**The effectiveness of aromatherapy, massage and reflexology on quality of life, pain and anxiety in people with palliative needs: A systematic review**

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**Abstract**

**Background:** Massage, aromatherapy, and reflexology are widely-used in palliative care. Despite this there are questions about their suitability for inclusion in clinical guidelines. The need to understand their benefits is a public priority, especially in light of funding pressures.

**Aim:** To synthesise current evidence to determine whether massage, aromatherapy, and reflexology affect palliative care patients’ quality-of-life, anxiety and pain.

**Design:** A systematic review of randomised controlled trials (PROSPERO CRD42017081409) was undertaken following international standards including Cochrane guidelines. The quality of trials and their pooled evidence were appraised.

**Data sources**: Eight citation databases and three trial registries were searched to June 2018.

**Results:** Twenty-two trials, involving 1,956 participants were identified. Eight evaluated massage, four aromatherapy, six reflexology, and four evaluated massage only compared with aromatherapy. Trials were at an unclear risk of bias. Many had small samples. Heterogeneity prevented meta-analysis. In comparison with usual care, another therapy or an active control, evidence on the effectiveness of massage and aromatherapy on pain, anxiety and quality-of-life was inconclusive, where measured many trials found no difference between trial arms. There was some evidence (low quality) that, when compared to an active control, reflexology improved pain.

**Conclusions:** This review identified a relatively large number of trials, but with poor and heterogeneous evidence. New clinical recommendations cannot be made based on current evidence. To help provide more definitive trial findings it may be useful first to understand more about the best way to measure the effectiveness of these therapies in this population of patients.

**What is already known about the topic?**

Reflexology, massage and aromatherapy are widely-used in palliative care.

Patients themselves often report that these therapies are helpful

It is important to demonstrate value for money in health care service provision including in palliative care.

**What this paper adds**

This is the first systematic review to focus on reflexology, massage and aromatherapy in palliative care and to synthesise the evidence using established systematic review methodology.

Low quality trials, differences in the nature of the control arms and in evaluation between trials made it difficult to draw any firm conclusions about the effectiveness of these therapies.

**Implications for practice, theory or policy**

Although there was limited evidence on the effectiveness of reflexology, massage and aromatherapy, equally no evidence of harm was reported.

Heterogeneity across the body of trials suggests the need for theoretical research to understand more clearly how complementary therapies are delivered in palliative care and the best way to measure any purported benefits.

**BACKGROUND**

People with advanced illness can experience a range of problems, such as pain, fatigue and anxiety [1], for which conventional treatments may not provide sufficient relief. In these circumstances people may seek complementary therapies as adjuncts to conventional care. Complementary therapies may be offered as part of a holistic package in palliative care settings such as hospices. In the UK, a significant proportion of the funding for palliative care is from the government. As with all public expenditure there is a need to demonstrate value for money. Without clear evidence derived from robustly designed studies, the place of publically-funded complementary therapy services is already in question [2, 3]. In a UK national prioritisation initiative, research about the benefits of complementary therapies in palliative care was identified as a public and clinical health priority [4].

A systematic review on the effectiveness of aromatherapy, massage and reflexology in palliative care is needed for a number of reasons. Aromatherapy, massage and reflexology are some of the most popular complementary therapies amongst the general public [5]. In the UK, these three therapies are commonly offered in palliative care settings. Whilst these therapies may not cause harm it is important to confirm this as well as any benefits. Their provison also incurs cost even though in palliative care settings they may be provided entirely by volunteers (Burbeck 2014). Costs can include dedicated room use, in reception, materials for the therapies and in satutory requirements of its provision as a service in a health care setting. There are a number of trials that have evaluated these therapies, but there has been limited systematic, critical review of the evidence about the effectiveness of these therapies in palliative care. Such a review will generate conclusions beyond single studies, instead evidence from across studies can be critiqued, compared and pooled together. Thereby to provide more informed recommendations for funders, clinical providers and practitioners, and for future research. It is also important to look at evidence specific to palliative care, as conclusions drawn from elsewhere may not necessarily accommodate the different requirements that are relevant to people at a palliative stage of their illness. People with advanced illness frequently experience increased frailty and co-morbidities, and it is possible that the effects of any treatments in this situation may be different from those experienced in other situations. The criteria by which the success or otherwise of treatments are judged may also differ, for instance it may not be possible for a dramatic improvement in symptoms to occur when someone is terminally ill and their condition is deteriorating day-by-day. How the complementary therapy is provided and the expectations may differ in this population compared to those less compromised and not facing existential issues.

It is important to highlight here that there are existing reviews of complementary therapies in palliative care. These reviews took a broader and different focus on the literature. For example, two reviews looked at both complementary and alternative medicines [6, 7]. Their search strategies did not include terms to describe different types of complementary therapies, thereby studies on specific therapies are likely to have been missed. Moreover, they only included studies written in the English language. Since some complementary therapies including reflexology, have their roots in Eastern countries e.g. China, the reviewers may have missed studies published only in other languages. These reviews also included in their search strategy terms to describe specific symptoms of pain, nausea, vomiting, anxiety, fatigue, insomnia and dyspnoea; therefore any trials that did not consider these specific symptoms would not have been identified. The Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) was used in the most recent review [8]. However, new methodological advances [e.g., 9] have led to an ongoing update of PRISMA [10]. In the review presented in this paper the focus and methods differ. We critically review, using current standard Cochrane methods that include methodological advances post publication of PRISMA [8, 9], evidence from trials of complementary therapies commonly provided in palliative care settings.

**AIM**

To undertake a systematic review on the effectiveness of aromatherapy, massage and reflexology in people who are at a palliative stage of an illness.

**METHOD**

The review protocol is registered on PROSPERO (CRD42017081409).

**Inclusion criteria**

Studies were included if they were randomised controlled trials (RCT) whose (1) participants were aged 18 years or over, and were in a palliative care setting (e.g., hospices) or who were described by the authors as having an advanced disease such as metastatic cancer or renal failure, and (2) the intervention however described involved at least one of the following complementary therapies: aromatherapy, reflexology or massage. There was no restriction on who provided the intervention and what the comparative arm involved. We included studies of patients at an earlier stage of disease, so long as at least 50% of the sample were described as palliative or at an advanced stage. Studies were not restricted to English language. We did not include studies involving as the only recepients of the therapy children or family carers.

**Outcomes**

Our primary outcomes were anxiety, pain, quality-of-life, and adverse events. These were selected as they are common issues in palliative care and are the focus of evaluation in trials of complementary therapy. Our primary time-point was the first measurement taken within a week of the end of the intervention. Secondary outcomes included mood, sleep, physical symptoms other than pain. We also sought measures of care satisfaction, such as self-report and attrition.

**Identification and selection of studies**

Database searches were conducted from inception to June 2018 in: The Cochrane Trials Register, MEDLINE, EMBASE, PsycINFO, AMED, CINAHL, KoreaMed and ProQuest. Variations of the terms ‘palliative’, ‘aromatherapy’, ‘massage’ and ‘reflexology’ were used as search terms. Appendix 1. The MetaRegister of controlled trials, clinicaltrials.gov and The WHO Trials Registry were also searched. For any relevant studies we checked their reference lists and reviewed papers citing the study, and sought contact with authors to ask if they knew of any studies we had missed.

Screening was undertaken in duplicate independently. One author (MA) screened all citations (records of title with if available abstract) and other authors (BC/NK/SW) each screened a third. When a citation appeared relevant, or did not have sufficient information to decide, we retrieved the full-text paper. Should we have found any discrepancies in eligibility at screening and at full-text, we planned for these to be discussed for resolution by the wider review team. We documented reasons at full-text for any studies excluded.

**Data** **handling**

Using reporting guidelines, data were extracted for each study by one reviewer (MA/BC) and checked by a second (BC/VV) [11]. Key trial characteristics were extracted. Where information was lacking, we attempted to contact the authors.

One author (MA) assessed risk of bias for each study using the criteria recommended by the Cochrane Collaboration [12]; this was checked by a second (BC) resolving any disagreements by discussion. We assessed risk relating to selection, performance, detection, attrition and sample size.

Results were analysed according to type of therapy. We considered whether the trials had substantial baseline imbalances between arms. When we found substantial baseline differences between trial arms in key characteristics (such as psychological or physical symptoms) we did not report the trial findings because this may have obscured any differential effect between arms. When treatment effects were reported as continuous variables we extracted (if appropriate) the mean difference (MD) between trial arms. When effects were reported as dichotomous we extracted (if appropriate) the relative risk (RR) and confidence intervals (CI). If we were unable to standardise results to a RR or MD between trial arms, we report alternative statistical results as presented in the relevant papers. We considered as detailed in our PROSPERO protocol combining data across trials in a meta-analysis. It was based on sufficient homogeneity in key characteristics across more than two trials. Due to the nature of the included studies a priori analysis was not feasible.

**Quality of evidence**

We used the GRADE system to assess the quality of the evidence of the primary outcomes [13, 14]. GRADE is a structured and transparent approach for rating confidence in estimates of effect. Evidence is graded as either, high, moderate, low or very low. We first assumed that the quality of the evidence was high, and downgraded by one level if there were serious limitations in risk of bias, indirectness, inconsistency, imprecision, or publication bias. Boxs 1 and 2.

In certain circumstances, for very serious limitations, we adjusted the overall rating by several levels for a particular outcome as recommended by GRADE guidelines [15]. For example, where there were so few data that the results were highly susceptible to the random play of chance.

Judgements were made by one author (BC) and checked by another (MA). Any disagreements were resolved through discussion, or where necessary, with reference to another author.

**RESULTS**

The database search yielded 13,304 unique citations. At screening 179 were deemed to be potentially relevant. At full-text we excluded 157; this was primarily because of the study population not palliative (n=46). Twenty-two RCTs met the inclusion criteria [16-36]. Figure 1.

**Included studies**

The included trials involved 1,956 participants, with most (n=17) having samples of less than 50 participants per trial arm. Eight studies evaluated aromatherapy, twelve massage, and six reflexology. Four compared aromatherapy with massage. Most involved participants with advanced cancer (n=15). One of the other trials involved participants with end-of-life AIDS [28], another end-stage renal disease [16], and five participants with palliative needs with no details on their disease [17, 22, 23, 25, 35]. Most trials had been conducted the USA or the UK (n = 9 in US, n = 7 in UK), and seven in the UK. Others were conducted in Iran (n=2), Germany (n=1), China (n=1), Poland (n=1) and Taiwan (n=1). All trials were published in English. In most the main follow-up time point was immediately post-intervention (n=15). Table 3.

For the eight trials involving aromatherapy, two provided this by inhaling oil only [16, 35]. The other six provided aromatherapy in the form of a massage with oils. Sessions ranged from a one-off 10-minute session [35] to eight one-hour sessions over ten weeks [19]. In two the intervention was delivered at the participants’ homes [16, 17], in two in a purpose built unit, such as a hospice [19] [21]. The other studies did not describe the setting. In five studies, the aromatherapy was delivered by qualified aromatherapists or nurses who had received training [17-19, 21, 22]; in two studies participants administered the intervention themselves (inhaling an aromatherapy oil) [16, 35]. One study did not describe who delivered the intervention [20]. In the twelve trials involving massage, sessions ranged from three 15-45 minute massages [24, 27] to a 15 minute massage daily for eight weeks [36]. All of the studies that described the setting were conducted in the participants’ homes [23, 27, 28, 37]. Interventions were delivered by massage therapists, other than one study that involved nurses [24], and one that did not describe the interventionist [25]. In the six reflexology studies, the sessions ranged from a one-off 30 minute session [31] to a session a week for six weeks [30]. The reflexology was conducted in hospital [29, 31, 34], at a participants’ homes [32, 33] and a day-care centre [30]. The reflexology was conducted by trained reflexologists [29, 30, 32] and participants’ caregivers or partners [31, 33]. One study did not report on this [34].

As listed in Table 1 most studies used a validated scale. Comparators varied; in eight this was usual care, six a placebo control, two social attention and the others different active interventions.

**Risk of bias**

All trials were limited in quality (Figure 2). For example, ten had an unclear risk of bias due to a lack of reporting [16, 20, 23, 27, 29-31, 35-37]. Only, five studies described methods to conceal group allocation by using for example sealed packs and opaque envelopes [20, 21, 26, 32, 33]. Four studies had a high risk of bias as the assessors were not blind [21, 23, 24, 27]. Five studies had a high risk due to high attrition rates [17, 18, 21, 36, 37]. Thirteen studies had a high risk of bias due to small sample size (<50 per trial arm) [16-21, 24, 25, 27, 29-31, 34].

**Effect of therapies**

The use of trial data in this review was limited. Some findings are not reported for six trials because there were baseline differences between trial arms that were not controlled for in all or some of the analyses [16, 17, 21, 22, 36, 37]. In one trial findings were not reported as it did not assess any of our outcomes of interest [35]. The trial focused on physiological outcomes such as heart rate. We included it because we wanted to document the existence of all trials of these therapies in palliative care. A further limitation on use of the data is that not all trials assessed differential effects between trial arms, instead they reported outcomes within each trial arm, from baseline to follow-up(s). Meta-analyses were not possible because of heterogeneity across the trials in key characteristics including comparators and outcome measurements, and also because data were not provided in an appropriate format.

**Aromatherapy**

**Primary outcomes**

One of the eight trials on aromatherapy measured short-term impact on anxiety and pain [20]. In each of its three arms (aromatherapy, massage or no intervention) there was no statistical significant differences in change from baseline in symptoms of anxiety or pain. The trial did not directly measure differential effect between the arms and full data were not reported.

Two trials measured quality-of-life [18, 20], and both involved three arms (aromatherapy, massage or no intervention). Neither found a statistically significant differential impact between trial arms at follow-up. Although in one study, for two of the five subscales (social and support) of the McGill Quality-of-Life Scale, there was a statistically significant difference favouring aromatherapy in comparison to the other arms [18]. Neither trial reported full data. We judged as very low the quality of evidence that aromatherapy has no differential impact in the short-term in comparison with massage or no intervention on quality-of-life. This was because of serious study limitations, in that the trials were underpowered to demonstrate effectiveness (small samples of 15 to 20 per trial arm).

One trial reported an adverse event, a rash following the aroma massage [21].

**Secondary outcomes**

Two trials evaluated mood [19, 21]. In both trials there was an improvement in mood in all trial arms, but no statistically significant difference between the arms: immediately after the intervention between the aromatherapy group and usual care (MD -0.4; 95% CI -3.4, 2.5) [21]; at two weeks after the intervention between aromatherapy and the control group of cognitive behavioural therapy (MD 3.00; 95% CI -12.75, 18.75) [19].

In the one trial that evaluated sleep there was a statistically significant difference favouring the combined groups of massage and aromatherapy compared with the control group who received no intervention (p= 0.04) [20]. This trial also measured impact on other symptoms. Using the Rotterdam Symptom Checklist, there were no statistically significant differences in impact on physical or psychological symptoms in any of the arms. Full data were not reported.

One trial measured satisfaction [21]. It reported that all patients were satisfied with receiving aromatherapy and wished to continue. It did not report on satisfaction in the arm receiving usual care.

**Massage**

**Primary outcomes**

Two of the twelve trials on massage measured anxiety, neither measured differential effects between trial arms [20, 27]. In both trials there were no statistically significant changes in anxiety between baseline and follow-up in all trial arms (massage, aromatherapy, usual care, and no-touch). We did not GRADE the evidence as differential effects were not measured.

Five trials measured pain [20, 24, 26, 27, 37]. One reported a statistically significant difference favouring massage compared with social attention (MD -1.60, 95% CI -2.67, 0.53) [24]. In another trial there was a statistically significant difference favouring massage compared to simple touch (MD -0.90; 95% CI -1.19, -0.61) [26]. In another two there was no statistically significant change between baseline and follow-up in all trials arms [20, 27]. Full data were not provided in either trial. In the fifth trial, there was no statistically significant differential effect between trial arms a week after the end of the intervention in impact on pain (pain intensity MD 0.20 [-0.82, 1.22]) [37]. We judged as very low the quality of evidence about the effect of massage on pain. We downgraded the score by three levels because of study limitations (small sample size), inconsistency in findings and indirectness (variation in comparison arm).

Five trials assessed quality-of-life [18, 20, 23, 26, 27]. In four there was no statistical difference in improvement between trial arms [18, 20, 23, 26]. In one this was in comparison with simple touch (MD 0.08; 95% CI -0.37, 0.53) [26]. The other three did not provide full data. In the fifth, using the McGill scale, there were three outcomes (physical, psychological and total) [27]. There was a significant (p = 0.03) difference at one week in total quality-of-life score favouring massage compared to the other arms (no touch and usual care), and in physical wellbeing in favour of touch (p = 0.005). Full data were not provided. We judged as very low the quality of evidence about the effect of massage on quality-of-life because of study limitations (small sample size), inconsistency in findings and indirectness (variation in comparison group).

One trial reported on adverse events, stating that there were few, with similar rates per trial arm [26]. None of the adverse events described in this trial or the other two trials that reported on adverse events [27, 28] appeared to be related to the intervention.

**Secondary outcomes**

Two trials measured mood at the end of the intervention [24, 26]. One found no statistically significant difference between trial arms in mood (MD-2.40; 95% CI -7.64, 2.8) [24]. The other found statistically significant improvement in the massage group compared to control (simple touch) (MD 0.61; CI 95% 0.35, 0.87) [26]. One trial measured impact on sleep [27] and found no significant differences between massage, no touch control and usual care after one week (p=0.25) or one month (p=0.49) after the intervention.

Five trials measured impact on other symptoms or measures of wellbeing [24-27, 36]. In one trial, comparing abdominal massage and kinesiotherapy (a movement therapy) with kinesiotherapy only, no significant improvement was found in measures of bowel function [36]. Another trial measured relaxation and found no significant difference between trial arms (MD -1.10; 95% CI -2.23, 0.03) [24]. In one they found no significant differences between trial arms for comfort and symptoms of distress (e.g. symptom distress over time between groups (time x group interaction: F = 0.617, p = 0.548)) [25]. In another they found no significant differences between the trial arms in terms of analgesic use, respiratory and heart rate or symptom distress [26].

One trial involving four arms (meditation, massage, both massage and meditation or standard care) found that the combined group of massage and meditation showed improvements from baseline to four weeks after intervention in quality-of-life (p = 0.005) and transcendence (p 0.01) , which were significantly greater (p = <0.05) than improvements in the other groups [28]. Full results were not reported.

No trials measured longer-term impact of the interventions on pain or anxiety. No trials reported on satisfaction. Although one reported that patients enjoyed the massage [30].

**Reflexology**

**Primary outcomes**

Two of the six trials on reflexology measured short-term impact on anxiety [31, 34]. In one the comparison group was sole touching [34] and in the other it was attention control [31]. In one there was a significant difference favouring those receiving reflexology (RR 5.53, 95% CI 2.16, 14.15) [31]. In the other there was no significant difference between the trial arms (MD -2.53, 95% CI -10.18, 5.12) . We judged as very low the quality of the evidence on the impact of reflexology on anxiety in the short-term. We downgraded the quality of evidence by three levels because of study limitations (unclear risk of selection bias), imprecision (wide confidence intervals) and inconsistency of findings.

Three trials measured short-term impact on pain [31, 33, 34]. In two the comparison was attention control [31, 33] and in the other it was sole touching [34]. In all three there was a significant difference favouring those receiving reflexology (MD-3.57, 95% CI -4.35, -2.79)[34]; MD -0.90, 95% CI -1.52, -0.28)[33]. The other trial did not provide full data [31]. We judged the quality of evidence that reflexology reduced the symptoms of pain in the short-term as low. We downgraded the quality of evidence by one level because of study limitations (sample sizes) and one because data were under reported.

One trial measured short-term impact on quality-of-life [29]. There was a clear difference favouring reflexology compared with placebo reflexology (RR 4.0; 95% CI 1.66 to 9.64). We judged the quality of evidence that reflexology improved quality-of-life in the short-term as very low. We reduced the quality of evidence by three levels because of very serious study limitations (sparse data).

trial

**Secondary outcomes**

Three trials measured other symptoms; one study measured symptom distress [30] and two fatigue [32, 33]. One analysed ten symptoms [30]. They found no difference between groups apart from a significantly greater improvement in appetite and mobility in the control (foot massage) group compared to reflexology. Full data not reported. Another found participants reported significantly lower scores on fatigue severity following the massage control (p = 0.02), but not following the reflexology (p=0.38) [32]. The third found significant improvements in symptom severity for reflexology compared to attention control (MD -4.34; 95% CI -7.97, -0.71) and in the interference that these symptoms had on daily living (MD -3.69, 95% CI -6.41, -0.97) between five and 11 weeks [33]. No trials measured mood or sleep as outcomes. One study measured the long-term impact of reflexology on anxiety [32]. There was no statistically significant difference at five or 11 weeks for reflexology compared to usual care or placebo. This study also measured the long-term impact of reflexology on pain and found no statistically significant difference between arms. Two studies measured the long-term impact of reflexology on quality-of-life [32, 33]. In both averaged over five to 11 weeks there was no statistically significant difference between reflexology and attention control (e.g. using Quality of Life Index, group coefficients 0.599 (SE 0.36), p value = 0.99 [33]).

No trials reported on satisfaction. Two reported that patients enjoyed receiving either reflexology or the comparison arm [29, 30]. None of the trials were at high risk of attrition bias.

**DISCUSSION**

This systematic review has critiqued the current evidence on aromatherapy, massage and reflexology in palliative care. It included 22 trials involving 1,956 participants. Overall, there was no statistical difference between aromatherapy and massage with comparator arms (usual care, active control or another therapy) in terms of short-term effect on anxiety, pain or quality-of-life. There was some evidence, albeit from a small pool of studies (n=3), that reflexology reduced pain in the short-term [31,33,34]. Few adverse events were reported, none of the studies stated that they led to loss to follow-up [21, 26-28,30]. However, all these findings are limited because of heterogeneity across trials and low quality with many having small sample sizes. The findings should not therefore be regarded as definitive.

To our knowledge this is the first systematic review specifically examining aromatherapy, massage and reflexology to critically evaluate trial evidence in palliative care populations. Other reviews of complementary therapies in palliative care have been broader in focus, but without using search terms to identify different complementary therapies [38].

The lack of overall positive effect found is perhaps not surprising given that previous reviews of these therapies in other populations have also failed to find robust evidence on effectiveness [39]. At the same time it is broadly recognised that aromatherapy, massage and reflexology are highly valued by patients themselves [e.g., 40, 41, 42] and also that trial data do not always reflect what participants report qualitatively [43]. It remains a challenge to reconcile the mismatch between qualitative and quantitative findings in this area. Is the problem that what is being measured in clinical trials is insensitive to what patients value about the therapies (i.e. the outcomes of quantitative studies are not suitable)? Or is it simply that many previous trials have been poorly designed and under-powered and that better trials may be needed to understand whether these therapies are truly effective?

**Strengths and limitations**

Our review followed robust methods, including protocol registration, adherence to standard guidelines, and critiquing of both the trials themselves and the evidence derived. We aimed to locate all available peer reviewed published evidence. We searched nine databases and trial registries. However, grey literature was not specifically searched and therefore potentially relevant studies may have been missed.

We considered whether a reason for the lack of clear differences between the therapies and comparison groups was affected by our choice of primary outcomes. However, there were no other outcomes that were measured in more than one or two of the included trials. There are recognised difficulties in the assessment of complex interventions in palliative care [44]. Seven different quality-of-life measures were used in the trials; highlighting the lack of a gold standard outcome measure in this population and is consistent with previous findings within palliative care research [45]. Moreover, none of the trials used a specific outcome measure for use in patients receiving complementary therapy. Indeed, as far as we are aware, no such outcome measure has been developed.

Our conclusions are also limited by the poor quality of the evidence found. Because of this it is possible that the true effect of the therapies might be different from the estimated effect derived from the included trials. One prominent quality issue was small sample sizes, which is a common issue in palliative care research [46]. Many of the trials in this review were pilot/feasibility studies which never went on to be a full trial with sufficient power to identify a clinically significant effect. The trial characteristics also limited the strength and generalisability of the findings. In most of the primary studies, the participants had advanced cancer.

Across the studies there was heterogeneity in characteristics. There were different comparison arms including treatment as usual, attention control, and dummy complementary therapies. Using an appropriate comparison arm is important to fully understand the effect of an intervention especially when it is not possible to blind the interventionist [47]. A control group should not include any of the active components that are present in the intervention [48]. For instance, it is possible that an active component of the complementary therapy may be engaging with the therapist and therefore an attention control group may not necessarily be the best comparator. The review found differences in choice of comparator but cannot make recommendations about the most suitable comparator in future trials. In the trials the intervention was carried out by nurses or therapists both who had undergone triaining. It was also undertaken in two by family members who were given training as part of the trial. Such innovation could be very useful to practice, but it brings into question if reflexology can be taught so quickly and without harm, why is reflexology training extensive? Perhaps the potential mechanisms of action in these two trials differ?

Due to the heterogeneity of the study characteristics and the inappropriateness of combining the data, we were unable to conduct any sensitivity analyses (such as on difference in how the intervention was delivered). Research that has explored palliative care patients’ views on aromatherapy, massage and reflexology has reported that participants found that the therapist, the ability to have choices about the therapy, and time to relax were all aspects they valued highly [e.g., 40, 41, 42]. This suggests that the active components of the therapies may have been under-explored. Moreover research design issues, including optimal components of the intervention, are known to be challenging in the evaluation of complex interventions in health care [49, 50].

**Implications for clinical practice and future research**

Our review can only draw limited conclusions about the effectiveness of aromatherapy, massage and reflexology and we are unable to provide new recommendations for practice. However, none of the studies that we identified revealed any major harm to the participants engaging in these therapies. In most, 20/22. harms related to the therapies were not reported, where they were reported they involved following massage foot discomfort or a rash, none resulting in attrition. Combined with our knowledge of the qualitative evidence that finds that complementary therapies are highly valued, we suggest that hospices should continue to offer these therapies as part of their holistic approach at least until definitive research has been conducted.

This review highlights a clear need for more robust research on the effectiveness of aromatherapy, massage and reflexology on outcomes in a palliative population. However, repeating previous trial design risks contributing to waste [51, 52]. Researchers need to first understand the effective components of the therapies by developing the interventions in consultation with complementary therapists and palliative care patients. More research is needed to develop more appropriate outcome measures which reflect the qualitative experience of palliative care patients receiving complementary therapies. Future research, should also consider how the therapies should be delivered and address the issue of what constitutes a suitable comparator arm.

**CONCLUSION**

Our review found no evidence of short-term benefits of aromatherapy and massage on quality-of-life, anxiety and pain for people with palliative care needs. For reflexology, some positive outcomes were found, but all conclusions were limited by the primary studies’ low quality and of the inability to conduct a meta-analysis. Further rigorous research is needed using appropriate outcome measures. Whilst there was limited evidence on the effectiveness of the complementary therapies, there was no evidence of harm; therefore, we suggest hospices continue to provide complementary therapies whilst further research is undertaken.

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**Data management and sharing**  
Data will be made available upon request.

**Declaration of conflicting interests**  
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**Research ethics and patient consent**  
As a systematic review and meta-analysis, the study did not directly involve human participants and required no approval from an Ethics Committee or Institutional Review Board.

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BC, NK, PS, SW and KF obtained funding for this research project. BC and MA contributed to data extraction and analysis and interpretation and drafted the initial manuscript. VV contributed to the analysis and interpretation of the data. All authors contributed to study design, all authors critically reviewed and revised the manuscript and approved the final manuscript for submission.

References

1. Moens K, Higginson IJ, Harding R, Brearley S, Caraceni A, Cohen J, Costantini M, Deliens L, Francke AL, Kaasa S: **Are there differences in the prevalence of palliative care-related problems in people living with advanced cancer and eight non-cancer conditions? A systematic review**. *Journal of Pain and Symptom Management* 2014, **48**(4):660-677.

2. Preen C: **NICE to remove CAM from Palliative Care Guidelines**. [http://wwwcomplementaryhealthprofessionalscouk/ - !NICE-to-remove-CAM-from-Palliative-Care-Guidelines/c1tla/56aa2b480cf289b6a281e14c](http://wwwcomplementaryhealthprofessionalscouk/#!NICE-to-remove-CAM-from-Palliative-Care-Guidelines/c1tla/56aa2b480cf289b6a281e14c)2006.

3. Sharp D, Lorenc A, Little P, Mercer SW, Hollinghurst S, Feder G, MacPherson H: **Complementary medicine and the NHS: Experiences of integration with UK primary care**. *European Journal of Integrative Medicine* 2018, **24**:8-16.

4. Curie M: **Palliative and end of life care Priority Setting Partnership.(PeolcPSP)**. In*.*; 2015.

5. Kemppainen LM, Kemppainen TT, Reippainen JA, Salmenniemi ST, Vuolanto PH: **Use of complementary and alternative medicine in Europe: Health-related and sociodemographic determinants**. *Scandinavian journal of public health* 2018, **46**(4):448-455.

6. Pan CX, Morrison R, Ness J, Fugh-Berman A, Leipzig RM: **Complementary and alternative medicine in the management of pain, dyspnea and nausea and vomiting near the end of life: A systematic review**. *Journal of Pain and Symptom Management* 2000, **20**(5):374-387.

7. Zeng YS, Wang C, Ward KE, Hume AL: **Complementary and Alternative Medicine in Hospice and Palliative Care: A Systematic Review**. *Journal of pain and symptom management* 2018.

8. Moher D, Liberati A, Tetzlaff J, Altman DG: **Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement**. *Annals of internal medicine* 2009, **151**(4):264-269.

9. Higgins JPT LT, Chandler J, Tovey D, Churchill R. : **Methodological Expectations of Cochrane Intervention Reviews**. In*.*, vol. Version 1.06: Cochrane: London; 2018.

10. Moher D, Shamseer L, Clarke M, Ghersi D, Liberati A, Petticrew M, Shekelle P, Stewart LA: **Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement**. *Systematic reviews* 2015, **4**(1):1.

11. Hoffmann TC, Glasziou PP, Boutron I, Milne R, Perera R, Moher D, Altman DG, Barbour V, Macdonald H, Johnston M: **Better reporting of interventions: template for intervention description and replication (TIDieR) checklist and guide**. *Bmj* 2014, **348**:g1687.

12. Higgins J: **Green S. Cochrane handbook for systematic reviews of interventions. The Cochrane Collaboration. 2011**. *Available from: www cochrane-handbook org* 2016.

13. Ryan R, Hill S: **How to GRADE the quality of the evidence, Version 3**. In*.* Edited by Cochrane Consumers and Communication Group, vol. Version 3.0; 2016.

14. Schünemann H, Oxman A, Higgins J, Vist G, Glasziou P, Akl E, Guyatt G, on behalf of the Cochrane GRADEing Methods Group and the Cochrane Statistical Methods Group: **Chapter 11: Completing ‘Summary of findings’ tables and grading the confidence in or quality of the evidence.** In: *Cochrane Handbook for Systematic Reviews of Interventions version 520.* edn. Edited by Higgins J, Churchill R, Chandler J, Cumpston M; 2017.

15. Guyatt GH, Oxman AD, Vist G, Kunz R, Brozek J, Alonso-Coello P, Montori V, Akl EA, Djulbegovic B, Falck-Ytter Y: **GRADE guidelines: 4. Rating the quality of evidence—study limitations (risk of bias)**. *Journal of clinical epidemiology* 2011, **64**(4):407-415.

16. Barati F, Nasiri A, Akbari N, Sharifzadeh G: **The Effect of Aromatherapy on Anxiety in Patients**. *Nephrourology Monthly* 2016, **8**(5):e38347.

17. Kyle G: **Evaluating the effectiveness of aromatherapy in reducing levels of anxiety in palliative care patients: results of a pilot study**. *Complementary Therapies in Clinical Practice* 2006, **12**(2):148-155.

18. Lai TKT, Cheung MC, Lo CK, Ng KL, Fung YH, Tong M, Yau CC: **Effectiveness of aroma massage on advanced cancer patients with constipation: A pilot study**. *Complementary Therapies in Clinical Practice* 2011, **17**(1):37-43.

19. Serfaty M, Wilkinson S, Freeman C, Mannix K, King M: **The ToT study: helping with Touch or Talk (ToT): a pilot randomised controlled trial to examine the clinical effectiveness of aromatherapy massage versus cognitive behaviour therapy for emotional distress in patients in cancer/palliative care**. *Psycho-Oncology* 2012, **21**(5):563-569.

20. Soden K, Vincent K, Craske S, Lucas C, Asley S: **A randomized controlled trial of aromatherapy massage in a hospice setting**. *Palliative Medicine* 2004, **18**(2):87-92.

21. Wilcock A, Manderson C, Weller R, Walker G, Carr D, Carey A, Broadhurst D, Mew J, Ernst E: **Does aromatherapy massage benefit patients with cancer attending a specialist palliative care day centre?** *Palliative Medicine* 2004, **18**(4):267-290.

22. Wilkinson S, Aldridge J, Salmon I, Cain E, Wilson B: **An evaluation of aromatherapy massage in palliative care**. In: *Palliative medicine.* vol. 13; 1999: 409-417.

23. Downey L, Diehr P, Standish L, Patrick D, Kozak L, Fisher D, Congdon S, Lafferty W: **Might massage or guided meditation provide 'means to a better end'? Primary outcomes from an efficacy trail with patients at the end of life**. *J Palliat Care* 2009, **25**(2):100-108.

24. Jane S-W, Chen S-L, Wilkie DJ, Lin Y-C, Foreman SW, Beaton RD, Fan J-Y, Lu M-Y, Wang Y-Y, Lin Y-H *et al*: **Effects of massage on pain, mood status, relaxation, and sleep in Taiwanese patients with metastatic bone pain: A randomized clinical trial**. *Pain* 2011, **152**(10):2432-2442.

25. Kolcaba K, Dowd T, Steiner R, Mitzel A: **Efficacy of hand massage for enhancing the comfort of hospice patients**. In: *Journal of hospice and palliative nursing.* vol. 6; 2004: 91-102.

26. Kutner J, Smith M, Corbin L, Hemphill L, Benton K, Mellis B, Beaty B, Felton S, Yamashita T, Bryant L *et al*: **Massage therapy versus simple touch to improve pain and mood in patients with advanced cancer: a randomized trial**. In: *Annals of internal medicine.* vol. 149; 2008: 369-379.

27. Toth M, Mrcantonio ER, Davis RB, Walton T, Kahn JR, Phillips RS: **Massage therapy for patients with metastatic cancer: A pilot randomized controlled trial**. *The Journal of Alternative and Complementary Medicine* 2013, **19**(7):650-656.

28. Williams A-L, Selwyn PA, Liberti L, Molde S, Njike VY, McCorkle R, Zelterman D, Katz DL: **A Randomized Controlled Trial of Meditation and Massage Effects on Quality of Life in People with Late-Stage Disease: A Pilot Study**. *Journal of Palliative Medicine* 2005, **8**(5):939-952.

29. Hodgson H: **Does reflexology impact on cancer patients' quality of life?** In: *Nursing standard (royal college of nursing (great britain) : 1987).* vol. 14; 2000: 33-38.

30. Ross C, Hamilton J, Macrae G, Docherty C, Gould A, Cornbleet M: **A pilot study to evaluate the effect of reflexology on mood and symptom rating of advanced cancer patients**. *Palliative Medicine* 2002, **16**(6):544-545.

31. Stephenson NL, Swanson M, Dalton J, Keefe FJ, Engelke M: **Partner-delivered reflexology: effects on cancer pain and anxiety**. *Oncology Nursing Forum* 2007, **34**(1):127-132.

32. Wyatt G, Sikorskii A, Rahbar MH, Victorson D, You M: **Health-related quality-of-life outcomes: a reflexology trial with patients with advanced-stage breast cancer**. *Oncology Nursing Forum* 2012, **39**(6):568-577.

33. Wyatt G, Sikorskii A, Tesnjak I, Frambes D, Holmstrom A, Luo Z, Victorson D, Tamkus D: **A Randomized Clinical Trial of Caregiver-Delivered Reflexology for Symptom Management During Breast Cancer Treatment**. In: *Journal of pain and symptom management.* vol. (no pagination); 2017.

34. Jahani S, Salari F, Elahi N, Cheraghian B: **Investigating the effect of reflexology in intensity of pain and anxiety among patients suffering from metastatic cancer in adults' hematology ward**. *Asian Journal of Pharmaceutical and Clinical Research* 2018, **11**(6):5.

35. Goepfert M, Liebl P, Herth N, Ciarlo G, Buentzel J, Huebner J: **Aroma oil therapy in palliative care: a pilot study with physiological parameters in conscious as well as unconscious patients**. In: *Journal of cancer research and clinical oncology.* vol. 143; 2017: 2123-2129.

36. Dadura E, Stępień P, Iwańska D, Wójcik A: **Effects of abdominal massage on constipation in palliative care patients–a pilot study**. *Advances in Rehabilitation* 2017, **31**(4):19-34.

37. Wilkie DJ, Kampbell J, Cutshall S, Halabisky H, Harmon H, Johnson LP, Weinacht L, Rake-Marona M: **Effects of massage on pain intensity, analgesics and quality of life in patients with cancer pain: a pilot study of a randomized clinical trial conducted within hospice care delivery**. *Hospice Journal - Physical, Psychosocial, & Pastoral Care of the Dying* 2000, **15**(3):31-53.

38. Rojas SV, Hanke JS, Avsar M, Ahrens PR, Deutschmann O, Tumler KA, Uribarri A, Rojas-Hernandez S, Sanchez PL, Gonzalez-Santos JM *et al*: *Revista Espanola de Cardiologia* 2017.

39. Sheppard MK: **The paradox of non-evidence based, publicly funded complementary alternative medicine in the English National Health Service: An explanation**. *Health Policy* 2015, **119**(10):1375-1381.

40. Cronfalk BS, Strang P, Ternestedt BM, Friedrichsen M, Cronfalk BS, Strang P, Ternestedt B-M, Friedrichsen M: **The existential experiences of receiving soft tissue massage in palliative home care--an intervention**. *Supportive Care in Cancer* 2009, **17**(9):1203-1211.

41. Beck I, Runeson I, Blomqvist K: **To find inner peace: soft massage as an established and integrated part of palliative care**. *International journal of palliative nursing* 2009, **15**(11):541-545.

42. Gambles M, Crooke M, Wilkinson S: **Evaluation of a hospice based reflexology service: a qualitative audit of patient perceptions**. *European Journal of Oncology Nursing* 2002, **6**(1):37-44.

43. Nyatanga B, Cook D, Goddard A: **A prospective research study to investigate the impact of complementary therapies on patient well-being in palliative care**. *Complementary therapies in clinical practice* 2018, **31**:118-125.

44. Higginson IJ, Evans CJ, Grande G, Preston N, Morgan M, McCrone P, Lewis P, Fayers P, Harding R, Hotopf M: **Evaluating complex interventions in end of life care: the MORECare statement on good practice generated by a synthesis of transparent expert consultations and systematic reviews**. *BMC medicine* 2013, **11**(1):111.

45. Albers G, Echteld MA, de Vet HC, Onwuteaka-Philipsen BD, van der Linden MH, Deliens L: **Evaluation of quality-of-life measures for use in palliative care: a systematic review**. *Palliative Medicine* 2010, **24**(1):17-37.

46. Kirchhoff KT, Kehl KA: **Recruiting participants in end-of-life research**. *American Journal of Hospice and Palliative Medicine®* 2008, **24**(6):515-521.

47. Serfaty M, Csipke E, Haworth D, Murad S, King M: **A talking control for use in evaluating the effectiveness of cognitive-behavioral therapy**. *Behaviour research and therapy* 2011, **49**(8):433-440.

48. Whitehead WE: **Control groups appropriate for behavioral interventions**. *Gastroenterology* 2004, **126**:S159-S163.

49. **A framework for development and evaluation of RCTs for complex interventions to improve health**: Medical Research Council; 2000.

50. McVicar A, Greenwood C, Ellis C, LeForis C: **Influence of study design on outcomes following reflexology massage: an integrative and critical review of interventional studies**. *The Journal of Alternative and Complementary Medicine* 2016, **22**(9):739-750.

51. Chalmers I, Glasziou P: **Avoidable waste in the production and reporting of research evidence**. *The Lancet* 2009, **374**(9683):86-89.

52. Glasziou P, Chalmers I: **Research waste is still a scandal—an essay by Paul Glasziou and Iain Chalmers**. *Bmj* 2018, **363**:k4645.