Meta-Analysis of Psychosocial Interventions to Reduce Pain in Patients With Cancer

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ABSTRACT

Purpose

Pain is one of the most common, burdensome, and feared symptoms experienced by patients with cancer. American Pain Society standards for pain management in cancer recommend both pharmacologic and psychosocial approaches. To obtain a current, stable, and comprehensive estimate of the effect of psychosocial interventions on pain—an important clinical topic—we conducted a meta-analysis of randomized controlled studies among adult patients with cancer published between 1966 and 2010.

Methods

Three pairs of raters independently reviewed 1,681 abstracts, with a systematic process for reconciling disagreement, yielding 42 papers, of which 37 had sufficient data for meta-analysis. Studies were assessed for quality using a modified seven-item Physiotherapy Evidence Database (PEDro) coding scheme. Pain severity and interference were primary outcome measures.

Results

Study participants ($N = 4,199$) were primarily women (66%) and white (72%). The weighted averaged effect size across studies for pain severity (38 comparisons) was 0.34 (95% CI, 0.23 to 0.46; $P < .001$), and the effect size for pain interference (four comparisons) was 0.40 (95% CI, 0.21 to 0.60; $P < .001$). Studies that monitored whether treatment was delivered as intended had larger effects than those that did not ($P = .04$).

Conclusion

Psychosocial interventions had medium-size effects on both pain severity and interference. These robust findings support the systematic implementation of quality-controlled psychosocial interventions as part of a multimodal approach to the management of pain in patients with cancer.

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INTRODUCTION

Pain is one of the most common symptoms experienced by patients with cancer. A recent meta-analysis of studies that assessed pain in patients with cancer estimated its prevalence at 53%.¹ Part of the reason pain is so common in patients with cancer is because it can arise for a variety of reasons. Possible causes include direct tumor involvement (eg, pain resulting from metastasis to bone and organs), treatment toxicity (eg, pain resulting from chemotherapy-induced mucositis), and diagnostic procedures (eg, pain resulting from lumbar punctures and biopsies).² In addition to being common, pain is one of the most feared and burdensome symptoms experienced by patients with cancer.¹ Moderate or severe pain, which is estimated to occur in one third of patients with cancer who experience pain, is often associated with inter-

ference with sleep, daily life activities, enjoyment of life, work ability, and social interactions.³

Clinical practice guidelines for the management of pain in patients with cancer issued by the American Pain Society recognize the role that both pharmacologic and nonpharmacologic approaches can play in providing pain relief.⁴ Among the nonpharmacologic approaches recommended for use in patients with cancer are the following two major types of interventions: skills training and education.⁵ In general, skills-based interventions focus on changing the way patients interpret pain (eg, reduce catastrophizing; ie, negative expectations about the ability to tolerate pain or to have it managed adequately) and provide practice in specific approaches to manage pain (eg, deep muscle relaxation). Educational approaches usually provide instruction about how to use analgesic medications and communicate effectively with clinicians about unrelieved pain.

Meta-analysis is a recognized tool for synthesizing the results of controlled studies to estimate the strength of evidence for intervention efficacy.⁶ Five published meta-analyses have evaluated the effects of psychosocial interventions on pain in patients with cancer.⁷⁻¹¹ Across these meta-analyses, the average effect sizes reported were relatively consistent. Although one meta-analysis reported a large effect size (1.1),⁷ the others all reported small to medium effects (range, 0.41 to 0.54).⁸⁻¹¹ Although these results may seem conclusive, closer examination of the five meta-analyses identifies important limitations in each. One meta-analysis focused only on relaxation training and reported an effect size based on only three studies.¹⁰ Another focused only on cognitive behavioral therapy and was further limited to only patients with breast cancer.¹¹ The meta-analysis that reported the largest effect size⁷ was limited to education-based interventions and, consequently, did not address the efficacy of skill-based approaches. The two remaining meta-analyses,^{8,9} which shared similar methodologies, focused on psychoeducational interventions, a term that was operationalized to encompass both education-based and skill-based approaches, even though those interventions differ, as discussed further later in this article.

To address the limitations of preceding meta-analyses and update findings with more recently published studies, we conducted a meta-analysis of randomized controlled studies of psychosocial interventions published between 1966 and 2010 in which pain was measured as an outcome in adults with cancer or adults undergoing procedures for the diagnosis of cancer. The primary aim was to obtain a more current, comprehensive, and robust estimate of the effect of psychosocial interventions on cancer-related pain than previously available. A secondary aim was to determine whether the effects of psychosocial interventions on pain in patients with cancer differed by the type of intervention (skills- or education-based approach). Third, we sought to explore the relationship between intervention design (eg, study quality) and patient sociodemographics (eg, sex, race/ethnicity) as moderators of the direction and/or strength of the relationship between psychosocial interventions and pain in patients with cancer.

METHODS

Search Strategy

The electronic databases MEDLINE, PsycInfo, CINAHL, EMBASE, and the Cochrane Library were searched using controlled vocabulary terms specific to each database and keywords for terms indicating pain (eg, pain, nociceptors) and presence of cancer (eg, neoplasms, cancer, leukemia). These criteria were combined with psychosocial interventions (eg, psychotherapy, hypnosis, desensitization, meditation) and publication types (eg, randomized controlled trial, controlled clinical trial). The searches were inclusive of studies published in English from the earliest publication date available in each database and updated through 2010. The MEDLINE search strategy is available in the Data Supplement.

Selection Strategy

Because more than 1,400 abstracts were initially identified, selection of abstracts for full review was divided among three pairs of raters. After each person reviewed the abstracts independently, the project leader reviewed findings from rater pairs, resolved any discrepancies, and produced a final list of studies for full-text examination. Studies had to include only adults (≥ 18 years old) with a diagnosis of cancer or undergoing procedures for diagnosis of cancer, use random assignment, assess pain, include a usual care or no treatment control condition, and use a psychosocial intervention. We defined psychosocial intervention as any approach involving cognitive-behavioral techniques, stress management, relaxation training, education, hypnosis, or other experiential techniques. Studies that used alternative therapies as their primary treatment, such as massage or Reiki, were not included. Treatment could be provided in any of multiple formats including individual, group, couples, telephone, or Internet-based modalities.

ment control condition, and use a psychosocial intervention. We defined psychosocial intervention as any approach involving cognitive-behavioral techniques, stress management, relaxation training, education, hypnosis, or other experiential techniques. Studies that used alternative therapies as their primary treatment, such as massage or Reiki, were not included. Treatment could be provided in any of multiple formats including individual, group, couples, telephone, or Internet-based modalities.

Review Strategy

The list of studies identified for full-text review was divided among the three pairs of raters, who independently reviewed the studies using an online coding program designed for this project. After each rater entered data abstracted from the articles, the program produced a list of discrepancies, which were then systematically resolved by consensus, and final data were entered for each study. Studies were assessed for quality using a modified seven-item version of the Physiotherapy Evidence Database (PEDro) coding scheme, which was developed using a Delphi expert consensus technique.¹² The scheme was designed to identify studies that are generalizable, internally valid, and contain interpretable data. When full text could not be located or when published articles did not present sufficient data, we contacted authors for required information.

Statistical Analysis

We used the Hedges g as the effect size statistic. Hedges g , as defined by Borenstein et al,⁶ is the difference between intervention and control group means (d), divided by their pooled standard deviation multiplied by a factor (J) that corrects for underestimation of the population standard deviation, such that $g = J \times d$. By pooling variances, the effect size statistic standardizes outcomes across studies and facilitates comparison among disparate outcome measures.¹³ Lipsey and Wilson¹³ examined distributions of effect sizes from meta-analyses categorizing effect size into tertiles (small, $g \leq 0.30$; medium, $g = 0.50$ to 2.50 ; and large, $g \geq 0.67$), with the modal effect size for psychological and behavioral interventions ranging from 0.30 to 0.50. Each effect size was weighted by its inverse variance weight in calculating mean effect sizes. Heterogeneity was examined using the I^2 statistic, which represents the approximate proportion of total variability (0% to 100%) in point estimates that can be attributed to systematic differences across studies (larger percentages reflect greater heterogeneity). Because the sample size for meta-analysis consists of the number of unique treatment comparisons, it is represented by k , in contrast to the number of participants in each study (N).

Because studies often reported more than one pain-related outcome, outcomes were chosen in the following order: worst, average, current, and least. Pain interference was examined separately. When studies reported outcomes at more than one follow-up time point, the assessment closest in time to intervention completion was used to calculate the Hedges g . Individual effect sizes were examined to identify outliers for possible correction.

Variance Modeling

All effect size calculations used a random effects estimation model. A random effects estimate assumes additional variance beyond the set of studies and facilitates generalizability of results.

Moderator Analysis

Moderators were chosen a priori to determine the influence of intervention, design, and sociodemographic characteristics on pain outcomes. Moderator analyses were limited to instances in which groups were represented by at least three studies to ensure sufficient data for analysis. To examine intervention characteristics, we compared the efficacy of studies that used cognitive-behavioral or skills-based interventions versus those that used educational approaches; we also examined the influence of number of treatment sessions on effect size. Moderators related to study design included the following: whether pain was a primary or secondary study outcome; whether presence of pain was an eligibility criterion for the study; and study quality as assessed by the PEDro scale. We also examined the relationship between effect size and percentage of women and minority participants included in the studies, based on previous reviews.⁷⁻¹¹ Of note, data on age were insufficient, because few studies reported age as a continuous variable.

Categorical moderators were examined using a mixed effects approach in which within-group effects were estimated using random effects and the between-group differences were estimated using a fixed effects model. This model compares within- and between-group heterogeneity¹³ using the Q statistic, which is distributed as a χ^2 , and tests the extent to which that variability is greater than study-level variability alone. Meta-regression, using method of moments estimation, was used for the analysis of continuous moderators.¹⁴

Sources of Bias

Mean effects were assessed for degree of publication bias (overrepresentation of small studies with positive effects) using the following two techniques: examination of the funnel plot and trim and fill. The funnel plot graphs the effect size of each study by its respective SE. If points are distributed equally between positive and negative effects, bias is lacking. Trim and fill¹⁵ assesses the symmetry of the funnel plot under the assumption that when publication bias exists, a disproportionate number of studies will fall to the bottom right of the plot. To examine stability of the overall effect, a fail-safe N was calculated to determine the number of studies with a null effect size needed to reduce the overall effect to nonsignificance.

All P values are two-sided. We used the Comprehensive Meta-Analysis software package (<http://www.meta-analysis.com/>) to conduct all statistical analyses.

RESULTS

Study Selection

A total of 1,681 study abstracts were identified through online databases (Fig 1). Of these, 1,613 did not meet criteria for inclusion in the meta-analysis. Full text was retrieved for 68 studies. On review of these studies, 28 were eliminated because they did not meet criteria for inclusion in the meta-analysis and/or were duplicates. An additional relevant study was identified through a hand search of reference lists.

Fig 1. Selection of included studies.

Forty-two studies met all criteria.¹⁵⁻⁵⁶ Of these, five studies¹⁵⁻¹⁹ did not provide sufficient data to compute an effect size, even after contacting the authors, yielding 37 studies for meta-analysis. One study²⁰ used two relevant intervention conditions, resulting in 38 separate effect sizes for analysis. Included studies were published between 1983 and 2010, with the largest number ($n = 5$) published in 2004.

Description of the Study Participants at Baseline

The key characteristics of the patients and the studies are listed in Table 1 and detailed in Appendix Tables A1 and A2 (online only). Included studies comprised a sample of 4,199 participants.¹⁵⁻⁵⁶ Study participants were primarily women (66%) and white (72%). In nearly two thirds (65%) of the studies, patients had mixed cancer stages at baseline. More than one half of participants for whom treatment was reported were receiving chemotherapy at baseline, either alone or in combination with other treatments. Seventy-one percent of the participants were receiving outpatient care at baseline, when reported. Most of the recruitment to these studies was conducted in medical center-based oncology clinics (67%) by systematic screening (eg, the study by Kwekkeboom³⁷) or mixed recruitment strategies in oncology clinics in medical centers alongside health maintenance organizations and/or private practices (31%; eg, the study by Syrjala et al⁵⁰). Retention was fairly high

Table 1. Summary of Participant Demographics and Study Characteristics at Baseline ($N = 4,199$ participants)

Demographic or Characteristic	%
White, % of patients	72
Female, % of patients	66
Cancer stage mixed, % of studies	65
Type of cancer treatment, % of patients	
Chemotherapy	54
Radiotherapy	31
Surgery	19
Hormonal therapy	19
Transplantation	12
Palliation	4
No active treatment	31
Mixed or other treatments (eg, biologic agents)	27
Treatment settings, % of patients	
Outpatient care	71
Inpatient care	23
Both outpatient and inpatient	6
Participant recruitment, % of studies	
Systematic screening in medical center-based oncology clinics	67
Mixed recruitment in oncology clinics alongside HMOs and/or private practices	31
Retention of participants*	
Rate, %	77
Length of retention, weeks	
Mean	6.4
Standard deviation	12.4
Measure of outcome, % of studies	
Pain severity	95
Pain interference	31

NOTE. Data coded by the study or the raters as unknown are not included. Abbreviation: HMO, health maintenance organization.

*From baseline to first follow-up.

Table 2. Summary of Study Intervention Characteristics (N = 4,199 participants)

Characteristic	Intervention Group (%)	Control Group (%)
Sample size		
Studies	63.51	54.89
Participants	50.05	46.97
No. of treatment sessions		
Mean	6.48	
Standard deviation	11.76	
No. of treatment or control arms		
One	74	90
Two	26	10
Three	2	
Type of intervention		
Skills training	48	
Education	50	
Supportive-expressive therapy	2	
Focus of the intervention		
Individual	90	
Group/dyads/families	10	
Intervention format		
In-person	76	
Audiovisual	22	
Print	20	
Telephone	12	
Web	5	
Intervention providers		
Nurses	63	
Other (radiation oncologist, health educator)	15	
Psychologists	10	
Social workers	2	
Multidisciplinary teams	7	
Types of control groups		
Usual care	64	
Component control*	31	
Equivalent active treatment (cross-over design)	5	
Wait list control	2	
Primary delivery setting		
Home†	27	
Clinic	73	

NOTE. Data coded by the study or the raters as unknown are not included.

*Component controls exclude the active ingredients of treatment but generally including nonspecific therapeutic factors such as expectations of improvement (eg, therapist-led intervention group without supportive-expressive therapy v therapist-led intervention group with supportive-expressive therapy).⁵⁷

†Includes delivery in the home and in the clinic.

from baseline to the study-defined primary follow-up (77%), although the follow-up period was relatively limited in most studies, averaging 6.4 weeks (standard deviation [SD], 12.4 weeks).

Description of the Intervention and Control Conditions

Descriptions of the intervention and control conditions are listed in Table 2 and detailed in Appendix Tables A1 and A2. At baseline, intervention sample sizes averaged 64 participants (SD, 50 participants); there was an average of 55 participants in the control group(s) (SD, 47 participants). The intervention group averaged six sessions (SD, 12 sessions) and was most frequently compared with a usual care control group (64%). Education, either alone or in combination with

symptom monitoring and management, was conducted in one half of all studies. Nearly half (48%) of the studies addressed skills training, including cognitive-behavioral therapy, relaxation, hypnosis, and experiential interventions (eg, conditioning the patient with auditory cues to replace pain with comforting sensations or numbness). One study (2%) was devoted to psychoanalytic therapy about a significant relationship (supportive-expressive therapy).³⁴ Generally, only one intervention group was involved (74%). In-person was the most common intervention format (76%). Nurses were the most frequent intervention providers (63%); multidisciplinary teams were relatively uncommon among providers (7%).

Generally, studies had one control group (90%); in four studies (10%), however, an additional comparison was included. Usual care control groups were most common (64%), followed by those with component controls (that is, providing participants with a control condition that excluded one or more of the active ingredients of treatment).⁵⁷ For example, one study compared therapist-led support groups with and without supportive-expressive therapy.³⁴ Control groups involving an equivalent active treatment (cross-over design³¹; 5%) or a wait list control (2%)⁵⁶ were least common.

Measured Outcomes

The primary outcome for this review, pain severity, was the primary outcome measure in most studies (95%). Pain interference was the second most common outcome measure in the studies we reviewed (31%; see Table 1 for summary and Appendix Tables A1 and A2).

Meta-Analysis

Effect sizes for all studies included in the meta-analysis are shown in Figure 2. The weighted average effect size in 38 comparisons for pain severity ($k = 38$) was 0.34 (95% CI, 0.23 to 0.46; $P < .001$; Table 3). The weighted averaged effect size in four comparisons for pain interference was 0.40 (95% CI, 0.21 to 0.60; $P < .001$; Table 3). Because only four studies reported pain interference outcomes, moderator analyses were conducted for pain severity outcomes only. No outliers were found because all studies fell within 2 SDs of the mean. Among studies that measured pain severity, skills-based interventions yielded a higher but statistically nonsignificant effect size than educational approaches ($k = 18$, $g = 0.45$ v $k = 19$, $g = 0.29$, respectively; $P = .22$). Screening for the presence of pain as an inclusion criterion before participant enrollment did not influence outcomes ($P = .94$). Studies in which pain was the primary outcome ($k = 32$) evidenced larger effects compared with studies in which pain was a secondary outcome ($g = 0.37$ v $g = 0.24$, respectively), although the difference was not statistically significant ($P = .26$). There was a statistical trend for the effect of the delivery setting ($g = 0.25$ for clinic only v $g = 0.43$ for home; $P = .08$). Effect size was unrelated to the number of sessions ($P = .76$), percentage of women participants ($P = .77$), or percentage of minority participants ($P = .50$) in each study.

Looking at publication bias, trim and fill analysis imputed no studies; examination of the funnel plot of effect sizes by their SEs (Fig 3) suggests a fairly even distribution of studies for the primary study outcome. The fail-safe N for pain severity was $N = 812$, indicating that the effect size was stable.

Fig 2. Forest plot of effect sizes (*g*) for studies measuring pain severity (*k* = 38).

Quality of Studies

To assess the influence of study quality on pain severity, we compared studies based on whether they did or did not meet a PEDro criterion. Fewer than 20% of studies concealed allocation or blinded assessors, and fewer than half of all studies reported monitoring treatment implementation.

PEDro criteria with sufficient variability (20% to 80% of studies) were individually examined as potential moderators of intervention effects (Table 4). The only criterion associated with a statistically

significant difference was monitoring of treatment implementation according to the protocol, with studies meeting this criterion showing a larger effect ($g = 0.52$) than those that did not ($g = 0.29$; $P = .04$).

DISCUSSION

Psychosocial interventions had meaningful effects on both pain severity and interference, as consonant with the results from previous

Table 3. Mean Effect Sizes and Moderator Analyses (k = 38)

Parameter	k	Effect Size (g)	95% CI	P	Heterogeneity
Mean effect size					
Pain severity*	38	0.34	0.23 to 0.46	< .001	$I^2 = 60.1$, $P < .001$
Pain interference	4	0.40	0.21 to 0.60	< .001	$I^2 = 0.001$, $P = .74$
Categorical moderators (pain severity)					
Intervention type†					
Skills based	18	0.45	0.21 to 0.69	.22	
Educational	19	0.29	0.19 to 0.39		
Pain as study outcome					
Primary	32	0.37	0.24 to 0.50	.26	
Secondary	6	0.24	0.06 to 0.42		
Presence of pain required for eligibility					
No	14	0.33	0.06 to 0.59	.94	
Yes	24	0.34	0.22 to 0.45		
Delivery setting					
Clinic only	24	0.25	0.10 to 0.40	.08	
Home	8	0.43	0.29 to 0.58		
Continuous moderators (pain severity)					
No. of treatment sessions	38	$B = 0.002$		.76	
Percentage of women to men participants	35	$B = 0.001$		.77	
Percentage of minority participants (US studies only)	19	$B = 0.001$		.50	

*All studies fall within 2 standard deviations of the mean effect size.

†Goodwin et al³⁴ was removed for this analysis because it was the only intervention primarily based on social support.

reviews of this type.⁷⁻¹¹ By comparison to previous reviews, this meta-analysis used more specific inclusion criteria for the psychosocial interventions and for pain, rigorously assessed multiple interventions with several independent raters, and systematically tested for moderators that have clinical relevance. The consistency of our findings with previous reviews on the effectiveness of psychosocial interventions for reducing pain in patients with cancer suggests robust and replicable findings. The necessary next step to improve pain management for patients with cancer is implementation of psychosocial interventions accompanied by systematic monitoring, evaluation, and feedback for quality improvement.^{58,59} Consonant with recommendations in a recent Institute of Medicine (IOM) report⁶⁰ and with guidelines of the American Pain Society,⁵ these findings support the use of psychosocial interventions as part of a multimodal approach to the treatment of cancer-related pain and the inclusion of experts in psychosocial care as members of the multidisciplinary treatment team. In short, psychos-

social interventions, including skills instruction and education, can improve cancer pain management.

Skills-based interventions showed somewhat greater effectiveness compared with educational approaches on reducing pain severity ($g = 0.45$ v $g = 0.29$, respectively). Although these findings were not statistically significant, perhaps because of low power attributable to within-group heterogeneity, the effect sizes for skills-based interventions suggest that if 50% of control patients reported the median pain score, only 33% of patients receiving a skills-based intervention would report scores that high or higher, a promising finding. In general, skills-based interventions focus on changing patients' dysfunctional beliefs about pain and promote the use of specific skills to manage it (eg, distraction, relaxation). The skills-based intervention approaches that have been studied vary considerably in their specific components, however. Greater standardization of intervention components is recommended for future research so that the effects of skill-based approaches can be more directly compared across different studies and subgroups of patients with cancer.

Moderator analyses suggest that psychosocial interventions were not differentially effective based on patient sociodemographic characteristics; they were equally effective in reducing pain severity across different racial/ethnic subgroups and sexes. In particular, because the number of minority participants was small relative to the number of white participants, additional data are needed to systematically examine whether more targeted interventions could better manage pain across different subgroups of patients with cancer and different settings, as suggested by several IOM reports.⁶⁰⁻⁶²

Of the studies included for review, larger effect sizes were associated with more rigorous designs that included monitoring of treatment implementation according to the study protocol. Because an increasing number of psychosocial interventions involve defined but

Fig 3. Funnel plot of effect sizes by standard error for pain severity.

Table 4. Analysis of Select Modified PEDro Quality Criteria on Pain Severity (k = 38)

Criterion Present	k	Effect Size (g)	95% CI	P
4. The groups were similar at baseline regarding the most important prognostic indicators				
No	11	0.50	0.23 to 0.78	.20
Yes	27	0.30	0.17 to 0.43	
6. Measures of at least one key outcome were obtained from more than 85% of the subjects initially allocated to groups				
No	16	0.35	0.22 to 0.48	.66
Yes	22	0.30	0.12 to 0.48	
7. All subjects for whom outcome measures were available received the treatment or control condition as allocated, or where this was not the case, data for at least one key outcome were analyzed by intention to treat				
No	11	0.37	0.04 to 0.70	.89
Yes	27	0.34	0.23 to 0.46	
9. The study provides both point measures and measures of variability for at least one key outcome				
No	10	0.44	0.14 to 0.74	.46
Yes	28	0.32	0.22 to 0.44	
10. The study had an adequate treatment fidelity protocol, including manualized treatment				
No	25	0.32	0.17 to 0.47	.52
Yes	13	0.40	0.23 to 0.57	
11. The study had an adequate treatment fidelity protocol, including monitoring of treatment implementation				
No	31	0.29	0.16 to 0.42	.04
Yes	7	0.52	0.34 to 0.71	
12. Loss to follow-up information is provided				
No	11	0.36	0.05 to 0.66	.92
Yes	27	0.34	0.22 to 0.46	

Abbreviation: PEDro, Physiotherapy Evidence Database.

dynamic protocol components, treatment fidelity becomes critical (as this review suggests) because it can affect the accuracy of the conclusions that can be drawn about the causal relationship between intervention and outcome.

Additionally, this review identified other potentially significant limitations in the methodologic quality of the cancer pain intervention literature that may influence the conclusions that can be drawn from the meta-analysis. First, not all studies measured pain as the primary outcome. Second, pain was measured inconsistently across studies. Finally, pain raters were rarely blinded. Few studies carefully described the other treatments (including pharmacologic) that participants were receiving that could have influenced their pain; this is particularly important for studies in which the intervention was compared with usual care. Moreover, measurement instruments for the primary outcome(s) varied considerably in their psychometric quality. National Cancer Institute–led efforts to collect and systematize the measurement of behaviors across studies as part of the Grid-Enabled Measures Database initiative may increase the use of pain measures that have known (and stronger) psychometric properties.⁶³

In most studies, patients were observed for only a limited period of time (6 weeks), limiting findings on chronic (and persistent) pain. The short duration of randomized clinical trials for pain management (typically 4 to 14 weeks) has been identified as a concern for both patients with cancer and patients with noncancer pain.⁶⁰ Among patients with cancer, long-term findings on the effectiveness of analgesics have been similarly hindered by studies of relatively short duration (no more than 12 weeks), despite the

examination by the US Food and Drug Administration of chronic health outcomes.^{64,65}

The strengths of this meta-analysis include substantial rigor in the application of the inclusion criteria and the scoring of studies. However, it is important to keep in mind that selection criteria necessarily limit the studies included for review, and different deployments of search strategies can influence the set of articles located.

The positive findings from this current and comprehensive meta-analysis considerably advance support for the importance of psychosocial interventions on reducing pain among patients with cancer. The meta-analysis provides strong evidence for psychosocial pain management approaches in accord with both the American Pain Society recommendations and similar findings from the recent IOM report.^{5,60}

AUTHORS' DISCLOSURES OF POTENTIAL CONFLICTS OF INTEREST

The author(s) indicated no potential conflicts of interest.

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