-legs therapy or no fan therapy would be a suitable control therapy, and to investigate changes in patients' face surface temperature after fan therapy	A quasi-experimental pilot study	Total N=9 Experimental group: n=9 Control group: no control group
Kako et al, 2018a [6] Japan	To determine the effect of fan therapy on dyspnoea in patients with terminally ill cancer	A parallel-arm randomised controlled trial	Total N=40 Experimental group: n=20 Control group: n=20
Niki et al, 2019 [7] Japan	To verify if simulated travel using Virtual Reality (VR) is efficacious in improving symptoms in terminal cancer patients	A quasi-experimental study	Total N=20 Experimental group: n=15 Control group: n=5

Quality assessment

The quality of the seven selected studies was assessed independently by two reviewers, JK and PK, and through the use of two Joanna Briggs Institute tools: the Critical Appraisal Checklist for Randomised Controlled Trials, which contains 13 questions, and the Critical Appraisal Checklist for Quasi-Experimental Studies, which contains nine questions (JBI 2020). If the answers to the questions in the tool were "yes," one score was given. If there was a disagreement concerning the assessment, a consensus was reached through discussion among the two reviewers. The quality scores ranged from seven to ten in the RCTs (maximum possible score: thirteen) and from seven to eight in the quasi-experimental studies (maximum possible score: nine). No studies were excluded due to their scores. All the included studies had a high risk of bias due to the low number of participants

and because the methods used for blinding the participants were not clearly reported (Higgins et al, 2020) (Table 2).

Data extraction and analysis

First, the data from the included studies (n=7) were extracted, and the general information (authors, year of publication, country, purpose, study design and participants) was tabulated by one author, JK. Second, the measurement scales used for dyspnoea assessment were described. Third, the following information was extracted: type of intervention, components of the interventions, dosing, physiological measurements and self-reported scale scores before and after the intervention, and the outcomes of changes in the physiological measurements and the participants' subjective expressions. The interventions were categorised based on similarities in the purposes of the

Table 5. The measurement scales of dyspnoea of the included studies

Modified Borg (Dyspnoea) Scale (MBS) Muza, Silverman, Gilmore, Hellerstein and Kelsen 1990	To rate the difficulty of patient's breathing	The severity of dyspnoea scores 0–10 'nothing at all—maximal symptoms'	Self-rating	Lai et al, 2010 Puspawati et al, 2017	Acceptable construct validity and responsiveness in previous studies (Lai et al, 2010) A validated tool (Puspawati et al, 2017)
Numerical Rating Scale Gift and Narsavage 1998	To screen for the severity of symptom	The severity of dyspnoea scores 0–10 "No symptom—worst symptoms"	Self-rating	Wong et al, 2017 Kako et al, 2018a Kako et al, 2018b Niki et al, 2019	Not reported
The Edmonton Symptom Assessment System (ESAS/ ESASr) Bruera, Kuehn, Miller, Selmser and Macmillan, 1991; Yokomichi et al, 2015 (in Japanese)	To assist in the initial assessment of nine symptoms that are common in palliative care patients	The diagnose of existing symptoms scores 0–10 verbally—no symptom—considerably severe Nine symptoms	Self-rating/ clinician-report/ family member rating	Kako et al, 2018a Ozcelik et al, 2014 Niki et al, 2019	Not reported (Niki et al, 2019; Kako et al, 2018a) Acceptable validity and reliability (Ozcelik et al, 2014)
European Organization for Research and Treatment (EORTC) Quality of Life Questionnaire C30 (QLQ C30) EORTC QLQ-C30 Bergman et al, 1994; Güzelant et al, 2004 (in Turkish)	To assess the quality of life of cancer patients	The patients' functionality in daily activities during the past week, 30 items with two subscales, functional and symptom	Self-rating	Ozcelik et al, 2014	Acceptable validity and reliability (Ozcelik et al, 2014)

interventions, which were supporting the patient's physical breathing and supporting their mental functioning (Kynge et al, 2020).

A variety of outcomes was found because the designs of the studies were heterogeneous; there was also dissimilarity in the data (Munn et al, 2014). A meta-analysis was not performed because the studies were not similar enough in terms of intervention, outcomes and study designs, though the populations were homogeneous. The seven studies were analysed using narrative analysis to describe the outcomes of the nursing interventions (Tufanaru et al, 2015). The outcomes were coded and divided into two groups: changes in physiological measurements and changes in participants' subjective expressions. Following the analysis, and in line with the structure of this article, a summary of the current state of knowledge is presented based on the three research questions posed by this systematic review. Finally, the study's limitations are discussed, as well as possible areas for future research (Popay et al, 2006).

Results

Description of the studies

The seven included studies were published between 2010 and 2019 and they were all conducted in hospital wards. Six of them were from Asia: three from Japan (Kako et al, 2018a, 2018b; Niki et al, 2019), one from China (Wong et al, 2017), one from Taiwan (Lai et al, 2010) and one from Indonesia (Puspawati et al, 2017). The last one of the studies was from Europe, specifically Turkey (Ozcelik et al, 2014). The experimental and control groups ranged from 5 to 53. Two studies did not have a control group, as all of the participants had the same intervention (Lai et al, 2010; Niki et al, 2019). Four studies were RCTs (Ozcelik et al, 2014; Kako et al, 2018a; Puspawati et al, 2017; Wong et al, 2017), and three were quasi-experimental studies (Lai et al, 2010; Kako et al, 2018b; Niki et al, 2019) (Table 3).

Nursing interventions for dyspnoea management

All seven studies included multi-component interventions. Five interventions made use of supplementary oxygen (Lai et al, 2010; Puspawati et al, 2017; Wong et al, 2017; Kako

et al, 2018a; 2018b), and six interventions relied on medication, such as opioids (Lai et al, 2010; Puspawati et al, 2017; Wong et al, 2017; Kako et al, 2018a, 2018b; Niki et al, 2019). The aims of the nursing interventions to alleviate patients' sensation of dyspnoea can be divided into two categories: supporting physical breathing and supporting mental functioning (Table 4).

Supporting the patient's physical breathing

Fan-to-face therapy alleviated participants' sensation of dyspnoea thanks to the airflow produced by the appliance. The dosing of fan-to-face therapy was five minutes at a time (Puspawati et al, 2017; Wong et al, 2017; Kako et al, 2018a; 2018b). The washout period was one hour (Puspawati et al, 2017; Kako et al, 2018b). The side involved and the distance of the fan from the patient's face followed their wishes (Wong et al, 2017; Kako et al, 2018a, 2018b); alternatively, the airflow was targeted at the patient's two/three trigeminal nerve branches area with the lowest fan speed selected (Kako et al, 2018a) or at a speed of 4 km/h (Puspawati et al, 2017). A combination of diaphragmatic breathing exercises, wetting of the patient's face without drying (Puspawati et al, 2017) and a half-sitting position during fan-to-face therapy was used (Wong et al, 2017). In addition, most of the patients were under supplementary oxygen (Lai et al, 2010; Puspawati et al, 2017; Wong et al, 2017; Kako et al, 2018a; 2018b) and under medical support (e.g. opioids) (Lai et al, 2010; Puspawati et al, 2017; Wong et al, 2017; Kako et al, 2018a; 2018b; Niki et al, 2019).

Supporting the patient's mental functioning

Patients' mental functioning was supported by transferring their thoughts away from the sensation of dyspnoea. A therapy based on theta music with guided imagery used a 20-minute set divided into four periods. Theta binaural beats are sounds perceived when two tones at slightly different frequencies are presented separately to each ear. During sleep, the brain produces theta waves at a frequency between 4 Hz and 8 Hz. Theta waves are also associated with drowsiness and meditation. Studies show that listening to binaural beats at a 6 Hz frequency can induce a meditative state (Jirakittayakorn and Wongsawat, 2017). In the first period, the patients stayed for 3 minutes without stimulation. In the second one, they listened to a peaceful, non-theta version of 'Amazing Grace' for 4 minutes. In the third period, the patients listened to 3 minutes

of theta music, 4 minutes of theta music with guided imagery, and 3 more minutes of theta music. In the fourth period, the last 3 minutes of the exercise had no stimulation (Lai et al, 2010). A virtual reality (VR) travel experience helped patients visit their memorable places using Google Earth and a pair of VR glasses. Depending on the patient's condition, one travel experience took around 30 minutes (Niki et al, 2019). Patients' ability to cope with dyspnoea, among other cancer-related symptoms, was supported by a patient education programme involving case management group therapy. This programme consisted of an educational book, a nurse-led daily educational session with the patient and their family lasting 15–20 minutes, and the support of a multi-professional palliative care team during the hospital stay (Ozcelik et al, 2014).

Dyspnoea measurement scales

Four scales were used to measure the effectiveness of the interventions examined in this review (Table 5). Two scales evaluated the severity of dyspnoea in general or during exercise. These tools are often used to describe the condition's severity and can be quickly completed by patients, which aids self-reporting (Muza et al, 1990; Gift et al, 1998). The first scale is the Numerical Rating Scale (NRS), which usually has grades from 0 to 10 that are associated with words ranging from 'no symptoms' to 'worst symptoms' (Gift et al, 1998). The NRS was used in three studies (Wong et al, 2017; Kako et al, 2018a; 2018b). The second scale was the Modified Borg Scale (MBS) (Dyspnoea), which also grades the intensity of the condition on a scale of 0 to 10, and uses words from 'nothing at all' to 'maximal symptoms' (Muza et al, 1990). The MBS (Dyspnoea) scale was used in two studies (Lai et al, 2010; Puspawati et al, 2017).

The two remaining scales measured other symptoms in addition to dyspnoea. The third one—the revised Edmonton Symptom Assessment System (ESASr)—is used to diagnose patients' existing symptoms; it has grades from 0 to 10 and verbal descriptions from 'no symptom' to 'considerably severe.' In addition to dyspnoea, the ESASr contains eight other symptoms: pain, anxiety, tiredness, drowsiness, nausea, lack of appetite, depression and wellbeing. This scale is used for patient self-ratings, clinician reports or family member ratings (Bruera et al, 1991; Yokomichi et al, 2015). The ESASr was employed in three studies (Ozcelik et al, 2014; Kako et al, 2018a; Niki et al, 2019). The

fourth scale was the European Organisation for Research and Treatment of Cancer Quality of Life Questionnaire C30 (EORTC QLQ-C30), which is used to measure patients' with cancer functionality in daily activities over a number of weeks. This scale contains 30 items and two sub-scales, one for functionality and the other for symptoms (Muza et al, 1990; Bergman et al, 1994; Güzelant et al, 2004). The EORTC QLQ-C30 scale is for patients' self-ratings and was used in one study (Ozcelik et al, 2014).

The validity and reliability of these scales were not reported in any of the included studies. However, they have been previously used in several studies and have been found to be both valid and reliable (Bausewein et al, 2007).

Outcomes of nursing interventions for dyspnoea management

The outcomes of the nursing interventions were divided into two categories: changes in physiological measurements and changes in patients' subjective expressions. The results of the systematic review are presented in *Table 6*.

Changes in physiological measurements

Before and after the interventions, the researchers measured patients' respiration rate, oxygen saturation, heart rate, end-tidal CO₂ (EtCO₂) and face surface temperature. The respiration rate decreased ($p=0.001$) after fan-to-face therapy when patients' faces were wet and when they did diaphragmatic breathing exercises alongside the therapy (Puspawati et al, 2017). Under the other conditions, there was no significant decrease in respiration rate after such therapy (Wong et al, 2017; Kako et al, 2018a, 2018b). After the theta music with guided imagery exercise, there was a decrease ($p=0.000$) in respiration rate (Lai et al, 2010). No significant decrease in patients' oxygen saturation levels was reported after fan-to-face therapy (Puspawati et al, 2017; Wong et al, 2017; Kako et al, 2018a, 2018b) or after the theta music with guided imagery exercise (Lai et al, 2010). No significant change was reported in heart rate after fan-to-face therapy (Kako et al, 2018a, 2018b) or the theta music with guided imagery exercise. Some change in patients' EtCO₂ ($p=0.005$) was reported in one study after the intervention with theta music and guided imagery (Lai et al, 2010). A decrease of 1°C in face surface temperature was reported after two fan-to-face therapy interventions (Kako et al, 2018a, 2018b).

Changes in patients' subjective expressions

Before and after the interventions, the researchers measured the patients' subjective expressions with the NRS, the MBS (Dyspnoea), the ESASr and the EORTC QLQ-30.

The patients expressed alleviation of dyspnoea after fan-to-face therapy when measured with the NRS ($p=0.001$) (Wong et al, 2017) and the ESASr ($p=0.001$) (Kako et al, 2018a). Similarly, expressions of dyspnoea intensity decreased after fan-to-face therapy according to the MBS (Dyspnoea) results ($p=0.001$) (Puspawati et al, 2017) and after the intervention with theta music and guided imagery ($p=0.000$) (Lai et al, 2010). The results of the case management group therapy were not very significant: the patients stated a decrease in symptoms as measured with the ESASr ($p=0.007$). They also expressed an increased capability to control the symptom burden of dyspnoea and improve their functionality by using the skills learned during the case management group therapy (Ozcelik et al, 2014). No significant decrease in dyspnoea was found ($p=0.022$) after the VR travel experience (Niki et al, 2019). The symptoms of cancer are complex, and they strongly affect patients' subjective quality of life. After the case management group patient education therapy, participants reported an increased global quality of life based on the EORTC QLQ-30 ($p=0.001$) (Ozcelik et al, 2014).

Discussion

The purpose of this systematic review is to explore the literature on the outcomes and assessment scales of nursing interventions for dyspnoea among inpatients with cancer in palliative care. The review presents the state of knowledge on this topic. It covers seven studies of nursing interventions for dyspnoea management and four dyspnoea assessment scales published between January 2008 and December 2022.

Only seven studies on nursing interventions for dyspnoea management among inpatients with cancer in palliative care were found. This systematic review, therefore, shows that the number of existing studies on the topic is low, as Hui et al (2020) had previously stated. Furthermore, as reported by other scholars (Ben-Aharon et al, 2008; Gupta et al, 2021), RCTs with inpatients with cancer in palliative care are difficult to conduct. One reason might be that the patients in question are a fragile group and that data collection among them is challenging not only from a clinical but also

Table 6. Intervention/components/physical measurements/patient's subjective expressions, and the decrease of dyspnoea in included studies

Intervention/components/physical measurements/patient's subjective expressions	Wong et al, 2017	Puspawati et al, 2017	Kako et al, 2018b	Kako et al, 2018a	Lai et al, 2010	Ozcelic et al, 2014	Niki et al, 2019
Interventions							
Patients' physical breathing support							
Fan therapy	x	x	x	x			
Patient's mental functioning support							
Theta music with Guided Imagery (GI)					x		
Simulated Virtual Reality (VR) travel							x
Case management group therapy						x	
Components							
An electric fan	x	x	x	x			
Supplementary oxygen	x	x	x		x		
Medication	x	x	x	x	x		x
Diaphragmatic breathing exercise		x					
Half-lying sitting position	x						
Written patient education material						x	
Outcomes							
Physical measurements: (+/0/-)							
Saturation rate	0			0	0		
Respiratory rate	0	+		0	+		
Heart rate				0	+		
End-tidal CO ₂ (EtCO ₂)					+		
Face surface temperature			-	-			
Patient's subjective expressions: decrease in dyspnoea (+/0/-)*							
The Numerical Rating Scale (NRS)	+		+	+			
The Modified Borg Scale (MBS)		+			+		
The Edmonton Symptom Assessment System (revised) (ESAS/r)				+		+	0
The European Organization for Research and Treatment (EORTC)							
Quality of Life Questionnaire C30 (QLQ C30)							
EORTC QLQ-30 (Global quality of life)							

*+=positive change/0=no change/-=negative change

from an ethical point of view. Six of the seven studies were carried out in Asia, which makes the results of this review unevenly distributed geographically. This raises the question whether nursing interventions for dyspnoea management are being studied or applied more often in hospital settings in Asia. However, the review relied on five databases, which increases its coverage.

The assessment scales used most often were the NRS and the MBS (Dyspnoea), both of which are patient self-reported scales, which measured the severity of dyspnoea as suggested by Meriggi (2018). Only one study (Kako et al, 2018a) assessed patients' expressed dyspnoea by combining a unidimensional scale (the NRS)

with a multidimensional scale (the ESASr) as recommended by Bausewein et al (2007).

Self-reported assessment scales may not give truthful results because patients' expressions are subjective. Therefore, it is unclear whether the nursing interventions examined here relieved dyspnoea. Physical measurements, such as respiration rate and oxygen saturation level, do not give reliable results either. For this reason, comparing the dyspnoea assessment scales used in nursing interventions is difficult based on the results of a small number of studies. Moreover, the studies did not report on the reliability or validity of the scales. In summary, a single scale does not provide a comprehensive answer to the assessment of dyspnoea.

The included studies adopted four multi-component nursing interventions with assessment scales as recommended by Hui et al (2021) and Inzeo and Tyson (2003): fan-to-face therapy, theta music with guided imagery, simulated travel with VR glasses and case management group therapy. The outcomes of the fan therapy interventions were promising for the physical management of dyspnoea, although the number of patients involved was relatively low (n=100). Despite the fact that there was no clear clinical significance when comparing the positive changes in oxygen saturation levels and respiration rates, the patients expressed a decrease in dyspnoea with the fan-to-face therapy according to both the NRS and the MBS (Dyspnoea) (Lai et al, 2010; Puspawati et al, 2017; Wong et al, 2017; Kako et al, 2018a, 2018b).

In the trials, there is neither strong evidence of any guidelines for dyspnoea management nor consistency between the nursing interventions and dosing. This makes it difficult to evaluate the significance of the intervention (Hui et al, 2021). Patients with advanced cancer form a specific patient group who need to be offered effective non-pharmacological interventions, such as nursing interventions for dyspnoea. However, it is challenging to find the most appropriate versions of such interventions and the scales to assess symptoms. These findings are in line with the systematic review by Ben-Aharon et al (2008).

Limitations

This systematic review has some limitations. A bias may have occurred during data selection

because studies that were not in English were excluded. Although the literature search was based on well-defined inclusion criteria, the number of included studies was low. The quality of the studies also varied and made the analysis difficult, which may have caused misinterpretation of the results. Three of the four RCTs scored below 10 (out of 13); however, due to the small number of suitable articles, these studies were included. Although all the participants were inpatients receiving palliative care for cancer, the number of patients was low, and blinding or randomisation was not possible. In addition, the study designs and the components used (e.g., supplementary oxygen and the combination of nursing interventions) varied among the studies and gave imprecise results concerning the outcomes of the interventions. Therefore, comparing the nursing interventions and the assessment scales is difficult, and generalisability should be treated with caution.

Conclusions

Nurses play a key role in the assessment and management of dyspnoea. As Bausewein (2010) points out, dyspnoea increases during the last months of life and near death in patients with cancer. However, there has been limited research conducted on nursing interventions and assessment scales for dyspnoea. This systematic review has identified four nursing interventions for dyspnoea management among inpatients receiving palliative care for cancer. Although the three patient self-reported scales examined in this review did not assure reliability in the assessment of the severity of dyspnoea, the nursing interventions that support a patient's physical breathing and mental functioning have proven to be effective in managing dyspnoea. It is crucial to use both subjective and physical assessment methods to accurately measure the outcomes of these interventions. An individualised approach to measuring and managing dyspnoea with appropriate assessment scales and nursing interventions is necessary to provide the best care for the patient group in question. Further research is needed to investigate the outcomes of nursing interventions among inpatients with cancer in palliative care through the use of randomised controlled designs. *IJPN*

Statement of interest: None.

Bausewein C, Booth S, Gysels M et al. Individual breathlessness trajectories do not match summary trajectories in advanced cancer and chronic obstructive pulmonary disease: results from a longitudinal study. *Palliat Med.* 2010; 24(8):777–786. <https://doi.org/10.1191/0963823708pmd1511a>

CPD reflective questions

- How could you implement dyspnoea assessment scales in practice?
- How could you implement nursing interventions in practice?
- How could research on dyspnoea management be developed among patients with cancer in palliative care?

Key points

- Dyspnoea is one of the most frequently experienced symptoms among patients with cancer
- Nurses play an important role when assessing and managing dyspnoea
- Nursing interventions and patient self-reported assessment scales of dyspnoea should be implemented in the dyspnoea management of patients with cancer in palliative care

- org/10.1177/0269216310378785
- Bausewein C, Farquhar M, Booth S, Gyselis M, Higginson IJ. Measurement of breathlessness in advanced disease: a systematic review. *Respir Med*. 2011;105(11):399–410. <https://doi.org/10.1016/j.rmed.2006.07.003>
- Ben-Aharon I, Gafter-Gvili A, Paul M, Leibovici L, Stemmer SM. Interventions for alleviating cancer-related dyspnea: a systematic review. *J Clin Oncol*. 2008; 26(14):2396–2404. <https://doi.org/10.1200/JCO.2007.15.5796>
- Bergman B, Aarnoson NK, Ahmedzai S, Kaasa S, Sullivan M. The EORTEC QLQ-LC13: a modular supplement to the EORTEC Core Quality of Life Questionnaire (QLQ-C30) for use in lung cancer clinical trials. EORTEC Study Group on Quality of Life. *Eur J Cancer*. 1994; 30A(5):635–642. [https://doi.org/10.1016/0959-8049\(94\)90535-5](https://doi.org/10.1016/0959-8049(94)90535-5)
- Bredin M, Corner J, Krishnasamy M et al. Multicentre randomised controlled trial of nursing intervention for breathlessness in patients with lung cancer. *BMJ*. 1999; 318(6):1–5. <https://doi.org/10.1136/bmj.318.7188.901>
- Bruera E, Kuehn N, Miller MJ, Selmser P, Macmillan K. The Edmonton Symptom Assessment System (ESAS): a simple method for the assessment of palliative care patients. *J Palliat Care*. 1991; 7(2):6–9
- Campbell M, Katikireddi SV, Sowden A, Thompson H. Lack of transparency in reporting narrative synthesis of quantitative data: a methodological assessment of systematic reviews. *J Clin Epidemiol*. 2019; 105(3):1–9. <https://doi.org/10.1016/j.jclinepi.2018.08.019>
- Chin C, Booth S. Managing breathlessness: a palliative care approach. *Postgrad Med J*. 2016; 92(1809):393–400. <https://doi.org/10.1136/postgradmedj-2015-133578>
- Corner J, Plant H, A'Hern R, Bailey C. Non-pharmacological intervention for breathlessness in lung cancer. *J Palliat Med*. 1996; 10(5):299–305. <https://doi.org/10.1177/026921639601000405>
- Gift AG, Narsavage G. Validity of the numeric rating scale as a measure of dyspnea. *Am J Crit Care*. 1998; 7(3):200–204
- Gupta A, Sedhom R, Sharma R et al. Nonpharmacological interventions for managing breathlessness in patients with advanced cancer. A systematic review. *JAMA Oncol*. 2021; 7(2):290–298. <https://doi.org/10.1001/jamaoncol.2020.5184>
- Güzelant A, Goksel T, Ozkok S et al. The European Organization for Research and Treatment of Cancer QLQ-C30: an examination into the cultural validity and reliability of the Turkish version of the EORTEC QLQ-C30. *Eur J Cancer Care*. 2004; 3(2):135–144. <https://doi-org.ezproxy.utu.fi/10.1111/j.1365-2354.2003.00435.x>
- Haavisto E, Soikkeli-Jalonen A, Tonteri M, Hupli M. Nurses' required end-of-life care competence in health centres inpatient ward—a qualitative descriptive study. *Scan J Caring Sci*. 2021; 35(2):577–585. <https://doi.org/10.1111/scs.12874>
- Higgins JPT, Thomas J, Chandler J et al (eds). *Cochrane Handbook for systematic reviews of interventions version 6.1* (updated September 2020). New York: Cochrane; 2020
- Hui D, Maddocks M, Johnson MJ et al. Management of breathlessness in patients with cancer: ESMO Clinical Practice Guidelines. *ESMO*. 2020; 5(6):e001038. <https://doi.org/10.1136/esmoopen-2020-001038>
- Hui D, Bohlke K, Bao T et al. Management of dyspnea in advanced cancer: ASCO Guideline. *J Clin Oncol*. 2021; 39(12):1389–1411. <https://doi.org/10.1200/JCO.20.03465>
- Hökkä M, Melender H-L, Lehto JT, Kaakinen P. Palliative nursing competencies required for different levels of palliative care provision: a qualitative analysis of health care professionals' perspectives. *J Palliat Med*. 2021; 24(10):1516–1524. <https://doi.org/10.1089/jpm.2020.0632>
- Inzeo D, Tyson L. Nursing assessment and management of dyspnea patients with lung cancer. *Clin J Oncol Nurs*. 2003; 7(3):332–333. <https://doi.org/10.1188/03.CJON.332-333>
- Jirakittayakorn N, Wongsawat Y. Brain Responses to a 6-Hz Binaural Beat: Effects on General Theta Rhythm and Frontal Midline Theta Activity. *Front Neurosci*. 2017; epub. <https://doi.org/10.3389/fnins.2017.00365>
- Joanna Briggs Institute. *Critical appraisal tools*. 2020; <https://joannabriggs.org/critical-appraisal-tools> (accessed 1 February 2024)
- Kako J, Morita T, Yamaguchi T et al. Fan therapy in relieving dyspnea in patients with terminally ill cancer: a parallel-arm, randomized controlled trial. *J Pain Symptom Manage*. 2018a; 56(4): 493–500. <https://doi.org/10.1016/j.jpainsymman.2018.07.001>
- Kako J, Morita T, Yamaguchi TM et al. Evaluation of the appropriate washout period following fan therapy for dyspnea in patients with advanced cancer: a pilot study. *Am J Hosp Palliat Care*. 2018b; 35(2):293–296. <https://doi.org/10.1177/1049909117707905>
- Kyngäs H, Kaakinen P. Deductive content analysis. In: Kyngäs H, Mikkonen K, Kääriäinen M (eds). *The application of content analysis in nursing science research*. Cham: Springer International Publishing; 2020:23–30
- Lai W-S, Chantal Chao C-S, Yang W-P, Chen C-H. Efficacy of guided imagery with theta music for advanced patients with cancer with dyspnea: a pilot study. *Bio Res Nurs*. 2010; 12(2):188–197. <https://doi.org/10.1177/1099800409347556>
- Lasserson TJ, Thomas J, Higgins JPT. Chapter 1: Starting a review. 2020. <https://training.cochrane.org/handbook>

Short reports

International Journal of Palliative Nursing now publishes short reports, and invites submissions for consideration. Short reports are intended to provide the international palliative care community with the opportunity for concise communication of work that will be of interest to nurses working in palliative care.

Short reports should be submitted via the usual channel: www.ijpn.co.uk/contribute.shtml

The Editor will be happy to respond to any queries: ijpn@markallengroup.com



- (accessed 1 February 2024)
- Meriggi F. Dyspnea in patients with cancer: a well-known and neglected symptom. *Rev recent clin trials*. 2018; 13(2):84–88. <https://doi.org/10.2174/1574887113666180326112116>
- Moore S, Corner J, Haviland J et al. Nurse led follow up and conventional medical follow up in management of patients with lung cancer: randomised trial. *BMJ*. 2002; 325(8):1–7. <https://doi.org/10.1136/bmj.325.7373.1145>
- Munn Z, Catalin T, Aromataris E. JBI's systematic reviews: data extraction and synthesis. *Am J Nurs*. 2014; 114(7):49–54. <https://doi.org/10.1097/01.NAJ.0000451683.66447.89>
- Muza SR, Silverman MT, Gilmore GC, Hellerstein HK, Kelsen SG. 1990. Comparison of scales used to quantitate the sense of effort to breathe in patients with chronic obstructive pulmonary disease. *Am Rev Respir Dis*. 141(4 Pt 1):909–913. https://doi.org/10.1164/ajrccm/141.4_Pt_1.909
- Niki K, Okamoto Y, Maeda I et al. A novel palliative care approach using virtual reality for improving various symptoms of terminal patients with cancer: a preliminary prospective, multicenter study. *J Palliat Med*. 2019; 22(6):702–707. <https://doi.org/10.1089/jpm.2018.0527>
- Ozcelik H, Fadiloglu C, Karabulut B, Uyar M. Examining the effect of the case management model on patient results in the palliative care of patients with cancer. *Am J Hosp Palliat Care*. 2014; 3(6):655–664. <https://doi.org/10.1177/1049909113506980>
- Page MJ, McKenzie JE, Bossuyt PM et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ*. 2021; 372:n71. <https://doi.org/10.1136/bmj.n71>
- Popay J, Roberts H, Sowden A et al. Guidance on the conduct of narrative synthesis in systematic reviews. 2006. <https://www.lancaster.ac.uk/media/lancaster-university/content-assets/documents/fhm/dhr/chir/NSynthesisguidanceVersion1-April2006.pdf> (accessed 1 February 2024)
- Puspawati NL, Sitorus R, Herawati T. Hand-held fan airflow stimulation relieves dyspnea in lung patients with cancer. *Asia Pac J Oncol Nurs*. 2017; 4(2):162–167. https://doi.org/10.4103/apjon.apjon_14_17
- Sekse RJT, Hunskaar I, Ellingsen S. The nurse's role in palliative care: a qualitative meta-synthesis. *J Clin Nurs*. 2018; 27:e21–e38. <https://doi.org/10.1111/jocn.13912>
- Solano JP, Gomes B, Higginson IJ. A comparison of symptom prevalence in far advanced cancer, AIDS, heart disease, chronic obstructive pulmonary disease and renal disease. *J Pain Symptom Manage*. 2006; 31(1):58–69. <https://doi.org/10.1016/j.jpainsymman.2005.06.007>
- Sugimura A, Ando S, Tamakoshi K. Palliative care and nursing support for patients experiencing dyspnoea. *Int J Palliat Nurs*. 2017; 23(7):342–351. <https://doi.org/10.12968/ijpn.2017.23.7.342>
- Tufanaru C, Munn Z, Stephenson M, Aromataris E. Fixed or random effects meta-analysis? Common methodological issues in systematic reviews of effectiveness. *Int J Evid Based Healthcare*. 2015; 13(3):196–207. <https://doi.org/10.1097/XEB.0000000000000065>
- World Health Organization. Palliative care. 2022. <https://www.who.int/news-room/fact-sheets/detail/palliative-care> (accessed 1 February 2024)
- Wong SL, Leong SM, Chan CM, Kan SP, Cheng HWB. The effect of using an electric fan on dyspnea in Chinese patients with terminal cancer: a randomized controlled trial. *Am J Hosp Palliat Med*. 2017; 43(1):42–46. <https://doi.org/10.1177/1049909115615127>
- Yokomichi N, Morita T, Nitto A et al. Validation of the Japanese version of the Edmonton Symptom Assessment System-Revised. *J Pain Symptom Manage*. 2015; 50(5):718–723. <https://doi.org/10.1016/j.jpainsymman.2015.05.014>

Short reports

International Journal of Palliative Nursing now publishes short reports, and invites submissions for consideration. Short reports are intended to provide the international palliative care community with the opportunity for concise communication of work that will be of interest to nurses working in palliative care. Submissions are invited on:

- Important ongoing projects—these may include a call for collaboration
- Recently completed research, the intention being rapid spread of important results prior to a full write-up
- Research, clinical innovation, or service development that may not be of sufficient size or implication to warrant a full-length paper, including novel research methodologies

All appropriate submissions will be peer-reviewed as short reports and if accepted will be published both in print and online. Submissions should be no more than 1000 words in length including references and should include a brief explanation (not for publication) of why a short report is preferred to a full-length paper. Work previously communicated as a conference abstract would be welcome but must be written up in an original short report format.

Short reports should be submitted via the usual channel: www.ijpn.co.uk/contribute.shtml

The Editor will be happy to respond to any queries: ijpn@markallengroup.com

