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Review

A systematic review on barriers hindering adequate cancer pain management and interventions to reduce them: A critical appraisal

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ABSTRACT

The aim of this paper is to identify the major barriers hindering adequate pain management and critically review interventions aiming to overcome them. We searched relevant literature on PubMed published between January 1986 and April 2007. The most frequently mentioned barriers for both patients and professionals were knowledge deficits, inadequate pain assessment and misconceptions regarding pain. Four interventions were identified: patient education, professional education, pain assessment and pain consultation. These interventions were never combined in multidisciplinary study protocols. Most RCTs included small groups of patients and reported no power analysis. Studies on professional education and pain assessment did not evaluate patients' outcomes. In 5 of 11 RCTs on patient education, pain intensity decreased statistically significantly. In two RCTs on pain consultation, patients' pain decreased statistically significantly, although the adequacy of pain treatment did not change. In conclusion, international guidelines on multidisciplinary interventions in pain management are partly substantiated by clinical trials.

1. Introduction

Pain is one of the most frequent and distressing symptoms in cancer. Pain is present in 36–61% of patients depending on cancer type, stage of disease and patient setting, e.g. in- or outpatients.[1–3] Of patients with advanced cancer 64% experience pain.[4] Management of cancer pain is considered to be complex. In 1986, the World Health Organisation (WHO) published the analgesic ladder.[5] The WHO analgesic ladder categorises analgesics into three steps that, depending on the pain intensity, progress from non-opioid analgesics to weak opioids and then to strong opioids. Analgesics should be prescribed 'around-the-clock' (ATC) for continuous pain and 'as needed' (PRN) for breakthrough pain.[5] The WHO analgesic ladder has been generally accepted as the foundation of cancer pain treatment. The fact remains, however, that despite the existing guidelines and knowledge about pain and pain management, cancer pain relief is still inadequate.[6]

Cleeland et al. developed the 'Pain Management Index' (PMI), a tool to assess the congruence between severity of

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pain and medication prescribed.[7] The PMI relates the patients’ worst pain intensity (categorised as none, mild, moderate or severe) to the most potent analgesic prescribed (no analgesics; non-opioid analgesics; weak opioids; strong opioids). It is calculated by subtracting the worst pain from the most potent analgesic prescribed. Negative PMI scores are considered to indicate suboptimal medication prescription and scores of zero or greater are considered indicating acceptable analgesic potency.[7] According to the PMI, 43% of patients, outpatients as well as inpatients, are treated inadequately.[8]

However, although almost half of the patients are treated inadequatly,[8] it has been proposed that effective treatment of pain should be feasible for 70–90% of oncology patients.[6] Numerous barriers have been documented that prevent patients from receiving effective pain treatment and avert physicians from providing adequate pain management. The first aim of this paper is to identify the major barriers hindering adequate pain management, patient – related barriers as well as professional – related barriers. The second aim is to critically review RCTs on interventions aiming to overcome these barriers with respect to the methodological quality of these studies and the effect on clinically relevant outcome measurements.

2. Methods

Relevant literature published in English was searched on PubMed from 1986 to April 2007. The search was limited to adults, cancer and humans. The terms ‘pain management’ and ‘barrier* or concern*’ were used as keywords to identify relevant titles and abstracts. We restricted the search to patients and health care providers. We found 121 articles of which 40 were relevant. Additionally, we conducted a search using the medical subject headings terms of ‘pain management’ and ‘health knowledge, attitudes, practice’ ($n = 80$), which produced twelve supplementary articles. The reference list of each relevant article and the senior author’s personal library was checked to retrieve additional relevant publications, which were not identified by means of the computerised search ($n = 18$) (Fig. 1). For the study of interventions to overcome the published barriers we selected randomised clinical trials (RCTs). The methodological quality of the RCTs was assessed using the criteria of van Tulder et al.[9] We added a criterion to what extent the power analysis was reported. The main outcome measurements used were patients’ pain intensity (average pain, worst pain and current pain), patients’ or professionals’ knowledge or barriers, adherence to analgesics and adequacy of pain treatment, measured with the pain management index (PMI).[7] To give an indication of the effect of the intervention studied in the RCT on pain, we calculated the difference in the decrease of pain intensity, with respect to baseline, between the intervention and the control group. A clinically relevant effect was defined as a difference in the reduction of pain intensity with 30% or $\geqslant 2$ points on a 0–10 scale.[10] If insufficient data on pain intensities were reported in the articles (e.g. only in graphs), we tried to contact the first author in order to gain access to the source data. All data on the statistical significances, reported in this review, were retrieved from the original papers (Table 3).

3. Results

3.1. *Patient-related barriers*

Patients often impede their own treatment due to misconceptions about analgesics and their side-effects, non-adherence to treatment regimens, and poor communication of their pain and their concerns about pain to health care providers.[11,12] In 1993, Ward et al. designed a 27-item questionnaire containing eight barriers, the Barriers Questionnaire (BQ).[13] The BQ is a self-report instrument designed to measure the extent to which patients have barriers reflecting two general factors: beliefs that hinder communication about pain and beliefs and attitudes that may interfere with the use of analgesics. In Table 1, an overview of 10 studies is given, in which the BQ was used.

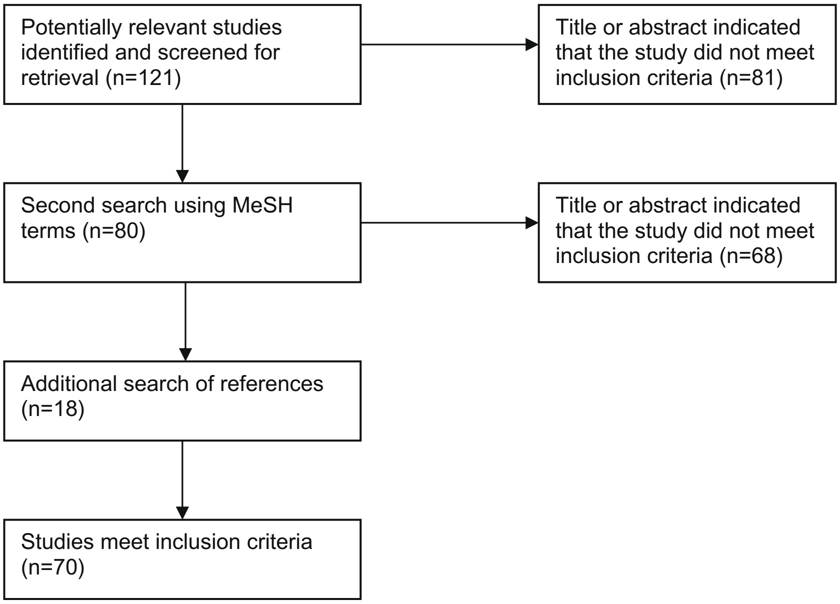

Fig. 1 – Flow chart.

The sample size varied between the studies, ranging from 35 to 270 patients. Four studies included more than 100 patients. In two studies, no BQ total score could be determined. Patients were most concerned about addiction, side-effects of analgesics, and that increased pain means progression of disease.[13–22]

Several studies using the BQ examined to what extent patients' barriers influenced pain management. These studies described that the patients who hesitated to report pain indeed had significantly higher BQ total scores as compared with the patients who did not hesitate.[15,20,23,24] Patients with a negative PMI, which indicates suboptimal use of analgesics,[7] had significantly higher BQ total scores than those patients who were adequately medicated.[13,15,16,18,21,24–27] Patients who hesitated to use analgesics had significantly higher BQ total scores as well.[15–17]

Fourteen studies were published about adherence to analgesics by cancer patients. Adherence rates varied from 20% to 95%.[25,28–40] Two of these studies examined the relation between adherence and patients' barriers. According to the study of Thomason et al., patients taking their medications only as needed (48%) had more barriers.[25] The study of Lai et al. showed that the stronger patients believed that they could control their pain themselves, the less likely they were to adhere to the prescribed regime. In addition, the stronger they believed that medication was necessary for their pain, the more likely they adhered to their analgesic regime.[34]

3.2. *Intervention to reduce patient-related barriers: patient education*

Patient education has been suggested as a method to overcome patients' barriers. Various Pain Education Programmes (PEPs) were developed to improve patients' knowledge and to stimulate them to participate actively in their own pain treatment. We found 11 RCTs evaluating PEP. The programmes varied greatly in type, content and duration. The educational interventions ranged in complexity from a single session (approximately 20 min)[41] to an academic detailing session tailored to patients' prior knowledge in combination with written instructions, pillbox and three follow-up phone calls and two follow-up home visits[42] (Tables 2 and 3).

The sample size varied widely between the studies. Four studies included >100 patients while four other studies included <60 patients (Table 2). Two studies reported their power analysis. Two other studies did not describe their dropout rate, in the remaining studies the dropout rate was acceptable (<25%). Only four studies clearly described the method used to randomise their patients. The study duration differed from 5 d to 8 weeks. Five studies measured a long-term effect (>4 weeks) of the intervention (Table 3).

All studies used patients' pain intensity as the main outcome measurement. One study did not specify what type of pain intensity was measured[39,43]; and three other studies measured one type of pain intensity.[35,41,44] The seven remaining studies measured several types of pain intensity (e.g. average pain, current pain and worst pain) according to the method sections of the respective papers.[39,42,45–49] However, three of these studies reported only one type of pain intensity,[39,45,46] in one of them not further specified.[48] The pain intensities that were measured but not reported in the original paper were described as 'not reported' in Table 3.

In one study, we could not calculate the effect of PEP on pain intensity because of insufficient information.[35] Although five studies described statistically significant differences in the decrease of pain, with respect to baseline, between the intervention and control group,[41,42,46,47,50] in only two of them[42,47] the differences in the decrease of pain could be classified as clinically relevant (reduction of pain intensity with $\geqslant$ 30% or $\geqslant$2 points on an 11-point scale).[10] However, one of these studies had a small sample size ($n = 30$), no power analysis performed and a follow-up of 5 d.[47] In three studies, the control group reported less pain at the end of the study, although this was not statistically significant.[43,45,48]

Ten studies evaluated patients' knowledge or barriers (Table 3). Eight of them reported a statistically significant improvement in knowledge about cancer pain and its management in the intervention group compared to the control group,[35,39,43,44,46,47,49,51] while two studies found no differences.[41,48] Three studies measured this knowledge at long-term (>4 weeks) follow-up.[44,48,51] Only one study reported a statistically significant improvement in the intervention group at long-term follow-up.[42]

Three of six studies reported a statistically significant improvement on patients' adherence to analgesics in the intervention group compared to the control group.

3.3. *Professional-related barriers*

Several studies have found professional-related barriers that may hamper therapeutic strategies. Most of these data were collected by surveys. In these surveys, the investigators used a list of possible barriers to effective pain management developed by the Pain Research Group at the University of Wisconsin, which included factors related to health care system, professionals and patients. In Table 4, an overview of the barriers that were reported most frequently by physicians and nurses is given.

Physicians and nurses reported the following barriers most frequently: (a) inadequate assessment of pain and pain management,[52–60] (b) patients' reluctance to report their pain or to give a pain score[13,52,54,56–60] and (c) inadequate knowledge of pain management of professionals (both physicians and nurses).[52–60]

Other studies, not mentioned in Table 4, also supported the notion that professionals may have inadequate knowledge. These studies used self-constructed questionnaires to measure professionals' knowledge on the topics: pain assessment, principles of pain management and management of side-effects.[61–69] Between 34% and 86% of the professionals overestimated the likelihood of addiction or tolerance[52,55,59,65,70] and approximately 35% of the physicians believed that morphine has an upper limit.[62]

3.4. *Interventions directed at professionals to improve pain management*

Our review identified three interventions directed at professionals that intended to improve the management of cancer

Table 1 – Patients' barriers (BQ).

	Year	Number cancer patients	Country	Fear of addiction	Fatalism	Concerns about tolerance	Desire to be a good patient	Concerns regarding side-effects	Fear of injections	Fear of distracting one's physician from treating the disease	Concern that increased pain means progression of disease	Misconception toward the interval of taking analgesics	Religious fatalism	Belief that pain medications are better given as needed instead of on an around-the-clock scheduled basis	Total BQ score
Ward et al.[13]*	1993	270	USA	2.20 (1.41)	1.04 (1.03)	1.47 (1.28)	1.11 (1.14)	2.03 (1.06)	1.68 (1.38)	1.27 (1.25)	2.08 (1.54)				1.65 (0.81)
Ward et al.[20]*	1994	53	USA	2.54 (1.38)	1.04 (1.01)	1.74 (1.40)	1.01 (1.21)	2.07 (1.02)	2.26 (1.49)	1.31 (1.33)	2.21 (1.61)				1.76 (0.79)
Ward et al.[19]*	1996	35	USA	2.34 (1.39)	1.29 (1.05)	1.39 (1.35)	1.73 (1.59)	2.50 (1.00)	1.52 (1.27)	1.67 (1.28)	2.59 (1.39)				1.94 (0.85)
Potter et al.[22]+	2003	93	Australia	76%	42%	59%	46%	67%	65%	49%	71%				
Ward and Hernandez[21]*	1994	263	Puerto Rico	3.05 (1.41)	2.37 (1.30)	3.20 (1.42)	2.78 (1.39)	2.68 (0.99)	2.45 (1.52)	3.00 (1.37)	3.20 (1.57)				2.82 (0.82)
Lin and Ward[15]*	1995	63	Taiwan	2.98 (1.97)	2.32 (1.33)	4.17 (1.51)	1.42 (1.47)		2.55 (2.00)	2.82 (1.74)	3.99 (1.61)				2.98 (0.85)
Wang et al.[18]*	1997	128	Taiwan	2.94 (1.62)	2.56 (0.98)	3.62 (1.29)	2.04 (1.10)	2.49 (0.85)	3.21 (1.59)	2.40 (1.14)	3.80 (1.69)	3.75 (1.15)			2.98 (0.60)
Wills and Wootton[14]*	1999	48	China	2.46 (0.83)	2.30 (0.66)		2.80 (0.76)	2.65 (0.56)							
Chung et al.[17]*	1999	39	Hong Kong	2.46 (0.92)	2.64 (0.74)	2.51 (0.72)	2.77 (1.13)	2.87 (0.95)	2.72 (1.26)	3.44 (0.67)	3.64 (0.82)	3.62 (0.86)			2.96 (0.36)
Lin[16]*	2000	159	Taiwan	3.21 (1.67)	1.45 (1.05)	3.66 (1.71)	0.95 (1.21)	3.08 (1.06)		2.55 (1.34)	3.48 (1.73)		2.16 (1.70)	3.29 (1.72)	2.56 (0.79)

Barriers according to the Barriers Questionnaire (BQ). * = mean (sd) (0 = do not agree at all; 5 = agree very much); + = % Patients with some agreement.

Table 2 – Methodological quality assessment of pain intervention RCTs.

		Method of randomisation presented	I/C similar at baseline	Outcome assessor blinded to intervention	Interventions by independent care provider	Number of patients randomised	Dropout rate	Assessment times similar in I/C groups	Intention-to-treat analysis	Power analysis reported*
PEP	Lin et al.[46]	+	+	uk	–	61	uk	+	+	–
	Miaskowski et al.[42]	–	+	uk	+	212	18%	+	+	+
	Yates et al.[44]	+	+	uk	+	189	12%	+	+	–
	Anderson et al.[45]	–	+	uk	uk	97	17–31%∼	+	+	+
	Lai et al.[47]	–	+	uk	uk	34	12%	uk	+	–
	Chang et al.[39]	–	+	uk	–	37	0%	+	+	–
	de Wit et al.[49,50]	–	+	uk	+	313	11–25%∼	+	+	–
	Oliver et al.[41]	+	+	uk	+	87	23%	+	+	–
	Ward et al.[48]	–	+	uk	–	43	23–37%∼	+	+	–
	Rimer et al.[35]	–	+	uk	uk	230	15%	+	+	–
	Dalton[43]	+	+	uk	–	30	uk	+	+	–
Nursing education	Camp-Sorrell and O'Sullivan[71]	–	+	uk	n/a	60	27%	+	+	–
	Vallerand et al.[72]	–	+	uk	n/a	202	22%	+	+	–
Pain assessment	Kravitz et al.[73]	+	+	uk	+	87	10%	+	+	–
	Trowbridge et al.[74]	–	+	uk	+	320	uk	+	+	–
Pain consultation	Du Pen et al.[32]	+	+	+	+	96	16%	+	+	–
	Cleeland et al.[75]	+	+	uk	+	129	11%	+	+	+

+ = measured; – = not measured; uk = unknown; ∼ = % at different assessment times; n/a = not applicable; *added item.

pain, namely professional education, pain assessment and pain consultation or protocol. In total, six RCTs were identified concerning these interventions (Tables 2 and 5). The sample size varied from 60 to 320 respondents (Table 2). One of the six studies reported their power analysis. One study did not describe the dropout rate. Four studies described clearly how they randomised their respondents.

For the first intervention, to increase professionals' knowledge through education, we found two RCTs. The educational interventions targeted nursing staff in both studies (Tables 2 and 5). The first RCT by Camp-Sorrell et al.[71] reported none of the outcome measurements that we considered relevant (Table 5). In the study of Vallerand and colleagues,[72] the intervention showed no significant differences in perceived nurses' barriers or perception of control over patients' pain, but significantly increased nurses' knowledge.[72]

Two RCTs evaluated the effect of pain assessment.[73,74] In the RCT conducted by Kravitz et al.[73] research staff assessed pain intensity in all the patients. However, only of the patients randomly assigned to the intervention group, they recorded the pain scores on bedside charts without active communication with the professionals. Health care providers

Table 3 – Pain education programmes: clinically relevant results.

	Year	Intervention/control	Assessment times	Differences in the decrease of pain between I and C groups				Patients' knowledge/ barriers-measured	Adherence measured
				Average pain NRS (%)	Current pain NRS (%)	Worst pain NRS (%)	Pain not specified NRS (%)		
Lin et al.[46]	2006	I: Education programme (30–40 min), and booklet. After 2 and 4 weeks visit in clinic C: Care as usual	2 weeks 4 weeks	NR	NR	0.8 (14) 1.3 (24)*	n/a	+* +*	+ +*
Miaskowski et al.[42], Kim et al.[51]	2004	I: Trained nurses educate and instruct patients for pain, 2 follow-up visits and 3 phone calls, coached how to communicate C: AHCPR patients' version and 3 home visits and 3 phone calls by nurse	5 weeks	**1.4 (34)***@	–	1.5 (28)*	n/a	+*	+
Yates et al.[44]	2004	I: Education programme (30 min), booklet and phone call after 1 week C: Education about cancer in general	1 week 8 weeks	0.6 (15) 0.1 (2.4)	 –	 –	 n/a	+* +	– –
Anderson et al.[45]	2004	I: Education programme in English and Spanish, including video's and consult nurse (30 min). After 48–72 h phone call C: Education programme about nutrition (English and Spanish)	2 weeks 8 weeks	 NR	 NR	0.4 (5)# –0.9 (–12)#	 n/a	 –	+ +
Lai et al.[47]	2004	I: Pain education 10–15 min per day for 5 d C: Care as usual and 10–15 min visit per day	5 d	**1.6 (30)***	**2.3 (61)***	0.1 (1.5)	n/a	+*	–
Chang et al.[39]	2002	I: Pain education (30–40 min) and booklet. After 2 weeks visit in clinic C: Care as usual	2 weeks	NR	NR	NR	0.6 (8)	+*	+*
de Wit et al.[49,50]	2001	I: Pain education inclusive promotion of 'help-seeking' behaviour and booklet, 1 phone call, and audiotape C: Care as usual	2 weeks 4 weeks 8 weeks	0.3 (7)* 1.0 (22)* 0.4 (10)*	0.8 (24)* 0.8 (24)* 0.5 (15)*	0.8 (10) 0.5 (6) 0.0 (0)	n/a	+* – –	– – –
Oliver[41]	2001	I: Pain education by Health Educator (20 min) C: Standard education cancer pain (20 min)	2 weeks	0.9 (18)*@	–	–	n/a	+	+
Ward[48]	2000	I: Individual tailored information about barriers and side-effects. Phone call after 1 week C: Care as usual	4 weeks 8 weeks	–	0.5 (**42**)@ –0.7 (**–69**)@	0.7 (12)@ **–2.0 (–59)**@	n/a	+ +	– –
Rimer[35]	1987	I: Brief nurse counselling session (15 min) and printed materials C: Care as usual	4 weeks	–	Not possible	–	n/a	+*	+*
Dalton[43]	1987	I: Pain education (<1 h), printed materials, phone call after 1 week C: Care as usual	7–10 d	–	–	–	–3.8 (–12%)^	+*	–

Bold = clinically relevant outcome; * = statistically significant; NR = measured but not reported; + = measured; – = not measured; ^ = 0–100 pain scale; @ = data received by email; # = data only reported in graph; n/a = not applicable.

Table 4 – Professionals' barriers.

	Year	Number	Inadequate pain assessment and pain relief	Inadequate staff knowledge of pain management	Medical staff reluctance to prescribe opioids	Patient reluctance to report pain	Lack of psychological support services	Patient reluctance to take opioids	Nursing staff reluctance to administer opioids	Lack of access to professionals who practice specialised methods	Excessive state regulation of prescribing opioids
Yu et al.[53]^	2001	427 physicians	74.9	64.8	41.4			39.7	22.8		74.7
Ger et al.[52]^	2000	204 physicians	54	57	25	7	54	15	10		19
Sapir et al.[55]^	1999	176 physicians	65	58	49			40	20.3		19.4
Von Roenn et al.,[59]^	1993	897 physicians	76	52	61	62	11	62	38		18
Anderson et al.[54]^	2000	57 physicians and nurses	71	54	40	56	16	36	21	13	17
O'Brien et al.[57]#	1996	148 nurses	86	79	69	87	75	68	58	70	
Ryan[58]#	1994	61 nurses	77	75	61	75	62	49	54	59	
Ryan et al.[58]#	1994	116 oncology nurses	61	53	48	79	45	77	32	29	
Vortherms et al.[60]#	1992	327 nurses	77.1	72	59.1	79.8	62.3	56.6	50.3	53.1	
Furstenberg et al.[56]*	1998	188 physicians	1.6 (0.8)	1.49 (0.9)	1.26 (0.95)	1.12 (0.77)	1.32 (0.98)	1.13 (0.78)	1.08 (0.97)	0.87 (0.91)	0.92 (0.90)
Furstenberg et al.[56]*	1998	248 nurses	1.58 (0.86)	1.55 (0.91)	1.52 (1.01)	1.29 (0.87)	1.34 (1.0)	1.25 (0.89)	1.19 (1.01)	1.43 (1.12)	0.76 (0.91)

^ = % of respondents who selected item as one of the top four barriers in the survey; # = % that rated that item as a barrier to optimal pain management in their setting; * = mean (sd); degree to which item represented a barrier 0–3 scale (0 = no barrier; 3 = major barrier).

Table 5 – Pain interventions: clinically relevant results.

	Year	Intervention/control	Assessment times	Differences in the decrease of pain between I and C groups			Nurses' Knowledge/ barriers measured	PMI measured
				Average pain NRS (%)	Current pain NRS (%)	Worst pain NRS (%)		
Nursing education								
Camp-Sorrell et al.[71]	1991	I: education of pain documentation (45 min) Received laminated assessment tool C: education of pain documentation N: non-responders, no education	1 week 1 month 2 months	–	–	–	–	–
Vallerand et al.[72]	2004	I: education session (4 hr); 4–6 weeks own practice; advanced session C: no education	4 weeks	–	–	–	+*	–
Pain assessment								
Kravitz et al.[73]	1996	I: assessing pain intensity by research staff and displaying results on bedside charts C: assessing pain intensity by research staff. Results were not displayed	3 d 5 d	–	NR	NR	–	–
Trowbridge et al.[74]	1997	I: patients completed pain assessments. Oncologists were instructed to review summary sheet of pain assessments prior to patient evaluation C: patients completed pain assessments	4 weeks	NR	–	NR	–	+
Pain consultation/pain protocol								
Du Pen et al.[32]	1999	I: study physician and nurse used multilevel treatment algorithm for pain management C: pain management by patients' own oncologist	2 weeks 4 weeks 2 months 3 months	–	–	0.5 (8)# 0.7 (12)# 0.2 (3)# 0.9 (15)#	–	–
Cleeland et al.[75]	2005	I: pain management protocol C: care as usual	15 d 29 d	0.9 (21)# **1.3 (30)#**	NR	1.3 (20) 0.9 (15)	–	+

Bold = clinically relevant outcome; * = statistically significant; + = measured; – = not measured; NR = measured but not reported; # = data only reported in graph.

were not actively involved in the study. Current and worst pain intensity was measured in every patient, but these data were not reported. The intervention did not result in improved pain control.[73] In the study conducted by Trowbridge et al.[74] all the patients completed pain assessments (e.g. average and worst pain intensity; pain treatment regimen and degree of pain relief). Only the clinical charts of the intervention group contained a summary of the pain scales. Oncologists were instructed to review the summary sheet prior to an evaluation. Data on the pain intensities were not reported in the article, but the authors suggest that the study resulted in a significant decrease in the proportion of patients with pain in the intervention group (from 70% to 55%). However, the proportion of patients with pain in the control group was not reported. In addition, they reported no differences between the intervention and control group in the percentages of patients with negative PMI scores (35% versus 38%).[74]

The third intervention was the implementation of a pain consultation[32] or pain protocol[75] to improve pain management (Tables 2 and 5). In the study of Du Pen et al., a specialised physician evaluated patients' pain following the Agency for Health Care Policy and Research (AHCPR) guidelines. With respect to the outcome measurements we defined, they found no statistically significant difference for worst pain or patient adherence between the intervention and control group (Table 5). In this study, they reported a statistically significant reduction in 'usual' pain intensity in the intervention group compared to the control group (not in table). This reduction was clinically relevant after 3 months (approximately 35%). Cleeland et al.[75] introduced in their RCT a pain management protocol in the intervention centres, randomising by centre. Although they used the BPI, they only reported on the intensities of worst pain, the primary end-point of the study, and average pain. Worst pain decreased statistically significantly in the intervention group, although not clinically relevant. In the control group, a non-significant reduction was reported (Table 5). A between-groups analysis was not described. The study was terminated early because of slow accrual. Since the study was underpowered they examined differences in proportions of responders, defined as patients whose worst pain scores changed from moderate or severe to none or mild, rather than mean levels of worst pain scores. The proportions of patients responding to pain treatments were 48% (protocol) versus 15% after 15 d ($p = 0.008$) and 52% versus 19% after 29 d ($p = 0.045$). This study showed no differences in PMI.[75]

4. Discussion

According to the multidisciplinary task force of the American Pain Society (APS), the adequacy of cancer pain management will only improve when a multidisciplinary and multilevel approach will be chosen. All the cancer patients should be routinely screened for pain during their visit in the clinic and their pain intensity should be documented and frequently reassessed. When the patients are in pain, this should be adequately treated with a multidisciplinary evidence-based pain protocol. As a part of this, patients and their relatives should be educated regarding pain and analgesics.[76]

Although, internationally, this approach is considered the only way to effectively improve daily cancer pain management, it is not substantiated in the studies here reported. Our review of the literature identified the most important patient-related as well as professional-related barriers hampering patients' pain treatment and also identified the studied interventions to overcome these barriers. Unfortunately, we were incapable to identify interventions that unequivocally demonstrated clinically relevant improvements in patients' pain using the outcome measurements and criteria we selected for this systematic review. Of note, the results of the studies on patient education could even be flattered because some of the studies did not report all the measured pain intensities (Table 3). The negative findings from the studies may be due to several factors.

The first factor is the quality of the design and reporting the studies. Many studies used small groups of patients and did not substantiate the sample size with a power analysis. Furthermore, most studies on professional education and pain assessment did not study or report the effect of the intervention on patients' pain. Although pain is a major problem in patients with cancer, internationally there is no consensus on the most important end-points for pain research, for example which pain intensity is most relevant (e.g. current, average or worst pain intensity). According to the recommendations formulated by Dworkin et al. pain intensity is one of the core end-points in clinical pain trials.[77] However, in the various studies in which pain intensity was used as the main outcome measurement, e.g. studies on patient education and pain consultation or pain protocol, different types of pain intensity were measured, making an overall analysis impossible. In this review, we chose to report clinically relevant results (reduction of pain intensity with $\geqslant 30\%$ or $\geqslant 2$ points on an 11-point scale) according to Farrar et al.[10] Other possibilities as 'numbers needed to treat' would have been potential alternatives, but in this review it is not possible because the included RCTs did not report these data.

Another explanation for the negative findings in the reviewed RCTs is that most of these trials studied a monodisciplinary intervention without standardising and optimising the practice of other disciplines, especially the medical discipline. For example, when studying the effect of patient education, in all RCTs it was only described as a nursing intervention, without taking the role of physicians into account. Adequate medical treatment may be pivotal before patient education becomes effective.[45]

We think that adequate medical treatment is a prerequisite for other interventions. As reported in the survey of Enting et al.,[28] insufficient awareness of cancer pain, inadequate analgesic prescription and non-adherence contribute to inadequate cancer pain treatment. In this study, 27% of the outpatients treated in a cancer clinic reported to have pain. Sixty-five percent of these patients were undertreated, as indicated by a negative PMI. Besides this, 27% declared to be non-adherent.[28] These data indicate that most patients will benefit from more effective analgesic prescription besides education to improve adherence to the treatment. Indeed, in our review of the literature the two studies on optimising medical treatment, by pain consult or the introduction of a pain protocol, both found a statistically significant effect on pain intensity.

In conclusion, over the years professionals as well as patients still report many barriers regarding pain and pain management. The most frequent barriers for both groups are inadequate pain assessment and inadequate knowledge and misconceptions regarding pain management. Our review indicates that despite all the studies and guidelines, there is no convincing study that showed a multidisciplinary intervention to improve cancer-related pain treatment. Future research should focus on a multilevel approach: structural identification of cancer-related pain, implementation of a multidisciplinary protocol to improve the quality of pain treatment and education of patients and their relatives to enhance their involvement in the pain treatment. Furthermore, international consensus about the primary outcome measurement in pain research is urgently needed.

Conflict of interest statement

None declared.

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