Pain Management Index (PMI) — does it reflect cancer patients' wish for focus on pain?

Morten Thronæs MD, PhD[1,2] (morten.thrones@ntnu.no), Trude Rakel Balstad MSc, PhD [1,2] (trude.r.balstad@ntnu.no), Cinzia Brunelli MSc, PhD[1,3] (cinzia.brunelli@institutotumori.mi.it), Erik Torbjørn Løhre MD[1,2] (erik.t.lohre@ntnu.no), Pål Klepstad MD, PhD [1, 4,5] (pal.klepstad@ntnu.no), Ola Magne Vagnildhaug MD[1,2] (ola.m.vagnildhaug@ntnu.no), Stein Kaasa MD, PhD [1,6] (stein.kaasa@medisin.uio.no), Anne Kari Knudsen MD, PhD[1,6] (anne.k.knudsen@ntnu.no), and Tora Skeidsvoll Solheim MD, PhD[1,2] (tora.l.skeidsvoll@ntnu.no)

[1.] European Palliative Care Research Centre (PRC), Department of Clinical and Molecular Medicine, Faculty of Medicine and Health Sciences, NTNU - Norwegian University of Science and Technology, Trondheim, Norway

[2.] Cancer Clinic, St. Olavs hospital, Trondheim University Hospital, Trondheim, Norway[3.] Department of Neuromedicine and Movement Science, Norwegian University of Science and Technology, Norway; Department of Neurology and Clinical Neurophysiology, St. Olavs hospital, Norway

[3] Palliative Care, pain therapy and rehabilitation Unit, Fondazione IRCCS, Istituto Nazionale Tumori, Via Venezian 1, 20133 Milano, Italy

[4.] Department of Anaesthesiology and Intensive Care Medicine, St. Olavs hospital, Trondheim University Hospital, Trondheim, Norway

[5] Department of Circulation and Medical Imaging, Faculty of Medicine and Health Sciences, Norwegian University of Science and Technology NTNU, Trondheim, Norway

[6] European Palliative Care Research Centre, Department of Oncology, Oslo University Hospital, and Institute of Clinical Medicine, University of Oslo, Oslo, Norway

Corresponding author: Morten Thronæs,
European Palliative Care Research Centre (PRC), Department of Clinical and Molecular Medicine, Faculty of Medicine and Health Sciences, NTNU, Norwegian University of Science and Technology. Postbox 8905, NO-7491 Trondheim, Norway. E-mail: morten.thrones@ntnu.no, telephone number: +47 72 82 64 85

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Abstract

Background: The Pain Management Index (PMI) was developed to combine information about the prescribed analgesics and the self-reported pain intensity in order to assess physicians' response to patients` pain. However, PMI has been used to explore undertreatment of cancer pain. The present study explores prevalence of negative PMI and its associations to clinical variables, including the patient-perceived wish for more attention to pain.

Methods: A single-centre, cross-sectional observational study of cancer patients was conducted. Data on demographics and clinical variables, as well as patient-perceived wish for more attention to pain, were registered. PMI was calculated. Negative PMI indicates that the analgesics prescribed might not be appropriate to the pain intensity reported by the patient and associations to negative PMI were explored by logistic regression models.

Results: 187 patients were included, 53% had a negative PMI score. Negative PMI scores were more frequent among patients with breast cancer (OR=4.2, 95% CI 1.3, 13.5), in a follow-up setting (OR 12.1, 95% CI 1.4, 101.4), and was inversely associated to low performance status (OR 0.14, 95% CI 0.03, 0.65). Twenty-two percent of patients with negative PMI scores reported that they wanted more focus on pain management versus 13 % among patients with a non-negative PMI score; the difference was not statistically significant.

Conclusion: A high prevalence of negative PMI was observed, but only 1/5 of patients with a negative PMI wanted more attention to pain by their physician. Our findings challenge the use of PMI as a measure of undertreatment of cancer pain.

Introduction

Despite huge resources allocated for research, teaching, and treatment, pain is still prevalent among patients with cancer (1-3). Barriers to improved cancer pain management are identified (4, 5), strategies to overcome the barriers are demonstrated (6, 7), and guidelines for treatment of cancer pain are published (8). In spite of these efforts, studies report that one third of cancer patients have undertreated pain (9).

Patient-reported outcome measures are recommended to assess cancer pain (10, 11) as physicians otherwise might under-estimate the symptom burden (12). Several questionnaires evaluating pain and other symptoms in cancer patients are developed (13-15). Symptom assessment tools are widely used both in clinical practice and in research (16). However, none of these questionnaires assess whether patients actually want more intense pain treatment or experience a need for more focus on pain (17).

The Pain Management Index (PMI) was developed by Cleeland et al. in 1994 (18). The PMI is computed based on pain intensity (numeric rating scale (NRS)) and on analgesics prescribed. It ranges from -3 (severe pain, but no analgesic drugs prescribed) to +3 (no pain and morphine or an equivalent drug prescribed) (Figure 1). The intention of the index was to compare the analgesics prescribed with the pain intensity reported by the patient. Negative scores were considered to indicate inadequate prescription of analgesics while 0 and positive scores indicated acceptable prescribed treatment.

Several authors have used PMI to assess the prevalence of undertreatment of pain, defined as a negative PMI (9, 19-22). This approach has been criticized since the original purpose of PMI was to measue physicians' responses to patients` pain, not undertreatment (23). Furthermore, it has been highlighted that the PMI assess only two variables in pain management; pain intensity and the prescribed analgesics. PMI does not take into account the drug *administered* or opioid *type* and opioid *dose* (23, 24). Factors related to the individual patient such as characteristics of pain, and adjuvant pain therapy is not considered (9). Furthermore, the PMI assess pain intensity only at one timepoint, not over a period of time (24).

However, in the present study we hypothesized that an association between a negative PMI and a patient-reported wish for more focus on pain would support that a negative PMI indicate

pain undertreatment in cancer patients. To explore this hypothesis, three research questions were asked;

1. What is the prevalence of negative PMI in a heterogeneous cancer population?
2. Which variables are associated to negative PMI?
3. What is the association between negative PMI and patient-perceived need of more focus on pain?

Methods

Study design

This is a secondary analysis of a cross-sectional study among cancer in-patients and out-patients conducted in Mid-Norway in 2013-14 (1). Patients included in the study were admitted to St. Olavs Hospital, Trondheim University Hospital, a 800-bed referral centre. In general, cancer patients are treated at the Departments of Oncology, Surgery, Internal Medicine, and Gynaecology. All eligible cancer in-patients admitted to these departments were included at predefined days in the autumn of 2013. Out-patients were included from the Department of Oncology at predefined days in January 2014.

Patients

Inclusion criteria for the cross-sectional study were: adult cancer patients (age $\leq$ 18 years), no cognitive impairment (judged by the physician), and able to understand Norwegian language. Patients who had undergone surgical procedures the last 24 hours were excluded to minimize registration of transient symptoms related to surgery and anaesthesia. In the present secondary analysis, only patients who reported pain and /or were using analgesics were eligible.

Data collection and assessment

Data on primary cancer disease, metastatic pattern, comorbidity, Karnofsky Performance Status (KPS) (25), and current pain medications were collected by health care providers. The patients completed a questionnaire with information on gender, age, marital status, education, symptoms, and wishes for focus on pain during the consultation with the physician.

KPS was classified into three groups; group 1 (KPS 80-100), group 2 (KPS 60-70), and group 3 (KPS 50 and below) (26). Cancer diagnoses were grouped into breast, urological, gastro-intestinal, and lung cancer, lymphomas and hematological malignancies, and “others”. The latter group represented gynecological, thyroidal, and head/neck cancer, sarcoma, malignant melanoma, brain tumors, and malignancy of unknown origin. In addition, the patients were classified according to the stage of the cancer: Localized disease, metastatic disease, and follow-up patients without known relapse of their cancer.

Pain medication was categorized according to the World Health Organization (WHO) pain ladder (27): no medication, step I (use of non-opioid analgesics, such as paracetamol and non-

steroid anti-inflammatory drugs), step II (opioids for mild pain, like codeine and tramadol), and step III (opioids for moderate to severe pain, like morphine, fentanyl, and oxycodone).

Pain was assessed by items from the Brief Pain Inventory (BPI) (14). A confirmative response to a screening question from the BPI (pain, yes/ no) qualified for additional questions on average and worst pain intensity in the previous 24 hours reported by the patients. Average and worst pain was assessed using a 0-10 numeric rating scale (NRS) where 0 is "No pain" and 10 is "Pain as bad as you can imagine". Furthermore, these patients were asked about the presence of pain flares using a question based on the Alberta Breakthrough Pain Assessment Tool (15). "Breakthrough pain can be defined as a brief flare-up of pain. It can be a flare-up of the usual, steady pain you always experience (your baseline pain) OR it can be a pain that is different from your baseline pain. Have you had flare-ups of breakthrough pain in the last 24 hours? (YES or NO)." Indication of neuropathic pain was assessed using the following question; "Does your skin in the painful area feel different from normal; more numb or more sensitive?" Positive response to this question was defined as "Indication of neuropathic pain". No clinical investigation to explore neuropathic pain was performed.

Psychological distress was assessed using the short version of the Patient Health Questionnaire, (PHQ-4) and classified in accordance to recommendations into no, mild, moderate, and severe psychological distress (28).

Finally, the patients were asked to respond to the question "Do you wish that your physician had more or less focus on your pain?" The answer was reported on a 5-point Likert scale (much less focus, less focus, as it is, some more focus, much more focus).

Pain Management index (PMI)

PMI was computed based on pain intensity level and on analgesics prescribed (18) and ranges from -3 (severe pain (0-10 NRS = 8-10) but no analgesic drugs prescribed) to +3 (morphine or an equivalent drug prescribed (step III opioids) and no pain (0-10 NRS = 0)). The classification in between -3 to +3 is described in Figure 1. Negative PMI indicates that the analgesics prescribed might not be appropriate to the pain intensity reported by the patient (18).

Statistical analysis

The proportion of patients with a negative score and its 95% confidence interval (95% CI) were calculated. Univariate and multivariate logistic regression models were applied to explore the association between negative PMI score and gender, age, marital status, education, performance status, cancer diagnosis, disease spread, comorbidity, pain flares, neuropathic pain symptom, and psychological distress. The association between wish for more focus on pain (binary variable; "some" or "much more" focus *versus* "as it is", "less" or "much less" focus) and clinical variables, including PMI, was explored using univariate logistic regression models. Multivariable modeling on wish for more focus on pain was not possible due to low number of events. In regression models age in years was divided by 10 to improve result interpretability. Analyses were carried out using STATA statistical software (STATA Statistical Software: Release 14; StataCorpLP, College Station, TX).

Ethics

The study was carried out in accordance with the principles of the Helsinki declaration and approved by the Regional Committee for Medical Research Ethics, Health Region Central Norway. Informed consent was obtained from all patients included.

Results

Four hundred and sixty-three patients were enrolled in the present study. Fifty patients were excluded due to missing pain evaluations (n= 44) or missing analgesic consumption data (n= 6). Two-hundred and twenty six patients who reported no pain and did not use any pain medication were not eligible, leading to the final analysis sample of 187 patients (Figure 2). Of the included patients, 99 (52.9%) were females, mean age was 61.8 years (SD 14.0). Breast cancer and gastro-intestinal cancer were the most prevalent cancer diagnoses (22.5% and 21.4%, respectively). Most patients (72.2%) had good performance status (KPS 80-100%). About half of the patients had metastatic disease (50.3%) and 72.1% had a comorbid condition (Table 1).

Mean scores of average and worst pain intensities (0-10 NRS) were 3.1 (SD 2.5) and 3.8 (SD 3.0), respectively. Pain flares were reported by 15.6% of the patients while an indication of neuropathic pain was reported by 44.8%. Psychological distress assessed by PHQ-4 was reported as absent or mild in 88.8% of the patients. Sixty one percent of the patients used pain medications (Table 2).

Prevalence of and factors associated to negative PMI

The proportion of patients with negative PMI was 53% (95% CI from 46% to 61%).

In the multivariate logistic regression model, performance status, cancer diagnosis and disease spread resulted significantly associated to negative PMI. In particular KPS ≤ 50% was associated with lower likelihood of negative PMI (OR = 0.14, 95% CI 0.03, 0.65), breast cancer was more frequently associated with negative PMI (OR =4.24, 95% CI 1.33, 13.49) and the vast majority of follow-up patients (patients without diagnosed relapse) had negative PMI score (94.1%), with OR 12.14, (95% CI 1.45, 101.45). Metastatic disease was inversely associated with negative PMI on the univariate logistic regression model, but this was not confirmed in the multivariate logistic regression model (Table 3).

Wish for more focus on pain and factors associated to it

Thirty out of 166 patients answering the question (18.1%, 95% CI from 12.5% to 34.8%) wished more focus on pain by their physician. Follow-up patients reported more frequently wish for more focus on pain (OR 6.67, 95% CI 1.90, 23.38). "Other" cancer diagnoses were associated to less frequent wish for more focus on pain in the univariate regression model (OR = 0.25, 95% CI 0.06, 0.99). Patients with higher pain intensity on the question "worst pain" (0-10 NRS) wished more focus on pain (OR 1.15, 95% CI 0.95, 1.38). Patients with negative PMI score reported more frequently that they wanted more focus on pain (22.2% versus 13.1% among non-negative PMI score patients) (Table 4), but the association was not statistically significant (OR=1.88, 95% CI 0.82, 4.33).

Discussion

In the present study, the proportion of negative PMI, was high (53%) but only 1/5 of the patients with negative PMI wished more focus on pain and negative PMI score was not statistically significantly associated to wish for more focus on pain compared to patients with non-negative PMI score.

The number of patients with negative PMI levels in the present study is high compared with previous studies where negative PMI is between 26-43%. This result suggest that in this cohort the use of analgesic drugs might have been underutilized. At the time of the study, standard procedures for systematic pain screening and assessment were not present in the population studied. Lack of assessment and inadequate focus on pain and pain treatment by health care providers are well known barriers to pain management (4) and the importance of symptom assessment in cancer care for optimizing pain treatment is demonstrated by several authors (10, 11, 29). Furthermore, early integration of palliative care into oncology reduce symptom burden (30), a principle not fully introduced for the population included in the present study.

Patients with breast cancer and follow-up patients were associated to negative PMI while patients with low performance status were less likely to have negative PMI. However, only a small number of patients were included in the latter group and results deserve further confirmation before robust conclusions can be drawn.

It is not clear why negative PMI was more frequent among breast cancer patients. There is no evidence that patients with breast cancer have higher pain intensity or are more at risk for not using appropriate pain medication. Women have more pain in a general population compared to men (31), but this finding is not confirmed in cancer patients (32). Moreover, in the present study, gender was not associated to negative PMI.

In the present study, patients classified as follow-up patients (without known relapse of their cancer) more frequently had a negative PMI. This group also had a wish for more focus on pain, which could indicate that the follow-up patients could be undertreated. There are several reasons why the follow-up patients scored high on pain intensity or was not prescribed pain medications in accordance to their pain intensity and wanted more focus on pain. Studies have demonstrated that cancer survivors do have a significant symptom burden (33, 34). In a busy clinic where both follow-up patients, patients receiving cancer treatment, and patients in

palliative care setting are handled, the follow-up patients might not be given enough attention for their symptoms. There may also be more reluctance among physicians to introduce analgesics, such as opioids, to patients with an expected long-term survival. Furthermore, follow-up patients might hesitate to report pain or asking for pain medication, fearing pain might be a sign of illness. Further studies should be conducted among patients in the follow-up setting to explore the treatment of pain.

Patients who report higher pain intensity at the question "worst pain" (0-10 NRS) had more frequently a wish for more focus on pain. This demonstrates the importance of pain assessment among cancer patients and might indicate the importance of screening questions that include the worst intensity of symptoms. Only asking about average pain might camouflage pain flares in need of treatment.

Several authors have used negative PMI as an outcome to measure the frequency of undertreatment of cancer pain. This is based upon that pain management is considered adequate if there is a congruence between pain intensity and the appropriateness of pain medications (21). In the present study, patients with negative PMI wanted more focus on pain by their physician compared to the rest of the patients (22% vs 13%) but this difference was not statistically significant. More of interest was that only about one fifth of patients with a negative PMI wanted more attention to pain. These findings challenge the use of PMI as a measure of undertreatment. If patients with negative PMI do not want more focus by their physician on pain, and implicit pain management, they might not be undertreated. The use of PMI as a measure of undertreatment has also previously been criticized (23, 24).

One of the challenges using PMI as a measurement of undertreatment is that the categories of drug use do not include the drug dosages. For instance, a patient with high symptom score in pain (high NRS) which has a low dose of a step III opioid is not given negative PMI in this classification system, even though the pain might be substantial, and obviously, the patient is undertreated. This challenge is also demonstrated in a clinical study where more than 50% of patients with non-negative PMI reported moderate to severe pain and obviously might be undertreated (24). Another issue is that patients with low pain intensity (NRS 1-3) without any pain medication are classified as PMI negative (PMI = -1) even though they might feel that their pain is not a problem. This is supported by a study of Sakakibari et al., which observed that patients with PMI=-1 did not have more pain interference than patients with PMI = 0 (35). Additionally, PMI gives no information about *which* drug that is prescribed or

the *use* of the prescribed drugs. Furthermore, no information of pain flares or neuropathic pain is obtained and medications taken for these pains are not included in the PMI score. Finally, experts have challenged the whole concept of the WHO pain ladder, arguing that step II might be removed (ClinicalTrials.gov: NCT01493635), a concept that will change the foundation of PMI.

One preferable way to measure undertreatment of pain might be to measure patients` satisfaction with pain management. In a study of Lim et al (36), a six point Likert scale (very unsatisfied to very satisfied) was applied for this purpose. More comprehensive questionnaires for evaluating satisfaction of medication exist, like the 14-item Treatment Satisfaction Questionnaire for Medication (37), but such tools might be too time consuming in clinical routine practice. Another approach for pain management is to establish personalized pain goals. Studies have demonstrated that for pain, patients report that a personalized pain goal of 3 on a 0 to 10 numeric rating scale is acceptable. (38, 39). Patients who do not achieve their personalized pain goal could be classified as undertreated. This approach would be in accordance to the increasing focus on patient autonomy; the patient defines what is undertreatment on an individual basis. Defining a personalized pain goal or asking the patient if they want more focus on pain, could be an important supplement when assessing pain in clinical practice.

There are several limitations in this study. First, relatively few patients were included in this single-center study, which challenge the generalizability of the findings. Additionally, an increased sample size would have allowed more statistical power to the tests of associations. Second, most patients were in good performance status and about 50% had metastatic disease. It is not known whether the results would have been different in other populations. Third, some patients might have pain not caused by their cancer. Non-malignant pain characteristics are different and its management often differ from the principles of WHO pain ladder. Furthermore, patients with non-malignant pain might not expect that the physician treating their cancer disease would address such a pain. Finally, the question “Do you wish that your physician had more or less focus on your pain?” is not identical to a question asking if the patient want more medical treatment for their pain. More comprehensive questions on this issue compared to PMI should be addressed in future trials.

Conclusion

This study observed a high prevalence of negative PMI. However, most patients with a negative PMI did not wish for more focus on their pain by the physician. This challenges the use of negative PMI as a measure for undertreatment of pain. Undertreatment of cancer pain is probably substantial in clinical practice, and efforts should be made to develop instruments to measure this in order to improve future cancer pain management.

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Table 1. Demographic variables

	No.	%
Patients in total	187	
Gender		
Female	99	52.9
Male	88	47.1
Age, years, mean (SD)	61.8 (14.0)	
Marital status		
Single, divorced, widow, widower	46	24.7
Married, cohbitant	140	75.3
Missing	1	
Education		
Primary school	32	17.2
High school	96	51.6
University low degree	30	16.1
University high degree	28	15.1
Missing	1	
Performance status		
Karnofsky 80-100	135	72.2
Karnofsky 60-70	36	19.2
Karnofsky $\leq$ 50	16	8.6
Cancer Diagnosis		
Gastro-intestinal cancer	40	21.4
Breast cancer	42	22.5
Urological cancer	30	16.0
Lung cancer	14	7.5
Lymphoma and hematological cancer	29	15.5
Others	32	17.1
Disease spread (*)		
Localized disease	76	40.6
Metastatic disease	94	50.3
Follow up	17	9.1
Comorbidity		
No	51	27.9
Yes	132	72.1
Missing	4	

(*) Disease spread refers to the categories; Localized disease, metastatic disease and follow-up where follow-up patients are patients without diagnosed relapse

Table 2: Medication and symptoms

	No.	%
Patients in total	187	
Pain medication		
Step 0/ no medication	73	39.04
Step I	52	27.81
Step II	15	8.02
Step III	47	25.13
missing	0	
Average pain (0-10 NRS)	3.12	S.D 2.51
Worst pain (0-10 NRS)	3.83	S.D 2.96
Pain flares		
No	119	84.40
Yes	22	15.60
missing	46	
Neuropatic pain symptom		
No	85	55.19
Yes	69	44.81
missing	33	
Psychological distress		
No	84	52.50
Mild	58	36.25
Moderate	10	6.25
Severe	8	5.00
Missing	27	

Table 3. Factors associated to negative PMI

		Univariable logistic regression model		Multivariable logistic regression model	
Variables	**Negative PMI N (%)**	**OR**	**95% CI**	**OR**	**95% CI**
Gender					
Female	59 (59.6%)	-	-	-	
Male	41 (46.6%)	0.59	0.33, 1.06	0.97	0.43, 2.15
Age (*)		0.88	0.71, 1.08	0.98	0.73, 1.31
Marital status					
Single, divorced, widow, widower	26 (56.5%)	-	-	-	
Married, cohbitant	73 (52.1%)	0.84	0.43, 1.64	0.86	0.38, 1.94
Education					
Primary school	18 (56.3%)	-	-	-	
Highschhol	48 (50.0 %)	0.78	0.35,1.74	0.70	0.28, 1.74
University low degree	15 (50.0 %)	0.78	0.29,2.11	0.62	0.19, 2.07
University high degree	18 (64.3%)	1.4	0.49, 3.97	1.16	0.32, 4.25
Performance status					
Karnofsky 80-100	78 (57.8%)	-	-	-	
Karnofsky 60-70	19 (52.8%)	0.82	0.39, 1.71	0.99	0.43, 2.30
Karnofsky $\leq$ 50	**3 (18.8 %)**	**0.17**	**0.05, 0.62**	**0.14**	**0.03, 0.65**
Cancer Diagnosis					
Gastro-intestinal cancer	14 (35.0%)	-	-	-	
Breast cancer	**32 (76.2%)**	**5.94**	**2.27, 15.56**	**4.24**	**1.33, 13.49**
Urological cancer	13 (43.3%)	1.42	0.54, 3.75	1.24	0.39, 3.90
Lung cancer	8 (57.1%)	2.48	0.72, 8.57	3.26	0.77, 13.80
Lymphoma and hematological cancer	16 (55.2%)	2.29	0.86, 6.08	1.92	0.65, 5.67
Others	17 (53.1%)	2.10	0.81, 5.45	2.37	0.82, 6.85
Disease spread					
Localized disease	46 (60.5 %)	-	-		
Metastatic disease	**38 (40.4 %)**	**0.44**	**0.24,0.82**	0.63	0.31,1.28
Follow-up	**16 (94.1 %)**	**10.4**	**1.31, 82.86**	**12.14**	**1.45, 101.45**
Comorbidity					
No	32 (62.8%)				
Yes	67 (50.8%)	0.61	0.32, 1.19	0.95	0.43, 2.13
Pain flares					
No	84 (70.6 %)				
Yes	14 (63.6 %)	0.73	0.28, 1.89		
Neuropathic pain symptom					
No	50 (58.8 %)				
Yes	49 (71.0 %)	1.72	0.87, 3.37		

Psychological distress					
0	47 (56.0)				
1	30 (51.7 %)	0.84	0.43, 1.65		
2	4 (40.0 %)	0.52	0.14, 2.00		
3	3 (37.5 %)	0.47	0.11, 2.11		

(*) Age in years was divided by 10

Neuropathic pain symptom, pain flares and psychological distress were not included in the multivariable model due to missing data

Table 4. Factors associated to wish for more focus on pain (N=166)

		Univariate logistic regression model	
Variables	Wish for more focus on pain N (%)	OR	CI (95%)
Gender			
Female	20 (22.2%)	-	-
Male	10 (13.2%)	0.53	0.23, 1.22
Age (*)		1.03	0.78, 1.37
Marital status			
rSingle, divorced, widow, widowe	6 (14.6%)	-	-
Married, cohbitant	24 (19.4 %)	1.4	0.53, 3.71
Education			
Primary school	7 (26.9 %)	-	-
Highschhol	15 (17.9 %)	0.59	0.21, 1.65
University low degree	2 (7.1 %)	0.21	0.04, 1.12
University high degree	6 (22.2 %)	0.78	0.22, 2.72
Performance status			
Karnofsky 80-100	22 (17.7 %)	-	-
Karnofsky 60-70	7 (25.0 %)	1.55	0.58, 4.08
Karnofsky $\leq$ 50	1 (7.1 %)	0.36	0.04, 2.87
Cancer Diagnosis			
Gastro-intestinal cancer	9 (24.3 %)	-	-
Breast cancer	10 (25.6 %)	1.07	0.38, 3.03
Urological cancer	4 (15.4 %)	0.57	0.15, 2.08
Lymphoma and hematological cancer	4 (17.4 %)	0.65	0.18, 2.44
Lung	0 (0 %)	-	-
Others	3 (7.3 %)	**0.25(**)**	**0.06, 0.99(**)**
Disease spread			
Localized disease	8 (11.6 %)	-	-
Metastatic disease	15 (18.3 %)	1.71	0.68, 4.31
Follow-up	7 (46.7 %)	**6.67**	**1.90, 23.38**
Comorbidity			
No	7 (14.9 %)	-	-
Yes	22 (19.1 %)	1.35	0.53, 3.42

Pain medication			
None	12 (17.9%)		
Step I	9 (19.6%)	0.95	0.36, 2.57
Step II	3 (21.4%)	1.20	0.29, 4.99
Step III	7 (16.7%)	0.88	0.32, 2.46
Worst pain		1.15	0.95, 1.38
Pain flares			
No	21 (20.0%)	-	-
Yes	4 (19.1 %)	0.94	0.29, 3.09
Neuropatic pain symptom			
No	13 (17.8 %)	-	-
Yes	14 (22.6 %)	1.35	0.58, 3.13
Psychological distress (PHQ-4)			
0	10 (12.2 %)		
1	12 (22.2 %)	2.06	0.82, 5.17
2	2 (20.0 %)	1.8	0.33, 9.70
3	2 (28.6 %)	2.88	0.49, 16.88
Negative PMI			
No	10 (13.1%)		
Yes	20 (22.2%)	1.88	0.82, 4.33

(*) Age in years was divided by 10

(**) Due to unestimability issues lung cancer patients have been classified as “other” in regression models

		WHO pain ladder			
Pain intensity		No drug	NSAIDs or Paracetamol	Weak opioids	Strong opioids
No pain	(NRS = 0)	0	+1	+2	+3
Mild pain	(NRS = 1-3)	-1	0	+1	+2
Moderate pain	(NRS = 4-7)	-2	-1	0	+1
Severe pain	(NRS = 8-10)	-3	-2	-1	0

Figure 1. Pain Management Index, Cleeland 1994 (18)

NRS: numerical rating scale; WHO; world health organization; NSAIDs: non-steroid anti-inflammatory drugs

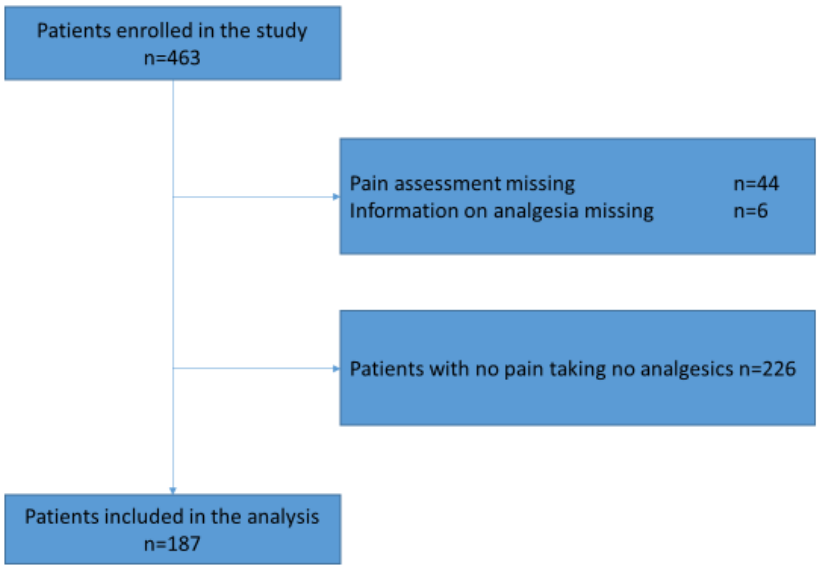

Figure 2. Flow-chart of enrolled patients in the study