

Humor Interventions in a Palliative Care Setting

Doctoral thesis

to obtain a doctorate (PhD)

from the Faculty of Medicine

of the University of Bonn

Lisa Linge-Dahl, née Linge

from Dresden, Germany

2024

Written with authorization of
the Faculty of Medicine of the University of Bonn

First reviewer: Prof. Dr. Lukas Radbruch

Second reviewer: Prof. Dr. Willibald Ruch

Day of oral examination: 06.12.2023

From the Clinic and Policlinic for Palliative Medicine
Director: Prof. Dr. Lukas Radbruch

For Max – the humor intervention of my life.

Table of Contents

	List of abbreviations	6
1.	Abstract	7
2.	Introduction and aims with references	9
2.1	Background	9
2.2	Aims	10
2.2.1	Systematic Review	10
2.2.2	Study Protocol	10
2.2.3	Humor Interventions for Patients	11
2.2.4	Humor Workshops for Staff	11
2.3	References	12
3.	Publications	14
3.1	Humor Assessment and Interventions in Palliative Care: A Systematic Review	14
3.2	Evaluation of a Study Protocol of the Application of Humor Interventions in Palliative Care through a First Pilot Study	27
3.3	Humour interventions for patients in palliative care – a randomized controlled trial	38
3.4	Humour Workshops for Staff Working in Palliative Care	48
4.	Discussion with references	63
4.1	Systematic review	63
4.2	Study protocol	63
4.3	Evaluation of humor interventions for palliative care patients	63
4.4	Discussion of humor workshops for staff	65
4.5	Concluding remarks	66
4.6	References	66
5.	Acknowledgement	69
6.	Scientific Presentations and Publications	71

List of abbreviations

ANOVA	Analysis of Variance
MIDOS	Minimal Documentation System for patients in palliative care
QST	quantitative sensory testing
SES	Schmerz-Evaluations-Skala (pain evaluation scale)
STCI-S	state-trait-cheerfulness-inventory – state part
STCI-T	state-trait-cheerfulness-inventory – trait part
SWLS	Satisfaction with Life Scale

1. Abstract

Background: The effect of humor intervention in a palliative care setting could prove beneficial and is worth investigating. However, data on humor interventions for palliative care patients are scarce. The impact of humor on palliative care staff members has been more extensively investigated and consistently demonstrates positive effects.

Aim: This study aimed to review the literature, develop a study protocol, and evaluate applicability and the effects of a humor intervention in a palliative care setting, and of humor workshops for health care professionals working in palliative care.

Design: Based on a systematic literature review, a study protocol for a humor intervention in a palliative care setting was developed. A two-step intervention was selected and the intervention and control groups completed questionnaires on life satisfaction, cheerfulness, symptom burden, and perceived stress, and provided saliva samples to measure oxytocin levels. Staff members were invited to participate in 1-2 humor workshops based on the concept of the Humor Helps to Cure Foundation were evaluated within the parameters of cheerfulness, perceived stress and oxytocin levels.

Setting: The clinical study was a randomized controlled monocenter study on patients treated in a palliative care ward. Participants had to be conscious and alert enough to complete data collection. Overall, 55 patients were included and randomized to the intervention or control group. In addition, 31 out of 37 staff members took part in one of four humor workshops.

Results: The systematic review found two studies on humor interventions and 11 on humor assessment. The patient perspective was underrepresented, but humor showed to have a beneficial effect. The study protocol had to be adapted due to a high attrition rate due to lengthy questionnaires and the inapplicability of quantitative sensory testing (QST). The number of questionnaires was reduced and oxytocin in saliva was included instead of QST. In the clinical trial, seriousness, bad mood, and stress were reduced in

the intervention group compared to the control group. Cheerfulness increased significantly after the intervention. However, the complex intervention proved too burdensome for most patients, even though the study design had been drafted specifically for a palliative care setting. Staff humor workshops resulted in a small but not significant oxytocin increase. For staff, distress and bad mood were reduced, seriousness decreased, and cheerfulness increased significantly.

Conclusion: The literature review emphasized the need for systematic research to evaluate the effect of humor interventions on patients. The study protocol demonstrated the importance of brief and valid assessment instruments for data collection in palliative care patients. Those who were able to participate benefited from the effects of the intervention on multiple levels. For future research short and simple interventions, biomarkers for well-being and proxy assessments in addition to patient related outcomes are needed to include patients with reduced cognitive and physical performance status at the end of their lives. Data and feedback from staff confirmed the value of humor for palliative care professionals.

2. Introduction and aims with references

2.1 Introduction and Background

At first glance, the combination of humor and palliative medicine appears incongruous (Aspinal et al., 2003). Palliative medicine is concerned with providing care for individuals who are seriously ill and dying, with the primary objective being the best possible preservation of quality of life rather than prolongation of lifespan. Commonly held perceptions suggest that a peaceful environment at the end of life is important, and thus loud laughter for example may be deemed inappropriate. However, in the clinical practice of palliative care, humor and laughter have been observed to play a prominent role even at the end of life (Rawlinson et al., 2016). This phenomenon has already been captured by the aphorism of George Bernard Shaw: "Life does not cease to be funny when people die any more than it ceases to be serious when people laugh." (Shaw, 1906).

However, humor in palliative medicine has mainly been investigated as a coping mechanism for staff members in palliative care (Müller et al., 2012) until now. Humor strengthens team cohesion and laughing together with colleagues reduces stress levels among staff (Scheel et al., 2017). In contrast, humor in relation to patients remains underexplored (Pinna et al., 2018). Humor can be a valuable resource for some patients, whether it is through shared laughter with family members or healthcare staff, or sometimes even through a dark sense of humor that may briefly relieve tension.

The lack of attention given to the potential benefits of humor for terminally ill patients may be due in part to the methodological challenges that arise when collecting data from individuals at the end of their lives. With a complex symptom burden that includes physical limitations such as pain, nausea, and fatigue, as well as cognitive impairment, psychological stressors and a desire for peace and introspection, participation in research endeavours is often thwarted. However, a systematic literature review (Pinna et al., 2018) suggest that humor can facilitate the development of trusting relationships and improve coping with the burden of illness. Trusting relationships may arise, for instance, between healthcare professionals and patients.

2.2 Aims

2.2.1 Systematic review

To review the current state of research and identify open research gaps, I performed a systematic literature review (Linge-Dahl et al., 2018), which is included in this document under point 3.1. I endeavored to explore the viability of humor interventions for patients in palliative care and their potential health benefits. To this end, I first determined what kind of intervention and evaluation instruments could be implemented in this setting.

2.2.2 Study protocol and humor interventions for patients

Video, group, and individual interventions were all considered, but due to the patients' limited mobility and highly variable physical and psychological states, we opted for personalized interventions for each patient. I established connections with the humor researchers including Prof. Willibald Ruch at the University of Zurich, who are at the forefront of methodology and diagnosis of humor and its related aspects. Additionally, I established a partnership with the "Humor Hilft Heilen" foundation (Humor Helps to Cure), which provides expertise in the field of humorous visits to hospitals and has a wealth of experienced and well-trained hospital clowns and humor trainers that could be recruited for this project. We developed a study setting and adapted the study protocol after piloting the study in a clinical setting with an interactive feedback loop. This aimed to implement an optimized methodology during data collection with patients and staff.

During visits with patients, a condensed version of McGhee's "7 Humor Habits" program (2010) served as the basis for the intervention. Originally designed for 5 sessions (Falkenberg et al., 2013), we shortened it to 1-2 interventions due to the patients' reduced tolerance for interventions and often short hospital stays. The evaluation instruments included questionnaires on satisfaction with life (Satisfaction with Life Scale - SWLS; Glaesmer et al., 2011); cheerfulness, seriousness and bad mood (State-Trait-Cheerfulness Inventory - STCI- S & T, Ruch et al., 1996); symptom burden (Minimal Documentation System - MIDOS; Stiel et al., 2010); and stress perception (Mehnert et al., 2006), as well as a physiological parameter. All questionnaires are described in detail in section 3.2. Our aim was to achieve a balanced combination of psychological and medical assessment tools, and we only utilized validated questionnaires. The selection

of these parameters was aimed at capturing the most comprehensive impression of the effects of our humor interventions with patients in the data. However, this proved to be extremely challenging. The originally planned quantitative sensory testing (QST) as physiological parameter for pain threshold measurement (Mücke, 2014) was too lengthy and burdening for the target group, as this testing requires at least 30 minutes and significant concentration and attention. As an alternative, the measurement of oxytocin in saliva was chosen as a physiological indicator for assessment of well-being (Carter et al., 2007; McCullough et al., 2013). The questionnaire test battery was shortened. The original study design included the Pain Evaluation Scale (Schmerz-Evaluations-Skala – SES; Geissner, 2004), which was intended to assess pain perception before and after the intervention. However, length of that questionnaire also proved to be too burdensome for the patients. Moreover, we were concerned that this assessment tool might have a negative impact on their mood. I extensively documented these experiences from an initial pilot testing and the necessary changes in the methodology in a study protocol, which has been submitted for publication (included in this document under section 3.2). The revised study protocol presented here aims to provide researchers with a suitable template for data collection in study settings with vulnerable patients, such as palliative care.

2.2.3 Humor interventions for patients

The Ethics Committee of the University Hospital Bonn examined and approved the protocol of the study under the number 003/16. To include as many patients as possible, humor interventions were offered weekly over a period of almost two years and evaluated using the methodology developed in the study protocol.

2.2.4 Humor workshops for staff

In addition, humor workshops were designed for the staff of the palliative care unit to include their perspective as well. Through engaging with members of the clinical staff, it has become apparent to the research team that the intersection of humor and health in a medical context is not only pertinent for the well-being of patients, but also crucial for the caregivers. The shortage of nursing personnel and the growing burden (Wilson and

Kirshbaum, 2011) on health care professionals have long posed significant challenges to the healthcare system (Cherny et al., 2015).

Thus, we decided to include humor workshops for the staff of the palliative care unit in our study. Their effect should be scientifically evaluated to determine to what extent humor is suitable as a relief factor for the staff. The methodological basis of the workshops was the program "Humor Helps Care" from the Humor Hilft Heilen foundation, which was originally designed for nursing students and caregivers during their training. The detailed methods and results of these workshops are reported in this document under section 3.3. The study protocol was used to generate the setting for the evaluation instruments.

2.4 References

Aspinal F, Addington-Hall J, Hughes R, & Higginson I J. Using satisfaction to measure the quality of palliative care: a review of the literature. *J Adv Nurs* 2003; 42: 324–339

Carter C, Pournajafi-Nazarloo H, Kramer K, Ziegler T, White-Traut R, Bello D, & Schwertz D. Oxytocin: Behavioral Associations and Potential as a Salivary Biomarker. *Ann N Y Acad Sci* 2007; 1098: 312-322

Cherny N I, Werman B, & Kearney M. Burnout, compassion fatigue, and moral distress in palliative care. In: Cherny N, Fallon M, Kaasa S, Portenoy R K, & Currow D C, eds. *Oxford Textb Palliat Med*. Oxford: Oxford University Press 2015: 246–259

Falkenberg L, McGhee P, & Wild B. Clowns benefit children hospitalized for respiratory illnesses. *Evid Based Complement Alternat Med* 2013: 1-8

Geissner E. Schmerz-Evaluations-Skala (SES - Pain Evaluation Scale). In: Bengel J & Jerusalem D, eds. *Handbuch der Psychologie und Gesundheit (Handbook of Psychology and Health)*. Göttingen: Hogrefe 2004: 232-236

Glaesmer H, Grande G, Braehler E, Roth M. The German version of the Satisfaction with Life Scale – psychometric properties and population based norms. *Eur J Psychol Assess* 2011; 27: 127–132

Linge-Dahl L, Heintz S, Ruch W, Radbruch L. Humor assessment and interventions in palliative care: a systematic review. *Front Psychol* 2018; 9: 890

McCullough M E, Churchland P S, & Mendez A J. Problems with measuring peripheral oxytocin: Can the data on oxytocin and human behavior be trusted?, *Neurosci Biobehav Rev* 2013; 37: 1485-1492

McGhee P E. *The Humor Advantage: Seven Keys to Laughing Your Way to a Healthier Life*. Bloomington, Indiana: AuthorHouse 2010

Mehnert A, Müller D, Lehmann C, Koch U. Die deutsche Version des NCCN Distress-Thermometers - Empirische Prüfung eines Screening-Instruments zur Erfassung psychosozialer Belastung bei Krebspatienten (The German version of the NCCN Distress Thermometer - Empirical examination of a screening tool for assessing psychosocial distress in cancer patients). *Z Psychiatr Psychol Psychother* 2006; 54: 213–223

Mücke M. Quantitative sensory testing in the German Research Network on Neuropathic Pain. *Schmerz* 2014; 28: 607-614

Müller M, Pfister D, Markett S, & Jaspers B. Wie viel Tod verträgt das Team? Eine bundesweite Befragung der Palliativstationen in Deutschland (How much death can the team handle? A nationwide survey of palliative care units in Germany). *Schmerz* 2012. 23: 600–608

Pinna M, Mahtani-Chugani V, Sánchez Correias M, Sanz Rubiales A. The use of humor in palliative care: a systematic literature review. *Am J Hosp Palliat Care* 2018; 35: 1–13

Rawlinson F, Hayes B, & Morrison K. The Role of Humor for Palliative Care Workers: A Systematic Review. *Palliat Med* 2016; 30: 217-224

Ruch W, Köhler G, & van Thriel C. Assessing the "humorous temperament": Construction of the facet and standard trait forms of the state-trait-cheerfulness-inventory — STCI. In: Ruch W, ed., measurement of the sense of humor [special issue]. *Humor* 1996; 9: 303-339

Scheel T E, Putz D, & Kurzawa C. Give me a break: Laughing with colleagues guards against ego depletion. *Eur J Humour Res* 2017; 5: 36–51

Shaw G B. 1906. *A Doctor's Dilemma: A Tragedy*. London: Constable & Company Ltd

Stiel S, Matthes M, Bertram L, Ostgathe C, Elsner F, Radbruch L. Validierung der neuen Fassung des Minimalen Dokumentationssystems (MIDOS) für Patienten in der Palliativmedizin (Validation of the new version of the Minimal Documentation System (MIDOS) for patients in palliative medicine). *Schmerz* 2010; 24:596–604

Wilson J, & Kirshbaum M. Effects of patient death on nursing staff: A literature review. *Br J Nurs* 2011; 20: 559–563

3. Publications

3.1 Publication 1: Humor Assessment and Interventions in Palliative Care: A Systematic Review



Humor Assessment and Interventions in Palliative Care: A Systematic Review

Lisa M. Linge-Dahl^{1*}, Sonja Heintz², Willibald Ruch² and Lukas Radbruch^{1,3}

¹ Department of Palliative Medicine, University of Bonn, Bonn, Germany, ² Personality and Assessment, Department of Psychology, University of Zurich, Zurich, Switzerland, ³ Center for Palliative Care, Malteser Hospital Seliger Gerhard Bonn/Rhein-Sieg, Bonn, Germany

OPEN ACCESS

Edited by:

Tim Bogg,

Wayne State University, United States

Reviewed by:

Liudmila Liutsko,

Instituto Salud Global Barcelona

(ISGlobal), Spain

Konrad Senf,

University of Hohenheim, Germany

*Correspondence:

Lisa M. Linge-Dahl

lisa.linge-dahl@ukbonn.de

Specialty section:

This article was submitted to
Personality and Social Psychology,
a section of the journal
Frontiers in Psychology

Received: 29 September 2017

Accepted: 15 May 2018

Published: 19 June 2018

Citation:

Linge-Dahl LM, Heintz S, Ruch W and
Radbruch L (2018) Humor
Assessment and Interventions in
Palliative Care: A Systematic Review.
Front. Psychol. 9:890.
doi: 10.3389/fpsyg.2018.00890

Background: The central goal of palliative care is to optimize the quality of life of patients suffering from life-limiting illnesses, which includes psychosocial and spiritual wellbeing. Research has demonstrated positive correlations between humor and laughter with life satisfaction and other aspects of wellbeing, and physiological symptoms can be improved by humorous stimuli.

Objectives: The aim of this review is to evaluate humor interventions and assessments that have been applied in palliative care and to derive implications for future research.

Methods: A systematic review of four databases identified 13 included studies. Criteria for inclusion were peer-reviewed English-language studies on humor interventions or assessments in a palliative care context.

Results: Two studies on humor interventions and 11 studies on humor assessment were included in the systematic review. Most of these studies were about the patients' perspective on humor in palliative care. Findings showed that humor had a positive effect on patients, their relatives, and professional caregivers. Humor was widely perceived as appropriate and seen as beneficial to care in all studies.

Conclusions: Even though humor interventions seem to be potentially useful in palliative care, descriptions evaluating their use are scarce. Overall, research on humor assessment and interventions in palliative care has remained limited in terms of quantity and quality. More research activities are needed to build a solid empirical foundation for implementing humor and laughter as part of regular palliative care activities.

Keywords: humor, intervention, palliative care, end-of-life, systematic review

INTRODUCTION

Rationale

Humor has been subject to research and philosophical reflections for centuries and has also been used for interventions in the health sector (Hulse, 1994). Most research has been conducted in pediatrics (review by Sridharan and Sivaramakrishnan, 2016). Apart from the health sector, humor interventions have also been investigated in the field of positive psychology (Ruch and McGhee, 2014; Ruch and Hofmann, 2017). Some studies in medical settings were conducted with older people in nursing homes (Mathieu, 2008; Goodenough et al., 2012; Low et al., 2013), cancer patients

(Itami, 2000; Venter et al., 2008), veterans (Steinhauser et al., 2000), and patients suffering from depression (Shahidi et al., 2011). Positive correlations have been reported on humor and laughter in relation to life satisfaction outside the health care setting (Wild et al., 2003; Ruch et al., 2010), and there is some evidence of a relationship between humor and health (Martin, 2001, 2004).

The theoretical model of the effect of humor on health has been described by Martin (2008) and Gremigni (2012) extensively, who concluded that humor as a complex psychological phenomenon needs to be differentiated according to the kind of humor and the setting. Hearty laughter, for example, works through different mechanisms than social and interpersonal aspects of humor and results in different effects. Social and interpersonal aspects of humor, such as enhancing personal connections, influence health and wellbeing by increasing one's level of social support, while hearty laughter may predominantly affect health by improving the respiratory, musculoskeletal, vocal, and cardiovascular activity. Each kind of humor requires a specific research setting and will produce specific effects (Martin, 2008).

Society perceives humor to have beneficial effects on health and wellbeing (Boyle and Joss-Reid, 2004). Implementation concepts of humor and the scientific evaluation of their effects (Boyle and Joss-Reid, 2004) have been developed over the last century. These different kinds of interventions range from individualized humor therapy visits via the presentation of humorous movies aligned with patients' humor preferences (Schwartz and Saunders, 2010) to clowns working in the public health sector. Warren and Spitzer (2011) provided a summary of different types of clowns working in health care settings (e.g., elder-clowns and "classical" clowns in hospitals) in various countries and concluded that the application in elder and end-of-life care may not only benefit residents and patients, but health care professionals and family members as well. There are not only different types of clowns in healthcare but also different styles of humor that can be assessed (Craik et al., 1996; Schultes, 1997; Martin et al., 2003; Ruch et al., 2018). One of the few randomized controlled studies on humor interventions with adequate power was carried out in Australia and included 398 residents from nursing homes (Goodenough et al., 2012; Low et al., 2013). The single-blind randomized controlled study evaluated a clown intervention over a period of 9–12 weeks, which showed a significant decrease in agitation in residents compared to the control group receiving usual care. Additionally, so called "LaughterBosses" (staff members in nursing homes) were trained as facilitators with techniques to incorporate humor in between elder-clown visits. Humor also seems to be a relevant coping mechanism in various aspects of patients' lives. In her analysis of posts in an online patient-to-patient cancer forum, Demjén (2016) found that patients make fun of cancer and its consequences in multiple and creative ways to cope with their physical and psychological distress.

Despite these beneficial effects, there has been limited research on humor interventions for patients at the end of life. This might result from the societal perception that death is not supposed to be the object of implementations that included humor (Herth,

1990). Also, certain situations or topics might limit or impede the use of humor; for example, unfamiliarity between the patient and the health care professional (Erdman, 1991) or the fear of ridicule in certain patient groups, such as penile cancer patients (Branney et al., 2014).

However, the limited number of existing studies imply that humor might be beneficial toward the end of life as well (Steinhauser et al., 2000). Cox (1998) explored the effect of humor, art, and music on dying children through a literature review and found that any kind of social support and artistic strategies to process emotions and grief helps children: "[...] to remove the distance to others, find relief for depression, enhance their self-esteem, lower anxiety, fear and other feelings of grief and achieve an improved level of acceptance of reality" (Cox, 1998, p. 416). Cancer patients talk about humor as one of the predominant themes and coping strategies in their lives (Venter et al., 2008). Dean (1997) extrapolated findings from humor research in other health care settings and concluded that humor may be applied in the palliative care setting as well. However, she also noted that in certain situations, like crises and imminent death, humor would not be appropriate. From the perspective of health care professionals, Müller et al. (2012) found that humor is one of the three most powerful resources that protect health care teams from the negative effects of the strain of death and dying.

Kanninen (1998) conducted a review on humor in palliative care, but found only one pilot study that analyzed the effect of humor on 14 patients (Herth, 1990). The remaining articles included in Kanninen's review were anecdotal personal experiences of individuals. Kanninen concluded that research is needed to establish if humor is effective in medicine, especially in palliative care. The present paper reviews the study of Herth (1990) and the research that has been added in the two decades since Kanninen's review. It thus lays the foundation for future research on humor interventions in palliative care, assessing the effects on patients, relatives, and health care professionals.

Objectives

The aim of this review is to synthesize humor interventions and assessments that have been applied in palliative care and to derive implications for future research and applications. The investigated patients were diagnosed with an incurable disease and were at the end of their lives. Study designs and outcomes of interventions and assessment are compared and grouped to facilitate cross-study comparisons.

Research Questions

This systematic review evaluates the effectiveness of humor interventions in a palliative care setting. It also outlines which kinds of humor interventions and assessments have been applied in palliative care until now and the methods, results, and limitations of these studies.

METHODS

Study Design

A systematic literature review of qualitative and quantitative research was undertaken in July 2017.

Participants and Interventions

The target group in the reviewed studies consisted of patients in a palliative care setting who received a humor intervention. Studies assessing the perspective of family caregivers or health care professionals on humor were also included. Different kinds of interventions and assessments were reviewed in a range of patient groups and institutions. All patients had diagnoses of incurable diseases and received end-of-life care.

Systematic Review Protocol

Overall, 336 abstracts were found and reviewed by two authors (LLD and LR), with an agreement rate of >95% regarding the investigated publications. Screenings resulted in 64 abstracts that were rated as potentially relevant for the review. Lack of consensus about inclusion was discussed with another author (SH). Next, 32 articles were analyzed as full-text versions, from which 13 met the inclusion criteria (see **Figure 1**), for further information please access the Supplementary Material. The included studies were published between 1990 and 2017. No older studies have been identified in the literature search. The 17 articles which were not included were an opinion paper (Dean, 1997) or articles that investigated patient groups which did not meet the criteria of palliative care (e.g., Low et al., 2015).

Search Strategy

Three search strings on the topics of humor, intervention, and palliative care connected by Boolean operators were used. The search terms were: {(humor OR humor OR humorous OR clowns OR clown[Title/Abstract]) AND (intervention OR training OR coaching OR visit OR practice OR therapy[Title/Abstract]) AND ("palliative care" OR "hospice care" OR "end-of-life" OR geriatric OR "life limiting illness" OR death OR dying[Title/Abstract])}.

Publications were included if they were published in a peer-reviewed journal, contained original qualitative or quantitative data, applied and/or assessed a humor(ous) intervention, evaluated effects on patients or residents in nursing homes receiving palliative care, and were published in English. The year of the publication of the study was not restricted.

Data Sources and Data Extraction

Four key databases (PsycInfo, PubMed, Google Scholar, and Cochrane Library of systematic reviews) were systematically searched to July 16th 2017. Full-text publications were downloaded via the library of the Medical Faculty of the University of Bonn.

Data Analysis

All included articles were reviewed in depth. The selected studies were divided into (a) studies that investigated humor in palliative care as the main goal of the paper and (b) studies in which humor emerged as an important variable from an initial research question that had not focused on this topic, for example assessing end-of-life wishes (Delgado-Guay et al., 2016). Target groups, participant numbers, publication bias, study methodology, and quality of research were also analyzed using a template. However, the wide range of different conceptualizations of humor in the studies as well as methodological weaknesses prevented

meaningful comparison between studies. Results are presented according to target groups and study methodology. Effect sizes were analyzed using Cohen's (1992) guidelines. Potential bias within the studies was identified and discussed.

RESULTS

The 14 included research papers contained data on 13 studies (see **Figure 2**). One study was published in two separate papers, one describing the qualitative results (Kontos et al., 2016) and the other discussing the quantitative results (Kontos et al., 2015). Ten articles were selected because they presented findings of interventions or assessments of humor as the main goal of the paper. Four other publications were included because they dealt with humor, among other variables, as a secondary outcome. Two publications focused on humor interventions and eight mainly on the assessment of patient's perception of humor, while three examined the perspective of caregivers and/or health care professionals. Nine publications described qualitative results (Herth, 1990; Langley-Evans and Payne, 1997; Schultes, 1997; Dean and Gregory, 2004; Adamle and Ludwick, 2005; Richman, 2006; Cain, 2012; Bentur et al., 2014; Kontos et al., 2015), and five articles presented quantitative results (Kissane et al., 2004; Ridley et al., 2014; Delgado-Guay et al., 2016; Kontos et al., 2016; Claxton-Oldfield and Bhatt, 2017). Overall, a total of 759 participants were included in the reviewed studies.

The results are presented in the following order: the two studies that included humor interventions (Schultes, 1997; Kontos et al., 2015, 2016), three studies exploring perception and appropriateness of humor in hospice settings (Herth, 1990; Ridley et al., 2014; Claxton-Oldfield and Bhatt, 2017), followed by five publications that assessed functions and results of humor applications on patients in hospice care (Langley-Evans and Payne, 1997; Dean and Gregory, 2004; Adamle and Ludwick, 2005; Cain, 2012; Delgado-Guay et al., 2016) and one on patients in an oncology ward (Bentur et al., 2014), followed by two studies presenting results from psychotherapists' observations (Kissane et al., 2004; Richman, 2006). Within each of the subsections of the results, the studies are presented in the order of their publication date beginning with the most recent one. At the end of each section, the main information is condensed in a table.

Studies That Included Humor Interventions

Two studies investigated the effects of humor interventions in a palliative care setting (Schultes, 1997; Kontos et al., 2015, 2016), one for patients with advanced dementia in nursing homes, and one for patients being treated by a hospice service at home. Both studies applied humor interventions in a palliative care setting. While one study used clowns (Kontos et al., 2015, 2016), the other study involved nurses using humor with the patient (Schultes, 1997). The outcome measures and the study participants varied strongly, limiting comparability between studies (see **Table 1**).

A Canadian study using so called "elder-clowns" (with a red nose, but minimal make-up and clothing from an earlier era) applied approximately 10 min humor interventions twice a week over a period of 12 weeks to nursing home residents in an advanced stage of dementia (Kontos et al., 2016). No

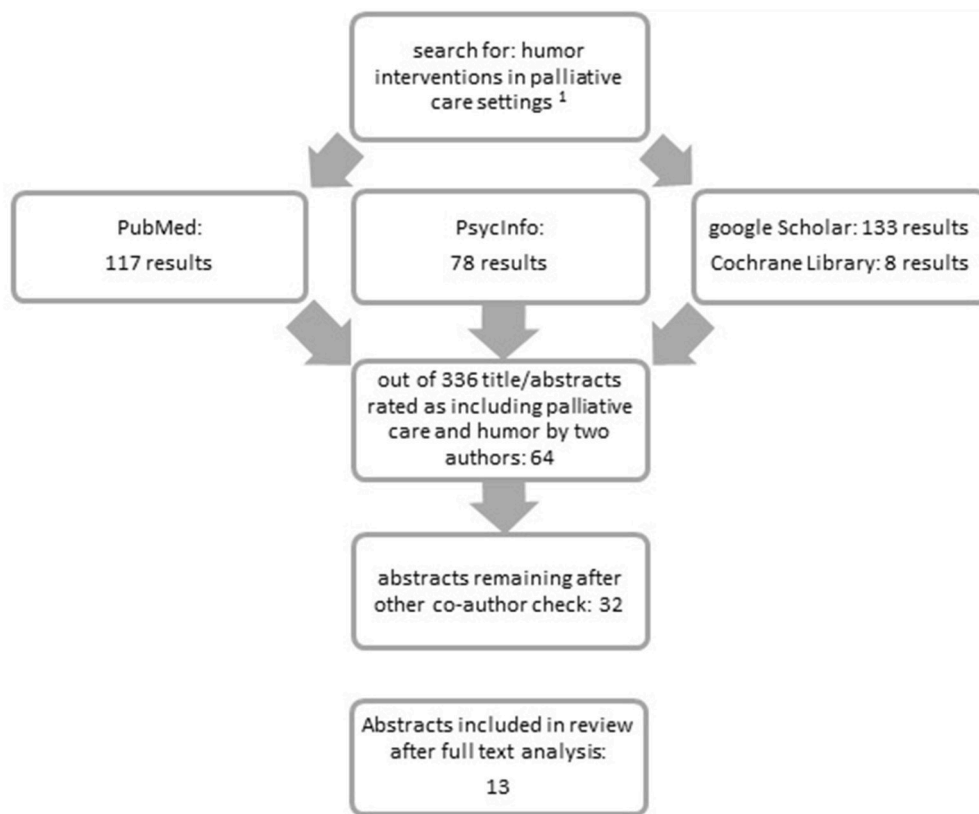
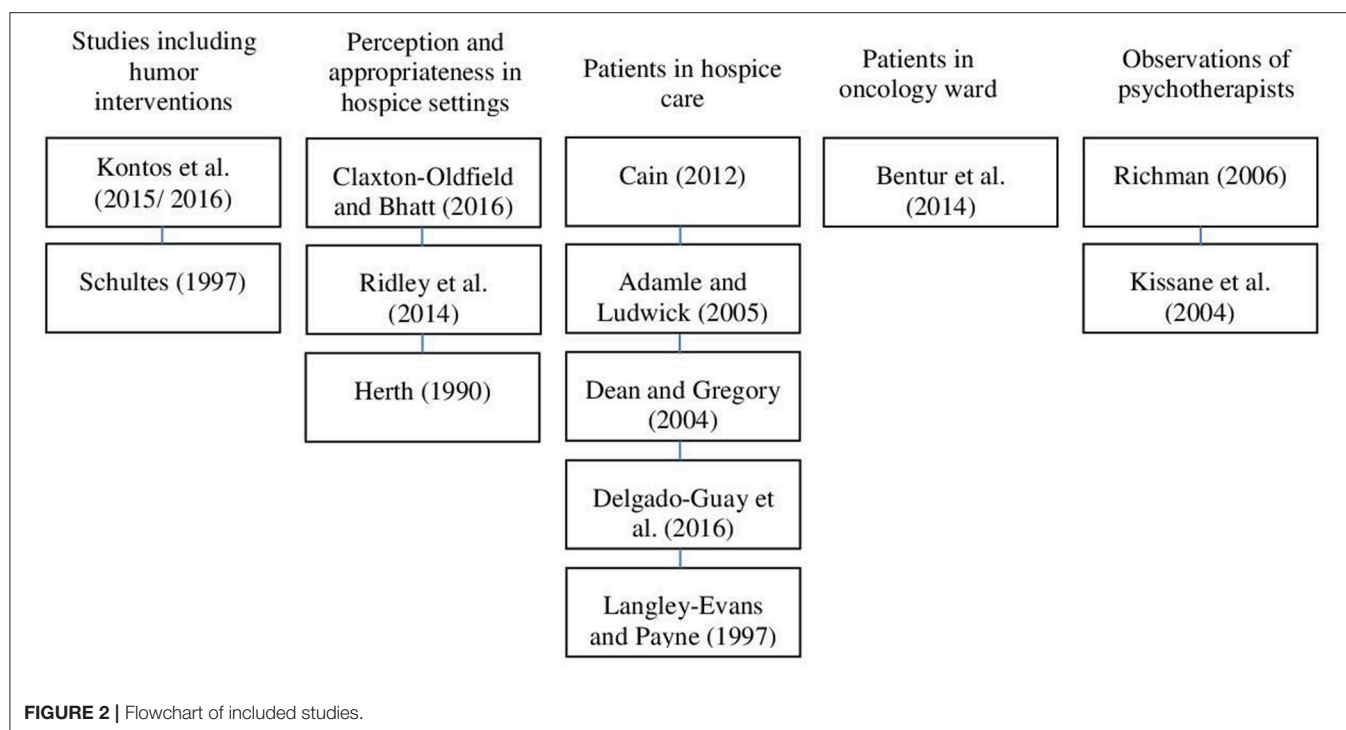


FIGURE 1 | Flowchart of the review protocol. ¹ search terms: {(humor OR humor OR humorous OR clowns OR clown[Title/Abstract]) AND intervention OR training OR coaching OR visit OR practice OR therapy[Title/Abstract]} AND "palliative care" OR "hospice care" OR "end-of-life" OR geriatric OR "life limiting illness" OR death OR dying[Title/Abstract].

control group was investigated, so bias cannot be ruled out. The qualitative results of the study were published separately (Kontos et al., 2015). The clowns used improvisations, humor, empathy, song, musical instruments, and dance. Data collection involved video recording the interventions, and the clowns were interviewed afterwards. Several researchers screened and transcribed the videos to assure interrater reliability. The aim of the intervention was to achieve "relational presence," a term that Kontos et al. define as: "[...] the reciprocal nature of engagement during plays, and the capacity of residents to initiate as well as respond to [...] creative engagement" (p. 5). To facilitate an appropriately tailored intervention for each participant, so called "census information"—personal preferences, history of the patient and personality—was informally collected from staff or family. With a small number of participants ($N = 23$) a significant improvement was found between the baseline and the end of intervention scores in "behavioral and psychological symptoms of dementia" (from $M = 24.4$; $SD = 12.9$ baseline to $M = 18.6$; $SD = 13.1$ after 12 weeks; scale from 0 to 144; $t = -2.68$, $p = 0.01$; Cohen's $d = -0.45$), quality-of-life (from $M = 0.04$; $SD = 0.51$ baseline to $M = 1.05$; $SD = 0.29$; scale from -5 to 5 ; after 12 weeks; $F = 23.09$, $p < 0.001$; Cohen's $d = 2.44$) and "occupational disruptiveness" (from $M = 8.09$;

$SD = 7.1$ baseline to $M = 4.9$; $SD = 5.2$ after 12 weeks; scale from 0 to 60; $t = -2.58$, $p = 0.02$; Cohen's $d = -0.51$) using questionnaires completed by the nursing staff and family members. Use of psychiatric medication and nursing burden did not change significantly. There was a tendency for decreased agitation/aggression, but this did not reach statistical significance (from $M = 3.3$; $SD = 3.3$ baseline to $M = 2.1$; $SD = 2.0$; scale from 0 to 12; $t = -1.86$, $p = 0.07$; Cohen's $d = -0.44$). The authors report that persons diagnosed with dementia could engage in the humor interventions in different ways even though they were in their last stage of life. This engagement ranged from sharing their sadness to reciprocal play, joy, imaginative exploration, and from recognizing humor to even creating humor on their own initiative.

The second intervention was developed after an analysis of the existing literature on humor in health care. Schultes (1997) evaluated a humor intervention for patients treated by hospice home care nurses. The intervention was guided by humor assessment questions to explore the preferred style of humor (e.g., incongruity, nonsense, ridicule, or slapstick) and instructions for nurses on how to observe humorous behavior. After the assessment procedure, humorous cassettes and movies were shown to the patient according to the preferred humor style.



The intervention was tested in a clinical case study with a 65-year-old woman suffering from metastatic colon cancer. Data collection on the intervention effects was based on observations of the patient by nurses and informal interviews with the patient's relatives. The results of the case study indicated that humorous interactions and listening to humorous cassettes or watching funny movies made the patient feel better, that she demanded less pain medication and smiled more, and that it also improved the quality of her remaining life. Even after the patient's death, her family reported that they continued to watch the movies, which helped them to feel relieved and to cope better with their grief, and which gave them a sense of power in a situation where they felt weak. However, the authors did not follow up the case report with a humor intervention trial and the lack of an independent researcher in the data collection could have led to biases.

Studies Assessing or Observing Humor in an Explorative Way

Exploring Perception and Appropriateness in Hospice Settings

Three studies assessed the appropriateness of humor as an intervention in hospice settings using qualitative data (Herth, 1990), quantitative data in general (Ridley et al., 2014), and quantitative data on volunteer-patient interactions (Claxton-Oldfield and Bhatt, 2017). Humor was perceived as appropriate or even essential in those settings, though the authors mentioned limitations regarding the use of humor, such as impending death or absence of a sense of humor (see **Table 2**).

Herth's (1990) small study on 14 terminally ill adults receiving hospice care at home explored patients' perceptions of and

experiences with humor in structured interviews. Patients explained that humor incorporated the following improvements: connectedness, change of perspective, hope, joy and relaxation including physiological improvements. Also, the majority (12 of the 14 participants) of the interviewees stated a need for humor, indicated by quotes such as "Everyone is so sad," "It just makes it harder, I wish we could lighten up," and "If I ever needed humor it is now" (Herth, 1990, p. 38). The author concluded that terminally ill people appeared to be the ones who benefitted the most from humor interventions. As a coping mechanism, humor becomes essential due to deteriorating body functions, unfamiliar procedures, and physical and emotional suffering. Humor was also described as one of the most powerful coping mechanisms. However, the strong conclusions that the authors drew may be questioned in relation to the small sample size of the study.

Ridley et al. (2014) analyzed whether humor is appropriate in a palliative care setting. They interviewed 100 patients in palliative care units and residential hospices. A standardized questionnaire captured patients' perception toward humor therapy prior to and during their illness (Ridley et al., 2014). Ridley et al. reported a potential "bias inherent to retrospective self-reporting" (2014, p. 474). Most participants valued humor as important prior to (77%) and during (76%) their illness. However, the frequency of laughter in patients who laughed 16 or more times a day declined from 65% prior to the illness to 22% during the illness. Patients who rated humor to be more important than other patients were more likely to consider themselves as funny before ($p < 0.001$) and during ($p = 0.014$) their illness.

The perception of appropriateness, types, frequency, and results of humorous interactions in hospice and palliative care

TABLE 1 | Studies including humor interventions.

Authors (year of publication)	Target group (N)	Intervention/assessment	Main results
Kontos et al., 2015, 2016	Nursing home residents (23)	Elder-clown interventions	Humor interventions of elder-clowns resulted in a decreased level of agitation and a nominal decrease in dosing of psychotropic medications. Observation protocols showed improvements in the patients' expression of joy, sadness, reciprocal play, and co-constructed imagination.
Schultes, 1997	Patients receiving home-care or in hospices (1/case study)	Humor intervention implemented and evaluated by hospice home-care nurses	The case study showed that the patient responded well to the humorous films and a change of the mood was perceived from the family as well. The film material was even used after the patient's death and helped the relatives to cope with the loss.

TABLE 2 | Studies exploring perceptions and appropriateness in hospice settings.

Authors (year of publication)	Target group (N)	Intervention/assessment	Main results
Claxton-Oldfield and Bhatt, 2017	Volunteers working in hospice or palliative care (32)	Humor application during patient visits	Humor was applied after getting to know the patient and following the patients lead (40.7%), depending on his stage of illness (41.4%). 96% of the volunteers stated that there is a place for humor in palliative care and 88.9% stated that humor helped them to cope with the demands of their voluntary work.
Ridley et al., 2014	Patients in palliative care units or residential hospices (100)	Questionnaire about appropriateness of humor in palliative care	Patients valued humor as important prior (77%) and during (76%) their illness. The frequency of laughter declined from 65% of patients who laughed 16 or more times a day prior to the illness to 22% during the illness.
Herth, 1990	Terminally ill adults (14)	Structured interview to explore patients views on humor	Eight participants reported humor to be an important part of their lives prior to the illness. Twelve stated that humor would be helpful in the present situation, but only two indicated a presence of humor in their lives.

patients during their interaction with volunteers was analyzed by Claxton-Oldfield and Bhatt (2017) from a volunteers' ($N = 32$) point of view. A quantitative questionnaire was developed on the basis of an informal discussion with four volunteers. The first part of the questionnaire examined the frequency of humor in patient-volunteer interactions (for example "How often do your patients initiate humor with you during your interactions with them?"). The second part examined the acceptability of humor in interactions. The volunteers visited patients in a range of different settings (hospital, client's home, nursing home, and residential hospice). The authors report a potential bias from nonresponse. More than half of the volunteers rated humor as very or extremely important in interactions with patients. In most cases humor was applied (a) after getting to know the patient and following the patients' lead ($n = 11$; 40.7%) and (b) depending on his/her stage of illness ($n = 12$; 41.4%). Impending death was perceived as a very inappropriate moment for the use of humor. All in all, 96% ($n = 31$) of the volunteers believed that there was a place for humor in palliative care, and 88.9% ($n = 24$) stated that humor helped them to cope with the demands of their voluntary work.

Assessment of Functions and Results of Humor Application

Patients in hospice care

Five studies examined the functions and results of humor applications (see **Table 3**). All of them used observations and interviews as methods of data collection. The results demonstrated that humor was crucial for hospice professionals to cope with the demands of their jobs (Cain, 2012), that it was primarily initiated by patients (Adamle and Ludwick, 2005), and that it helped health care professionals and patients to build relationships and to bear difficult situations. Humor was, moreover, a means to express sensibility (Dean and Gregory, 2004), it represented an important end-of-life wish (Delgado-Guay et al., 2016), and it helped patients to distance themselves from their own death (Langley-Evans and Payne, 1997).

Delgado-Guay et al. (2016) compared four different tools developed to rate end-of-life wishes in a randomized controlled trial (RCT). Hundred patients with advanced cancer in an inpatient palliative care unit in South Texas rated "to keep my sense of humor" as one of the ten most important end-of-life wishes (45% of all participants).

TABLE 3 | Studies assessing functions and results of humor application.

Authors (year of publication)	Target group (N)	Intervention/assessment	Main results
Delgado-Guay et al., 2016	Advanced cancer patients (100)	Assessment of end-of-life wishes	45% of the participants rated “to keep my sense of humor” as one of the ten most important end-of-life wishes.
Cain, 2012	Hospice professionals (41 + 7 informal interviews)	Participating observation, structured and informal interviews	Humor was found to inherit an important role predominantly in the back region of the hospice. Humor was found as an instrument of distancing, to enable professionals to deal with emotional difficult times, and being a resource of strength to continue their job.
Adamle and Ludwick, 2005	Patients in hospice care (160)	Observation of patient-nurse –primary caregiver interactions	Humor was observed during more than 80% of all observed visits. 70% of this humor was initiated by the patients, 17% by the nurses, and 12% by the caregivers. The average number of humorous remarks per visit was three.
Dean and Gregory, 2004	Patients, their families and health care professionals in palliative care (15 interviews)	Participating observation, semi-structured (health care professional) and informal interviews (patients and family)	Humor was found to be pervasive and persistent in palliative inpatient care. Three main functional categories of humor emerged from the data: building relationships, contending with circumstances, and expressing sensibility.
Langley-Evans and Payne, 1997	Patients in a day care palliative care ward (14)	Participant observation and informal interviews	Rather nonverbal humorous nature in this “death talk” enabled the patients to distance themselves from their deaths.

TABLE 4 | Studies with patients in other care settings.

Authors (year of publication)	Target group (N)	Intervention/assessment	Main results
Bentur et al., 2014	Advanced cancer patients (22)	In-depth interviews about coping strategies	Humor was found to be one of five coping strategies that were applied by the patients.
Richman, 2006	Patients receiving psychotherapy (8)	Investigation during psychotherapy	Ten features of humor in psychotherapy with patients at the end of their lives emerged. This included empathy, connectedness, the possibility to mentally distance from death, and the reduction of stress.
Kissane et al., 2004	Women with advanced breast cancer (227)	Supportive expressive group therapy	Amongst other topics, genuine humor was found to be a sign of a healthy functioning group in group therapy.

Cain (2012) analyzed “front” and “back region” personalities of health care professionals; that is, the personality shown in front of patients and relatives on the one hand, and the personality presented in team meetings and with colleagues on the other hand. Data was collected through observations over 1 year by a researcher at the ward and 51 interviews with staff-members. Bias was possible because only one researcher collected the data, so no inter-rater checks were conducted. Among the dynamic and complex interactions of staff and patients, she found that humor fulfilled an important role, predominantly in the “back region” of the hospice staff. It was not only an instrument to distance oneself from negative emotions, but also a resource of strength, which enabled professionals to deal with emotionally difficult times.

Adamle and Ludwick (2005) observed 132 interactions between nurse, patient, and primary caregivers in hospice settings (home care hospice services, inpatient hospice, and hospice care in nursing homes) including 160 participants. They

counted the number of occurrences of humor and who initiated them. Potential bias was reported in the selection process of participants. In three different settings, humor was observed in 85% of the 132 observed interactions. In about 70% of the cases, humor was initiated by the patient, and the average number of humor occurrences per visit was three. The lack of humorous occurrences in 15% ($n = 20$) of the observed interactions was due to the cognitive inability or impending death of the patient (nine patients were either in a coma or did not respond physically or mentally to verbal cues, and five patients were dying).

In another study, Dean and Gregory (2004) focused on the circumstances, functions, and appropriateness of humor in an inpatient palliative care unit using participant observation plus informal and structured interviews with 15 health care professionals. Detailed field notes and transcribed interviews were analyzed. Humor was reported to be “pervasive and persistent” (p. 140) and had the following key functions:

(a) building relationships (making connections, humor as attraction, discovering hidden verbal messages, energizing, nurturing community, neutralizing status differences), (b) bearing the situation (humor as respite, humor as survival, humor as tension relief/lightening the heaviness, maintaining perspective/providing support), and (c) expressing sensibility (preserving dignity, acknowledging personhood).

In their ethnographic investigation, Langley-Evans and Payne (1997) studied how patients in a palliative day care unit think and talk about their condition and death, using participant observation over a period of 7 weeks and evaluating field notes and documentary information from health care professionals. One theme that emerged from the qualitative data analyses was the rather nonverbal humorous nature of this “death talk,” which enabled patients to distance themselves from their own deaths.

Patients in Other Settings

Three studies examined patients in other settings (see **Table 4**). Bentur et al. (2014) analyzed coping strategies at the end of life in 22 advanced cancer patients in an Israeli daycare oncology clinic. The interviews were transcribed verbatim and analyzed afterwards. Humor was described as one of the five applied coping strategies. One participant stated on the use of humor “maybe it helped me ease the burden” (Bentur et al., 2014, p. 4).

Two studies in a psychotherapeutic setting with end-of-life care patients extracted data from participant (therapist) observations and showed humor as an unplanned result of an explorative observation. Richman (2006) discussed the functions of humor in psychotherapy. Ten features of humor were developed by Richman based on eight patients, at the end of their lives, receiving psychotherapy. There is a risk of bias due to an unclear selection process of the patients. Skills in the use of humor were found to be necessary for psychotherapists treating patients at the ends of their lives or facing the topic of death. The ten features of humor were: (1) emerges spontaneously, (2) timing is essential, (3) fosters social cohesion, (4) power to reduce stress, (5) enforces feeling of community, (6) permits to distance from death, (7) the content of humor can be negative, (8) communication is essential, (9) requires a healing therapist with empathy, and (10) feeling of commonness.

In a large RCT study on 227 women with metastatic breast cancer, the topics and facilitating aspects of a weekly supportive-expressive group therapy were qualitatively analyzed (Kissane et al., 2004), indicating that genuine humor was a sign of a healthy functioning group. Furthermore, notes of the co-therapists were cross-checked by the main therapists and analyzed qualitatively, resulting in five categories: (1) the structure of supportive-expressive group therapy, (2) the role of therapists, (3) key themes, (4) group transformation, and (5) anti-group phenomena.

DISCUSSION

Summary of Main Findings

By systematically reviewing the state of the art of humor in palliative care two decades after the review of Kanninen (1998), which included only one study on a humor intervention, we were

able to include 13 studies in this review. Study results suggested that humor is an appropriate and useful resource in palliative care, but only two studies evaluated humor interventions in palliative care, and only one of the two was a RCT. Most of the reviewed publications explored and observed humor in different settings. There was no consensus on a definition of humor, on types of intervention, or on the assessment of effects that would allow comparisons of the published trials. Thus, studies were difficult to compare due to a different understanding of what humor interventions should look like, what they should accomplish, and which group of professionals should implement these interventions. Still, some conclusions about the benefits of humor can be derived from the reviewed studies.

One of the key benefits of humor in health care, which was reported in several trials, was an increased pain tolerance (Weisenberg et al., 1995; Zwyer et al., 2004). This finding was also in line with Herth's study (1990) in a palliative setting. However, it needs to be stated that RCT studies would be necessary to show whether the increase in pain tolerance (cold pressure test) was really due to the humorous stimuli or related to distraction or other factors.

Konradt et al. (2012) demonstrated the effect of a humor therapy group on older patients suffering from depression, which led to lower levels of seriousness and higher satisfaction with life scores in comparison to the control group. The study by Kontos et al. (2015) also highlighted the positive impact of clown interventions on physical and psychological well-being, demonstrating the benefits of the holistic approach. These statements need to be interpreted very carefully in relation to the small sample sizes that have been examined. The SMILES model for the implementation of humor in palliative care (Borod, 2006) was developed on the basis of a literature review about uses of humor and was modeled on the SPIKES model for the delivery of bad news in health care (Baile et al., 2000). SMILES aims at facilitating the use of humor in patient-physician interactions. The categories of this model are “smile” (enter patient room with a smile), “make eye contact” (look and actually see the patient), “intuition and imagination” (sense appropriate cues for humor introduction), “look for, listen to, and Leap at the Opportunity” (get the real meaning of patients statements, so register subtle cues), “elephants never forget” (remember exchanges with the patient and use them in following interactions) and “sensitive to situation” (be aware of appropriateness of humor due to the situation). All these categories were illustrated by examples and aim at the application of humor in an appropriate and successful way. The success was not evaluated and bias in the selection of categories is possible.

But how does humor compare to other interventions in terms of well-being? Wellenzohn et al. (2016) tested the effect of different online humor interventions against a control group that reported early childhood memories and found humor to be efficacious. It needs to be noted though that this study included only healthy adults, and humor interventions would thus have to be tested in hospital patients at the end of their lives to provide conclusions for the target group of the present systematic review. Auerbach et al. (2016) were able to show that clinic clowns can induce more positive emotions than a circus clown and a nurse

interaction by assessing the patients' current emotional state. Lacking in the literature is a comparison of humor interventions with other interventions such as music interventions, relaxation, yoga, or art therapy in palliative care (Koch et al., 2016). These controlled studies should include humor interventions as well as active control groups, including comparable interventions like music and art interventions and groups receiving usual care or additional nursing care to determine which beneficial effects are due to humor and laughter, and which ones are due to indirect factors (such as increased positive emotions or more interpersonal contacts). Future studies should also investigate whether humor interventions (in comparison to control groups) can lead to a decrease in the consumption of analgesics as well as a decrease in self-reported pain intensity. In addition, a longitudinal study setting would be preferable for future research as generalizations are limited for the results of cross-sectional studies.

However, there are discrepancies concerning the aim of the humor intervention. While Kontos et al. (2015) stressed that sadness and frustration need to receive sufficient attention and space, Schwartz and Saunders (2010) stated that the aim of humor therapy is to make patients laugh. Kontos et al. further emphasized that the aim of humor interventions is not to make the resident laugh, but to ease his/her state of mind and work with whatever is possible at that very moment. Similarly, the American Cancer Society (quoted in Schwartz and Saunders, 2010, p. 554) defined humor therapy as "[...] the relief of physical or emotional pain and stress and as a complementary method to promote health and cope with illness". Apart from different definitions and concrete applications of humor, the consent of all investigated studies was that humor is not only valuable, but an important component of palliative care: "[...] humor is the glue that helps to put the connection together [...] and as Palliative Care is all about relationships [...] it would be incomplete" (Dean and Gregory, 2004, p. 141).

Not losing one's sense of humor was rated as an important spiritual end-of-life need (Delgado-Guay et al., 2016). These results might differ significantly in other cultural and spiritual settings, but we found no publications on the use of humor outside the Western-European cultural setting.

It has been stated that the sense of humor remains intact in people and even increases toward the end of life (Ruch et al., 2010). Thus, humor interventions are meaningful throughout the whole lifespan, including the end of life. Conducting humor interventions with patients in palliative care makes sense with the limitation that a sense of humor needs to be present in those individual patients taking part (Ruch and Hofmann, 2012; Auerbach, 2017), and the participants should not suffer from gelotophobia (the fear of being laughed at; Ruch et al., 2014).

There were several approaches to assess the patients' preferred kind of humor and whether they perceive humor as appropriate in their individual situation. Asking patients whether they consider themselves to be funny might be used as a screening question to identify people who find humor in their interactions with care providers appropriate (Ridley et al., 2014). However, humor production (being funny) is different from humor appreciation (perceiving humor as appropriate and helpful).

Additionally, this kind of question needs to be used with care and considering the patient's actual emotional and spiritual situation. Adamle and Ludwick (2005) suggested that humor should occur without cues or prompting, enabling spontaneous humor. This would require an emotional atmosphere in the palliative care setting that allows the expression of humor from the patient's point of view. However, there were also critical voices that point to the use of off-color humor (gallows humor) amongst health care professionals (Piemonte, 2015). Self-disparagement related to functional defects was found to be predominant in elderly care, but should be initiated by the residents themselves, as otherwise it could be counterproductive (Keltner and Bonanno, 1997). To understand the benefits and limitations of the use of humor in palliative care, researchers need to conceptualize humor as a continuous rather than a binary concept (to have or not have a sense of humor), and they need to consider different facets of humor, ranging from benevolent humor to mockery (see Craik et al., 1996; Ruch et al., 2018). Both the "flavor" of humor (e.g., supportive, critical) as well as the targets (who jokes about whom) need to be taken into account, because it might heavily influence the impact of the use of humor. As a result, humor in palliative care settings should be social, benevolent, and supportive for the patient and his/her family.

The positive effects of humor on mourning relatives reported by Schultes (1997) has also been assessed by Keltner and Bonanno (1997) in a more structured way using questionnaires and structured interviews. However, family caregivers of patients receiving palliative care have not yet been included in a study in a structured and adequate way to comprehensively assess the effect of humor interventions with them.

In the field of professional caregivers and volunteers, humor was observed to be a valuable resource. Cain (2012) recorded statements of hospice workers saying that former colleagues, who quit their jobs because they could not handle the emotional burden, supposedly did so because they had lacked a sense of humor. This implies that humor is an ingredient to successful performance in this field (Müller et al., 2012). Measurement tools for assessing individual differences in humor could also be useful in the area of palliative care (for reviews see Ruch, 2007; Ruch et al., 2014). Critical aspects of humor such as sarcasm and cynicism could be potentially detrimental in the area of palliative care and thus need to be analyzed in more detail (Ruch et al., 2018). Importantly, assessing humor might put more strains on palliative patients (e.g., in terms of concentration, comprehension, and effort) than on healthy adults, for which humor measures were usually developed and tested. Thus, existing instruments might likely need to be adapted and pre-tested to ensure that the measurement is feasible and ethical in palliative patients. For example, short and/or simplified versions might need to be employed, or the items might need to be read to the patients. This need for short assessment tools has become clear in an unpublished pilot test of our research group.

Attrition numbers are an important component when analyzing the effects of humor interventions, because it is possible that certain people are more likely to remain in this kind of study setting. Low et al. (2013) reported a dropout of 16 residents from the initially 414 people that have been assessed for eligibility. Of

those 16 residents, six did not give consent to participate in the study and 10 died or were transferred to a different location. Kontos et al. (2016) reported screening 45 residents, from which 23 were recruited. No information was provided on the selection process. The authors stated that during the intervention, 10 residents received all treatments, whereas 13 missed an average of 2.3 of the 24 visits. It needs to be taken into account that this kind of dropouts needs to be analyzed carefully in future research to explore potential differences in humor-related traits (such as gelotophobia or the sense of humor) of people who stay in humor intervention studies and those who drop out or decline to participate in the first place. Identification of potential responders might be difficult though, as data from people who decline to participate in a study usually is scarce. The study of Wellenzohn et al. (2016) gave detailed information on a 25% dropout rate from all four investigated groups. The dropouts were younger, with a predominance of men, yet they did not differ from other participants in their baseline levels of happiness or in depressive symptoms.

Limitations

Our search strategy focused on publications in peer-reviewed journals and English language, and thus some interesting and potentially relevant results published in dissertations or in other languages could not be included. Overall, the search strategy might have been too restrictive with its focus on palliative care, as results from other areas of medicine might be transferred to the palliative care setting. However, the cognitive and physical impairment of patients with advanced life-limiting diseases and the high prevalence of depression in these patients put this comparability into question. It is also possible that studies have been published in nonmedical or psychological journals that were not included in the databases chosen for the present systematic review. However, any of these expansions would have gone beyond the scope of this paper.

The findings of the analyzed studies were often based on either self-reports or observations. To ensure the validity of the findings, multi-method studies, such as the study by Kontos et al. (2015, 2016), would be worthwhile. Ideally, these studies should combine for example self-reports, other-reports, physiological measures, and behavior observations, and they should include the perspectives of patients, caregivers, and health care professionals alike.

The small effect sizes of the quantitative studies need careful interpretation. Due to the small sample sizes, the effect sizes, according to Cohen's guidelines (1992), were not interpretable as representative results. Larger samples would be needed to demonstrate the efficiency of the interventions in the studies of Kontos et al. (2016), Claxton-Oldfield and Bhatt (2017), and Adamle and Ludwick (2005). Limitations of studies with small sample sizes (Ioannidis, 2005; Maxwell et al., 2008) also imply that for the study of Kontos et al. (2016) a careful calculation of sample size and power analysis would have been required to improve the quality of results. Using multiple comparisons (e.g., Kontos et al., 2016) would also require corrections for alpha error accumulation, if appropriate to the design (Armstrong, 2014).

The risk of bias has been assessed, and no bias has been found due to mutual cross-checks of the selection of articles between two authors. A publication bias may have affected the published literature because studies with significant positive results are more likely to be published than those without significant results.

A documentation template had been developed for our review, but with only scarce information on the quality of research and details on effect sizes, the scheme did not deliver usable results. A different template with a lower focus on study quality might have been more suitable. In general, the quality of the included studies was not as high as would have been desirable for a systematic review. RCTs of the field are needed. These should include humor interventions as well as other comparable interventions such as music and art interventions as well as a control group receiving usual care. Consensus should be sought for evaluating instruments and study settings for the different types of humor in order to provide meaningful data for comparisons and meta-analyses (Martin, 2008).

It needs to be noted that conducting research in palliative care settings needs to be designed with caution to avoid adding to the burden of patients and relatives with assessment and data collection. Also thorough coordination with nursing staff, physicians, relatives, other research staff and the patients themselves is crucial.

CONCLUSION

The review of the literature has shown that 20 years after the first systematic review, there is still only limited research available on the use of humor interventions and assessments in palliative care. Researchers from different fields agree that humor is not only a valuable resource for patients, but also for health care professionals working with patients at the end of life. A few studies have looked at the effect of humor interventions in this group of patients, mostly with promising results. Still, improved quality of life, better communication and sense of connectedness to staff and family members, the ability to distance oneself from the problems and burdens of the illness, and sometimes enabling a decreased perception of pain have been demonstrated. However, there is no consensus on a definition of humor, on types of interventions, or on the best method to assess the effects that would allow comparisons between published trials. Clearly, more research on the use of humor in palliative care is needed. Advancements in outlining the field of humor (Craik et al., 1996; Ruch et al., 2018) and the evaluation of standardized humor interventions (the Humor Habits Program; McGhee, 2010) might be fruitful for the context of palliative care as well.

Future research should use widely agreed definitions of humor and validated assessment instruments. Data from RCTs with humor interventions from different palliative care settings are needed. In addition, training interventions for palliative care teams would be useful, teaching them to use humor as a resource to prevent burnout, but also fostering an emotional atmosphere that allows patients to express humor in their interactions with staff. This would be an efficient way to introduce humor on a structural level with members of staff. By doing so, humor could

be implemented in palliative care with a long-term perspective rather than within the restricted setting of a clinical trial. Providing this kind of evidence will allow humor interventions to become part of the palliative care toolbox, to help lightening the burden of patients, caregivers, and health care professionals.

AUTHOR CONTRIBUTIONS

The study design and search strategy were conceived by LL-D, LR, and SH. LL-D performed the literature search and screened the search results. Publications were reviewed by LL-D and LR. The manuscript was prepared by LL-D with support from SH, WR, and LR. All authors critically reviewed and contributed to the manuscript and approved the final version.

REFERENCES

- Adamle, K., and Ludwick, R. (2005). Humor in hospice care: who, where, and how much? *Am. J. Hospice Pall. Med.* 22, 287–290. doi: 10.1177/104990910502200410
- Armstrong, R. (2014). When to use the Bonferroni correction. *Ophthalm. Physiol. Opt.* 34, 502–508. doi: 10.1111/opo.12131
- Auerbach, S. (2017). Are clowns good for everyone? The influence of trait cheerfulness on emotional reactions to a hospital clown intervention. *Front. Psychol.* 8:1973. doi: 10.3389/fpsyg.2017.01973
- Auerbach, S., Ruch, W., and Fehling, A. (2016). Positive emotions elicited by clowns and nurses: an experimental study in a hospital setting. *Transl. Issues Psychol. Sci.* 2, 14–24. doi: 10.1037/tps0000055
- Baile, W., Buckman, R., Lenzi, I., Glober, G., Beale, E., and Kudelka, A. (2000). SPIKES—a six-step protocol for delivering bad news: application to the patient with cancer. *Oncologist* 5, 302–311. doi: 10.1634/theoncologist.5-4-302
- Bentur, N., Stark, D., Resnizky, S., and Symon, Z. (2014). Coping strategies for existential and spiritual suffering in Israeli patients with advanced cancer. *Isr. J. Health Policy Res.* 3:21. doi: 10.1186/2045-4015-3-21
- Borod, M. (2006). SMILES—toward a better laughter life: a model for introducing humor in the palliative care setting. *J. Cancer Educ.* 21, 30–34. doi: 10.1207/s15430154jce2101_11
- Boyle, G., and Joss-Reid, J. (2004). Relationship of humour to health. A psychometric investigation. *Br. J. Health Psychol.* 9, 51–66. doi: 10.1348/135910704322778722
- Branney, P., Witty, K., Braybrook, D., Bullen, K., White, A., and Eardley, I. (2014). Masculinities, humour and care for penile cancer: a qualitative study. *J. Adv. Nurs.* 70, 2051–2060. doi: 10.1111/jan.12363
- Cain, C. (2012). Integrating dark humor and compassion: identities and presentations of self in the front and back regions of hospice. *J. Contemp. Ethnogr.* 41, 668–694. doi: 10.1177/0891241612458122
- Claxton-Oldfield, S., and Bhatt, A. (2017). Is there a place for humor in hospice Palliative Care? Volunteers Say “Yes”! *Am. J. Hospice Palliat Med.* 34, 417–422. doi: 10.1177/1049909116632214
- Cohen, J. (1992). A power primer. *Psychol. Bull.* 112, 155–159. doi: 10.1037/0033-2909.112.1.155
- Cox, G. (1998). Using humor, art, and music with dying and bereaved children. *Illness Crisis Loss* 6, 408–420. doi: 10.2190/IL6.4.d
- Craik, K. H., Lampert, M., and Nelson, A. J. (1996). Sense of humor and styles of everyday humorous conduct. *Humor* 9, 273–302. doi: 10.1515/humr.1996.9.3-4.273
- Dean, R. (1997). Humor and laughter in palliative Care. *J. Palliat. Care* 13, 34–39.
- Dean, R., and Gregory, D. (2004). Humor and laughter in palliative care: an ethnographic investigation. *Palliat. Support. Care* 2, 139–148. doi: 10.1017/S1478951504040192
- Delgado-Guay, M., Rodriguez-Nunez, A., De la Cruz, V., Frisbee-Hume, S., Williams, J., Wu, J., et al. (2016). Advanced cancer patients' priorities regarding wishes at the end of life: a randomized controlled study. *J. Clin. Oncol.* 33, 4273–4281. doi: 10.1007/s00520-016-3260-9
- Demjén, Z. (2016). Laughing at cancer: humour, empowerment, solidarity and coping. *J. Pragmat.* 101, 18–30. doi: 10.1016/j.pragma.2016.05.010
- Erdman, L. (1991). Laughter therapy for patients with cancer. *Oncol. Nurs. Forum* 18, 1359–1363. doi: 10.1300/J077V11N04_04
- Goodenough, B., Low, L.-F., Casey, A.-N., Chenoweth, L., Fleming, R., Spitzer, P., et al. (2012). Study protocol for a randomized controlled trial of humor therapy in residential care: the Sydney Multisite Intervention of LaughterBosses and ElderClowns (SMILE). *Int. Psychogeriatr.* 24, 2037–2044. doi: 10.1017/S1041610212000683
- Gremigni, P. (2012). *Humor and Health Promotion*. Hauppauge, NY: Nova Science Publishers.
- Herth, K. (1990). Contributions of humor as perceived by the terminally ill. *Am. J. Hosp. Care* 7, 36–40. doi: 10.1177/104990919000700108
- Hulse, J. (1994). Humor: a nursing intervention for the elderly. *Geriatr. Nurs.* 15, 88–90. doi: 10.1016/S0197-4572(09)90023-4
- Ioannidis, J. (2005). Why most published research findings are false *PLoS Med.* 2:e124. doi: 10.1371/journal.pmed.0020124
- Itami, J. (2000). A trial psychosomatic treatment for cancer—meaningful life therapy. *J. Int. Soc. Life Inform. Sci.* 18, 162–166.
- Kanninen, M. (1998). Humour in palliative care: a review of the literature. *Int. J. Palliat. Nurs.* 4, 110–114. doi: 10.12968/ijpn.1998.4.3.9112
- Keltner, D., and Bonanno, G. (1997). A study of laughter and dissociation. Distinct correlates of laughter and smiling during bereavement. *J. Clin. Oncol.* 73, 687–702.
- Kissane, D., Grabsch, B., Clarke, D., Christie, G., Clifton, D., Gold, S., et al. (2004). Supportive-expressive group therapy: the transformation of existential ambivalence into creative living while enhancing adherence to anti-cancer therapies. *Psychooncology* 13, 755–768. doi: 10.1002/pon.798
- Koch, S., Gruber, H., Kortum, R., Reichelt, S., Martin, L., Warth, M., et al. (2016). Künstlerische Therapien in der Palliativversorgung – ein Review (creative arts therapies in palliative care - a review). *Hospizzeitschrift* 1, 20–26. doi: 10.1055/s-0043-121402
- Konradt, B., Hirsch, R., Jonitz, M., and Junglas, K. (2012). Evaluation of a standardized humor group in a clinical setting: a feasibility study for older patients with depression. *Int. J. Geriatr. Psychiatry* 28, 850–857. doi: 10.1002/gps.3893
- Kontos, P., Miller, K.-L., Colobong, R., Lazgare, L., Binns, M., Low, L.-F., et al. (2016). Elder-clowning in long-term dementia care: results of a pilot study. *J. Am. Geriatr. Soc.* 64, 347–353. doi: 10.1111/jgs.13941
- Kontos, P., Miller, K.-L., Mitchell, G., and Stirling-Twist, J. (2015). Presence redefined: the reciprocal nature of engagement between elder-clowns and persons with dementia. *Dementia* 16, 46–66. doi: 10.1177/1471301215580895
- Langley-Evans, A., and Payne, S. (1997). Light-hearted death talk in a palliative day care context. *J. Adv. Nurs.* 26, 1091–1097. doi: 10.1046/j.1365-2648.1997.00422.x
- Low, L., Baker, J., Harrison, F., Jeon, Y., Haertsch, M., Camp, C., et al. (2015). The lifestyle engagement activity program (LEAP): implementing social and

ACKNOWLEDGMENTS

We would like to thank Nancy Preston, Catherine Joyce Letcher Lazo, Gülay Ates, and Birgit Jaspers for their support with conducting the systematic review and preparation of the manuscript. We would also like to thank Eckart von Hirschhausen for providing very helpful comments and for advising on earlier versions of the manuscript.

SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/fpsyg.2018.00890/full#supplementary-material>

- recreational activity into case-managed home care. *J. Am. Med. Dir. Assoc.* 16, 1069–1076. doi: 10.1016/j.jamda.2015.07.002
- Low, L., Brodaty, H., Goodenough, B., Harrison, F., Jeon, Y.-H., Haertsch, M., et al. (2013). The Sydney Multisite Intervention on Laughter Bosses and ElderClowns (SMILE) study: cluster randomised trial of humor therapy in nursing homes. *BMJ Open* 3:2. doi: 10.1136/bmjopen-2012-002072
- Martin, R. (2001). Humor, laughter, and physical health: methodological issues and research findings. *Psychol. Bull.* 127, 504–519. doi: 10.1037/0033-2909.127.4.504
- Martin, R. (2004). Sense of Humor, physical health, and well-being at work: a three-year longitudinal study of Finnish police officers. *Humor* 17, 21–35. doi: 10.1515/humr.2004.006
- Martin, R. (2008). “Humor and health,” in *The Primer of Humor Research*, ed V. Raskin (Berlin: Mouton de Gruyter), 479–522.
- Martin, R. A., Puhlik-Doris, P., Larsen, G., Gray, J., and Weir, K. (2003). Individual differences in uses of humor and their relation to psychological well-being. *J. Res. Pers.* 37, 48–75. doi: 10.1016/S0092-6566(02)00534-2
- Mathieu, S. (2008). Happiness and humor group promotes life satisfaction for senior center participants. *Act. Adapt. Aging* 32, 134–148. doi: 10.1080/01924780802143089
- Maxwell, S., Kelley, K., and Rausch, J. (2008). Sample size planning for statistical power and accuracy in parameter estimation. *Annu. Rev. Psychol.* 59, 537–563. doi: 10.1146/annurev.psych.59.103006.093735
- McGhee, P. E. (2010). *Humor as Survival Training for a Stressed-Out World: The 7 Humor Habits Program*. Bloomington: AuthorHouse.
- Müller, M., Pfister, D., Markett, S., and Jaspers, B. (2012). Wie viel Tod verträgt das Team? Eine bundesweite Befragung der Palliativstationen in Deutschland. *Schmerz* 23, 600–608. doi: 10.1007/s00482-009-0845-y
- Piemonte, N. (2015). Last laughs: gallows humor and medical education. *J. Med. Humanit.* 36, 375–390. doi: 10.1007/s10912-015-9338-4
- Richman, J. (2006). The role of psychotherapy and humor for death anxiety, death wishes, and aging. *Omega* 54, 41–51. doi: 10.2190/D0NX-7V03-W1H0-4614
- Ridley, J., Dance, D., and Pare, D. (2014). The acceptability of humor between palliative care patients and health care providers. *J. Palliat. Med.* 17, 472–474. doi: 10.1089/jpm.2013.0354
- Ruch, W. (2007). *The Sense of Humor: Explorations of a Personality Characteristic*. Berlin: Mouton de Gruyter.
- Ruch, W., Heintz, S., Platt, T., Wagner, L., and Proyer, R. T. (2018). Broadening humor: comic styles differentially tap into temperament, character, and ability. *Front. Psychol.* 9:6. doi: 10.3389/fpsyg.2018.00006
- Ruch, W., and Hofmann, J. (2012). “A temperament approach to humor,” in *Humor and Health Promotion*, ed P. Gremigni (Hauppauge, NY: Nova Science Publishers), 79–112.
- Ruch, W., and Hofmann, J. (2017). “Fostering humor,” in *Positive Psychology Interventions in Practice*, ed C. Proctor (New York, NY: Springer), 65–80.
- Ruch, W., Hofmann, J., Platt, T., and Proyer, R. (2014). The state-of-the art in gelotophobia research: a review and some theoretical extensions. *Humor* 27, 23–45. doi: 10.1515/humor-2013-0046
- Ruch, W., and McGhee, P. E. (2014). “Humor intervention programs,” in *Handbook of Positive Psychological Interventions*, eds S. Schueller and A. Parks (Oxford: Wiley-Blackwell), 179–193.
- Ruch, W., Proyer, R., and Weber, M. (2010). Humor as a character strength among the elderly. Empirical findings on age-related changes and its contribution to satisfaction with life. *Z. Gerontol. Geriatrie* 43, 13–18. doi: 10.1007/s00391-009-0090-0
- Schultes, L. (1997). Humor with hospice clients: you’re putting me on. *Home Healthc. Nurse* 15, 561–566. doi: 10.1177/104990919100800307
- Schwartz, K., and Saunders, J. (2010). Laughter, Leininger, and home healthcare. *Home Healthc. Nurse* 28, 552–557. doi: 10.1097/NHH.0b013e3181f2f312
- Shahidi, M., Mojtahed, A., Modabbernia, A., Mojtahed, M., Shafiabady, A., Delavar, A., et al. (2011). Laughther yoga versus group exercise program in elderly depressed women: a randomized controlled trial. *Int. J. Geriatr. Psychiatry* 25, 322–327. doi: 10.1002/gps.2545
- Sridharan, K., and Sivaramakrishnan, G. (2016). Therapeutic clowns in pediatrics: a systematic review and meta-analysis of randomized controlled trials. *Eur. J. Pediatr.* 175, 1353–1360. doi: 10.1007/s00431-016-2764-0
- Steinhauser, K. E., Christakis, N. A., Clipp, E. C., McNeilly, M., McIntyre, L., and Tulsky, J. A. (2000). Factors considered important at the end of life by patients, family, physicians and other care providers. *J. Am. Med. Assoc.* 284, 2476–2482. doi: 10.1001/jama.284.19.2476
- Venter, M., Venter, C., Botha, K., and Strydom, M. (2008). Cancer patients’ illness experiences during a group intervention. *J. Psychol. Afr.* 14, 549–560. doi: 10.1080/14330237.2008.10820234
- Warren, B., and Spitzer, P. (2011). Laughing to longevity - the work of elder clown. *Lancet* 378, 562–563. doi: 10.1016/S0140-6736(11)61280-4
- Weisenberg, M., Tepper, I., and Schwarzwald, J. (1995). Humor as a cognitive technique for increasing pain tolerance. *Pain* 63, 207–212. doi: 10.1016/0304-3959(95)00046-U
- Wellenzohn, S., Proyer, R. T., and Ruch, W. (2016). How do positive psychology interventions work? A short-term placebo-controlled humor-based study on the role of the time focus. *Pers. Individ. Differ. Adv.* 96, 1–6. doi: 10.1016/j.paid.2016.02.056
- Wild, B., Rodden, F., Grodd, W., and Ruch, W. (2003). Neural correlates of laughter and humour. *Brain* 126, 1–18. doi: 10.1093/brain/awg226
- Zweyer, K., Velker, B., and Ruch, W. (2004). Do cheerfulness, exhilaration, and humor production moderate pain tolerance. *Humor* 17, 85–119. doi: 10.1515/humr.2004.009

Conflict of Interest Statement: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Copyright © 2018 Linge-Dahl, Heintz, Ruch and Radbruch. This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY). The use, distribution or reproduction in other forums is permitted, provided the original author(s) and the copyright owner are credited and that the original publication in this journal is cited, in accordance with accepted academic practice. No use, distribution or reproduction is permitted which does not comply with these terms.

3.2 Evaluation of a Study Protocol of the Application of Humor Interventions in Palliative Care through a First Pilot Study

Open camera or QR reader and
scan code to access this article
and other resources online.



ORIGINAL ARTICLE

Open Access

Evaluation of a Study Protocol of the Application of Humor Interventions in Palliative Care Through a First Pilot Study

Lisa Linge-Dahl,^{1,*} Sonja Heintz,² Willibald Ruch,³ Maria Bley,⁴ Eckart von Hirschhausen,⁴ and Lukas Radbruch^{1,5}

Abstract

Background: Humor and laughter might have an alleviating effect on pain threshold and enhance coping and building relationships. However, randomized controlled studies in palliative care have struggled with high percentages of attrition and missing values.

Objectives: We aimed to evaluate a study protocol through a pilot study for the evaluation of a multistage humor intervention with psychological and physiological outcome parameters that may be applied successfully in a palliative care environment.

Design: This pilot study utilized a pre–post design. The inclusion of a control group for the final study setting recruiting 120 patients is planned.

Setting/Subjects: The study was a monocenter study in a clinic for palliative care in Germany. All patients were eligible for recruitment. Seven patients were recruited for the pilot study.

Measurements: Interventions were developed using a humor training for psychiatric patients. Quantitative sensory testing for pain threshold testing and questionnaires on humor as a character trait, pain intensity, life satisfaction, and symptom burden were planned to be evaluated before and after three humor interventions.

Results: The feasibility of the original study design was re-evaluated after pilot testing. Only two out of the seven patients were able to complete two interventions, requiring modification. Fewer questionnaires, less complex physiological testing, and reduction from three to two interventions were then planned.

Conclusion: The initial planned research methodology must be adjusted for patients with high symptom burden. In the experimental group of the final study setting, the effects of one to two interventions will be evaluated measuring oxytocin levels in saliva and using standardized questionnaires to determine cheerfulness, life satisfaction and symptom burden, as well as assessing as-needed medication.

Trial registration: DRKS00028978 German Registry of Clinical Studies.

¹Department of Palliative Medicine, University Hospital Bonn, Bonn, Germany.

²Faculty of Health, School of Psychology, University of Plymouth, Plymouth, United Kingdom.

³Department of Psychology, University of Zurich, Zurich, Switzerland.

⁴Foundation "Humor Hilft Heilen" (Humor Helps to Cure), Bonn, Germany.

⁵Center for Palliative Care, Helios Hospital Bonn/Rhine-Sieg, Bonn, Germany

*Address correspondence to: Lisa Linge-Dahl, Department of Palliative Medicine, University of Bonn, Venusberg-Campus 1, Bonn 53127, Germany; E-mail: lisa.linge-dahl@ukbonn.de



Keywords: end-of-life; humor; intervention; palliative care

Background

Defining humor presents a challenge due to its multifaceted nature with a wide range of perspectives and applications. Humor can be self-generated, appreciated, employed as a coping mechanism, convey aggressive content, be practiced as a cheerful and composed attitude toward life, and can be both a component of one's character and a situation-specific state. A definition that comes closest to what we aimed to foster in this study is the one by Ruch,¹ "Humor is associated with a personality-based cognitive-emotional style of processing situations and life in general, characterized by the ability to find positive aspects even in negative situations (dangers, self-threats, etc.), remaining calm and composed, and even being able to smile or react with amusement, at least to some extent."

Humor and health might be related.² Scientific proof for this link is growing, and there are some indications of a beneficial effect of laughter and humor interventions for adult patients.³ A meta-analysis of randomized controlled trials of laughter and humor interventions described a significant decrease of depression, anxiety, and sleep quality in adults.⁴ Pinna et al.⁵ and Linge-Dahl et al.⁶ have summarized the limited studies exploring humor, health, and palliative care. They suggest that palliative care professionals are frequently using humor. Results from this review suggesting patients' coping,^{7–9} relationship-building,¹⁰ and psychotropic dose burden^{11,12} may benefit. This helps the patients by gaining a different perspective of their own dying process.^{13,14} However, the systematic reviews described that standardized evaluations, including a control group, has only been implemented in one of the studies.¹⁵ Results are also limited as humor interventions during the last days of patients' lives are ethically problematic.

Research has shown that humor interventions may be designed in various ways.^{16–19} Humorous videos,^{20,21} clown visits,^{22–24} laughter yoga,^{25,26} and other personalized interventions²⁷ have all shown benefit to some degree. Group and individual interventions^{28,29} and the use of different kinds of humor^{30–33} have been tested. Staff in palliative care institutions show a strong gatekeeper barrier toward new or potentially burdening experiences for their patients.³⁴ Pallia-

tive care professionals' use of humor and laughter within teams has also been documented³⁵ as strongly developed.

The reproducibility of humor interventions is challenging due to the subjective and context-dependent nature of humor. The perception and response to humor can vary significantly among individuals and cultural backgrounds, making it difficult to establish standardized protocols and consistent outcomes across studies. This issue has been acknowledged in the field,^{4,36,37} emphasizing the need for rigorous methodology and replication studies to enhance the reliability and generalizability of results in humor intervention research.

There are significant barriers to performing clinical research in palliative care, especially with randomized controlled studies.^{36,38–40} High levels of attrition have been reported in various patient groups receiving palliative care services such as with advanced cancer,⁴¹ heart failure,⁴² and chronic obstructive pulmonary disease (COPD).⁴³ Patients did not want to take part in studies with "too much record keeping" and reported being "too tired or too sick" (p.77; Ref.³⁶). Chen et al.⁴⁴ asked researchers from the field about their experiences and found that limited funding and work capacities, the challenging nature of the field, and discomfort in relation to the topic also create barriers. Preston et al.⁴⁵ suggested attrition in palliative care clinical trials should be expected. Missing values and attrition in the results should be carefully analyzed.

Some outcome parameters that are often used in palliative care research are quality of life, pain, and overall symptom burden.^{46–49} Positive psychology research rather focuses on outcomes such as life satisfaction and personality traits: for example, cheerfulness, playfulness, or preferred humor styles.^{30,50} Oxytocin might be used as an indicator of well-being.⁵¹ Radioimmunoassay (RIA) oxytocin has previously been described by de Jong et al.⁵² as a potential analysis method.

Methods

Aim of the study

This pilot study aimed to explore a methodology to evaluate the psychological and physical effects of humor interventions on patients treated in a palliative care unit. We selected evaluation instruments that minimized patient burden and attrition. Enhanced



cheerfulness is potentially influenced by humor interventions and was, therefore, included.⁵³

Trial design and study setting

A pilot testing was performed to prepare a monocenter randomized controlled clinical trial. Assessment involved testing the effect of three humor interventions on patients. The evaluation encompassed life satisfaction, character strengths, cheerfulness, burden of symptoms, stress, pain sensation, order of as-needed medication, and pain threshold. The control group would receive standard palliative care.

Recruitment and randomization

Participants were recruited from the palliative care ward of the University Hospital Bonn. Participants had to be conscious, orientated, adequately alert to respond to the questionnaires, and had to speak German fluently. The inclusion criteria fulfillment for each patient was discussed with the ward staff. Potential participants were randomized to intervention group or control group using a simple randomization list constructed with the random number generation function in Microsoft Excel. The study was not blinded. To test for a medium effect with $\alpha > 0.5$ and a power of 0.7 (Cohens d), 240 patients would be required: 120 each in the intervention and control groups. All participants had to provide written informed consent. If inclusion criteria were not met patients that had not completed the assessments could still receive a humor intervention as compassionate use, according to the mission of Humor Hilft Heilen (Humor helps to cure) is to provide humor interventions to anyone who wants to receive it.

Control group data collection was scheduled on alternate days, to avoid inadvertent contact with the humor interventions in progress.

Intervention visits and evaluation instruments

Data collection included measurements of character strengths, cheerfulness, symptom burden and well-being, life satisfaction, pain sensation, and pain threshold.

The humor intervention was based on the Humor Habits program from McGhee,⁵⁴ which has been adapted by Falkenberg et al.⁵⁵ for patients being treated in an inpatient psychiatric setting. It was planned to take place in three separate individualized sessions. Two trained humor coaches by the foundation Humor Helps to Cure (Humor Hilft Heilen) implemented the intervention. If possible the intervention

was repeated on days three and five (or one week after the first intervention according to the availability of the humor coaches, see Fig. 1) following a multistage model.⁵⁵ Each intervention was scheduled to take ~30 minutes. The first intervention included the following elements: remembrance of a funny episode during childhood to find the patient's preferred humor style and then providing humor according to that style for the participant.

The second and third intervention focused on finding humorous aspects in the current situation, producing humor and applying humor in everyday life. Given that the processing speed of the elements per person could vary significantly, the allocation into first, second, and third intervention was tailored to the individual pace of the patients. The coaches used various requisites (such as musical instruments, pencils, and a folding rule) but mostly they communicated and used imagination to create humorous interactions. Both coaches were educated as hospital clowns and play at least one instrument; one studied at a circus school in Brussels, Belgium and is a trained actress, the other studied at the clown school Hannover and is a certified social worker.

After entering, the humor coaches always explored the mood of the patient first and then tried to find a matching tone to communicate. They asked every patient a couple of questions regarding the biography and a humorous anecdote from the patients' childhood to get to know the patient's preferred humor style. Subsequently they tried to find humorous aspects in the current situation using everything available in the room or finding something funny in the information the patient had given. If the patients were still at the palliative care ward the coaches prepared a second and potentially third visit based on the first visit. If it had not happened already, they encouraged the patient with tailored motivations to engage and produce humor themselves.

Unstructured field notes with time stamps were taken to document the interaction with and the reactions of the patients. Qualitative data analysis using MAXQDA software was planned for the field notes. Immediately after the intervention questionnaire assessment was repeated.

Cheerfulness was measured using the state-trait-cheerfulness-inventory—trait part and state part (STCI-T and STCI-S).^{56–59} The STCI-T (30 items) and STCI-S (18 Items) consist of cheerfulness, seriousness, and bad mood scales, which are built from sum scores of 10 (STCI-T) and 6 (STCI-S) items, respectively. The investigator aided questionnaire completion



TIMEPOINT	STUDY PERIOD						
	Enrollment Randomization		Post-allocation				
	Day 0	Day 1	Day ₁ (pre)	Day ₁ (post)	Day ₃ (pre)	Day ₃ (post)	Day ₇
ENROLMENT:							
Eligibility screen	X						
Informed consent	X						
Group allocation		X					
INTERVENTIONS:							
Intervention 1*			↔				
Intervention 2*					↔		
Intervention 3*,**							
ASSESSMENTS:							
Pain medication		X		X	X	X	
Character strengths VIA-IS			X				
Cheerfulness state STCI-S			X	X	X	X	
Cheerfulness trait STCI-T			X				
Life satisfaction SWLS			X		X		
Symptom burden MIDOS			X	X	X	X	
Pain evaluation SES			X	X	X	X	
Pain threshold QST			X	X	X	X	
Post-Intervention Interview							X
TIME (min):	10		70-90	35-40	45-55	35-40	10-20

FIG. 1. SPIRIT flowchart of pilot test sequence intervention group. *Each intervention took 20–30 minutes.
**Same data collection scheme as intervention 2 on day five.

by reading questions to patients or supervising the patients' reading and responses, depending on patient performance level. Symptom burden and well-being were assessed using the Minimal Documentation System for patients in palliative care (MIDOS).⁶⁰ MIDOS uses categorical scales, with 10 items on physical and psychological symptoms and one item on gen-

eral well-being. Life satisfaction was measured using the Satisfaction with Life Scale (SWLS)⁶¹ it comprises five items whose sum score indicates current life satisfaction. All questionnaires are listed in the Supplemental Material.

Assessment of humor as character trait using the Values in Action Inventory of Strengths (VIA-IS)⁶²



with 240 items and perception of pain using the Schmerz-Evaluations-Skala (pain evaluation scale) (SES)⁶³ consisting of 24 items were included.

Measurement of the pain threshold using an extract of the quantitative sensory testing (QST) system.⁶⁴ QST is a standardized method for testing perception- and pain-thresholds using different mechanical stimuli and by that, the functioning of the somatosensory system can be characterized. QST puts calibrated stimuli on the skin and underlying tissue to test the perception and pain-threshold or pain-tolerance-threshold using nonpainful and painful stimuli.^{46,64–67} For this study, three out of the seven standardized tests were included. The mechanical detection thresholds (von Frey filaments and a 64-Hz tuning fork), mechanical pain sensitivity (Pinprick stimuli, brush, Q-Tip, cotton wool) and the pressure pain threshold, to reduce the burden on the participants. It was estimated that the three QST tests would take a maximum of 30 minutes. All tests and questionnaires added up to 328 items and a total duration of preintervention testing of more than one hour. The post-interventional status would take ~30 minutes.

Information on as-needed medication administered before and after the interventions was extracted from the patients' medical records. This information aimed to determine whether observed differences in symptom intensity were related to medications.

The same test batteries were repeated before (STCIS, SWLS, MIDOS, SES, and QST) and after the second and third intervention (Fig. 1). A semistructured interview was planned two days after the third intervention to explore the patient's experience and perceived intervention burden and benefit. The interview guideline was divided into three main categories with seven open-answer questions. Answers were documented on paper by the researcher who conducted the interview and the interventions. We planned to use MAXQDA for qualitative data analysis.

Ethics

This study was approved by the ethics committee of the University Hospital Bonn (No. 003/16). Every participant will be asked to give written informed consent before being included in the study. The informed consent document and committee approval letters are obtained.

Results of Pilot Study

Seven patients were recruited for a pilot study, but only three were able to complete the pain threshold mea-

surement. Two agreed to complete the related questionnaires and take part in two interventions; one completed all the test instruments before and after the two interventions. This patient also agreed to the assessment of the pain threshold (QST) and questionnaires after the second intervention. The other patients did not consent to repeat QST or did not complete questionnaires. One patient agreed to the day seven interview.

All patients commented on the questionnaires as being too long, especially the SES to having a number of redundant questions and being difficult to understand after about half of the items. The participating researcher observed reduced levels of concentration and alertness toward the end of data collection and a negative mood swing after the completion of the SES. The application of QST was commented as very uncomfortable by the three patients who agreed to take part in the procedure. Patients complained that they had to fill out the same questionnaires before and after the intervention in all cases.

Discussion

Limitations

The interventions were standardized to a limited extent and otherwise individualized for each patient, resulting in restricted methodological transferability and a low generalizability of the findings.

As previously outlined in the background section, humor encompasses a wide range of manifestations, making its definition and measurement challenging. This aspect further impacts the transferability of results.

The first challenge with the initiation of the study was to overcome staff's gatekeeper function, members of the clinical team voiced concerns a large portion of eligible patients had cognitive impairment and advanced disease that should preclude them from participation. We instituted ~15-minute educational dialogue sessions during staff meetings to educate the clinical teams about the pilot study. Close cooperation with the senior physician and the lead nurse was maintained in the adaption process of the study protocol after the pilot testing.

The control group would be more meaningful if they received an intervention such as reading to them or showing a video, which uses the same amount of time and attention as the humor intervention. No patients from the control group were included in the pilot test. However, for the final study, the intention



is to provide the best palliative care for all patients. This could potentially introduce bias due to additional attention given to the intervention group.

The functional status of different patients may vary significantly, due to differences in underlying diseases and stages of illnesses. Use of a staging system could help to standardize the impact of the disease.

As Blum et al.³⁶ previously reported, there is bias toward exclusion of patients with high symptom burden. This limitation affects the generalizability of the findings to all palliative care patients.

In addition, the transferability of results is constrained by the fact that the study was conducted in a single-center setting. Since the study was not blinded, there is also a risk of bias due to potential variations in the researchers' interactions with the intervention and control group.

Implementing interviews within the study framework was challenging due to temporal constraints. Patients who were fit enough to participate in data collection were often discharged home or transferred to a hospice within the seven-day study period.

Finally, patient expectations surrounding a humor intervention may have been a source of bias in our pilot study. One of the patients, for example, voiced a concern her physical and mental state may inhibit her sense of humor. Although this ultimately was not the case for her, such anticipation itself could affect outcomes. Therefore, future studied interventions will begin with a careful assessment of the patient's prior expectations and current situation to minimize potential bias introduction.

Discussion of changes after pilot testing

The literature on humor interventions in palliative care has primarily been focused on workshops and interventions for staff.^{34,35} However, humor interventions may have a meaningfully supportive role for patients receiving palliative care services. This pilot study supported literature findings³⁶ suggesting extensive research data collection is excessively burdensome for those facing serious illness. Higher symptom burdens and increased time obligations restrict these patients' capacity to participate in extended research-related activities. We considered the cognitive and physical limitations often experienced by this population when creating the pilot study protocol.

However, its results demonstrated more challenges than anticipated. Our pilot study supported the available literature^{39,40} suggesting our single center would

be unlikely to recruit sufficient statistical power. However, research on complex interventions⁶⁸ such as humor therapy may be difficult to evaluate in multicenter trials, as these interventions are provided by highly skilled specialists who would need to be trained in advance to maximize comparability between therapists and centers. It was determined the semistructured interview planned for two days after the third intervention (day seven) was excessively burdensome for this patient population.

We plan to involve our specialized homecare palliative care team (SAPV) in the study, as home-treated patients in our services often have more resources and are in healthier condition. This may facilitate the participation in interventions and more complete datasets. The palliative care inpatient consultation team in the hospital is working on transferring patients with palliative care needs earlier, so that we can reduce the proportion of patients in the terminal phase of dying who are being treated at the palliative care ward. This team is working toward early integration of palliative care, including earlier transfer to the palliative care unit for patients with complex problems and needs. This should lead to more patients receiving crisis intervention with subsequent transfer to other care settings and less imminently dying patients in the palliative care unit. This in turn should lead to a higher percentage of patients eligible for humor interventions.

Because of the high attrition rate in the pilot testing some instruments were removed from study setting. This study found hints that completing the SES⁶³ increased patients' negative mood. Therefore, when we had to decide on shortening data collection to reduce attrition, the complete scale was removed from the study setting. The QST⁶⁴ caused a significant physical burden and the testing elicited pain sensations in patients, who already suffered from disease-related pain to some extent. Therefore, we decided to exclude QST from the final study, as we deemed the additional burden as ethically inappropriate.

The VIA-IS, with its 240 items, was too long for patients in our palliative care unit to complete. Even though having a comprehensive profile on the character strengths of all participants would have provided valuable information, implementation was not feasible due to resource and ethical considerations. The interview was also hardly conducted due to discharge, illness progression, fatigue, or other reasons. These modifications reduced the preintervention assessment from ~60 to 30 minutes and the post-intervention from 40 to 10 minutes.



The questionnaires that remained in the study protocol after pilot testing were STCI-T, STCI-S, SWLS, and MIDOS (Fig. 2) because the number of items of these instruments seemed manageable for the patients. We included the STCI-T in the study because it has significantly fewer items compared with the VIA-IS and allows for checking statistical equality between the intervention and control groups. The STCI-S, as the main variable for potential mood changes, had to be retained.

We included life satisfaction, measured by the SWLS, because it has been widely used in previous

studies, consists of only five items, and enables us to compare our results with others' research. We kept the MIDOS for evaluating the burden of symptoms since patients found it less burdensome than the SES during pilot testing. Including this medical evaluation instrument in the test battery was valuable for our research concept. Finally, assessment of the effect of one to two humor interventions on 120 patients, evaluating life satisfaction, cheerfulness, burden of symptoms, stress, order of as-needed medication and oxytocin levels in saliva was planned.

TIMEPOINT	STUDY PERIOD						
	Enrollment Randomization			Post-allocation			
	Day 0	Day 1	Day ₁ (pre)	Day ₁ (post)	Day ₃ (pre)	Day ₃ (post)	Day ₅
ENROLMENT:							
Eligibility screen	X						
Informed consent	X						
Group allocation		X					
INTERVENTIONS:							
Intervention 1*			↔				
Intervention 2*					↔		
ASSESSMENTS:							
Pain medication		X		X	X	X	
Cheerfulness state STCI-S			X	X	X	X	
Cheerfulness trait STCI-T			X				
Life satisfaction SWLS			X		X		
Symptom burden MIDOS			X	X	X	X	
Level of oxytocin			X	X	X	X	
Post-Intervention Interview							X
TIME (min):	10		20-35	5-10	15-25	5-10	10-20

FIG. 2. SPIRIT flowchart of final test sequence intervention group. *Each intervention took 20–30 minutes.



Potential alternative physiological parameter

Oxytocin has been suggested as a potential indicator of well-being, as it is involved in social bonding, positive emotions, and stress regulation.^{69,70} Research has shown that higher levels of oxytocin are associated with enhanced social interactions and improved mental health outcomes.^{71,72} However, it is important to note that the relationship between oxytocin and well-being is complex, and further studies are needed to fully confirm its role as a valid indicator of well-being. The laboratory regulations prohibit saliva collection for oxytocin measurements if patients have multiresistant infections.

After completing the questionnaire, a study nurse would collect saliva by having the patient chew on a cotton wool roll for at least 60 seconds. The sample would then immediately be placed on dry ice at -80°C and then stored in a refrigerator at -80°C . Samples would then be shipped to the laboratory by courier service every six months. The salivary oxytocin level could be analyzed before and immediately after the humor interventions. For each sample 300 μL of saliva would be evaporated (Concentrator, Eppendorf, Germany), and 50 μL of assay buffer would be added, followed by 50 μL anti-oxytocin rabbit antibodies.

The detection limit of the RIA is 0.1–0.5 pg/sample; the intra- and interassay variabilities were $<10\%$. Plasma samples (0.5 mL) were kept at -20°C until extraction using heat-activated LiChroprep[®] Si60 (Merck) at 690°C for three hours. Twenty milligrams of LiChroprep Si60 in 1 mL distilled water are added to the sample, mixed for 30 minutes, washed twice with distilled water and 0.01 mol/L HCl, and eluted with 60% acetone. The evaporated extracts and evaporated saliva samples (0.3 mL) are analyzed for oxytocin together in a highly sensitive and specific RIA.

Conclusion

Our pilot study revealed some unanticipated barriers for participation and potential biases that could be minimized further. We were able to utilize these results to more efficiently develop a protocol for a vigorous study that will enhance participation and optimize outcome reliability. Patients receiving treatment in the palliative care unit have a limited remaining life span, thus slimming down the humor intervention with the reduction from three to two interventions and condensing the content represents one of the most crucial improvements resulting from the pilot testing.

Acknowledgments

Our thanks go to all persons at the University Hospital Bonn and most importantly to the patients who agreed to take part in this study.

Consent to Publish

This article does not include details, images, or videos relating to an individual person. All information has been pseudonymized. A trial number was assigned to each patient, and all personal data have been linked to this number.

Authors' Contributions

The article was written by the first author who also conducted the scientific evaluation of the humor interventions. All other authors contributed in the development of the study setting and provided substantial feedback to the article. We also thank Lena Straßburger and Sarit Quirin for proof reading and editing the article.

Funding Information

The foundation Humor Hilft Heilen (Humor Helps to Cure), Bonn participated in the conceptualization of the study as a source of knowledge on humor interventions. During data collection this nonprofit organization provided the salary for their humor coaches.

Author Disclosure Statement

No competing financial interests exist.

Supplementary Material

Questionnaires

References

1. Ruch W. Humor und Charakter [Humor and Character]. In: *Humor in Psychiatrie und Psychotherapie* [Humor in Psychiatry and Psychotherapy]. (Wild B. ed.) Schattauer: Stuttgart, Germany, 2012; pp. 8–27.
2. Bennett M, Lengacher C. Humor and laughter may influence health: III. Laughter and health outcomes. *Evid Based Complement Alternat Med* 2008;5(1):37–40.
3. Steinhäuser KE, Christakis NA, Clipp EC, et al. Factors considered important at the end of life by patients, family, physicians, and other care providers. *JAMA* 2000;284(19):2476–2482.
4. Zhao J, Yin H, Zhang G, et al. A meta-analysis of randomized controlled trials of laughter and humour interventions on depression, anxiety and sleep quality in adults. *J Adv Nurs* 2019;75(11):2435–2448.
5. Pinna M, Mahtani-Chugani V, Sánchez Correas M, et al. The use of humor in palliative care: A systematic literature review. *Am J Hosp Palliat Med* 2018;35(10):1342–1354.
6. Linge-Dahl L, Heintz S, Ruch W, et al. Humor assessment and interventions in palliative care: A systematic review. *Front Psychol* 2018;9:890.
7. Cain C. Integrating dark humor and compassion: Identities and presentations of self in the front and back regions of hospice. *J Contemp Ethnography* 2012;41(6):668–694.



8. Claxton-Oldfield S, Bhatt AI. Is there a place for humor in hospice palliative care? Volunteers say "yes"! *Am J of Hosp Palliat Med* 2017;34(5): 417–422.
9. Bentur N, Stark D, Resnizky S, et al. Coping strategies for existential and spiritual suffering in Israeli patients with advanced cancer. *Isr J Health Policy Res* 2014;3:21.
10. Dean R, Gregory D. Humor and laughter in palliative care: An ethnographic investigation. *Palliat Support Care* 2004;2(2):139–148.
11. Kontos P, Miller K-L, Mitchell G, et al. Presence redefined: The reciprocal nature of engagement between elder-clowns and persons with dementia. *Dementia* 2015;16(1):46–66.
12. Kontos P, Miller K-L, Colobong R, et al. Elder-clowning in long-term dementia care: Results of a pilot study. *J Am Geriatr Soc* 2016;64(2):347–353.
13. Richman J. The role of psychotherapy and humor for death anxiety, death wishes, and aging. *Omega* 2006;54(1):41–51.
14. Langley-Evans A, Payne S. Light-hearted death talk in a palliative day care context. *J Adv Nurs* 1997;26:1091–1097.
15. Delgado-Guay M, Rodríguez-Núñez A, De la Cruz V, et al. Advanced cancer patients' priorities regarding wishes at the end of life: A randomized controlled study. *Support Care Cancer* 2016;24(10):4273–4281.
16. Hofmann J, Ruch W. Moving Forward in Fostering Humour: Towards Training Lighter Forms of Humour in Multicultural Contexts. In: *Theoretical Approaches to Multi-Cultural Positive Psychological Interventions*. (van Zyl L, Rothmann S. eds.) Springer: Cham; 2019.
17. Pérez-Aranda A, Hofmann J, Feliu-Soler A, et al. Laughing away the pain: A narrative review of humour, sense of humour and pain. *Eur J Pain* 2019; 23(3):220–233.
18. Ruch W, McGhee PE. Humor Intervention Programs. In: *The Wiley Blackwell Handbook of Positive Psychological Interventions*. (Parks AC, Schueller SM. eds.) Wiley-Blackwell: Oxford and Hoboken, NJ, USA, 2014; pp. 179–193.
19. Hofmann J, Ruch W. Laughter. In: *Oxford Bibliographies Online*. (DS D. ed.) Oxford University Press: New York, NY, USA; 2017.
20. Bains G, Berk L, Lohman E, et al. Humors effect on short-term memory in healthy and diabetic older adults. *Altern Ther Health Med* 2015;21(3): 16–25.
21. Gelkopf M, Gonen B, Kurs R, et al. The effect of humorous movies on inpatients with chronic schizophrenia. *J Nerv Ment Dis* 2006;194(11):880–883.
22. Warren B, Spitzer PL. Laughing to longevity—The work of elder clown. *Lancet* 2011;378(9791):562–563.
23. Goodenough B, Low L-F, Casey A-N, et al. Study protocol for a randomized controlled trial of humor therapy in residential care: The Sydney Multisite Intervention of LaughterBosses and ElderClowns (SMILE). *Int Psychogeriatr* 2012;24(12):2037–2044.
24. Low L, Brodaty H, Goodenough B, et al. The Sydney Multisite Intervention on Laughter Bosses and ElderClowns (SMILE) study: Cluster randomized trial of humor therapy in nursing homes. *BMJ Open* 2013;3:e002072.
25. Ellis J, Ben-Moshe R, Teshuva K. Laughter yoga activities for older people living in residential aged care homes: A feasibility study. *Australas J Ageing* 2017;36(3):28–31.
26. Fujisawa A, Ota A, Matsunaga M, et al. Effect of laughter yoga on salivary cortisol and dehydroepiandrosterone among healthy university students: A randomized controlled trial. *Complement Ther Clin Pract* 2018;32:6–11.
27. Gonot-Schoupinsky F, Garip G. Laughter and humour interventions for well-being in older adults: A systematic review and intervention classification. *Complement Ther Med* 2018;38:85–91.
28. Konradt B, Hirsch R, Jonitz M, et al. Evaluation of a standardized humor group in a clinical setting: A feasibility study for older patients with depression. *Int J Geriatr Psychiatry* 2012;28(8):850–857.
29. Wellenzohn S, Proyer R, Ruch W. Who benefits from humor-based positive psychology interventions? The moderating effects of personality traits and sense of humor. *Front Psychol* 2018;9:821.
30. Craik K, Lampert M, Nelson A. Sense of humor and styles of everyday humorous conduct. *Humor Int J Humor Res* 1996;9(3–4):273–302.
31. Schultes L. Humor with hospice clients: You're putting me on. *Home Healthc Nurse* 1997;15(8):561–566.
32. Martin R, Puhlik-Doris P, Larsen G, et al. Individual differences in uses of humor and their relation to psychological well-being. *J Res Personality* 2003;37:48–75.
33. Ruch W, Heintz S, Platt T, et al. Broadening humor: Comic styles differentially tap into temperament, character, and ability. *Front Psychol* 2018;9:6.
34. Ross C, Cornbleet M. Attitudes of patients and staff to research in a specialist palliative care unit. *Palliat Med* 2003;17(6):491–497.
35. Muller M, Pfister D, Markett S, et al. Wie viel Tod verträgt das Team? Eine bundesweite Befragung der Palliativstationen in Deutschland [How many patient deaths can a team cope with?: A nationwide survey of palliative care units in Germany]. *Schmerz* 2009;23(6):600–608.
36. Blum D, Inauen R, Binswanger J, et al. Barriers to research in palliative care: A systematic literature review. *Prog Palliat Care* 2015;23(2):75–84.
37. van der Wal CN, Kok RN. Laughter-inducing therapies: Systematic review and meta-analysis. *Soc Sci Med* 2019;232:473–488.
38. Jordhøy M, Kaasa S, Fayers P, et al. Challenges in palliative care research; attrition and compliance: Experience from a randomized controlled trial. *Palliat Med* 1999;13(4):299–310.
39. Stromgren A, Sjogren P, Goldschmidt D, et al. A longitudinal study of palliative care: Patient-evaluated outcome and impact of attrition. *Cancer* 2005;103(8):1747–1755.
40. Rinck GC, van den Bos GA, Kleijnen J, et al. Methodologic issues in effectiveness research on palliative cancer care: A systematic review. *J Clin Oncol* 1997;15(4):1697–1707.
41. Applebaum AJ, Lichtenthal WG, Pessin HA, et al. Factors associated with attrition from a randomized controlled trial of meaning-centered group psychotherapy for patients with advanced cancer. *Psychooncology* 2012; 21(11):1195–204.
42. Bakitas M, Dionne-Odom J, Pamboukian S, et al. Engaging patients and families to create a feasible clinical trial integrating palliative and heart failure care: Results of the ENABLE CHF-PC pilot clinical trial. *BMC Palliat Care* 2017;16:45.
43. Steinhauser KE, Clipp EC, Hays JC, et al. Identifying, recruiting, and retaining seriously-ill patients and their caregivers in longitudinal research. *Palliat Med* 2006;20(8):745–754.
44. Chen E, Riffin C, Reid M, et al. Why is high-quality research on palliative care so hard to do? Barriers to improved research from a survey of palliative care researchers. *J Palliat Med* 2014;17(7):782–787.
45. Preston NJ, Fayers P, Walters SJ, et al. Recommendations for managing missing data, attrition and response shift in palliative and end-of-life care research: Part of the MORECare research method guidance on statistical issues. *Palliat Med* 2013;27:899–907.
46. Rolke R, Andrews Campbell K, Magerl W, et al. Deep pain thresholds in the distal limbs of healthy human subjects. *Eur J Pain* 2005;9(1):39–48.
47. Ngamaba K, Panagioti M, Armitage C. How strongly related are health status and subjective well-being? Systematic review and meta-analysis. *Eur J Public Health* 2017;27(5):879–885.
48. Bausewein C, Daveson B, Currow D, et al. EAPC White Paper on outcome measurement in palliative care: Improving practice, attaining outcomes and delivering quality services—Recommendations from the European Association for Palliative Care (EAPC) Task Force on Outcome Measurement. *Palliat Med* 2016;30(1):6–22.
49. Stiel S, Pastrana T, Balzer C, et al. Outcome assessment instruments in palliative and hospice care—A review of the literature. *Support Care Cancer* 2012;20(11):2879–2893.
50. Pavot W, Diener E. The satisfaction with life scale and the emerging construct of life satisfaction. *J Positive Psychol* 2008;3(2):137–152.
51. Scheel T, Hoepfner D, Grotevendt A, et al. Clowns in paediatric surgery: Less anxiety and more oxytocin? A pilot study. *Klin Padiatr* 2017;229(5): 274–280.
52. de Jong TR, Menon R, Bludau A, et al. Salivary oxytocin concentrations in response to running, sexual self-stimulation, breastfeeding and the TSST: The Regensburg Oxytocin Challenge (ROC) study. *Psychoneuroendocrinology* 2015;62:381–388.
53. Wellenzohn S, Proyer R, Ruch W. Humor-based online positive psychology interventions: A randomized placebo-controlled long-term trial. *J Positive Psychol* 2016;11(6):584–594.
54. McGhee P. *Humor as Survival Training for a Stressed-Out World: The 7 Humor Habits Program*. AuthorHouse: Bloomington, IN, USA; 2010.
55. Falkenberg I, McGhee P, Wild B. *Humorfähigkeiten trainieren. Manual für die psychiatrisch-psychotherapeutische Praxis [Training Humor Skills: A Manual for Psychiatric-Psychotherapeutic Practice]*. Schattauer: Stuttgart; 2013.
56. Ruch W, Zweyer K. *Heiterkeit und Humor: Ergebnisse der Forschung [Cheerfulness and Humor: Research Results]*. In: *Heiterkeit und Humor im Alter [Cheerfulness and Humor During Aging]*. (Hirsch R, Bruder J,



- Radebold H. eds.). Schriftenreihe der Deutschen Gesellschaft für Gerontopsychiatrie und Psychotherapie. Chudeck-Druck: Bornheim-Secktem; 2001.
57. Ruch W, Hofmann J. "A temperament approach to humor". In: *Humor and Health Promotion*. (Gremigni P. ed.). Nova Biomedical Books: Hauppauge, NY, USA, 2012; pp. 79–112.
 58. Ruch W, Köhler G, van Thriel C. Assessing the "Humorous Temperament": Construction of the Facet and Standard Trait Forms of the State-Trait-Cheerfulness-Inventory—STCI. In: *Measurement of the Sense of Humor [Special Issue]*. (Ruch W. ed.). *Humor Int J Humor Res* 1996;9:303–339.
 59. Ruch W, Köhler G, van Thriel C. To be in good or bad humor: Construction of the state form of the State-Trait-Cheerfulness-Inventory—STCI. *Pers Individ Dif* 1997;22(4):477–491.
 60. Stiel S, Matthes ME, Bertram L, et al. Validation of the new version of the Minimal Documentation System (MIDOS) for patients in palliative care. *Schmerz* 2010;24(6):596–604.
 61. Glaesmer H, Grande G, Braehler E, et al. The German Version of the satisfaction with life scale—Psychometric properties and population based norms. *Eur J Psychol Assess* 2011;27(2):127–132.
 62. Ruch W, Proyer R, Harzer C, et al. Adaptation and validation of the German version of the values in action inventory of strengths (VIA-IS) and the development of a peer-rating form. *J Individual Differ* 2010;31:138–149.
 63. Geissner E. Die Schmerzempfindungsskala SES—Manual [Evaluation of Pain Scale]. Hogrefe: Göttingen; 1995.
 64. Mücke M, Cuhls H, Radbruch L, et al. [Quantitative sensory testing]. *Schmerz* 2014;28(6):635–648.
 65. Rolke R. Quantitative sensorische testung: Mechanismen-basierte diagnostik chronischer schmerzsyndrome [Quantitative sensoric testing: Mechanism-based diagnosis of chronical pain syndromes]. Eigenverlag: Mainz; 2010.
 66. Rolke R, Baron R, Maier C, et al. Quantitative sensory testing in the German Research Network on Neuropathic Pain (DFNS): Standardized protocol and reference values. *Pain* 2006;123(3):231–243.
 67. Rolke R, Magerl W, Campbell KA, et al. Quantitative sensory testing: A comprehensive protocol for clinical trials. *Eur J Pain* 2006;10(1):77–88.
 68. Datta J, Petticrew M. Challenges to evaluating complex interventions: A content analysis of published papers. *BMC Public Health* 2013;13:568.
 69. Grewen KM, Girdler SS, Amico J, et al. Effects of partner support on resting oxytocin, cortisol, norepinephrine, and blood pressure before and after warm partner contact. *Psychosom Med* 2005;67(4):531–538.
 70. Saphire-Bernstein S, Way BM, Kim HS, et al. Oxytocin receptor gene (OXTR) is related to psychological resources. *Proc Natl Acad Sci U S A* 2011;108(37):15118–15122.
 71. Heinrichs M, Baumgartner T, Kirschbaum C, et al. Social support and oxytocin interact to suppress cortisol and subjective responses to psychosocial stress. *Biol Psychiatry* 2003;54(12):1389–1398.
 72. Lischke A, Berger C, Prehn K, et al. Intranasal oxytocin enhances emotion recognition from dynamic facial expressions and leaves eye-gaze unaffected. *Psychoneuroendocrinology* 2012;37(4):475–481.

Cite this article as: Linge-Dahl L, Heintz S, Ruch W, Bley M, von Hirschhausen E, and Radbruch L (2023) Evaluation of a study protocol of the application of humor interventions in palliative care through a first pilot study, *Palliative Medicine Reports* 4:1, 239–248, DOI: 10.1089/pmr.2023.0014.

Abbreviations Used

COPD = chronic obstructive pulmonary disease
MIDOS = minimal documentation system for patients in palliative care
QST = quantitative sensory testing
RIA = radioimmunoassay
SAPV = specialized homecare palliative care team
SES = Schmerz-Evaluations-Skala (pain evaluation scale)
STCI-S = state-trait-cheerfulness-inventory—state part
STCI-T = state-trait-cheerfulness-inventory—trait part
SWLS = satisfaction with life scale
VIA-IS = values in action inventory of strengths

Publish in *Palliative Medicine Reports*



- Immediate, unrestricted online access
- Rigorous peer review
- Compliance with open access mandates
- Authors retain copyright
- Highly indexed
- Targeted email marketing

liebertpub.com/pmr



3.3 Publication 3: Humour interventions for patients in palliative care – a randomized controlled trial

RESEARCH



Humour interventions for patients in palliative care—a randomized controlled trial

Lisa Linge-Dahl¹ · Rainer Kreuz² · Mieke Stoffelen² · Sonja Heintz^{3,4} · Willibald Ruch³ ·
Eckart von Hirschhausen² · Lukas Radbruch^{1,5}

Received: 19 July 2022 / Accepted: 23 January 2023
© The Author(s) 2023

Abstract

Purpose The effect of humour on end-of-life patients could be beneficial and is worth investigating. However, data on humour interventions for patients in palliative care are scarce. This study evaluated the effects of a humour intervention in a palliative care setting.

Methods A two-step intervention was developed based on the humour habits programme by McGhee. Patients were assisted to remember funny episodes from their past and recognize humorous aspects of the present and encouraged to produce humour. The intervention and control group completed questionnaires on life satisfaction, cheerfulness, symptom burden, and perceived stress and if possible gave saliva samples to investigate oxytocin levels. The study was a randomized controlled monocentre study on patients treated in a palliative care ward. Participants had to be conscious and alert enough to complete data collection. Overall, 55 patients were included and randomized to the intervention or control group.

Results Parameters in the control group did not change significantly. In the intervention group, seriousness, bad mood, and stress were reduced. Cheerfulness increased significantly after the intervention. However, the methodologically complex intervention setting was too exhausting for the majority of patients.

Conclusion Patients who were able to participate benefited from the effects of the intervention on multiple levels. For future research simple interventions, biomarkers for well-being and assessments by staff or proxies are needed to include patients with reduced cognitive and physical performance status at the end of their lives.

Trial registration DRKS00028978 German Registry of Clinical Studies.

Keywords Humour · Intervention · Patient · Palliative care

Background

Humour has been investigated in various contexts in the past, but a range of diverging definitions has been used in these studies. Ruch [1] defined the perception that something is funny as prerequisite for the occurrence of humour. Martin and Ford [2] defined humour as a broad, multifaceted term that represents anything that people say or do and that others perceive as funny and tends to make them laugh but also included thoughts and the emotional response such as enjoyment and mirth to humorous stimuli. They stated that humour essentially is a way for people to interact in a playful manner. In the expression of humour, eight comic styles have been defined [3], including lighter (fun, humour, nonsense, and wit) and darker styles (irony, satire, sarcasm, and cynicism). The darker styles were associated with a potentially negative-critical effect.

✉ Lisa Linge-Dahl
Lisa.Linge-Dahl@ukbonn.de

¹ Department of Palliative Medicine, University of Bonn, Bonn, Germany

² Foundation “Humor Hilft Heilen” (Humour Helps to Cure), Bonn, Germany

³ Department of Psychology, University of Zurich, Zurich, Switzerland

⁴ School of Psychology, University of Plymouth, Plymouth, UK

⁵ Centre for Palliative Care, Helios Hospital Bonn/Rhein-Sieg, Bonn, Germany

Humour interventions in patients with palliative diagnosis have rarely been implemented or systematically evaluated. Recent systematic reviews have summarized the available evidence from Pinna et al. [4] and Linge-Dahl et al. [5] showing that humour serves different purposes, such as forming relationships (e.g. between patient and health care professional) or dealing with circumstances, and have mostly been researched in health care professionals. The few studies evaluating the effect of humour from the patients' perspective reported only unstructured qualitative data. Pinna et al. [4] also distinguished between humour before and after the diagnosis of terminal illness and emphasized that there were also situations in which humour should not be used, such as coma or when people are on the verge of death. Patients suffering from certain pneumonic illnesses such as COPD might risk hyperinflation during intensive laughter [6], so these patients should not be included in humour studies. Kontos et al. [7] studied the effects of humour interventions in dementia care homes in Australia and demonstrated reduced agitation and aggression in residents. Adamle and Ludwick [8] illustrated that humour during the interaction with the patient was also frequently observed in hospices and was mainly initiated by the patients themselves. Based on the current state of literature [4, 5, 7], no commonly used styles of humour in palliative care can be defined. We developed and pilot tested an adapted version of the five-step humour training for psychiatric patients based on McGhee [9], as this programme is supported by research and clinical applications. In addition, it comes with a well-tested manual that has been applied in various areas. Based on previous studies, we chose an outcome measure premised on the state-trait model of cheerfulness [10]. The experiences and promising results of humour studies in paediatrics [11, 12] led to the inclusion of a biomarker parameter in this study.

Objectives

We hoped to improve the foundation of knowledge of suitable evaluation instruments for interventions in a palliative care setting. We investigated the effect of a humour intervention on life satisfaction, cheerfulness, seriousness, bad mood, symptom burden, level of stress, and oxytocin in saliva. We hypothesized that the intervention would reduce levels of stress and symptom burden and improve mood and cheerfulness in comparison to a control group without the intervention.

Methods

Sample/study design

We implemented a parallel study design with two groups with equal randomization. A pilot test used a more elaborate

study setting with extensive questionnaires and quantitative sensory pain threshold testing [13]. As the recruitment rate was extremely poor and due to ethical concerns, the setting had to be adapted and simplified for the main study. The pilot test and the methodological development will be reported in detail elsewhere.

Inclusion and exclusion criteria

All participants were being treated in the palliative care ward of the University Hospital Bonn in Germany. Patients had to be conscious and alert and understand the German language well enough to complete the questionnaires. They had to provide informed consent to participate in the study.

Patients were excluded if they were unconscious or severely fatigued. Potential test persons with multi-resistant infections could not provide saliva samples due to laboratory restrictions.

All included patients were randomized to intervention or control group using a simple randomization list (using the random number generation function in Excel). The study was not blinded nor allocation concealed as the ethics committee had requested to include information on the specific burden related to participation in the study for each group. One of the authors (LLD), who is a researcher in the Department of Palliative Medicine, but not involved in clinical care, enrolled and assigned the patients to one of the groups. The power calculation resulted in overall 240 patients to achieve a medium effect of $d=0.50$ in the State-Trait-Cheerfulness Questionnaire (power = 0.70, Cohen's d), with 120 in the intervention and 120 in the control group. Patients in the control and intervention group were tested on different days to avoid any inferences between the groups. The primary outcome was the mood of patients (State-Trait-Cheerfulness-Inventory). Secondary outcomes were burden of symptoms, distress, life satisfaction, and oxytocin level in saliva.

Instruments

The set of questionnaires included the State-Trait-Cheerfulness-Inventory (STCI-T and -S) [10, 14], the Satisfaction with Life Scale (SWLS) [15], the stress thermometer [16], the Minimal Documentation System for patients in palliative care (MIDOS) [17, 18], and a few psychometric variables (age, gender, illness). The ECOG performance status was derived from the patient files [ECOG, 19]. The German self-rating version of all questionnaires was used.

Cheerfulness was measured using the STCI-T and -S [10, 14, 20, 21]. The STCI-T and -S, which are rated on 4-point Likert scale (from "strongly disagree" to "strongly agree"), consist of the three scales cheerfulness, seriousness, and bad mood, which are built from sum scores of 10 (STCI-T) and 6 (STCI-S) items, respectively. Mean values of 25.75

(*SD* 6.87) for cheerfulness, 24.28 (*SD* 6.03) for seriousness, and 15.20 (*SD* 6.31) for bad mood have been described in healthy subjects for the STCI-T [20]. The STCI-S evaluates the mood in the current situation, while the STCI-T investigates enduring personality traits [10, 14, 20, 21].

Symptom burden and well-being were assessed with the MIDOS [17, 18]. MIDOS is a short instrument with 8 items on physical and psychological symptoms and one item on general well-being, using categorical scales.

Life satisfaction was measured with the SWLS [15] with the sum score of 5 items, each rated on a 7-point Likert scale.

The distress thermometer consists of a scale from 0 to 10 where participants can mark their level of stress in the current situation [16].

Saliva samples were collected by a study nurse by having the patient chew on a cotton wool roll (Salivette® Sarstedt) for at least 60 s. Then the concentration of oxytocin in saliva [11] was analysed.

The researcher assisted the patients in completing the questionnaires. Depending on their performance level, she read the questions aloud or supervised independent completion.

Intervention

The “humorous visit” was offered to the patients of the intervention group. Two professional hospital clowns who were dressed in the bright style of Mr. Bean (as clown outfits and the red nose seemed unsuitable for the setting) visited the patients one or two times. The training was performed by Laura Fernandez. The primary goal was to find the connection between the clown characters “Robert “ and “Lilly”, their joy, their humour, their differences, and their abilities. This was followed by exercises to “be in the moment”, “to get in touch”, and to find a playful or calm way from there on. Improvisation was one tool for training and to establish a trustful understanding between the clown actors. As both clown actors play instruments, making music together became not only an important part for the interventions, but also a nice warm-up for the clown actors to re-focus on their goals every week before the intervention. The intervention was based on McGhee’s humour habits programme, which was adapted by Falkenberg et al. [9] to a five-session training—memory of a funny episode during childhood (finding one’s preferred humour style), providing humour according to that style to the participant, finding humorous aspects in the current situation, producing humour, and applying humour in everyday life. The content of these 5 group sessions was condensed to two tailored humorous visits per patient. The coaches used various props (colourful cloths, a hand puppet, heating jacket tubes, musical instruments), but mostly they communicated and used their own and the

patient’s imagination to build humorous interactions with the materials in the room (cushions, curtains, whiteboard, a wheelchair, etc.). Both coaches were educated as hospital clowns and play at least one instrument; one studied at a circus school and is a trained actress; the other studied at a clown school and is a certified social worker.

Entering the patient’s room, the humour coaches explored the mood of the patient and tried to find an adequate vibe to communicate. They asked a couple of questions concerning the biography and important life events to find out the patient’s preferred humour style. They then tried to find humorous aspects of the current situation using equipment in the room or making up a funny song about something the patient had mentioned. If the patients were still at the palliative care ward in the following week, they prepared a second visit focusing on aspects that were dear to the patient. As planning into the future is limited for patients in palliative care, they sometimes acted out unfulfilled wishes (such as a concert with songs of a specific singer or a cruise) in a caring and humorous manner.

The control group filled out the questionnaires twice and then provided saliva samples as well 1 day before the intervention group.

Procedure

Data collection was performed according to the scheme displayed in Table 1. The control group was evaluated with the same routine except the interventions. The researcher documented field notes during the interventions, which were supplemented by questionnaires that the humour coaches completed after the humorous visits. The field note logs included start and end times and time stamps.

Analyses

We implemented SPSS statistics for quantitative and MAX-QDA for qualitative analyses. For pre- and post-workshop comparisons, *t*-tests were performed on mean values of the grouped data of all participants of the intervention and control group that completed the questionnaires. We included patients who had not more than two missing values in the main outcome variables STCI-S and SWLS in the evaluation. An ANOVA was used to compare pre-post values for both groups. We also compared means of the STCI-T, ECOG, and SWLS sum scores as well the MIDOS results of both groups to analyse potential differences in personality to agree to take part in a humour intervention.

An inductive-deductive approach was used to analyse the qualitative data. The inductively defined codes were condensed with additional codes until saturation was reached. The details of these analyses will be reported elsewhere.

Table 1 Procedure of data collection intervention group

	Procedure (time)	Assessment instruments
Day 0	Briefing (10)	Informed written consent
Day 1	Assessment of psychological parameters (questionnaires) (15–25)	State-Trait-Cheerfulness (STCI-S and T), life satisfaction (SWLS), stress
	Assessment of medical parameters (5–10)	Burden of symptoms (MIDOS), oxytocin level, ECOG
	1st humour intervention (20–30)	Standardized non-participant observation (notes, “questionnaire” humour coaches, start and ending time)
	Assessment of the impact of the intervention (5–10)	STCI-S – oxytocin level
Day 3	Assessment of psychological parameters (questionnaires) (15–25)	STCI-S and T, SWLS, stress – MIDOS, oxytocin level
	2nd humour intervention (20–30)	Same as 1st humour intervention
	Assessment of the impact of the intervention (5–10)	STCI-S, SWLS, stress + MIDOS, oxytocin level

Results

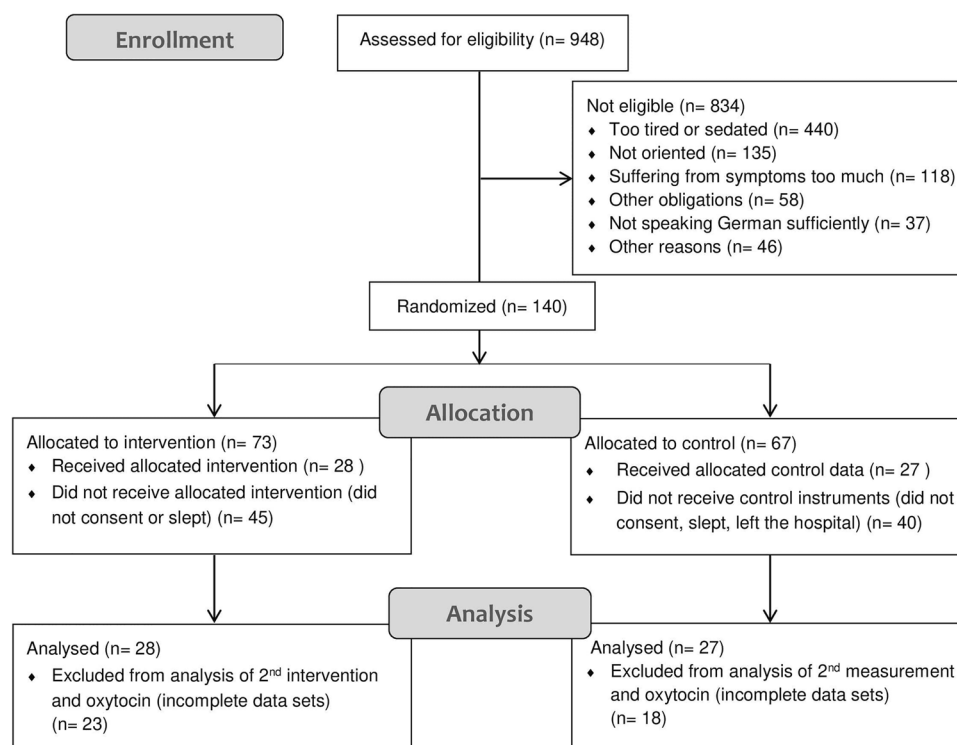
Sample

Overall 984 patients were scanned for eligibility from October 2017 to April 2019, and 140 patients were recruited for the study. However, only 55 patients completed the questionnaires and were included in the evaluation (27 were in the control group and 28 in the intervention group; see Fig. 1). Gender was well distributed with 27 women and 28 men (intervention group 16 ♀/12 ♂, control group 11 ♀/16 ♂). Age ranged from 29 to 99 years with a median of 64.48 (*SD* 14.09). All

but 7 patients had an oncological diagnosis. ECOG performance status at admission was 2.91 (*SD* 0.95; min 0–max 4). In addition to the 55 patients included in the evaluation, another 68 patients received the humour intervention even though they were not able to complete the questionnaires. No patient reported adverse events or additional emotional burden from the humour intervention or data collection.

Missing values

Only five of the 28 patients who received a second intervention were able to fill out the complete questionnaires again

Fig. 1 Flowchart patient recruitment

before and after the intervention to make an evaluation of quantitative data possible. Oxytocin in saliva could only be derived from 9 patients of the intervention and 9 of the control group, and thus, oxytocin data were not included in the analysis.

Group comparisons

There were no significant differences in the pre-test scores for life satisfaction ($t(48)=0.70$, $p>0.001$) between intervention ($M=20.24$, $SD=7.94$) and control group ($M=18.72$, $SD=7.24$). Bad mood was slightly but not significantly higher in the control group ($t(46)=-0.57$) with mean values $M=22.50$ ($SD=9.39$) in the control and $M=21.13$ ($SD=7.01$) in the intervention group. The magnitude of the differences in the means (mean difference=0.63, 95% CI: -3.51 to 4.75) was very small for life satisfaction and also small for the nine other parameters that were investigated (see Table 2). The statistical parameters show that the intervention and control group were highly similar before the intervention in all investigated features. ANOVA analysis showed no significant differences in between groups (see Table 3).

In the control group, none of the investigated parameters changed significantly between pre- and post-measurement (see Table 4). For example, the score of state seriousness showed no significant change in between the pre- ($M=16.90$, $SD=4.48$) and post-measurements ($M=16.76$, $SD=4.54$),

$t(20)=0.37$. The mean change in the test scores was 0.13 with a 95% confidence interval ranging from -0.63 to 0.91.

As expected, the t -test for paired samples for the pre- and post-measures in the intervention group found four significant effects (see Table 5). The scores of distress, cheerfulness, seriousness, and bad mood changed significantly between pre- and post-measurements (Table 5).

Qualitative data

Field notes were documented for all patients in the intervention group by the researcher. The field notes were coded and afterwards categorized into condition, contact, situation and life, expression of emotion, positive aspects, and symptoms. In the category condition, the code “deep breath” was coded most frequently. Frequent topics for contact were “participation”, “reception”, and “thank you/expression of gratitude”. “Reported memories” were predominant in situation and life. Expressions of emotion were very versatile, but signs of emotion were frequently coded. The category positive aspects included the highest number of codes including “smile”, “laugh”, “I like/that was great”, “joke”, and “applause”. Symptom codes were related to fatigue and exhaustion. During the coding of the data, new codes were added during the first half of the protocols, after which saturation occurred and the existing codes were sufficient for the analysis of the protocols.

Table 2 Pre-test group differences

				Test for equality of means		
		<i>M</i>	<i>SD</i>	<i>T</i>	<i>df</i>	<i>p</i>
Life satisfaction	Intervention	20.24	7.94	0.70	48	0.483
	Control	18.72	7.24			
Stress	Intervention	5.11	2.95	-0.86	38	0.397
	Control	5.84	2.44			
Symptom burden	Intervention	19.41	6.28	-0.32	30	0.751
	Control	20.07	5.12			
ECOG	Intervention	2.95	1.12	0.42	52	0.674
	Control	2.84	0.77			
Cheerfulness trait	Intervention	32.22	6.77	0.30	43	0.761
	Control	31.59	6.96			
Seriousness trait	Intervention	30.38	6.08	-0.29	45	0.769
	Control	30.91	6.39			
Bad mood trait	Intervention	21.13	7.01	-0.57	46	0.568
	Control	22.50	9.39			
Cheerfulness state	Intervention	11.53	4.81	0.04	53	0.969
	Control	11.48	4.62			
Seriousness state	Intervention	16.96	4.11	0.13	53	0.895
	Control	16.81	4.23			
Bad mood state	Intervention	13.24	5.56	1.45	53	0.152
	Control	11.22	4.67			

Table 3 Univariate analysis for variances between intervention and control

		Squares	df	Mean Squares	<i>F</i>	<i>p</i>
Life satisfaction	Between groups	28.87	1	28.87	0.50	0.483
	In groups	2769.60	48	57.70		
Stress	Between groups	5.27	1	5.26	0.74	0.397
	In groups	272.46	38	7.16		
Symptom burden	Between groups	3.42	1	3.47	0.10	0.751
	In groups	1001.04	30	33.37		
ECOG	Between groups	0.16	1	0.16	0.18	0.674
	In groups	48.36	52	0.92		
Cheerfulness state	Between groups	0.03	1	0.03	0.00	0.969
	In groups	1180.55	53	22.27		
Seriousness state	Between groups	0.30	1	0.30	0.02	0.895
	In groups	927.04	53	17.48		
Bad mood state	Between groups	55.90	1	55.90	2.12	0.152
	In groups	1400.58	53	26.42		

Table 4 Mean values pre- and post-measures in the control group

		<i>M</i>	<i>SD</i>	<i>t</i>	<i>df</i>	<i>p</i>
Life satisfaction	Before	19.78	6.92	0.00	17	1.000
	After	19.78	6.87			
Stress	Before	5.56	2.55	−0.20	16	0.835
	After	5.59	2.51			
Symptom burden	Before	20.67	5.98	0.96	8	0.366
	After	20.11	6.40			
Cheerfulness	Before	11.14	4.33	0.76	20	0.452
	After	11.00	4.30			
Seriousness	Before	16.90	4.48	0.37	20	0.706
	After	16.76	4.54			
Bad mood	Before	11.00	4.62	−1.27	20	0.219
	After	11.57	5.06			

Table 5 Mean values pre- and post-measures in the intervention group

		<i>M</i>	<i>SD</i>	<i>t</i>	<i>df</i>	<i>p</i>
Life satisfaction	Before	19.94	7.35	1.63	15	0.123
	After	18.56	7.09			
Stress	Before	5.55	2.90	2.40	10	0.037*
	After	3.41	2.63			
Symptom burden	Before	19.80	7.35	1.72	9	0.120
	After	18.30	5.89			
Cheerfulness	Before	11.49	4.23	−4.06	19	0.001**
	After	15.80	5.40			
Seriousness	Before	16.45	4.60	2.90	19	0.009*
	After	13.10	4.02			
Bad mood	Before	13.35	5.51	3.11	19	0.006*
	After	9.95	4.43			

** $p \leq 0.001$; * $p \leq 0.05$.

Exemplary quotes can be accessed in a table in the [supplementary files](#).

Discussions and conclusions

Limitations

There was major attrition in this study, leading to many incomplete datasets and only very few patients that were treated according to protocol, even though we had shortened and simplified assessment instruments and intervention following a pilot testing. Most randomized patients did not consent to participate in the study due to feeling fatigued or being sedated, and most of those who participated were not available for a second humour intervention as they had been discharged or transferred to another place of care. Therefore an intention-to-treat analysis was not feasible. With almost zero questionnaire data available from these patients, imputation was not possible, and an elevation of N in the existing analyses would have distorted the standard error and painted an overly positive picture of the effect. We were not able to meet the power analyses calculated for the study plan with this inadequate sample size. Considering the high degree of attrition, we decided to stop the study after 18 months of recruitment. In consequence, we could only evaluate the results of the first humour intervention in this article in a smaller as planned sample. Ultimately, only 14% of the patients treated in the palliative care unit in the 18-month recruitment period were found to be eligible for the study, and only 39% of those patients (6% of the total patient number) participated and were included in the analysis. Oxytocin in saliva could only be sampled from 9 patients of each group and thus was not included in the analysis.

The control group did not receive an alternative intervention, due to feasibility reasons. This inactive control group setting creates the risk of performance bias. Lack of an active control also prevented adequate blinding and allocation concealment. These limitations may limit the transferability of the results. However, inclusion rates did not differ significantly between the intervention and control group, indicating a low risk of allocation bias. Methodologically, it would have been useful to set a cut-off value for cheerfulness to rule out bias by higher levels of cheerfulness in the persons who agreed to participate in the study. However, since levels of state cheerfulness did not show significant differences between intervention and control group, it can at least be assured that there was no bias due to allocation. The effect of cheerfulness on the willingness to participate might not be specific to humour interventions though, as a higher level of depression has been shown to limit the willingness to participate in any kind of study [22]. Thus, this limitation

would not produce a specific bias of this study but rather seems to be a general phenomenon due to the elaborated precaution of persons with symptoms of depression.

The comparison of control and intervention group at the start of data collection showed that there was no significant difference between groups. Even though allocation was not concealed, these data seem to ensure comparability of both groups.

Ethical aspects of collecting complex data with severely ill patients at the end of their lives need to be discussed [23]. The SWLS questions for example were found to be distressing by more than half of the patients surveyed. Asking them how happy they are with their lives at the moment after receiving a palliative diagnosis seemed inappropriate.

In the original study plan, we had included a semi-structured interview for day 5 of the data collection. This was only possible in very few cases due to patient discharge, fatigue, and exhaustion of patients after the data collection and interventions.

Discussion

Although we had already simplified the intervention after the pilot test and reduced the number of intervention appointments, still only a very small proportion of palliative care patients were eligible, and even fewer were able to provide sufficient data from the first intervention. This phenomenon of high attrition rates has been reported in palliative care previously [21, 24]. Attrition has even been identified as a major problem in palliative care research [24, 25]. We aimed to reduce attrition with a combination of patient-reported outcome questionnaires with physiological parameters [11, 26]. Using the level of oxytocin in saliva as biomarker has been evaluated critically in the past [27] because of its strong concentration fluctuations and potentially not measurable amount in saliva. The radioimmunoassay (RIA) method [28], which has been used in this study, can measure even very small amounts of oxytocin. However, even though saliva samples do not place a huge burden on patients, these assessments were possible only in a small minority of the study patients. Many patients suffered from xerostomia or were not able to chew on the swab for 60 s due to nausea. Half of the samples did not contain enough liquid for analysis.

Even though the analysis of variance did not show a significant effect of the intervention in the pre- and post-comparison, the comparison of pre- and post-data between the intervention and control group presented some promising results despite the small sample size. Whereas there were no significant changes in the control group, the perceived level of stress, seriousness, and bad mood were reduced in the intervention group, and cheerfulness increased. The positive effects of the humour intervention were supported

in the qualitative analysis of the field notes. However, Bland and Altman [29] warned to use baseline as parameter for comparison. Recruitment of a bigger sample would be desirable in order to evaluate analysis of variance in the pre- and post-data between groups.

In the intervention group, life satisfaction was slightly lower after the intervention, in contrast to the positive findings for level of stress, seriousness, bad mood, and cheerfulness. A possible explanation could be that completing the questionnaires might have had a negative effect on patients' life satisfaction. This effect has been reported in literature in the past [30], and there has been even a questionnaire created to measure negative effects [31]. However, neither the intervention group nor the control group showed this effect. More research is needed to evaluate this discrepancy.

Our study confirmed that short and simple assessment instruments are a mandatory precondition for palliative care research. However, evaluation of the effectiveness of humour interventions in patients with far-advanced disease might require proxy-reported instead of patient-reported outcome measures and observational assessment instruments as well as suitable biomarkers. Again, problems with sampling have to be considered, such as the high frequency of dry mouth or swallowing problems which can interfere with saliva sampling.

Conclusion

Major problems with attrition led to a smaller as planned sample size in our intervention study. However, we found some promising results for a positive effect of the humour interventions for patients in palliative care. Further research could be planned for the outpatient and home care setting, recruiting patients less advanced in the disease trajectory and thus with less physical or cognitive impairment compared to those on a palliative care unit. However, standardized training of clowns for this kind of humour intervention would be a necessary prerequisite for such a roll-out.

Supplementary Information The online version contains supplementary material available at <https://doi.org/10.1007/s00520-023-07606-9>.

Acknowledgements The study has been registered at the German Registry of Clinical Studies under the number DRKS00028978. We thank Martin Mücke and Sarit Quirin for proofreading the manuscript and giving valuable advice, as well as the medical staff of the palliative care unit of the University Hospital Bonn for cooperating and supporting our study at all times. Most importantly we thank the patients who agreed to take part in this study.

Author contribution The article was drafted and written by Lisa Linge-Dahl. All other authors contributed to previous versions and approved the final manuscript. Lisa Linge-Dahl, Sonja Heintz, Willibald Ruch, Eckart von Hirschhausen, and Lukas Radbruch constructed

the conceptualisation of the data collection. Mieke Stoffelen and Rainer Kreuz performed the humour interventions and gave feedback to the manuscript. Lukas Radbruch and Lisa Linge-Dahl performed the data analysis.

Funding Open Access funding enabled and organized by Projekt DEAL. The non-profit organization Humour Helps to Cure (Humor Hilft Heilen) provided partial financial support. The salary for the humour coaches who conducted the humour interventions. Their feedback was focused on the description of the intervention in this manuscript. The data collection, analysis, and interpretation were performed by the first author. The 6th author is funding member of Humour Helps to Cure. He gave feedback to the manuscript from a professional point of view.

Data availability Due to privacy regulations considering data from patients being treated in a German university hospital, we cannot provide the data to others. The ethics committee also demanded a paragraph stating that the data will only be used by us in pseudonymized form for the publication of the results of our study.

Declarations

Ethics approval and consent to participate The Ethics Committee of the University Hospital Bonn examined and approved the questionnaires and methodology of the study under the number 003/16 on the 10th of February 2016. It works in accordance with the 1964 Helsinki Declarations. All participants had to provide informed written consent to be able to participate in the study.

Consent for publication All participants also agreed to the publication of data in anonymized form.

Competing interests The authors declare no competing interests.

Open Access This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>.

References

1. Ruch W (2008) Psychology of humor. In: Raskin V (ed) The primer of humor research. Mouton de Gruyter, Berlin, pp 17–100
2. Martin RA, Ford TE (2018) The psychology of humor: an integrative approach. Academic Press as an imprint of Elsevier, London, United Kingdom
3. Ruch W, Heintz S, Platt T, Wagner L, Proyer R (2018) Broadening humor: comic styles differentially tap into temperament, character, and ability. *Front Psychol* 9(6)
4. Pinna M, Mahtani-Chugani V, Sánchez Correas M, Sanz Rubiales A (2018) The use of humor in palliative care: a systematic literature review. *Am J Hosp Palliat Med*:1–13.

5. Linge-Dahl L, Heintz S, Ruch W, Radbruch L (2018) Humor assessment and interventions in palliative care: a systematic review. *Front Psychol* 9
6. Lebowitz K, Suh S, Diaz P (2011) Emery CF 2014 Effects of humor and laughter on psychological functioning, quality of life, health status, and pulmonary disease: a preliminary investigation. *Heart Lung* 40(4):310–9
7. Kontos P, Miller K-L, Colobong R, Lazgare L, Binns M, Low L-F et al (2016) Elder-clowning in long-term dementia care: results of a pilot study. *J Am Geriatr Soc* 64(2):347–353
8. Adamle K, Ludwick R (2005) Humor in hospice care: who, where, and how much? *Am J Hosp Pall Med* 22(4):287–290
9. Falkenberg I, McGhee P, Wild B (2013) Humorfähigkeiten trainieren (Training Humour Skills). Stuttgart, Germany: Schattauer
10. Ruch W, Zweyer K (2001) Heiterkeit und Humor: Ergebnisse der Forschung. In: Hirsch R, Bruder J, Radebold H, (eds). Heiterkeit und Humor im Alter. Schriftenreihe der Deutschen Gesellschaft für Gerontopsychiatrie und Psychotherapie. Bornheim-Seckem: Chudeck-Druck
11. Scheel T, Hoepfner D, Grotevendt A, Barthlen W (2017) Clowns in paediatric surgery: less anxiety and more oxytocin? A pilot study. *Klin Padiatr* 229(5):274–280
12. Lopes-Júnior LC, Pereira-da-Silva G, Silveira DSC, Veronez LC, Santos JC, Alonso JB et al (2018) The effect of clown intervention on self-report and biomarker measures of stress and fatigue in pediatric osteosarcoma inpatients: a pilot study. *Integr Cancer Ther* 17(3):928–940
13. Mücke M, Cuhls H, Radbruch L, Baron R, Maier C, Tolle T et al (2014) Quantitative sensory testing. *Schmerz*. 28(6):635–46 (quiz 47–8)
14. Ruch W, Hofmann J (2012) A temperament approach to humor". In: (Ed.) PG, editor. *Humor and health promotion* Hauppauge, NY: Nova Science Publishers, pp 79–112
15. Glaesmer H, Grande G, Braehler E, Roth M (2011) The German version of the Satisfaction with Life Scale – psychometric properties and population based norms. *Eur J Psychol Assess* 27(2):127–132
16. Mehnert A, Müller D, Lehmann C, Koch U (2006) Die deutsche Version des NCCN Distress-Thermometers - Empirische Prüfung eines Screening-Instruments zur Erfassung psychosozialer Belastung bei Krebspatienten. *Z Psychiatr Psychol Psychother* 54(3):213–223
17. Stiel S, Matthes M, Bertram L, Ostgathe C, Elsner F, Radbruch L (2010) Validierung der neuen Fassung des Minimalen Dokumentationssystems (MIDOS) für Patienten in der Palliativmedizin. *Schmerz* 24:596–604
18. Stiel S, Kues K, Krumm N, Radbruch L, Elsner F (2011) Assessment of quality of life in patients receiving palliative care: comparison of measurement tools and single item on subjective well-being. *J Palliat Med* 14:599–606
19. Oken MM, Creech RH, Tormey DC, Horton J, Davis TE, McFadden ET et al (1982) Toxicity and response criteria of the Eastern Cooperative Oncology Group. *Am J Clin Oncol* 5(6):649–656
20. Ruch W, Köhler G, van Thriel C (1996) Assessing the “humorous temperament”: construction of the facet and standard trait forms of the State-Trait-Cheerfulness-Inventory — STCI. In: Ruch W, editor. *Measurement of the sense of humor [special issue]*. 9: *Humor: Int J Humor Res*:303–39
21. Ruch W, Köhler G, van Thriel C (1997) To be in good or bad humor: construction of the state form of the State-Trait-Cheerfulness-Inventory — STCI. *Pers Individ Differ* 22(4):477–491
22. Leykin Y, Dunn LB, Munoz RF (2017) The effect of depression on the decision to join a clinical trial. *J Consult Clin Psychol* 85(7):751–756
23. Rees E (2001) The ethics and practicalities of consent in palliative care research: an overview. *Int J Palliat Nurs* 7(10):489–492
24. Hui D, Glitza I, Chisholm G, Yennu S, Bruera E (2012) Attrition rates, reasons, and predictive factors in supportive care and palliative oncology clinical trials. *Cancer* 119(5):1098–105
25. Jordhøy M, Kaasa S, Fayers P, Underland G, Ahlner-Elmqvist M (1999) Challenges in palliative care research; recruitment, attrition and compliance: experience from a randomized controlled trial. *Palliat Med* 13(4):299–310
26. Santos F, Pinto S, Pessalacia J, Luchesi B, Silva L, Marinho M (2021) Effects of clown activities on patients eligible for palliative care in primary health care. *Rev Bras Enferm* 74(5):1–8
27. Horvat-Gordon M, Granger DA, Schwartz EB, Nelson VJ, Kivlighan KT (2005) Oxytocin is not a valid biomarker when measured in saliva by immunoassay. *Physiol Behav* 84(3):445–448
28. de Jong TR, Menon R, Bludau A, Grund T, Biermeier V, Klampfl SM et al (2015) Salivary oxytocin concentrations in response to running, sexual self-stimulation, breastfeeding and the TSST: The Regensburg Oxytocin Challenge (ROC) study. *Psychoneuroendocrinology* 62:381–388
29. Bland JM, Altman DG (2011) Comparisons against baseline within randomised groups are often used and can be highly misleading. *Trials* 12:264
30. Herzog AR, Bachman JG (1981) Effects of questionnaire length on response quality. *Public Opin Q* 45:549–559
31. Rozenal A, Kottorp A, Boettcher J, Andersson G, Carlbring P (2016) Negative effects of psychological treatments: an exploratory factor analysis of the negative effects questionnaire for monitoring and reporting adverse and unwanted events. *PLoS ONE* 11(6):e0157503

Key statements • Humour in palliative care has rarely been investigated systematically.

- It is known to be commonly used and researched especially amongst staff.
- This study shows that humour interventions are well applicable for patients who receive palliative care.
- High attrition rates underline that lengthy questionnaires and data collection are unsuitable for this setting.
- Nonetheless, distress, seriousness, bad mood, and cheerfulness showed significant changes in the intervention group.
- Universally applicable qualitative evaluation tools should be developed to enable a higher level of complete datasets.

Publisher's note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

3.4 Publication 4: Humour Workshops for Staff Working in Palliative Care



Humour Workshops for Staff Working in Palliative Care

Lisa Linge-Dahl¹ · Rainer Kreuz² · Mieke Stoffelen² ·
Eckart von Hirschhausen² · Lukas Radbruch^{1,3}

Accepted: 10 April 2022
© The Author(s) 2022

Abstract

Palliative care teams frequently use humour as a coping instrument. Humour used within the professional team has to be distinguished from humour in the interaction with patients. Humour among staff members working in palliative settings is widely accepted and the positive effect has been demonstrated. Four humour-workshops were organized for staff working in a palliative care unit. All participants completed the State-Trait-Cheerfulness-Inventory (STCI-S and T) and the Distress-Thermometer. Before and after the last two workshops, saliva samples were collected for analysis of oxytocin concentrations. The humour workshops were performed by two coaches based on a concept for the use of humour and mindfulness in the nursing routine. Overall 31 staff members out of 37 participated. Representatives of all professions were included, 28 women, 3 men, 24 to 59 years old. Saliva samples demonstrated a small but not significant oxytocin increase from a mean of 1.52 pg/ml to 1.80 pg/ml after the intervention ($p = .26$). The mean p value of distress was reduced from 5.24 to 3.90 with an effect of $p = .05$ and bad mood was reduced from 11.19 to 9.43 ($p = .36$), seriousness decreased from 15.06 to 12.26 ($p = .01$) and cheerfulness changed from 16.33 to 19.03 ($p = .02$). Despite the small sample size, the reduction of distress and seriousness and the increase of cheerfulness was significant. The changes in Oxytocin and bad mood proved to not be significant. Feedback from participants confirmed the value of humour in palliative care.

Keywords Humour/humor · Intervention · Cheerfulness · Palliative care · Staff-centred

✉ Lisa Linge-Dahl
Lisa.Linge-Dahl@ukbonn.de

¹ Department of Palliative Medicine, University of Bonn, Bonn, Germany

² Foundation “Humor Hilft Heilen” (Humour Helps Healing), Bonn, Germany

³ Center for Palliative Care, Helios Hospital Bonn / Rhine-Sieg, Bonn, Germany

1 Background

The nursing crisis in Germany poses an enormous amount of stress on clinical staff. Death of patients (Wilson & Kirshbaum, 2011), burnout, fatigue, and distress (Cherny et al., 2015) intensify the precarious situation of lack of staff and extreme burden for existing staff.

Humour has been used in various contexts and concepts. Therefore we would like to define what humour means in this study. In his book chapter ‘psychology of humour’ Ruch (2008) identified the perception that something is funny as a foundation for the occurrence of humour. Martin & Ford (2018, p. 3) defined “*humour as a broad, multifaceted term that represents anything that people say or do that others perceive as funny and tends to make them laugh, as well as the mental processes that go into both creating and perceiving such an amusing stimulus, and also the emotional response of mirth involved in the enjoyment of it*”. Adding to the social component of humour they add that “*humour essentially is a way for people to interact in a playful manner*” which is the core component of the humour intervention in this study. The outcome measure of humour in this study focuses on the state-trait-model of cheerfulness (Ruch & Zweyer, 2001) to enable people to be in a playful and cheerful interaction and state. Ruch et al. (2018) analysed eight humour styles and defined lighter (fun, humour, nonsense and wit) and darker styles (irony, satire, sarcasm and cynicism). In accordance with the aims and functions of the lighter styles of humour we integrated those in the construction of this study. The potentially destructive or negative-critical nature of the darker comic styles do not fit the aims of this study. Ruch (2010) also postulated that humour needs to be evaluated using a personality approach to analyse the reasons for different perceptions of individuals to humorous content. Therefore not only the state of participants needs to be measured, but also the trait of humour and other relevant characteristics.

The relationship of humour and well-being has been investigated in depth for some years now. Proyer and Wolf (2017) described in their overview that research proves a link between humour and well-being. Martin (2001, 2002, 2008) has been reviewing the progress in the field for almost a decade. Two monographs give more detailed information on methodology and findings in the field (Attardo, 2014; Raskin, 2008). Attardo (2014) classified all facets of humour in his encyclopaedia including a rich pool of detailed information on the history of humour. Raskin (2008) on the other hand focused on various disciplines perspectives on humour like linguistics, psychology, folklore, philosophy and others to give a solid foundation to researchers new to the field of humour research. The effect of laughter during breaks in the workspace was described as an efficient buffer for stress (Scheel et al., 2017b) and a meta-analysis stressed the value of the use of humour of supervisors to efficiently improve output performance of subordinate workers (Mesmer-Magnus et al., 2012). But what is the effect of humour on staff working in palliative care? Pinna et al. (2018) and Linge-Dahl et al. (2018) summarized the research on humour in palliative care mainly with the focus on the patient’s perspective. Teams working in palliative care have to deal

with the constant presence of death and dying as an additional emotional burden compared to other health sectors. The function of humour and laughter in palliative care teams has been documented (Müller et al., 2012) and appears to be strong. However, humour in the team needs to be distinguished from humour during the interaction with the patient (Dean & Gregory, 2004). While the first is widely accepted, the latter has been discussed critically in the past (Herth, 1990). Cain (2012) looked at the use of humour in “front and back regions” (in front of patients and relatives vs. between staff only) in hospice staff and found that humour in the “back region” during interactions between team members was more frequent, accepted, and served beneficial effects for the employees. Adamle and Ludwick (2005) illustrated that humour during the interaction with the patient is also frequently observed in a hospice setting and is most often initiated by the patients themselves. Cavendish et al. (2003) described humour as one of the techniques used by nurses providing spiritual care.

Parameters which are often investigated in palliative care research are quality of life, burden of symptoms, and stress (Bausewein et al., 2010; Ngamaba et al., 2017; Rolke et al., 2005). Research in the field of positive psychology focuses on life satisfaction and personality traits such as cheerfulness, playfulness or preferred humour styles instead (Craik et al., 1996; Pavot & Diener, 2008). This study seeks to combine the methodology from both fields. Hofmann et al. (2018) discovered that lighter forms of humour correlate with and reinforce mindfulness, which supports the combination of both in the humour intervention. Since Müller et al. (2012) stressed that humour is one of the three most powerful tools to protect palliative care teams from the distress related to their work, it seems reasonable that humour training for health care professionals could be worthwhile toward increasing resilience. Oxytocin has been proven to enhance wound healing, reduce stress, and has been described as an indicator of wellbeing (Scheel et al., 2017a), and was thus selected as a physiological outcome parameter in this study. Wellenzohn et al. (2018) discussed that extraversion moderates the effect of humour interventions, but humour itself may be enhanced by situationally tailored interventions (Ruch & McGhee, 2014; Wellenzohn et al., 2016). Humour interventions showed to be efficient in structured or improvised versions as well as online self-administered applications (Ruch & Hofmann, 2017). As part of a study on humour interventions for palliative care patients based on the humour habits program by McGhee (McGhee, 2010), we implemented four humour workshops for the staff members working in the palliative care ward based on a concept of Michael Christensen. Staff supported and cooperated highly in the study and therefore received the humour workshops as an expression of gratitude from the research team afterwards to compensate stress (Vachon, 1995), lack of staff (Cherny et al., 2015), and as a preventive measure against burnout (Schmitz et al., 2000). Humour interventions have been shown to increase cheerfulness and decrease seriousness, bad mood, and distress (Vachon, 1995). Oxytocin has been suggested as an indicator of well-being (Scheel, 2017a). This led to the following research questions for the evaluation of the workshops:

→ What is the effect of humour workshops on the mood of staff working in palliative care?

→ Do humour workshops affect distress and oxytocin-levels of staff working in palliative care?

2 Methods

2.1 Participants

Participants were recruited from all 37 health care professionals working in the palliative care ward or the hospital palliative care support team of the University Hospital Bonn, Germany in the manner of a pilot study. All staff members were informed via email six weeks before each humour workshop and could enrol for free by signing up on lists which had been put up in the team rooms. The workshops were 3–3.5 h long. The time spent in the workshop was counted as working time. As to additional psychosocial support, it needs to be noted that the team has access to supervision on a regular basis as well.

2.2 Humour Workshops

The four workshops offer practical insights into the seminars developed by the foundation ‘Humor Hilft Heilen (Humour Helps Healing, HHH)’ for physicians, nurses and caregivers in 2018. Through playful exercises, social humour is made tangible with respect to the professions of medicine and nursing. The topics of this workshop are based on the concepts of Michael Christensen, founder of the New York ‘Big Apple Circus Clown Care Unit’, whose ideas, by example, started a worldwide healthcare clowning movement. However, the workshop is not about teaching clowning, but about fostering humorous awareness and opening hearts. A concept with overlapping topics is the 7 humour habits programme by McGhee (2010). Playfulness, humour under stress, and humour in everyday life are core topics of our workshops as well. The workshops were conducted by two trained humour coaches from the foundation HHH tailored for this target group. Workshops started with a 10-min video with background information on the concept. Three sessions of practical exercises followed. Feedback and reflection followed after each session, with discussions on the implications in clinical practice. The first session covered the topic ‘playful attitude’ with different games. For example, the ‘Woosh’ game incorporates different signals passed on verbally or physically in the group as fast as possible. The second session under the headline ‘mindfulness and awareness’ included pair-work exercises like ‘leading and being led’. The persons being led closed their eyes as soon as they felt safe and were lead through the room by their partner. In the third session on ‘self-compassion and coping with stressful situations’, the ‘applause game’ was played, amongst others. One participant volunteers to leave the room while the others build an obstacle course which must be passed in a certain order. The volunteer is led through the obstacle course by applause. When they walk/climb or perform another activity correctly, the other participants applaud. This way, the volunteer finds the right way to solve the final task.

Four workshops were organized. The third and fourth workshops were planned as extension modules for the previous workshops, and were held six months after the first two workshops. Before and after the third and fourth workshop saliva samples were collected. Then the humour workshop took place. After approximately three hours participants received a small gift and some take-home tasks and filled in the STHI-S and the distress-thermometer again.

The gift was meant as an anchor for implementation of the newly acquired skills to their clinical routine.

2.3 Measures

Outcome was evaluated assessing cheerfulness with the State-Trait-Cheerfulness-Inventory (STHI-T and -S) focussing on the state measures before and after the workshops (Ruch & Hofmann, 2012; Ruch & Zweyer, 2001), the Distress-Thermometer (Mehnert et al., 2006) psychometric questions (age, gender, profession and work years) and the measurement of oxytocin in saliva before and after the third and fourth workshop.

The STHI-S consists of 18 items rated on 4-point Likert scale (strongly disagree, moderately disagree, moderately agree, strongly agree), with subscales on cheerfulness, seriousness and bad mood as experienced right now. The STHI-T trait questionnaire includes 30 items with the same Likert scales and the same subscales as the STHI-S but in relation to constant personality traits (Ruch & Hofmann, 2012; Ruch et al., 1996, 1997; Ruch & Zweyer, 2001). The mean values in the main construction sample ($N=595$; Ruch et al., 1997) of the STHI-S 30 (state) were 25.75 (M , $SD = 6.87$) cheerfulness (Cronbach's $\alpha = .93$), 24.28 (M , $SD = 6.03$) seriousness ($\alpha = .85$) and 15.20 (M , $SD = 6.31$) bad mood ($\alpha = .93$). We used the STHI-S 18 where no construction values are given. Adapting the sum scores of ten items per scale to 6 items resulted in the following mean sum score values: 15.45 cheerfulness, 14.57 seriousness and 9.12 for bad mood.

The Distress Thermometer includes a scale from 0 to 10 where participants can mark their level of distress by marking it on the scale, and a problem checklist with 35 items in five categories (practical problems, family problems, emotional problems, spiritual/religious concerns, physical problems). Only the 0–10 distress scale was included in this study. Internal consistency values were only given for the complete scale in validation studies of the instrument. All questionnaires were used in the German version for self-assessment. The questionnaires which have been used can be found in the supplementary material.

For the saliva sample the test subjects had to chew on a cotton wool roll (Salivette® Sarstedt) for at least one minute. This sample was stored on dry ice immediately because the half-time period of oxytocin is less than 2 min and then stored in a -80°C freezer until it was shipped on dry ice via courier service to the laboratory analysing the concentration of oxytocin (Scheel et al., 2017a, b). The RIAGnosis laboratory in Sinzing, South Germany was chosen due to its specialization on saliva extractions as used in this study. Radioimmunoassay (RIA) oxytocin (OXT) has previously described by de Jong et al. (de Jong et al., 2015). The

analysis was performed on all saliva samples which were labelled with consecutive numbers. For each sample 300 µl of saliva was evaporated (Concentrator, Eppendorf, Germany), and 50 µl of assay buffer was added followed by 50 µl antibody raised in rabbits against OXT. The detection limit of the RIA was in the 0.1–0.5 pg/sample range; the intra- and inter-assay variabilities were < 10%. All saliva samples were assayed in the same batch. Plasma samples (0.5 ml) were kept at –20 °C until extraction using LiChroprep® Si60 (Merck) heat-activated at 690 °C for 3 h. 20 mg of LiChroprep® Si60 in 1 ml distilled water were added to the sample, mixed for 30 min, washed twice with distilled water and 0.01 mol/l HCl, and eluted with 60% acetone. The evaporated extracts together with evaporated saliva samples (0.3 ml) were analysed for OXT in a highly sensitive and specific RIA.

2.4 Procedure of Data Collection

Each participant who arrived at the site had to complete a set of questionnaires on cheerfulness (STHI-S and T), level of distress and psychometric questions. The same set of questionnaires was provided directly after the workshop again except from the STCI-T (see Table 1). Eleven people took part in the first, eight in the second, eight in the third and four in the fourth workshop. Between the first two workshops and the third and fourth workshop was a six-month break for participants to apply their new skills in practice and reflect on the effect of the first workshop. The following workshops were planned as extension modules. The long-term effect was meant to be evaluated during these workshops.

However, as very few participants took part in the first or second and the follow-up workshops, this evaluation of long-term effectiveness was not possible. The evaluation results from all four workshops were compiled, as all workshops included only two participants with prior humour training.

2.5 Analyses

To compare pre- and post-workshop data mean values were compared using frequencies and variance that was related to group membership was tested using SPSS Statistics 27. For evaluation of significance in differences an analysis of variance was implemented. The data on the sample are calculated as frequencies. Effect sizes for all variables were calculated using η^2_p for the difference between the pre- and post-observations of the within subjects' design.

3 Results

3.1 Participants

In total 31 persons (out of 37) participated in the four workshops. The majority of participants were female (3 men, 28 women) between 24 and 59 years old ($M = 45.75$, $SD = 8.86$) and had been working for 0.5–35 years ($M = 9.87$,

Table 1 procedure of data collection

	Procedure (minutes)	Assessment instruments
Workshop 1 + 2	Briefing (10)	Providing information & consent to participate
	Assessment of psychological parameters (questionnaires) (10)	State- and Trait-Cheerfulness (STHI-S & T), Distress-Thermometer, sociodemographic variables
1st session	Introduction movie (10)	Short movie on humour workshops for medical staff
	Icebreaker game (15)	Whoosh game - passing different signals as fast as possible
	Reflection and discussion (15)	Reflection of the game and transfer of the exercises to the job environment
	Mindfulness exercise (15)	Moving through the room focusing on different sensory aspects
	Reflection and discussion (15)	Reflection and report on perceptions - transfer of the exercise to the job environment
	Break (15)	Coffee/ Tea break
2nd session	Childhood game (15)	“Grandma’s footsteps” – fostering playfulness and being silly
	Reflection and discussion (15)	Reflection and report on perceptions - transfer to positive emotions from childhood
	Mindfulness exercise (15)	Leading- and being led eyes closed
	Reflection and discussion (15)	Reflection and report on perceptions – team dynamics, sharing tasks
	Break (20)	Refreshments and Snacks
3rd session	Applause game (20)	Participant finds the right way through obstacle course led by applause
	Reflection and discussion (15)	Reflection and report on perceptions – team dynamics, sharing tasks
	Gift and Homework (10)	Anchor gift and homework to apply the results in the daily routine
	Assessment of psychological parameters (questionnaires) (10)	State- and Trait-Cheerfulness (STHI-S & T), Distress-Thermometer
Workshop 3 + 4	Similar exercises + saliva samples	Before and after the workshop saliva samples were collected to measure oxytocine level

$SD=10.69$) in Palliative Care. Participants included nurses, physicians, case managers, psychologists, researchers and sociologists and a documentation assistant. The fourth workshop was moved on short notice due to the participation of a key member of staff. This significantly reduced the number of participants.

3.2 Pre- Post Comparisons

Mean oxytocin concentration in saliva was 1.52 pg/ml ($SD=0.47$) before, and 1.80 pg/ml ($SD=0.67$) after the humour workshop ($F(1,22)=1.35$, $p=.26$) in those 12 team members who took part in the 3rd and 4th workshop (95% CI [1.39, 1.96]). Thirty persons completed the Distress Thermometer, with a mean value of 5.24 ($SD=2.44$) before and 3.90 ($SD=2.46$) ($F(1,60)=4.07$, $p=.05$) after the workshop (95% CI [3.04, 5.38]). Thirty participants responded to the STHI-S before and after the workshop. The mean value for the STHI-S subscale for cheerfulness increased from 16.33 ($SD=5.27$) to 19.03 ($SD=3.52$) ($F(1,60)=5.50$, $p=.02$) post-workshop (95% CI [16.63, 20.41]) (see Table 2). Bad mood was reduced from 11.19 ($SD=7.61$) to 9.43 ($SD=7.72$) ($F(1,60)=0.81$, $p=.36$; 95% CI [8.30, 18.84]) and seriousness decreased from 15.06 ($SD=2.84$) to 12.26 ($SD=3.14$) ($F(1,60)=13.24$, $p=.01$; 95% CI [11.98, 15.25]). Effect sizes (η^2_p) ranged from 0.013 for bad mood to 0.182 for seriousness (see Table 2).

3.3 Qualitative Data

In the warm-up round before the exercises in the workshop, the majority of the participants stated to be “tired”, “stressed”, “worn-out”. During and after the workshop more than 70% of participants explicitly provided positive feedback on the

Table 2 Differences pre- and post-testing

Group affiliation		Oxytocin in saliva	Distress	Cheerfulness*	Seriousness*	bad mood*
pre-workshop data	Mean	1.52	5.24	16.33	15.06	11.19
	N	12	30	30	30	30
	standard deviation	0.47	2.44	5.27	2.84	7.61
	mean standard error	0.13	0.45	0.92	0.50	1.34
post-workshop data	Mean	1.80	3.90	19.03	12.26	9.43
	N	12	30	30	30	30
	standard deviation	0.67	2.46	3.52	3.14	7.72
	mean standard error	0.19	0.47	0.63	0.56	1.41
Effect sizes	η^2_p	0.058	0.071	0.084	0.182	0.013

*STCI-S values

workshop. Expressions of gratefulness and statements such as “feeling like having had a small vacation” have been recorded.

4 Discussion and Conclusion

Over the timespan of six months, four humour workshops were held. Participants indicated significant changes with reduced distress level, more cheerfulness, and less bad mood. Mimic expressions and verbal remarks after the workshops were grateful and positive. With these effects on cheerfulness, seriousness, and distress level, the combination of practical training on humour and mindfulness in this study match the effects described by Hofmann et al. (2018), who reported correlating as well as mediating effects between humour and mindfulness. The short term-effects were striking, showing significant improvement in cheerfulness, mood and distress levels. However, as the subsequent workshops were not used as follow-up, we were not able to evaluate the long-term effectiveness of the intervention. All results must be interpreted critically since no power analysis was conducted prior the workshop to determine the appropriate sample size. The effect sizes (η^2_p) were small and therefore other factors might have been part of the more cheerful mood after the workshops. Only the effect of the reduction of seriousness is worth mentioning, since the pre- and post-value difference was significant and 18% of the variance can be explained via the effect of the workshops. Other factors which might have had an effect on the participants could be the food provided or the relief that the long work day was over after the workshop.

Participants responded that they found the workshops worthwhile. In addition to the significant changes in distress level, cheerfulness, and bad mood, the facial and verbal feedback revealed that staff benefited from participation. Four participants even came to the hospital to participate in the workshop on their day off. The literature confirms that humour workshops and interventions are very well suited for staff working in a palliative working sector (Hirsmüller & Schröer, 2012); Müller et al., 2012; Ross & Cornbleet, 2003). This seems worthwhile considering the high level of burn-out (Schmitz et al., 2000) and shortage of skilled workers in German hospitals (Oulton, 2006).

The voluntary participation might also have led to a bias in the data, since persons with a stronger sense of humour were more likely to participate in the humour workshops. However, 84% of all staff members participated in the workshops, and the high rate of participation seems to outweigh this bias.

The workshops were also created as an incentive for better cooperation and less gatekeeping of the staff towards recruitment for a study on the implementation of a humour intervention for patients in palliative care. Ross and Cornbleet (2003) stated that staff in palliative care is cooperative and has a realistic view on the state of their patients, however, we found significant barriers with the recruitment of patients for that study.

The use of oxytocin in saliva as outcome parameter needs to be evaluated critically. Scheel et al., (2017a) discussed that oxytocin is a questionable indicator for well-being because of its fluctuations during the day and uncharted influences of

medications like contraceptives (de Jong et al., 2015) have not been examined in this study. Though the difference of the pre- and post-oxytocin measures was not significant, the interpretation of the insignificantly small difference needs to be interpreted cautiously. Scheel et al., (2017a) tested the oxytocin levels of children which should not be compared to adult concentrations. Therefore we only focused on pre- post-differences in this study and did not compare the results to the literature in exact numbers.

The first game was designed to stimulate playfulness, create an atmosphere of well-being, and encourage the participants to be present in the moment. With this introduction and the professional set-up, all participants were able to truly engage in the workshops. In the second session, conscious leading and relinquishing control as well as confidence were trained. This led to a fruitful discussion after the game and created an atmosphere of peacefulness in the room. The desired effect of the third session was the perception of useful stimuli and to empower participants to send impulses signalling one's own needs. Several participants stated that they had problems communicating their needs and that the positive reinforcement of the applause game was considered as helpful if transferred to their professional work field. The theoretical concept of the three workshop sessions getting in contact, being in contact and staying in contact with oneself and others thus has worked well for the team.

4.1 Limitations

A key challenge was to overcome the problem of the staff members' work overload and the need for maintenance of the palliative care ward. Additionally, sick-leave and the work shifts of medical and nursing staff made scheduling the workshops quite challenging. Initially, we had planned for participants to complete a basic workshop and a follow-up workshop after six months. No participant followed this concept because of the health care staff shortages in Germany, especially prominent for nurses. Some staff members found it challenging to participate in the workshops as they already had accumulated excessive overtime hours.

Originally the third and fourth workshops were planned as extension modules for the first two workshops, implying that the same people would participate in the second set of workshops than in the first set. However, only two members of the team participated in both the first and the second set of workshops, so that evaluation of the long-term effect of the humour training was not possible. Instead, all four workshops had participants without previous training. However, this means that staff members had a total of four workshops to choose from, enabling a large part of the palliative care to participate in the humour training.

The most severe limitation of this study is the lack of a control group. We wanted to offer all staff members the possibility to participate in the workshops and thus had decided against a control group.

The participation in the humour workshops was optional for the entire staff, which was essential considering that Gelotophobes would most seemingly not profit from this kind of workshop (Ruch et al., 2013). Gelotophobes have an irrational fear of being laughed at.

For future studies, evaluation of the long-term effectiveness requires careful and well in advance scheduling of workshops and the commitment of staff members to participate in longitudinal training.

This study presents data from only one centre, and with two humour coaches, and results may not be representative for other palliative care settings. More research would be needed to confirm the validity of the results in different settings and the sustainability of the positive effects over time.

Last, we would like to discuss the topic of expectations insofar as they might change the results of the humour workshop. The participants had been informed about the aim of the humour workshop in advance, and expectations were expressed by several team members, for example “hope it is going to be funny” or “hope I won’t make a fool of myself”. These expectations might have led to a positive bias.

4.2 Conclusion

A series of humour workshops for health care professionals working in palliative care was beneficial, demonstrating improvements in distress levels, cheerfulness, seriousness and bad mood. Careful scheduling and organization of the workshops seems to be necessary in order for staff members to participate and benefit from them. Even with the small sample size the results seem promising and warrant follow-up research projects on humour training for staff members in palliative care.

Evaluation with a larger and multicentre sample as well as long-term follow-up evaluation is required to ensure representativity, and long-term follow-up evaluation to ensure sustainability. Stratification for different personality types (e.g.: gelotophobes) would be interesting in future research.

Supplementary Information The online version contains supplementary material available at <https://doi.org/10.1007/s41042-022-00063-5>.

Acknowledgements Our thanks go to all persons at the university hospital Bonn and most importantly to the staff who agreed to take part in this study. Laura Fernandez and Sarit Quirin for their help in various stages for their feedback on language and content of the manuscript.

Authors’ Contributions The manuscript has been written by the first author. All other authors contributed in the development of the workshop setting and provided substantial feedback to the manuscript.

Funding Open Access funding enabled and organized by Projekt DEAL. The foundation Humour Helps to Cure (Humor Hilft Heilen), Bonn participated in the conceptualization of the study as a source of knowledge on humour interventions. During data collection this non-profit organization provided the salary for their humour coaches.

Data Availability Changes in the dataset have been documented and saved in different file versions. The data is accessible by the research team in Bonn only.

Code Availability Each participant was given a custom code.

Declarations

Ethics Approval The study has been approved by the ethics committee of the University Hospital Bonn (No. 003/16).

Consent to Participate Every participant was asked to give written informed consent before being included in the study.

Consent for Publication This article does not include details, images, or videos relating to an individual person. All information has been pseudonymized. A trial number was assigned to each patient, and all personal data have been linked to this number. Consent for publication of these pseudonymized data has been given by all participants.

Conflict of Interest/ Competing Interests No competing interest exist for any author of person involved in this article.

Open Access This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>.

References

- Adamle, K., & Ludwick, R. (2005). Humor in hospice care: Who, where, and how much? *American Journal of Hospice & Palliative Medicine*, 22(4), 287–290. <https://doi.org/10.1177/104990910502200410>
- Attardo, S. (2014). *Encyclopedia of humor studies*. Sage.
- Bausewein, C., Booth, S., Gysels, M., Kühnbach, R., Haberland, B., & Higginson, I. J. (2010). Understanding breathlessness: Cross-sectional comparison of symptom burden and palliative care needs in chronic obstructive pulmonary disease and Cancer. *Journal of Palliative Medicine*, 13(9), 1109–1118. <https://doi.org/10.1089/jpm.2010.0068>
- Cain, C. (2012). Integrating dark humor and compassion: Identities and presentations of self in the front and back regions of hospice. *Journal of Contemporary Ethnography*, 41(6), 668–694. <https://doi.org/10.1177/0891241612458122>
- Cavendish, R., Konecny, L., Mitzeliotis, C., Russo, D., Kra-yn-yak Luke, B., Lanza, M., ..., McPartlan Bajo, M. A. (2003). Spiritual care activities of nurses using nursing interventions classification (NIC) labels. *International Journal of Nursing Terminologies and Classifications*, 14(4), 113–124. <https://doi.org/10.1111/j.1744-618x.2003.00113>
- Cherny, N. I., Werman, B., & Kearney, M. (2015). Burnout, compassion fatigue, and moral distress in palliative care. In N. Cherny, M. Fallon, S. Kaasa, R. K. Portenoy, & D. C. Currow (Eds.), *Oxford textbook of palliative medicine* (5th ed., pp. 246–259). Oxford University Press.
- Craik, K. H., Lampert, M., & Nelson, A. J. (1996). Sense of humor and styles of everyday humorous conduct. *Humor-International Journal of Humor Research*, 9(3–4), 273–302. <https://doi.org/10.1515/humr.1996.9.3-4.273>
- de Jong, T. R., Menon, R., Bludau, A., Grund, T., Biermeier, V., Klampfl, S. M., ..., Neumann, I. D. (2015). Salivary oxytocin concentrations in response to running, sexual self-stimulation, breastfeeding and the TSST: The Regensburg Oxytocin Challenge (ROC) study. *Psychoneuroendocrinology*, 62, 381–388. <https://doi.org/10.1016/j.psychneuen.2015.08.027>

- Dean, R., & Gregory, D. (2004). Humor and laughter in palliative care: An ethnographic investigation. *Palliative & Supportive Care*, 2(2), 139–148. <https://doi.org/10.1017/S1478951504040192>
- Herth, K. (1990). Contributions of humor as perceived by the terminally ill. *The American Journal of Hospice Care*, 7, 36–40.
- Hirmüller, S., & Schröer, M. (2012). "Wer's mit humor trägt, macht's sich leichter!". Humor – Ein wichtiger Schutzfaktor in der Arbeit mit Sterbenden ("It's get's easier with humour!"). Humour - an important resilience factor while working with dying people.). In M. Müller & D. Pfister (Eds.), *Wie viel Tod verträgt das team? (how much death can a team process?)* (pp. 268–276). Vandenhoeck & Ruprecht.
- Hofmann, J., Heintz, S., Pang, D., & Ruch, W. (2018). Differential relationships of light and darker forms of humor with mindfulness. *Applied Research in Quality of Life*, 1–25. <https://doi.org/10.1007/s11482-018-9698-9>
- Linge-Dahl, L., Heintz, S., Ruch, W., & Radbruch, L. (2018). Humor assessment and interventions in palliative care: A systematic review. *Frontiers in Psychology*, 9. <https://doi.org/10.3389/fpsyg.2018.00890>
- Martin, R. (2001). Humor, laughter, and physical health: Methodological issues and research findings. *Psychological Bulletin*, 127(4), 504–519. <https://doi.org/10.1037/0033-2909.127.4.504>
- Martin, R. (2002). Is laughter the best medicine? Humor, laughter, and physical health. *Current Directions in Psychological Science*, 11(6), 216–220. <https://doi.org/10.1111/1467-8721.00204>
- Martin, R. (2008). Humor and health. In V. Raskin (Ed.), *The primer of humor research* (pp. 479–522). Mouton de Gruyter.
- Martin, R. A., & Ford, T. E. (2018). *The psychology of humor: An integrative approach*. United Kingdom, Academic Press as an imprint of Elsevier.
- McGhee, P. (2010). *Humor as survival training for a stressed-out world: The 7 humor habits program*: AuthorHouse.
- Mehnert, A., Müller, D., Lehmann, C., & Koch, U. (2006). Die deutsche Version des NCCN Distress-Thermometers - Empirische Prüfung eines Screening-Instruments zur Erfassung psychosozialer Belastung bei Krebspatienten. *Zeitschrift für Psychiatrie, Psychologie und Psychotherapie*, 54(3), 213–223.
- Mesmer-Magnus, J., Glew, D. J., & Viswesvaran, C. (2012). A meta-analysis of positive humor in the workplace. *Journal of Managerial Psychology*, 27(2), 155–190. <https://doi.org/10.1108/02683941211199554>
- Müller, M., Pfister, D., Markett, S., & Jaspers, B. (2012). Wie viel Tod verträgt das Team? Eine bundesweite Befragung der Palliativstationen in Deutschland. *Schmerz*, 23, 600–608.
- Ngamaba, K. H., Panagioti, M., & Armitage, C. J. (2017). How strongly related are health status and subjective well-being? Systematic review and meta-analysis. *European Journal of Public Health*, 27(5), 879–885. <https://doi.org/10.1093/eurpub/ckx081>
- Oulton, J. (2006). The global nursing shortage: An overview of issues and actions. *Policy, politics, & nursing. Practice*, 7(3_suppl), 34S–39S. <https://doi.org/10.1177/1527154406293968>
- Pavot, W., & Diener, E. (2008). The satisfaction with life scale and the emerging construct of life satisfaction. *The Journal of Positive Psychology*, 3(2), 137–152. <https://doi.org/10.1080/17439760701756946>
- Pinna, M., Mahtani-Chugani, V., Sánchez Correas, M., & Sanz Rubiales, A. (2018). The use of humor in palliative care: A systematic literature review. *American Journal of Hospice & Palliative Medicine*, 1–13. <https://doi.org/10.1177/1049909118764414>
- Proyer, R. T., & Wolf, A. (2017). Bern patent no. 9780128093245. Reference module in neuroscience and biobehavioral psychology: J. Stein.
- Raskin, V. (2008). *The primer of humor research*. Mouton de Gruyter.
- Rolke, R., Campbell, K., Magerl, W., & Treede, R.-D. (2005). Deep pain thresholds in the distal limbs of healthy human subjects. *European Journal of Pain*, 9(1), 39–48. <https://doi.org/10.1016/j.ejpain.2004.04.001>
- Ross, C., & Cornbleet, M. (2003). Attitudes of patients and staff to research in a specialist palliative care unit. *Palliative Medicine*, 17(6), 491–497. <https://doi.org/10.1191/0269216303pm7850a>
- Ruch, W. (2008). Psychology of humor. In V. Raskin (Ed.), *The primer of humor research* (pp. 17–100). Gruyter.
- Ruch, W. (2010). *Foreword and overview. Sense of humor: A new look at an old concept*. De Gruyter Mouton.

- Ruch, W., et al. (2018). Broadening humor: Comic styles differentially tap into temperament, character, and ability. *Frontiers in Psychology*, 9(6).
- Ruch, W., & Hofmann, J. (2012). "a temperament approach to humor". In P. G. (Ed.) (Ed.), *humor and health promotion* (pp. pp. 79-112). Hauppauge, NY: Nova science publishers.
- Ruch, W., & Hofmann, J. (2017). Fostering Humour. In: . (eds) . . . In C. Proctor (Ed.), *Positive psychology interventions in practice*. : Springer.
- Ruch, W., Hofmann, J., Platt, T., & Proyer, R. (2013). The state-of-the art in gelotophobia research: A review and some theoretical extensions. *Humor - International Journal of Humor Research*, 27(1). <https://doi.org/10.1515/humor-2013-0046>
- Ruch, W., Köhler, G., & van Thriel, C. (1996). Assessing the "humorous temperament": Construction of the facet and standard trait forms of the state-trait-cheerfulness-inventory — STCI. In W. Ruch (Ed.), *measurement of the sense of humor [special issue]* (Vol. 9, pp. 303-339): Humor: International journal of humor research.
- Ruch, W., Köhler, G., & van Thriel, C. (1997). To be in good or bad humor: Construction of the state form of the state-trait-cheerfulness-inventory — STCI. *Personality and Individual Differences*, 22(4), 477–491.
- Ruch, W., & McGhee, P. E. (2014). Humor intervention programs. In A. C. Parks & S. M. Schueller (Eds.), *Handbook of positive psychological interventions* (pp. 179–193). Wiley-Blackwell.
- Ruch, W., & Zwyer, K. (2001). Heiterkeit und Humor: Ergebnisse der Forschung. In R. Hirsch, J. Bruder, & H. Radebold (Eds.), *Heiterkeit und Humor im Alter*. Bornheim-Sechtem.
- Scheel, T., Hoepfner, D., Grotevendt, A., & Barthlen, W. (2017a). Clowns in Paediatric surgery: Less anxiety and more oxytocin? A Pilot Study. *Klinische Pädiatrie*, 229(5), 274–280. <https://doi.org/10.1055/s-0043-106854>
- Scheel, T. E., Putz, D., & Kurzawa, C. (2017b). Give me a break: Laughing with colleagues guards against ego depletion. *The European Journal of Humour Research*, 5(1), 36–51. <https://doi.org/10.7592/EJHR2017.5.1.scheel>
- Schmitz, N., et al. (2000). Stress, burnout and locus of control in German nurses. *International Journal of Nursing Studies*, 37(2), 95–99. [https://doi.org/10.1016/S0020-7489\(99\)00069-3](https://doi.org/10.1016/S0020-7489(99)00069-3)
- Vachon, M. L. (1995). Staff stress in hospice/palliative care: A review. *Palliative Medicine*, 9(2), 91–122. <https://doi.org/10.1177/026921639500900202>
- Wellenzohn, S., Proyer, R., & Ruch, W. (2018). Who benefits from humor-based positive psychology interventions? The moderating effects of personality traits and sense of humor. *Frontiers in Psychology*, 9. <https://doi.org/10.3389/fpsyg.2018.00821>
- Wellenzohn, S., Proyer, R. T., & Ruch, W. (2016). Humor-based online positive psychology interventions: A randomized placebo-controlled long-term trial. *The Journal of Positive Psychology*, 11(6), 584–594. <https://doi.org/10.1080/17439760.2015.1137>
- Wilson, J., & Kirshbaum, M. (2011). Effects of patient death on nursing staff: A literature review. *The British Journal of Nursing*, 20(9), 559–563.

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

4. Discussion with references

4.1 Systematic review

The literature on humor interventions in palliative medicine remains sparse (Linge-Dahl et al., 2018). Even the more overarching topic of humor in health care in general is the subject of limited research and publications (Pinna et al., 2018). This is undoubtedly due to the challenges involved in conducting complex data collection among this vulnerable population. A recent publication provides a comprehensive overview of Positive Psychology Interventions (PPIs; Carr et al., 2023). The review summarizes a large number of interventions in this area, but their long-term effectiveness is rather limited. Particularly effective are interventions that include a mind-body connection, such as yoga. The findings of this very broad review of PPIs are only partially transferable to our research field. At best, they can be applied to the effectiveness of humor workshops additionally provided for staff (see paragraph 4.4). However, the review provides a number of critical points that should be taken into account for planning and organizing research on humor interventions.

4.2 Study protocol

The humor intervention study was drafted with considerable experience in palliative care research, but quickly proved to be too ambitious. First pilot testing showed patients being overburdened from study methodology as well as from the number and length of the humor interventions. Despite a strong reduction in the scope of the evaluation instruments there was still major attrition with the assessment of the study data. This experience is compiled in the study protocol manuscript. Even though this manuscript resulted from the attrition problems in the clinical trial, it seems particularly important to publish such information, as the failure and adaptation of methodology may hold even greater value for the research community than the actual results of the humor interventions with patients and staff.

4.3 Evaluation of humor interventions for palliative care patients

Although we had already simplified the evaluation instruments and reduced the number of interventions from 3 to 2 after the pilot test, very few patients were able to participate in

the study and even fewer were able to complete all questionnaires before and after the intervention. In consequence, we suggested to reduce the number of evaluation instruments even more in the study protocol which is included in this document. This phenomenon of high attrition rates has been reported in other studies of palliative care (Hui et al., 2012) and has been identified as a major problem in palliative care research (Hui et al., 2012; Jordhøy et al., 1999, Preston et al., 2013). We attempted to reduce attrition by combining shorter questionnaires with physiological parameters as indicators of well-being (Scheel et al., 2017; Santos et al., 2021). However, the use of salivary oxytocin levels did not show a significant effect of the intervention. Salivary oxytocin as a biomarker has been evaluated critically in the past (Horvat-Gordon et al., 2005; McCullough et al., 2013) due to its strong diurnal concentration fluctuations and the potentially unmeasurable amount in saliva. In palliative care patients, the influence of medications received by the patients is unclear. The radioimmunoassay (RIA) method (de Jong et al., 2015), which was used in this study, can measure very low amounts of oxytocin. Although the saliva samples were not a major burden for the patients, these tests were only possible for a small minority of the participants. Many of the palliative care patients suffered from xerostomia or were unable to chew on the swab for 60 seconds due to nausea. About half of the samples did not contain enough fluid to perform the RIA analysis.

Although the analysis of variance (ANOVA) did not show a significant effect of the intervention in the before-after comparison, there were promising results in comparing the before-after data in the intervention and control groups despite the small sample size. While there were no significant changes in the control group, the perceived stress level, seriousness, and bad mood were reduced and cheerfulness was increased in the intervention group. The positive effects of the humor intervention were also supported in the qualitative analysis of field notes. However, Bland and Altman (2011) cautioned against using baseline value as a parameter for comparing values. It would be desirable to recruit a larger sample to test for statistical significance in pre-post data between groups.

In the intervention group, life satisfaction was slightly lower after the intervention. One possible explanation could be that filling out the questionnaires had a negative impact on the patients' life satisfaction. This effect has been reported in the literature in the past (Herzog and Bachmann, 1981), and a questionnaire has even been developed to capture potential negative effects (Rozental et al., 2016). Further research is needed to analyse this potential discrepancy.

Our study confirms that short and simple assessment instruments are an essential precondition for palliative care research (Hui et al., 2012). However, evaluation of the effectiveness of humor interventions in patients with advanced disease with cognitive and functional impairments may require proxy-reported outcome indicators and observational assessment instruments. Suitable biomarkers would be useful, as they could reduce patient burden. However, problems with biomarker sampling must be considered, such as the high prevalence of dry mouth or swallowing problems that can interfere with saliva collection.

4.4 Discussion of Humor workshops for staff

Interestingly, in the systematic literature review (Linge-Dahl et al., 2018) humor was found to play a particularly significant role in staff interactions, such as in the bustling hub of a hospital ward. For instance, Kontos et al. (2016) demonstrated through a structured study of humor interventions in Australian nursing homes that laughter could effectively mitigate participants' restlessness and aggression. In other words, when it comes to the power of humor in palliative care, the evidence is no laughing matter! Health care staff shortages put a strain even on palliative care units, despite the more favourable staff-patient ratios compared to other domains in the hospital setting. The frequent encounter with patients dying under their care exacerbates this strain (Müller et al., 2012).

Four workshops were organized, with the third and fourth workshops originally planned as expansion modules for the preceding workshops to be held six months after the first two workshops. While repetition of the workshops for the same individuals would have been beneficial for deepening the impact and measuring long-term effects (Cohen et al., 2009), this was not feasible in the clinical setting due to staffing constraints. As a result, only staff

members who had not participated in the first two workshops registered for the third and fourth workshops, which were thus conducted as new workshops and not as a follow-up, preventing long-term follow-up evaluation.

The health care professionals benefited from the positive impacts of the workshops, as evidenced by significant reductions in stress, bad mood, and seriousness, and an increase in humor (see publication 3). However, structural problems (Kuhlmey et al. 2015) could not be resolved through the workshops, although the effects of these problems may have been mitigated with the use of humor. As a conclusion, the goal of using humor should be to repeatedly provide small impulses to establish humor as a permanent resource.

4.5 Concluding remarks

Many patients have used humor as a resource in their lives, but in their lived experience of their life-threatening illness, this often fades into the background. A humorous impulse can serve as a reminder to patients that it is permissible to laugh, even in a palliative care setting. This can have a positive impact on the patients' ability to cope with their illness and grief, and this in turn can increase the resilience of the staff. However, the use of humor must be viewed within the limits of what is possible. Patients with advanced and progressive illness often suffer from major physical and cognitive impairments and thus will only tolerate short and simple humor interventions. And while humor can strengthen the resources of the staff members, it cannot compensate for the consequences of major nursing shortages and understaffing.

4.6 References

Bland JM, Altman DG. Comparisons against baseline within randomised groups are often used and can be highly misleading. *Trials* 2011; 12:264

Carr A, Finneran L, Boyd C, Shirey C, Canning C, Stafford O, Lyons J, Cullen K, Prendergast C, Corbett C, Drumm C, & Burke T. The evidence-base for positive psychology interventions: A mega-analysis of meta-analyses. *J Posit Psychol* 2023. Advance online publication

Cohen S, Janicki-Deverts D, & Doyle W J. Chronic stress, glucocorticoid receptor resistance, inflammation, and disease risk. *Proc Natl Acad Sci U S A* 2009; 106: 5995-5999

de Jong T R, Menon R, Bludau A, Grund T, Biermeier V, Klampfl S M et al. Salivary oxytocin concentrations in response to running, sexual self-stimulation, breastfeeding and the TSST: The Regensburg Oxytocin Challenge (ROC) study. *Psychoneuroendocrinology* 2015; 62: 381–388

Herzog AR, Bachman JG. Effects of questionnaire length on response quality. *Public Opin Q* 1981; 45: 549–559

Horvat-Gordon M, Granger DA, Schwartz EB, Nelson VJ, Kivlighan KT. Oxytocin is not a valid biomarker when measured in saliva by immunoassay. *Physiol Behav* 2005; 84: 445–448

Hui D, Glitza I, Chisholm G, Yennu S, Bruera E. Attrition rates, reasons, and predictive factors in supportive care and palliative oncology clinical trials. *Cancer* 2012; 119:1098–105

Jordhøy M, Kaasa S, Fayers P, Underland G, Ahlner-Elmqvist M. Challenges in palliative care research; recruitment, attrition and compliance: experience from a randomized controlled trial. *Palliat Med* 1999; 13: 299–310

Kontos P, Miller K-L, Colobong R, Lazgare L, Binns M, Low L-F, et al. Elder-clowning in long-term dementia care: results of a pilot study. *J Am Geriatr Soc* 2016; 64: 347–353

Kuhlmey A, Dassen T, & Halfens R. Nursing care in Germany: The current state and potential for development. *Health policy* 2015; 119: 1643-1650

Linge-Dahl L, Heintz S, Ruch W, Radbruch L. Humor assessment and interventions in palliative care: a systematic review. *Front Psychol* 2018; 9: 890

McCullough M E, Churchland P S, & Mendez A J. Problems with measuring peripheral oxytocin: Can the data on oxytocin and human behavior be trusted?, *Neurosci Biobehav Rev* 2013; 37: 1485-1492

Müller M, Pfister D, Markett S, & Jaspers B. Wie viel Tod verträgt das Team? Eine bundesweite Befragung der Palliativstationen in Deutschland (How much death can the team handle? A nationwide survey of palliative care units in Germany). *Schmerz* 2012. 23: 600–608

Pinna M, Mahtani-Chugani V, Sánchez Correias M, Sanz Rubiales A. The use of humor in palliative care: a systematic literature review. *Am J Hosp Palliat Care* 2018; 35: 1–13

Preston NJ, Fayers P, Walters SJ, Pilling M, Grande GE, Short V, et al. Recommendations for managing missing data, attrition and response shift in palliative and end-of-life care research: part of the MORECare research method guidance on statistical issues. *Palliat Med* 2013; 27: 899-907

Rozental A, Kottorp A, Boettcher J, Andersson G, Carlbring P. Negative effects of psychological treatments: an exploratory factor analysis of the negative effects

questionnaire for monitoring and reporting adverse and unwanted events. *PLoS ONE* 2016; 11: e0157503

Santos F, Pinto S, Pessalacia J, Luchesi B, Silva L, Marinho M (2021) Effects of clown activities on patients eligible for palliative care in primary health care. *Rev Bras Enferm* 2021; 74:1–8

Scheel T, Hoeppner D, Grotevendt A, Barthlen W. Clowns in paediatric surgery: less anxiety and more oxytocin? A pilot study. *Klin Padiatr Trials* 2017; 229:274–280

5. Acknowledgements

Firstly, I would like to thank my family dad, mom and my brother, who have accompanied and supported me throughout the last years. Without your childcare, encouragement, and the many big and small helps, this work would not have been completed. I would like to thank my grandmother Sonnel for her support and the pride she takes in me taking this endeavour. At 94 years old, you are a rockstar! I thank my son for his unconditional love and the strength he gives me through his humor and creativity. Being your mom is my most important and beautiful job.

I thank my two heart people, Almut Guercke-Bellinghausen and Christiane Wasmann, for accompanying me on this journey. You always had an open ear and so often knew exactly what I needed without me having to ask. I am so grateful to have you two angels by my side.

I thank my doctoral advisor, Lukas Radbruch, for his never-ending support throughout the years. For his quick feedback in all the stress when it was important. For caring about this topic as much as I did, and I knew I could rely on you.

I thank the team of humorists, Mieke Stoffelen and Rainer Kreuz, for their wonderful and inspiring work with the patients of the palliative care unit and the staff. You are the heart of this project, and I am very grateful to have met you. I thank Willibald Ruch and Sonja Heintz for their well-founded scientific assistance. You supported the project from the beginning and had a lot of patience with all the publications. I thank Maria Bley and Eckart von Hirschhausen from Humor Hilft Heilen for their financial and mental support of the humorists. Being able to tap into your knowledge from years of engagement for more humor in German hospitals made the start much easier for me. I thank Sarit Quirin for proofreading. It is incredibly great that you did this for me in your busy daily life. Thank you.

I thank the entire team of Palliative Medicine Bonn, especially the nurses and doctors of the palliative care unit, but also the physiotherapists, social workers, cleaning helpers, and our secretary Verena Gräfe, for supporting and carrying this project.

I thank my scientific colleagues for always being available as a contact person and for lightening up my workday through personal conversations. I thank the organizers and participants of the doctoral colloquium in palliative medicine for the valuable input over the years and the appreciative interaction.

I thank all the dear neighbours in my community housing project for their small and large gestures, especially Katja for ensuring that I always had healthy and delicious food when things got really stressful. And yes, it's okay that you kept asking if I'm finally done.

And last but not least, I thank all the patients and relatives who agreed to participate in this study. It is not self-evident to me that you have embarked on this adventure in your challenging situation. And I will always keep the encounters, every personality, every smile, and every deep sigh and breath, when the tension and stress subsided, in my heart forever.

6. Scientific Presentations and Publications

- 01/23 Linge-Dahl L, Kreuz R, Stoffelen M, Heintz S, Ruch W, von Hirschhausen E, Radbruch L. Humour interventions for patients in palliative care—a randomized controlled trial. *Supportive Care in Cancer* 2023. doi: 10.1007/s00520-023-07606-9
- 05/22 Linge-Dahl L, Kreuz R, Stoffelen M, von Hirschhausen E, Radbruch L. . Humour Workshops for Staff Working in Palliative Care. *Int. J of Applied Positive Psychology* 2022. doi: 10.1007/s41042-022-00063-5
- 04/20 Preston N, Hasselaar J, Hughes, Kaley A, Linge-Dahl L, Radvanyi I, Tubman P, Van Beek K, Varey S & Payne S. Disseminating research findings using a massive online open course for maximising impact and developing recommendations for practice. *BMC Palliat. Care* 2020; 54(19). doi: 10.1186/s12904-020-00564-7
- 04/20 Vranken MJM, Linge-Dahl LM, Mantel-Teeuwisse¹ AK, Radbruch L, Schutjens M-HDB, Scholten W, Payne S and Jünger S (2020). The perception of barriers concerning opioid medicines: A survey examining differences between policy makers, healthcare professionals and other stakeholders. *Palliative Med.*;34(4): 493 –503. doi: 10.1177/0269216319894190
- 06/18 Linge-Dahl LM, Heintz S, Ruch W and Radbruch L. Humor Assessment and Interventions in Palliative Care: A Systematic Review. *Front. Psychol* 2018. 9:890.doi: 10.3389/fpsyg.2018.00890
- 02/18 den Herder-van der Eerden M, Ebenau A, Payne S, Preston N, Radbruch L, Linge-Dahl L, Csikos A, Busa C, Van Beek K, Groot M, Vissers K and Hasselaar J. Integrated palliative care networks from the perspectives of patients: A cross-sectional explorative study in five European countries. *Palliative Med* 2018; 32 (6): 1-11, doi: 10.1177/0269216318756812
- 02/18 den Herder-van der Eerden M, van Wijngaarden J, Payne S, Preston N, Linge-Dahl L, Radbruch L, Van Beek K, Menten J, Busa C, Csikos A, Vissers K, van Gurp J and Hasselaar J. Integrated palliative care is about professional networking rather than standardisation of care: A qualitative study with healthcare professionals in 19 integrated palliative care initiatives in five European countries. *Palliative Med* 2018; 32(6): 1-12. doi: 10.1177/0269216318758194
- 05/17 6th World Congress of the European Association for Palliative Care (EAPC), Madrid, Spain; Poster: Putting a smile on their face – effects of humour interventions on patients receiving palliative care

- 06/16 9th World Research Congress of the European Association for Palliative Care (EAPC), Dublin, Ireland; Poster: The Role of General Practitioners and Integrated Palliative Care at the End-of-Life from a Patients' Point of View
- 12/15 Linge-Dahl L, Vranken M, Juenger S, North K, Scholten W, Payne S, Radbruch L. (2015). Identification of challenges to the availability and accessibility of opioids in twelve European countries: conclusions from two ATOME six-country workshops. *J Palliat Med.* 2015; 18(12): 1033-1139. doi: 10.1089/jpm.2015.0051. Epub 2015 Oct 20.
- 11/14 Access to opioid medication in Europe: final report and recommendations to the Ministries of Health. / Radbruch, L (Editor); Jünger, S; Larjow, E; Linge-Dahl, L; Lynch, T; Mantel-Teeuwisse, A; Papavasiliou, E; Payne, SA; Scholten, W; Schutjens, M-H; Vranken, M,. Bonn: Pallia Med Verlag, 2014. 156 p.